

**ENERGY ACCOUNTABILITY AND REFORM  
LEGISLATION**

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**HEARINGS**  
BEFORE THE  
**COMMITTEE ON**  
**ENERGY AND NATURAL RESOURCES**  
**UNITED STATES SENATE**  
ONE HUNDRED FOURTEENTH CONGRESS  
FIRST SESSION

\_\_\_\_\_  
JUNE 9, 2015  
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Printed for the use of the  
Committee on Energy and Natural Resources

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The text for each of the bills which were addressed in this hearing can be found on the committee's website at: <http://www.energy.senate.gov/public/index.cfm/hearings-and-business-meetings?ID=8B5BD69E-E1ED-4440-A902-6A2B0CD24B1B>



## ENERGY ACCOUNTABILITY AND REFORM LEGISLATION

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TUESDAY, JUNE 9, 2015

U.S. SENATE,  
COMMITTEE ON ENERGY AND NATURAL RESOURCES,  
*Washington, DC.*

The Committee met, pursuant to notice, at 9:37 a.m. in Room SD-366, Dirksen Senate Office Building, Hon. Lisa Murkowski, Chairman of the Committee, presiding.

### OPENING STATEMENT OF HON. LISA MURKOWSKI, U.S. SENATOR FROM ALASKA

The CHAIRMAN. Good morning. I call to order the Energy Committee hearing this morning. Welcome to you all. We are here today to consider our fourth and final legislative hearing related to the broad energy bill that we have been assembling.

When we first started this process some weeks ago we were not sure exactly how these hearings were going to go, but I am very pleased with the strong participation from our members, the generally collegial spirit that has marked our discussions and really the number of bills that we have been able to consider throughout this process.

Counting the 42 different bills we are reviewing today, the Committee will have reviewed a total of 114 bills over the past several weeks. That is a significant accomplishment, and the work that went into it, I think, will provide us with a better understanding of the many ideas for our nation's energy policy as we sit down to craft our larger bill.

Our focus today is on a crucial area that does not always receive the attention that it deserves, and that is accountability and reform of our energy laws and programs.

This is an authorizing committee, and we are responsible for conducting oversight of the Federal agencies within our jurisdiction. Since the last major energy bill was passed back in 2007, we have conducted numerous oversight hearings. Many of us have also discharged oversight responsibilities through initiatives within our own offices. In addition, a number of studies and reports on agency activities have been released from both the Federal Government and third party entities.

Many of the bills included in this hearing reflect members' hard work on oversight as well as our desire to ensure that Federal agencies are operating effectively, efficiently and with the highest degree of accountability. We will also be taking stock of our own actions here at the Committee in the coming weeks. In particular,

we will be evaluating the accumulation of authorizations, programs, studies, reports and other contributions to the U.S. code we have made over the course of the years. In many cases what made policy sense years ago has perhaps become outdated, been rendered duplicative or is serving to bury Federal agencies in requirements they cannot reasonably be expected to meet. Before all is said and done I intend to make sure that we fix those issues, and we will continue working closely with the agencies to be sure that we have done a good job.

I think as far as all of the issues that we have taken up, the various policy aspects of this larger, broader energy bill, an area that, I believe, deserves very, very close attention is what we already have on the books, and is it doing that which we intended it to. So this opportunity for scrutiny and oversight is critically important.

With a total of 42 bills, today's hearing covers a wide range of topics. We are looking at things like addressing energy exports, permitting, our national labs, electric grid reliability, manufacturing and loan programs, just to mention a few of them.

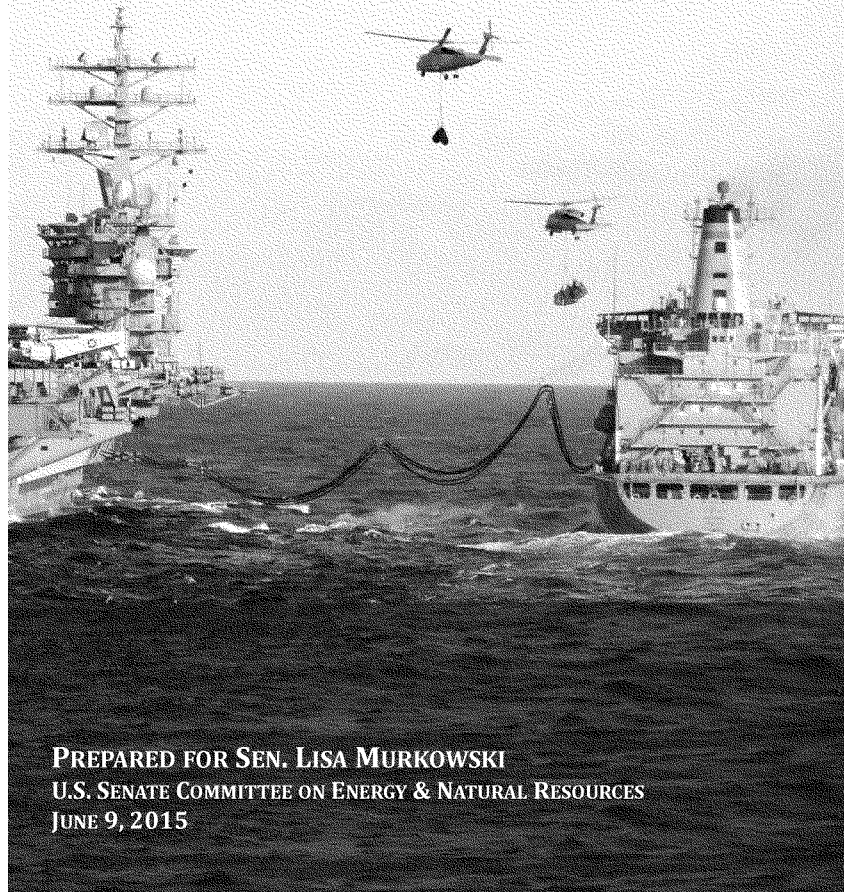
One topic of particular importance is the ability of the United States to export its oil. As the members of this Committee know, our nation is now the top oil producer in the world. Included in today's hearing is a bipartisan bill that I have introduced to lift our outdated oil exports ban. Lifting the ban will bring an array of benefits to our nation, more jobs, more revenues, more production, more security and more diplomatic leverage on the international stage. You do not necessarily have to take my word for it, you can also look at the growing list of experts and studies that agree with this analysis.

In support of this bill today, I am releasing a report that has been prepared by the Committee staff that is entitled, "Rendering Vital Assistance: Allowing Oil Shipments to U.S. Allies."

[The information referred follows:]

# **RENDERING VITAL ASSISTANCE:**

## **ALLOWING OIL SHIPMENTS TO U.S. ALLIES**



**PREPARED FOR SEN. LISA MURKOWSKI**  
**U.S. SENATE COMMITTEE ON ENERGY & NATURAL RESOURCES**  
**JUNE 9, 2015**

## **Rendering Vital Assistance: Allowing Oil Shipments to U.S. Allies**

Prepared by Majority Staff for Chairman Lisa Murkowski  
U.S. Senate Committee on Energy & Natural Resources  
June 9, 2015

### **Summary**

During the 1970s, the United States enacted a series of laws that, taken together as a practical matter, ban the export of domestic crude oil. The United States is the only advanced nation that maintains such a general prohibition.<sup>1</sup> Efforts are currently underway to repeal those laws, such as S. 1312, *The Energy Supply and Distribution Act of 2015*.<sup>2</sup> The President also retains the authority to approve oil exports immediately, without any further action from Congress.<sup>3</sup> American allies could formally request an exemption from the general prohibition and President Obama is fully empowered to grant such a request under existing laws.

### **Legislative Framework**

The centerpiece of the oil export regime is the Energy Policy and Conservation Act (EPCA) of 1975. Section 103 of the Act provides the President authority to restrict exports of oil by rule. It also provides explicitly for exemptions and grants the President broad discretion to apply them. For example, in providing for exemptions, it also states:

“Exemptions from any rule prohibiting crude oil . . . exports . . . may be based on the purpose for export, class of seller or purchaser, country of destination, or any other reasonable classification or basis as the President determines to be appropriate and consistent with the national interest and the purposes of this chapter.”<sup>4</sup>

It is noteworthy that even EPCA, enacted at a time of severe oil shortages, from the outset clearly provided the President with very broad discretion to exempt oil exports from the general restrictions it empowered him to impose and contemplated that he would use it. The implementing regulations also show the scope of the President’s authority to allow oil exports. Other export-restrictive laws also allow oil exports – subject to a presidential finding – including the Mineral Leasing Act, the Outer Continental Shelf Lands Act, and the Naval Petroleum Production Reserves Act.<sup>5</sup>

<sup>1</sup> See *A Ban for One: The Outdated Prohibition on U.S. Oil Exports in Global Context* (June 26, 2014): <http://1.usa.gov/1iNfofu>.

<sup>2</sup> The bill’s status is available here: <https://www.congress.gov/bills/114th-congress/senate-bill/1312>.

<sup>3</sup> See *Past is Precedent: Executive Power to Authorize Crude Oil Exports* (March 3, 2014): <http://1.usa.gov/WJ3JnE>.

<sup>4</sup> 42 U.S.C. 6212(b)(2).

<sup>5</sup> For general background, see Phillip Brown, et al, *U.S. Crude Oil Export Policy: Background and Considerations* (R43442), published by the Congressional Research Service on December 31, 2014. See also David Gordon, Elizabeth Rosenberg, and Ellie Maruyama, “Crude Oil Export & U.S. National Security,” (May 14, 2015): [http://www.cnas.org/sites/default/files/publications-pdf/CNAS%20Crude%20Exports\\_052015.pdf](http://www.cnas.org/sites/default/files/publications-pdf/CNAS%20Crude%20Exports_052015.pdf).

### Regulatory Framework

Oil exports are regulated by the Bureau of Industry and Security (BIS) at the Department of Commerce. The rules governing these exports are enshrined in the Short Supply Controls, Part 754 of the Export Administration Regulations. Originally conceived during an era of scarcity and Cold War tension, the list of items still in “short supply” now includes only western red cedar (a type of tree), horses for export by sea (intended for slaughter), and crude oil (but not petroleum products).

The BIS regulations provide detail about an array of exceptions to the general prohibition on crude oil exports. Crude oil may be exported from Alaska and California under certain conditions, for example, and crude oil may also be exported to Canada for consumption in Canada. Exports are authorized for testing purposes and from the Strategic Petroleum Reserve in certain cases. The BIS may also approve swaps or exchanges.

Most significantly, the regulations state:

“BIS will review other applications to export crude oil on a case-by-case basis and... generally will approve such applications if BIS determines that the proposed export is consistent with the national interest and the purposes of the Energy Policy and Conservation Act (EPCA).”

This “case-by-case” authority is the regulatory expression of the legislative framework discussed above. Under existing regulations, any company may submit an application to export crude oil from the United States and the Department of Commerce retains the explicit authority to approve or deny such an application. The only question is whether the administration determines that exports are in the national interest.

### National Exemptions

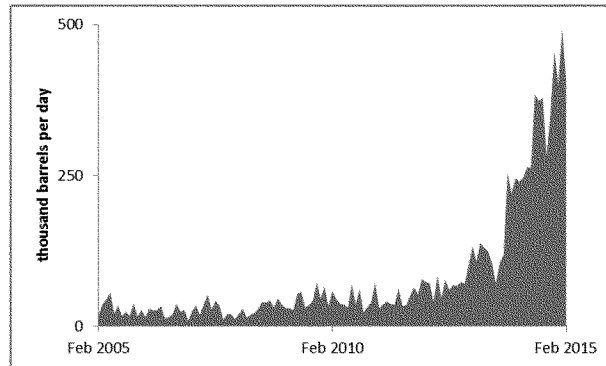
The existing legal structure allows for exemptions for virtually any reason. The administration could determine that all exports of condensate or light crude oil are in the national interest or that a mismatch between high production levels of light crude oil and low capacity levels at refineries capable of processing that type of oil warrants a new class of exception to the general prohibition.<sup>6</sup> The administration could authorize all exports from unconventional shale plays or from certain regions that lacked access to infrastructure. Perhaps most easily, however, the administration could exempt certain countries of destination from the export ban.

President Reagan authorized all crude oil exports to Canada for consumption Canada in 1985, establishing an exemption for that country. (See Appendix A.) This decision has

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<sup>6</sup> See *License to Trade: The Commerce Department's Authority to Allow Condensate Exports* (April 2, 2014): <http://1.usa.gov/1HwAiVWk>. See also *Terms of Trade: Condensate as an Exportable Commodity* (July 9, 2014): <http://1.usa.gov/VYUJQE>.

proved to be far-sighted. In 2005, the United States exported only 30,000 barrels per day of crude oil to Canada. In February of 2015, that number stood at 409,000 barrels per day. This national interest determination followed the conclusion of a cross-border swap program initiated in 1976 by President Ford and continued by President Carter.<sup>7</sup>



**Figure 1.** U.S. Crude Oil Exports to Canada (Source: EIA)

In March 2015, a bipartisan group of twenty-one senators led by Senators Murkowski (R-AK) and Heidi Heitkamp (D-ND) sent a letter to the Department of Commerce encouraging the administration to grant an exemption for Mexico on the same basis as the one granted for Canada in 1985. (See Appendix B.) This letter was followed by a bipartisan companion letter sent from the House of Representatives in April 2015.

The United States is also permitted to export crude oil to Israel in the event of a national emergency. This agreement was first signed in 1975 by the Ford administration and formalized in 1979 by the Carter administration. It was subsequently reauthorized by the Clinton administration in 1994 and by the Bush administration in 2004. It expired in November 2014, but the Obama administration renewed the agreement following a bipartisan letter led by Senators Lisa Murkowski and Mark Warner (D-VA) sent in April 2015, encouraging the Department of State to expedite its renewal. (See Appendix C.)

Nothing at all prevents another government from requesting an exemption from the general prohibition on U.S. oil exports. There is no standard protocol for submitting such a request. It could be transmitted by a letter or during a meeting at the ministerial or ambassadorial level, for example. Further, companies could also submit a detailed proposal for transactions directly to the Department of Commerce.

Any nation could make a request. To demonstrate the breadth of the opportunity, consider a series of examples:

<sup>7</sup> See *Crude Pro Quo: The Use of Oil Exchanges to Increase Efficiency* (May 22, 2014): <http://1.usa.gov/1nUEA1K>.

### Poland

In 2012, Poland produced approximately 20,000 barrels per day of crude oil and imported another 500,000 barrels per day.<sup>8</sup> This equation renders it virtually entirely dependent on oil imports, 96 percent of which come from Russia. There are four operational refineries in the country. Despite its import dependence, Poland exports small amounts of crude oil and significant volumes of refined products, occasionally even to the United States.

Ties between Poland and the U.S. date back to the American Revolution, when figures such as Tadeusz Kościuszko and Casimir Pulaski fought alongside the colonists. More recently, Poland deployed troops to both Iraq and Afghanistan as a vital coalition partner.

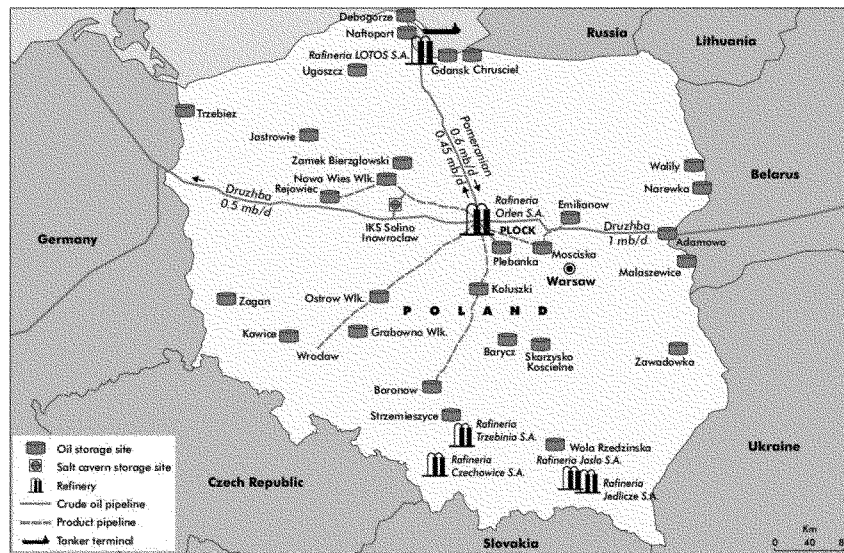


Figure 2. Poland's Oil Infrastructure (IEA)

<sup>8</sup> International Energy Agency, *Energy Supply Security: The Emergency Response of IEA Countries* (2014): [https://www.iea.org/media/freepublications/security/EnergySupplySecurity2014\\_Poland.pdf](https://www.iea.org/media/freepublications/security/EnergySupplySecurity2014_Poland.pdf).

### Belgium

In 2012, Belgium produced no crude oil. It imported over 300,000 barrels per day, with 37 percent of that total coming from Russia and another 23 percent from Saudi Arabia.<sup>9</sup> Despite this complete dependence on imported crude oil, Belgium maintains a significant presence in the downstream sector, boasting four refineries and the major port of Antwerp. The United States is among its customers, importing some 60,000 barrels per day of mostly unfinished oils in 2014. The North Atlantic Treaty Organization (NATO) is headquartered in Brussels. Belgium has also deployed troops to Afghanistan as part of the coalition.

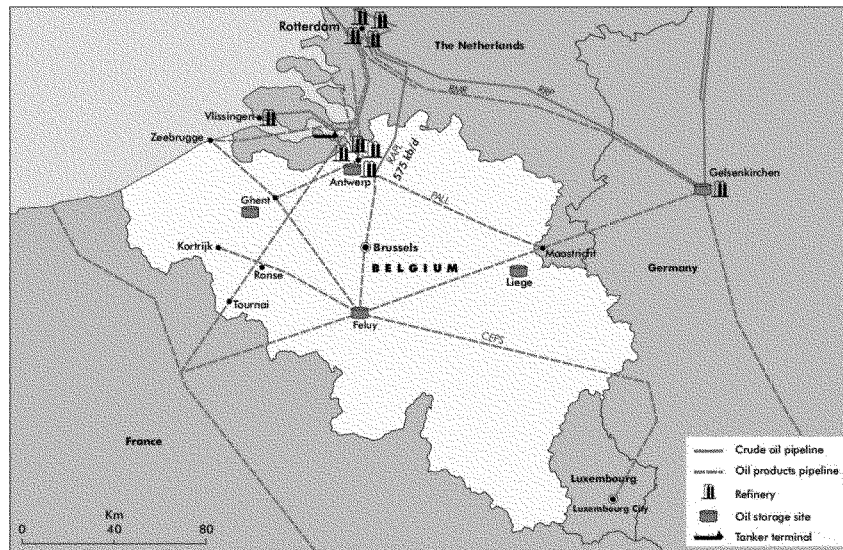


Figure 3. Belgium's Oil Infrastructure (IEA)

<sup>9</sup> IEA, *Energy Supply Security*:  
[https://www.iea.org/media/freepublications/security/EnergySupplySecurity2014\\_Belgium.pdf](https://www.iea.org/media/freepublications/security/EnergySupplySecurity2014_Belgium.pdf).

### *The Netherlands*

In 2012, the Netherlands produced approximately 52,000 barrels per day of crude oil, but consumed over 1 million barrels per day.<sup>10</sup> It is approximately 95 percent dependent on imported crude oil. About 31 percent of these barrels come from Russia. The country is a major hub in the broader European energy system. The International Energy Agency describes the Netherlands as “a key link in European oil supply flows, with the total volumes of oil transiting over four times larger than Dutch oil demand.” The country’s five refineries export petroleum products, including some 84,000 barrels per day to the United States. The two nations have maintained diplomatic relations since 1782. Dutch and American military forces have served together in numerous engagements across the globe.

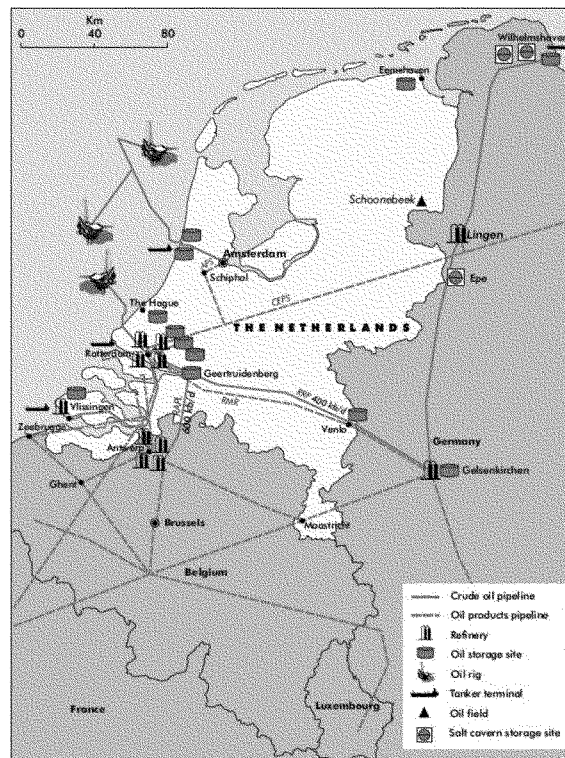


Figure 4. The Netherlands' Oil Infrastructure (IEA)

<sup>10</sup> IEA, *Energy Supply Security*:

[https://www.iea.org/media/freepublications/security/EnergySupplySecurity2014\\_TheNetherlands.pdf](https://www.iea.org/media/freepublications/security/EnergySupplySecurity2014_TheNetherlands.pdf).

### India

In 2012, India produced just over 800,000 barrels per day of crude oil but imported more than three times that amount.<sup>11</sup> The country is approximately 76 percent dependent on crude oil imports, the vast majority (69 percent) from the Middle East – including 279,000 barrels per day from Iran in 2014, according to the International Energy Agency. There were 22 refineries in India in 2012 with approximately 4.4 million barrels per day in refining capacity. In 2014, the U.S. imported over 90,000 barrels per day of refined products – mostly motor gasoline blending components – from India. The two nations are strategic partners with growing bilateral economic and security ties.

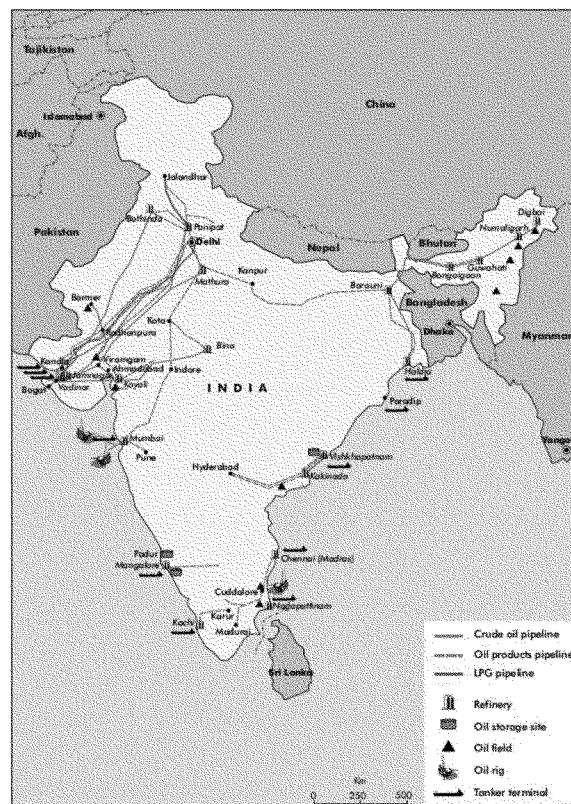


Figure 5. India's Oil Infrastructure (IEA)

<sup>11</sup> IEA, *Energy Supply Security*:

[https://www.iea.org/media/freepublications/security/EnergySupplySecurity2014\\_India.pdf](https://www.iea.org/media/freepublications/security/EnergySupplySecurity2014_India.pdf).

### Japan

In 2012, Japan produced approximately 17,000 barrels per day of crude oil but imported approximately 4.7 million barrels per day.<sup>12</sup> The island nation is 99.7 percent dependent on oil imports. It receives approximately 33 percent of its crude oil from Saudi Arabia, 23 percent from the United Arab Emirates, 8 percent from Kuwait, 6 percent from Qatar, and 5 percent from Russia. Nonetheless, it is home to one of the largest downstream centers in the world with 27 refineries and nearly 5 million barrels per day in capacity. Japan has historically imported liquefied natural gas, as well as crude oil, from Alaska, and even exports approximately 14,000 barrels per day of refined products to the United States. The two nations signed a bilateral defense treaty in 1951 and have cooperated in security operations ever since.

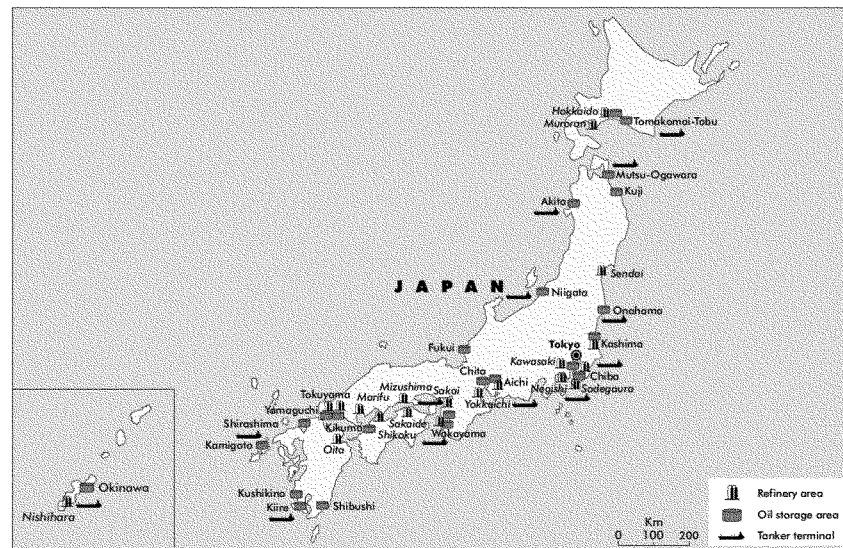


Figure 6. Japan's Oil Infrastructure (IEA)

<sup>12</sup> IEA, *Energy Supply Security*:

[https://www.iea.org/media/freepublications/security/EnergySupplySecurity2014\\_Japan.pdf](https://www.iea.org/media/freepublications/security/EnergySupplySecurity2014_Japan.pdf).

### South Korea

In 2012, South Korea produced approximately 21,300 barrels of crude oil but imported more than ten times that amount.<sup>13</sup> It is 99.1 percent dependent on crude oil imports, the vast majority of which originate from the Middle East: 33 percent from Saudi Arabia, 15 percent from Kuwait, 11 percent from Qatar, 10 percent from Iraq, and 9 percent from the United Arab Emirates. It has five refineries with approximately 3 million barrels per day in capacity and exports approximately 61,000 barrels per day in refined products to the United States. The two nations signed a bilateral defense treaty in 1953.

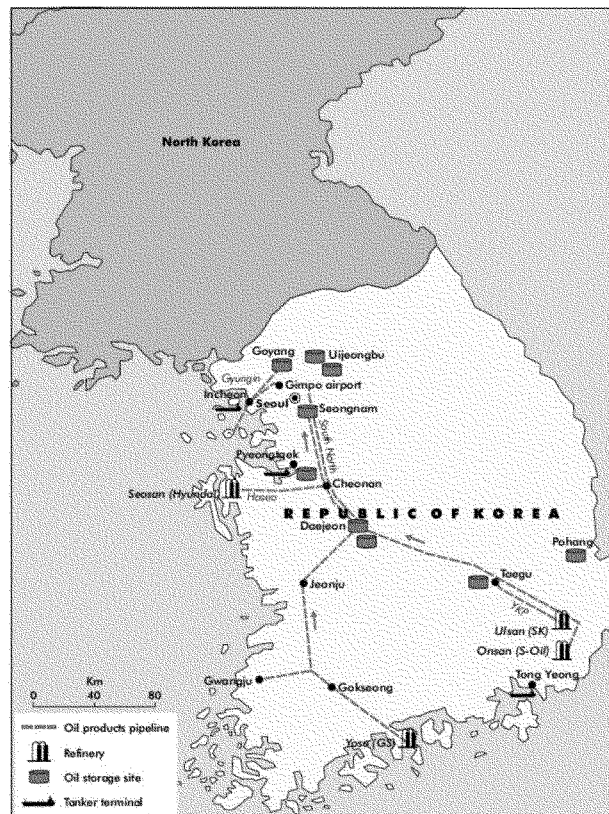


Figure 7. South Korea's Oil Infrastructure (IEA)

<sup>13</sup> IEA, *Energy Supply Security*: [https://www.iea.org/media/freepublications/security/EnergySupplySecurity2014\\_TheRepublicofKorea.pdf](https://www.iea.org/media/freepublications/security/EnergySupplySecurity2014_TheRepublicofKorea.pdf).

## Conclusion

While legislative efforts aimed at full repeal of crude oil export restrictions progress in Congress, the administration retains broad authority to allow greater exports to U.S. allies that request exemptions from those restrictions. This authority is enshrined in both law and regulation and was explicitly delegated to the executive branch by Congress. Substantial precedent exists for such exemptions to be granted, particularly to U.S. allies. A national interest finding by the President could be implemented immediately by the Department of Commerce and exports could set sail as soon as the commercial and logistical arrangements were made.

Many U.S. allies and trading partners are interested in purchasing American oil to diversify away from Russia, Iran, and other problematic sources. Allowing such shipments would send a powerful signal of support and reliability at a time of heightened geopolitical tensions in much of the world.<sup>14</sup> The mere option to purchase U.S. oil would enhance the energy security of countries such as Poland, Belgium, the Netherlands, India, Japan, and South Korea, even if physical shipments did not occur. The administration, in fact, makes this same argument in its authorizations to export liquefied natural gas (LNG):

“An efficient, transparent international market for natural gas with diverse sources of supply provides both economic and strategic benefits to the United States and our allies. Indeed, increased production of domestic natural gas has significantly reduced the need for the United States to import LNG. In global trade, LNG shipments that would have been destined to U.S. markets have been redirected to Europe and Asia, improving energy security for many of our key trading partners. To the extent U.S. exports can diversify global LNG supplies, and increase the volumes of LNG available globally, it will improve energy security for many U.S. allies and trading partners.”<sup>15</sup>

Exempting certain countries on a case-by-case basis, as the statutes and regulations currently allow, would be a partial and helpful step toward the modernization of U.S. energy policy. Nonetheless, full statutory repeal of U.S. oil export restrictions remains the most effective way of allowing domestic producers to access global markets.

## Acknowledgments

Staff wish to thank the Congressional Research Service for its assistance with this report. The cover image is of the oiler USNS Big Horn replenishing the aircraft carrier USS Dwight D. Eisenhower in the Mediterranean Sea.<sup>16</sup>

<sup>14</sup> Arthur Herman, “Crude Story,” *The American Interest* (May 26, 2015): <http://www.hudson.org/research/11324-crude-story>.

<sup>15</sup> See, for example:

[http://www.fossil.energy.gov/programs/gasregulation/authorizations/2012\\_applications/ord3638.pdf](http://www.fossil.energy.gov/programs/gasregulation/authorizations/2012_applications/ord3638.pdf), p. 191.

<sup>16</sup> Marc D. Schron, US Navy (March 14, 2009):

<http://www.defense.gov/HomePagePhotos/LeadPhotoImage.aspx?id=13529>.

**APPENDIX A:**  
President Reagan's Finding for Canada

Federal Register  
Vol. 50, No. 117  
Tuesday, June 18, 1985

## Presidential Documents

Title 3—

The President

Presidential Findings of June 14, 1985

### United States-Canadian Crude Oil Transfers

On March 18, 1985, at the Quebec Summit, I joined Prime Minister Mulroney in endorsing a Trade Declaration with the objective of liberalizing energy trade, including crude oil, between the United States and Canada. Both Governments recognized the substantial benefits that would ensue from broadened crude oil transfers and exchanges between these two historic trading partners and allies. These benefits would include the increased availability of reliable energy sources, economic efficiencies, and material enhancements to the energy security of both countries. Following this Declaration, Canada declared that it would permit Canadian crude oil to be freely exported to the United States effective June 1, 1985.

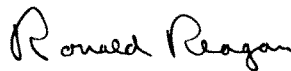
Before crude oil exports to Canada can be authorized, I must make certain findings and determinations under statutes that restrict exports of crude oil. I have decided to make the necessary findings and determinations under the following statutes: Section 103 of the Energy Policy and Conservation Act (42 U.S.C. 6212); section 28 of the Mineral Lands Leasing Act of 1920, as amended by the Trans-Alaska Pipeline Authorization Act of 1973 (30 U.S.C. 185); and section 28 of the Outer Continental Shelf Lands Act (43 U.S.C. 1354) (crude oil transported over the Trans-Alaska Pipeline or derived from the Naval Petroleum Reserves is excluded).

I hereby find and determine that exports of crude oil under these statutes are in the U.S. national interest, and I further find and determine that such U.S. crude oil exports to Canada—

- will not diminish the total quantity or quality of petroleum available to the United States;
  - will not increase reliance on imported oil;
  - are in accord with provisions of the Export Administration Act of 1979;
- and
- are consistent with the purposes of the Energy Policy and Conservation Act.

Therefore, such domestic crude oil may be exported to Canada for consumption or use therein.

These findings and determinations shall be published in the Federal Register. I direct the Secretary of Commerce to take all other necessary and proper action to expeditiously implement this decision.



THE WHITE HOUSE,  
June 14, 1985.

[FR Doc. 85-14782  
Filed 6-17-85; 9:35 am]  
Billing code 3195-01-M

## Rules and Regulations

Federal Register

Vol. 50, No. 122

Tuesday, June 25, 1985

This section of the FEDERAL REGISTER contains regulatory documents having general applicability and legal effect, most of which are keyed to and codified in the Code of Federal Regulations, which is published under 50 titles pursuant to 44 U.S.C. 1510. The Code of Federal Regulations is sold by the Superintendent of Documents. Prices of new books are listed in the first FEDERAL REGISTER issue of each week.

### DEPARTMENT OF COMMERCE

#### International Trade Administration

##### 15 CFR Part 377

[Docket No. 50698-5098]

#### Exports of Crude Oil to Canada for Consumption or Use Therein

**AGENCY:** International Trade Administration, Commerce.

**ACTION:** Final rule.

**SUMMARY:** On June 14, 1985, President Reagan determined that crude oil exports to Canada are in the national interest and made the necessary findings under the Energy Policy and Conservation Act, the Mineral Lands Leasing Act, and the Outer Continental Shelf Lands Act to permit exports to Canada of crude oil subject to those statutory restrictions (50 FR 25189, June 18, 1985). To implement this determination, Part 377 of the Export Administration Regulations is being revised to permit crude oil exports to Canada for consumption or use therein, provided that it was not transported via the Trans-Alaska Pipeline and was not produced from Naval Petroleum Reserves.

**EFFECTIVE DATE:** June 25, 1985.

**FOR FURTHER INFORMATION CONTACT:** Rodney A. Joseph, Acting Manager, Short Supply Program, Room 3876, Office of Industrial Resource Administration, U.S. Department of Commerce, Washington, DC 20230, Telephone: 202/377-3984.

#### SUPPLEMENTARY INFORMATION:

##### Rulemaking Requirements

1. Since this rule pertains to a foreign affairs function of the United States, the proposed rulemaking procedures and the delay in effective date required under

the Administrative Procedures Act are inapplicable.

2. This rule contains a collection of information requirement subject to the Paperwork Reduction Act of 1980, 44 U.S.C. 3501 *et seq.* The collection of this information has been approved by the Office of Management and Budget (OMB control number 0625-0001).

3. This rule is not subject to the requirements of the Regulatory Flexibility Act, 5 U.S.C. 601 *et seq.*, because a notice of proposed rulemaking is not required to be published. Accordingly, no initial or final Regulatory Flexibility Analysis has or will be prepared.

4. Since this rule pertains to a foreign affairs function, it is not a rule within the meaning of section 1(a) of Executive Order 12291 (46 FR 13193, February 19, 1981), "Federal Regulation."

Therefore, this regulation is issued in final form. Although there is no formal comment period, public comments on this regulation are welcome on a continuing basis.

#### List of Subjects in 15 CFR Part 377

Exports.

#### PART 377—SHORT SUPPLY CONTROLS AND MONITORING

1. The authority citation for Part 377 is revised to read as follows:

Authority: Secs. 203, 206, Pub. L. 95-223, as amended (50 U.S.C. 1702, 1704); E.O. 12470 of March 30, 1984 (49 FR 13099, April 3, 1984); Presidential Notice of March 28, 1985 (50 FR 12513, March 29, 1985); Sec. 103, Pub. L. 94-163, as amended, (42 U.S.C. 6212); Sec. 28, Pub. L. 93-153, (30 U.S.C. 185); Sec. 28, Pub. L. 95-372, (43 U.S.C. 1354); E.O. 11912 of April 3, 1976 (41 FR 15825, as amended); and Presidential Findings (50 FR 25189, June 18, 1985).

2. Accordingly, the Export Administration Regulations (15 CFR Part 368-399) are amended by adding § 377.6(d)(1)(viii) as follows:

#### § 377.6 Petroleum and petroleum products.

\* \* \* \* \*

(d) \* \* \*

(1) \* \* \*

(viii) Exports to Canada for consumption or use therein. The Group A commodity was not produced from the Naval Petroleum Reserves and was not and will not be transported by pipeline over rights-of-way granted pursuant to Sec. 203 of the Trans-Alaska

Pipeline Authorization Act and is being exported to Canada for consumption or use therein.

\* \* \* \* \*

Issued: June 20, 1985.

William T. Archey,

Acting Assistant Secretary for Trade Administration.

[FR Doc. 85-15204 Filed 6-24-85; 8:45 am]

BILLING CODE 3510-25-M

### SECURITIES AND EXCHANGE COMMISSION

#### 17 CFR Parts 230, 239, 270, and 274

[Release Nos. 33-6588; IC-14575; File No. S7-1007]

#### Registration Forms for Insurance Company Separate Accounts That Offer Variable Annuity Contracts

**AGENCY:** Securities and Exchange Commission.

**ACTION:** Adoption of forms, rule amendments, and publication of guidelines.

**SUMMARY:** The Commission is adopting: (1) Form N-3, a new registration form for certain separate accounts registered under the Investment Company Act of 1940 as management investment companies, and certain other separate accounts; (2) Form N-4, a registration form for certain separate accounts registered under the Investment Company Act of 1940 as unit investment trusts, and certain other separate accounts; and (3) related rule amendments. The Commission is also publishing staff guidelines for the preparation of Forms N-3 and N-4. The Commission is adopting the foregoing to integrate and codify disclosure requirements for insurance company separate accounts that offer variable annuity contracts and to shorten and simplify the prospectus provided to investors, while making more extensive information available for those who request it. Separate accounts will be permitted to use existing registration forms during a transition period of approximately one year.

**DATE:** The amended rules will be effective July 25, 1985. The new forms and guidelines will be available for registration of separate accounts and for

**APPENDIX B:**

Letter to Secretary Pritzker on Mexico Oil Exports

# United States Senate

WASHINGTON, DC 20510

February 18, 2015

The Honorable Penny Pritzker  
Secretary  
U.S. Department of Commerce  
1401 Constitution Ave., NW  
Washington, D.C. 20230

Dear Secretary Pritzker:

We are writing to express our support for increasing our nation's energy ties with Mexico. As you know, energy resources often overlie international boundaries, as we have clearly seen in deepwater exploration in the Gulf of Mexico and the Eagle Ford shale along our southern border. Natural gas is traded between our two nations through more than twenty existing pipelines, and many others are under consideration. Additionally, increasing commercial activity in petroleum products, natural gas liquids, and other types of energy is further expanding the U.S.-Mexico energy relationship.

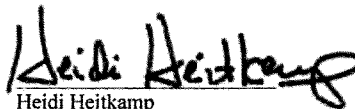
Recent news reports indicate that PEMEX has applied for a swap transaction that would involve imports of heavy Mexican oil in exchange for exports of light U.S. oil. We encourage the Department of Commerce to approve any such applications it has received or may receive from adjacent foreign states, such as Mexico. The Energy Policy and Conservation Act and other relevant statutes clearly authorize swaps and exchanges and, in our view, deserve bipartisan support. Presidents Gerald Ford, Jimmy Carter, and Ronald Reagan all supported such a program with Canada from 1976 to 1985, with the intention of relieving a supply and quality mismatch comparable to the present North American situation. These potential transactions are in the national interest and, if applied for, should be authorized without delay.

In fact, we believe it would be appropriate to further liberalize energy trading with Mexico. President Reagan issued a national interest finding in 1985 stating that oil exports to Canada (for consumption in that country) were in accord with existing statutes and would not threaten U.S. supply. This limited but clear authority to expand exports was given to the executive branch through laws (such as the Energy Policy and Conservation Act of 1975) passed by Congress and is particularly relevant as our nation's energy mix evolves with the rise of domestic production. As a result of the expressed interest from Mexico in obtaining U.S. crude oil, we encourage the current administration to follow President Reagan's example by issuing a similar finding that United States oil exports to Mexico, for consumption in Mexico, are in the national interest.

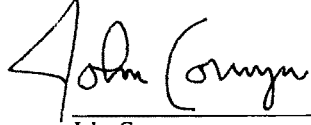
Sincerely,

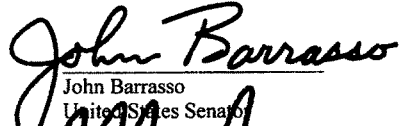


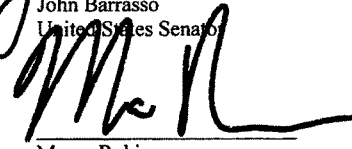
Lisa Murkowski  
United States Senator




Heidi Heitkamp  
United States Senator

  
 John Cornyn  
 United States Senator

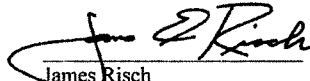
  
 John Barrasso  
 United States Senator

  
 Marco Rubio  
 United States Senator


  
 Lamar Alexander  
 United States Senator

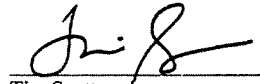
  
 James Inhofe  
 United States Senator

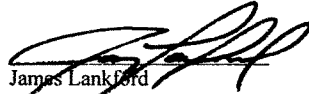
  
 John Hoeven  
 United States Senator

  
 James Risch  
 United States Senator

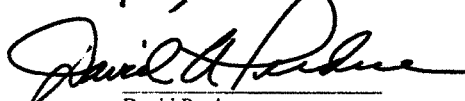
  
 Ted Cruz  
 United States Senator

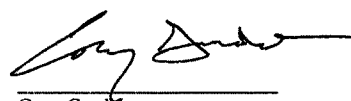
  
 Jeff Flake  
 United States Senator

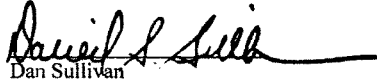
  
 Tim Scott  
 United States Senator

  
 James Lankford  
 United States Senator

  
 Tom Cotton  
 United States Senator

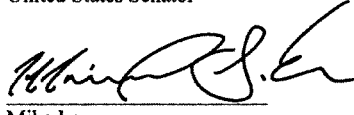
  
 David Perdue  
 United States Senator

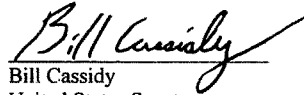
  
 Cory Gardner  
 United States Senator

  
Dan Sullivan  
United States Senator

  
Ron Johnson  
United States Senator

  
Shelley Moore Capito  
United States Senator

  
Mike Lee  
United States Senator

  
Bill Cassidy  
United States Senator

**APPENDIX C:**

Letter to Secretary Kerry on Israel Oil Supply Agreement

# United States Senate

WASHINGTON, DC 20510

March 12, 2015

The Honorable John Kerry  
Secretary of State  
United States Department of State  
2201 C Street, NW  
Washington, DC 20520

Dear Secretary Kerry:

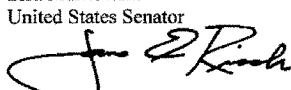
The President's National Security Advisor recently said that our nation's relationship with Israel should be "unquestionably strong, immutable, regardless of political seasons in either country and regardless of which party is in control in either country." We could not agree more.


The United States has long worked with Israel on issues related to energy and the environment. The Energy Independence and Security Act of 2007, which provided for such cooperation, passed the Senate in an overwhelming bipartisan vote. An American company is helping explore and develop hydrocarbon resources in the Eastern Mediterranean. Most recently, the United States-Israel Strategic Partnership Act of 2014 passed both chambers of Congress unanimously and President Obama signed it into law last December.

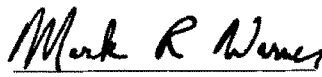
We are writing to express our support for the renewal of a historic agreement that expired on November 25, 2014. Under its terms, our nation guarantees the delivery of oil to Israel in the event that Israel ever loses access to global markets, as may occur during a crisis. The first iteration of this agreement was signed under President Ford in 1975. President Carter's Secretary of State formalized the agreement in 1979. It has been renewed under Presidents Clinton in 1994 and Bush in 2004. It has never been invoked. We appreciate that your Department is working closely with the Government of Israel to assure its energy security. We urge you to expedite the renewal of this important agreement as a meaningful gesture of support to our friend and ally at this challenging time.

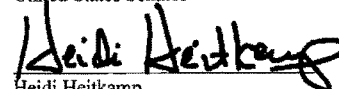
Sincerely,

  
Lisa Murkowski  
United States Senator

  
James Risch  
United States Senator

  
John Barrasso  
United States Senator

  
Mark Warner  
United States Senator

  
Heidi Heitkamp  
United States Senator

  
Joe Manchin  
United States Senator

I would recommend it to each of the Committee members here. As with the other white papers that we have released, it is imminently readable. It is factually stable and sound and really lays it out in a very clean and forthright measure. The report further develops an argument that I have been making that even while Congress works to remove the export ban, the Administration already has authority exclusively delegated to it, by Congress, to allow for greater oil exports.

In addition to this opportunity to modernize our nation's energy policies, we will spend time looking at interagency coordination on the so-called energy water nexus, protecting electric grid reliability during agency rulemakings, reforming the innovative, but at times mismanaged, loan programs at DOE, making sure our national labs are operating in the most effective manner, ensuring greater cooperation between the states and feds on energy development, as well as lowering energy costs in regions that face above average prices.

We have a great panel before us this morning, with a great breadth of knowledge and experience to speak on these and many other topics. I thank you all for the time you have taken to be here with us this morning, and I am grateful for your input. With that, I will turn to my Ranking Member, Senator Cantwell.

Good morning.

**STATEMENT OF HON. MARIA CANTWELL, U.S. SENATOR FROM WASHINGTON**

Senator CANTWELL. Thank you, Madam Chair, Thank you for calling this hearing and gathering such a strong group of witnesses across a broad array of issues in the general categories of discussion of energy accountability and reform proposals. Accountability in energy markets starts with data, arming consumers and industry, policy makers, and regulators, with information about our energy systems and markets that help all of us make smart decisions. This is particularly important at this point in time when our energy systems are in major transition—as outlined by Secretary Moniz in the Quadrennial Energy Review.

One of the legislative proposals before us today, S. 1420, the Energy Market Act of 2015, would boost the Energy Information Administration's (EIA) ability to collect data on energy traders and the kinds of entities engaged in both the physical and financial energy markets. It would establish the Office of Financial Market Analysis at EIA, along with an interagency working group on energy markets that would span the Department of Energy and FERC, along with regulators at the Securities Exchange Commission, Commodity Futures Trading, and the Department of Treasury.

I bring this up because there are some in the House that think “reform” and “accountability” mean actually rolling back important consumer protections. This is particularly a concern because this Committee in a bipartisan fashion, crafted legislation in response to the Western energy crisis that we were able to implement. It has been good legislation and worked well for consumers and businesses in Washington, California, Nevada, and Oregon.

Last week, the head of the enforcement at FERC testified that current proposals pending in the House would hinder the agency's effort to pursue market manipulation cases. Since the Committee led the effort to put this in place, a ban on market manipulation in 2005 in the Energy bill, FERC has returned almost \$1 billion to consumers and the U.S. Treasury for market infractions and unjust profits.

It would seem that the House proposal is more motivated to help Wall Street banks and their attorneys who have complained that FERC is being too tough on them.

I find it ironic that at the same time our colleagues in the House cannot find their way forward to vote on reauthorizing the EXIM bank. The House is also now trying to undermine the appropriate actions of FERC and energy market regulators to protect consumers from market manipulation.

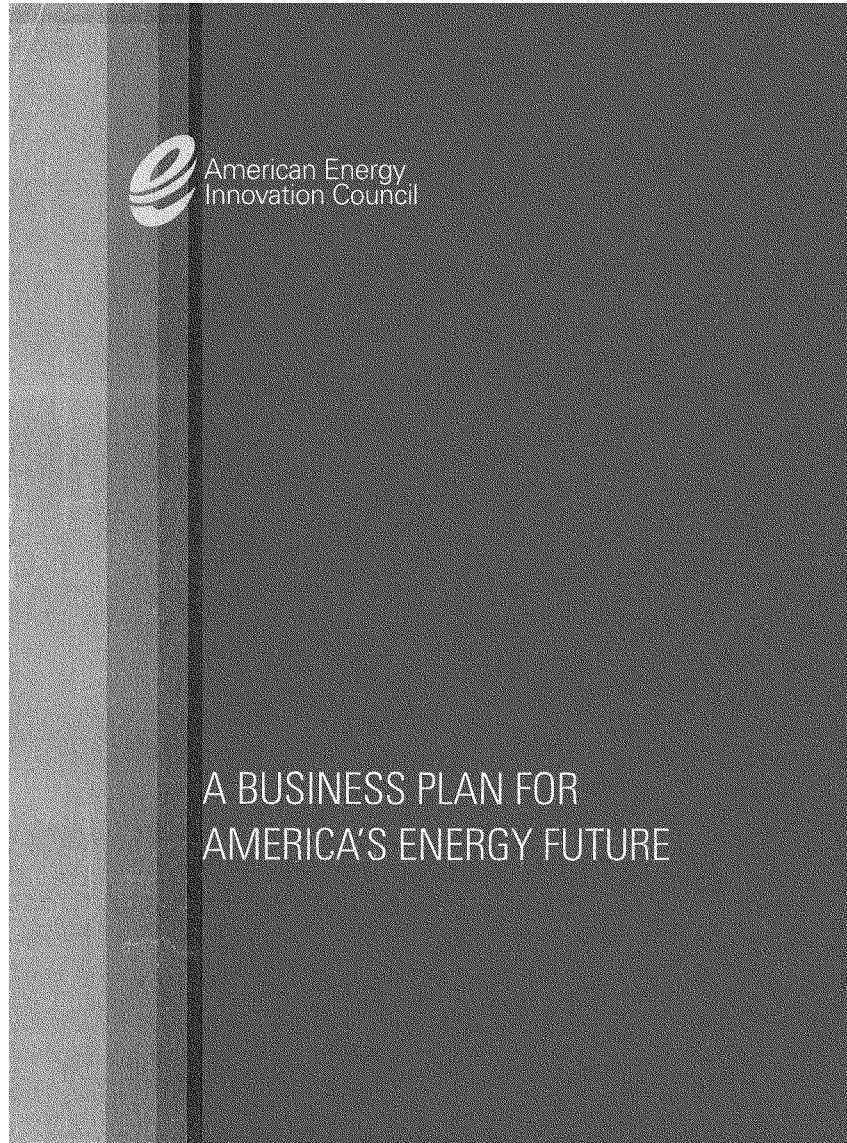
So when we talk about accountability, I hope my colleagues will agree holding industry accountable to just and reasonable rates and markets free of manipulation is just what the American consumers want us to do.

In our role as an authorizing committee, it is also our job to review existing Federal programs to assess, as my colleague said, what is working and not working, and whether the agencies within our purview have set the right priorities.

Judging by the number of proposals before us today, it seems obvious that prioritizing innovation and investment in the kinds of technologies that will grow jobs and our economy is something we should be able to agree on.

The American Energy Council, which I think we will hear about from Mr. Augustine, has suggested we ought to triple our current annual investment in energy-related research and technology.

[The information refereed to follows:]



## ABOUT THE AMERICAN ENERGY INNOVATION COUNCIL

[www.americanenergyinnovation.org](http://www.americanenergyinnovation.org)



### Who we are

American Energy Innovation Council members include: **Norm Augustine**, former chairman and chief executive officer of Lockheed Martin; **Ursula Burns**, chief executive officer of Xerox; **John Doerr**, partner at Kleiner Perkins Caufield & Byers; **Bill Gates**, chairman and former chief executive officer of Microsoft; **Chad Holliday**, chairman of Bank of America and former chairman and chief executive officer of DuPont; **Jeff Immelt**, chairman and chief executive officer of GE; and **Tim Solso**, chairman and chief executive officer of Cummins Inc. The Council is advised by a technical review panel consisting of preeminent energy and innovation experts and is staffed jointly by the Bipartisan Policy Center and the ClimateWorks Foundation.

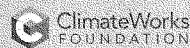
### Our mission

The mission of the American Energy Innovation Council is to foster strong economic growth; create jobs in new industries; and reestablish America's energy technology leadership through robust, public investment in the development of clean energy technologies.



### About the Bipartisan Policy Center

In 2007, former U.S. Senate Majority Leaders Howard Baker, Tom Daschle, Bob Dole and George Mitchell formed the Bipartisan Policy Center (BPC) to develop and promote solutions that can attract the public support and political momentum to achieve real progress. Currently, the BPC focuses on issues including health care, energy, national and homeland security, transportation, science and economic policy. For more information, please visit [www.bipartisanpolicy.org](http://www.bipartisanpolicy.org).



### About the ClimateWorks Foundation

The ClimateWorks Foundation supports public policies that prevent dangerous climate change and catalyze sustainable global prosperity. The ClimateWorks network includes partner organizations across the world, aligned to support smart policies in the regions and sectors that have the greatest potential for reducing greenhouse gas emissions. For more information, please visit [www.climateworks.org](http://www.climateworks.org).

About Us

## ACKNOWLEDGEMENTS

The American Energy Innovation Council (AEIC) gratefully acknowledges the important contributions and guidance provided by the following members of its Technical Review Committee:

- Chair** – Maxine Savitz, former general manager of technology partnerships at Honeywell; member of the President's Council of Advisors on Science and Technology; Vice President, National Academy of Engineering
- Ken Caldeira – Department of Global Ecology, Carnegie Institution of Washington
  - David Garman – Former Under Secretary of Energy and Assistant Secretary of Energy Efficiency and Renewable Energy at the Department of Energy
  - Rebecca Henderson – Senator John Heinz professor of environmental management, Harvard Business School
  - David Keith – Professor and director of ISEEE Energy and Environmental Systems Group at the University of Calgary
  - Richard Lester – Director of the Industrial Performance Center and professor and head of the department of nuclear science and engineering at MIT
  - Nate Lewis – George L. Argyros professor of chemistry at the California Institute of Technology
  - Ernie Moniz – Cecil and Ida Green professor of physics and engineering systems and director of the MIT Lab for Energy and Environment and of the MIT Energy Initiative, MIT; member of the President's Council of Advisors on Science and Technology
  - Franklin Orr – professor of petroleum engineering, Stanford University
  - Allen Pfeffer – Vice President of technology, Alstom Power
  - Dan Sarewitz – Director, Consortium for Science, Policy, and Outcomes, Arizona State University
  - Chuck Shank – Former director of Lawrence Berkeley National Laboratory

In addition, the AEIC would like to thank Tom Bechtel, Jabe Blumenthal, Joe Chaisson, Joseph Danko, Karen Fries, Daniel Goldman, Scott Elrod, Kelly Gallagher, Mark Little, Brian Mormino, Sherm Mullin, John Pinette, Sophie Vandebroek and John Wall for their expert contributions to this report.

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## A BUSINESS PLAN FOR AMERICA'S ENERGY FUTURE

### PRELUDE

It may seem surprising that a group of business leaders who are not primarily in the energy field would make a strong statement on energy innovation and the need for a more vigorous public commitment. We have two reasons for speaking out on this issue:

First, the energy challenge is much worse than most people realize. The problem is already imposing a heavy burden on our nation—a burden that will become even more costly. The economic, national security, environmental and climate costs of our current energy system will condemn our children to a seriously constrained future unless America makes significant changes to current policies and trends.

Second, there is vast, but neglected, potential to produce and spread innovation in the energy sector. Most of the technologies that underlie the current energy system were invented decades ago, and are increasingly costly, brittle, and incompatible with a clean future. In almost every realm of energy, we can develop and deploy new technologies that are more efficient, secure, and clean. Technology can be a game changer.

The scale of these threats—and the wealth of opportunities to do better—make the message clear: It is time we invent our future.

In developing a plan for how to do that, we called upon our experience managing large innovation programs in our companies. Our staff read dozens of reports from the field and interviewed another hundred experts. And we took a hard look at what has worked to promote innovation in defense, medicine, information technology and other fields.

We are convinced that America has a great deal to gain from smart, ambitious investments in clean energy innovation. As business leaders, we know how the private sector can be mobilized to attack these problems, but we also know the government must step up to protect the public interest. We set forth here the necessary actions that the public sector must take to unlock the ingenuity and capital of the American marketplace in pursuit of the nation's clean energy goals.

We hope that the President, Congress, and American public pay heed to the findings we present in this report.

*Mark Augustine* *Wanda M. Burns* *John Don* *Bill Gates*  
*Chad Halliday* *Jeffrey R. Immelt* *Tom Ichniowski*

Prelude

It is time we invent our future.

## EXECUTIVE SUMMARY

As business leaders, we feel that America's current energy system is deficient in ways that cause serious harm to our economy, our national security, and our environment. To correct these deficiencies, we must make a serious commitment to modernizing our energy system with cleaner, more efficient technologies.

Such a commitment should include both robust, public investments in innovative energy technologies as well as policy reforms to deploy these technologies on a large scale. By tapping America's entrepreneurial spirit and long-standing leadership in technology innovation, we can set a course for a prosperous, sustainable economy—and take control of our energy future.

Conversely, if we continue with the energy status quo, we will expose ourselves to risks that pose significant threats to our way of life.

*Innovation without implementation has no value.*

—Tim Solso

Executive Summary

### The need for government involvement in energy

There are two reasons the government must play a key role in accelerating energy innovation.

**First**, innovations in energy technology can generate **significant, quantifiable public benefits** that are not reflected in the market price of energy. These benefits include cleaner air and improved public health, enhanced national security and international diplomacy, reduced risk of dangerous climate change, and protection from energy price shocks and related economic disruptions. Currently, these benefits are neither recognized nor rewarded by the free market.

**Second**, the energy business requires **investments of capital at a scale** that is beyond the risk threshold of most private-sector investors. This high level of risk, when combined with existing market structures, limits the rate of energy equipment turnover. A slow turnover rate exacerbates the historic dearth of investments in new ideas, creating a vicious cycle of status quo behavior.

The government must therefore act to spur investments in energy innovation and mitigate risk for large-scale energy projects. By heeding the following five recommendations, we feel the government can unleash the nation's technology potential.

### RECOMMENDATION 1: Create an independent national Energy Strategy Board

The United States does not have a national energy strategy. Without such a strategy, there is no way to assess the effectiveness of energy policies, nor is there a coherent framework for the development of new energy technologies. The results of this neglect have included oil-driven recessions, environmental degradation, trade deficits, national security problems, increasing CO<sub>2</sub> emissions, and a deficit in energy innovation.

We recommend the creation of a congressionally mandated Energy Strategy Board charged with (1) developing and monitoring a National Energy Plan for Congress and the executive branch, and (2) oversight of a New Energy Challenge Program (see Recommendation 5). The board should be external to the U.S. government, should include experts in energy technologies and associated markets, and should be politically neutral.

**RECOMMENDATION 2:  
Invest \$16 billion per year  
in clean energy innovation**

In order to maintain America's competitive edge and keep our economy strong, the United States needs sizable, sustained investments in clean energy innovation. We believe that \$16 billion per year — an increase of \$11 billion over current annual investments of about \$5 billion — is the minimum level required. This funding should be set with multi-year commitments, managed according to well-defined performance goals, focused on technologies that can achieve significant scale, and be freed from political interference and earmarking.

If Recommendation 2 is not adopted, our other recommendations will not matter much. Reliance on incrementalism will not do the job.

*This \$16 billion figure covers all of the recommendations we make in this report.*

**RECOMMENDATION 3:  
Create Centers of Excellence with strong  
domain expertise**

Technology innovation requires expensive equipment, well-trained scientists, multi-year time horizons and flexibility in allocating funds. This can be done most efficiently and effectively if the institutions engaged in innovation are located in close proximity to each other, share operational objectives and are accountable to each other for results. Resources should not be spread thinly across many institutions working on the same problem.

To provide the above attributes to the energy industry, we recommend the creation of national Centers of Excellence in energy innovation. The Department of Energy's newly created Energy Innovation Hubs are a good start at such centers, but are not sufficiently funded to achieve the desired results. Additional centers of excellence need to be supported with an annual budget of \$150 to \$250 million each. To function effectively and deliver results, each of these centers will need the flexibility to pursue promising developments and eliminate dead-end efforts.

**RECOMMENDATION 4:  
Fund ARPA-E at \$1 billion per year**

The creation of the Advanced Research Projects Agency-Energy (ARPA-E) has provided a significant boost to energy innovation. ARPA-E focuses exclusively on high-risk, high-payoff technologies that can change the way energy is generated, stored, and used, and has challenged innovators to come up with truly novel ideas and "game changers." The program has high potential for long-term success, but only if it is given the autonomy, budget, and clear signals of support to implement needed projects. It will need long-horizon funds on a scale commensurate with its goals, and a life extension beyond the current federal stimulus. We recommend a \$1 billion annual commitment to ARPA-E.

**RECOMMENDATION 5:  
Establish and fund a New Energy Challenge  
Program to build large-scale pilot projects**  
America's energy innovation system lacks a mechanism to turn large-scale ideas or prototypes into commercial-scale facilities. We recommend the creation of a New Energy Challenge Program to fund, build and accelerate the commercialization of advanced energy technologies—such as fourth generation nuclear power and carbon capture and storage coal plants.

This program should be structured as a partnership between the federal government and the energy industry, and should operate as an independent corporation outside of the federal government. It should report to the Energy Strategy Board (see Recommendation 1) and focus on the transition from pre-commercial, large-scale energy systems to integrated, full-size system tests. The public sector should initially commit \$20 billion over 10 years through a single federal appropriation, which would unleash significant private sector resources as projects are developed.

**Summary**

In the defense, health, agriculture, and information technology industries, this country has made a deliberate choice to use intelligent federal investments to unleash profound innovation. As a result, the country leads in all those realms. In energy, however, the United States has failed the grade, and is paying a heavy price for that failure. We are optimistic about the potential for dramatic change in the energy realm. To seize this opportunity, America must put aside partisan interests and make a strong, bold commitment.

## innovation

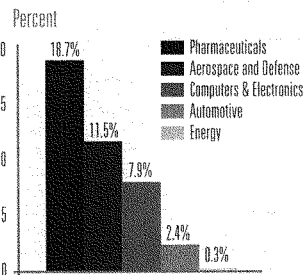
As business leaders, we have had the privilege of building companies that lead their respective fields and employ hundreds of thousands of American workers. Our experience has given us an unshakable belief in the power of innovation.

Each of our companies achieved prominence because we invested heavily and steadily in new ideas, new technologies, new processes and new products.

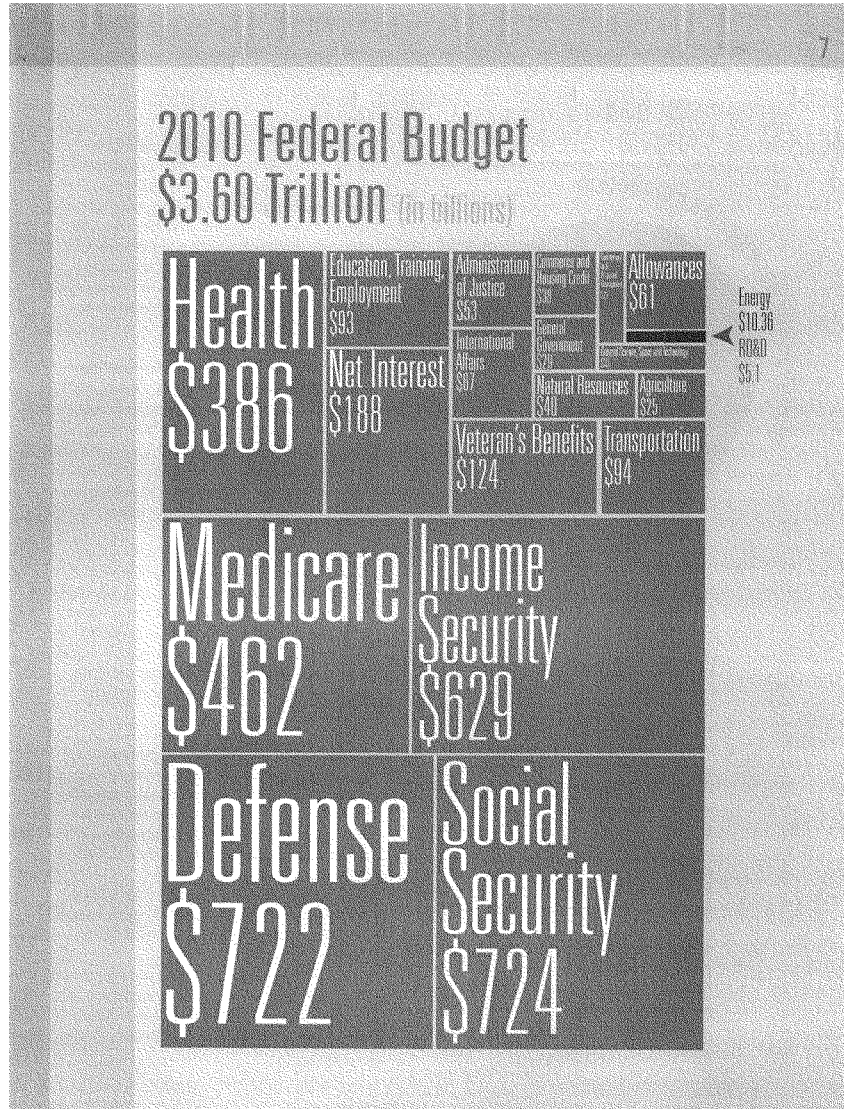
Indeed, **innovation is the essence of America's economic strength.** It has been our nation's economic engine for centuries. Our leadership in information technology, medicine, aviation, agriculture, biotech and dozens of other fields is the result of our enduring commitment to innovation.

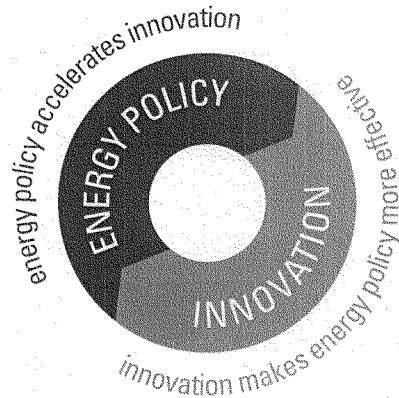
But in one realm central to America's economic, national security, and environmental future, our commitment to innovation is sorely lacking: energy. Investment in energy innovation, from both the public and private sectors, is tiny—less than one-half of one percent of the national energy bill. This neglect carries serious consequences.

## R&D Spending as a Share of Sales



(Of all major technology-dependent sectors, the energy sector spends the smallest portion of its sales on research and development.<sup>1</sup>)





Due to our lack of energy options, our **economy** is vulnerable to price shocks—in oil, natural gas, and even electricity. The United States sends about \$1 billion overseas every day for imported oil, an expenditure that represents the biggest part of the trade deficit and often causes hardship for American consumers and businesses. Our foreign oil reliance undermines **national security** by enriching hostile regimes, while our military forces are often deployed to protect access to oil. And the **environmental** costs are steep and growing, with both conventional pollution and climate change harming human health, threatening lives and livelihoods, and imperiling the natural systems upon which we rely for food, water, and clean air.

As business leaders who have constantly faced competitive threats, we see a clear and compelling need for a vigorous response to these energy challenges. The nation must not sit back and let these problems grow. America must take control of its energy future with the right combination of smart investments and smart policy.

If this nation gets serious about energy innovation, we are optimistic about the prospects. There are dozens of opportunities in the energy field where a serious commitment to technology is very likely to reap great rewards. Solar cells, dropping in price, can become an affordable, mainstream power source. The next generation of nuclear power has the potential to be safer and less expensive. Advanced biofuels could provide a viable alternative to oil. And energy efficiency—in devices and whole systems—can reduce waste and cut demand by half, or even more, in many sectors.

But if the nation is to succeed, the government must help lead the way. We remain convinced that a free-enterprise system led by the private sector is by far the most powerful driving force for innovation. But in energy, as in defense, aviation, and health care, the nation needs a coordinated effort between business and the government if it is to accelerate the innovation engine and create real options for our energy future. Today, the U.S. has no comprehensive national energy strategy.

There are many well-known precedents for this kind of public-private collaboration. Federal programs have been responsible for a wide range of game-changing technologies: new unmanned aircraft systems save the lives of American soldiers serving overseas; the Internet was born from military programs; and many of the most important medical breakthroughs of the last century came from our world-leading investments in medical science research at our universities and laboratories.

#### Conditions for success in energy innovation

Successful energy innovation has three prerequisites: the first is a pipeline of new inventions; the second is a suite of policy reforms that will stimulate market demand for these new inventions; and the third is a highly skilled workforce with the ability to create and deploy these inventions.

This plan addresses the first. Ours is a strategy to fill the American energy innovation pipeline with new technologies designed to deliver a more secure, sustainable future.

But we recognize that research, development and deployment (RD&D) needs complementary energy policies to advance innovation and drive market adoption of new technologies. Innovation without implementation has no value. A strong

market signal will increase the intensity of energy research, add large private-sector commitments, reduce barriers between the lab and market, and ensure technologies perform better and cost less over time. Those policies may include some combination of a price or cap on CO<sub>2</sub>, a clean energy or renewable energy portfolio requirement, and technology performance standards.

Regardless of the specific mechanisms that are chosen, successful energy policy will share three main characteristics:

1. It will provide long-term price or market signals. On-again, off-again policies hinder progress and scare away private sector investors.
2. It will encourage competition among technologies. Performance standards that allow the market to choose winners based on good technology and low cost are very powerful drivers of innovation.
3. It will reward steady improvements in performance. Credible, predictable and periodic adjustments in performance requirements will stimulate research and ensure continued innovation.

The effect of such policies would be to create a large, sustained market for new energy technology. Our nation cannot succeed without it.

RD&D =  
research, development  
and deployment

## Bill Gates

Chairman, Microsoft Corp.

Co-chairman, Bill & Melinda Gates Foundation

The world faces many challenges, but none more important than taking immediate and decisive action to develop new, inexpensive clean-energy sources that avoid the negative effects of climate change. Low-cost clean energy is the single most important way to lift poor countries out of poverty and create more stable societies. The whole world would benefit from this, and the United States can and should lead the way.

Decreasing our dependence on coal, oil, and natural gas also will reduce the greenhouse gas pollution that is causing the earth to warm. If we do not dramatically reduce CO<sub>2</sub> pollution associated with the use of high-carbon fuels, the earth will continue to get hotter, causing the sea to rise and creating unpredictable weather patterns with potentially catastrophic consequences.

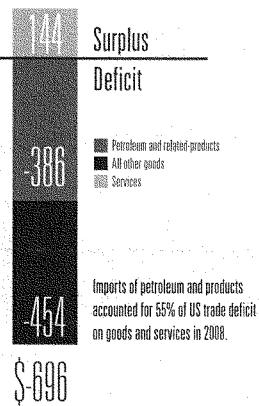
While none of us will be immune from these adverse effects, they will be particularly devastating for the world's poorest people. Increased droughts and floods, for example, could mean the difference between a harvest that sustains life and a crop failure that ends it.

I'm optimistic about our ability to meet this challenge, but the longer we delay, the more difficult it will be. Delay locks in expensive investments that have huge environmental consequences. Around the world, new coal-fired energy plants that will each emit 300 million tons of CO<sub>2</sub> over their 50-year lifetime are being built to meet the world's growing energy demand. At the same time, developing large amounts of low-cost and reliable clean energy will require time: 10 to 20 years of research and discovery, and, at the very least, another 20 years to build out new energy infrastructure. If we are to meet 2050 targets of reducing CO<sub>2</sub> emissions by 80 percent, we must begin now.

With innovation and determination, we can develop the low-cost clean-energy technologies so critically needed by the world's poor and so essential to ensuring a sustainable planet for all of humanity. Increased federal investment in energy R&D is an essential first step. The time for action is now.

## US Trade Balance for Goods and Services

Billion USD in 2008



Source: Bureau of Economic Analysis, International Economic Accounts

The world faces many challenges, but none more important than taking immediate and decisive action to develop new, inexpensive clean-energy sources that avoid the negative effects of climate change.

—Bill Gates

Finally, it is clear that to succeed in energy, the nation needs a workforce with deep grounding in science and engineering. We refer to the educational recommendations outlined in the National Academies' *Rising Above the Gathering Storm* report to provide guidance on how to revitalize our science and technology education system in the United States.

A few of us were involved in the writing of the *Gathering Storm* report, and many of us have been involved in the political progress that stemmed from its call to action. That report made four pointed recommendations:

- Vastly improve K-12 science and mathematics education.
- Sustain and strengthen the nation's commitment to long-term basic research that has the potential to be transformational.
- Make the United States the most attractive setting in which to study and perform research. Attach a green card to the diploma for international students who pursue higher education in science, technology, engineering or math in the United States.
- Ensure that America is the premier place in the world to innovate; invest in manufacturing and marketing; and create high-paying jobs based on innovation.

Complementary market policy and education reform are vital to the energy innovation ecosystem. This report focuses on America's immediate opportunity to invest in energy innovation—and how to seize it.

### THE HIGH PRICE OF INACTION

There is no part of our economy that can operate without access to reliable, affordable energy. Our nation has built an energy system that is miraculous in its breadth and power, but in its current incarnation, exacts steep costs in four ways:

1. **Faltering economic competitiveness** in the \$5 trillion global energy industry, as vast new markets for clean energy technologies are expanding rapidly in Asia and Europe, rather than in the United States.
2. **Direct economic** costs of constrained energy choices, from (a) price volatility, which has driven two recessions and several economic shocks, including the 2008 shock that cost our economy \$500 billion in one year alone and (b) the trade deficit, driven by about \$1 billion per day sent overseas to pay for imported oil.

## Tim Solso

CEO, Cummins Inc.

The energy and climate challenges facing the world are huge, and they demand both increased energy innovation and sound strategies to get those technologies into the market. Cummins is a leader in clean engine technology for three reasons: We take the long view, work with public and private partners whose expertise complements our own, and embrace clear and responsible regulations which drive the innovation that can lead to a competitive advantage.

Technology innovation does not happen overnight. We invest hundreds of millions of dollars each year in R&D, because without technology leadership, we cannot compete. Our innovation has to be dependable since our customers often count on our engines to run for more than a million miles.

Nor does technology innovation happen in isolation. Cummins was able to develop the technology for high-efficiency, low-emissions engines through partnerships with the Department of Energy. We worked with combustion experts at Sandia National Laboratory and with catalyst experts at Oak Ridge and Pacific Northwest National Labs to develop the technologies that allowed us to meet the 2010 diesel engine emission standards three years early in Dodge Ram pickup trucks. This kind of development requires a view towards product implementation from the outset. Cummins brings application knowledge, and laboratory partners bring sophisticated physical analysis tools. Together we deliver innovative technologies that work well in the hands of the customer. At Cummins, we call that "Innovation You Can Depend On."

Finally, regulations can help make sure these innovations get to the market. When our engineers are challenged with tough, long-term performance standards, they know how to orient their research. As CEO, I know that meeting or beating those standards gives Cummins a market advantage. And when we deliver cleaner, more efficient engines than our competitors, our company prospers.

## Jeff Immelt

Chairman & CEO, General Electric

GE is fortunate to have some of the world's best engineers, innovators, and technology experts working under our roof. We invest heavily so that they can drive the most advanced ideas off the drawing board and into development.

For some of the markets where we do business, like healthcare, a really good idea can gain market share simply by solving a new problem or by outsmarting the competition. But in energy, we don't have that kind of dynamic market situation; a big year in the U.S. electricity market is 2 percent or 3 percent growth. The current energy markets don't favor cleaner technology or low-carbon; they stay at affordability and reliability.

For a challenge as mammoth as energy, innovation must adapt – and policy must encourage it. Since I started at GE in 1982, our health care division has evolved through a half dozen advances in technology. Over that same period, energy technology has hardly budged. This has nothing to do with the quality of our engineers, but it has everything to do with the marketplace where they do business.

No business will invest when there is no certainty about what a market will look like two, five or 10 years into the future. If we're serious about transforming our energy markets, we must send the right signals and create demand for the technologies that solve those problems.

For a challenge as mammoth as energy, innovation must adapt — and policy must encourage it.

3. **National security** problems from (a) sending vast sums of money into global petroleum markets that support nations hostile to the United States and (b) relying on an energy system that is increasingly vulnerable to blackouts or supply disruptions.
4. **Environmental** dangers, from both (a) air pollution that negatively impacts human health, water quality and ecosystems; and (b) climate change from greenhouse gas emissions, which are largely the byproduct of fossil fuel combustion.

This is a serious nexus of problems. Each individually would merit national attention; together, they should be at the top of the national agenda. Fortunately, serious investments in new energy technologies offer leverage against all these problems.

## GOALS FOR AMERICAN ENERGY

We believe America should have four intersecting energy goals, directly aimed at the costs above.

1. Fuel the American engine to compete in the global market for energy and energy technology. Create modern industries with modern jobs.
2. Power the domestic economy with clean, affordable energy.
3. Reduce national security threats from disruption of energy sources, whether domestic or international.
4. Protect public health and mitigate the very real threat of climate change.

To achieve those goals, the United States will need to rapidly develop and deploy a rich array of technologies. Energy is fundamentally a technology business, in its extraction, production, transformation, storage, and use. Advanced technologies can improve every one of these phases, sometimes radically. The United States needs a concrete strategy for achieving these clear goals.

### Why can't the private sector solve this problem?

The private sector has underinvested in energy innovation, and it cannot achieve these goals alone. There are fundamental differences between energy and most other economic sectors, and these differences limit the ability of the private sector to solve large-scale energy problems on its own.

**First**, the high price of inaction highlights the need for the public to invest in better energy options. National security, national economic strength, and the environment are not primary drivers for private sector investments, but they are critical for the health of our country. They merit a public commitment.

**Second**, large-scale deployment of many new energy technologies requires massive capital expenditures that are too risky for private investors. A new generation of microwave technology might cost \$10 million to develop and can be built on existing assembly lines. That risk-reward calculus makes business sense. In contrast, a new electric power source can cost several billion dollars to develop, yet still will carry risk of technology failure or regulatory changes. And the product, electricity, is sold into a generic market that does not differentiate between clean and dirty sources. So that investment does not make sense for most companies.

**Third**, America's long-term corporate R&D budgets, especially those run by utilities, have been in decline for several decades.

**Fourth**, the turnover in the electrical generation system is very slow. Power plants last 50 years or more and are relatively cheap to run once built, so there is little market for new models. Moreover, patents for replacement technology last only 20 years, so the slow power plant turnover considerably reduces the reward for inventors.

Combine these elements and it becomes clear why private sector investments in clean energy technology development have been so small. Once businesses see a market situation that reduces their technology development risk and rewards clean energy sources, they will invest.

America must take control of its energy future with the right combination of smart investments and smart policy.

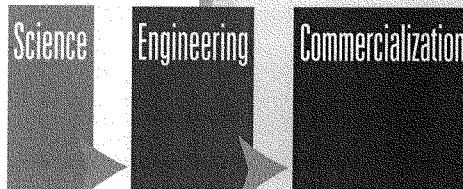
## HOW INNOVATION REDUCES THE PRICE OF NEW TECHNOLOGY

The main purpose of RD&D investment is to make new technologies affordable. That means it is necessary to understand what drives down the price of new technology. Getting this right is the key to designing good programs.

The United States has a history of great success in driving down the price of new technology. Indeed, this is the basis of its prosperity. Computer chips are the most famous example. Their costs have come down by a factor of more than four million since 1975.<sup>2</sup> For perspective, if today's chips were the same size and cost as they were in 1975, Apple's iPod would cost \$1 billion and be the size of a building.

Other technologies, from cars to consumer goods to energy, follow the same kind of price reduction. Solar photovoltaic cells, for example, have dropped by about 22 percent in cost with each doubling of capacity. This is known as the "learning curve" for solar. But falling prices are not an axiomatic result of time passing, or even of more installed solar arrays. The drivers of this progress are worth unpacking.

There are three basic phases of technology development: science, engineering, and commercialization. Employing best practices in each of these realms is the key to bringing down costs—and thus these best practices drive the recommendations in this report.

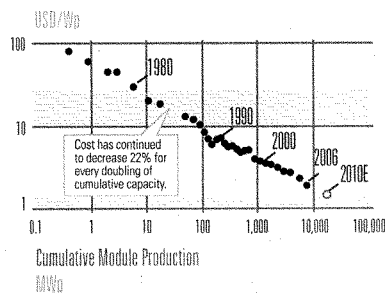


## Stuck between science and engineering

Sometimes moving from science to engineering requires large sums of money, while other times the needs are small. At Lawrence Berkeley National Laboratory, scientists have made important steps for advanced lithium-ion (Li-ion) batteries—but they are caught in a budget trap. Researchers at the lab found that if silicon were used instead of graphite in batteries, total battery life would be expanded significantly—for example, more than doubling the number of recharge cycles for electric vehicle batteries. But silicon use requires creation of an expensive new manufacturing production line. Gao Liu, a staff scientist at Berkeley Lab, found an alternative: He has test results showing a new silicon method that uses the same manufacturing production lines as graphite Li-ion batteries. He needs minimal engineering assistance to carry out the next round of complex tests to see if this production will work. But national laboratories have a heavy focus on basic scientific research rather than applied research, and Gao Liu's scientific research has already been successfully published. So for now, at least, this promising energy technology remains an idea rather than a reality.

## Cost Reduction of Silicon Solar

### Photovoltaic Module Costs



Public and private investments in science, engineering, and commercialization have led to dramatic reductions in the cost of solar power.<sup>3</sup>

### The role of basic science

The first stage of technology innovation comprises research and development in the basic sciences. For example, grid-scale energy storage would make renewable power far more useful, but making electricity storage affordable will require fundamental advances in electrochemistry. Indeed, many of the most urgently needed innovations still depend on fundamental advances in biology, chemistry, materials science or thermodynamics. Today's basic science research will provide the foundation for tomorrow's energy technologies; we need to commit to these investments.

Several principles differentiate the successful science programs from the unsuccessful. The National Academies, Government Accountability Office, and President's Committee of Advisors on Science and Technology have undertaken numerous assessments of national energy RD&D programs.<sup>4</sup>

The lessons stressed by these studies:

- Overall research goals and desired social benefits should be explicit.
- Peer review should be built into research selection and evaluation.
- Programs should tolerate failure, because it is not research if the outcomes are known in advance.
- Funds should be concentrated in centers of excellence rather than spread across many institutions.
- Funding risk should be minimized through periodic check-ins, or "performance gates," in which well-defined milestones must be met or the project gets shut down.

### Engineering: From the lab to the shop floor

Engineering turns research into practice by converting science into workable products. For example, a cup of algal biofuel turns into a running system for oil production at scale, or a solar cell prototype transforms into a workable module that can be mass produced. The engineering phase must be informed by what is required to take a new technology to industrial scale, make it easy to manufacture, and integrate into existing systems. The engineering phase also solves problems associated with constructing large, first-of-a-kind pilot projects.

Best practices in engineering include:

- Ensure that the ultimate goal is within the realm of the possible, in terms of cost, performance and reliability. Set clear performance gates for technologies in the engineering stage.
- Bring many disciplines together to tackle system-wide energy engineering questions.
- Dispatch engineers and production experts to complement the scientists who already focus on R&D.
- Enable large-scale pilot projects. Focus on whether a project is replicable: learning how to engineer and build the first energy project should be about learning how to build the next ten projects.

### Commercialization: Closing the sale

For innovations to be commercialized, private sector manufacturers must anticipate large-scale, long-term markets. For example, renewable portfolio standards created the large market that was required to drive the cost of wind power from 40 cents per kilowatt-hour to 8 cents. That investment yielded a clean source of power that is increasingly competitive with traditional electricity prices. The standard did double duty: It bought a lot of wind power, and by helping drive down the cost of wind, it created a viable new energy technology option.

Best practices in commercialization include:

- Clear, long-term market signals to create market pull for innovation. Examples include renewable performance standards, feed-in tariffs, and reverse auctions. Such policies must reward performance, not investment.
- Projects should include private sector participants with "skin in the game." The power of competitive markets is crucial to real-world discipline that avoids waste.
- Projects at the commercialization stage should also have performance gates. Such clear markers are central to private sector innovation, and they will help in the public sector as well.

Regardless of the specific mechanism, all policy options for supporting the commercialization phase must share one characteristic: They must operate over timeframes long enough to send appropriate signals to the private sector.

If today's computer chips were the same size and cost as they were in 1975, Apple's iPod would cost \$1 billion and be the size of a building.

## Ursula Burns

CEO, Xerox

Many people equate innovation with a "Eureka" moment. Someone comes up with a sudden, amazing idea; investors show up, and that's that.

But in the quickly evolving technology business, your shareholders are unlikely to accept "Eureka" as a business strategy. The reality at Xerox is that we spend a significant amount of our time and resources cultivating and managing innovation. We never stop the innovation process, because without a continual stream of new ideas and technologies, our business will become obsolete.

At any one time, we have numerous innovation programs underway and we guide our efforts according to four principles:

1. Unify innovation efforts with a clearly articulated *vision and strategic goals* for our global teams to rally around.
2. Guide progress by creating *roadmaps* based on global and industry trends as well as technology trends.
3. Involve the best *global partners and a diverse set of customers* early and throughout the end-to-end innovation process.
4. Invest in a *balanced portfolio*, having a mix of early-stage research and products ready for mass deployment. We need a mix of technologies that are truly disruptive, and we need refinements to our existing platforms.

Adhering to these four principles—no matter what field you're working in—delivers results. I strongly believe we should be applying this multifaceted approach to renewable energy innovation. Instead of a series of fractured challenges and solutions, we should actively manage the future of our energy system as the integrated whole that it is, building a pipeline of technologies that will solve the serious problems our world is facing.

## THE PLAN: OUR RECOMMENDATIONS

## Recommendation One

## Create an independent national Energy Strategy Board.

The United States does not have a realistic, technically robust, long-term energy strategy. Without such a strategy, there is no coherent way to assess energy, environmental or climate policy, nor is there a coordinated framework for developing new technologies. The result of this neglect is reflected in our nation's history—with oil-driven recessions, trade deficits, national security problems, increasing CO<sub>2</sub> emissions, and a deficit in energy innovation.

It is time to address our energy future with more serious purpose. To do so, we call for the creation of a congressionally mandated Energy Strategy Board. This would be a high-level board of experts charged with development and monitoring of a National Energy Plan for Congress and the executive branch, and oversight of a New Energy Challenge Program (see Recommendation 5).

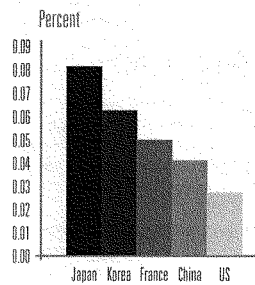
**National Energy Plan**

The country needs a National Energy Plan. Such a plan would assess problems and opportunities, establish clear objectives, and chart a course toward achieving them. It would serve as a benchmark for national energy, climate, and environmental policy, and would guide and coordinate energy research investments by the Department of Energy, the New Energy Challenge Program<sup>5</sup>, and the Clean Energy Deployment Administration<sup>6</sup>.

The National Energy Plan should provide an ambitious but achievable strategy. The plan should contain concrete and measurable energy objectives and then allow technologies and markets to compete to meet them. For example, the United States is dependent on petroleum for 97 percent of transportation fuels. The nation would benefit from having a target to reduce that single-source dependence, and a realistic plan to get there. The National Energy Plan would

It is time to address our energy future with more serious purpose.

### Public Energy RD&D Spending as a Share of GDP, 2007



Among its major trading partners and competitors, the United States spends the smallest fraction of its GDP on energy RD&D.

map out both the policies and energy technology strategies to achieve these goals. The plan would include metrics against which progress can be measured.

The plan would also assess political path dependence questions that require resolution if the United States is serious about taking on our energy challenge. The government's decisions on these fundamental issues should drive America's energy technology strategy. For example:

- Is the federal government willing to take on long-term liability for storing CO<sub>2</sub> through carbon capture and storage (CCS)? Or for storing nuclear waste?
- Can the utility industries be reformed to align with the nation's 21st century aspirations of deploying innovative energy technologies and creating a robust, modern grid?

A National Energy Plan cannot just be the sum of the advocacy of different energy interests. It needs to be built upon an in-depth assessment of end uses (transportation, housing, industry, etc.) and their potential for improvement; a complementary assessment of energy supply options (electric,

liquid, and gaseous fuel sources as well as the technologies used in power generation); and a plan for the infrastructure that conveys that energy (storage, transmission, and distribution). For each realm, the analysts must understand technical potential, cost curves, research frontiers, economics, scaling potential, and siting characteristics. They will also need a keen sense of the effects and side effects of various energy policies.

All of that option-specific work will then need optimization. Many technologies depend on each other. For example, massive renewables deployment will require some combination of enhanced electric transmission capacity, storage, back-up capacity, and demand control. It makes little sense to push renewables without developing an intelligent combination of these four complementary technologies. Today, these technologies are developed largely in isolation from each other.

Naturally, the plan must take advantage of the dynamics of the private sector, which is the best engine for innovation

and for allocation of capital. This report makes clear that we believe the federal government has a crucial role—in setting energy policy, undertaking research and development, and demonstrating large-scale technologies. But that work, and the National Energy Plan, will all fail if the government does not help unleash large private sector commitments and innovation. The National Energy Plan must be cognizant of the conditions that accelerate private investment.

The Energy Strategy Board would be responsible for generating the Plan and updating it every three years. It would produce a formal report to the federal government, and would require the U.S. secretary of energy and other relevant agency administrators to respond.

The Energy Strategy Board would also charge the Energy Information Administration (EIA) with scoring how energy policy affects the nation's energy future. Today, the Office of Management and Budget and the Congressional Budget Office track the fiscal impacts of various policies with an overall budgetary strategy in mind. The EIA currently has no overall strategy against which to track the energy impacts of energy bills. This needs repair, and the Energy Strategy Board would be ideally positioned for the job.

#### New Energy Challenge Program

This report argues for a special federally chartered corporation to develop and demonstrate large-scale energy technologies, such as advanced nuclear power, or carbon capture and storage for coal. Without such an institution, these options will stagnate—as they have in the United States—for decades.

The New Energy Challenge Program (NECP) is described in more detail as Recommendation 5. We envision an independent institution tasked with demonstrating advanced energy technologies at commercial scale. The NECP would be a subsidiary organization of the Energy Strategy Board, with its own small executive management authority. The NECP would be organized around the Board's stated technology priorities.

#### Staffing and funding

The Energy Strategy Board would be a small, politically-neutral, high-level group, with a lean operating budget and a focused mandate. It would have one federally-appointed chair and about 15 members made up of preeminent figures in the energy domain, such as leaders of the National Academies and relevant company executives. The members of the Board would be selected by their peers, rather than the political process. Slots on the board should be reserved for the sitting directors of ARPA-E and the Clean Energy Deployment Administration, as well as the President of the New Energy Challenge Program (see Recommendation 5). Other positions would be filled with experts on technology development, such as Chief Technology Officers and experts in energy policy. The Energy Strategy Board would require a small, highly competent staff for production of the National Energy Plan, and it would have broad authority over the budget of the New Energy Challenge Program.

Today's basic science research will provide the foundation for tomorrow's energy technologies; we need to commit to these investments.

## John Doerr

Partner, Kleiner Perkins Caufield & Byers

"My venture capital firm, Kleiner Perkins, helps entrepreneurs turn breakthrough innovations into new technology companies, creating more than 400,000 new jobs. American entrepreneurs have literally created the biotechnology and information technology industries, resulting overall in 12 million American jobs and worldwide prosperity.

Today, American companies are the world leaders in biotech and information technology. However, in new energy technologies, America has fallen well behind.

If you look at today's top companies in clean energy technology—in wind, solar, and advanced batteries—only 4 out of 30 are American. Comparing to IT, it's as if Microsoft, Apple, Google, and Intel were headquartered in Asia or Europe, and only Amazon was in the United States.

Why are we lagging so far behind? A key reason is inadequate energy technology research and development. Energy is a \$1 trillion part of the \$14 trillion U.S. economy. But America spends only about \$5 billion—about half a percent—per year on new energy R&D. That compares with \$30 billion spending per year of biomedical R&D, or nearly 8 percent of our national health budget. Sadly, America spends more on potato chips than we do on our new energy R&D.

To create and bring new technologies to market, the country also needs strong performance standards for autos, buildings, and utilities, and a carbon price signal to let companies know that polluting is not forever free. I am convinced these policies will usher a vast array of new technologies, and give our country the energy options we need.

We can no longer afford to neglect energy technology or climate policy. The economic stakes are enormous. And the climate threats are far more serious and more urgent than most people realize. If left unanswered, we confront catastrophic and irreversible climate change.

My partners and I believe new clean energy is the next great global industry. The world needs much more investment in and commitment to energy innovation. America must suit up, step up, and get serious about energy R&D if we're going to be a winner in this race.

*Sadly, America spends more on potato chips  
than we do on our new energy R&D.*

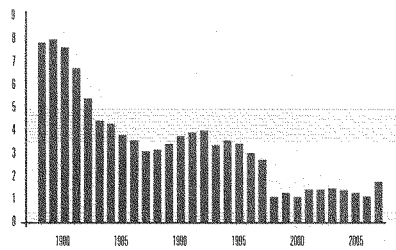
## THE PLAN: OUR RECOMMENDATIONS

## Recommendation Two:

Invest \$16 billion per year  
in clean energy innovation.

## Public Energy R&amp;D Spending, 1978-2007

Billion 2005 USD



Public spending on energy research and development has been in decline for 30 years, and is currently one-quarter of its high point in 1979.<sup>14</sup>

Innovation spending must relate the size of our energy market and its importance in driving our economy. We argue that our current underinvestment should be scaled to a minimum of \$16 billion per year. This is about \$11 billion more than we now spend in a typical year, and will put energy research, development and deployment (RD&D) closer to (though still well short of) other technologically intensive sectors; bring U.S. investment in line with those of its trading partners and competitors; and meet the bottom-up needs of major technologies.

The benefits of this investment will far outweigh the costs. By comparison, the United States sends \$16 billion overseas for petroleum every 16 days. Our recommended RD&D commitment represents about 3 percent of what the nation spent on the 2008 oil price shock in that year alone. At just 1.5 percent of U.S. energy sales, this figure still represents a significantly smaller share than most high-tech industries re-invest into innovation.

If this recommendation is not adopted, the others will not do much good. Incrementalism will neither fill the gaps, nor create the sweeping change this nation needs in energy. Bold action is required.

Numerous groups, from the National Academy of Sciences to the President's Committee of Advisors on Science and Technology, have studied energy innovation spending; all agree that large increases are necessary.

## Model budget:

To allow time for establishing the appropriate programmatic infrastructure, we envision a sustained budget ramp-up. Model five-year numbers are included below, with additional explanation in the Budget Details available online at <http://www.americanenergyinnovation.org>.

Model RD&D Budget (millions 2005\$)	2009	2009 ARRA	2010	2011 Request	Model Budget in 5 years
<b>Basic Energy Science</b> (with increases directed to Energy Frontier Research Centers, Innovation Hubs and other Centers of Excellence)	1,390	502	1,468	1,627	2,600
<b>Nuclear Fission</b> (advanced reactor technologies, fuel cycles, new modeling and simulation capabilities and waste management)	508	0	464	502	1,000
<b>Nuclear Fusion</b>	357	82	382	337	400
<b>Efficiency</b> (including buildings, transportation and industrial sectors)	716	648	844	823	2,100
<b>Renewables</b> (including solar, wind, bioenergy, geothermal and hydropower)	763	1,450	891	846	2,400
<b>Fossil Energy</b> (including carbon capture and storage, clean coal, natural gas and hydrates)	771	3,075	577	511	1,300
<b>Electricity Transmission and Distribution</b> (including electricity storage, smart grid, transmission and distribution)	111	654	143	154	1,200
<b>ARPA-E</b>	8	352	0	266	1,000
<b>RD&amp;D Subtotal</b>	4,624	6,763	4,769	5,066	12,000
<b>New Energy Challenge Program</b>	NA	NA	NA	NA	\$2,000
<b>Clean Energy Deployment Administration</b>	NA	NA	NA	NA	\$2,000
<b>Grand Total</b>					<b>\$16,000</b>

**How much money is needed?**

Several perspectives can help determine how much financing is needed to advance new energy technologies. All point to roughly the same total. We examine our nation's own annual energy expenditures along with the proportion devoted to R&D compared with other sectors of the economy; we compare R&D spending in the United States to that of other nations; and we examine the projected costs for several important technologies. The Report Notes have further details on each of these methodologies, as well as a justification for each of our budget's line items.<sup>9</sup>

**How can the nation ensure this money is spent well?**

America's track record of substantial, sustained money for health and defense research is instructive. Building on that experience, plus our own, we have learned what works:

1. Support for R&D must have multi-year commitments, which translate to multi-year appropriations. It is impossible to do serious R&D without assembling top-notch talent, building or buying equipment, conducting experiments, and validating results. None of this can be done well with year-at-a-time funding.
2. Research can be managed and tracked through pre-defined performance gates, to ensure that projects on course keep receiving support and those failing get terminated.
3. Support must be given to technologies that have real potential to scale. The federal government should focus on supporting technologies with potential for national impact—the sectors where there is a major gap between the best technologies available and the technical and economic potential.
4. Earmarks are counter-productive. Congress should fund broad programmatic areas rather than particular projects in specific districts. Competition within broader categories is healthy. This structure increases the likelihood that the best proposals will move forward.

5. Concentrated effort increases success rates. Our analysis of current federal energy R&D suggests that many programs fail, or are slow to succeed, because funds for R&D are spread across dozens of laboratories and universities. Program managers must be able to concentrate their resources in order to succeed.

**Innovation in health and defense has created jobs and economic growth**

The health and defense sectors show how America can spend innovation money effectively. The National Institutes of Health (NIH) is well funded out of the federal budget at around \$30 billion per year—which is about 75 percent of *global* spending in basic medical science. This commitment has developed many medicines that are now central to our people's health, and has also made America the leader in this vast industry. The budget of the NIH more than doubled in recent years, and the growth of NIH is instructive in thinking about how to build energy R&D. For example, the Institutes maintained a healthy level of competition for research grants throughout its period of budget expansion, ensuring that the quality and productivity of research was maintained or even increased.

Fully 80 percent of NIH's annual research budget supports work performed at university laboratories.<sup>10</sup> All resulting papers must be publicly available, thus allowing collaborations to emerge across disciplines and fueling innovation. As a result, NIH was instrumental in funding 15 of the 21 major breakthrough drugs from 1965 to 1992.<sup>11</sup> For example, Gleevec, arguably the most effective cancer drug of the past decade, was nearly abandoned by its private sector backer. Under NIH support, a cancer specialist at the Oregon Health and Science University continued the research that led to the drug's ultimate commercialization.

Another great story comes from the Defense Advanced Research Projects Agency (DARPA), which has been able to produce large-scale technologies in record time through its agile funding model and its risk-tolerant, idea-driven, outcome-oriented culture. The agency exemplifies the benefits of multi-year funding and relative insulation from the political process. DARPA made investments in the technology and infrastructure that gave birth to the Internet. This required collaboration with professors at MIT and UCLA, as well as several private companies, and that required an innovation model that encourages such collaboration.

*Incrementalism will not fill the gaps nor create the sweeping change this nation needs in energy.*

## Last year, more than 30 Nobel laureates called

the President's attention to the need for a sustained increase in federal clean energy innovation spending, emphasizing that "stable R&D spending is not a luxury." This group of prominent American scientists also recommended that the federal government spend \$15 billion per year on clean energy innovation.

Many other expert panels and respected studies have called for sustained increases in federal investment in energy innovation.

2x

The President's Council of Advisors on Science and Technology and the National Commission on Energy Policy in 1997 and 2005 recommended a doubling of spending.

4x

Several studies between 1999 and 2003 looking at options value and risk mitigation recommended a fourfold spending increase.

3x-6x

The International Energy Agency in 2009 recommended a three- to sixfold increase for all countries in the Major Economies Forum.

6x-9x

The Intergovernmental Panel on Climate Change recommended in 2000 a six- to ninefold global increase.

5x-10x

A University of California analysis in 2006 recommended a five- to tenfold increase for the United States.

3x

Our report, by way of comparison, recommends an increase to about three times today's levels.

THE PLAN FOR AMERICAN ENERGY INNOVATION

## Recommendation Three:

### Create Centers of Excellence with strong domain expertise.

Concentrating resources and intelligence will drive new technology development. Innovation in the energy field relies on many factors—expensive equipment, corps of well-trained scientists and engineers, strong leadership, the ability to attract the best young minds, flexibility in the allocation of research funds, and multi-year time horizons. These are all necessary for the scale and speed of innovation required. Development can slow or stall for a specific technology if its research budget is spread across a dozen national laboratories. Success requires a point of confluence for new ideas.

America's great research universities can serve as natural homes for these Centers. National labs can also provide homes for these Centers of Excellence—they allow open access to testing equipment and partner with the private sector through Cooperative Research and Development Agreements.

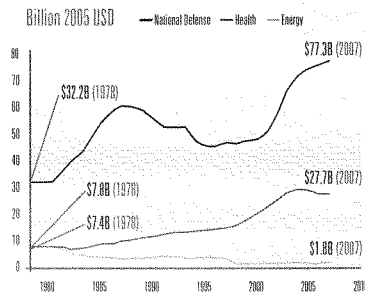
One example of a university-centered Center of Excellence is North Carolina's Research Triangle. Anchored by three universities with significant R&D programs, the Triangle attracts major public (e.g., the National Environmental Health Science Center) and private (e.g., DuPont, GlaxoSmithKline and Burroughs Wellcome) research attention. The region features some \$1.2 billion in annual research, as well as the infrastructure and skilled labor pool resulting from the critical mass of expertise. Among the most significant local accomplishments are the discoveries of the anti-cancer drug Taxol, and AZT, a drug to fight HIV-AIDS.

These concentrations can also surround the Department of Energy's national labs. The Combustion Research Facility (CRF) at Sandia National Laboratory provides an example. With advanced equipment to analyze engine combustion conditions, the CRF has become the world leader in the field, and has made significant advances in vehicle fuel economy and vehicle emissions reductions. Its industrial partnerships have enabled American companies to lead in the truck engine business.

Success requires a point of confluence for new ideas.

Federal spending on defense R&D is more than 30 times greater than spending on energy R&D; health care spending is 10 times greater.<sup>12</sup>

### Federal R&D Spending in National Defense, Health, and Energy



Similar success could be had for other energy technologies. To this end, we applaud the strategic direction of the Department of Energy's newly created Energy Innovation Hubs, which have been funded with \$22 million in 2010 and \$25 million annually for subsequent years. However, these hubs and additional centers of excellence need to be supported with real money—hundreds of millions of dollars, not tens of millions.

Structured along the lines described above, these centers can drive technologies down all three phases of the learning curve: funding for pilot-scale energy research will encourage breakthroughs; labs and equipment—made available to academics and private industry alike—will test the scalability of new energy technologies; and partnerships to share intellectual property will help bring technologies to market. Program managers at these centers need the power to make quick decisions in order to follow the most promising leads and abandon dead ends.

Energy Centers of Excellence should focus on a handful of specific technology areas with great promise, including solar photovoltaics, concentrated solar power, wind power, advanced energy storage, clean vehicles, transportation systems, and carbon capture and sequestration, in addition to the Energy Innovation Hubs selected by the Department of Energy for 2010 (fuels from sunlight, efficient energy buildings systems design, and modeling and simulation for nuclear reactors).

In order to function effectively and deliver results, each of these centers will require annual funding in the range of \$150 million to \$250 million as a part of the total \$16 billion energy innovation budget.

## THE PLAN: OUR RECOMMENDATIONS

## Recommendation Four:

## Fund ARPA-E at \$1 billion per year.

The Defense Advanced Research Projects Agency (DARPA) is legendary for its innovation. As the research arm of the Department of Defense, it is responsible for early investments in computer networking, the Internet, virtual reality, and artificial intelligence. Several factors explain DARPA's success:

- The review process for funding technology is internal, lean and fast.
- It has a risk-taking culture, and it is idea-driven and outcome-oriented.
- Congress grants it significant money but remains relatively hands-off. The work is not constrained by earmarks or excessive scrutiny; this freedom fosters creativity.
- Its bottom-up governance focuses on hiring an eclectic, world-class managerial and technical staff.

The Advanced Research Projects Agency-Energy (ARPA-E) applies the same principles to the energy sector that have made DARPA successful in the defense sector. ARPA-E, a recommendation of the *Gathering Storm* report, was established by the Department of Energy. It focuses exclusively on high-risk, high-payoff technologies that can change the way energy is generated, stored, and used. Projects are selected for their potential to make rapid progress toward commercialization, and funds are not extended without demonstrable progress within two or three years.

ARPA-E is designed to follow DARPA's highly entrepreneurial approach to RD&D by funding scientists and technologists to accelerate immature energy technologies with exceptional potential. ARPA-E does not fund discovery science, nor does it

In ARPA-E's first year of operation, the agency only had funds to support 37 of the 3,700 proposals it received—just 1 percent.

support incremental improvements to current technologies. Its managers take a hands-on approach to managing the funded program activities. Authorized in 2007 without an initial budget, ARPA-E received stimulus funding of \$400 million for two years over 2009 and 2010. For 2011, the Department of Energy has requested \$300 million.

ARPA-E provides support for early-stage energy innovation. Administrators especially hope to receive proposals from companies, laboratories, and universities that have formed interdisciplinary partnerships. The amount of ARPA-E funding provided to a particular project can range from \$500,000 to \$10 million. In ARPA-E's first year of operation, the agency only had funds to support 37 of the 3,700 proposals it received—just 1 percent. The second round of awards funded less than 7 percent of applicants in just three focus areas—biofuels, carbon capture, and batteries for electric vehicles.

For example, ARPA-E is supporting Nalco Co. of Naperville, IL, to develop a new process to capture carbon in the smokestacks of coal-fired power plants, building on a partnership the company already has with Argonne National Laboratory. The objective of the project is to use less energy to capture 90 percent of a coal plant's CO<sub>2</sub> emissions at a lower cost. If successful, this new technology will cut carbon capture costs at coal-fired power plants by as much as half, making it more affordable for such plants to clean up their emissions.

ARPA-E is asking innovators to come up with truly novel ideas; it is looking for "game changers." The program has high potential for long-term success, but only if it is given the autonomy, budget, clear signals of support, and ability to implement needed projects. We believe a multi-year commitment at a \$1 billion annual level would be well invested as a part of the recommended \$16 billion total.

## Norman R. Augustine

Retired Chairman and CEO, Lockheed Martin Corp.  
Former Undersecretary of the Army

Among the more likely causes of future military conflicts are disruptions in the supply of energy and environmental change. The latter includes, but is not limited to, massive human migrations due to rising ocean levels, shortages of water and the emergence of arid regions no longer suitable for the production of food. As history has shown, desperate people take desperate measures, which can portend a highly unstable political/military situation on our planet.

Properly channeled, technology can present part of the answer to such a turbulent global circumstance by providing clean, affordable, sustainable and secure sources of energy. But this can only be accomplished by investing in research and development—particularly research and development that has high potential payoff but of the type that, unfortunately, is often accompanied by high risk. Endeavors of this type are generally unattractive investments for the private sector, yet clearly serve the public good. This is exactly the kind of effort for which government must step in and provide the needed financial investment.

This is particularly true in transitioning concepts with promising results but substantial remaining risk from the exploratory phase into the prototype phase—and eventually into the operational phase. The "gaps" inherent in this process are often referred to as the "Valley of Death," due to the difficulty of obtaining commercial funding—not to mention the technical challenges to be met.

One highly successful approach to bridging these gaps is the Department of Defense's Advanced Research Projects Agency (DARPA). It is there that such concepts as stealth and the Internet were spawned. The Department of Energy has now created a corresponding activity known as ARPA-E ("Energy"), which, if adequately funded, promises disproportionately great returns.

One thing that is clear based upon my own career in industry and government is that when faced with major challenges of high technological content in a time of austerity, the last thing one should underfund is R&D...to do so is the equivalent to removing an engine from an overloaded aircraft in order to reduce its weight.

## THE PLAN FOR INNOVATION

## Recommendation Five:

## Establish and fund a New Energy Challenge Program to build large-scale pilot projects.

America's energy innovation ecosystem lacks a mechanism to build, test, and refine large-scale technologies.

Many technologies that need demonstration assistance are too big, expensive or risky to go forward by traditional means. A single nuclear plant, or a coal plant that captures and stores carbon, can cost several billion dollars. Large scale projects carrying significant technology risk, when combined with public resources, create high visibility and intense scrutiny—which in turn add the chance of political interference. Simply put, the United States does not have the capacity to rapidly demonstrate large-scale, capital-intensive energy technologies. The nation needs to fix these institutional challenges or it will not develop the large-scale energy options that our system so urgently needs.

We propose a new institution, the New Energy Challenge Program, to accelerate advanced energy technologies to commercial or near-commercial scale. This program would operate as a publicly owned, private corporation outside of the federal government, and it would report to the Energy Strategy Board. It would apply specifically to energy projects with large system sizes, and it would focus on the transition

from pre-commercial, scalable energy systems to integrated, full size system tests. The New Energy Challenge Program would draw on a broad range of expert perspectives and a set of financial, technical and management tools, with two main tasks: (1) to create detailed technology commercialization roadmaps for priority technologies determined by the Energy Strategy Board, with the specific roadmaps to inform the National Energy Plan as well as particular demonstration projects; and (2) to commission, finance and build first-of-kind commercial scale advanced energy facilities.

### Staff and funding

We recommend funding the New Energy Challenge Program with a single appropriation of \$20 billion over 10 years. This commitment of resources, while decidedly large, should be weighed against the private sector investments it would unleash to transform our energy system over the next half century. The New Energy Challenge Program would leverage public resources to attract private capital and would participate in profits generated from successful activities. Private dollars would be committed on a per-project basis and individually negotiated once its strategic plan is established.

The New Energy Challenge Program would need strong support from the highest levels of industry and government. As discussed in Recommendation 1, it would employ a small management team and bring in top professionals from all relevant fields—scientists, engineers, financiers, risk managers, and the like. Much like DARPA, ARPA-E and other engines of innovation, the New Energy Challenge Program would explicitly not be a long-term career destination for its staff, but rather a place for the best and brightest professionals to interact with the most talented minds in the industry and work on high-priority national projects.

#### Structure and operations

The New Energy Challenge Program would have two areas of focus:

1. **Technology Assessment Working Groups** would be charged with developing and updating commercialization plans for the high priority technology arenas determined by the Energy Strategy Board. Modeled on the effective public-private technology collaboration that SEMATECH achieved in the semiconductor industry, this group would engage leaders from the relevant technology domains (e.g., advanced nuclear, CCS, wind, solar, etc.) and develop detailed technology development plans or roadmaps. The working groups would need a high degree of independence from industry lobbying, and political forces. Best-in-class analytical and research capabilities will be necessary. Within this structure, key activities would include:
  - Assessing the long-term potential of various energy technologies, including price performance and scalability
  - Developing roadmaps for the most promising options
  - Engaging with international partners on their activities and identifying opportunities for collaboration

The Technology Assessment Working Groups would hire only a small core staff, supported by program teams recruited from industry, finance and academia and seconded by DOE offices, the national labs, and other federal government departments.

2. **The Technology Demonstration Initiative** would be the heart of the New Energy Challenge Program's effort. These Demonstration Initiatives would be set up to commission (through competitive proposals), fund, and facilitate the construction of the large-scale energy demonstration technologies identified by the Energy Strategy Board. These projects would be designed to test multiple technology pathways and move forward large-scale demonstrations of the most promising options. Discretion to undertake projects that are smaller or more pilot in nature would also be allowed to resolve important stumbling blocks. Other attributes of the Technology Demonstration Initiative would include:
  - Each Initiative would be overseen by New Energy Challenge Program management, but program teams would have a great degree of decision-making autonomy.
  - The programs must be designed to bring in private sector partners without inhibiting the sharing of relevant information to the public.
  - Each Initiative would be authorized to pursue beneficial international cooperation.

In addition to these elements, The New Energy Challenge Program should have flexibility to employ a range of financial tools, but it would prioritize direct equity investments negotiated on a case-specific basis with private sector partners. This organization should have explicit support from the White House and Congress to freely seek independent partnership opportunities with other government agencies and with industry. Through its private-sector partners, the Technology Demonstration Initiative would offer project management services and technical resources to help accelerate and improve the design and construction of facilities. It would work to enable fast-track siting and construction opportunities within utilities or public power agencies (e.g., TVA), on federal or military lands, or even overseas through international partners in some cases.

The United States currently does not have the capacity to rapidly demonstrate large-scale, capital-intensive energy technologies.

## FUNDING RD&D

There is no way to make the progress this country requires on energy technology without increasing RD&D budgets. The federal deficit means that it is very tough to find those funds. This section suggests methods to meet the challenge.

First and most important, we believe that underfunding RD&D is an exercise in gross fiscal irresponsibility. The oil embargoes of the 1970s caused recessions that cost this nation more than a trillion dollars—yet we invest tiny sums in reducing petroleum dependence. The country sends \$1 billion overseas *every day* to purchase oil, but publicly funded research in advanced vehicles and alternative fuels totals just \$680 million annually—about 16 hours worth of oil imports. Blackouts cost the economy over \$1 billion each, yet the nation typically spends only \$170 million per year on electricity delivery and reliability. We will not save money by starving ourselves of future options.

Second, we believe that energy innovation should be financed from within the energy system. Our recommendations would total just 1.5 percent of the U.S. energy bill. This is a healthy jump from today's levels, but is still about one-tenth as much, as a fraction of sales, as other high technology industries.

The energy system should finance its own innovation—for three reasons:

- It is good economics to peg investments to the systems that generate social costs.
- Funding RD&D from sales is the normal way to build new technologies. The costs are more a user fee than a tax.
- Investment success in RD&D will pay off through lower energy bills.

There are several options for financing this investment. When there is a system to reduce greenhouse gas emission in the United States, it will likely generate revenue—in the form of permit sales, for example. The first \$16 billion of these greenhouse gas revenues should be devoted to RD&D—because new technologies will make it far cheaper to reduce emissions. This is a virtuous cycle.

The United States employs other user fees on the energy system today that could be expanded. Wires charges (a small fee on electricity sales) are a natural way to finance improvement in the electric sector, just as gasoline taxes pay for transportation infrastructure. Reducing today's subsidies to fossil fuel industries could also cover much of the distance.

The essential requirements, though, are that we make the basic investment, and that we commit these funds, steadily, over the long term.

## MEASURING SUCCESS

Monitoring progress in stimulating energy innovation will be critical for adjusting to new conditions, making midcourse corrections, and maintaining accountability. Below we outline metrics to chart progress in the short, medium, and long term for each of our five recommendations.

America's energy innovation ecosystem lacks a mechanism to turn advanced ideas or prototypes into commercial-scale facilities.

**Recommendation 1:**  
**Create an independent national Energy Strategy Board.**

**Short term:** Have we convened the Energy Strategy Board? Is it appropriately independent and does it have access to capital?

**Medium term:** Has the Energy Strategy Board developed a National Energy Plan with concrete and measurable goals? Has it provided guidance to the New Energy Challenge Program to deploy large-scale pilot energy projects? Has the secretary of energy responded to the National Energy Plan? Has Congress reviewed the plan and begun to adjust policy accordingly? Has the energy innovation community responded to the Plan?

**Long term:** Has the Plan been updated to account for new technologies? Have the Plan's goals been met?

**Recommendation 2:**  
**Invest \$16 billion per year in clean energy innovation.**

**Short term:** How much money is the nation investing in energy RD&D?

**Medium term:** Are investments driving down prices for the most critical energy technologies? Have the technologies met and passed performance gates?

**Long term:** Are key technologies being built and sold at a reasonable price? Are low-carbon technologies being deployed at sufficient scale?

**Recommendation 3:**  
**Create Centers of Excellence with strong domain expertise.**

**Short term:** How many Centers of Excellence have been created? How much funding are they receiving?

**Medium term:** What innovations have been pioneered by the Centers of Excellence? Are they using funds efficiently? Are the Centers catalyzing productive relations between government bodies, universities and the private sector?

**Long term:** Are technologies developed by the Centers for Excellence competitive in price and being deployed widely? Are the Centers the nucleation points for industry? Are they, in effect, new Research Triangles or Silicon Valleys for energy?

**Recommendation 4:**  
**Fund ARPA-E at \$1 billion per year.**

**Short term:** How much funding is ARPA-E receiving? How many projects is it supporting?

**Medium term:** What innovations have been pioneered by ARPA-E? Is the project using funds efficiently?

**Long term:** Are technologies developed by ARPA-E competitive in price and being deployed widely?

**Recommendation 5:**  
**Establish and fund a New Energy Challenge Program to build large-scale pilot projects.**

**Short term:** Has a New Energy Challenge Program been established and funded? Does it have Congressional and White House support to operate nimbly and quickly? Has it successfully assembled a group of experts and launched a series of roadmaps? Has it brought in private sector resources to support its mission?

**Medium term:** Have the technology roadmaps successfully informed the National Energy Plan and the Technology Demonstration Initiatives? Are the initiated projects meeting cost, performance and schedule milestones? Has the NECP established international partnerships? Is the Program maintaining an appropriate risk profile?

**Long term:** Are there follow-on projects from the Program's first-of-kind projects? Has the organization maintained strong private sector participation and financial support? Are supported projects operating at capacity, generating clean power for the American economy and sequestering harmful greenhouse gases?

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## Chad Holliday

Former Chairman and CEO, DuPont  
Chairman, Bank of America

The Montreal Protocol was an international treaty that worked: it saved the ozone layer from destruction. The crisis was real, the science was clear, and the culprit—in the form of fluorinated gases, called CFCs—was obvious.

We knew the world had to stop producing CFCs, and fast. DuPont was the world's leader in making these chemicals, so our business confronted a defining challenge. DuPont used this emergency to invent entire new businesses. We found substitutes for CFCs, and these new substitutes formed the core of a half-dozen new business lines. In fact, we beat every target we set.

The point is that a serious goal, supported by strong public policy, made our mission clear, and with a clear mission, American businesses can do just about anything. To be sure, our energy and climate challenges are far rougher than the ozone hole. But that makes it even more important to get going now, to create smart policies, and to let our businesses get to work. As with the ozone hole, time is of the essence. Our options for dealing with the climate challenge diminish every year—so let's get started.

*The point is that a serious goal, supported by strong public policy, made our mission clear, and with a clear mission, American businesses can do just about anything.*

## CONCLUSION AND PAYOFF

Energy innovation is a commitment to long-term prosperity. If the United States invests in its clean energy future now, our nation can reap immense benefits. We have seen this work in other sectors, and it can work in energy. Public- and private-sector innovators have made miracles happen right here on home soil—Americans developed the computer and the Internet, delivered air and space travel and decoded the human genome. Standing on their shoulders, we can see a clean energy future within reach. By scaling the good technologies of today and discovering new technologies that do not yet exist, we have an opportunity to achieve a similar miracle in energy.

On the other hand, if we starve energy research, there is no doubt that this country will have constrained future options. The national energy system is almost unfathomably large, and it will take many decades for its sunk investments to turn over. Today's investment decisions on transportation systems, power plants, buildings, and factories have the effect of locking in long-term consequences for our economy, national security, and environment. There is vast room for improvement in our energy system.

The American way is to invent our future, to seize control of our destiny. In the energy realm, that means a step-function change in the way we innovate. As Americans, we all need to create new patterns in power, transportation, manufacturing, and housing that strengthen—rather than undermine—our national security and economic health.

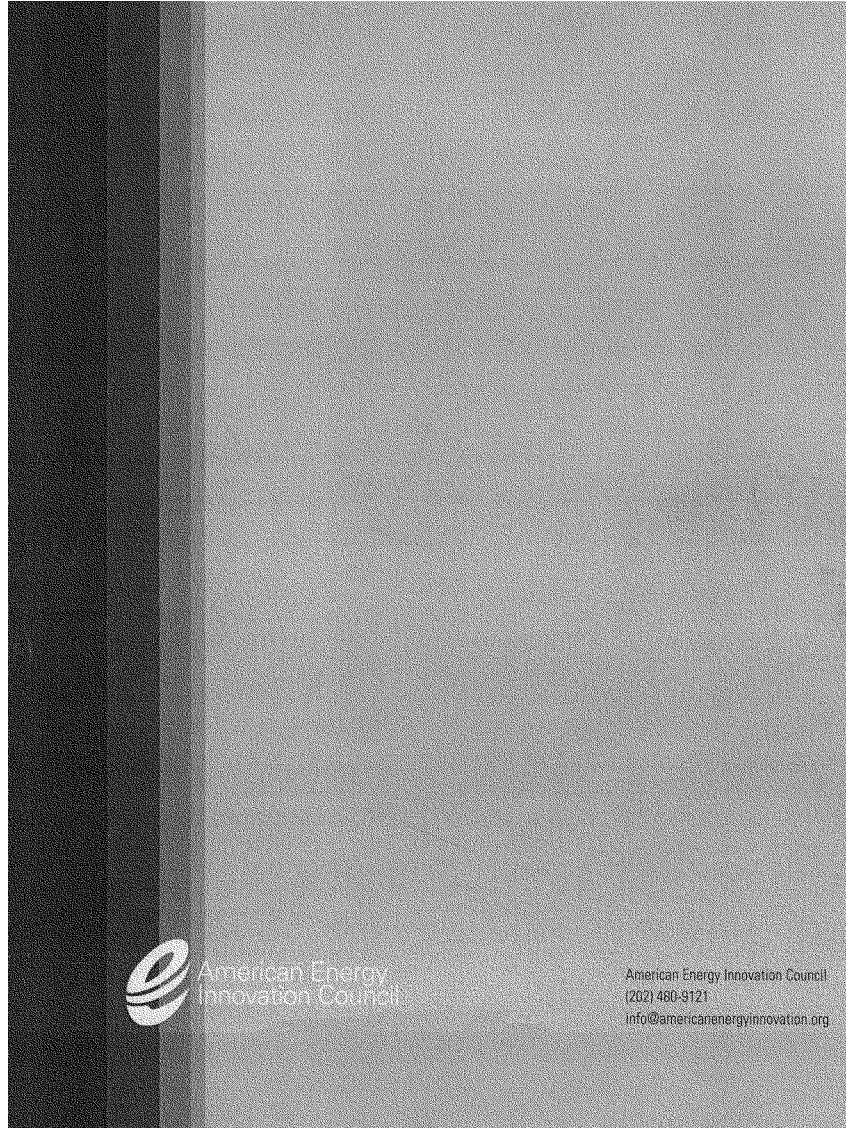
The recommendations in this report are specific and affordable. They are not especially difficult, and they need not inspire a partisan battle. The recommendations reflect hundreds of years of private sector management experience, and the seasoned advice of scientists, academic leaders, government lab directors, and energy specialists.

We call upon the Congress and the president to act on these recommendations. We stand ready to help with further consultation, design, and implementation.

## ENDNOTES

1. Figure Source: (1) National Science Foundation Data table 36. Federal research and development obligations, budget authority, and budget authority for basic research, by budget function: FY 1955–2009. [http://www.nsf.gov/statistics/nsf08315/content.cfm?pub\\_id=3880&id=2](http://www.nsf.gov/statistics/nsf08315/content.cfm?pub_id=3880&id=2)
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The American way is to invent our future,  
to seize control of our destiny.



That is because today the Federal commitment to energy research and development is less than one-half of one percent of what consumers in this nation spend every year in energy. U.S. research and development needs the proper investment in order to help us diversify our energy sources in the future and keep consumer costs down.

We will hear from Mr. Augustine that China is expected to surpass us in research and development in the next five years and now the United States ranks 29th among developing nations with Federal research and development. So I hope, if we are holding ourselves accountable, we will look at how we compare to the rest of the world.

The House recently passed a version of the America Competes Act that would actually cut ARPA-E funding research in half, so I do not think that is how we compete. In fact, one of my constituents, Bill Gates, and the CEO of Cummings Engineering, led a charge in 2010 to say that ARPA-E should actually be increased in a significant way if we are going to usher in the innovation and job growth that is going needed to advance our energy market. The Department of Energy needs to make sure that we are collaborating on a variety of issues with ARPA-E, and it seems to me that my colleagues in the House seem intent in rolling back the clock.

One of top scientific advisor for President Roosevelt, who was a key figure in launching the Manhattan Project, said, "Advances in science when put to practical use mean more jobs, higher wages, and shorter hours ... but to achieve these objectives—to secure a high level of employment, to maintain a position of world leadership—the flow of new scientific knowledge must be both continuous and substantial." I could not agree more.

We have one of our witnesses here today from the Northwest, Commissioner Colleen McAleer, from the Port of Port Angeles. The Commissioner and her colleagues at the port are working on innovation in composite materials that help improve fuel efficiency whether you are talking about aerospace or you are talking about automobiles, and that market is expected to grow to \$26 billion by next year.

How the Department of Energy's Advanced Manufacturing Office and its laboratories who work with economic development and translate their scientific capabilities into real world economics value is something that we need to talk about today in helping us move our energy efforts forward.

It is also important and very timely that we talk about our investment in cyber security. Last week we discovered over 4,000,000 Federal employees' personnel files were hacked. The breach only underscores the persistent and constantly evolving threat from cyber. So it is very important that we talk this morning about that particular issue, as it relates to the grid, because it is a target. The Department of Energy has an underappreciated role in addressing this threat and has piloted ways to engage industry in technology development, and information sharing on the security supply chain. I hope that we will be able to talk about research and development and efforts for enhanced grid security on today's agenda.

So again, thank you, Madam Chair, and I thank the witnesses for being here today to talk about this broad subject area that we have before us.

The CHAIRMAN. Thank you, Senator Cantwell.

Let us begin with our witnesses. Welcome to each of you. We will have an opportunity for five minutes of testimony from each of you. Your full statements will be included as part of the record. Once you have all given your initial opening statements, we will move to the Committee members for questioning.

This morning we have the Honorable Lynn Orr, who is the Under Secretary for Science and Energy at the U.S. Department of Energy. Next to him we have Ms. Colleen McAleer, who is Commissioner at Port of Port Angeles in Washington State. Mr. Norm Augustine has appeared before this Committee many times. Welcome, Mr. Augustine, as a member of the Bipartisan Policy Center. We also have the Honorable Karen Harbert, who is the President and CEO of the Institute for the 21st Century Energy. Mr. Duane Highley is the President, CEO and Chief Affordability Officer for the Electric Cooperatives of Arkansas, welcome. Finally, we have Mr. Mark Mills, who is Senior Fellow of the Manhattan Institute for Policy Research. Welcome to each of you.

Deputy Secretary Orr, if you would like to start the panel off this morning, we welcome your comments. Thank you.

**STATEMENT OF HON. LYNN ORR, UNDER SECRETARY FOR  
SCIENCE AND ENERGY, U.S. DEPARTMENT OF ENERGY**

Dr. ORR. Thank you very much, Chairman Murkowski, Ranking Member Cantwell and members of the Committee. I appreciate the opportunity to testify today on behalf of the Department of Energy regarding energy accountability and reform legislation.

As I know you know, the United States energy landscape is undergoing a period of rapid transition. We're now the largest combined producer of oil and gas in the world, and our oil imports are the lowest they've been in over 40 years. Natural gas use in power generation has significantly increased, and U.S. liquefied natural gas exports are scheduled to start within a year. Wind and solar power generation have grown dramatically, vehicles have reached historical levels of efficiency and ethanol is now ten percent of U.S. gasoline supply.

While these dramatic changes have created enormous opportunities, they also pose a set of challenges and opportunities for energy policymakers, investors, non-governmental organizations and industry. These opportunities and challenges come in many forms. And addressing them will require action by many parties including Congress, the private sector and the public sector. And the need for action is urgent as the impacts of climate change threaten our economy, environment and national security.

To work to combat these impacts, the Department of Energy is leading efforts to move to a low carbon future in support of the Administration's all of the above approach to energy and climate action plan. The Department carries out this work by collaborating with some of the nation's best innovators and businesses to support high impact applied research development and demonstration activities. This includes the experts at DOE's 17 national laboratories

which carry out cutting edge research and development to advance the nation's most complex challenges in science, energy, national security and environmental management.

With Congress' support the Department implements a range of strategies aimed at reducing U.S. reliance on oil, saving American families and businesses money, creating jobs and reducing pollution. In the last year we've seen some important accomplishments across the Department's technology portfolio that highlight this all of the above approach.

Let me just name a few. We've sequestered, geologically, ten million metric tons of CO<sub>2</sub> through DOE-supported projects. We have two commercial-scale, cellulosic ethanol facilities supported by DOE grants or loan guarantees that have now begun operations. We've commissioned one of the world's largest battery storage systems at the Tehachapi Wind Energy Storage Project, and we've successfully completed the first five-year program at the Consortium for Advanced Simulation of Light Water Reactors, CASL, which continues to work toward design and licensing support of small modular nuclear reactors with advanced safety features.

So as Under Secretary for Science and Energy, my job is to coordinate DOE's scientific research efforts and our portfolio of applied energy research and development as we transition to a low carbon future. My office is working to enhance the productive links amongst the science and energy programs as we build and execute the Department's research, development, demonstration and deployment activities.

Now this is particularly important because fundamental science underpins absolutely everything we do in the energy sector, and the world of energy applications is rich with opportunity to put the science to work and also for energy applications to illuminate the opportunities for science that could have game changing impact.

Senator Cantwell's quote of Vannevar Bush resonated with me the investments we make in fundamental science will pay off in all kinds of ways that we don't foresee exactly right now but are fundamental to our ability to compete in the global world that's ahead of us.

The Committee is taking on a yeoman charge of a broad range of 42 bills today, the majority of which have some kind of connection to the Department of Energy. I'd be happy to try to answer your questions to the extent that I can this morning. I appreciate the ongoing bipartisan efforts to address our nation's energy challenges, and I look forward to working with the Committee.

[The prepared statement of Dr. Orr follows:]

**Statement of Dr. Lynn Orr  
Under Secretary for Science and Energy  
U.S. Department of Energy**

**Before the  
Committee on Energy and Natural Resources  
United States Senate**

**June 9, 2015**

**Introduction**

Chairman Murkowski, Ranking Member Cantwell, and Members of the Committee, thank you for the opportunity to testify today on behalf of the Department of Energy regarding energy accountability and reform legislation.

In support of the Administration's all-of-the-above approach to energy and the Climate Action Plan, DOE is leading efforts to move to a low carbon future and doing so by working with some of the Nation's best innovators and businesses to support high-impact applied research, development, and demonstration activities.

With Congress's support, the Department implements a range of strategies aimed at reducing U.S. reliance on oil, saving American families and businesses money, creating jobs, and reducing pollution. We work to ensure that the low carbon technologies of today and tomorrow are invented and manufactured in America.

As Under Secretary for Science and Energy, my job is to coordinate DOE's scientific research efforts and our portfolio of applied energy research and development (R&D) as we transition to a low carbon future. Fundamental science underpins everything we do in the energy sector, and the world of energy applications is rich with opportunity to put the science to work, and also for energy applications to illuminate the opportunities for science that could have game-changing impact. My office is working to enhance the productive links among the science and energy programs as we build and execute the Department's research, development, demonstration and deployment activities.

I have been asked to testify on a package of bills related to energy accountability and reform. The Committee is considering a broad range of 42 bills today, the majority of which have some nexus to the Department of Energy. The Administration continues to review all of these bills and has not formulated a position on them.

I appreciate the ongoing bipartisan efforts to address our Nation's energy challenges, and I look forward to working with the Committee.

### **Energy Landscape**

There has been an energy revolution in the United States over the last decade. We are now the largest combined producer of oil and gas in the world and our oil imports are the lowest they have been in more than 40 years. Natural gas use in power generation has significantly increased and U.S. liquefied natural gas exports are scheduled to start within a year. Wind and solar power generation has grown dramatically, vehicles have reached historic levels of efficiency, and ethanol is now ten percent of U.S. gasoline supply.

The United States is, however, at an energy crossroad. As noted, our energy landscape is dramatically changing with implications for all parts of the energy sector and our economy as a whole. The rapid and dramatic changes in the Nation's energy landscape have created enormous opportunities. At the same time, they pose a set of challenges and opportunities for energy policy makers, investors, non-governmental organizations and industry. These opportunities and challenges come in many forms, and addressing them will require action by many parties, including Congress, the private sector, and public sector.

The Committee's last several hearings have focused on broad topics such as energy infrastructure, energy supply, and today on energy accountability and reform. Over the past year and a half, the DOE has led an Administration wide effort focused on the energy issues facing our Nation, specifically on infrastructure in the first installment of the Quadrennial Energy Review (QER). As you know, this first installment of the QER was released in April and, the Secretary testified in front of this Committee days after its release.

### **Quadrennial Energy Review (QER)**

The first installment of the QER focuses specifically on the critical energy infrastructure that serves as the backbone of our nation's system for energy transmission, storage, and distribution. The development of the QER underscores the strong public interest in advancing key national goals of jobs, competitiveness, energy security and a cleaner energy future. It also provides policy makers with a roadmap for meeting key energy objectives: enhancing energy infrastructure resilience, reliability, safety and security; modernizing the electric grid and our energy security infrastructures; and improving "shared" energy infrastructures—railways, waterways, ports and roads—that move both energy and other commodities. Several crosscutting themes were also considered, including jobs, the environment, infrastructure siting, and integration of North American energy markets.

Some recommendations within the QER will require new authority from Congress, and we look forward to working with you on those issues, which include, but are not limited to:

- Financial assistance to help states make cost-effective improvements in the safety and environmental performance of natural gas distribution systems, focusing on offsetting incremental costs to low-income households and enhanced direct inspection and maintenance programs.
- Updating Strategic Petroleum Reserve release authorities to reflect modern oil markets, and funding for necessary infrastructure life extension and enhanced incremental distribution capacity.
- Analyzing the risks associated with the loss of large power transformers and approaches for mitigating this risk, possibly including the development of one or more transformer reserves, which would require congressional authorization.

To help guide the work of this Committee, a summary version of the QER was developed for policymakers. I ask the Chairman's permission to submit this summary for the record.

#### **Quadrennial Technology Review (QTR)**

Later this summer, DOE will complete the second-ever Quadrennial Technology Review (QTR). The QTR will offer a comprehensive analysis of energy technology trends and opportunities, with a focus on identifying the research, development, demonstration, and deployment pathways that will help the Nation achieve greater energy, economic, and environmental security. We look forward to briefing the findings of the QTR for the Committee and your Senate colleagues.

#### **All-of-the-above Approach**

An essential focus of the Department of Energy is helping our nation lead the transition to a clean, low carbon energy economy in order to enhance our energy security and mitigate the impacts of climate change. The Department serves this goal principally through supporting advancements in science and technology across the energy spectrum.

In the last year, we have seen important accomplishments across the Department's technology portfolio that highlight this all-of-the-above approach. We have geologically sequestered 10 million metric tons of CO<sub>2</sub> through DOE-supported projects. Two commercial-scale cellulosic ethanol facilities supported by DOE grant or loan guarantees have commenced operations. We have commissioned one of the world's largest battery storage systems at the Tehachapi Wind Energy Storage Project. ARPA-E's grant program has attracted more than \$850 million in private follow-on funding to 34 projects, with 30 ARPA-E teams forming new companies.

The Office of Energy Efficiency and Renewable Energy (EERE) has launched the Frontier Observatory for Research in Geothermal Energy (FORGE), a first-of-a-kind field laboratory to deploy enhanced geothermal energy systems, and the first round of awardees was announced last month. The Office of Nuclear Energy has successfully completed the first five-year program at the Consortium for Advanced Simulation of Light Water Reactors (CASL) nuclear modeling

Hub at the Oak Ridge National Laboratory, and continues its work toward design and licensing support of a small modular nuclear reactor with advanced safety features.

I would like to take this opportunity to talk about a few existing programs that focus on the work represented by legislation being considered today.

#### **Office of Energy Efficiency and Renewable Energy**

EERE's energy efficiency portfolio seeks to improve the energy efficiency of the Nation's homes, buildings, and industries. The Building Technologies, Advanced Manufacturing, Weatherization and Intergovernmental Programs, and Federal Energy Management Program Offices develop and help provide businesses, consumers, and government agencies with innovative, cost-effective energy-saving solutions to improve their energy efficiency. This includes the development of higher-efficiency products, new ways of designing homes and buildings, and new ways of improving the energy intensity and competitiveness of American manufacturers. EERE's energy efficiency portfolio also supports better integrating the built environment with our energy system to combat costly peaks in energy demand and to increase the capabilities and value of buildings and facilities.

EERE's renewable power portfolio supports developing solutions to significantly increase the amount of cost-competitive electric power that is generated from renewable resources across the Nation. The Solar, Geothermal, and Wind and Water Power Technologies Offices within EERE help advance technology RD&D to cost-effectively harness the United States' abundant and diverse supply of renewable resources. While each renewable power technology has unique tradeoffs, EERE seeks to ensure the development of multiple renewable power technology options for every region of the country, enabling the U.S. to diversify its energy portfolio and better protect our environment and respond to the threat of climate change.

EERE's sustainable transportation portfolio supports research, development, and demonstration work and efforts to break down market barriers for a variety of domestic and cost-effective sustainable transportation technologies. Broadly, the Vehicle, Bioenergy, and Hydrogen and Fuel Cell Technologies Offices support two key parallel solution pathways: (1) using less energy to move people and freight and (2) replacing conventional fuels with cost-competitive, domestically produced, sustainable alternative fuels with lower greenhouse gas emissions. Because most petroleum use in the transportation sector occurs in personal vehicles and heavy trucks, EERE's portfolio emphasizes transportation technologies in these areas.

#### **Office of Electricity Delivery and Energy Reliability**

The Office of Electricity Deliverability and Energy Reliability's (OE) mission is to lead national efforts to modernize the electricity delivery system, enhance the security and reliability of America's energy infrastructure, and facilitate recovery from disruptions to the energy supply. OE leads the Department's efforts to strengthen, transform, and improve our energy infrastructure so that consumers have access to reliable, secure, and clean sources of energy. The

goal for the future grid is to provide a platform that delivers reliable, affordable, and clean electricity to consumers where they want it, when they want it, and how they want it.

To accomplish this vital mission, OE works closely with private industry and Federal, state, local, and tribal governments on a variety of initiatives to modernize the electric grid and enhance key characteristics of the U.S. electric transmission and distribution systems, which include:

- Reliability – consistent and dependable delivery of high quality power;
- Flexibility – the ability to accommodate changing supply and demand patterns and new technologies;
- Efficiency – low losses in electricity delivery and more optimal use of system assets;
- Resiliency – the ability to withstand and quickly recover from disruptions and maintain critical function;
- Affordability – more optimal deployment of assets to meet system needs and minimize costs;
- Security – the ability to protect system assets and critical functions from all hazards; and
- Minimal environmental footprint – grid system designs that reduce total environmental impact of grid components and connected systems.

Improvements to all of these operational capabilities, together with end-to-end protection from manmade and natural threats, are necessary for a modern and reliable grid.

#### **Office of Fossil Energy**

The Office of Fossil Energy (FE) advances technologies related to the reliable, efficient, affordable, and environmentally sound use of fossil fuels which are essential to our Nation's security and economic prosperity. FE leads Federal research, development, and demonstration efforts on advanced carbon capture, and storage (CCS) technologies to facilitate achievement of the President's climate goals. FE also develops technological solutions for the prudent and sustainable development of our unconventional domestic resources.

FE also manages the Nation's Strategic Petroleum Reserve (SPR). The SPR, with a capacity of 727 million barrels, serves as the largest stockpile of government-owned emergency crude oil in the world. The SPR helps ensure U.S. energy security by providing protection against disruptions in U.S. oil supplies. It also allows the United States to meet, in combination with commercial stocks, its International Energy Agency (IEA) obligation to maintain strategic oil stocks equal to ninety days of net oil imports.

In addition to the SPR, FE oversees the Northeast Home Heating Oil Reserve, which provides a short-term supplement to commercial home heating oil supplies in the Northeast in the event of a supply interruption.

### **Office of Science**

The Office of Science (SC) continues its distinguished history of making important investments in basic research, scientific user facilities, and facility construction across our six program areas:

- Advanced Scientific Computing Research (ASCR) supports research to discover, develop, and deploy computational and networking capabilities to analyze, model, simulate, and predict complex phenomena important to DOE.
- Basic Energy Sciences (BES) supports research to understand, predict, and ultimately control matter and energy at the electronic, atomic, and molecular levels in order to provide the foundations for new energy technologies.
- Biological and Environmental Research (BER) supports fundamental research and scientific user facilities to achieve a predictive understanding of complex biological, climatic, and environmental systems for a secure and sustainable energy future.
- Fusion Energy Sciences (FES) supports research to expand the fundamental understanding of matter at very high temperatures and densities and to build the scientific foundation of fusion energy.
- High Energy Physics (HEP) supports research to understand how the universe works at its most fundamental level by discovering the most elementary constituents of matter and energy, probing the interactions among them, and exploring the basic nature of space and time itself.
- Nuclear Physics (NP) supports research to discover, explore, and understand all forms of nuclear matter, including experimental and theoretical research to create, detect, and describe the varied forms of nuclear matter that can exist, including those that are no longer found naturally.

### **Other Topics of Legislation**

This hearing also includes bills that, while not under my direct purview, are related to DOE. There are several bills relating to the Loan Program Office, which issues loans and loan guarantees to accelerate the commercial deployment of clean energy projects and advanced vehicle manufacturing in the U.S. The program works with the private sector to fill a critical role in the marketplace because commercial banks and bondholders are often unwilling to finance the first few commercial-scale projects that use a new technology since there is not yet a history of credit performance or operation.

The LPO currently manages a more than \$30 billion portfolio of projects, including the first new nuclear power plant to be licensed and constructed in the United States in more than thirty years,

some of the largest utility-scale solar facilities in the world, dozens of retooled auto manufacturing plants producing some of America's best-selling vehicles, the world's largest solar thermal energy storage system, and many other ground-breaking projects. Overall, these loans and loan guarantees have resulted in more than \$50 billion in total project investment. As of March 2015, \$22.3 billion has been disbursed and \$5.4 billion of principal and interest has been repaid to the U.S. Treasury; actual and estimated losses to date represent approximately 2% of the more than \$30 billion of closed and committed loans and loan guarantees which compares favorably to the private sector.

Further, there are several bills regarding the national laboratories, of which 13 come within the purview of my office. In fact, I have been fortunate enough to visit all of DOE's national laboratories. The Energy Secretary has made it a cornerstone of his tenure to strengthen and enhance the relations between the Department and the national laboratories. To this end, we have established a regular strategic dialogue with the labs through leadership councils involving lab directors, Chief Operating Officers, and other key managers. Those coordinated efforts include standing up the National Laboratory Policy Council, which consists of the National Lab Directors Council leadership and senior Departmental leadership, and the National Laboratory Operations Board, led by the Office of the Under Secretary for Performance and Management which includes representatives from the labs' Chief Operating Officers and Chief Research Officers, as well as programs within the Department that steward labs.

There are also a number of ongoing efforts to review lab issues, including the congressionally directed Commission to Review the Effectiveness of the National Energy Laboratories and the Secretary of Energy Advisory Board, which is looking at important issues to keep DOE's national laboratories on the cutting edge of scientific development.

We are making good progress in these efforts, and are continuing to strengthen and enhance our national laboratory system, a priority that the Secretary and I share with you. While it is important to look at streamlining and improving the operations of our national labs, I am concerned that some of the proposed provisions in introduced legislation would weaken DOE oversight of the laboratories.

### **Conclusion**

Through research and development, deployment, and collaborations at all levels of government and the private sector, the Department of Energy aims to support an efficient transition during our Nation's energy revolution. While significant progress has been made, continued investments are necessary to capture the full set of opportunities.

The Administration looks forward to continuing to work with the Congress on bipartisan energy legislation to boost U.S. competitiveness and job creation.

Thank you again for the opportunity to be here today, and I would be happy to answer your questions.

## Summary

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# TRANSFORMING U.S. ENERGY INFRASTRUCTURES IN A TIME OF RAPID CHANGE: THE FIRST INSTALLMENT OF THE QUADRENNIAL ENERGY REVIEW

## SUMMARY FOR POLICYMAKERS

The U.S. energy landscape is changing. The United States has become the world's leading producer of oil and natural gas combined. The country is less dependent on foreign oil, as a percentage of national oil consumption, than it has been since 1971. Current cars can go farther on a gallon of gas than ever before. Between 2005 and 2014, U.S. consumption of motor gasoline fell 2.6 percent despite population growth of 7.6 percent and gross domestic product growth of 13.0 percent. Additionally, as a result of changes in economic structure and conditions and policies to promote energy efficiency, U.S. electricity consumption was flat over that 10-year period and total energy use declined by 1.9 percent.<sup>a</sup>

The composition of the Nation's energy supply has also started to shift: petroleum consumption is flat and coal consumption is declining, while the use of natural gas and renewables is growing. In 2014, renewable energy sources accounted for half of new installed electric-generation capacity, and natural gas units made up most of the remainder. Electricity generation from wind grew 3.3-fold between 2008 and 2014, and electricity generation from solar energy grew more than 20-fold.

The focus of U.S. energy policy discussions has shifted from worries about rising oil imports and high gasoline prices to debates about how much and what kinds of U.S. energy should be exported, concerns about the safety of transporting large quantities of domestic crude oil by rail, and the overriding question of what changes in patterns of U.S. energy supply and demand will be needed—and how they can be achieved—for the United States to do its part in meeting the global climate change challenge.

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<sup>a</sup> The figures in this and the succeeding paragraph are from: Energy Information Administration. "Monthly Energy Review." March 2015. [www.eia.gov/totalenergy/data/monthly/pdi/mer.pdf](http://www.eia.gov/totalenergy/data/monthly/pdi/mer.pdf). However, the population data are from: Census Bureau. "Population Estimates." [www.census.gov/popest/](http://www.census.gov/popest/). Accessed April 5, 2015.

In the “Climate Action Plan” unveiled by President Obama in June 2013, he directed his Administration to initiate an interagency Quadrennial Energy Review (QER) to help ensure, in this dramatically changing energy landscape, that Federal energy policy is appropriately matched to the Nation’s economic, security, and climate goals. The approximately annual installments of the QER over the ensuing 4 years are to focus on different components of the Nation’s energy system—resource extraction and processing, energy transport and storage infrastructure, electricity generation, energy end-use—providing findings and recommendations on how Federal energy policy can best complement and incentivize state, local, tribal, and private sector actions so as to meet ongoing and emerging challenges and take advantage of new opportunities.

This first installment of the QER addresses infrastructures for energy transmission, storage, and distribution (TS&D), broadly defined as *infrastructures that link energy supplies, carriers, or by-products to intermediate and end users*. This focus was chosen because the dramatic changes in the U.S. energy landscape have significant implications for TS&D infrastructure needs and choices. Well-informed and forward-looking decisions that lead to a more robust and resilient infrastructure can enable substantial new economic, consumer service, climate protection, and system reliability benefits. Good decisions on TS&D infrastructure can also provide flexibility in taking advantage of new opportunities to achieve our national energy objectives.

This summary follows the organization of the main report, starting with an introduction to TS&D infrastructure issues (corresponding to Chapter I, Introduction, in the main report) and continuing with sections on the following:

- Increasing the Resilience, Reliability, Safety, and Asset Security of TS&D Infrastructure (Chapter II)
- Modernizing the Electric Grid (Chapter III)
- Modernizing U.S. Energy Security Infrastructures in a Changing Global Marketplace (Chapter IV)
- Improving Shared Transport Infrastructures (Chapter V)
- Integrating North American Energy Markets (Chapter VI)
- Addressing Environmental Aspects of TS&D Infrastructure (Chapter VII)
- Enhancing Employment and Workforce Training (Chapter VIII)
- Siting and Permitting of TS&D Infrastructure (Chapter IX).

The main report’s treatment of the QER analytical and stakeholder process (Chapter X, Analytical and Stakeholder Process) and its appendices on technical details of TS&D infrastructure for liquid fuels, natural gas, and electricity are not covered here.

### Introduction to TS&D Infrastructure Issues

The United States has one of the most advanced energy systems in the world, supplying the reliable, affordable, and increasingly clean power and fuels that underpin every facet of the Nation’s economy and way of life. The energy TS&D infrastructure that links the components of that system with each other and with users is increasingly complex and interdependent. It includes approximately 2.6 million miles of interstate and intrastate pipelines; about 640,000 miles of transmission lines; 414 natural gas storage facilities; 330 ports handling crude petroleum and refined petroleum products; and more than 140,000 miles of railways that handle crude petroleum, refined petroleum products, liquefied natural gas, and coal. The components of the Nation’s TS&D infrastructure considered in this report are listed in Table SPM-1.

The requirements that this TS&D infrastructure must meet are extensive and demanding. It must handle a diverse and evolving mix of energy sources and energy products; link sources, processors, and users across immense distances; match demands that vary on multiple time scales; co-exist with competing uses of the

same systems (e.g., ports and railways); and perform 24 hours a day, 365 days a year with high reliability, which in turn requires both low susceptibility to disruptions and the resilience to recover quickly from whatever disruptions nonetheless occur. The longevity and high capital costs of energy TS&D infrastructure, moreover, mean that decisions made about how to locate, expand, and otherwise modify this infrastructure today will be influencing—either enabling or constraining—the size and composition of the national energy system for decades to come.

### **Challenges of TS&D Infrastructure Management and Policy**

Much of the TS&D infrastructure is owned and operated by the private sector, and a significant portion of the related legal, regulatory, and policy development and implementation occurs at state and local levels. At the same time, the Federal Government controls and operates substantial TS&D infrastructure assets of its own, including inland waterways, thousands of miles of transmission lines, and strategic oil and product reserves. Some of the infrastructure elements owned by others are federally regulated with respect to aspects of siting, safety, environment, and reliability. A number of emergency authorities bearing on TS&D infrastructure are also vested in the Federal Government.

A further complexity affecting the TS&D infrastructure management and policy is that these infrastructures often reach across state and even international boundaries, thus affecting large regions and making multi-state and sometimes multi-national coordination essential for modernization, reliability, resilience, and flexibility. In addition, the large capital costs, scale, and “natural monopoly” characteristics of much TS&D infrastructure tend to perpetuate the role of incumbent providers; these circumstances constrain innovation and add to the usual litany of market failures—public goods, externalities, information deficits, perverse incentives—generally understood to warrant intervention through government policy when the proposed remedy is expected to have sufficient net benefits to overcome predictable ancillary and unintended consequences.

Table SPM-1. Components of TS&amp;D Infrastructure Considered in this Installment of the QER

Fuel/Energy Carrier	TS&D Infrastructure Element/System
<b>Electricity</b>	Transmission lines and substations
	Distribution lines and distributed generation
	Electricity storage
	Other electric grid-related infrastructure
<b>Natural Gas</b>	Natural gas gathering lines
	Transmission pipelines
	Natural gas storage facilities
	Processing facilities
	Distribution pipelines and systems
	LNG production/storage facilities (including export terminals)
<b>Coal</b>	Rail, truck, barge transport
	Export terminals
<b>Crude Oil/ Petroleum Products</b>	Crude oil pipelines
	Crude oil and products import and export terminals
	Rail, truck, barge transport
	Oil refineries
	Strategic Petroleum Reserve & Regional Petroleum Product Reserves
	CO <sub>2</sub> pipelines (including EOR)
<b>Biofuels</b>	Transport of feedstock and derived products, biorefineries

Chapter 1, Table 1-1.

Given the complexity of this policy landscape, it should be obvious that Federal policies to encourage and enable modernization and expansion of the Nation's TS&D infrastructure must be well coordinated with state, local, tribal, and (sometimes) international jurisdictions. Full consideration must be given to the interaction of policy at all levels of government with private sector incentives and capabilities and include attention to opportunities for well-designed, purpose-driven, public-private partnerships.

### Current Trends Affecting TS&D Infrastructure Choices

A number of changes in the U.S. energy landscape over the last decade were previously mentioned—dramatic changes in the pattern of domestic coal, petroleum, and natural gas production; a drastically altered outlook for energy imports and exports; large increases in electricity generation from wind and sunlight; and an increased priority on moving rapidly to reduce greenhouse gas (GHG) emissions from the energy sector. All of these trends have significant implications for the Nation's TS&D infrastructure. So does another trend that has been building for decades, which is lack of timely investment in refurbishing, replacing, and modernizing components of that infrastructure that are simply old or obsolete. These trends are elaborated briefly in the subsections that follow.

#### Aging Infrastructure and Changing Requirements

More than a decade ago, a Department of Energy (DOE) report pronounced the U.S. electricity grid “aging, inefficient, congested, and incapable of meeting the future energy needs of the information economy without significant operational changes and substantial public-private capital investment over the next several decades.”<sup>1</sup> Although significant improvements have been made to the grid since then, the basic conclusion of the need to modernize the grid remains salient. The Edison Electric Institute estimated in 2008 that by 2030 the U.S. electric utility industry would need to make a total infrastructure investment of \$1.5 trillion to \$2.0 trillion, of which transmission and distribution are expected to account for about \$900.0 billion.<sup>2</sup>

Modernization of the grid has been made all the more urgent by the increasing and now virtually pervasive dependence of modern life on a reliable supply of electricity. Without that, navigation; telecommunication; the financial system; healthcare; emergency response; and the Internet, as well as all that depends on it, become unreliable. Yet the threats to the grid—ranging from geomagnetic storms that can knock out crucial transformers; to terrorist attacks on transmission lines and substations; to more flooding, faster sea-level rise, and increasingly powerful storms from global climate change—have been growing even as society’s dependence on the grid has increased.

In addition, technology is altering expectations of what the grid should do. Once satisfied with a simple arrangement where utilities provided services and consumers bought power on fixed plans, individual consumers and companies increasingly want to control the production and delivery of their electricity, and enabling technology has become available to allow this. These trends, coupled with flat or declining electricity demand, could dramatically alter current utility business models, and they are already making it more important to appropriately value and use distributed generation, smart grid technologies, and storage.

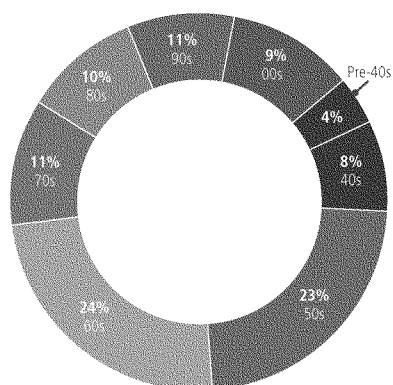
Natural gas and oil TS&D infrastructures likewise face aging and obsolescence concerns. These infrastructures have not kept pace with changes in the volumes and geography of oil and gas production. The Nation’s ports, waterways, and rail systems are congested, with the growing demands for handling energy commodities increasingly in competition with transport needs for food and other non-energy freight. Although improvements are being made, much of the relevant infrastructure—pipelines, rail systems, ports, and waterways alike—is long overdue for repairs and modernization.

One compelling example is the infrastructure for moving natural gas. Close to 50 percent of the Nation’s gas transmission and gathering pipelines were constructed in the 1950s and 1960s—a build-out of the interstate pipeline network to respond to the thriving post-World War II economy (see Figure SPM-1). Analyses conducted for the QER suggest that natural gas interstate pipeline investment will range between \$2.6 billion and \$3.5 billion per year between 2015 and 2030, depending on the overall level of natural gas demand. The total cost of replacing cast iron and bare steel pipes in gas distribution systems is estimated to be \$270 billion.<sup>3</sup>

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<sup>3</sup> The American Gas Association reports that the total cost of replacing all cast iron pipe in the United States would be about \$83 billion in 2011 dollars. American Gas Association. “Managing the Reduction of the Nation’s Cast Iron Inventory,” 2013. [www.aga.org/managing-reduction-nation%E2%80%99s-cast-iron-inventory](http://www.aga.org/managing-reduction-nation%E2%80%99s-cast-iron-inventory). Accessed January 16, 2015. According to Pipeline and Hazardous Materials Safety Administration data, cast iron pipes represent approximately 30 percent of the total leak-prone pipe in the United States. Therefore, assuming other pipe replacement has similar costs, the total cost for replacement of all leak-prone pipe is roughly \$270 billion.

Figure SPM-1. Age by Decade of U.S. Gas Transmission and Gathering Pipelines



Chapter 1, Figure 1-1.

The Nation's Strategic Petroleum Reserve (SPR) also requires attention. The design of the SPR and the infrastructure for utilizing it were determined in 1975, when domestic oil production was in decline, oil price and allocation controls separated the U.S. oil market from the rest of the world, there was no global commodity market for oil at all, and there were no hedging mechanisms to manage risk. The SPR requires updating in light of changed circumstances, including significant maintenance and upgrades to enhance its distribution capability.

#### Climate Change

Energy TS&D infrastructure has always been shaped not only by the mix of energy supply technologies and end-use patterns, but also by the characteristics of the environment where the infrastructure must operate, including, for example, terrain, vegetation, soil and seismic conditions, and climate. It has long been true, as well, that choices about TS&D infrastructure have had to take into account the need to limit that infrastructure's adverse impacts on the environment.

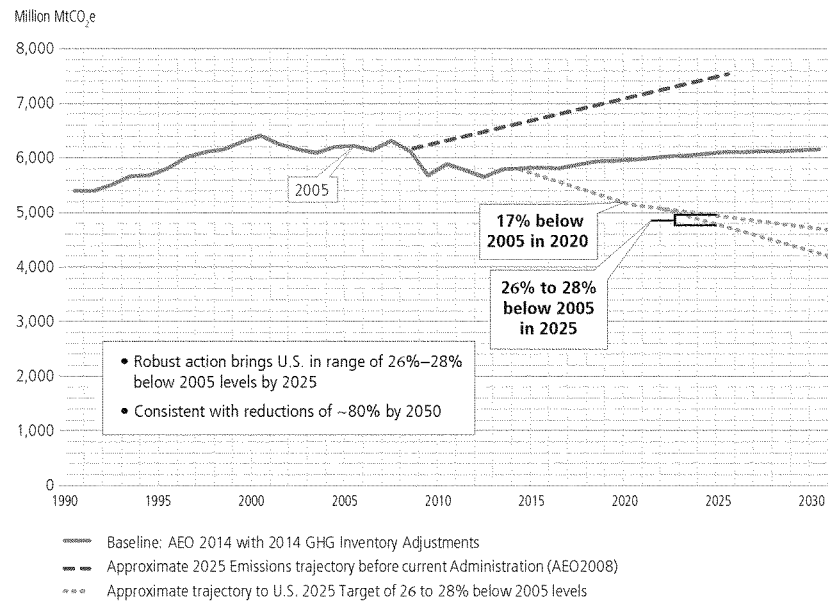
By far the most important environmental factor affecting TS&D infrastructure needs now and going forward is global climate change. Sea-level rise, thawing permafrost, and increases in weather extremes are already affecting TS&D infrastructure in many regions. The need to mitigate global climate change by reducing GHG emissions, moreover, is accelerating changes in the mix of energy supply options and end-use patterns, and over time, it is likely to become the dominant such influence. Reducing GHG emissions from TS&D infrastructure, including methane emissions from the transmission and distribution of natural gas, will be increasingly important in this context.

The key relevant conclusions from climate science—as embodied in the most recent reports of the Intergovernmental Panel on Climate Change, the National Academy of Sciences (jointly with the Royal Society of London), and the Third National Climate Assessment of the Global Change Research Program<sup>3,4,5</sup>—are that GHGs emitted by civilization's energy system are the dominant cause of changes in climate being observed across the globe; that the changes not just in average conditions, but in extremes, are already causing harm to life, health, property, economies, and ecosystem processes; and that deep reductions in GHG emissions will be required if an unmanageable degree of global climate change is to be avoided.

Actions taken in the first term of the Obama Administration in response to the climate change challenge included major investments in a cleaner, more efficient U.S. energy future in the American Recovery and Reinvestment Act of 2009 and subsequent Presidential budgets; the promulgation of the first-ever joint fuel economy/GHG emission standards for light-duty vehicles and new, more stringent energy efficiency standards for commercial and residential appliances; and the announcement of a U.S. emissions reduction target in the range of 17 percent below the 2005 level by 2020. These steps were followed in the second term by the President's announcement, in June 2013, of a new "Climate Action Plan" with three pillars: reducing U.S. emissions of GHGs, increasing domestic preparedness for and resilience against the changes in climate that can no longer be avoided, and engaging internationally to encourage and assist other countries in taking similar steps.<sup>6,7</sup>

Among the actions subsequently taken under the "Climate Action Plan," those with potential relevance for the future of TS&D infrastructure include a new Strategy for Reducing Methane Emissions nationwide; acceleration of permitting for new renewable energy projects on public lands and military installations; Executive Orders requiring that Federal departments and agencies—including those with responsibilities relating to TS&D infrastructure—take climate change into account in all of their policies and programs; and the announcement, in November 2014, of a post-2020 U.S. GHG emissions reduction target of 26 percent to 28 percent below the 2005 level by 2025.

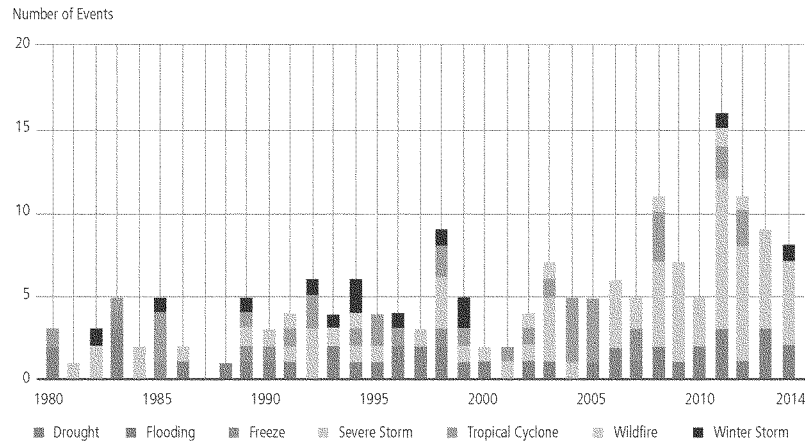
The Administration's actions under the "Climate Action Plan" put the United States on a path to meet the Administration's 2020 and 2025 targets through several means, including the establishment of carbon emission standards for the power sector that will drive further shifts to low- and zero-carbon fuels, cleaner electricity generation technologies, and continuing improvements in end-use efficiency. Historic and projected U.S. emissions under these latest targets are shown in Figure SPM-2. While the Administration's 2020 and 2025 targets are ambitious, it is clear that continued reduction in GHG emissions will be needed beyond 2025 in the United States and globally. These reductions will continue to drive significant changes in TS&D infrastructure in the long term.

**Figure SPM-2. Historic and Projected U.S. Emissions under Obama Administration Targets**

Chapter 1, Figure 1-8.

Meanwhile, the ongoing impacts of global climate change have already been stressing energy TS&D infrastructure in a variety of ways. Extreme weather events with high societal costs have been increasing (see Figure SPM-3), a trend expected to intensify under continuing climate change. This means greater vulnerabilities for TS&D infrastructure from hurricanes, drought, extreme temperatures, wildfires, more intense precipitation events, and flooding. Climate change is also driving sea-level rise, which interacts with storm surge and heavy downpours to intensify coastal flooding, and it has been thawing large areas of permafrost in the far North, with impacts on pipelines, roads, and other energy-linked infrastructure.

Figure SPM-3. Billion-Dollar Disaster Event Types by Year



Chapter 2, Figure 2-2.

### Goals for TS&D Infrastructure Policy

This first installment of the QER analyzes how to leverage authorities, expertise, and resources to help modernize and transform the extensive, interlocking, capital-intensive networks constituting the national energy TS&D system so as to meet, in a complex jurisdictional environment, the evolving set of requirements and challenges just described. This report presents a set of findings and recommendations, organized around the high-level goals of energy security, economic competitiveness, and environmental responsibility, in the context of a set of analytically derived objectives that reflect an integrated assessment of the adequacy of existing TS&D infrastructures to meet these goals. These objectives include the following:

- Enhancing TS&D infrastructure resilience, reliability, safety, and asset security
- Modernizing the electric grid
- Modernizing the segments of TS&D infrastructure essential for collective energy security
- Improving the increasingly stressed TS&D infrastructures that are shared by energy and other goods and commodities.

These objectives are also informed and affected by an additional set of crosscutting needs and requirements, namely the following:

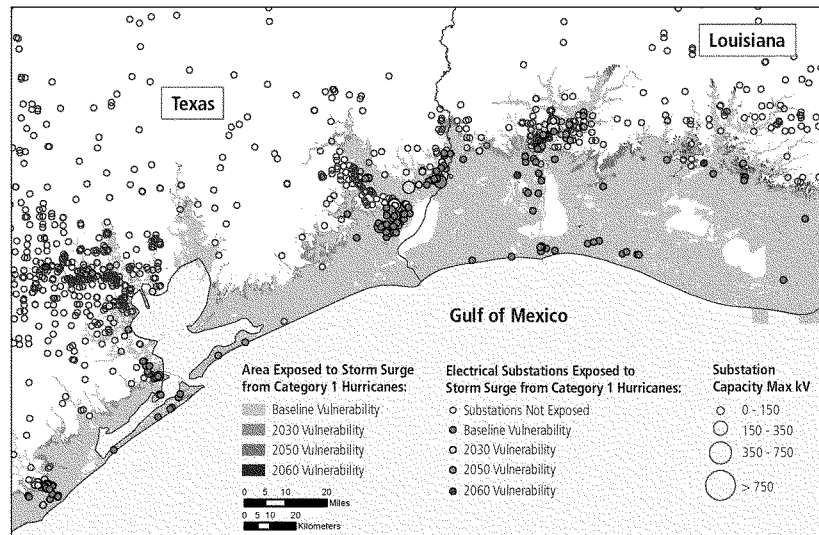
- Promoting environmental responsibility in developing, managing, and updating TS&D infrastructure, including reducing emissions from infrastructure that could contribute to climate change
- Developing and training the workforce needed for a 21st century energy infrastructure
- Expediting the siting of critical TS&D infrastructures to meet a range of energy needs and policy objectives
- Enhancing North American energy market integration.

Modernizing the Nation's TS&D infrastructures will also help enhance U.S. competitiveness in a global economy, and it will support jobs—approximately 1 million people were employed in energy transmission and distribution jobs in 2013, or almost 0.75 percent of U.S. civilian jobs; modernization will increase those numbers.

## Increasing the Resilience, Reliability, Safety, and Asset Security of TS&D Infrastructure

Ensuring the resilience, reliability, safety, and security of TS&D infrastructure is a national priority and vital to American competitiveness, jobs, energy security, and a clean energy future. The imperative for TS&D infrastructure in the United States, going forward, is to maintain the high performance of existing systems; to continue to accommodate significant growth in domestic energy supplies; and to manage and adapt to new technologies, threats, and vulnerabilities in cost-effective ways. For example, severe weather is the leading source of electric grid disturbances in the United States. In fact, between 2003 and 2012, an estimated 679 widespread power outages occurred due to severe weather, costing the U.S. economy \$18 billion to \$33 billion each year between 2003 and 2013. This risk is growing; the number of Gulf Coast electricity substations exposed to inundation caused by storm surge from Category 1 storms is projected to increase from 255 to 337 by 2030 due to sea-level rise (see Figure SPM-4). TS&D infrastructures are becoming increasingly interconnected and interdependent, so disruptions from climate change, natural disasters, and cyber and physical incidents can have serious consequences beyond the specific TS&D infrastructure system that is directly affected.

Figure SPM-4. Gulf Coast Electricity Substation Facilities Exposure under Different Sea-Level Rise Scenarios



Chapter 2, Figure 2-4.

### Key Findings

**Mitigating energy disruptions is fundamental to infrastructure resilience.** Mitigating energy disruptions is particularly important because other critical infrastructures rely on energy services to operate, and these interdependencies are growing. Should disruptions occur, it is essential to have comprehensive and tested emergency response protocols to stabilize the system and begin recovery.

**TS&D infrastructure is vulnerable to many natural phenomena.** These include hurricanes, earthquakes, drought, wildfires, flooding, and extreme temperatures. Some extreme weather events have become more frequent and severe due to climate change, and this trend will continue. Sea-level rise resulting from climate change, coupled with coastal subsidence in the Mid-Atlantic and Gulf Coast regions, increases risks and damages to coastal infrastructure caused by storm surge.

**Threats and vulnerabilities vary substantially by region.** In many cases, a particular natural threat or infrastructure vulnerability will be region specific (e.g., Gulf Coast hurricanes threatening refineries), dampening the utility of national, one-size-fits-all solutions for reliability and resilience. Regional solutions are essential.

**Recovery from natural gas and liquid fuel system disruptions can be difficult.** Although liquid fuels and natural gas disruptions are less likely than electricity disruptions, it is relatively more difficult to recover from disruptions to these systems than electric systems. Recovery from natural gas disruptions is particularly difficult because of the need to locate and repair underground breakages.

**Cyber incidents and physical attacks are growing concerns.** Cyber incidents have not yet caused significant disruptions in any of the three sectors, but the number and sophistication of threats are increasing, and information technology systems are becoming more integrated with energy infrastructure. There have been physical attacks; while some physical protection measures are in place throughout TS&D infrastructure systems, additional low-cost investments at sensitive facilities would greatly enhance resilience.

**High-voltage transformers are critical to the grid.** They represent one of its most vulnerable components. Despite expanded efforts by industry and Federal regulators, current programs to address the vulnerability may not be adequate to address the security and reliability concerns associated with simultaneous failures of multiple high-voltage transformers.

**Assessment tools and frameworks need to be improved.** Research has focused more on characterizing vulnerabilities and identifying mitigation options than on measuring the effects of best practices for response and recovery. In addition, assessment tools and frameworks tend to characterize the impacts of disruptions on system performance, but are less able to examine impacts on national or regional consequences like economic loss or loss of life.

**Shifts in the natural gas sector are having mixed effects on resilience, reliability, safety, and asset security.** The addition of onshore shale gas infrastructure benefits natural gas resilience by decreasing the percentage of infrastructure exposed to storms. The Energy Information Administration (EIA) reports that the Gulf Coast percentage of natural gas production went from 18 percent in 2005 to 6 percent in 2013. On the other hand, overall reliance on gas for electricity has gone up, creating a new interdependence and grid vulnerability. Furthermore, additional export infrastructure resulting from the natural gas boom would increase vulnerabilities to coastal threats, such as sea-level rise.

**Dependencies and interdependencies are growing.** Many components of liquid fuels and natural gas systems—including pumps, refineries, and about 5 percent of natural gas compressor stations—require electricity to operate. The interdependency of the electricity and gas systems is growing as more gas is used in power generation.

**Aging, leak-prone natural gas distribution pipelines and associated infrastructures prompt safety and environmental concerns.** Most safety incidents involving natural gas pipelines occur on natural gas distribution systems. These incidents tend to occur in densely populated areas.

### **Selected Recent Federal Government Actions**

The Federal Government, the states, and the private sector all play crucial roles in ensuring that energy infrastructures are reliable, resilient, and secure. In 2013, President Obama released Presidential Policy Directive-21, *Critical Infrastructure Security and Resilience*, establishing national policy on critical infrastructure security and resilience and refining and clarifying the critical infrastructure-related functions, roles, and responsibilities across the Federal Government, as well as enhancing overall coordination and collaboration. The directive applies to all critical infrastructures, but calls out energy infrastructures as being *uniquely* critical due to the enabling functions they provide across all other critical infrastructures. Other recent Federal Government actions include the following:

- **Creating the Build America Investment Initiative.** The Administration has created this initiative—an interagency effort led by the Departments of Treasury and Transportation—to promote increased investment in U.S. infrastructure, particularly through public-private partnerships.
- **Enhancing grid resilience to geomagnetic storms.** In June 2014, the Federal Energy Regulatory Commission adopted a new reliability standard to mitigate the impacts of geomagnetic disturbances on the grid. In November 2014, the Administration established an interagency Space Weather Operations, Research, and Mitigation Task Force to develop a National Space Weather Strategy, to include mitigation of grid vulnerability.
- **Improving safety of natural gas transmission pipelines.** The Pipeline and Hazardous Materials Safety Administration of the Department of Transportation (DOT) is currently developing a proposed rule on integrity management for natural gas pipelines. In addition, the Federal Energy Regulatory Commission has issued a policy statement that will allow interstate natural gas pipelines to recover certain expenditures made to modernize pipeline system infrastructure in a manner that enhances system reliability, safety, and regulatory compliance.
- **Developing and operating regional refined petroleum product reserves.** DOE created the Northeast Gasoline Supply Reserve in 2014 and continues to manage the Northeast Home Heating Oil Reserve.
- **Enhancing emergency preparedness.** The National Petroleum Council, in response to a request from the Secretary of Energy, recently completed an Emergency Preparedness Study to help industry and government achieve a more rapid restoration of motor fuel supplies after a natural disaster.

### Recommendations in Brief

To continue to drive progress toward addressing these TS&D infrastructure challenges, we recommend taking the following additional actions:

**Develop comprehensive data, metrics, and an analytical framework for energy infrastructure resilience, reliability, safety, and asset security.** DOE, in collaboration with the Department of Homeland Security and interested infrastructure stakeholders, should develop common analytical frameworks, tools, metrics, and data to assess the resilience, reliability, safety, and security of energy infrastructures.

**Establish a competitive program to accelerate pipeline replacement and enhance maintenance programs for natural gas distribution systems.** DOE should establish a program to provide financial assistance to states to incentivize cost-effective improvements in the safety and environmental performance of natural gas distribution systems through targeted funding to offset incremental costs to low-income households and funding for enhanced direct inspection and maintenance programs.

**Support the updating and expansion of state energy assurance plans.** DOE should undertake a multi-year program of support for state energy assurance plans, focusing on improving the capacity of states and localities to identify potential energy disruptions, quantify their impacts, share information, and develop and exercise comprehensive plans that respond to those disruptions and reduce the threat of future disruptions.

**Establish a competitive grant program to promote innovative solutions to enhance energy infrastructure resilience, reliability, and security.** DOE should establish a program to provide competitively awarded grants to states to demonstrate innovative approaches to TS&D infrastructure hardening and enhancing resilience and reliability. A major focus of the program would be the demonstration of new approaches to enhance regional grid resilience, implemented through the states by public and publicly regulated entities on a cost-shared basis.

**Analyze the policies, technical specifications, and logistical and program structures needed to mitigate the risks associated with loss of transformers.** As part of the Administration's ongoing efforts to develop a formal national strategy for strengthening the security and resilience of the entire electric grid for threats and hazards (planned for release in 2015), DOE should coordinate with the Department of Homeland Security and other Federal agencies, states, and industry on an initiative to mitigate the risks associated with the loss of transformers. Approaches for mitigating this risk should include the development of one or more transformer reserves through a staged process.

**Analyze the need for additional or expanded regional product reserves.** DOE should undertake updated cost-benefit analyses for all of the regions of the United States that have been identified as vulnerable to fuel supply disruptions to inform subsequent decisions on the possible need for additional regional product reserves.

**Integrate the authorities of the President to release products from regional petroleum product reserves into a single, unified authority.** Congress should amend the trigger for the release of fuel from the Northeast Home Heating Oil Reserve and from the Northeast Gasoline Supply Reserve so that they are aligned and properly suited to the purpose of a product reserve, as opposed to a crude oil reserve.

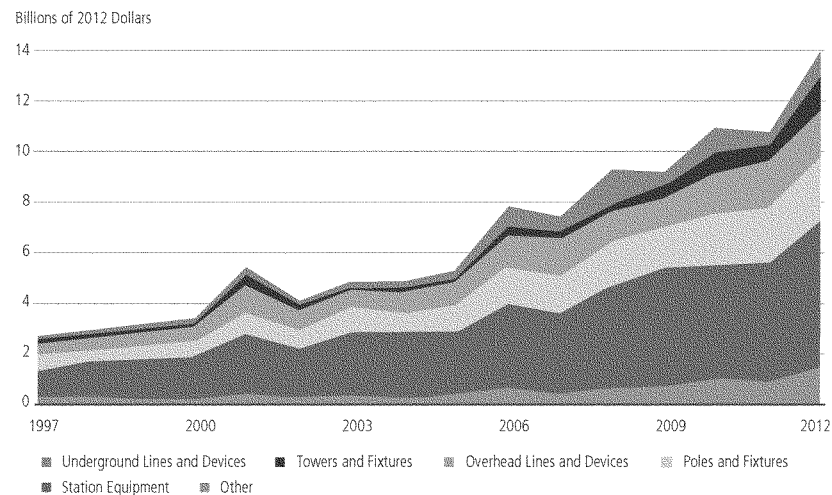
## Modernizing the Electric Grid

Electricity is central to the well-being of the Nation. The United States has one of the world's most reliable, affordable, and increasingly clean electric systems, but the U.S. electric system is currently at a strategic inflection point—a time of significant change for a system that had had relatively stable rules of the road for nearly a century. The U.S. electricity sector is being challenged by a variety of new forces, including a changing generation mix; low load growth; increasing vulnerability to severe weather because of climate change; and growing interactions at the Federal, state, and local levels. Innovative technologies and services are being introduced to the system at an unprecedented rate—often increasing efficiency, improving reliability, and empowering customers, but also injecting uncertainty into grid operations, traditional regulatory structures, and utility business models. Modernizing the grid will require that these challenges be addressed.

### Key Findings

**Investments in transmission and distribution upgrades and expansions will grow.** It is anticipated that in the next two decades, large transmission and distribution investments will be made to replace aging infrastructure; maintain reliability; enable market efficiencies; and aid in meeting policy objectives, such as GHG reduction and state renewable energy goals. Recent increases in investment in transmission infrastructure by investor-owned utilities are shown in Figure SPM-5.

Figure SPM-5. Investment in Transmission Infrastructure by Investor-Owned Utilities, 1997–2012



Chapter 3, Figure 3-3.

**Both long-distance transmission and distributed energy resources can enable lower-carbon electricity.** The transmission network can enable connection to high-quality renewables and other lower-carbon resources far from load centers; distributed energy resources can provide local low-carbon power and efficiency.

**The potential range of new transmission construction is within historic investment magnitudes.** Under nearly all scenarios analyzed for the QER, circuit-miles of transmission added through 2030 are roughly equal to those needed under the base case, and while those base case transmission needs are significant, they do not appear to exceed historical yearly build rates.

**Flexible grid system operations and demand response can enable renewables and reduce the need for new bulk-power-level infrastructure.** End-use efficiency, demand response, storage, and distributed generation can reduce the expected costs of new transmission investment.

**Investments in resilience have multiple benefits.** Investments in energy efficiency, smart grid technologies, storage, and distributed generation can contribute to enhanced resiliency and reduced pollution, as well as provide operational flexibility for grid operators.

**Innovative technologies have significant value for the electricity system.** New technologies and data applications are enabling new services and customer choices. These hold the promise of improving consumer experience, promoting innovation, and increasing revenues beyond the sale of electric kilowatt-hours.

**Enhancing the communication to customer devices that control demand or generate power will improve the efficiency and reliability of the electric grid.** For example, open interoperability standards for customer devices and modified standards for inverters will improve the operation of the grid.

**Appropriate valuation of new services and technologies and energy efficiency can provide options for the utility business model.** Accurate characterization and valuation of services provided to the grid by new technologies can contribute to clearer price signals to consumers and infrastructure owners, ensuring affordability, sustainability, and reliability in a rapidly evolving electricity system.

**Consistent measurement and evaluation of energy efficiency is essential for enhancing resilience and avoiding new transmission and distribution infrastructure.** Efficiency programs have achieved significant energy savings, but using standard evaluation, measurement, and verification standards, like those recommended by DOE's Uniform Methods Project, is key to ensuring that all the benefits of efficiency are realized, including avoiding the expense of building new infrastructure.

**States are the test beds for the evolution of the grid of the future.** Innovative policies at the state level that reflect differences in resource mix and priorities can inform Federal approaches.

**Different business models and utility structures rule out "one-size-fits-all" solutions to challenges.**

A range of entities finance, plan, and operate the grid. Policies to provide consumers with affordable and reliable electricity must take into account the variety of business models for investing, owning, and operating grid infrastructure.

**Growing jurisdictional overlap impedes development of the grid of the future.** Federal and state jurisdiction over electric services are increasingly interacting and overlapping.

### **Selected Recent Federal Government Actions**

In addition to resilience-related activities aimed at the electric grid (e.g., large power transformer) discussed in the Chapter II (Increasing the Resilience, Reliability, Safety, and Asset Security of TS&D Infrastructure), the Administration has undertaken the following activities aimed at creating the electric grid of the future:

- **Promoting grid modernization.** DOE has made a comprehensive grid modernization proposal in the President's Fiscal Year (FY) 2016 Budget request. The crosscutting proposal supports strategic DOE investments in foundational technology development, enhanced security capabilities, and greater institutional support and stakeholder engagement, all of which are designed to provide the tools necessary for the evolution to the grid of the future. Specific elements include the following:

- A new State Energy Reliability and Assurance Grants program for grants to states, localities, regions, and tribal entities for electricity TS&D reliability planning.
- A program directed at research and development (R&D) on transformer protection from geomagnetic fields.
- Increases directed at improved controls, sensors, power electronics, and connection to energy storage.
- Increases in the Smart Grid program to develop next-generation distribution management system and controls to accommodate new end-use technologies and develop microgrid systems.
- Increases in R&D to improve building control system interoperability with new grid control systems and improve building internal controls to adapt to efficient and improved grid connectivity.
- Increases to link plug-in electric vehicle systems to building and grid systems.

### Recommendations in Brief

The Administration and Congress should support or incentivize investment in electricity infrastructure reliability, resilience, and affordability through the development of tools, methods, and new funding for planning and operating the grid of the future. Accordingly, we recommend the following:

**Provide grid modernization R&D, analysis, and institutional support.** DOE should continue to pursue a multi-year, collaborative, and cost-shared research and development, analysis, and technical assistance program for technology innovation that supports grid operations, security, and management; and for analyses, workshops, and dialogues to highlight key opportunities and challenges for new technology to transform the grid.

**Establish a framework and strategy for storage and grid flexibility.** DOE should conduct regional and state analyses of storage deployment to produce a common framework for the evaluation of benefits of storage and grid flexibility, and a strategy for enabling grid flexibility and storage that can be understood and implemented by a wide range of stakeholders.

**Conduct a national review of transmission plans and assess barriers to their implementation.** DOE should carry out a detailed and comprehensive national review of transmission plans, including assessments on the types of transmission projects proposed and implemented, current and future costs, consideration of interregional coordination, and other factors. A critical part of this review should be to assess incentives and impediments to the development of new transmission.

**Provide state financial assistance to promote and integrate TS&D infrastructure investment plans for electricity reliability, affordability, efficiency, lower carbon generation, and environmental protection.** In making awards under this program, DOE should require cooperation within the planning process of energy offices, public utility commissions, and environmental regulators within each state; with their counterparts in other states; and with infrastructure owners and operators and other entities responsible for maintaining the reliability of the bulk power system.

**Coordinate goals across jurisdictions.** DOE should play a convening role to bring together public utility commissioners, legislators, and other stakeholders at the Federal, state, and tribal levels to explore approaches to integrate markets, while respecting jurisdictional lines, but allowing for the coordination of goals across those lines.

**Value new services and technologies.** DOE should play a role in developing frameworks to value grid services and approaches to incorporate value into grid operations and planning. It should convene stakeholders to define the characteristics of a reliable, affordable, and environmentally sustainable electricity system and create approaches for developing pricing mechanisms for those characteristics. The goal should be to develop frameworks that could be used by the Federal Energy Regulatory Commission, state public utility commissions in ratemaking proceedings, Regional Transmission Organizations in their market rule development, or utilities in the operation and planning of their systems.

**Improve grid communication through standards and interoperability.** In conjunction with the National Institute of Standards and Technology and other Federal agencies, DOE should work with industry, the Institute of Electrical and Electronics Engineers, state officials, and other interested parties to identify additional efforts the Federal Government can take to better promote open standards that enhance connectivity and interoperability on the electric grid.

**Establish uniform methods for monitoring and verifying energy efficiency.** Through its Uniform Methods Project, DOE should accelerate the development of uniform methods for measuring energy savings and promote widespread adoption of these methods in public and private efficiency programs.

## Modernizing U.S. Energy Security Infrastructures in a Changing Global Marketplace

Until recently, the concept of energy security has focused on “oil security” as a proxy for “energy security.” It is clear, however, that energy security needs to be more broadly defined to cover not only oil, but other sources of supply, and to be based not only on the ability to withstand shocks, but also to be able to recover quickly from any shocks that do occur. In addition, security is not exclusively domestic; it is dependent on interactions in the interconnected global energy market. U.S. energy security and the infrastructure that supports it should be viewed in the context of this new, broader, more collective definition of energy security.

### Key Findings

**Multiple factors affect U.S. energy security.** These include U.S. oil demand; the level of oil imports; the adequacy of emergency response systems; fuel inventory levels; fuel substitution capacity; energy system resilience; and the flexibility, transparency, and competitiveness of global energy markets.

**The United States has achieved unprecedented oil and gas production growth.** Oil production growth has enabled the United States to act as a stabilizing factor in the world market by offsetting large sustained supply outages in the Middle East and North Africa and, later, contributing to a supply surplus that has reduced oil prices to levels not seen since March 2009. The natural gas outlook has also changed tremendously. Just 10 years ago, it was projected that the United States would become highly dependent on liquefied natural gas imports, whereas the current outlook projects that the United States will have enormous capacity and reserves and could become a major liquefied natural gas exporter.

**The United States is the world's largest producer of petroleum and natural gas.** Combined with new clean energy technologies and improved fuel efficiency, U.S. energy security is stronger than it has been for over half a century. Nonetheless, challenges remain in maximizing the energy security benefits of our resources in ways that enhance our competitiveness and minimize the environmental impacts of their use.

**The network of oil distribution (“the midstream”) has changed significantly.** Product that had historically flowed through pipelines from south to north now moves from north to south, and multiple midstream modes (pipelines, rail, and barges) are moving oil from new producing regions to refineries throughout the United States.

**The SPR's ability to offset future energy supply disruptions has been adversely affected by domestic and global oil market developments coupled with the need for upgrades.** Changes in the U.S. midstream (for example, competing commercial demands and pipeline reversals) and lower U.S. dependence on imported oil have created challenges to effectively distributing oil from the reserve. This diminishes the capacity of the SPR to protect the U.S. economy from severe economic harm in the event of a global supply emergency and associated oil price spike.

**Increasing domestic oil production has focused attention on U.S. oil export laws established in the aftermath of the 1973–1974 Arab Oil Embargo.** There are now concerns that the U.S. oil slate may be too light for U.S. refineries; although, recent Department of Commerce clarifications that liquid hydrocarbons, after they have been processed through a crude oil distillation tower, are petroleum products, and therefore eligible for export, will help avoid adverse production impacts.

**An extensive network of pipelines, electric transmission lines, roads, rail, inland waterways, and ports link the United States with Mexico and Canada.** These systems provide not only economic value to all three nations, but also enhance continental energy security and improve system reliability.

**Biofuel production in the United States has increased rapidly over the last decade, enhancing energy security and reducing emissions of GHGs from transportation.** This growth has been driven in part by the Renewable Fuel Standard. Ethanol now displaces approximately 10 percent of U.S. gasoline demand by volume; biodiesel, advanced, and cellulosic biofuel production volumes have also been growing. Continued growth in ethanol use will depend in part on investment in additional distribution capacity; growth in the use of other biofuels, such as “drop-in” fuels, will depend on continued investment in research, development, demonstration, and deployment.

#### **Selected Recent Federal Government Actions**

- **Testing the capabilities of the SPR.** In March 2014, DOE conducted a test sale to demonstrate the drawdown and distribution capacity of the SPR. This test sale highlighted changes in the distribution infrastructure in the Gulf Coast region.
- **Addressing SPR deferred maintenance backlogs.** The President’s FY 2016 Budget Request provided \$257 million for the development, operation, and management of the SPR, including funding to address the backlog of deferred maintenance on the SPR.
- **Addressing changes in propane TS&D infrastructure.** DOE has responded to changes in TS&D infrastructure for propane and other natural gas liquid by adding capability at the EIA to monitor propane inventories on a more granular, state-by-state basis.

#### **Recommendations in Brief**

**Update SPR release authorities to reflect modern oil markets.** Congress should update SPR release authorities to allow the SPR to be used more effectively to prevent serious economic harm to the United States in case of energy supply emergencies.

**Invest to optimize the SPR’s emergency response capability.** DOE should analyze appropriate SPR size and configuration, and, after carrying out detailed engineering studies, DOE should make infrastructure investments to the SPR and its distribution systems to optimize the SPR’s ability to protect the U.S. economy in an energy supply emergency.

**Support other U.S. actions related to the SPR and energy security infrastructures that reflect a broader and more contemporary view of energy security.** The United States should continue to consult with allies and key energy trading partners on energy security issues, building on the G-7 principles on energy security.

**Support fuels diversity through research, demonstration, and analysis.** DOE and the Department of Defense should continue research and demonstration activities to develop biofuels that are compatible with existing petroleum fuel infrastructure, especially in aviation and for large vehicles. DOE should provide technical support to states, communities, or private entities wishing to invest in infrastructure to dispense higher-level ethanol blends. DOE should ensure adequate support for data collection and analysis on fuels, like propane, that play an important role in the Nation’s diverse energy mix and are challenged by changing TS&D infrastructures.

**Undertake a study of the relationship between domestic shipping and energy security.** The relevant agencies should conduct a study of the economic, engineering, logistics, workforce, construction, and regulatory factors affecting the domestic shipping industry's ability to support U.S. energy security. The Secretary of Transportation should ensure that the National Maritime Strategy includes a consideration of the energy security aspects of maritime policy in its discussion and recommendations.

## Improving Shared Transport Infrastructures

Changes in U.S. energy production and use are stressing and transforming the way that energy and other commodities are transported in the United States. Some energy commodities, such as coal and ethanol, have traditionally relied on rail and barge transport to move from suppliers to distribution points and end users. Their use of transportation modes (e.g., rail, barge, and truck transport) that are also shared by agricultural and other major commodities is being joined by significant growth in the use of these transport modes by crude oil, refined petroleum products, and petrochemicals. Increasingly, the shipment of oil from the wellhead to a refinery may employ a combination of trucks, pipelines, railcars, barges, and other marine vessels—giving oil transportation in the United States an increasingly multi-modal character. Since these transportation modes have been, and continue to be, used for transporting other commodities, they are considered in the QER to be “shared transport infrastructures” for energy commodities. The increased utilization of rail, barge, and truck for oil transport, as well as for other energy supplies and materials, exacerbates underlying issues in these shared transport infrastructures and underscores the need for an expanded infrastructure investment as proposed by the Administration.

### Key Findings

**Rapid crude oil production increases have changed the patterns of flow of North American midstream (pipelines, rail, and barge) liquids transport infrastructure.** Pipelines that previously delivered crude oil from the Gulf of Mexico to Midcontinent refineries have now changed direction to deliver domestic and Canadian oil to the Gulf of Mexico. In addition, oil produced in North Dakota is now being shipped to refineries on the East and West Coasts of the United States. As a result, modes of transport other than pipelines are being employed to move crude oil, including a significant increase in crude oil unit trains and barge shipments.

**Limited infrastructure capacities are intensifying competition among commodities, with some costs passed on to consumers.** Until new additional capacity becomes available, the competition among commodity groups for existing capacity will intensify. The proximity of Bakken crude oil movements and Powder River Basin coal movements, along with agricultural shipments in the region, affect Midwest power plants and the food industry. Typically, rail and barge service are the most cost-effective shipping methods available for moving grain and other relatively low-value, bulk agricultural commodities, and the Department of Agriculture has indicated that disruptions to agricultural shipments caused by recent unexpected shifts in supply and demand for rail services exceed even those caused by Hurricane Katrina.

**Rail, barge, and truck transportation are crucial for ethanol shipment.** Ethanol production in the United States has increased over the last few decades. Ethanol is typically shipped from production plants by rail and then delivered by truck (or directly by rail or barge) to petroleum product terminals. Ethanol is likely to rely on shared infrastructure for its transport for the foreseeable future.

**The ability to maintain adequate coal stockpiles at some electric power plants has been affected by rail congestion.** The Surface Transportation Board (STB) recently acted to require weekly reports of planned versus actual loadings of coal trains.

**Funding for the U.S. freight transportation system is complex and involves a combination of Federal, state, local, and private investments.** Railroad infrastructure is primarily owned and maintained by the private sector. The marine transportation infrastructure involves a mix of Federal, state, local, and private investments, and roadways are owned and maintained by a range of Federal, state, local, and—in some cases—even private entities.

**Navigable waterways are essential for the movement of energy commodities, equipment, and materials, especially petroleum and refined petroleum products.** Investments in construction, rehabilitation, and maintenance of this infrastructure must be balanced against other investments, including other water resource investments, such as flood and coastal storm damage reduction projects and aquatic ecosystem restoration.

**Increased transportation of crude oil by rail and barge has highlighted the need for additional safeguards.** For rail transport, in particular, the Federal Government has a number of efforts underway, including a rulemaking on improving the safety of rail transport of crude oil, including more robust tank car standards and operational requirements, to address these concerns.

**Multi-modal shared transportation infrastructure is stressed by increased shipments of energy supplies, materials, and components.** Wind turbine blades, for example, have more than tripled in length since the 1980s. Transporting components of this size (and others of significant weight and size, such as large power transformers) creates a range of challenges, including stress on roads, many of which are rural; the need to coordinate movement through ports, tunnels, overpasses, and turning areas; and additional permitting and police escort requirements.

### Selected Recent Federal Government Actions

The stresses on shared transport infrastructures as a result of changes in energy production have resulted in a series of responses and initiatives across the Administration, including both regulatory initiatives on the part of responsible agencies for specific infrastructures and broader initiatives to provide new resources to help the modernization of these shared infrastructures. These include the following:

- **Addressing congestion and service for rail transport of commodities.** In light of the problems of rail congestion affecting shipments of key commodities, STB, an independent regulatory body in DOT, has taken a number of actions. Starting in October 2014, STB has required all major (Class I) railroads to publicly file weekly data reports regarding service performance of unit trains carrying coal, crude oil, ethanol, and grain. In December 2014, STB initiated a formal notice and comment rulemaking proceeding for weekly performance data reporting by the Class I railroads and also the freight railroads serving the Chicago gateway. STB has two ongoing proceedings on rail business practices aimed at helping shippers to have competitive access to railroads and be protected against unreasonable freight rail transportation rates.
- **Improving safe shipment of crude oil by rail.** DOT and other Federal agencies have been taking action to respond to heightened awareness and concern over rail shipments of crude oil from the Bakken and ethanol. DOT issued a proposed rule in August 2014 containing comprehensive proposed standards to improve the rail transportation safety of flammable liquids, including unit trains of crude oil and ethanol. A final rule is anticipated to be issued in May 2015. DOE, in cooperation with the Pipeline and Hazardous Materials Safety Administration, is supporting studies on the properties (including behavior in fires) of crude oil. The Federal Emergency Management Agency has assessed training needs and requirements in 28 states with oil rail routes identified by DOT. The interagency National Response Team Training Subcommittee launched Emerging Risks Responder Awareness Training for Bakken Crude Oil to help responders better prepare for these incidents.

- **Doubling the size of the Inland Waterways Trust Fund.** This fund currently pays 50 percent of the Federal cost for construction, replacement, rehabilitation, and expansion costs for inland and intracoastal waterways. In December 2014, Congress authorized an increase in the fuel tax supporting this fund from the current \$0.20 per gallon to \$0.29 per gallon, which took effect April 1, 2015. In addition, the President's Fiscal Year 2016 Budget proposes a new per-vessel user fee that will raise \$1.1 billion over the next 10 years, effectively doubling the level of resources available in the Fund.
- **Helping ports through the DOT Maritime Administration StrongPorts initiative.** This program is developing tools and initiatives helpful to port authorities that are pursuing modernization projects, including those interested in public-private partnerships. While the StrongPorts initiative does not provide direct financial assistance, the recently released guide provides an additional resource regarding financing for ports.
- **Creating a multi-modal freight grant program through the GROW AMERICA Act.** The Administration has proposed the GROW AMERICA Act, which includes \$18 billion over 6 years to establish a new multi-modal freight grant program to fund innovative rail, highway, and port facilities that will improve the efficient movement of goods across the country. The Generating Renewable, Opportunity, and Work with Accelerated Mobility, Efficiency, and Rebuilding of Infrastructure and Communities throughout America Act (GROW AMERICA Act) also will give shippers and transportation providers a stronger role in working with states to collaborate and establish long-term freight strategic plans.
- **Expanding funding for the DOT TIGER grant program.** The Transportation Investment Generating Economic Recovery (TIGER) program is a competitive grant program that funds state and local transportation projects across the United States. The Administration's GROW AMERICA Act proposal will provide \$7.5 billion over 6 years to the TIGER grant program, more than doubling it.

### Recommendations in Brief

**Enhance the understanding of important safety-related challenges of transport of crude oil and ethanol by rail and accelerate responses.** Key activities at DOE and DOT should be strongly supported.

**Further analyze the effects of rail congestion on the flow of other energy commodities, such as ethanol and coal.** DOE, STB, and the Federal Energy Regulatory Commission should continue to develop their understanding of how rail congestion may affect the delivery of these energy commodities.

**Analyze the grid impacts of delayed or incomplete coal deliveries.** In assessing these issues, the Federal Energy Regulatory Commission and DOE should examine whether a minimum coal stockpile for electricity reliability should be established for each coal-fired unit.

**Address critical energy data gaps in the rail transport of energy commodities and supplies.** Congress should fund the President's FY 2016 Budget Request for the EIA to address critical energy transportation data gaps and continued data sharing with the STB.

**Support alternative funding mechanisms for waterborne freight infrastructure.** The Administration should form an ongoing Federal interagency working group to examine alternative financing arrangements for waterborne transportation infrastructure and to develop strategies for public-private partnerships to finance port and waterway infrastructure.

**Support a new program of competitively awarded grants for shared energy transport systems.** A new grant program—Actions to Support Shared Energy Transport Systems, or ASSETS—should be established and supported at DOT, in close cooperation with DOE. This program should be dedicated to improving energy

transportation infrastructure connectors. A Federal investment in ASSETS would likely mobilize additional and significant non-Federal investment, based on typical TIGER cost shares.

**Support public-private partnerships for waterborne transport infrastructure.** Developing a set of shared priorities for investment ensures that public and private sector needs are met.

**Coordinate data collection, modeling, and analysis.** DOE should lead an interagency effort with DOT, the Department of Agriculture, the Army Corps of Engineers, and the Coast Guard—in cooperation with other relevant agencies with data regarding marine, rail, and other energy transport modes—to improve and coordinate their respective data collection, analytical, and modeling capabilities for energy transport on shared infrastructures.

**Assess the impacts of multi-modal energy transport.** DOE, working with DOT and the Army Corps of Engineers, should conduct a one-time comprehensive needs assessment of investment needs and opportunities to upgrade the Nation's energy-related shared water transport infrastructure.

**Assess energy component transportation.** DOE, in coordination with relevant agencies, should examine routes for transportation of energy system-related equipment, materials, and oversized components. The assessment would include the capacity of the Nation's transportation infrastructure systems to safely accommodate more frequent and larger shipments where analyses indicate such transport will be required.

## Integrating North American Energy Markets

The United States, Canada, and Mexico, as well as other North American neighbors, benefit from a vast and diverse energy TS&D network that has enabled the region to achieve economic, energy security, and environmental goals. Continued integration of the North American energy markets will increase those benefits and address structural changes and constraints that have arisen since new production, processing, consumption, and policies have taken effect.

Energy system integration is in the long-term interest of the United States, Canada, and Mexico, as it expands the size of energy markets, creates economies of scale to attract private investment, lowers capital costs, and reduces energy costs for consumers. There is already a robust energy trade between the United States and Canada (more than \$140 billion in 2013) and the United States and Mexico (more than \$65 billion in 2012).

The scope and magnitude of the existing and ongoing energy integration among the United States, Canada, and Mexico goes far beyond any one particular infrastructure or project, and continuing to foster this integration is an enduring interest on the part of each country. While a smaller market, there are also needs and opportunities for greater energy trade and integration with individual nations and islands in the Caribbean.

The North American Arctic region, including Alaska and U.S. territorial waters in the Bering, Chukchi, and Beaufort Seas, as well as Canada and its territorial waters, is experiencing rapid changes on land and at sea due to the changing climate. These changes have important implications for TS&D infrastructure in this region. Warming in the North American Arctic is resulting in increased risk of land subsidence from thawing permafrost, which threatens TS&D infrastructure. It also leads to a reduction in late-summer sea ice extent, which will affect offshore energy and mineral exploration and extraction in U.S. and Canadian waters.

### Key Findings

**The United States has significant energy trade with Canada and Mexico, including oil and refined products, gas, and electricity.** Canada is the largest energy trading partner of the United States, with energy trade valued at \$140 billion in 2013. Mexican energy trade was valued at \$65 billion in 2012. Both countries are reliable sources of secure energy supplies.

**Greater coordination will improve energy system efficiency and build resiliency to disruptions of the North American energy market, data exchanges, and regulatory harmonization.**

**The electricity systems of the United States and Canada are fully interconnected.** There are currently more than 30 active major transmission connections between the United States and Canada, trading approximately \$3 billion worth of electricity in 2014. If the transmission projects filed with DOE in the last 5 years are constructed, they would add approximately 4,100 megawatts of additional hydropower to the U.S. electricity mix.

**Canadian natural gas production is expected to slightly outpace consumption with exports rising slowly over the projection period.** Oil production is anticipated to continue to grow over the next 30 years.

**Mexico has reformed its energy sector.** Mexico amended its constitution and reformed its energy sector in 2013, retaining government control over its assets while opening oil and gas resources to private sector exploration and development. These reforms provide an opportunity for increased trade with the United States.

**Increasing U.S. natural gas exports may help Mexico generate more gas-fired electricity and achieve its environmental goals.**

**Changing climate conditions in the Arctic are expected to continue with the melting of permafrost and reduced sea ice extent, which will affect increasing energy development that is underway.** This presents both an opportunity for greater cooperation between the United States and Canada, but also a need for both countries to undertake risk mitigation.

**There is an opportunity to lower Caribbean electricity costs and emissions.** The Caribbean is largely reliant on foreign sources of oil with little energy resources of its own. Energy demand is driven largely by electricity generation, mostly from fuel oil. A 30 percent decrease in carbon dioxide (CO<sub>2</sub>) emissions could be achieved by displacement of fuel oil by natural gas—and even more if this were combined with renewable energy.

### Selected Recent Federal Government Actions

Recognizing the importance of North American energy, the Administration has been undertaking a number of activities to promote market integration and to address the challenges we share in the North American Arctic region, including the following:

- **Improving data exchange.** The United States, Canada, and Mexico are creating a framework for the sharing of publicly available information and data on their respective energy systems. This initiative was formalized in a memorandum of understanding (MOU) signed by DOE, Canada's Ministry of Natural Resources, and Mexico's Ministry of Energy on December 15, 2014. The President's FY 2016 Budget Request provides an increase of \$1 million to the EIA for the purpose of carrying out this collaboration.
- **Leading the Arctic Council.** In April 2015, the United States assumed the chairmanship of the Arctic Council for a 2-year period. This will provide the United States with the opportunity to implement increased international collaboration in such areas as addressing the impact of climate change and Arctic Ocean stewardship and scientific research. In addition to this leadership role in Arctic policy, there is an opportunity for increased and enduring cooperation between the United States and Canada on issues such as Arctic energy infrastructure and climate and ocean science as an important future dimension to the U.S.-Canadian energy relationship.

- **Partnering with remote communities to develop renewable energy.** DOE's National Renewable Energy Laboratory, in partnership with the Department of the Interior, has developed the Remote Communities Renewable Energy partnership to develop, demonstrate, and deploy smaller-scale technologies for remote communities, such as in the Arctic, to utilize local renewable energy resources, reduce diesel fuel dependence and distribution requirements, and create an independent microgrid operation.
- **Pursuing a Caribbean Energy Security Initiative.** In 2014, Vice President Biden announced the Caribbean Energy Security Initiative, which recognizes the diversity of Caribbean nation economies, natural resources, and energy constraints. Led by the State Department, in coordination with the U.S. Overseas Private Investment Corporation, DOE, and other agencies, the initiative seeks to improve energy sector governance, to increase access to affordable finance, and to improve communication and coordination among regional governments and their development partners.

### Recommendations in Brief

**Continue advances that have been made in the North American energy dialogue.** All three countries should encourage further business exchanges and regular minister-level engagement.

**Increase the integration of energy data among the United States, Canada, and Mexico.** Provide resources for the EIA to collaborate with its Canadian and Mexican counterparts to systematically compare their respective export and import data, validate data, and improve data quality. In addition, efforts should be taken to better share geographic information system data to develop energy system maps and review forward-looking assessments and projections of energy resources, flows, and demand.

**Undertake comparative and joint energy system modeling, planning, and forecasting.** Enhance comparative and joint modeling, planning, and forecasting activities among U.S., Canadian, and Mexican energy ministries and related governmental agencies. The current scale of activities has aided bilateral and individual goals; however, increasing trilateral engagement on planning, modeling, or forecasting activities would capture greater efficiencies and enhance each country's ability to reach economic, security, and environmental goals. DOE's Offices of Energy Policy and Systems Analysis and International Affairs would lead modeling workshops with their Canadian and Mexican counterparts to share methodologies and collaborate on North American analysis.

**Establish programs for academic institutions and not-for-profits to develop legal, regulatory, and policy roadmaps for harmonizing regulations across borders.** In partnership with universities, qualified not-for-profits, and relevant U.S. energy regulatory authorities, state/provincial, local, and national energy regulations will be compared to identify gaps, best practices, and inconsistencies with regulations in Canada and/or Mexico with the goal of harmonization.

**Coordinate training and encourage professional interactions.** This should involve the technical staff in government agencies of the three North American countries that share similar responsibilities to evaluate and implement cross-border energy projects.

**Partner with Canada and the Arctic Council on Arctic energy safety, reliability, and environmental protection.** Joint work should emphasize research and information sharing on the effects of spills and the effectiveness of countermeasures, the identification and mobilization of the resources necessary to mitigate the effects of a pollution incident, and the development of international guidelines for preparedness and response in this logistically challenging region.

**Partner with Canada and the Arctic Council on energy delivery to remote areas.** This should be done through promoting and disseminating the work of the Remote Community Renewable Energy partnership.

**Promote Caribbean energy TS&D infrastructure.** As part of a larger Caribbean strategy, the United States should support the diversification of energy supplies, including actions to facilitate the introduction of cleaner forms of energy and development of resilient energy TS&D infrastructure in the Caribbean.

## Addressing Environmental Aspects of TS&D Infrastructure

Energy TS&D infrastructure affects the environment in a variety of ways. While it is important to address the direct environmental impacts and vulnerabilities of TS&D infrastructure, this infrastructure also has enormous potential to enable better environmental performance for the energy system more broadly. Key examples include CO<sub>2</sub> pipeline infrastructure to enable carbon sequestration, smart grid technologies to enable energy efficiency, and long-distance transmission to enable utilization of remote renewable resources. Energy efficiency also reduces the need for new infrastructure with all of its attendant challenges.

Understanding the potential positive and negative effects of TS&D infrastructure, then, on the achievement of overall environmental goals—including climate mitigation—is key to siting, constructing, operating, and maintaining TS&D infrastructure in an environmentally responsible manner. Many QER recommendations in other chapters touch on actions that will enhance the ability of the United States to achieve its environmental goals. This chapter focuses on those that relate specifically to the environmental impacts posed by TS&D infrastructure itself.

### Key Findings

**TS&D infrastructure can serve as a key enabler for—or barrier to—better environmental outcomes.**

Certain types of TS&D infrastructure enable improvements in system-wide environmental performance at lower cost, such as electric transmission and distribution infrastructure to access renewable energy resources and interstate natural gas pipelines which can facilitate CO<sub>2</sub> emission reductions from the electric power sector.

**TS&D infrastructure contributes a relatively small share of total air and water pollution from the energy sector.** TS&D infrastructure covered by this installment of the QER contributes to nearly 10 percent of U.S. GHG emissions. Many of the environmental issues related to TS&D infrastructure are subject to rules established by existing statute and regulation.

**Energy infrastructure can have direct, indirect, and cumulative land-use and ecological impacts.** The nature and magnitude of those impacts depend on a number of factors, including whether construction of a facility will affect endangered species or sensitive ecological areas, or cause land-use impacts such as top-soil erosion or habitat fragmentation.

**Energy transport, refining, and processing infrastructure contribute to emissions of criteria air pollutants that pose risks to public health and the environment.** Ports and rail yards with high densities of vehicles and congestion often have high concentrations of pollutants and increase risks to nearby urban communities. Reducing emissions of particulate matter from aircraft, locomotives, and marine vessels would have public health benefits. Low-income and minority households are two to three times more likely to be affected by freight-based diesel particulate pollution than the overall U.S. population.

**Transportation of crude oil by pipeline, rail, and waterborne vessels has safety and environmental impacts.** The Federal Government has a number of efforts underway to mitigate these impacts, including a rulemaking on rail transport of crude oil.

**The United States currently has a network of more than 4,500 miles of CO<sub>2</sub> transportation pipelines that can be a critical component of a low-carbon future.** The pipelines mostly transport naturally occurring CO<sub>2</sub>, but new projects are increasingly linking captured CO<sub>2</sub> from electric power plants and other industrial sources to a productive use in oil fields (through CO<sub>2</sub> enhanced oil recovery) and safe storage in deep saline formations.

### Selected Recent Federal Government Actions

In addition to the efforts to improve natural gas pipeline safety discussed under Chapter II (Increasing the Resilience, Reliability, Safety, and Asset Security of TS&D Infrastructure), which will have environmental benefits, the Administration is undertaking a number of other initiatives to reduce methane emissions and address environmental effects of TS&D infrastructure. They include the following:

- **Setting a national goal to reduce methane emissions.** Building on the 2014 interagency Strategy to Reduce Methane Emissions, in January 2015, the President announced a national goal to reduce methane emissions from the oil and gas sector by 40 percent to 45 percent from 2012 levels by 2025.
- **Establishing standards for methane emissions from new and modified sources.** The Environmental Protection Agency (EPA) has initiated a rulemaking to set standards for methane and volatile organic compound emissions from new and modified oil and gas production sources and natural gas processing and transmission sources. EPA will issue a proposed rule in the summer of 2015, and a final rule will follow in 2016.
- **Modernizing natural gas transmission and distribution infrastructure.** Following on its methane roundtables, DOE is taking steps to encourage reduced GHG emissions, including the following:
  - Issuing energy efficiency standards for natural gas and air compressors
  - Funding was proposed in the FY 2016 Budget to advance R&D to bring down the cost of detecting leaks and to improve estimates of methane emissions from midstream natural gas infrastructure for incorporation into EPA's Greenhouse Gas Inventory
  - Implementing an Advanced Natural Gas System Manufacturing Research and Development Initiative
  - Partnering with the National Association of Regulatory Utility Commissioners to help modernize natural gas distribution infrastructure
  - Issuing an Advanced Fossil Energy Projects Solicitation inviting applicants to apply for developing a clearinghouse of information on effective technologies, policies, and strategies.
- **Working cooperatively with industry to reduce methane emissions.** EPA is working to expand on its successful Natural Gas STAR Program by launching a new partnership in collaboration with key stakeholders later in 2015. EPA will work with DOE, DOT, and leading companies—individually and through broader initiatives, such as the One Future Initiative and the Downstream Initiative—to develop and verify robust commitments to reduce methane emissions.
- **Reducing other air pollution from TS&D infrastructure systems.** A number of Administration initiatives are reducing air pollution from TS&D infrastructure. Examples of this include the EPA's guidelines to states to reduce ozone precursors from oil and gas systems; DOE's work to improve the energy efficiency of equipment powering natural gas transmission systems and other TS&D infrastructure; DOT's Federal Highway Administration funding of state and local programs that reduce air emissions through its Congestion Mitigation and Air Quality Improvement program; and funding of the National Clean Diesel Campaign, which issues grants to eligible entities for projects to reduce emissions from existing diesel engines, which are pervasive in TS&D infrastructure.

### Recommendations in Brief

**Improve quantification of emissions from natural gas TS&D infrastructure.** Congress should approve the \$10 million requested in the FY 2016 Budget to help update Greenhouse Gas Inventory estimates of methane emissions from natural gas systems. DOE and EPA should undertake a coordinated approach, building on stakeholder input, to ensure that new research and analysis is targeted toward knowledge gaps unaddressed by other researchers.

**Expand R&D programs at DOE on cost-effective technologies to detect and reduce losses from natural gas TS&D systems.** DOE should leverage its R&D efforts in this area to facilitate broader air quality benefits.

**Invest in R&D to lower the cost of continuous emissions monitoring equipment.** To further improve safety and reduce emissions from natural gas systems, additional R&D—as proposed in the FY 2016 Budget—is needed to reduce costs and enable deployment of continuous emissions monitoring technologies.

**Support funding to reduce diesel emissions.** To protect workers and nearby communities through further reductions in diesel particulate matter emissions from ports and rail yards, the Administration proposed, and Congress should provide, funding for the Diesel Emissions Reduction Act and other related programs.

**Collaborate on R&D on the beneficial use and/or disposal of dredging material.** The Army Corps of Engineers and other appropriate Federal agencies should undertake collaborative R&D on treating and then either beneficially using or disposing of dredging material.

**Improve environmental data collection, analysis, and coordination.** DOE should work with other Federal agencies to improve data and analysis on the environmental characteristics and impacts of TS&D infrastructures.

**Work with states to promote best practices for regulating and siting CO<sub>2</sub> pipelines.** Building on successful state models for CO<sub>2</sub> pipeline siting, DOE, in cooperation with Federal public land agencies, should take a convening role to promote communication, coordination, and sharing of lessons learned and best practices among states that are already involved in siting and regulating CO<sub>2</sub> pipelines or that may have CO<sub>2</sub> pipeline projects proposed within their borders in the future.

**Enact financial incentives for the construction of CO<sub>2</sub> pipeline networks.** Congress should enact the Administration's proposed Carbon Dioxide Investment and Sequestration Tax Credit, which would authorize \$2 billion in refundable investment tax credits for carbon capture technology and associated infrastructure (including pipelines) installed at new or retrofitted electric generating units that capture and permanently “sequester” CO<sub>2</sub>.

### Enhancing Employment and Workforce Training

The workforce needed to build, maintain, and operate energy infrastructures will continue to evolve and, in many cases, grow significantly. The heavy investment in new U.S. energy infrastructure that is anticipated over the next few decades, combined with the maintenance needed by current infrastructure systems and the looming retirement of a significant fraction of this sector's labor pool, will stimulate the creation of a wide range of new job opportunities for skilled workers. This will pose an increasing challenge for workforce development and job training strategies.

### Key Findings

**Approximately 1 million people were employed in energy transmission and distribution jobs in 2013.** This represented almost 0.75 percent of U.S. civilian jobs. An additional 900,000 jobs were indirectly supported by energy transmission and distribution activity.

**Projections indicate that, by 2030, the energy sector overall, including the TS&D segment, will employ an additional 1.5 million workers.** Most of these jobs will be in construction, installation and maintenance, and transportation, and approximately 200,000 more workers with computer and mathematics skills will be in demand.

**Changes in the electricity sector, in particular, affect the number and types of energy jobs.** New technologies are changing the skill sets in demand in the electricity workforce, creating opportunities that include utility management positions for smart grid programs, meter installers and service providers, intelligent transmission and distribution automation device producers, communications system products and services providers, and software system providers and integrators.

**Accelerating methane abatement actions in the natural gas TS&D system is projected to support a significant number of jobs.** One study projects that an accelerated replacement timeline along with other measures could support 313,000 jobs throughout the economy.

**New job-driven training strategies, reflecting a broader range of needed skills, will be required to meet the challenges of the future.** Whether it is by expanding training curricula to use the latest educational tools and techniques, moving to a competency-based system of evaluating educational and training outcomes, or engaging new pools of potential talent (such as veterans), innovation in methods to attract and train the TS&D infrastructure workforce of the future will be required.

**Defining priorities in the area of jobs and workforce training and establishing effective programs requires good data.** It is challenging both to define and quantify jobs in the energy industry because of how employment data in the United States are organized and published. The lack of information is especially critical in job categories experiencing high growth and rapid technological change, such as those dealing with infrastructure associated with the solar industry.

### **Selected Recent Federal Government Actions**

The activities of the Federal Government to respond to changes in employment and workforce for TS&D infrastructures exist in a broader context of initiatives to train a competitive domestic energy workforce that are being undertaken by the energy industry, labor organizations, colleges, trade schools, and state and local governments. Some recent Federal actions and initiatives that are aimed at supporting and partnering with these broader efforts include the following:

- **Expanding existing efforts.** The Administration's Ready to Work Initiative and the passage of the Workforce Innovation and Opportunity Act have led to several important efforts in the energy sector. In addition to the significant investments in energy and advanced manufacturing workforce training, the newly formed Skills Working Group, an interagency task force of 13 Federal agencies chaired by the Secretary of Labor, has focused on the energy sector as one of six key opportunity areas for expanding apprenticeships, building career pathways to the middle class, and initiating place-based initiatives to expand opportunities to underserved communities.
- **Providing financial assistance for training.** The Department of Labor has granted \$450 million in Trade Adjustment Assistance Community College and Career Training grants to nearly 270 community colleges across the country. Also, in December 2014, the Department of Labor announced the American Apprenticeship Grants Competition—a \$100-million grant program to launch apprenticeship models in high growth fields, such as energy, and expand apprenticeship models that work.
- **Creating an energy Jobs Council.** DOE has created a new Jobs Council, which brings together the diverse energy programs of the Department with its laboratories and technology resources to accelerate job creation across all energy sectors in partnership with other Federal agencies, the private sector, and state and local governments.

- **Developing curricula and certification standards.** DOE has been deeply engaged with both traditional and new energy sectors, developing curricula and/or certification standards for the solar, unconventional natural gas extraction, and building energy efficiency industries, for instance. In addition, through DOE's Office of Economic Impact and Diversity and its new Jobs Council, the Department's programs have focused on driving energy opportunities to traditionally underserved communities and to veterans and other specific populations.

### Recommendations in Brief

**Support an energy-job skills training system through the interagency Skills Working Group.** The training system should include new curricula, apprenticeship programs, industry-based credentialing standards, and innovative online learning systems.

**Expand support for an open-source learning community to develop, facilitate, and expand use of state-of-the-art courses in energy-related fields.** These efforts should work to maintain and improve the National Training and Education Resource platform.

**Coordinate efforts to accelerate the development of high-quality energy and manufacturing curricula and apprenticeship programs.** DOE should coordinate with existing Department of Labor and National Science Foundation programs.

**Facilitate national credentials for energy occupations.** DOE should support and facilitate an industry-led process of defining needed skills in a number of emerging occupations.

**Facilitate the transition of military veterans into the energy sector.** DOE should work with the Departments of Labor and Defense and stakeholders to standardize the applicability of Military Occupation Codes to civilian jobs in energy sectors.

**Establish an interagency working group to reform existing energy jobs data collection systems.** DOE should convene a group with the Departments of Labor and Commerce to provide complete and consistent definitions and quantification of energy jobs across all sectors of the economy.

### Siting and Permitting of TS&D Infrastructure

The trends affecting TS&D infrastructure are discussed in this report—including major increases in oil and gas production, expanding production of renewable energy, changing requirements for what is expected of energy infrastructure, climate change, and steps to maintain electricity grid—are shaping and driving demand for new TS&D infrastructure. Over the last decade, there has been a growing awareness of the gap between the times typically needed to permit new generation and production sources of energy and the much longer times needed for TS&D infrastructure. This discrepancy in permitting time frames affects everything from transmission planning to utility procurement and project finance decisions—making it more challenging to plan, site, permit, finance, and construct energy infrastructure projects. Given these challenges, it is essential to promote more timely permitting decisions while protecting our Nation's environmental, historic, and cultural resources.

### Key Findings

**The involvement of multiple jurisdictions adds time to siting, permitting, and review of infrastructure projects.** As major infrastructure projects are proposed, Federal, state, local, and tribal governments must work to consider and minimize potential impacts on safety and security, as well as environmental and community resources (e.g., air, water, land, and historic and cultural resources). These entities often have overlapping and sometimes conflicting statutory responsibilities for siting and permitting projects. The interplay among the diverse sets of participants and statutorily defined responsibilities is challenging, and for particularly large and complex infrastructure projects, multiple permits and approvals can lead to inefficiencies and delay.

**Close collaboration with tribal, state, and local governments is critical to siting, permitting, and review of infrastructure projects.** Most infrastructure siting and permitting decisions are made at the state and local levels; some also require consultation with affected Indian Tribes. The bulk of Federal review and permitting responsibilities are also handled at regional offices rather than agency headquarters. The local nature of decision making requires close interaction between local and tribal governments and Federal agencies, as well as appropriate knowledge of resource concerns to be addressed in the permitting process.

**Robust public engagement is essential for the credibility of the siting, permitting, and review process.** Major infrastructure projects, such as high-voltage transmission lines and pipelines, are likely to trigger potentially conflicting stakeholder interests and have the potential to produce significant impacts on local communities and the environment due to their complexity and scale. Robust stakeholder engagement is necessary to avoid, minimize, and mitigate these potential impacts and is likely to reduce delays in reaching a decision.

**Siting timetables vary widely, and processes for siting energy infrastructure differ by sector.** Major infrastructure projects typically involve multi-year design, development, and construction timelines with complex approval processes. Timelines and processes for approval vary depending on the scope and type of project.

### **Selected Recent Federal Government Actions**

The Obama Administration has taken steps within and across Federal agencies to modernize the Federal permitting and review process for major infrastructure projects to reduce uncertainty for project applicants, to reduce the aggregate time it takes to conduct reviews and make permitting decisions by half, and to produce measurably better environmental and community outcomes. These include the following actions:

- **Coordinating project review.** The Interagency Steering Committee established under Executive Order 13604 and the Interagency Infrastructure Permitting Improvement Team housed at DOT are currently developing a Policy for Coordinated Review of infrastructure project applications among Federal agencies and with project sponsors.
- **Developing pre-application procedures and cost recovery for project reviews.** In 2013, DOE—through the Council on Environmental Quality and the Administration's Rapid Response Team for Transmission—developed a proposed Integrated Interagency Pre-Application Process for onshore electric transmission lines. DOE is now considering issuing a revised regulation under Section 216(h) of the Federal Power Act that would incorporate that process. In September 2014, the Bureau of Land Management issued a proposed rule that would require all applicants for rights of way across public lands for electric transmission lines of 100 kilovolts or greater and pipelines 10 inches or more in diameter to hold pre-application meetings to coordinate with appropriate Federal and state agencies and tribal and local governments. It would also require proponents to pay reasonable or actual costs associated with the pre-application process.
- **Expanding online project tracking and developing metrics.** The Administration launched a Federal Infrastructure Project Permitting Dashboard to track designated infrastructure project schedules. The dashboard also hosts a "Permit Inventory"—a searchable database of required permits and approvals—as well as National Environmental Policy Act (NEPA) reviews and milestones relating to major infrastructure projects.
- **Expanding availability and sharing of data and geographic information system tools.** The Administration has identified a number of actions and policies to facilitate adequate collection, integration, and sharing of the best available data to assist project sponsors in siting projects in order to minimize resource impacts and to support Federal decision making, including (1) NEPA node;

(2) the Fish and Wildlife Service Information, Planning, and Conservation Tool; (3) EPA's NEPAassist; (4) the Eastern Interconnection States Planning Council Energy Zones Mapping Tool; (5) the Army Corps' Federal Support Toolbox; (6) the Western Governors' Associations' Crucial Habitat Assessment Tool; and (7) the National Oceanic and Atmospheric Administration's Social Vulnerability Index.

- **Designating corridors for pipelines, electric transmission lines, and related infrastructure.** The Department of the Interior and the Department of Agriculture are conducting a periodic review of the Western energy rights-of-way corridors designated in 2009. As directed in the June 2013 Presidential Memorandum, DOE issued two reports—one for assessing potential corridors in the West, as proposed by the Western Electricity Coordinating Council, and one for the rest of the United States that looks at current and potential crossings for transmission lines and oil and gas pipelines on federally protected national trails.
- **Undertaking landscape- and watershed-level mitigation and conservation planning.** Federal land management agencies have begun to implement mitigation and conservation planning at the landscape, ecosystem, or watershed level. For example, in March 2014, the Department of the Interior released the Solar "Regional Mitigation Strategy for the Dry Lake Solar Energy Zone," and in April 2014, Secretary Jewell issued the "Strategy for Improving the Mitigation Practices of the Department of the Interior."

### Recommendations in Brief

**Allocate resources to key Federal agencies involved in the siting, permitting, and review of infrastructure projects.** Federal agencies responsible for infrastructure siting, review, and permitting have experienced dramatic appropriations cuts and reductions in staff. Many of the components of the overall effort to improve the Federal siting and permitting processes have been stymied in recent years by appropriations shortfalls. Congress should fully fund these priorities.

**Prioritize meaningful public engagement through consultation with Indian Tribes, coordination with state and local governments, and facilitation of non-Federal partnerships.** Early and meaningful public engagement with affected residential communities, nonprofit organizations, and other non-Federal stakeholders through the NEPA process and other forums can reduce siting conflicts. Federal agency coordination with state and local governments and government-to-government consultation with affected Indian Tribes should remain a Federal Government priority. When possible, Federal agencies should co-locate energy infrastructure environmental review and permitting staff from multiple Federal agencies' regional and field offices.

**Expand landscape- and watershed-level mitigation and conservation planning.** When adverse impacts to the Nation's landscape cannot be avoided or minimized any further, Federal agencies should seek innovative approaches to compensate for adverse project impacts commensurate with the scope and scale of the project and effects to resources. Through mitigation planning at a landscape, ecosystem, or watershed scale, agencies can locate mitigation activities in the most ecologically important areas.

**Enact statutory authorities to improve coordination across agencies.** Congress should authorize and fund the Interagency Infrastructure Permitting Improvement Center in DOT, as set forth in Section 1009 of the Administration's draft legislation for the GROW AMERICA Act.

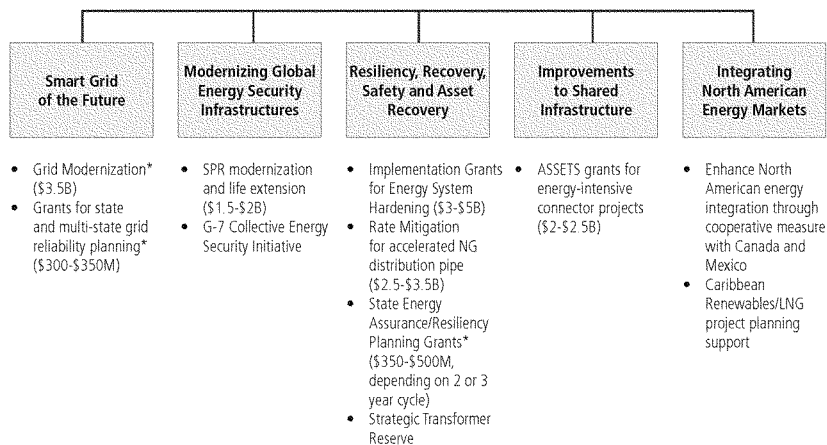
**Adopt Administration proposals to authorize recovery of costs for review of project applications.** Consistent with the proposal in the President's FY 2016 Budget Request, additional flexibility for certain agencies to accept funds from applicants would be appropriate and could expedite the Federal permitting and review process.

## Investing in Energy Infrastructure

The replacement, expansion, and modernization of dedicated and related energy infrastructure require major investment over an extended period of time. Most of the resources will come from the private sector—sometimes as approved costs under Federal and state-regulated rate structures for energy delivery to consumers and businesses. Nevertheless, a significant number of the infrastructure recommendations put forward in this QER call for Federal funds, either for direct investment or for stimulating and incentivizing other investments. The desirability of Federal engagement comes in large part from classic market failures of a variety of kinds, above all public goods and negative externalities. As noted in a 2012 report by the Department of the Treasury and the President's Council of Economic Advisers, moreover, there is a large body of evidence showing significant private sector productivity gains from public infrastructure investments, in many cases with higher returns than private capital investment.<sup>8</sup>

The QER calls for increased Federal investments, targeted both at areas of traditional Federal responsibility and at new approaches to inform, incentivize, and leverage the investment decisions of state and local governments and the private sector that reinforce overarching economic, security, and environmental objectives (see Figure SPM-6). Some of these investments were already proposed in the President's FY 2016 Budget Request. The recommendations that were not proposed in the FY 2016 Budget, both on the mandatory and discretionary side, will be subject to the President's Budget process, including, for example, identification of revenue sources or other offsets. Other recommendations would require new authorizing legislation and were not proposed in the FY 2016 Budget. Table SPM-2 summarizes the recommendations that will require further legislative authorization, together with initial order-of-magnitude cost estimates. More precise cost estimates will depend upon more detailed program design and final statutory language. The Administration looks forward to working with Congress to advance these recommendations.

Figure SPM-6. Recommendations Requiring Legislative Authorization



Note: Most funding is over 10 years and would be incremental to agency baseline budgets. Programs identified with an asterisk would require incremental funding over a shorter time period.

Table SPM-2. Examples of Federal Mechanisms/Tools Applied to Each Energy Infrastructure Objective

Objectives ►	Resilience, Reliability Safety and Security	Electricity Grid Modernization	Energy Security and Supporting Infrastructures	Administration Chair
Mechanisms/Tools ▼				
<b>Direct Federal Infrastructure Investments</b>	Provide competitive, cost-shared implementation grants to harden and enhance the resilience of electricity TS&D infrastructures	Provide competitive grants for State and multi-State reliability planning to meet environmental, resilience, and efficiency goals	De-bottleneck Strategic Petroleum Reserve (SPR) distribution capability through marine terminal enhancements	Provide cost sharing for investments in shared energy transportation systems
<b>Research, Development and Analysis</b>	Develop and demonstrate cost-effective technologies to detect and reduce GHG losses from natural gas transmission and distribution systems	Assess flexibility and value of electricity storage	Enhance research on Arctic energy safety and accident prevention	Support research on disposal of dredging materials
<b>Data Collection and Information Management</b>	Develop a framework and metrics for modeling and measuring resiliency	Institutionalize energy efficiency evaluation, measurement, and verification	Increase the integration of EIA energy data with Canada and Mexico	Improve data collection on shared energy transportation infrastructure
<b>Federal Regulation</b>	Enhance safety standards for gas transmission pipelines	Develop grid connectivity and interoperability standards to enhance safe and reliable grid operation	Revise legal, regulatory, and policy roadmaps for harmonizing regulations for energy emergency response	Eliminate regulatory impediments to ensure adequate power plant fuel reserves.
<b>Workforce Development</b>	Develop curricula, training programs, and industry-based credentialing standards to expand energy sector workforce			

## Endnotes

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The CHAIRMAN. Thank you, Dr. Orr.  
Commissioner McAleer, welcome.

**STATEMENT OF HON. COLLEEN McALEER, COMMISSIONER,  
PORT OF PORT ANGELES, PORT ANGELES, WASHINGTON**

Ms. McALEER. Thank you.

Chairman Murkowski, Ranking Member Cantwell and distinguished members of the Committee, good morning and thank you for allowing me to speak before you.

My name is Colleen McAleer. I'm a combat veteran, mother of two boys, and a small business owner, but I offer my testimony today in my capacity as the Commissioner for the Port of Port Angeles. We are located in Clallam County in the northern portion of the state's, Washington State's, Olympic Peninsula.

Today I will talk to you about the effort we've spearheaded, the Composite Recycling Technology Center, or CRTC, where industry, small business, academia and government converge to reduce energy use and costs and strengthen U.S. manufacturing.

Carbon fibers replacing other materials in products that benefit from high strength to weight ratios. It's a \$26 billion global industry and growing. Light weight carbon fiber composites reduce the weight of a product, thus reducing the energy consumption; however, they are expensive to produce and do not deteriorate creating long term disposal issues.

Twenty-seven million pounds end up in U.S. landfills each year, two million from Washington State alone. Our port is well on its way to providing a solution to this problem through a public/private partnership, the Composite Recycling Technology Center.

Our port has headed an effort to recycle the production scrap of carbon fiber manufacturing processes, a first of its kind recycling center. Their research efforts in the U.S. and Europe address so-called end-of-life carbon fiber recycling, a more complex and energy intensive process, but we will first focus on the low hanging fruit of recycling and repurposing production scrap.

Carbon fiber products already reduce energy consumption by reducing weight in industries from transportation to sporting goods. Recycling carbon fiber composites will drastically reduce the energy required for manufacturing them. The recycled carbon fiber composite in the CRTC approach will use only six percent of the energy required to produce the comparable virgin carbon fiber fabrics.

In my rural, economically distressed county, we have several manufacturers that use advanced composites and are dealing with this very issue today. They make yachts, cutters, snowboards, aerospace parts and more.

Also located in the county is the Pacific Northwest National Labs, Marine Science Lab. It has permitted in water facilities to test carbon fiber wave and tidal technologies. Last year our community was an integral part of the West Coast application for the \$70 million, Department of Energy award for our Composites Institute.

Our multi-state team lost the competition to Tennessee, but the program represented a compelling solution for industry and small business so we have carried on without the DOE funding on a smaller scale.

Our Port has received a preliminary award of \$4 million from the U.S. Department of Commerce, Economic Development Administration, Washington State and Clallam County.

In addition the Port has provided the space for the facility and committed \$1.5 million in cash for its development and advanced manufacturing program in the works since 2012. The 25,000 square foot facility will be a shared equipment center that serves four functions. It will accept uncured scrap carbon fiber and remake it into a useable form. It will manufacture and sell secondary repurposed products. It will serve as a workforce training space for local colleges. Most importantly, it will serve as an industrial scale, shared equipment space for entrepreneurs and universities.

These functions will create a locally trained workforce, drive accelerated technology transfer with a national reach and deliver a significant economic impact to our struggling county.

I sit on the Executive Board of our state's Center of Excellence for Aerospace and Advanced Manufacturing. I often hear business owners say they can't find employees with the needed skill sets. This Center of Excellence has aggressively coordinated with the state's technical and community colleges to address this very issue.

Washington State community colleges deliberately designed their curriculum to match the local employer's requirements. In fact, colleges often buy equipment identical to that used by manufacturers in their facilities. Standardization through certification programs serve two constructive purposes. First it develops the certification programs employers need. Second, it enables employers to readily hire qualified workers.

At the CRTC we have a parallel workforce training effort. Peninsula College is relocating their advanced manufacturing composites program and equipment to our facility. The CRTC will house the business innovators and their future workers. The CRTC will accelerate commercialization of technologies from the lab to the manufacturing floor. Small businesses will lease the CRTC lab space to develop proprietary products at our shared equipment center. They will also have access to CRTC material and process experts accelerating their development process. We believe the reduced costs and resident expertise will produce innovation and induce capital investments in carbon fiber technologies.

Mervin Manufacturing, a local company with \$13 million in annual exports, makes skis, skateboards and surfboards and several brands of snowboards from virgin carbon fiber. They intend to further innovate in the Center's maker space in order to replace that virgin carbon fiber with recycled carbon fiber for their snowboard bindings, skateboards and surfboard fins.

We currently have five major universities from three corners of the country that intend to send researchers and students to the Center. They intend to demonstrate and commercialize their technologies to the CRTC community.

At Washington State University we intend to leverage the Composite Material Engineering Center. It has a 35-year history in commercializing composite wood products like the plastic lumber materials used in decking. We are finalizing an agreement with Washington State University to test the CRTC products for certification and the construction industry at their facility.

CRTC efforts will re-shore jobs back to the United States. As an example Batson Enterprises is a local, wholesale supplier of fishing rods. The current purchase component, composite and aluminum parts overseas in order to keep their overall costs competitive. By partnering with the CRTC for product development using our recycled carbon fiber, Batson Enterprises will be able to manufacture those components with higher quality materials that were formally cost prohibitive.

The CRTC will be a small step in bringing back American manufacturing. We can't and don't want to compete with foreign countries on their labor costs. Recycled carbon fiber lowers material costs allowing companies to profit while paying a living wage.

The CHAIRMAN. Ms. McAleer, you need to wrap up.

Ms. MCALEER. I thank the Committee for considering this legislation supporting carbon fiber recycling, and I look forward to your questions.

The CHAIRMAN. Thank you.

Ms. MCALEER. Thank you.

[The prepared statement of Ms. McAleer follows:]

**Testimony of**

**Colleen McAleer  
Commissioner  
Port of Port Angeles  
Port Angeles, Washington**

**Before the Senate Committee on Energy and Natural Resources**

**June 9, 2015**

Good morning Chairman Murkowski, Ranking Member Cantwell and members of the Committee. Thank you for allowing me to speak before the Committee.

My name is Colleen McAleer. I am a Commissioner for the Port of Port Angeles, located in Clallam County on the northern portion of Washington State's Olympic Peninsula.

I moved to Washington State after serving ten years in the Army as an intelligence officer and aviator. I served with the 2nd Armored Cavalry Regiment as a platoon leader in Desert Storm and then flew rotary and fixed-wing aircraft in stateside and overseas assignments for the Army. In 2002, I moved to Washington State to raise two young boys. For nearly a decade, I worked with my father and brother as an owner of a successful family business.

Working with our clients, I watched too many businesses struggle and eventually close, leaving vacant storefronts across our county's communities. In the economic downturn, I saw that local governments needed a different approach to make an impact on the local economy. We couldn't afford to sit by and hope a rising tide would lift Clallam County. That's where the Port comes into this story.

In 2011, I accepted a position as Director of Business Development at the Port of Port Angeles. After two years, I felt compelled to run for Port Commissioner. I ran on economic progress and fiscal responsibility—two areas I am passionate about.

***The Washington State Port System***

Port authorities in Washington State are unique; they are autonomous governments with commissioners directly elected by the citizens of our districts. A Washington State port's primary function is to drive a prosperous economy within its defined district. The commissioners have the authority to levy taxes and prioritize spending. I will try to show how our potential for economic improvement relates to the legislation under consideration.

***Clallam County Economy***

Historically, logging has been our county's economic lifeblood. But with issues of threatened species, we've been less able to profitably harvest much timber, costing tens of thousands of jobs and affecting the entire county economy. Add the lingering economic downturn, and our county has struggled with double digit unemployment, a private industry median wage holding at about \$33,000, and a trend of exporting our graduates. Our unemployment numbers would be higher, but many in the local labor force have departed the county to find work in Seattle and the booming I-5 corridor to our east. To turn this around, we know we must innovate, change, and compete.

***Synergy in the Composites Industry***

As both the former Director of Business Development and current Commissioner, I have courted and collaborated with leaders in industry, academia, and government, making the argument that our county is ripe for investment in composites technology and sustained economic growth.

As you may know, composites are the material of the future. They are lightweight, adaptable and strong. Boeing's new planes are made of composites. Our relatively small county already has several manufacturers who use these materials. They make yachts, cutters, snowboards, aerospace parts and more. And the Pacific Northwest National Laboratory's Marine Science lab (PNNL) located in our county has facilities to test marine hydro-kinetic devices made from carbon fiber.

We have three large mills that have closed their doors in just the last year. This workforce is ideally suited for the carbon fiber industry. Both sectors are automated, high volume industries that require precise processes and quality control. A strong composites manufacturing capability holds the promise of becoming a sorely needed economic driver. Advanced manufacturing technology can boost each of these two industries and have a multiplier effect on the Clallam County economy. This brings me to our **Composites Recycling Technology Center (CRTC)** initiative.

#### *The CRTC Story*

Recycling carbon fiber composites has two challenges. The first is how to deal with leftover or uncured scrap. Today, over 29 million pounds of this material ends up in landfills every year in the United States alone. The second, larger challenge is to reclaim fibers from cured material.

We have created a non-profit center called the Composite Recycling Technology Center (CRTC) to meet the challenge around the uncured (pre-impregnated or pre-preg) scrap or waste that is created through the manufacturing process.

Since 2012, the Port of Port Angeles has spearheaded the idea of an advanced composites manufacturing, where industry and researchers share workspace and workforce. It would leverage our existing technologies and assets.

- Our Port has owned and operated a Composite Manufacturing Campus since 1988 as part of our airport industrial park which houses industrial-scale autoclaves used to cure advanced carbon fiber pre-preg products.
- Our relatively small county already has several manufacturers that use composite materials to manufacture products such as yachts, cutters, aerospace components, snowboards, surfboards, skateboards, and fishing rods.
- PNNL's Marine Science Laboratory is located in our county and already has the necessary facilities to research and demonstrate in-water marine hydro-kinetic devices made from carbon fiber materials.

Large manufacturers and suppliers have agreed to donate their scrap carbon fiber pre-preg material to the CRTC. In addition, these major aerospace partners have the capability to support targeted technology transfer to secondary use industries and partnered marketing support. As the primary generators of vast quantities of this high quality "waste," aerospace firms want to stop landfilling the pre-preg materials and put it to a more productive use. These carbon fiber pre-preg users have both business and operational reasons for not creating secondary products themselves and there is no existing industry to repurpose the material.

Last year, the CRTC, led by the Puget Sound Regional Council, was one of six Catalytic Investments to win the Federal Investing in Manufacturing Communities Designation. In addition, our local team was an integral part of the state's application for the \$70 million DOE Clean Energy Manufacturing Innovation Institute. The state team lost that competition to a team in the Southeast, but we believed the composites recycling composites niche was an excellent fit for our state and country, and even more so for our community. So we carried on without the Department of Energy funding.

Industry partners, small businesses, universities and community colleges have committed more than \$30 million over many years of in-kind support. The Port of Port Angeles has already spent millions on this project and will add another \$2 million in capital and operational funding. In addition, we have received preliminary notice of awards for the full \$4M needed for infrastructure through a combination of federal, state and local support.

The 25,000 square foot CRTC facility will be a shared equipment center that serves the following functions:

1. Reduce carbon fiber pre-preg waste in landfills by accepting regional manufacturer's scrap and waste pre-preg material.
2. Sell reformed carbon fiber pre-preg material to manufacturers when supplies allow.
3. Manufacture secondary repurposed products with uncured waste material.
4. Serve as a hub for industry and academic research to universities.
5. Serve as a workforce training space for Peninsula College and potentially others.

We anticipate opening our doors in January 2016. We also anticipate that this investment in advanced manufacturing and composites technology will help boost the Clallam County economy, while providing other benefits to our State and country.

#### *Technology Transfer*

Small businesses will use the CRTC to conduct proprietary product development at our shared equipment center and consult with our material and process experts on hand at a fraction of the price and risk they would take on if they were to do it on their own. An example of a Clallam County business partner is Mervin Manufacturing. They manufacture skis, skateboards and surfboards and several brands of snowboards (LibTech & GNU) from carbon fiber composite materials. Mervin exports \$13 million of their product overseas annually. They plan to recycle some of their composite waste stream with the CRTC. More importantly, they will develop new manufacturing methods and products created from the high-grade recycled composites that the CRTC will be processing in a variety of their products including snowboard bindings, surfboard fins and accessories, skateboards, and other action-sports accessories.

University partners, such as WSU, UW, USC, UCLA, and the University of Alabama, Birmingham all have interests in sending researchers and students to test composites recycling technology and work with CRTC personnel on projects of mutual interest. The commercialization of technology owned by universities and PNNL will be readily transferred to other parties. Universities will send their graduate students to complete capstone projects at our full-scale manufacturing facility.

As an example, Washington State University has a 35-year history of commercializing products ranging from wood oriented strand board (OSB) to plastic lumber materials used in decking. WSU has the capability to certify a product for building codes. We are finalizing an MOU with WSU and their Composite Material Engineering Center for certification of building materials and development of specifications for municipalities building code.

#### *Intellectual Property*

The ultimate goal of the Port and its funders is to create spinoff companies and jobs in Clallam County. The CRTC non-profit board will finalize the IP Management Plan. We plan to incentivize companies to use our center, rather than require IP ownership rights which would create a barrier for prospective users of the facility and thus create a barrier to economic growth for our county.

#### *Reshoring Manufacturing*

We can't and don't want to compete with the low wages of foreign countries. One way to deal with this is by lowering material and process costs while raising wages. Recycling the two million pounds of incredibly valuable carbon fiber pre-preg scrap, instead of landfilling it, meets this goal.

Here's an example: Batson Enterprises, located in Clallam County, is a wholesale supplier of fishing rod blanks. Today they purchase some of their component composite and aluminum parts overseas in order to keep their

overall costs competitive. By partnering with the CRTC for product development with the recycled pre-preg, Batson Enterprises will be able to purchase locally-produced, higher quality materials — aerospace-quality materials — that were formerly cost prohibitive.

#### *Workforce Training*

We know from local business owners that one of the greatest hurdles to growth is developing a trained workforce. That is why our local community college, Peninsula College, will relocate their Advanced Manufacturing – Composite program into the CRTC facility to conduct workforce training in composite manufacturing and carbon fiber recycling techniques. The CRTC will house both the business entrepreneurs and the future workers. The Center is designed so that skills will be accurately defined and taught, businesses leaders will have a view of the potential workforce, and the workers can better understand which business program more likely will fit their needs.

Like all community colleges in Washington State, Peninsula College works hand-in-hand with local employers to ensure that programs are designed to fit market requirements. Colleges often buy equipment identical to that used by manufacturers in their facilities. Sometimes trained employees apply for job opportunities elsewhere in the state. This makes standardization through certification programs crucial for smart training and hiring. I sit on the Executive Board of the State's Center of Excellence for Aerospace and Advanced Manufacturing and have heard numerous accounts from manufacturers about the importance of the work this Center has done to standardize college training programs to make the productivity of their businesses more efficient.

#### *Reducing Greenhouse Gases and the Impact of Recycling Carbon Fiber*

There is a clear and compelling connection between the CRTC initiative I've described and the potential to address environmental challenges. To put the energy savings in perspective, I submit the following estimates for production requirements, which clearly shows the benefit of recycling carbon fiber:

Virgin carbon fiber pre-preg	315 MJ/kg
Virgin aluminum	218 MJ/kg
Recycled aluminum	29 MJ/kg
CRTC Estimates for Recycled carbon fiber pre-preg:	
Collection, transportation, and storage	4 MJ/kg
Cutting, handling, and conversion to "usable" format	4 MJ/kg
Re-processing into final product	12 MJ/kg
<b>Total for recycled carbon fiber pre-preg</b>	<b>20 MJ/kg</b>

Recycled carbon fiber composite embodied energy is estimated as follows:

1. Aluminum and carbon fiber are roughly equivalent in embodied energy use to produce a component with virgin feedstock when we take into account the lighter weight of carbon fiber used. The carbon fiber part continues to have the benefit of the 30-40% weight reduction to lower lifetime energy use during operation. For vehicles, production energy is around 15-20% of total lifecycle energy, so reducing upfront weight is a critical factor in total lifecycle energy usage.
2. Recycled carbon composite in the CRTC approach will have about 6% of the embodied energy of a product made from virgin carbon fiber composite.
3. Recycled carbon fiber component using the CRTC model and approach would have about 1/3 the embodied energy of an equivalent product from recycled aluminum.

Additionally we will develop processes that use net-shape molding, with near-zero waste, further improving the energy and manufacturing benefits.

*Conclusion*

I hope I have painted a clear picture of how recycling composite carbon fiber scrap will not only provide essential jobs on our local economy, but promote a needed market that provides environmental benefits as well. Our Port sees the CRTC as a win-win on all of these levels. I do not believe that we have to choose between a healthy environment and a healthy economy. I believe that they are mutually supportive and that you can't have one without the other.

We are meeting these societal challenges—and providing derivative benefits to our local and State economy—with the Composite Recycling Technology Center (CRTC). Given the many societal benefits of a recycling center, and the combined interests, we have set it up as a non-profit.

It is my fervent hope that the initiatives supporting energy accountability and reform, particularly S. 1432 which supports a recycled carbon fiber study, and S.1304 for a skilled 21st century energy workforce, will meet with your approval. Thank you for the opportunity to address this committee.

The CHAIRMAN. Mr. Augustine?

**STATEMENT OF NORMAN AUGUSTINE, BOARD MEMBER,  
BIPARTISAN POLICY COUNCIL**

Mr. AUGUSTINE. Well, thank you, Chairwoman Murkowski and Ranking Member Cantwell, members of the Committee for the opportunity to speak on a subject that I consider to be extremely important.

By way of background I'm a member of the Board of Directors of the Bipartisan Policy Council, and I co-chair the American Energy Innovation Council. The latter consists of seven members, CEOs of major firms, not in the energy business but who are in the research and development businesses. And we're very concerned about the lack of investment in America in energy research.

The names of my colleagues are in the written statement and I will try to reflect our collective views, although today my remarks will, in fact, be my own.

Energy research is obviously critical. It drives the economy to a large degree. It certainly has major environmental impacts. It impacts the world's geopolitical situation, certainly including national security.

We've had great examples of successes. Most recently one would have to think of the impact of the combination of 3D seismics and of horizontal drilling and hydraulic fracking which have had the effect, as I see it, of buying us time that we did not expect to have to be able to work on long term solutions. However, to find long term solutions we have to invest in energy R and D, and that raises the question of who shall invest?

One obvious answer might be industry should invest in R and D since it's one of the beneficiaries. When the Government cut back in overall R and D, their share from, well the Government's share from two-thirds to one-third, industry increased its share from one-third to two-thirds. The problem is that industry will invest in D by and large, but not R, and there are several reasons for that. One is that research, R, tends to be very long term in terms of its payoff. Today the average shareholder owns their stock four months; when I first went into business that was eight years. It has an enormous impact in discounting the future payoffs when shareholders view new company's investments. Furthermore in research the funder may not be the long term beneficiary of the results of that research because of the unpredictability of research. And finally, particularly in the energy area, there are major capital investments that firms hold and if the firms are not highly motivated to or take those investments and replace them with new equipment.

Let me state openly that I'm not a fan of heavy Government involvement in the free enterprise system. On the other hand I do recognize that there are some things that the private sector can't do, shouldn't do or won't do, and certainly energy R and D is one of them.

As you heard earlier today however, the Government ranks 29th in the share of research conducted within a nation's borders that's funded by the Federal Government. We've dropped from first to tenth in R and D intensity overall. We've dropped from first to sev-

enth at basic research in the world. China is about to pass us in both research intensity and value of research, and we spend more on potato chips in this country than we spend on clean energy research.

The national labs play a very critical role. They conduct high payoff, high risk research that industry is discouraged from undertaking. They conduct long term research. They can conduct very large, costly products that only Government can afford, and they also can supply major research equipment. But this research at the laboratories is of no value if it's not translated to industry. And frankly, in my view, we do a very poor job today of translating that investment in the labs into industry. The DOE is taking major steps to try to improve this, but there are many impediments in the way that we need to remove.

You, Madam Chairman, mentioned a number of bills before this Committee. It's large indeed. I would just like to highlight two that I think are terribly important. One is the America Competes Act that, particularly the Senate version, that really underpins all we do in this area. The second is funding of ARPA-E. ARPA-E has been highly successful but it is, frankly, being starved.

The bad news is that we're under-investing in energy research. The good news is that we could triple what we invest in energy research and it would barely show in the overall Federal budget.

Thank you very much.

[The prepared statement of Mr. Augustine follows:]



## BIPARTISAN POLICY CENTER

Norman R. Augustine  
Board Member  
Bipartisan Policy Center

**TESTIMONY OF NORMAN R. AUGUSTINE  
BEFORE THE COMMITTEE ON ENERGY AND NATURAL RESOURCES OF THE UNITED STATES  
SENATE**

**June 9, 2015  
WASHINGTON, DC**

Good morning, Chairwoman Murkowski, Ranking Member Cantwell, and Members of the Committee. Thank you for inviting me to speak with you today on how we can strengthen our federal investments in energy technology innovation.

I am a member of the board of directors of the Bipartisan Policy Council and co-chair of the American Energy Innovation Council, or AEIC. My associates in the AEIC are John Doerr, partner at Kleiner Perkins Caufield & Byers; Bill Gates, founder of Microsoft; Charles Holliday, retired CEO of DuPont; Jeff Immelt, chairman and CEO of GE; and Michael Graff, President and CEO of Air Liquide USA. We have all led major innovation-based enterprises and understand the critical importance of investments in new technologies. Our objective is to seek greater federal support for energy technology innovation investments because of their important potential impact upon our nation, including its economic future and international competitiveness; preservation of the national environment; and assuring national security. I am an engineer and businessperson, not a researcher, and the views I express will be my own.

In my remarks today I would like to indicate why I consider energy innovation to be of such importance; very briefly address several of the bills under your consideration; speak to the role of the National Laboratories; and conclude with an assessment of where America stands in the global, increasingly competitive race for energy technology leadership.

But first let me offer a few words about why I focus on energy technology innovation. Private-sector innovation on its own cannot restore American energy technology leadership. Private companies cannot capture the full economy-wide value of new knowledge and thus systematically underinvest in research and development relative to the benefits it produces. Moreover, the longer-term the research and development investment, the less likely private companies will choose to underwrite it when compared with the opportunities presented by shorter-term, incremental investments as demanded by the public equity markets. This is precisely why there is a critical role for the federal government in energy technology research and development. Public investment has been critical to generating the discoveries and inventions that form the basis of previous disruptive energy sources--be that commercial nuclear power, jet engines, shale gas, or solar photovoltaic technology. Markets will undoubtedly drive innovation, but U.S. businesses will only win the global, increasingly competitive race for energy technology leadership when supported by public innovation investments.

Despite its importance to our economy and future, federal energy innovation investments have stagnated over the last five years, remaining at or below 2010 levels in real dollars. The extent of America's disinvestment in research is such that America now ranks 29th among developed nations in the fraction of research that is governmentally funded. It is projected that within about five years China will surpass the U.S. in research funding as both a fraction of GDP and in absolute terms. This does not portend well for national security, jobs, the economy or the well-being of America's citizens.

Simply stated, America must compete. And if it is going to compete, it needs to invest in ingenuity.

I commend you both, Chairwoman Murkowski and Ranking Member Cantwell, as well as your colleagues Senator Gardner and Senator Heinrich, for co-sponsoring S. 1398, the Energy Title of the America COMPETES Reauthorization Act. This bill would begin to put federal energy innovation investments back on the growth track that bipartisan Congressional majorities initiated in the 2007 America COMPETES Act and sustained in its 2010 reauthorization. In my view, this piece of legislation is of pivotal importance with regard to America's competitiveness future.

Furthermore, I strongly support the efforts of this committee to proactively identify and support priority areas for federal research investment. Your colleagues in the House previously invited me to testify on the significance of research in high-performance computing, and I am pleased to see your committee take up companion legislation in S. 454. Additionally, I want to acknowledge the several bills that seek to increase research and development efforts associated with energy storage. Few other technologies could be as much of a game-changer for the U.S. energy system and international technology leadership.

But in addition to increasing energy technology investments, the federal government must seek to maximize the returns on those investments.

Most federal energy innovation investments are channeled through the 17 National Laboratories, which fill a role otherwise largely neglected by industry: namely, long-term, high-risk/high-payoff, often large-scale projects whose applications may not be evident at their outset. Having observed the Labs closely in my roles as Undersecretary of the Army, CEO of Lockheed Martin Corporation, and a frequent chair of National Academies and other studies, I understand that the large body of research conducted in the National Labs not only has advanced specific energy technologies, like nuclear power and hydraulic fracturing, but also tends to find applications in industry in non-energy fields. Unfortunately, in my view relatively little of this potential is being realized by American industry as it seeks to compete in the global marketplace. Among the many reasons for this, one is that industry, especially small firms, has little idea what research is being conducted at the national laboratories. A second reason is that well-intended rules and oversight mechanisms make it difficult for the laboratories to work closely with industry and also discourage the best means of technology transfer, the movement of people between government and industry. Other nations seem to have found solutions to these problems, albeit not without accepting certain risks. It is my view that the national laboratories are generally well run and are a national treasure that could make an even greater contribution than is the case today. But to do this they will need to be given greater latitude to create and additional funding—especially ARPA-E.

The Committee today is considering a number of bills that address different aspects of this challenge. What unites them all is a strong, bipartisan agreement on the importance of public-private partnerships in energy technology innovation, primarily through the National

Laboratories. Facilitating these partnerships among universities, industry, and the Labs will more readily translate publicly funded research into commercial offerings, maximizing the return on federal investments. I have previously endorsed bipartisan companion legislation in the House to S. 1187 the America INNOVATES Act, which seeks to ease the establishment of public-private technology partnerships, and I encourage the committee to consider including its provisions in future legislation. I also want to acknowledge the efforts in S. 784 and S. 1259, which in particular address the issue for smaller companies that may lack the resources to engage with the Labs.

Fundamentally, these federal investments in energy research must be guided by long-term vision. My colleagues and I support a national planning process, such as is recommended in the S. 1033 the Quadrennial Energy Review Act. I also want to acknowledge Chairwoman Murkowski's bill S. 1229, which would direct DOE to develop an implementation plan for recommendations given by the Commission to Review the Effectiveness of the National Energy Laboratories. As a sitting member of that committee, I appreciate your support in advance of our final conclusions--it not only is a vote of confidence for our work, but also for underscoring the urgency of reforms to ensure federal investments best support America's competitiveness.

I will conclude my remarks by addressing the question that often seems to be on people's minds when they observe my commitment to strengthening research in America. Why, they ask, would a fellow creeping up on 80-years of age, a non-researcher, view this as such a critical issue. The reason is that everything I have observed in my various roles in industry, government and academia suggests that other than our freedom and Free Enterprise system, discovery, invention and education are the nation's most fundamental assets and as such are the keys to a prosperous and secure future for America's citizens.

Thank you.

The CHAIRMAN. Thank you, Mr. Augustine.  
Ms. Harbert, welcome.

**STATEMENT OF HON. KAREN HARBERT, PRESIDENT AND  
CHIEF EXECUTIVE OFFICER, INSTITUTE FOR 21ST CENTURY  
ENERGY**

Ms. HARBERT. Thank you.

Thank you, Chairman Murkowski, Ranking Member Cantwell, members of the Committee for soliciting our input today. I applaud your efforts putting together a multi-title energy bill in today's world which is very difficult, so we applaud your efforts.

I can't address, obviously, all 42 of the bills today. Let me highlight a few. I'll start with the one that, I think, will have the most profound impact on our energy landscape which is lifting the ban on oil exports which is truly a relic of the 1970's and the era of oil embargo and a very different energy landscape.

In today's era of energy abundance unconventional shale oil and gas is a tremendous economic stimulus and catalyst. Shale energy has already added 2.1 million jobs to our economy during the deepest, darkest points of our recession. It has stimulated a tremendous amount of revenue, and it is slated to add \$1.6 trillion of Government revenue over the next ten years and to create an additional two million jobs by 2025.

If, on top of that, we lift the oil export ban we would support an additional 400,000 jobs, grow GDP and increase Government revenue by an additional \$1.3 trillion in the next 15 years while still ensuring that gasoline remains affordable to the American consumer. So it's clearly an economic win, but it's also a geopolitical win or wins, I might say.

We will be importing oil. We will be importing less oil from countries that don't share our values and are benefiting from our financial resources we send them to buy their oil. We have seen Russia and what it has done to the Ukraine. We have seen Russia's stranglehold on the energy supply to Europe, and we can break that stranglehold by adding more molecules into the market. And of course, new stable supply from America, from a reliable supply of energy, will choke the opportunity from non-state actors to use energy to fund their operations. And we know that ISIS and ISIL is using oil to fund their operations, directly threatening our national security. So it's a win/win/win, and the time to act is now.

Of course, as you pointed out in your report this morning, the executive branch could act now while Congress is still debating this. Staying on production for a moment, we support the Protecting State Rights Act. Between 2009 and 2014 oil production grew less than 1 percent on Federal lands and yet is up 90 percent on State and private lands.

BLM admits that it takes them 227 days to process an oil permit and yet in the states, it takes 30, so clearly the Federal process is less efficient than the states. So adding an unneeded layer of Federal permitting and regulatory process over the state process will be as disincentivizing investment on Federal lands, slow jobs and revenue growth. State primacy is important, and this legislation will preserve that.

We oppose the deficit reduction through Fair Oil Royalties Act because it's an arbitrary proposal to change a law that Congress passed in 1995 to stimulate investment in frontier deep water leases when prices were low and exploration expensive. So predicated a company's ability to enter new leases today on agreeing to higher prices for things they've already agreed to with the Government, ex post facto, violates the concept of sanctity of contracts and possibly even the Constitution.

We do support the bill to make DOE the coordinator for clean coal projects. They've proven challenging, economically and engineeringly challenged; however, the regulatory obstacles are even more daunting requiring permits from every element of the Federal Government. Designating DOE as the lead agency makes sense that potentially we might get more of these projects built even in the face of massive challenges to the domestic coal industry.

Regarding the Energy Loan Improvement Act, we greatly support returning the loan program to its original intent that Congress laid out in the Energy Policy Act and require applicants to have some skin in the game and pay the subsidy cost. That way we will ensure more bankable projects and avoid the problems of the 2009 stimulus package which let people off the hook and we saw many companies go bankrupt.

We also support the America Competes Act.

We also support the Advanced Grid Storage Act with some changes. The intent to focus DOE funds on grid storage is a very important element of our electricity sector transformation, and DOE should be spending more time and attention in that area. Yet we would like to not see the Davis-Bacon provisions included.

Lastly, without the work force to lead America's 21st century economy, we will not succeed. We have a growing skills gap and are facing the great shift change where 50 percent of energy professionals today can retire in the next ten years. So we support efforts like Senate bill 1422 which will make collaboration between industry, academic institutions, State governments, a priority to grow our energy workforce and focus on STEM skills.

I will especially note the Department of Veterans' Affairs efforts to put veterans into the workforce as a model we should likely emulate.

So thank you very much for the opportunity to testify today.

[The prepared statement of Ms. Harbert follows:]



## **Statement of the U.S. Chamber of Commerce**

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**ON: Energy Accountability & Reform Legislation**

**TO: U.S. Senate Committee  
on  
Energy & Natural Resources**

**DATE: June 9, 2015**

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1615 H Street NW | Washington, DC | 20062

The Chamber's mission is to advance human progress through an economic, political and social system based on individual freedom, incentive, initiative, opportunity and responsibility.

Thank you, Chairman Murkowski, Ranking Member Cantwell, and members of the Committee. I am Karen Harbert, president and CEO of the Institute for 21st Century Energy (Institute), an affiliate of the U.S. Chamber of Commerce, the world's largest business federation representing the interests of more than three million businesses of all sizes, sectors, and regions, as well as state and local chambers and industry associations, and dedicated to promoting, protecting, and defending America's free enterprise system.

The mission of the Institute is to unify policymakers, regulators, business leaders, and the American public behind common sense energy strategy to help keep America secure, prosperous, and clean. In that regard we hope to be of service to this Committee, this Congress as a whole, and the administration.

I would like to commend your leadership demonstrated by this undertaking. Drafting a multi-title energy bill and moving it through regular order is not something accomplished since 2007 and certainly not an easy task. I would also like to thank Chairman Murkowski and Ranking Member Cantwell for soliciting the Chamber's input on what a broad, bi-partisan energy bill should include. I would also like to thank your staffs for always being available, open-minded, and committed to success.

As we have previously shared with Committee Members and staff, in 2014, the Institute published *Energy Works for U.S.*, our comprehensive policy framework. Energy Works for US includes over 60 specific and actionable recommendations, covering all aspects of energy policy from nuclear to renewables to coal to oil and natural gas, but also areas sometimes overlooked when discussing energy policy such as workforce, cyber-security, and permitting to name a few. Many of these recommendations are incorporated in bills being discussed today, as well as bills that have been and will be considered by the Committee in the future.

Today's hearing is focused on "Energy Accountability and Reform Legislation," covering some 42 individual bills. In drafting energy legislation, we think it important to establish a framework for determining whether legislation is necessary, which agencies it should be directed towards, and how best to effect the desired change. Within the context of accountability and reform, we believe there is a great need for action. There have been, and continue to be, dramatic changes in our energy economy and existing law, sometimes decades old, is hampering our markets from being able to adapt to the changes. Additionally, as these changes have occurred, there has been more tension on the role of federal versus state regulatory primacy that was largely a dormant issue in the past. And as the United States Code and Code of Federal Regulations grow every day, it is important to continually make changes to streamline their governance and to minimize their impacts on Americans while still ensuring their efficacy. Finally, it remains crucial that the federal government is a judicious and competent steward of the tax revenue it collects and spends. It is through this lens that the Institute reviewed today's docket of bills and informed our positions.

Given the large number of bills and limited time we have to consider them, I will address a small subset of them in my testimony today.

## MARKET REFORM

### S. 1312 – Energy Supply & Distribution Act of 2015

No area of the U.S. economy has changed more dramatically over the last decade than the energy sector. Since 2006 the amount of oil produced in the U.S. has increased more than 90%. That 4.2 million barrel per day increase is larger than the annual production of every other country, save Saudi Arabia and Russia. In 2006 we were importing about two-thirds of all the crude we consumed in the U.S., and today that has been winnowed down to just over 40% and declining.

This massive growth in oil, as well as natural gas, production has created a tremendous economic catalyst for the U.S. economy. A recent IHS report the Institute commissioned found that this shale energy revolution had created some 2.1 million jobs by 2012 and is projected to reach nearly 3.9 million jobs by 2025. Similarly, the report found this renaissance had added more than \$280 billion to the U.S. economy and is expected to generate more than \$1.6 trillion in government revenue through 2025.

#### *Energy Security*

This massive change has outgrown many regulations and systems of governance and S. 1312 does an admirable job addressing some of the most glaring examples. As it relates to energy security, the bill would require a more strategic focus from the Department of Energy (DOE) in considering how energy markets have changed and that impact on energy security. The Institute has been the leading authority on energy security at home, and abroad, annually publishing the *U.S. Energy Security Risk Index* since 2011, quantifying the risks to energy security across dozens of metrics and tracking the trends of those risks in the past and into the future. Since 2012 we have also annually published the *International Energy Security Risk Index* comparing the levels of energy security risks across dozens of countries.

We support the bill's effort to infuse government thinking with energy security considerations and stand ready to work with DOE and the various agencies when this bill is enacted.

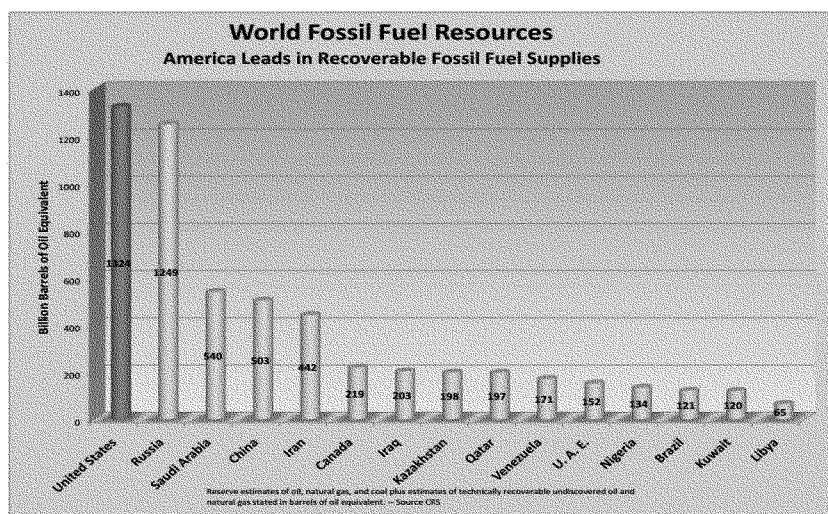
#### *Data Collaboration*

In producing our International Energy Security Risk Index, it has become clear that the level of energy data transparency varies greatly across the world, but becomes more vital to efficient markets every day. The Energy Information Administration (EIA) stands as an example by which the rest of the world should hold itself. Improvement can surely be made, but if the world provided the robust, accurate, and transparent data that EIA reports daily, energy markets would benefit tremendously. As such, we support the bill's focus on energy data collaboration between the U.S., Canada, and Mexico. Energy markets across the three countries are already integrated and interdependent, and further transparency and normalization would add significant benefit.

#### *Crude Oil Exports*

The prohibition on U.S. crude oil exports is a 40 year old vestige of a by-gone era and must be repealed immediately. This ban was instituted in the shadow of the Arab oil embargo that brought the U.S. economy to a grinding halt. The purported rationale was that the U.S. was not self-reliant enough on its own production to consider exporting any domestically produced oil. However, much has changed in the subsequent 40 years since the Energy Policy & Conservation Act of 1975 was passed.

Today, thanks to favorable geology and continuing innovation by the American oil and gas industry, the U.S. maintains more than 200 years of technically recoverable oil and over 500 years of in-place oil. Together with our massive natural gas and coal reserves, the U.S. has the largest energy resource base in the world. The policy of prohibiting trade of U.S. oil is not consistent with having the largest energy reserves in the world. Nor do any of these other countries with the largest energy reserves prohibit export of their domestically produced oil.



One of the concerns that many have voiced about exporting U.S. oil is the impact on consumers. Thankfully, this question has been investigated thoroughly by the Government Accountability Office as well as several think tanks and independent energy analysts and every report has concluded that exporting U.S. crude will cause gasoline prices to decline, not increase them.

These reports all found that allowing U.S. oil exports would add supply to the global oil market. Additional supply puts downward price pressure on the price of crude.

Because gasoline is essentially priced globally, a cheaper price for crude would put downward price pressure on gasoline.

Not only would consumers benefit from lower priced transportation fuels, but according to a recent IHS report, allowing U.S. oil exports would support an average of 400,000 jobs per year, generate an additional \$1.3 trillion in government revenue through 2030, and add \$265 in additional disposable income to every American household.

Over the past seven months, the drop in oil prices has led to more than 1,000 rigs to be laid down, resulting in an estimated 150,000 lay-offs. Much of this pain was unnecessary. Over the month of March, the average spread between West Texas Intermediate, the U.S. benchmark, and Brent, the global benchmark, was \$7.50. That's an additional \$7.50 per barrel U.S. producers are being denied because they cannot market that barrel outside of the U.S. If they could export and negotiate that higher Brent price, a significant number of U.S. wells that are now uneconomic would get spudded, putting thousands back to work.

Additionally, allowing U.S. exports would help deleverage countries that use their respective crude oil market dominance to negatively influence countries that must rely on imported oil. The world has witnessed how Russia has used oil and natural gas exports to force countries in Europe and Asia to acquiesce to its geopolitical and economic demands. Bringing U.S. oil to those markets would not completely displace Russian exports, but would provide a much stronger negotiating position for importers, most of which are strategic U.S. allies.

Moreover, it has become clear that terrorist groups such as ISIS are using oil produced from fields taken by force to fund its terrorist efforts. Bringing U.S. crude to the rest of the world presents the opportunity to undermine the demand for this illegally taken crude, helping to stifle further terrorist actions.

Exporting oil would benefit the U.S. economy and reduce the influence of countries and groups that use oil exports for purposes inconsistent with America's geopolitical and national security interests. I commend Chairman Murkowski and Senator Heitkamp for their steadfast leadership on this issue and their desire to bring U.S. policy into this millennium. We strongly support S. 1312 and urge the Committee to include it in the broader energy bill.

#### **S 1310 - Deficit Reduction Through Fair Oil Royalties Act**

Inasmuch as S. 1312 would update the regulation of energy markets to benefit the consumer and our geopolitical interests, S. 1310 would cause severe damage to our energy markets and significantly harm U.S. energy security.

This legislation would force any company wishing to enter into a new lease for exploration and production in the Gulf of Mexico to renegotiate old leases and agree to

pay a higher rate of royalty than what it is contractually obligated now. This bill seeks to fix an alleged error committed by the Department of Interior when implementing the Deepwater Royalty Relief Act, which was passed in 1995 at a time of historically low oil prices. To encourage continued investment in the frontier area of deepwater oil and gas development, Congress created a royalty relief program whereby producers would pay a lower royalty rate in order to decrease marginal operating costs and induce additional investment and ultimately, increased production.

This relief was to be based on volumetric levels, not price. When prices recovered, the relief was still in effect. Companies who successfully bid on leases assumed a predictable royalty rate as outlined by the law, regardless of price. This legislation intends to rewrite history after the fact and force companies to “voluntarily” agree to retroactively pay a higher royalty rate than the law requires. This legislation attempts an end-around the Constitution’s prohibition of Congress passing *ex post facto* laws, forcing a renegotiation in order to be eligible for new leasing.

The sanctity of contracts is an underpinning of democratic law and a cornerstone of American democracy. We are not surprised when despot governments in the developing world retroactively change or break contracts, but it is unacceptable for it to happen in the U.S., even if indirectly. We oppose S. 1310 and encourage the Committee not to include it in the broader bill.

## **THE ROLE OF THE FEDERAL GOVERNMENT**

As the U.S. energy landscape continues to shift at breakneck speed, it is crucial the role of the federal government constantly be reviewed to ensure continued technological innovation and reduction of energy security risk while also ensuring it continues to be done safely and with an ever-decreasing impact on the environment. In some cases that role has been and will continue to be, best served by the various states. In other instances, it is incumbent upon the federal government to streamline its regulatory approach to decrease barriers to investment and innovation.

### **S. 15 - Protecting States' Rights to Promote American Energy Security Act**

On March 20, 2015, the Bureau of Land Management (BLM) issued new regulations of hydraulic fracturing on federal and tribal lands. However, in neither this final rule, nor the previously two proposed rule, did BLM justify new or additional regulation. State regulatory authorities have maintained primacy in the regulation of oil and natural gas exploration and production within each respective state’s borders, including, to a large extent, federal lands.

State regulators not only possess the regulatory mandate from their respective state laws, but they have also developed the expertise necessary to understand the specific

geology, hydrology, and other physical nuances of the lands in their respective states. As such, the nation has benefited from the efficient extraction of oil and natural gas from producing states while also protecting human health and the environment.

While producers must comply with applicable state regulations when operating on federal lands, they must also navigate the moribund federal permitting process. As such, oil and natural gas exploration and production on federal lands has grown increasingly inefficient, preventing Americans from realizing job creation, economic growth, and increased energy security that accompany additional domestic production. The additional time required by the federal permitting process, in addition to existing regulatory requirements, increases the cost of production and makes operations on federal lands less economical than on state and private lands.

On April 3, 2015, the Congressional Research Service released an analysis concluding that oil production on federal lands had increased less than 1% between 2009 and 2014, while production on state and private lands had increased almost 90%. Similarly, natural gas production on federal lands decreased 35% while production on state and private lands increased more than 40%. Clearly, the existing federal regulatory process is much less efficient than the respective state processes. A recent report produced by the Heritage Foundation highlighted that BLM estimates it takes an average of 227 days for it to process and conclude an application for permit to drill, compared to 154 days in 2005 and the average 30 days it takes state governments to do the same.

BLM's rule will alter the balance of regulatory authority in a manner that would further disincentivize businesses from investing in the development of oil and natural gas on federal and tribal lands, while not identifying or addressing any specific issue that warrants the regulation. A July 2013 study sponsored by the Western Energy Alliance found that BLM's proposed hydraulic fracturing rule would create nearly \$350 million in annual compliance costs, which corresponds to approximately \$100,000 per well.

In promulgating its rule, BLM failed to identify any specific shortcomings of the existing framework of state regulation and in many cases merely duplicates state requirements. S. 15 would prevent BLM's arbitrary decision to further regulate hydraulic fracturing and making oil, natural gas, and geothermal energy production on federal lands even less economical than it already is. By clearly designating the primacy of state hydraulic fracturing regulations and preventing BLM from adding an unnecessary layer of federal regulation, this legislation would help maintain the economic benefits of America's shale revolution and preserve its nascent manufacturing renaissance.

#### **S. 1230 – BLM MEMORANDA OF UNDERSTANDING**

Similar to the impetus behind S. 15, S. 1230 would establish a strong direction from Congress that BLM should be relying on state oil and gas regulators, and not trying to duplicate their efforts. This legislation would provide a formalized avenue for a state to request BLM enter into a memorandum of understanding (MOU) relating to

measurements, meter inspections, and other operational activities. While we would like to see the scope of areas expanded and more clearly defined, this legislation is a good step towards a standard operational relationship whereby the expertise and competencies of state regulators is relied upon by BLM.

We support S. 1230 and urge the Committee to include it in the broader energy bill.

#### **S. 1293 – DOE COORDINATION OF CLEAN COAL PROJECTS**

Like all first-of-a-kind technology, the development of clean coal projects has proven to be expensive, lengthy, and an engineering challenge. Unlike some technology development though, clean coal technology has also encountered regulatory obstacles from seemingly all corner of the federal government. From air emissions, to water effluent, to geologic storage, clean coal technologies represents the melding of multiple technologies, as well as regulatory platforms. With so many disparate regulators involved in the permitting, licensing, and oversight of such projects, the regulatory process can add an additional layer of deterrent for the private sector to invest in developing clean coal technology.

To help introduce regulatory efficiencies, S. 1293 would designate DOE as the lead agency for coordinating all federal requirements for clean coal projects, including those emanating from the Clean Air Act, Safe Drinking Water Act, and the National Environmental Policy Act. Having one agency designated as lead would help prevent duplicative analysis as well as encourage the potential for a strategic regulatory approach across the multitude of regulatory frameworks. As a participant in the development of clean coal technology, DOE has the greatest knowledge base and experience with these projects and is the appropriate agency to be designated.

We support S. 1293 and urge the Committee to include it in the broader energy bill.

#### **SPENDING TAX DOLLARS WISELY**

The federal government has an important role in fostering the research and development that yields the energy technologies of tomorrow and in many cases, ensuring the country has the required workforce to not only operate today's energy economy but to design, build, and operate the energy economy of the future.

#### **S. 1223 – Energy Loan Program Improvement Act of 2015**

When the Energy Policy Act of 2005 was enacted, the creation of the Loan Guarantee program at DOE was arguably the most promising and novel aspect of a very robust bill. These guarantees were created to foster the deployment of energy technologies that are cleaner and aren't yet commercialized. As a way to minimize risk to the taxpayer, Congress stipulated that the recipient of the guarantee must fund the entire portion of the credit subsidy cost. This provision ensured the recipient had "skin in the game" and was not skirting any form of financial risk.

However, the American Recovery and Reinvestment Act of 2009 created a new class of loan guarantees whereby the federal government would shoulder the entire risk by funding the credit subsidy. When several of the recipients went bankrupt, much attention was drawn to the loan guarantee program, and many castigated it because of the undue risk born by the tax-payer. Unfortunately, this sordid period did much to sully the concept of loan guarantees, throwing the baby out with the bathwater.

Concessionary financing tools like loan guarantees provide an invaluable opportunity to bring new technologies to the market that would otherwise never see commercialization, depriving the public of cleaner and more efficient technologies. S. 1223 would correct the mistake made in the 2009 law by requiring a loan guarantee recipient again fund the credit subsidy cost, significantly reducing tax-payer risk. This legislation would also increase transparency for applicants.

We support S. 1223 and urge the Committee to include it in the broader energy bill.

#### **S. 1256 – The Advancing Grid Storage Act of 2015**

Through the development of the Clean Power Plan, this administration has it the policy of the U.S. to eliminate coal and natural gas generation and to marginalize nuclear power. In forcing the country into greater reliance on renewable electricity, the administration has not addressed how these largely intermittent power sources will be able to replace the baseload generation they are intended to replace. Without a functional and cost-effective stationary storage component widely deployed throughout the distribution grid, renewable power will never be baseload, limiting its potential use.

S. 1256 takes a step that DOE has not, making development of stationary storage a research priority and establishing a framework where commercialization is possible. We support the intent and pathways this bill provides to make that happen. We do, however, oppose the requirement that receiving support created by this bill be conditioned on requirement of Davis-Bacon prevailing wage rates.

We encourage the committee to adopt S. 1256, after removing the Davis-Bacon requirement, and include it in the broader energy bill

**S. 1398 – the Energy Title of the America COMPETES Reauthorization Act of 2015**

The America Competes Act was a watershed piece of legislation that began the arduous journey of accelerating advanced technology development and focus on STEM education development. Many positive results can be traced back to the original COMPETES including the creation and operation of ARPA-E. We continue to support the focus of COMPETES and appreciate the modifications made in this legislation to eliminate and combine programs.

We support S. 1398 and urge the Committee to include it in the broader energy bill.

**S. 1422 – the Energy Workforce for the 21st Century Act**

As an organization with membership spanning the entire energy economy, one of the most notable commonalities across all sectors and industries is workforce shortage. Some have called it the “great shift change” and it’s already being felt today, but the greatest impacts are still to come. It is estimated that roughly one-third of the utility industry is within five years of retirement, and the number may be greater in the oil and gas industry. S. 1398 creates a strategic and methodic approach to increase the number of skilled workers trained to work in the energy and manufacturing sector, and taken together with COMPETES Reauthorization, this represents a good next step in workforce development. We are especially supportive of the technology-neutral fashion in which the bill approaches this issue.

While we support the intent of this legislation, we encourage Congress to ensure that such efforts to not compete with initiatives already funded and operational by the private sector academic institutions, as well as federal and state governments, including the Department of Veterans’ Affairs.

**SCOPE OF THIS TESTIMONY**

This testimony represents our position only on the bills included. We have positions on other bills included in today’s hearing, but were not included in this testimony in the interest of brevity and time. Additionally, there are other bills that require additional analysis and member consultation before we can offer an opinion. We look forward to working with the Committee on any of the bills considered today as this process continues to move forward.

The CHAIRMAN. Thank you, Ms. Harbert.  
Mr. Highley, welcome.

**STATEMENT OF DUANE HIGHLEY, PRESIDENT AND CHIEF EXECUTIVE OFFICER, ELECTRIC COOPERATIVES OF ARKANSAS**

Mr. HIGHLEY. Good morning.

Chairman Murkowski, Ranking Member Cantwell and all members of the Committee, thank you for inviting me to testify today. I serve as President and CEO of Arkansas Electric Cooperative, a non-profit, power supply system which serves 17 retail distribution systems, who in turn, serve about one million Arkansans. And I report to a democratically-elected board representing the customers that we serve.

The Electric Cooperatives of Arkansas are members of the National Rural Electric Cooperative Association, NRECA, which is a service organization of over 900, not-for-profit electric utilities serving 42 million Americans in 47 states. Collectively electric cooperatives account for 11 percent of all electric energy served in the United States that serve about 75 percent of the land mass of the United States in selling that 11 percent of the electric energy.

Electric cooperatives are governed by our member owners, and we reflect the values of our membership. I answer to our owners to justify every expense. Our mission is to keep their power reliable and affordable and to do that in a way that's responsible to the environment and the communities we serve because we reflect their values of stewardship for the land.

Today I'd like to offer testimony on behalf of Arkansas Electric Cooperatives and NRECA focusing on two bills.

First, Senate 1068 titled CyberSecurity Emergency Authority. We agree that when the Government has knowledge of an imminent threat to the bulk power system the Secretary of Energy should have authority to order action to avert or mitigate. I serve as co-chair of the Electric Subsector Coordinating Council which serves as the principle policy liaison between leadership and industry and our Government counterparts at DOE, DHS, FERC, FBI and others. NRECA agrees with your proposal for the Government to engage with the ESCC and the owners and operators of the system to the extent possible prior to taking action. By working together and sharing threat information we have been able to improve reliability and resiliency of the grid. We believe that the cost recovery provision of S. 1068 is unnecessary and duplicates current provisions of the Federal Power Act, namely Sections 205 and 206 of the act which allows FERC to determine just and reasonable rates.

While we do not oppose those that use cost-based rates having the ability to recover costs for their actions that might be taken under this bill, we do not support those that use market-based rates to have the same ability. Market-based entities recover higher revenues during periods of scarcity while cost-based entities do not. Those entities that chose to pursue higher market-based revenues also agreed to bear the many risks that go along with that decision.

Moving to Senate 1221 titled Bulk Power System Reliability Impact Statement. I'm glad to see this bill requiring Federal agencies to effectively look before they leap and reach out to experts for feedback on proposed regulations. The electric grid is the most complex machine created by man, and it has taken decades to develop the levels of reliability and affordability that we now take for granted.

This bill requires experts on the operation of the bulk power system to provide feedback on proposed Federal regulations that may impact reliability and affordability. As currently written this bill proposes to use reliability coordinators under the Electric Reliability Organization to create the required reliability impact Statements. However, it would be more appropriate to conduct those reports within NERC, the North American Electric Reliability Corporation.

In 2007, FERC approved mandatory national reliability standards for administration by NERC. NERC has the subject matter experts on staff with an overview of the entire North American power supply system, and they have created the standard setting system and independent governance and established process for stakeholder input across all sectors which makes NERC uniquely qualified to analyze reliability impacts and issue reports such as their seasonal, annual and long term reports or their special assessment of the clean power plan. We welcome collaboration with NERC to inform agencies of the impact of their proposed regulations.

I'd like to add a comment on the Department of Energy emergency orders. In some instances to protect reliability DOE must issue a must run emergency order to a generator. This requires the generator to run even though it may not be economic for it to run. Many cooperatives are not subject to FERC jurisdiction under Section 202 of the Federal Power Act. However, they comply voluntarily with these emergency orders to preserve grid reliability. In some instances complying with a "must run" order may cause a generator to violate environmental laws or regulations resulting in exposure to third-party lawsuits or agency penalties.

S. 1222, the Continuity of Electric Capacity Resources Act, contemplates establishing liability protection for these actions. We would like to work with the Committee to ensure that both voluntary and mandatory compliance with an emergency order is protected.

Thank you for inviting me to testify.

[The prepared statement of Mr. Highley follows:]



**Testimony of Mr. Duane D. Highley**  
**President and CEO of the Electric Cooperatives of Arkansas**  
**to the Committee on Energy and Natural Resources**  
**U.S. Senate**  
**June 9, 2015**

Duane Highley, President and CEO  
 Electric Cooperatives of Arkansas  
 June 9, 2015 Testimony

### **Introduction**

Chairman Murkowski, Ranking Member Cantwell, and all members of the Committee, thank you for inviting me to testify today on the committee's proposed energy accountability and reform legislation package.

I serve as President and CEO of Arkansas Electric Cooperative, a not-for-profit power supply system serving 17 distribution systems, who in turn serve about 1 million Arkansans. I report to a democratically-elected board representing the customers I serve. Arkansas Electric Cooperative Corporation (AECC) was created in 1949 and provides power for more than 500,000 farms, homes and businesses served by our 17 distribution electric cooperative owners. AECC relies on a diverse generation mix, including hydropower, natural gas, coal, and renewables, to serve its members.

The electric cooperatives of Arkansas are members of the National Rural Electric Cooperative Association (NRECA), a service organization for over 900 not-for-profit electric utilities serving over 42 million people in 47 states. NRECA's members also include 67 generation and transmission ("G&T") cooperatives, which generate and transmit power to 668 of the 838 distribution cooperatives across the nation. Electric cooperative service territory makes up 75 percent of the nation's land mass. Kilowatt-hour sales by rural electric cooperatives account for approximately 11 percent of all electric energy sold in the United States. NRECA members generate approximately 50 percent of the electric energy they sell and purchase the remaining 50 percent.

As member owned not-for-profit utilities, distribution cooperatives and G&Ts reflect the values of our membership, and are uniquely focused on providing reliable energy at the lowest reasonable cost. We have to answer to our owners and justify every expense to them. There is never any debate as to whether a proposed project will benefit our shareholders or our customers because they are one and the same.

Today I am offering testimony on behalf of the Arkansas Cooperatives and NRECA, and intend to focus on two bills before the Committee today:

- 1) S. 1068 – Cybersecurity Emergency Authority; and
- 2) S. 1221 – Bulk-Power System Reliability Impact Statement Act.

### **S. 1068 Cybersecurity Emergency Authority**

Let's start with the emergency authority language as considered in S. 1068. Electric cooperatives take protection and security of their consumer-members' assets very seriously. One of the big challenges is ensuring appropriate information sharing with government and among industry so that those who operate the systems can take action. NRECA agrees that where the federal government has information regarding an imminent cyber security threat against the bulk-power system requiring immediate action, that as described in Section (b)(1) the Secretary of Energy should have the authority to order action(s) to avert or mitigate the threat. Ensuring that owners and operators of impacted bulk-power systems are consulted, as time permits, along with the Electricity Sub-sector Coordinating Council (ESCC) where I serve as a co-chair, is also appropriate and appreciated.

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The ESCC it was formed to serve as the principal policy-level liaison between the leadership of industry and government. After recent reforms, the ESCC is now composed of 30 utility CEO's and trade association leaders, representing all segments of the electricity industry, and engages with government, including, senior Administration officials from the White House, Department of Energy (DOE), Department of Homeland Security (DHS), the Federal Energy Regulatory Agency (FERC), and the Federal Bureau of Investigation (FBI) and others as needed. The ESCC works with government to coordinate policy-level efforts to prevent, prepare for, and respond to, national-level incidents affecting critical infrastructure. These efforts include several areas like: planning and exercising coordinated responses; ensuring that information about threats is communicated quickly among government and industry stakeholders; and deploying government technologies on utility systems that improve situational awareness of threats. It also serves an advisory role with the Electric Sector Information Sharing and Analysis Center (ES-ISAC)

We believe the cost-recovery provision under proposed Federal Power Act (FPA) Sec. 224(b)(4) is unnecessary and duplicative of current provisions of the FPA. As it exists today, FERC uses FPA Section 205 and 206 to determine just and reasonable and not unduly discriminatory rates for jurisdictional costs. There is no need to amend the FPA to provide a new mechanism for cost recovery related to a cyber-emergency as defined in the bill as FPA Sections 205 and 206 clearly provide existing mechanisms to do so.

NRECA wants to be clear – we do not oppose those with cost-based rates having the ability to recover costs for actions described in the bill. However, we do not support those entities with market-based rate authority for power sales having the ability to recover costs over and above the market-based rate they are free to charge. Holders of market-based rate authority are able to charge much higher prices for power supply during times of scarce resources (i.e., during peak weather conditions) whereas cost-based entities are not permitted to do so. Those entities that made a business decision to seek market-based rate authority from FERC must rely on market forces for cost recovery.

#### **S. 1221 – Bulk-Power System Reliability Impact Statement Act**

Next I'd like to discuss S. 1221, which is essentially a call for Federal agencies to take a "look before they leap" by ensuring that experts with a comprehensive understanding of the potential impact of a proposed major rule have a real role in explaining what a rule would do to the reliability of our electric system. However, the legislation as it currently reads requires the use of Reliability Coordinators to create the reliability impact statements. It would be more appropriate for the role to sit within the North American Electric Reliability Corporation (NERC) itself.

Section 215 of the Federal Power Act authorizes FERC to oversee the reliable operation of the Nation's bulk power system. In 2007, FERC approved mandatory national reliability standards for administration by NERC. The national standards apply to entities that own,

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operate, or use the bulk power system. As owners and operators of the bulk power system, utilities are subject to mandatory compliance with many of these reliability standards.

NERC's role in working with industry and creating mandatory standards for the bulk power system means that NERC is in a unique position to be able to assess major regulations to ensure they do not impair or impede bulk power system reliability.

While nobody can guarantee future reliability, we can do better in understanding the risks and issues facing the bulk power system in the future. For example, the sufficiency of our generating resources has been clouded by uncertainties arising from changing environmental regulation. Despite FERC & NERC's unique and well-established roles in overseeing bulk power system reliability and recent FERC technical conferences, there has been a troublesome lack of coordination between EPA and these entities regarding major rules. There needs to be careful analysis and coordination with those familiar with the largest machine in our country – the United States bulk power system – to ensure that reliability is promoted through collaboration.

#### **Department of Energy Emergency Orders**

Rural electric cooperatives face a unique situation. Many co-ops that generate electricity are not subject to the jurisdiction of the Federal Energy Regulatory Commission, and, as a result, these co-ops are not required to adhere to a "must run" emergency order. However when DOE issues such an order, co-ops comply on a voluntary basis to address the emergency. Unfortunately, a no-win situation emerges where, due to compliance with the order, electric utilities may violate environmental laws and regulations resulting in agency penalties and potentially third party law suits.

Additional legislation S. 1222, the Continuity of Electric Capacity Resources Act, contemplates the establishment of protection against this very liability. If we could work with you to ensure that both voluntary and mandatory compliance with an emergency order is protected, all electric utilities, including co-ops, would benefit.

#### **Conclusion**

Thank you for holding this hearing today on these very important bills. In closing, I thank you again for inviting me to testify today and would be happy to answer any questions you may have.

The CHAIRMAN. Thank you, Mr. Highley.  
Mr. Mills, welcome to the Committee.

**STATEMENT OF MARK MILLS, SENIOR FELLOW, MANHATTAN  
INSTITUTE**

Mr. MILLS. Thank you, Madam Chairman, and thank you for the invitation to testify before you and your Committee. And I, like all the panel members here, commend the Promethean effort to take on so much legislation.

I'd like to reinforce the comments you made in your opening remarks about the fact that so much of what we're dealing with is outdated and give some context to four classes of legislation that are being considered specifically the regulation of the oil and gas industry, particularly the shale oil and gas industry, the regulation to control and constraint on exports, the importance of grid reliability and cyber security as they are interrelated and also the vital importance of long term R and D.

The fact is that it would make as much sense as a context for Congress in 1985 when the Energy Policy and Conservation Act was amended, it would have made as much sense for Congress today to think and stay mired in the facts that they had in 1985 as it would have been for Congress in 1985 to forge legislation based on the facts of 1955 which, of course, would make no sense.

Let me highlight how profound the changes are in the landscape that we're dealing with. I mean, it's unremarkable to note how much the non-energy landscape has changed in the last 30 years.

Thirty years ago President Reagan has just begun his second term as President. The Soviet Union was still extant. The Internet was still almost a decade in the future and Apple was a small public company. It was only four years old, and the word cyberspace had just been invented the year before by a science fiction writer. So the words cyber security were not even in the political lexicon.

We have changed the law to policies that have evolved from these profound alterations in the landscape of the economy and technology of America, but it's remarkable how little policies have changed on the energy domains despite profound changes in the energy landscape.

My fellow panelists have outlined and you, Chairman Murkowski and the members, all know how much the United States has changed its energy landscape. I think we still fail to fully appreciate how different the world really is.

It's not just that the United States is no longer the world's largest, fastest-growing energy consumer. We don't even talk in terms of, which we did in 1985, peak oil and the idea of the imminent end of the very availability of oil and gas. We now have debates about whether we should export oil and gas. That, by itself, illustrates how profound the change has been in the energy landscape.

Let me add one other feature of the energy landscape that typically gets ignored. Thirty years ago the information part of our economy was very small. In today's GDP the information part of our economy, that's everything from data centers to digital movies to manufacturing software and microprocessors, that part of our economy now is 300 percent bigger than the transportation part of our GDP. This is a profound change. It's the part of our economy

that's utterly and totally dependent on electricity. This makes the grid reliability and the inherent stability and affordability of electricity more important today than any time in history.

So in general we live in a world that has, compared to 1985 when we forged, sort of, the anchoring legislation that we deal with today, there's two billion more people in the world. The world's economy is about \$30 trillion bigger than then, and we consume 30 million more barrels of oil per day than we did in 1985.

Let me summarize, sort of, very quickly four implications of this profoundly different landscape.

The first, of course, relates to the psychology of legislation that was anchored in ideas of dependency and oil disappearing. We now no longer have to think in those terms. We can now begin to think in terms of influence. We should be forging policies with respect to oil and gas in how we can influence the world in positive ways, and this has direct relevance to legislation that inhibits or bans the export of natural gas and hydrocarbons.

Second, the issue of grid reliability, I think, is of utter and critical importance, particularly not just because the United States is more electrified than it's ever been in history, but also because of the integration of information technologies, the internet of things and the very foundational merging of the cyber infrastructure with our energy infrastructure. I would say that cyber security on the grid is a profoundly and critical social issue.

Lastly, I would like to reinforce Mr. Augustine's observations about the vital importance of basic research. I am a big fan, like Mr. Augustine, of the increase of Federal support for basic research. I am also am not a fan of increased involvement of the Federal Government in industrial projects.

In fact, I would suggest and like to reinforce the critical importance of basic research and having the Government step in where the private sector does not want to and cannot in many cases. And I believe we could find the money by simply reallocating the Government spending of money on capital projects that are better left to the private sector and spending the money at both the national labs and in universities on basic research.

With that, I'll end my remarks, and I thank you very much for the opportunity to testify.

[The prepared statement of Mr. Mills follows:]

**Testimony of:**  
**Mark P. Mills, Senior Fellow, Manhattan Institute**  
**Before the Senate Committee on Energy and Natural Resources**  
**June 9, 2015**

Chairman Murkowski and members of the Committee, thank you for the opportunity to testify. The time has come for a foundational re-imagining of U.S. energy policy to reflect the new realities of the 21<sup>st</sup> century.

It is unremarkable to note how many fundamental changes have taken place in the world over the past several decades. In June 1985, when President Reagan had just begun his second term, the Soviet Union was still extant, Apple had been a public company for only four years, the Internet was still nearly a decade in the future, and the word “cyberspace” had only just been invented in a science fiction novel the year before. The concepts and worries about cyber-security were not even in the lexicon of politics.

Meanwhile, it is remarkable to consider how *little* has changed in energy policy domains, despite the fact that underlying energy realities are also profoundly different today.

In 1985, on the occasion of passage of the Amendments to Energy Policy and Conservation Act of 1975, the U.S. was still deeply worried about oil import dependency, and still in the thrall of the idea of “peak oil” – the claim of an imminent end to the very availability of oil and natural gas. And in 1985, the U.S. was the world’s fastest growing major energy consumer, and world biggest oil importer. The facts have flipped.

Today America is the world’s fastest growing energy producer, and is well on the way to rendering talk of oil import dependency irrelevant. In fact the debate of the day is now over the opportunity for U.S. petroleum exports. On the demand side, we now live in world now where all significant growth in fuel use takes place elsewhere.

The other foundational shift over the past three decades with energy relevance has been the astonishing growth of the digital economy. The share of the U.S. GDP now associated with information – counting everything from data centers to digital movies, from coding software to making microprocessors – is today 300 percent bigger than the share of our GDP associated with transportation. And the former is growing far faster than the latter. This digital transformation is making society far more dependent on the cost, security, and reliability of the electric grid.

In general, we live in a world today that has 2 billion more people on earth, in a global economy that is \$30 trillion bigger, and with a civilization consuming 30 million *more* barrels of oil a day compared with 1985. It is also a world where capital spending on information equipment that *consumes* electricity now rivals global capital spending by the entire oil and gas sector to *produce* fuel.

It would have made as much sense for the Congress of 1985 to have forged energy policy on the basis of the facts in play circa 1955, as it does today to stay mired in policies based on the world of 1985.

Permit me to briefly summarize four implications of 21<sup>st</sup> century energy realities

First is the opportunity for the United States to transform its role from oil and gas dependency to global influence. The technologies that underlie the shale revolution are new and have only just begun to unfold. Policies re-oriented around encouraging and facilitating more production, both on private and federal lands, could increase U.S. output well beyond the high levels that have already shocked the world. In particular, decades old restrictions on petroleum and gas exports no longer make sense and are counterproductive.

Second, the resilience and reliability of the electric grid is of paramount importance. Consider: the U.S. economy uses nearly 50% more electricity than in 1985, while non-electric energy use, excluding for transportation, has not risen 10%. Our economy is far more electrified and electric dependent.

Third, the increasing integration of information – the Internet not just of things, but every thing and in particular of the energy infrastructure itself – drives the vital importance of cyber-security. Infrastructure cyber-security is now socially critical, even if it is a less contentious issue compared to the popular debate over personal information security.

Finally, there is the reality of rising global energy use as the world’s economies expand, and billions of the poor finally enter middle class. Hundreds of billions of dollars have been devoted to finding alternative forms of energy to help meet staggering future levels of demand, but 85% of world energy still comes from hydrocarbons. The world needs foundational new technologies that can only emerge from basic research and new science. Here the federal role is vital, both in the direct funding of foundational university research, and also in properly deploying the great repository of scientific talent in America’s national laboratories to pursue core science rather than industrial projects, the latter best left to industry.



The CHAIRMAN. Thank you, Mr. Mills. I appreciate your comments at the end, because in my view you have summarized exactly why this Committee needs to take on this Promethean task, as you have described it. I think we forget just working in the day-to-day how outdated our policies are in the energy sector. While this is a big task for us to do a larger, broader bill that is more all encompassing, the reason it needs to happen is because it is so outdated.

As outdated as it is to us, it is the policymakers who are holding back the opportunities—whether it is for job creation that Ms. Harbert talks about or whether it is our opportunities to influence around the globe. We need to be the one to take up the heavy burden and the work and make it happen, so I appreciate your very articulate summary.

I am going to start with you because you mentioned the opportunities within a changing policy to make sure that we are moving forward with the research and development that will lead to the infrastructure and the technologies of the future. Is there a linkage between allowing exports whether oil or gas or both and sending the right signals to build new infrastructure, to get that moving? Because a big part of what we are dealing with is how do you then translate that into the financing, like loan programs, or is there a linkage there between oil exports, gas exports and advancing infrastructure?

Mr. MILLS. Well the short answer, Madam Chairman, is of course there is. The production of oil and gas is geographically specific, of course, but the infrastructure needed to transport and move oil and gas to global markets covers many more of the states of the Union and the access to the global markets for a product will profoundly stimulate long-term and short-term investment.

I think that if the United States took the posture of saying to the world that we are reorienting our foundational energy policy toward selling to the world, not being insular, not becoming independent, but becoming a player on the world stage, this would stimulate profound reactions in the private sector. And if we did not constrain the private market's ability to invest based on market access to buyers around the world, we would see incredible increase in the building of pipelines and ports.

Obviously all the regular regulations pertaining to how you can build these from an environmental perspective would pertain, but those are not constraints compared to the banning of the ability of the private market to function and invest capital to sell to world markets.

The CHAIRMAN. I appreciate that.

Ms. Harbert, it has been suggested to me that the reason that I would support lifting the oil export ban is because I come from a producing state, and I think many forget that actually there is an exemption that currently allows Alaska to export our oil. In fact earlier in the month of May we moved about 975,000 barrels to South Korea. So that is not necessarily my pitch. I think it is because, I know it is because this is an outdated policy that needs to be revamped. Can you give me your assessment as to why lifting the oil export ban actually helps those states that do not produce oil? What is the benefit to them?

Ms. HARBERT. Sure. I mean, if we lift this oil export ban it does allow all 48 states to be in the business. If you are a producing state, you benefit in one way. But 30 percent of these jobs, the 400,000 jobs that I mentioned, are in the supply chain and that does not mean that they are located in Texas or Oklahoma. In fact, the state that has the most to gain from this is the State of Illinois because they will be resident to more of supply and service industry to servicing the export industry. So it truly means that every state has an equity in getting this done and benefiting from the jobs, the revenue and the investments.

You know, as long as we can export and we keep energy affordable here at home it has a secondary effect as well as more people invest here because we have affordable energy. And the Gulf of Mexico is a huge beneficiary of that as well.

The CHAIRMAN. I am going to reserve other questions for the next round because I have a lot to talk about, but I know that we have good participation amongst our colleagues here this morning. We are going to skip Senator Cantwell until she comes back and go to Senator Franken.

Senator FRANKEN. Thank you, Madam Chair.

Mr. Augustine, welcome back. Your testimony emphasizes the critical role for the Federal Government in energy research. You note the important role played in your testimony in hydro-fracking technology, and I think the history of the Federal Government's involvement in hydro-fracking is very telling.

The Eastern Gas Shales Project was an initiative that the Federal Government began back in 1976 before hydro-fracking was even a mature industry. That initiative included dozens of pilot demonstration projects for test drilling and fracturing methods. This was instrumental in the development of the commercial extraction of natural gas from shale which previously that had just been not economically feasible.

Another tool that is used in fracking, micro seismic imaging, was originally developed by the Sandia National Laboratory in New Mexico, a Federal energy laboratory.

Thank you for emphasizing it and having emphasized it the last time you testified. It is why it is so important that we invest in game-changing technologies including energy storage which will allow us to incorporate more renewables. It will give utility customers more control over their energy use. It will help them keep the lights on in case of a grid outage.

I have introduced the Advancing Grid Storage Act which will dedicate R and D funding so our scientists and engineers can have the resources they need to innovate and bring down the costs of these technologies. My bill also provides technical assistance and loans to those who want to deploy energy storage systems.

Mr. Augustine, can you give us some of your recommendations as to what this Committee can do to support the development and deployment of more reliable, efficient and cost effective energy technologies including those, things like energy storage?

Mr. AUGUSTINE. Senator, thank you for the question.

I would certainly go back and cite the very points you make where the Federal Government has and can and should, in my view, support the early phase research that is high risk such as

was done in hydraulic fracking the companies just didn't do. And so the Federal Government, I think, deserves a great deal of credit for taking on those kinds of tasks.

When it comes to energy storage I could think of very few areas where a breakthrough would be more significant than in energy storage. Energy storage limits us today in terms of the efficiency of the grid, automotive electrification, even mobile pocket devices. Energy storage is really on a critical path, and the gains we've made have been disappointing to be very candid. Disappointing in part because it's a tough problem in chemistry and physics. Disappointing in part because we just haven't invested in that area. So I think the first thing we need to do is to increase our investment.

Secondly, we need to have much better connections between the research labs, the government labs and industry where candidly we don't do a good job today.

Senator FRANKEN. Thank you.

Mr. Orr, can you talk about how research at our national labs has contributed to the development of advanced energy storage systems?

Dr. ORR. Senator, thanks for that question.

It's an opportunity for me to point out that we have quite a lot going on in the energy storage area. Perhaps the most visible is the Joint Center for Energy Storage Research at Argonne Lab. It's a collaboration of both university and lab folks working on the chemistries that are beyond lithium ions to make batteries have higher energy density and good power delivery and lower weight and addressing the kinds of safety problems. So it's a big center, one of our energy hubs.

We have a variety of energy frontier research centers. These are funded out of the Office of Science, and they really focus on the fundamentals of chemistry, electro chemistry, in particular, nano structure materials, understanding the fundamentals of material properties that will go into making better batteries. So providing the underpinning there. On the applied side we have work in our Vehicle Technology Office that works on batteries for applications in vehicles, and then we have quite a lot of work in our Office of Electricity that's aimed at the grid storage kinds of settings.

What's so interesting about the energy storage area is that it applies on a variety of scales from the cell phone up to the grid, on a variety of time scales from the short term variations from a wind turbine to the day/night variations or even to the winter/summer kinds of variations. And it can be a very important contributor to a stable grid in operating with lots of intermittent distributed generation in the future.

Senator FRANKEN. Thank you.

Madam Chair, I am very cognizant I am through my time, but I just want to emphasize that if you think about what a game changer fracking has been and how much of that came out of the Federal Government research and know what a game changer storage is going to be that we would be really negligent if we did not invest in storage.

Thank you.

The CHAIRMAN. Who would have thought storage could be so exciting? It really is.

Senator FRANKEN. You want to know how excited I am?

The CHAIRMAN. I can hear it in your voice.

Senator FRANKEN. Oh, thank you. [Laughter.] Because otherwise I was going to take up more time. [Laughter.]

The CHAIRMAN. Senator Gardner?

Senator GARDNER. We can see the excitement too, just so you know, we can see it.

Senator FRANKEN. For those listening on the radio. [Laughter.]

Senator GARDNER. Thank you, Madam Chair, for hosting this hearing today and thanks to the witnesses for your time today.

I wanted to follow up, Mr. Augustine, a little bit with one of your comments in response to a question and talking about working with the private sector, research development.

Senator Alexander and I and others on this Committee and beyond are working on reauthorization of the America Competes legislation. His focus, of course, is on energy. In Colorado we are very proud of the work at the National Renewable Energy Laboratory is pursuing and undertaking.

The legislation, though, that represents his efforts on energy represent the legislation that we will be moving through the Commerce Committee, through NIST and NASA and other programs on research and development that will drive the energy sector, that will drive economic opportunity, that will drive this real, new invigoration of research across this country.

Could you talk about what would happen if we fail to reauthorize some of these major research and development type of programs? What would happen at DOE? What it would mean for the future of this country, energy future, and what it would mean domestically and globally?

Mr. AUGUSTINE. Well the impact would be immense, and you mentioned Senator Alexander's contribution. It was he who really caused the Gathering Storm study to be established that led to the creation of ARPA-E and much of the research that's being funded in DOE today.

When one looks at the impact of not continuing this kind of support currently the impact on the economy, on jobs, is currently immense, and the impact on national security. The fact that we no longer are so dependent upon a cartel of nations for much of our energy.

In fact, geopolitically most of the traffic through the Hormuz Straits are going to go from West to East now, rather than East to West which places a whole different view on the national security implications.

So I think everything from jobs, to the broad economy, to, of course, the provision of energy itself on the natural environment. These are all considerations that your question impacts profoundly.

Senator GARDNER. Thank you.

Mr. Orr, I do not know if you would like to add to that at all?

Dr. ORR. I would just endorse everything that Mr. Augustine said that our ability to deliver scientific research is well supported in the Senate version of the America Competes Act, and we are certain that we can put to work in a good way the additional support

for science. That underpins everything. And the innovative approach that ARPA-E has brought to challenging ourselves to do, to think of out of the box ways to solve game changing energy problems. Those are all things that can contribute in a very big way to the future of the country.

Senator GARDNER. Thank you. Ms. Harbert, a question for you.

Colorado is in the leading edge of regulations when it comes to oil and gas development. It continues to make sure that we are responsibly enacting policies to protect the environment while also allowing our economy to thrive with the production of abundant and affordable energy.

Last week we had the EPA's Draft Report that confirmed hydraulic fracturing has not impacted our drinking water resources. We also have a BLM rule that is moving forward, and we had the BLM testifying before this Committee. They could not cite a single incident that led to the BLM rule even though we have states like Colorado that are putting their, kind of, stringent regulations forward.

We talked a little bit about the variance process before this Committee. It is important to Colorado since that is the mechanism the BLM is going to choose to address duplication in a state like Colorado where efforts are being undertaken by the state as well as the BLM to regulate hydraulic fracturing.

About 3 weeks ago, I understand, Colorado had its first meeting with the BLM to discuss the memorandum of understanding and the variance process. What we have been told is that BLM is still waiting for guidance and a template to the variance request from Washington and then there is little chance that the state could have a variance in place by June 24th when the BLM regulations are going to go into effect.

What does this mean for industry and production and during this variance request processing, that period as we wait for Washington's guidance and the ultimate approval variance?

Ms. HARBERT. Well, thank you, Senator Gardner for that question, and let me say that states have been leading on this effort and you have some of the best environmental permitting regulations in the country in Colorado. And there are some of your neighbors who do as well. And we should recognize that.

The Federal process by BLM's own statistics is not as good as yours. So adding an inferior process on top of a superior process doesn't sound like good policy or good regulation. In talking with BLM and looking at their regulatory process and looking at the actual regulation, we entered into the record the fundamental question of why do we need this? They were supposed to actually answer that in the final regulation, and they did not.

So it is clear that this is ultimately going to end up at the courts because they have not justified why this process is needed. And in the interim they're going to leave states like Colorado and investors in limbo not knowing what rules to follow which is not good for Coloradans. It's not good for the industry, and it's not good for continued production. So they're introducing a whole other level of uncertainty that is needless and unjustified.

Senator GARDNER. Thank you, Madam Chair.

The CHAIRMAN. Thank you, Senator Gardner.

Senator Heinrich?

Senator HEINRICH. Thank you, Madam Chair for holding this hearing, and I certainly look forward to working with you and my colleagues on crafting bipartisan energy legislation.

I had thought I would take a couple of minutes to speak briefly about a few of the bills on today's agenda that I hope to see, hope will have broad support, and I think should be considered by the Committee.

The first is S. 1407, the Public Land Renewable Energy Development Act sponsored by Senators Heller, Tester, Risch, and myself. This bill would direct the BLM to identify areas that are ideal for wind and solar development, places with a high potential for development and low conflicts, with sensitive wildlife habitat, water resources and other land uses. It directs the revenues from the royalties on renewable energy projects to permit processing costs, habitat projects and to the states and counties where these solar and wind projects would be located. The bill has a very long history of bipartisan support, and I certainly thank the Committee for including it on the agenda.

The second bill is S. 1434 which promotes the development of energy storage, something that I am the primary sponsor of and I have been working with Senator King on as a co-sponsor. We have heard a lot about energy storage today, but it is a rapidly developing field with the potential to really dramatically impact the operation of both intermittent and conventional power generation as well as the way that the transmission system and even local distribution are managed. I think as the cost of storage has declined we are going to continue to see the deployment on both sides of the meter, grow increasingly rapidly. I know a number of my colleagues share my interest in storage, and there are several related bills on today's agenda. My hope would be that the Committee will include a very strong storage provision that promotes the large scale development of this important technology.

S. 1422, the Energy Workforce for the 21st Century Act, is a bill that I introduced with Senator Booker. The bill is a companion to the bipartisan effort led by Congressman Bobby Rush in the House. In addition to expected base line growth in employment, nearly half of skilled technicians, utility line workers and engineers in the energy industry may retire and need to be replaced in the next ten years due to the aging out of the workforce. Now these two factors will open the door to millions of future well paying STEM jobs. S. 1422 directs DOE to establish a program to improve education and training for energy workers, and the bill is aimed at aligning future energy workforce needs and increasing the participation of women and minorities throughout the energy sector.

I think I would like to turn now to DOE's national laboratories and specifically to technology transfer. An issue that is particularly important to my state but touches many of our colleague's states as well. I am pleased that Mr. Augustine from the Bipartisan Policy Center is here as a witness today. He certainly has very broad experience in both the public and private sectors and interest in innovative technologies. I think my colleagues know he is currently a member of the Commission to review the effectiveness of all of DOE's national labs. One of the topics the Commission is consid-

ering is tech transfer and partnering with industry as one important part of the overall mission of the national labs, and I think I will end with a question.

Mr. Augustine, I know your Commission's work is not complete, but I would love to hear your perspective on what you view as some of the challenges that you cited in your testimony and some of your conversation related to commercializing innovative technologies and the difficulties that small businesses have in particular with engaging with the national labs on those issues?

Mr. AUGUSTINE. First of all let me comment on how important this is because we invest, I think, something like \$15 billion in the national labs every year some to carry out basic missions, but others to support things that would have to be implemented in industry. So what we get out of that \$15 billion or a share of it depends on how well we translate new knowledge into the business community.

There are many inhibitors today to answer your question that particularly affect small business. Small business, by and large, doesn't have the resources to know what's going on at 17 different national labs. And it's partly, I think, the burden of the labs to help those small businesses know what's going on at the labs. Second, the process of setting up joint efforts between business and the labs is very bureaucratic. I talk to people in small businesses who just throw up their hands and say, we give up. It is just too hard. We'll try it by ourselves. Then there are just broader matters that have to deal with both big companies and small companies. The best way to translate knowledge, technology, in my experience, has been to move people back and forth in and out of the government, into universities, into the labs. And well meaning conflict of interest laws today make it extremely difficult to do that. So those are just a few of the examples that I would cite.

Senator HEINRICH. Thank you, Madam Chair.

The CHAIRMAN. Thank you.

Senator Cassidy?

Senator CASSIDY. Thank you, Madam Chair.

Let me first speak to Senate bill 1181, the Energy Technologies Access and Accountability Act, which I am introducing and which is somewhat similar to Senator Stabenow's Senate bill 1449 which modifies the definition of a vehicle under the Advanced Technology Vehicle Manufacturing Program (ATVMP) to include commercial trucks in the case of both our bills and in the case of mine, United States flag vessels.

Now this allows, obviously, energy transportation to be converted to natural gas. It is my understanding that until March of this year the ATVMP had not issued a new loan for four years, and many have begun to question the usefulness of the program. This bill would modify the program to include commercial trucking and maritime vessel manufacturing where investment in new fuel type vehicles are needed the most and where the technology and implementation of these vehicles stands ready.

As one example, here is the New York Times article about EPA requiring 18-wheelers to run more fuel efficiently. Obviously natural gas would be a more fuel efficient way, so this is a meeting of a lot of factors that could really jump start.

[The information referred to follows:]



**The New York Times** <http://nyti.ms/1d6c7WW>

ENERGY & ENVIRONMENT

## E.P.A. Proposal Will Put Bigger Trucks on a Fuel Diet

By AARON M. KESSLER and CORAL DAVENPORT MAY 30, 2015

ANN ARBOR, Mich. — Inside the National Vehicle and Fuel Emissions Laboratory here, a mammoth contraption, with steel rollers, advanced electronics and exhaust tubes, is nearing completion.

The project — an enormous “truck treadmill” — is the new centerpiece of the Environmental Protection Agency’s complex. One of the largest vehicle testing centers in the world, the truck lab will play a crucial role in shaping and enforcing a major new environmental mandate by the Obama administration that could dramatically transform America’s trucking industry.

This week, the E.P.A. is expected to propose regulations to cut greenhouse gas emissions from heavy-duty trucks, requiring that their fuel economy increase up to 40 percent by 2027, compared with levels in 2010, according to people briefed on the proposal. A tractor-trailer now averages five to six miles a gallon of diesel. The new regulations would seek to raise that average to as much as nine miles a gallon. A truck’s emissions can vary greatly, depending on how much it is carrying.

The hotly debated rules, which cover almost any truck larger than a standard pickup, are the latest in a stack of sweeping climate change policy measures on which President Obama hopes to build his environmental legacy. Already, his administration has proposed rules to cut emissions from power plants and has imposed significantly higher fuel efficiency standards on passenger vehicles.

The truck proposals could cut millions of tons of carbon dioxide pollution while saving millions of barrels of oil. Trucks now account for a quarter of all greenhouse gas emissions from vehicles in the United States, even though they make up only 4 percent of traffic, the E.P.A. says.

But the rules will also impose significant burdens on America's trucking industry — the beating heart of the nation's economy, hauling food, raw goods and other freight across the country.

It is expected that the new rules will add \$12,000 to \$14,000 to the manufacturing cost of a new tractor-trailer, although E.P.A. studies estimate that cost will be recouped after 18 months by fuel savings.

Environmental advocates say that without regulation, the contribution of American trucks to global warming will soar.

"Trucking is set to be a bad actor if we don't do something now," Jason Mathers, head of the Green Freight program at the Environmental Defense Fund.

But some in the trucking industry are wary.

"I'll put it this way: We told them what we can do, but they haven't told us what they plan to do," said Tony Greszler, vice president for government relations for Volvo Group North America, one of the largest manufacturers of big trucks. "We have concerns with how this will play out."

The E.P.A., along with the National Highway Traffic Safety

Administration, began its initial phase of big truck fuel economy regulation in 2011, and those efforts have been widely seen within the industry as successful. But meeting the initial standards, like using more efficient tires, was not especially difficult by comparison.

The proposed rules will ask much more of the industry. They will require more investment and innovation, like tweaking engines and transmissions, improving aerodynamics and using lighter materials. More disruptive options, like recycling engine heat to drive a secondary turbine, or moving away from diesel itself, are also under consideration. Already, some bigger fleets like that of the United Parcel Service have started outfitting some of their trucks with natural gas.

To win over industry players, regulators say they have made efforts to engage companies up and down the supply chain. They have held hundreds of meetings and have tried to shape their proposal in a way that would help truck-related businesses.

“Fuel is either at the top or near the top of truck operators’ costs,” said Christopher Grundler, director of the E.P.A.’s Office of Transportation and Air Quality. Reducing those costs, he added, was good for business and the environment.

Mr. Obama led the cheerleading for his truck rules. In a speech last year signaling the rules, he said, “Because they haul about 70 percent of all domestic freight — 70 percent of the stuff we use, everything from flat-screen TVs to diapers to produce to you name it — every mile that we gain in fuel efficiency is worth thousands of dollars of savings every year.”

John C. Wall, chief technical officer at Cummins, a leading manufacturer of truck engines, said his company had “tried to engage proactively in the development of the regulations” and had found federal officials to be open-minded about what the company thought could be achieved.

Others in the industry, though, hold a different view.

John Yandell Jr., president of Yandell Truckaway in Pleasant Hill, Calif., said that fuel is the second-highest cost for his family business and that he would love to get better mileage on his fleet, which operates short-haul regional routes. But, he said, he is skeptical that can be achieved in the near future in a way that is affordable for him, if at all.

“Twenty years ago, my trucks were getting five miles per gallon; today they are getting around 6.2 to 6.4,” he said, but getting up to nine or 10 seemed like a pipe dream. “Talk is cheap, but I don’t see how they get there.”

Getting there, however, is a priority for Mr. Obama. The administration also hopes that ambitious government targets can help drive the innovation needed to achieve them. After the 54.5 m.p.g. requirement for cars and light trucks was announced in 2009, a wave of new research and development happened in Detroit, as automakers rushed to develop new hybrid, electric and super-efficient gasoline engines.

The new truck rules are intended to spur the same rush to innovation among the companies that build the 10-ton tractor-trailers that haul things as varied as timber, steel and frozen fish.

But as with any new environmental rules, the details are complicated and will take time to sort out. The public will be asked to comment on the proposed rules before the final version is put in place sometime next year.

Back at the testing lab, the truck treadmill was put through its paces. A semi truck was fastened down with thick chains secured to even thicker steel anchors. A driver started the engine, which roared as the truck sat atop enormous metal rollers that allowed the wheels to spin in place. Orange tubes, intended to collect the exhaust fumes when the formal testing begins, hung from the ceiling.

“This was a hole in the ground before Christmas,” said David Haugen, director of the E.P.A. lab’s testing and advanced technology division. “Now we’re ready to make history.”

Aaron M. Kessler reported from Ann Arbor, Mich., and Coral Davenport from Washington.

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So with that kind of statement, Mr. Orr, the program has not issued any new loans in four years. Under its current parameters is there enough interest to completely disperse the remaining \$16 billion in loan authority?

Dr. ORR. Thanks, Senator, for that question.

You know that we did issue a loan associated with aluminum sheet, high strength, low weight aluminum for vehicle applications this year. The loan program's office is actually not in my part of DOE, but and I'm sort of—so I'm a bit of an external watcher. I don't have a window on the projects that are in review now, but I'd be happy to look into that and work with your office.

Senator CASSIDY. Now do you feel qualified to comment if there is potential for the trucking industry and the maritime industry if more loans were made available? Is there potential for us to help them jump start, moving to a more fuel efficient standard or type of engine and would this loan program be beneficial in that regard?

Dr. ORR. So I'd say in a variety of ways vehicle efficiency for trucks is actually a quite important area.

We do have a super truck, one program, in our Vehicle Technologies Office aimed at increasing fuel efficiency by 50 percent in trucks. And in fact the work that was done under that program actually exceeded the goal by quite a bit. There was one manufacturer that got to 115 percent. So that's kind of a doubling from five to ten miles per gallon in a big truck, and we're just embarking now on a super truck two program that will enhance that further.

Senator CASSIDY. You get more BTU per carbon from natural gas than you do from oil or diesel or from oil, so it sounds like you think there is still upside in terms of how we can improve the efficiencies of these vehicles.

Dr. ORR. I do. Yes, I do.

Thank you.

Senator CASSIDY. And is there potential? Of course, I have a bias, but do you agree that if these loan programs are made available it would facilitate the development of these higher standards?

Dr. ORR. I think the loan programs can contribute. Those tend to come a bit at the later stage after the research part of it is farther along.

Senator CASSIDY. Natural gas engines are actually somewhat developed. I mean, the city buses in DC, I think, work on compressed or on liquefied natural gas.

Dr. ORR. There are plenty that work on compressed natural gas. Frequently that's done for air quality kinds of reasons. The overall efficiencies in the engines are roughly the same, but there's an opportunity for both research and then, of course, the deployment side as well.

Senator CASSIDY. I see.

Finally, what has the DOE been doing to create the infrastructure because when you speak about other countries having compressed natural gas vehicles and also having an infrastructure to fill up the tank whereas we do not, is DOE doing anything to facilitate that infrastructure development?

Dr. ORR. There has been work that has gone into, mostly it's been in, kind of, fleet applications, again, largely for air quality

reasons. And to be honest, I'm not sure how much we're doing in that area right now. But I can certainly follow up with your staff.

Senator CASSIDY. Okay, thank you, I yield back.

The CHAIRMAN. Senator Cantwell?

Senator CHAIRMAN. Thank you, Madam Chair.

Mr. Orr and Ms. McAleer, if I could continue.

Mr. Orr, I mentioned both cyber security and this issue of carbon fiber. Obviously carbon fiber is very important from an energy perspective because it is a lighter weight material, so both the auto and aero industries are scoring big victories in the marketplace by utilizing carbon fiber.

So the question becomes what else can DOE do to help with research and development and how to transition this material into other uses? What other opportunities are available? How big is that opportunity?

On cyber security, obviously, this past week's events are very jarring. I think DOE's role is somewhat underplayed, and I believe DOE has a major role in helping us.

In 2011, we had the Grid Cybersecurity Act before this Committee. We actually reported it out of Committee a couple years ago, but it did not pass the full Senate. The bill's focus was on hardening our grid and making sure that we are doing everything to protect our nation's energy infrastructure. So on those research and development issues what do you think we need to do?

Dr. ORR. Well certainly the idea of light weighting and carbon fiber materials is a very important component of our Vehicle Technologies Office. One of the principle ways you can increase the efficiency of vehicle transport is to provide the same strength but with a lighter weight materials. So we have an active program in that area, and we're very interested in pursuing it going forward.

On the cyber security area, we take our responsibility in this area quite seriously. And it goes well beyond the grid, but it certainly is very important for the grid. You might be aware that in the last few years at the Department we have put together a series of cross cutting research efforts that are meant to attack big, hard problems with all the expertise that we have available within the agency—one of those is the cyber security area.

So we are very much interested in fulfilling our responsibility there. This is an area where the national labs really have very deep and appropriate expertise for us to apply to a problem of national interest.

Senator CHAIRMAN. Do we have that appropriately funded?

Dr. ORR. Well, we have requested quite significant support for our cyber security effort in the FY'16 budget, and we're looking forward to pursuing it with all the strength we can.

Senator CHAIRMAN. Okay, thank you.

Ms. McAleer, your challenge is looking at the scalability, right? What are some of the R and D issues for scaling up the industry to make it more economic?

Ms. MCALEER. Yes, Senator Cantwell.

We have found that working first and foremost with carbon fiber prepared materials is the low hanging fruit, and we can move forward in accepting those materials and then creating products. However, the end of life issues with carbon fiber products is much

more complex. But even just working with the carbon fiber pre-impregnated material scraps is a challenge in that it comes in all sorts of different formats, sometimes it's in a pristine format and other times it's a wad of waste.

And so in order to really fulfill the full potential of this very valuable, high value material, we need to educate the manufacturers so that when they create their manufacturing floor spaces that they will also consider how do they take advantage of the scrap material that they're creating so that it can be put into a more productive use.

Senator CANTWELL. Well it is amazing that we have to sit here. I mean, we really are ushering in a new era of carbon fiber just as we speak, and there are so many applications for this material, everything from bridges to aerospace.

At the same time we really do need to usher in this era of recycling research, because we know it is going to be a highly used material. Figuring out how to increase the value of carbon fiber by recycling is critical. My understanding of the process is heating up the material then allows us to reuse it in other ways, so I certainly hope we can get some answers from DOE on this.

Thank you.

Ms. MCALEER. Thank you.

The CHAIRMAN. Senator Alexander?

Senator ALEXANDER. Thanks, Madam Chairman.

I want to congratulate Chairman Murkowski on her effort to incorporate such a wide range of legislation in the bill and thank her for this hearing.

I also would like to point out the leadership of Senator Gardner who is a newer member of the Senate, but who is taking an active interest in America Competes along with Senators Murkowski, Cantwell, Coons, Feinstein, Heinrich and me. We are all very interested in that legislation, and I want to talk about that in just a minute.

Mr. Augustine, Senator Murkowski has in her bill, I believe, because I am co-sponsoring it, a provision that says the Congress should wait until after the Commission on national labs has finished its work and then the Department should make a report to us about what it recommends we do. Do you think it is a wise idea to wait until after the Commission has completed its report before we take any action to reform the laboratories?

Mr. AUGUSTINE. Senator, I think that there are some things that one would not need to wait to do that are fairly evident, so I would not make a blanket statement that one ought to wait on everything. But I do think that our Commission is putting forth a great deal of effort. We visited all the labs. We're very near to completing our work, so I think for many of the issues it probably is worth waiting that brief period of time.

Senator ALEXANDER. Yes. I have seen how valuable the work you did was on America Competes years ago, and you basically gave us a plan that was recommended by a number of reputable people. It was a big help to Democrats and Republicans here because we could follow your blueprints.

I, for one, think what we should do is wait until we see your report, and then I look forward to working with Senator Murkowski and Senator Cantwell and others to deal with that.

Dr. Orr, Senator Bingaman sent me to Japan when I was a new Senator to take a look at Japan's computer. I flew all the way to Yokohama and did that, but there was not much to see, just a big box. But it got me involved in exascale computing, and ever since one area of agreement between the Congress and the Administration has been the priority on exascale computers. Now we have some big computers already today. What can we do with exascale computing that we cannot do with computers that we have today and why is it important that we fund them properly?

Dr. ORR. Senator Alexander, that's a question that we've thought a lot about and one that, I think, is very important. We certainly appreciate all your leadership over the years in helping us maintain the United States' lead in high performance computing.

The Department of Energy has really contributed a lot at various stages when we really needed an advance in capabilities. The ability to replace weapons testing with very high performance computing really led to an advance in computing capability, but then that spread across the entire scientific base.

The exascale computing initiative is the next version of that. It will let us simulate the properties, the materials, to do materials by design, to do processes at very detailed scientific scales in a way that we can't do now because the problems are too hard. They're important for the detectors in all the basic science facilities. It's really important across the whole fundamental scientific base.

So we're, as you know, investing in the next round toward exascale. I just had a chance to participate in the announcement about the CORAL computing effort that involves Oak Ridge and Argonne. We're well on the way, and if we have the support we will maintain U.S. leadership. If we don't do that, then the competing work in China and elsewhere will take over the lead.

Senator ALEXANDER. Thank you.

I want to use my last 20 seconds simply to once again congratulate Mr. Augustine and his team for keeping our eye on the ball about the importance of energy research that Senator Franken mentioned.

The American Association for the Advancement of Sciences recommended a four percent increase each year on the route toward doubling energy research. Now that is over 20 years, but at least it does double it over that period of time.

The legislation by Senators Murkowski, Cantwell, Gardner, Coons, Feinstein, Heinrich and I would authorize that. I want us to think back ten years ago what we had, I think, nearly 35 Republicans and 35 Democrats and legislation that was introduced by the Majority Leader and the Minority Leader to begin America Competes.

I am delighted with that kind of leadership from the Chairman and the Ranking Member of our Committee and all of the effort by the other Senators, and I am glad to see that you are still chugging along and urging us to do what we ought to do about energy research.

Thank you, Madam Chairman.

The CHAIRMAN. Thank you, Senator Alexander.  
Senator Stabenow?

Senator STABENOW. Thank you, Madam Chair, to you and our Ranking Member. We have a lot of great opportunities, I think, working together on this. I want to echo Senator Alexander and what so many of you have said about energy research. It needs to be a top, top priority.

Mr. Augustine, thank you and thanks to all of you on the Committee and Mr. Orr as well.

There are two bills I would like to bring to the Committee's attention, one specifically on research and one that would focus on how we take what we learn through research and actually apply it which is really important in terms of leveraging jobs and manufacturing in America.

One is the Building Better Trucks Act, S. 1449. I was just outside the Committee room plotting and planning with Senator Cassidy on how we might bring together his bill and mine that are very similar in terms of expanding the opportunity to focus the advanced vehicle loan program on medium and heavy duty trucks where we know the energy efficiency is and real opportunities there for jobs as well. Then also S. 1408 which is a bill that I have put forward a number of times that has actually come out of the Committee in the past and is now being introduced by my colleague, Senator Peters, from Michigan joined by Senator Alexander and myself, that deals with research.

Before proceeding I would like to ask that a letter that we will be delivering be put in the record, Madam Chair, Ranking Member, from the Motor and Equipment Manufacturers Association supporting both these bills.

Senator Cantwell [presiding]: Without objection.

Senator STABENOW. Thank you.

[The information referred to follows:]

**Motor & Equipment Manufacturers Association**  
 1030 15th Street, NW Suite 500 East Washington, DC 20005  
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June 10, 2015

The Honorable Lisa Murkowski  
 Chairman  
 Committee on Energy and Natural Resources  
 United States Senate  
 Washington, D.C. 20510

The Honorable Maria Cantwell  
 Ranking Member  
 Committee on Energy and Natural Resources  
 United States Senate  
 Washington, D.C. 20510

Dear Chairman Murkowski and Senator Cantwell:

The Motor & Equipment Manufacturers Association (MEMA) represents more than 1,000 companies that manufacture or remanufacture components and systems for use in motor vehicles and equipment in the light vehicle and heavy-duty, on- and off-highway commercial vehicle markets for the original equipment and aftermarket industries. Motor vehicle component manufacturers are the nation's largest manufacturing sector with total direct employment of over 700,000 U.S. jobs and with an employment impact of 3.62 million employees – for every direct job in the motor vehicle supplier industry, another five jobs are created. On behalf of this industry, I write to you in support of S. 1408, the Vehicle Innovation Act, and S. 1449, the Building Better Trucks Act.

S. 1408 will help automotive and commercial vehicle suppliers develop and implement technology for more fuel efficient components. The research, development, deployment and commercial applications projects called for in this legislation will assist motor vehicle suppliers in developing the highly efficient components and technologies necessary for future cutting edge vehicles. At the same time, the federal investments in the bill will expand and strengthen U.S. manufacturing capabilities for the next generation of motor vehicles and increase our nation's energy independence.

The inclusion of suppliers as part of federal vehicle research and development programs is critical because component suppliers and vehicle manufacturers work together to develop the technologies necessary for advanced vehicles that will improve the fuel efficiency of our nation's fleet. Suppliers account for 30 percent of total automotive investment in research and development and continue to take on a greater role in the design, testing and engineering of new vehicle parts and systems. Additionally, suppliers now account for as much as 70 percent of the value-added in the manufacture of motor vehicles.

Similarly, extending existing loan programs to medium- and heavy-duty vehicle manufacturers and suppliers, as called for in S. 1449, will assist companies manufacture the parts and vehicles necessary to meet future fuel efficiency mandates for medium- and heavy-duty trucks. The Advanced Technology Vehicle Manufacturing Program (ATVM), which was originally authorized in the Energy Independence and Security Act, provides low-interest credit to component manufacturers and automakers for retooling, expanding or establishing manufacturing plants in the United States with the goal of building the next generation of more efficient vehicles. S. 1449 builds on the goals of this program by broadening the current program in such a way that will assist with retooling existing U.S. facilities. Retooling these facilities will allow companies to manufacture fuel efficient vehicles and components that will meet federal fuel efficiency standards.

MEMA urges you to support these important bills and include the provisions in any omnibus energy legislation that the committee develops.





Thank you again for your leadership in support of motor vehicle suppliers. I look forward to continuing to work with you on these bills and on other important issues.

Sincerely,

A handwritten signature in cursive script, reading "Ann Wilson", is positioned below the word "Sincerely,".

Ann Wilson  
Senior Vice President, Government Affairs  
Motor & Equipment Manufacturers Association

Senator STABENOW. The Building Better Trucks Act would basically build on what we did in 2007. Under the previous Administration I authored what has been now dubbed the ATVM Program that would create opportunities for loans to upgrade, expand and create manufacturing in the United States for advanced fuel efficiency vehicles. It was important as we were increasing CAF standards to make sure that the building of those new vehicles was in the United States, not overseas. In fact, we have brought jobs back to the United States as a result of that program. So the question is now as we go forward and look at the need to do the same, not just for small vehicles, but medium and heavy duty vehicles, how do we take that same approach for trucks?

The Building Better Trucks Act would do two things. It would allow manufacturers of medium and heavy duty vehicles and their components to qualify for loans. As we know right now trucks on the roads account for seven percent of vehicle traffic and they consume 25 percent of our fuel. So when we can tackle energy efficiency around larger vehicles that is a very smart thing to do on a lot of different fronts. The second thing is we would clarify that suppliers can also qualify for the program. As has been said already by members of the panel, we have a situation where there are actually more jobs in the supply chain than in actual assembly whether it is automobiles, trucks, or any other kind of manufacturing capacity. It is the supply chain, and we want to make sure that we are supporting the supply chain as well. We have 700,000 people nationwide, everywhere from Michigan, Ohio, Indiana, Tennessee, Kentucky, Texas, Alabama, South Carolina, Georgia, all over the country, working as a result of focusing on the supply chain.

Madam Chair, in the past the ATVM, I know, including from myself, has had some criticism that it was not working as well as it should. I want to thank Secretary Moniz for addressing those issues. We now have reports that are much, much more positive from GAO and so on. In fact, the good news is that in March the Department issued a loan to Alcoa to upgrade and expand its Tennessee aluminum mill to produce specialized aluminum used to reduce weight and improve fuel economy in a number of different cars and trucks including, I have to say, the Ford F150 truck which they are now taking 700 pounds of steel out of weight and using aluminum which is very exciting. The ATVM program is a very important part of that. Madam Chair, I really want to work with you on this. Senator Cassidy and I are very interested in working together and working with you on how we could use this program to expand what we need to do around large vehicles.

Finally, I would just say that the Vehicle Innovation Act authorizes R and D efforts through the DOE's Vehicle Technologies Office and is very much, again, involved and focused on our medium and heavy duty, commercial trucks, and how we can come together to support new research and development on technologies that will have a very big bang for the buck in terms of efficiency of larger vehicles. It is an area that really needs to be focused on, and I am looking forward, Madam Chair, to working with you as we move forward on the energy bill that will address a lot of different energy efficiency issues.

Thank you.

The Chairman [presiding]: Thank you, Senator Stabenow.

Senator Daines?

Senator DAINES. Thank you, Chairman Murkowski and Ranking Member Cantwell, and thanks for having this hearing on this most important piece of legislation.

I certainly support your efforts here on examining a series of bills that foster a far more robust, all of the above energy strategy, developing a more diversified portfolio from an energy viewpoint for the U.S.

In my home State of Montana coal is an important piece of that energy mix. It powers over half of our electricity. It generates thousands of jobs. It generates over \$100 million a year in tax revenues that helps our infrastructure, helps fund our schools, our teachers. Though these are all good paying jobs, the tax revenue and affordable electricity seemed to be under threat under this current Administration. I think the legislation like Senate bill 1221, the Bulk Power System Reliability Impact Statement Act, is critical to ensure Federal agencies are accountable for their actions and the impacts that Federal actions have on affordable electricity reliability.

Moreover I am also glad the Committee is considering Senate bill 15, offered by Senator Hatch, and the other measures that prohibit duplicitous and unnecessary Federal regulations on energy development on Federal lands and allow the states to lead.

I also commend Senator Murkowski and others on this Committee for taking the lead and strengthening global dependence on American made energy by facilitating energy exports.

I would also like to voice my support for the Public Lands Renewable Energy Development Act as well. In addition to the wealth of conventional fuels, Montana has immense potential for wind, for solar, for biomass, for geothermal energy development. This bill would facilitate that production while ensuring a firm partnership between states as well as supporting conservation.

My first question is for Mr. Highley. Mr. Highley, why is it important for Federal agencies to look before they leap in promulgating regulations for the energy sector? It is actually two questions. That would be the first one. The second is can you provide some examples of Federal agencies and Federal actions where the public would have been better served if these agencies had deliberated on the impact on grid reliability in a meaningful fashion prior to issuing the regulations?

Mr. HIGHLEY. Well, thank you for the question.

And why it's important to look before you leap is because the electric grid is the most complex machine yet created by man. It didn't get created overnight. It took decades and decades to get it built to the level it is.

Every device on the grid has to operate in exact synchronism with every other device, and changes to that should not be made lightly. It's possible for a well-meaning regulatory body to come up with something that sounds like a great idea but that jeopardizes reliability and the integrity of the grid. So that's the reason for asking for this expert level review prior to issuing the regulations.

Now I've seen it on the state level where well-meaning regulators have had a new idea on how to regulate the grid and issued regula-

tions that cause us to have to go back and change the rules. I can't give you a lengthy list, but I'm sure we could provide you with one to your office.

One that comes to mind currently is the Clean Power Plan and the impacts that could occur with the rapid loss of generation in 2020 based on some of the timelines in the proposed rule. When we see the final rule, if those timelines are still there, we are greatly concerned about reliability impacts. Having that feedback from people who know how the grid works would be very helpful in crafting those kinds of regulations.

Senator DAINES. Thank you, Mr. Highley.

Mr. Mills, there are places like developing countries in Asia that do not have access to electricity and sources of energy production generated from Federal and Indian lands like in my home State of Montana that have the potential to meet this rising global energy demand. I believe U.S. coal represents about 12 percent of the world's demand, so 88 percent comes from other sources.

Energy produced from the Powder River Basin coal is cleaner than other types of coal as well as creating good paying, American jobs, creating sources of revenue in places where it is needed most on Indian Reservations. So my question is do you think it is important that American coal which is developed in a cleaner and more environmentally sound fashion than other types of coal be prepared to meet international demands for energy?

Mr. MILLS. Well Senator, that's a terrific question and one that most people I've encountered don't like the answer to. The answer is yes, it's critically important.

The world has nearly a billion people who don't have access to electricity, and they want cheap electricity. There are many ways to make electricity but the cheapest way, globally, on average, is using burning coal.

In fact something on the order of 75 percent all the net increase in electricity supply in the last two decades has come from coal, and it will continue to come from coal according to every forecast, the majority of the supply to the world for new electricity.

The United States has an opportunity to participate in that market both for economic benefit but, as you say, I think very correctly, since the world will use coal and will use more of it, we can provide it in the most environmentally benign and safe fashion and benefit ourselves and our allies and friends around the world.

Senator DAINES. Thank you, Mr. Mills.

The CHAIRMAN. Senator King?

Senator KING. Thank you, Madam Chair.

First I want to complement the Vice Chair, how she so felicitously worked the phrase, "One of my constituents, Bill Gates" into her opening statement. [Laughter.] One of my constituents, Stephen King, would appreciate the way you did that. [Laughter.] This hearing has been a valentine to research. All of us have talked about how important it is and everything else. I want to point out that the sequester will hit the research budget of the Department of Energy.

There is a fantasy around here that we are fixing the sequester by dealing with it in the Defense budget with the overseas contingency money which is a trick wrapped up in a gimmick borrowed

from future generations of Americans and we do not need to worry about the sequester otherwise. It is going to take direct aim at exactly what all of you have said is one of the crucial priorities of this country. That is not a question. That is just a statement. But I think some of our colleagues think, okay, we fixed the sequester because we have got this gimmick in the Defense bill, but now it is okay everywhere else.

Well, everywhere else includes the exact programs that we are talking about today. I think that is an important point for this Congress to understand that there is a real problem in national security with leaving the sequester in place. Not only energy research but little items like the FBI or the border patrol are also affected by the sequester. So that is just sort of a general observation.

Mr. Highley, cyber security. We are going to have a serious cyber attack. The next Pearl Harbor is going to be cyber. Would not one way to defend against that in your industry be to air gap your system control, your system control computers, isolate them physically from the rest of the system? I do not care if people hack your emails, but I do care if they hack your grid control. Is that an option? We have got to do something. Defense is not going to work.

Mr. HIGHLEY. In fact, we are already seeing Pearl Harbor, and we are already under attack in the electric sector. That is why through NERC we have the mandatory and enforceable standards for cyber security that are ordered by FERC and promulgated by NERC, the North American Electric Reliability Corporation, that we have to adhere to.

We're currently coming into CIP Version 5, Cyber Security Standards, Version 5, and going to Version 7 we can already see that coming. It does require us to——

Senator KING. But whatever——

Mr. HIGHLEY. Have air gaps, as you've discussed for control systems.

Senator KING. But we have Einstein three which was supposed to protect OPM, and they got hacked last week.

Mr. HIGHLEY. Yeah.

Senator KING. I do not believe you are ever going to be able to protect yourself fully by defensive cyber technology.

Mr. HIGHLEY. Agreed. We can never be 100 percent protected. I would say that, so far, we have never seen a loss of electric service because of a cyber attack. With that said, we practice defense in depth in the utility industries. So we have redundancy, redundancy, redundancy, and it's been proven throughout the years in terms of physical attacks and physical forces of nature we'll practice that same defense in depth on the cyber side.

Senator KING. Well, I just think that is an area, I mean, we keep getting these warning shots.

Mr. HIGHLEY. Yes.

Senator KING. Movie studios, they are all serious, but when it is the gas pipeline system or the electric grid or the finance system, how long is it going to take until we understand the significance?

Mr. HIGHLEY. We see it not as a matter of if, but when, and we want to be in close working relationship with the Government. I serve as co-chair on the Electric Subsector Coordinating Council

and that's another means we have of sharing information at the highest level of government on these——

Senator KING. I would point out that if we have greater distribution of distributed energy, that is customers making their own energy and interacting with the grid, that in itself would be a national security plus. You are nodding. Would you say yes?

Mr. HIGHLEY. I agree, yes.

Senator KING. Thank you.

Ms. Harbert, quick question. You have testified about the advantages of exporting oil and how it is going to stimulate investment. I am honestly a little confused about that because there is a world price for oil. If the price for oil is the same everywhere why does exporting, is it the difference between Brent and WTI? That is about \$4 this morning. Is that what we are talking about here that is going to stimulate all of this investment? Otherwise, if you sell a commodity for \$5 and it is going to be \$5 in the future what difference does it make where you are selling it?

Ms. HARBERT. Well, I think it's important to know that, I mean, obviously when you get back to basic economics, more supply will bring down the price. And we will see the world oil market price, not only its increase, but the volatility be reduced by American supply on the market.

And the infrastructure investment that I'm talking about is to be able to move all of this natural gas and oil around our country. We're going to have to build a lot of infrastructure, and those are good paying jobs. It's good investment, good property taxes, and good state property taxes.

Senator KING. I understand that, but I do not understand what the incentive is to export oil if you get \$62 for it this morning in Europe and you get \$62 in Galveston. What?

Ms. HARBERT. Well we want to produce it and we want to sell it. Right now we're running out of storage and we're running out of opportunity to sell it here because our refining capacity is set up to refine the heavy oils that we have been importing for so long. We're producing the light, sweet stuff that other refineries around the world are set up to accept.

Senator KING. So it is a question of refining capacity and, in effect, customers here in the U.S.?

Ms. HARBERT. And if we aren't allowed to sell that and people stop producing it has two effects. We will import more from Venezuela, from other places, and we will see our own production slow down and prices go up.

Senator KING. Fine.

Thank you, Madam Chair.

The CHAIRMAN. A perfect segway for me to sell my latest white paper, "Rendering Vital Assistance, Allowing Oil Shipments to U.S. Allies." It speaks very directly to some of the questions that you have raised, Senator King. So I will make sure all members of the Committee have our latest, greatest edition.

Senator KING. I always try to set up the Chair. [Laughter.]

The CHAIRMAN. Thank you. It is so appreciated.

Did you say you are related to Stephen King or was that just? [Laughter.]

Senator KING. I keep saying I am trying to get him to adopt me. I said I will not even have to change my monogram, but so far it has not worked. [Laughter.]

The CHAIRMAN. Thank you, Senator King.

Deputy Secretary Orr, let me ask you about some of the financing opportunities, the loan opportunities, through the Department of Energy.

In Alaska we have several different loan and investment programs that are designed to help facilitate renewable energy and energy efficiency programs throughout the state. We have the Alaska Energy Authority, the Alaska Industrial Development and Export Authority as well as the Alaska Housing Finance Corporation, that again, are designed to help build out renewable energy projects and get so many of our small villages off of diesel. Many of these projects are really just so very small that it is difficult to take advantage of DOE's loan programs.

Has DOE considered whether state entities, like the financing institutions that I have just named, whether it is AEA or ADA, could be a recipient of DOE loan guarantees as an aggregator of qualifying projects? Because right now we just do not fit. It does not work for us. Is this something that we could look to, to work with DOE to help better facilitate some of these programs for smaller communities? It is not just Alaska, it is other areas as well.

Dr. ORR. Certainly you raise a very good question, Senator, and that is how we address the needs of isolated communities whether they're in the far North or on islands or well, you have some of those as well. So it truly is an important area and one that we take seriously.

I hasten to point out that I'm not in charge of the Loan Programs Office, but I understand from them that there's no prohibition for state or local or tribal entities to participate in the program. So I believe it would be possible for the state, for example, to make a proposal to the Loan Programs Office. How that would get evaluated, I'm not really sure. But, it, I think, it's not prohibitive.

The CHAIRMAN. Well, it might be something that we want to look at just to make sure that, again, there are no obstacles built into the law that would prohibit that.

Another area that we are looking at is oftentimes, in order to be eligible for many of these programs, there is a distinction between innovative technology and commercial technology. The commercial technology is different there, but again, you may have proven technology that works everywhere else in America but in a remote, isolated, small village, it is really cutting edge or innovative. I want to look to see if there are obstacles in the law, particularly in Section 1703, that perhaps would allow for greater opportunities there for us.

I want to talk quickly about the regulatory side and what we have with the overlap between State and Federal. As I mentioned in my opening comments, I think that this is one area where we have very good intentions here in the Congress in terms of putting on regulations or some level of oversight, but we have not seen how many things we have smothered underneath it that now, even though we know where we want to go with it, we are inhibited from doing.

Alaska is a pretty good example of what we have been doing to produce oil over the decades. We have not only produced more than 17,000,000,000 barrels of oil but the collection of royalties that we have done over the years. Excuse me, only 29.1 million barrels have been Federal, everything else that we have done has been state, state lands, state production, and therefore state regulation. But when we turn to the Federal lands our BLM lands or any other agency, they have their own rules. They have their own measure for production, and they have their own accounting for royalties, for inspecting, meters and operations.

In many cases the State laws are clearly superior to the Federal laws, and yet, what we have is this duplication of effort, a redundancy that really does not insure greater protection to the taxpayer. All it does is create a more complicated and complex operating environment.

So I have introduced a bill, Senate bill 1230, that would require the Secretary of Interior, after getting a request from a governor, to direct the BLM or the Federal land managers to enter into an agreement with the State to create a consistent operating environment. This is not about going around environmental standards in any way shape or form, but it is looking to leverage our Federal and State resources and improve the investment climate on our Federal lands. We are not looking to reduce standards, but what we are hoping is that the State programs that have proven themselves to be sufficient to fulfill the oversight and the enforcement responsibilities of the BLM, that they can effectively lead.

So I would like to ask you, Mr. Mills, or you, Ms. Harbert. In terms of inconsistent and duplicative regulations between State and Federal jurisdictions and the impact that they then have on investment, I think you heard Senator Gardner mention it as related to the fracking in places like Colorado. What can we be doing to, again, insure that we have good standards in place because that is what we want but an assurance that we do not have an overlap and a duplicative process that does not contribute to better value? Mr. Mills?

Mr. MILLS. Well, Madam Chairman, that's a critical issue. In my work with small businesses and right now in my capacity as an advisor to venture funds and doing a lot of venture capital I interact with a lot of small businesses, and what I find is that those businesses are the ones who will tell you quickly the single biggest problem they face in expanding their business. It's not taxation. It's not finding skilled employees. It's regulations.

And in the oil and gas business and the shale business it's populated by thousands of small and midsize enterprises, so the friction that's created is very real. It's very expensive and it slows development, and yet we have the evidence of how big an impact it is. There's a lot of shale on Federal land. We know how much the shale oil and gas production has not increased on Federal land and how much it has increased on State lands. It is a very simple metric not because the shale doesn't exist, but because you're comparing, as my colleagues have pointed out, permits that take days and weeks to permits that take years.

If you're a small business employing 20 people, you can't wait and pay for their salaries for a permit that takes a year. You will

go where the permit takes 40 days. No one in that business community is looking to avoid the permitting requirements. They just want them to be clear and expeditious.

The CHAIRMAN. I think this is where the great frustration is. It is not as if the states are not doing a good job, in fact, in many cases states are doing an exemplary job of regulating. Somehow or other we have gotten to the point where unless it is regulated by the Feds it is just not good. I am not quite sure how we got there, but I want to change that dynamic. I think the states have done good jobs, continue to do good jobs and I think that we need to recognize that. Yet so many of our policies say unless it is Federal oversight on top of what the states are doing we cannot trust you. We have got to get away from this lack of trust of what our states have been doing.

Senator Manchin?

Senator MANCHIN. Thank you, Madam Chairman. Thank all of you for your expert testimonies.

I come from the State of West Virginia, as you know, and we have a challenge right now as I think the Government is in denial that they need the products that we produce. I really believe that.

So what I am going to ask is very simply, the EIA Department of Energy, as you know, basically says that well the next what, 30 plus years through 2040 or 25 years, that we are going to be using fossil fuels and about 65 percent of the makeup of our energy mix is going to be from fossil fuels.

Is there anyone here, just very quickly a yes or no, that does not agree with that? Do you not believe that we are going to be using natural gas, coal and oil for at least the next 25 years in order to basically fuel the grid and keep the lights on, if you will? Is there anyone that does not agree with that? Is there anyone that believes that we can do it with a new energy source or through renewables by eliminating all fossil? So all of you are in agreement that we are going to have to use fossil?

Okay, then I would say that if that is the case and there is no new energy source, I keep thinking commercial hydrogen. Wouldn't that be wonderful? Commercial hot water vapor? I would be all in if they had it, but they do not.

I am living in the real world right now, and West Virginia is getting absolutely plummeted by the overreach of this Administration. I cannot explain it. We are not going to be able to provide the reliable energy you have always received from our little state, and most of the East Coast will be shut down if little West Virginia quits producing. People do not know that.

We are trying to make it. We have wind and solar. We are trying everything, but we know that a majority of that is coming from our coal, and it is so in doubt now because of the uncertainty.

Mr. Orr, I will go to you. \$8 billion since 2008 has been sitting on the Department of Energy's table in EIA for clean coal technology. None of it has gone out. Would you not think something is wrong when the private sector will not step up to use this money to find the new technology because they just do not have faith that this Government really wants them to find anything?

Dr. ORR. So, Senator, thanks for the question.

The program that you're talking about is a solicitation for loan guarantees associated with fossil energy that are tests of new and innovative approaches to using fossil energy but with an effort to make it cleaner and with lower greenhouse gas emissions.

Again, that's in the Loan Programs Office which is actually not in the part that I look after, but I do talk to the folks there and I understand from them that they're pleased at the response to the solicitation. These are big complicated projects.

Senator MANCHIN. We are looking in, sir, I did not mean to cut you short. We are looking into it also and they might be pleased with it, but no one has stepped to the table yet. The way it is structured, there is an awful lot of capital at risk. If you looked at energy stocks, they have gone down to basically junk stock, if you looked at them recently. So you have no confidence, basically. Financial institutions are shutting down everything.

This Government has not stepped forward, this Administration, and said oh, wait a minute, I cannot replace 34, 35, 36 percent of the energy that coal produces, right? I don't have it. Yet we are decimating it. You are not going to be able to produce it, and you have got FERC taking low cost. They do not take reliability into consideration anymore. It is all low cost generation, so they are going to the lowest cost. Ask any utility company today, any CO, "Are you satisfied with your portfolio?" They will all say "No, I'm not."

We are not diversified enough. We have got our eggs in one basket. We are going to get smacked hard, and the country is going to be in jeopardy, but for some reason there is a blind eye to all of this.

I will say that Secretary Moniz has been more receptive than anybody. This is not Democratic. I am a Democrat and this is a Democratic Administration. This is not Democrat and Republican. It is just common sense. If there is a fuel already ready to go, let me know. But I cannot get anybody to step up.

We have got NETL, the National Energy Technology Lab. If we could partner up with NETL and we had our research institutions with the private sector involved to push in and was able to restructure how that money went out, we would get you some answers.

I will give you an example. We do fracking. You know now in West Virginia we have some of the largest plays of shale gas, and we have more to come. We have got a lot of hydrocarbons coming out, propane, ethylene, but we are only recovering five percent, five percent. That is 95 percent left in the ground. Yet we have no research going on that basically would allow us to do enhanced recovery other than oil. All we are using, basically, is CO<sub>2</sub>. So we cannot offset the cost of knowing the collection on these utilities that could basically sell that get enhanced gas recovery or hydrocarbons that would pay for it and make it financially feasible. Nobody cares about that. They are afraid they are going to find an answer. Well, it would be different. You are going to use it for 25 more years, why not work with us?

I do not know if anyone, Mr. Augustine, all of you, Mr. Mills, I know you are there and you are watching it happen. It is just a shame.

I am on a rampant here, but I am going to keep going. I see that basically there is eight billion tons of coal being burnt in the world. If you quit burning every lump of coal in America today there would still be seven billion tons being burned, more than ever in the history of the world.

There is going to be 1,200 new coal-fired plants in the world built in the next four to five years, and I will guarantee you where they are being built there is not going to be oversight that they put all the new technology on, 450 or 500 will be built in India, 350, 400 in China. It goes on and on. Yet we are worried about the climate. I am worried about the climate. I am not a denier. I think seven billion people have contributed, and we have a responsibility. But we are not doing anything, basically, to curtail to our trading policies that they should use the technology that we have already developed. In 20 years we have taken out more pollution in America than ever in history of particulates, SOX and NOX, you know. Now with MERC we have MATS.

We can do those things, but the carbon capture sequestration and using it because of the energy it takes to pull it off of the clear stream is just about broke, and it will break financially, the energy markets, to where they know it is infeasible.

So when they make the statement, "Go ahead and build it, we'll break you." Look at the Kemper plan that Southern Company did, \$2 billion over, maybe even more than \$2 billion over, on cost overrun. They cannot afford to commercialize that program. No one will step forward and do it.

So this is the frustration I see. I come from West Virginia and they look at me and say, "Oh, he doesn't care about the climate." I am as much an environmentalist as anybody sitting here. I want clean air, and I want clean water, as clean as I feasibly can make it. But I also have to have a job and work in this environment.

We just need help from people with you all with the expertise. It is not one size fits all. When commercial hydrogen comes on board, sign me up. West Virginia will figure out a way to make it. Until then, use me the best you can.

Does anybody want to comment on all that tirade that I just—I am just so frustrated, but I want to find out if there is a way the Department of Energy will work with us? Mr. Mills, you observe a lot and you might want to say something, comment on this?

Mr. MILLS. Well I would just first use that old expression, second the emotion on your eloquent defense of hydrocarbons, fossil fuels.

But there's interesting irony here. We've talked about how the Department of Energy was involved in the basic research in shale, hydraulic fracturing in the early days in basic research and seismic imaging. What we've learned in the shale industry is any of the shale players will tell you, is that the morphology of the shales are very complex.

And the reason we only extract five percent, maybe ten percent at best in many cases, is that it's a very complicated environment which is another way of saying it is amenable to basic research. The one place the Department of Energy could play a role is in the underlying science and modeling using exascale computers and petaflop computers to figure out what is going on so we can extract

the other 95 percent, and if we did that in a few years we'd double American production again and really change the world.

Dr. ORR. I agree that there are very interesting research questions involving, for example, the flow in shales. And I'll say that we would be happy to work with your office and you as we think about how to demonstrate and employ CCS and other technologies that will help.

Senator MANCHIN. Secretary Moniz has offered to come to West Virginia, and he will be the first official in that type of environmental realm, if you will, that has been willing to come and sit down and be on the front line.

Now they have flown to China, and they fly all over the world. West Virginia sometimes might be too difficult for a four or five hour drive to get there, but we are working on that because they need to see the front line of defense.

Our little state works its tail off. They are trying, but boy, I will tell you, the uncertainty right now. At this point in time it would be hard for me to say that we are going to be able to produce the energy that you all sitting right here depend on every day from my little state.

Dr. ORR. Well I would say that I have been to West Virginia and I would be more than happy to come back. Maybe I will tag along with the Secretary when he comes.

Senator MANCHIN. Why don't you come with him when he comes?

Dr. ORR. I would.

Senator MANCHIN. Is there anyone else who would like to chime in on this?

Gang, let me tell you we are all in this together. That is all I can tell you. We are in this together, and we are going to find a solution for it, and it is not one size fits all. If there is nothing else right now that this country demands it is affordable, reliable and dependable energy. We are not going to have it if we go down the path we are going right now in the grid system. It is not capable of diversifying itself quick enough to do it.

Thank you, Madam Chairman. I am so sorry.

The CHAIRMAN. No, Senator Manchin. I think many of us feel your pain. Having been one who has accepted the invitation to visit your state and see all that you do, I know and I understand. I know what you are capable of and I know the pride that the people of West Virginia have in producing something that this country needs. So thank you and thank you for your advocacy.

Another coal producer, Senator Barrasso.

Senator BARRASSO. Thank you very much, Madam Chairman. Thank you for holding today's hearing. I am encouraged that the Committee is actually looking to increase transparency and accountability at the Department of Energy.

We need transparency and accountability, especially with respect to the Department of Energy's management of the public stockpile of excess uranium. Since 2009 the Department has repeatedly violated its own written policy and the Federal law when managing the public's excess uranium. As a result the Department of Energy has failed to obtain a fair return on this uranium for American taxpayers.

For example, the Government Accountability Office found that the Department of Energy's transfers of excess uranium in 2012 may have cost taxpayers up to \$195 million. Now the Department of Energy's mismanagement has also contributed to volatility in the uranium market and has led to job losses in states like my home State of Wyoming. In April we learned that employment among U.S. uranium producers fell by 32 percent between 2013 and 2014. Employment among U.S. uranium producers is now at the lowest level since 2006.

Now there is a third reason why we need transparency and accountability with respect to the Department of Energy's management of excess uranium, specifically, the decision by two principle beneficiaries of the Department of Energy's excess uranium to hire Daniel Poneman, former Deputy Secretary of Energy. I am referring to the Traxis Group which appointed Mr. Poneman to its Board of Directors in December of 2014, and Centrus Energy Corporation, formerly known as USEC, which appointed Mr. Poneman as President and CEO in March of this year.

I am deeply troubled by the decision of these private companies to hire Mr. Poneman. Mr. Poneman led the Department of Energy when the agency violated Federal law with respect to excess uranium transactions which benefited specifically these two companies.

Last month I, along with Senators Markey, Cornyn and Heinrich introduced S. 1428. Madam Chairman, you talk about a bipartisan group, that is it.

The CHAIRMAN. That is good.

Senator BARRASSO. The Excess Uranium Transparency and Accountability Act. This bipartisan bill would require the Department of Energy to maximize the value of the public stockpile of excess uranium. Our bill would also require that DOE give the American public a say in how it will manage this excess uranium. Finally the bill would codify the Department of Energy's recent announcement that it will not transfer more than 2,100 metric tons of uranium in calendar year 2016 and thereafter.

These are common sense reforms that will help the Department fulfill its legal obligations going forward. These reforms will ensure the Department manages our excess uranium on behalf of the American public, not two private corporations which the Department of Energy favors. So I encourage all Committee members to support the bill.

I do have a question for Dr. Orr, specifically. My bill would require the Department of Energy to make decisions related to the management of the public's excess uranium inventory through the rulemaking process. The rulemaking process would require the Department to be responsive to the public's comments about the excess uranium inventory. Do you think it is reasonable for Congress to require the Department of Energy to give the American public a say in how the Department manages our stockpiles of excess uranium?

Dr. ORR. Senator, thanks for the question.

As you know I'm pretty new to this process so I just have had an opportunity to observe the end part of it as we made, as the Secretary made the determination this year. And as I know you

know, it's a balancing act with the capturing value for the taxpayers of the uranium, the excess uranium that we hold and at the same time not doing damage to the markets.

This last time around we did offer a big opportunity for public comment, and we really do appreciate all the comments that were made on all sides of the issue. It really is an important part of that balancing act. And we look forward to doing that in the future, kind of, regardless of whether we do it with a change in the rules.

Senator BARRASSO. Well, yes, thank you, but the Department of Energy is not making its decision through the rulemaking process. Isn't that correct?

Dr. ORR. As I understand it it is not a formal rulemaking process, but we did engage in a process that was essentially parallel that very much attempted to do exactly the same kind of thing.

Senator BARRASSO. So it is not really required that DOE be responsive to public comment, but I think it is reasonable. Let us say it is not an unreasonable request or requirement. I would like to see the Department support it.

Dr. ORR. Yeah. If you look at what we did this last time around I think you can see that we thought that was a reasonable way to take into account public comment and to balance the various interests.

Senator BARRASSO. Thank you.

Thank you, Madam Chairman.

The CHAIRMAN. Thank you, Senator Barrasso.

I have a laundry list of other measures that relate to some of the specific bills that I have introduced. I think you are aware that I have been working on an energy water nexus bill for some time. Again, an area that, I think, oftentimes we do not stop to think about. But you cannot have the energy we need unless we have water, and we cannot have the water unless we have energy. So making sure that we are paying attention to the connection to the nexus is important to me.

We have had good conversation here in Committee today about the need to do more when it comes to advancing our research and building out these technologies. The R and D side, making sure that we are doing what government is best suited to do. I am a big believer in ARPA-E and what it can do.

I am looking forward to working with Senator Alexander and Senator Cantwell and others on the America Competes Act. Again, I join Senator Alexander in thanking you, Mr. Augustine, for your leadership in that area. I think it is key for us.

I have a bill that would allow for a prize bill to again give that encouragement to those imagineers that are out there that can really help us find some of these solutions that move us forward rather than the fix for today but that might lock us into that.

I think we have had some good discussion on cyber security today. Although I will say that in my state and in many of the rural parts of the country, you have utilities that are municipally owned or cooperatives that are very small, and they look to what may be coming their way in terms of ways that they can provide for a level of protection or resiliency when it comes to cyber. It is extraordinarily daunting in terms of where those resources might be and how they can actually get things to scale if you are a small

and, again, a remote utility that is not connected to others. So some of these challenges, again, as we work to build out legislation that will move us forward, are part of the challenge in front of us.

I am pleased that we have had some good discussion and an opportunity to hear from you all on the importance, the significance, of utilizing our energy resources as assets, as an opportunity to again move from this mind set of energy scarcity to how we operate, how we move as a nation where we have energy abundance. Not just on the fossil fuel side, but how that abundance can also translate to our renewable energy future. Making sure that we put the right signals in place and again, developing policies that are helpful rather than duplicative, redundant or costly.

So we have a big task in front of us, our Promethean task. I think we need to rename this. I am glad you didn't refer to Sisyphus. [Laughter.] Although sometimes I feel like that is what we are doing is pushing that rock up the hill. That may, in fact, be where we are, but, you know, you don't know until you try.

Again, this is an area that is so long overdue in terms of needed reform. Know that this Committee is going to continue to work aggressively to build policies that are not Reagan era, that are not taking us back in time, but really allow us to move into the future.

I thank you for the time that you have given the Committee this morning, for your thoughts and your reflections. I would ask that if you have additional comments on any of the matters that have been raised today, feel free to provide those to the Committee as we will be working to assemble broader legislation in the weeks ahead.

The CHAIRMAN. And with that, we stand adjourned.

[Whereupon, at 11:53 a.m. the hearing was adjourned.]

## **APPENDIX MATERIAL SUBMITTED**

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**Department of Energy**  
Washington, DC 20585

October 5, 2015

The Honorable Lisa Murkowski  
Chairman  
Committee on Energy and Natural Resources  
United States Senate  
Washington, DC 20515

Dear Madam Chairman:

On June 9, 2015, Dr. Lynn Orr, Under Secretary for Science and Energy, testified regarding Energy Accountability and Reform Legislation.

Enclosed are answers to questions submitted by Ranking Member Maria Cantwell, Senators Joe Manchin III, Mazie Hirono, and you to complete the hearing record.

If you need any additional information or further assistance, please contact me or Lillian Owen, Office of Congressional and Intergovernmental Affairs at (202) 586-5450.

Sincerely,

A handwritten signature in black ink, appearing to read "Christopher King", is written over a horizontal line.

Christopher King  
Principal Deputy Assistant Secretary  
Congressional and Intergovernmental Affairs

Enclosures

cc: The Honorable Maria Cantwell  
Ranking Member



## QUESTIONS FROM CHAIRMAN LISA MURKOWSKI

- Q1. In your testimony, you highlighted that you are concerned with some of the provisions included in the bills related to reforms to the national laboratories. Can you provide details about the provisions about which you are most concerned?
- A1. Of particular concern is a provision included in S.1187, the *America Innovates Act*, Section 202, which proposes to delegate to the directors of the DOE national laboratories the ability to enter into certain laboratory partnering agreements (e.g. Cooperative Research and Development Agreements or “CRADAs”) with private parties, and commit Federal resources, without DOE approval. A similar provision is included in the House bill H.R. 1806, to which the Administration has expressed its opposition in a Statement of Administration Policy<sup>1</sup>. As you know, sixteen of DOE’s seventeen laboratories are Federally-Funded Research and Development Centers (FFRDCs) and are operated under a federal management and operating (M&O) contract between DOE and the contractor. Any time work and funding is added to the M&O contract, whether the work is funded by DOE, another federal agency or a private sector entity, the federal M&O contract is modified to add the funding and related work, and that modification is reviewed and approved by a DOE federal contracting officer (CO). Section 202 of the Act would allow the M&O contractor to modify its own contract with the government with no federal review or approval by a DOE Contracting Officer having appropriate warrant authority. This type of authority where the DOE M&O contractor modifies its own M&O contract is self-dealing and potentially self-serving by the M&O contractor to the detriment of DOE and the taxpayers; it is inconsistent with federal contract policy, violates basic contracting best practices, and exposes the Department and the federal government to unacceptable risks and liabilities while potentially conflicting with execution of the DOE mission. It circumvents the acquisition requirements for fair and open competition. Additionally, the legislation provides the M&O contractor with the authority to perform an inherently governmental function (i.e., bind the Government for financial liability/modify its contract (which is a type of contract-award)). This authority has always been reserved to the Government, not a contractor.

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<sup>1</sup> [https://www.whitehouse.gov/sites/default/files/omb/legislative/sap/114/saphr1806r\\_20150518.pdf](https://www.whitehouse.gov/sites/default/files/omb/legislative/sap/114/saphr1806r_20150518.pdf)

Giving DOE laboratories approval authority for agreements originated from a recommendation in a 2013 joint Center for American Progress / Heritage Foundation report on the national laboratories, which suggested that the DOE review and approval processes “slow[s] down the speed of innovation.” It was suggested that DOE approval of third party agreements, such as CRADAs and Strategic Partnership Projects (SPP) [formerly called Work for Others], takes too long and is the rate-limiting step in getting new agreements in place at the DOE laboratories. This is not true. Benchmarking DOE review and CO approval at the site office adds typically 7 to 10 business days to a much longer process on average.

Although the Department appreciates efforts to streamline and bring efficiencies to administrative practices, this provision does not solve any real identified problem, but instead compromises DOE’s oversight responsibilities for the laboratories and does not allow the federal government to ensure that the proposed agreements with the FFRDC are in the best interest of DOE, the government as a whole, or the American taxpayer.

As I mentioned in my testimony, the Department is engaged in a number of ongoing efforts to review issues that interfere with the efficiency and effectiveness of the DOE laboratories and identify options to strengthen and enhance our national laboratory system, and I look forward to working with this committee on this topic.

- Q2. Under S. 1346 funding for the E-Prize awards would come from the Energy Technology Commercialization Fund. By statute that Fund receives 0.9 percent of annual Department funding for applied energy research, development, demonstration and commercial application. Am I correct that the amount made available to the Fund is roughly \$20 million each year? Is the development of technology that will reduce the cost of electricity or space heat in high-cost regions an acceptable use of that Fund – noting that we are talking about \$4 million total over a two to five year period, or roughly \$40 million to \$100 million in funding to the Commercialization Fund?
- A2. The Department intends to utilize approximately \$20 Million from the applied programs in FY 2016 to support Technology Commercialization Fund (TCF) activities. The amounts for FY 2017 and beyond will be determined through the standard budget development process.

Section 1001 of the Energy Policy Act of 2005 (42 U.S. Code § 16391(e)), the Technology Commercialization Fund (TCF), states that the fund is to be used “to provide matching funds with private partners to promote promising energy technologies for commercial purposes.” Should matching funds from private partners be available and a proposed technology project meet both the “promoting” and the “promising energy technologies” language, then the TCF could potentially be used. The use of the TCF would be allowable in promoting a qualifying technology that reduces electricity or space heating costs in high-cost regions. OTT has been tasked to implement the TCF. Input on implementation is being solicited under RFI and via DOE’s Technology Transfer Policy Board (TTPB), DOE’s Technology Transfer Working Group (TTWG), and through stakeholder meetings.

- Q3. Cyberattacks are a dynamic and complex threat that can move very quickly through a system. Can you describe the need for the Department of Energy (DOE) to be able to quickly respond to a cybersecurity threat to the bulk power system?
- A3. The latency between threat identification, analysis, and mitigation gives attackers an advantage. To counter this, the Department does not solely rely on a reactive strategy and response to cybersecurity threats to the energy sector. The Quadrennial Energy Review (QER) includes four areas in which cybersecurity is addressed to give the energy sector the advantage in cybersecurity: building a robust information-sharing architecture across the energy sector; expanding implementation of best practices and sound investments by owners and operators; developing and deploying cutting-edge technical solutions; and building a strong incident management capability. These efforts and others will develop resiliency within the sector that allows energy delivery systems to be designed, installed, operated, and maintained to survive a cyber incident while sustaining critical functions. DOE, in partnership with the energy sector, also has an incident response activity underway that is another part of our multi-faceted approach toward reducing the risk that energy delivery could be disrupted by a cyber-incident.
- Q4. Can you describe the steps the Department of Energy is taking to make the national labs more accessible for entrepreneurs with innovative energy technologies?

- A4. The Department of Energy's (DOE) Office of Technology Transitions (OTT) was established in February 2015 to serve as a DOE-wide functional unit that coordinates the commercial development of DOE's research outputs, with a mission of expanding the short, medium and long-term commercial impact of DOE's portfolio of Research Development, Demonstration, and Deployment (RDD&D) activities. Part of OTT's role includes identifying opportunities to enhance access to the national laboratories by coordinating DOE's technology transfer activities, collecting stakeholder input, and conducting impact evaluations to understand how DOE can further enhance its commercial impact. OTT helps to coordinate a variety of activities to make the national labs more accessible for entrepreneurs. These efforts include, but are not limited to, the following examples:

DOE's Office of Energy Efficiency and Renewable Energy (EERE) will soon begin operating its Small Business Voucher (SBV) pilot program; a \$20 million investment in small business assistance and collaborative research with the potential to change the way DOE's national labs engage with clean energy entrepreneurs. EERE will allocate the funds to three to five DOE national laboratories selected to participate in the pilot through an open, competitive call for proposals. Besides assisting small businesses enhancing their own technologies, small businesses from across the country will begin working with DOE labs on cutting-edge research and commercialization challenges to bring the next generation of EERE technologies to market.

OTT recently created a public, [online database](#) with over 200 national laboratory facilities accessible to the private sector. The database contains an overview and direct contact information for each facility, increasing awareness and information on a wide variety of unique DOE assets.

SC has improved industry access to its Advanced Scientific Computing Research (ASCR) facilities through two allocation programs, including the Innovative and Novel Impact on Theory and Experiment (INCITE) program and the ASCR Leadership Computing Challenge. In conjunction with industry outreach efforts by the facilities,

these programs have allocated more use of ASCR facilities to industry researchers and eased access for small businesses and entrepreneurs.

DOE's Lawrence Berkeley National Laboratory (LBNL) is announcing a new \$5 million public-private partnership to expand Cyclotron Road, a home for top entrepreneurial researchers to advance energy technologies until they can succeed beyond the research lab. By leveraging the unique national laboratory facilities and expertise of the DOE, Cyclotron Road can reduce the time and cost of energy innovation, providing a select cohort of scientists with the time and resources to develop breakthrough energy materials and manufacturing technologies.

In recent years, DOE created and continues to maintain the Energy Innovation Portal, a one-stop resource to locate energy-related technologies developed with DOE funding and available for licensing from national laboratories and participating research institutions. DOE is currently developing an application programming interface (API) to further enhance the Portal. The Portal contains over 16,000 DOE-created patents and patent applications, providing streamlined searching and browsing of patents, patent applications, and marketing summaries for clean energy technologies. The Portal also allows interested parties to directly contact the licensing representative or scientist from each laboratory and improves opportunities for cross-lab intellectual property bundling.

- Q5. S. 1256 (Franken bill) places a new Energy Storage Research Program including an authorization for \$50 million in ARPA-E. Isn't storage already within ARPA-E's domain? If so, how would this new program align with what ARPA-E is already doing?
- A5: Energy storage is currently within the domain of the Advanced Research Projects Agency-Energy (ARPA-E) as well as several other DOE offices and programs; however, they each have different missions and goals and therefore tackle different aspects of energy storage technology challenges. In coordination with the other program offices, ARPA-E focuses on high-potential, high-impact energy storage projects that are too early for private-sector investment and are not being funded by other programs.
- Q6. Can you describe the importance of maintaining America's leadership in supercomputing? What are the biggest challenges to creating exascale computers? What

other countries are pursuing this level of computing and is the United States ahead of them in research and development?

- A6. U.S. private- and public-sector organizations are increasingly using supercomputers to achieve breakthroughs of major scientific or economic importance. These achievements have already advanced U. S. competitiveness and were, in many cases, accomplished through access to very powerful supercomputers and High Performance Computing experts at the Department of Energy national laboratories. Recent examples include: discoveries in functional materials; 3-D models of full-core reactor neutron transport to predict the behavior of novel nuclear fuels in fission reactors; 3-D turbulent combustion simulations of hydrocarbons to increase fuel efficiency; an industry project that made U.S. airplane engines quieter, more fuel efficient, and less polluting, a small business project that made long haul trucks more energy efficient in record time; another industry project that simulated ice formation from million-molecule water droplets that is reducing the wind turbine downtime in cold climates; and research partnerships that are identifying novel materials for use in extreme energy environments.

According to a recent study by the Council on Competitiveness , U.S. companies that use high performance computing to deliver a competitive edge “...are confident their organizations could consume up to 1,000-fold increases in capability and capacity in a relatively short amount of time,” but 92% see “scalability of software” as a significant barrier to delivering on that potential followed closely by the cost of the systems, the programmability of the systems, and the availability of expertise.

Numerous reports have documented the challenges of simply scaling existing computer designs to reach exascale. Drawing from these reports and experience, the Advanced Scientific Computing Advisory Committee identified the top 10 computing technology advancements that are needed to achieve productive, economically viable exascale systems:

- create more energy efficient circuits, power and cooling technologies;
- increase the performance and energy efficiency of data movement through new interconnect technologies;

- integrate advanced memory technologies to dramatically improve capacity and bandwidth;
- develop scalable system software that is power- and resilience- aware;
- invent new programming environments that express massive parallelism, data locality, and resilience;
- create data management software that can handle the volume, velocity and diversity of data that is anticipated;
- reformulate science problems and redesign, or reinvent, their solution algorithms for exascale systems;
- facilitate mathematical optimization and uncertainty quantification for exascale discovery, design, and decision making; ensure correct scientific computation in the face of faults, reproducibility, and algorithm verification challenges; and
- increase the productivity of computational scientists with new software engineering tools and environments.

Many other countries, including China, Japan, the European Union, Russia and India, are also pursuing research and industry partnerships to address the challenges of developing exascale computing. China has been investing heavily in growing a domestic capability to produce state-of-the-art computing chips and high performance computing systems including the workforce necessary to program and utilize these technologies for scientific, industrial and national security purposes. Though the U.S. has a considerable lead, the level and pace of investment and the commitment of the Chinese government have increased recently.

## QUESTIONS FROM RANKING MEMBER MARIA CANTWELL

- Q1a. Dr. Orr, as you heard from Commissioner McAleer, there is tremendous interest in the Pacific Northwest, in terms of growing emerging industries associated with advances in new composite materials.

I can also say, however, that we often worry that our West Coast supply chains associated with diverse applications—aerospace among them—are sometimes overlooked by the Department of Energy. There is tremendous interest in getting more engaged with DOE and its new \$70 million Institute for Advanced Composites Manufacturing Innovation, headquartered at the University of Tennessee, in collaboration with Oakridge National Lab.

Can your office work with Commissioner McAleer and my constituents at the Composites Recycling Technology Center to help collaboration and information sharing with the IACMI regarding recycled carbon fiber composites?

- A1a. Yes, the Department is happy to work with your constituents and any other entities interested in engaging and discussing potential partnerships with the Institute for Advanced Composites Manufacturing Innovation (IACMI). At your request, the Department and IACMI leadership have engaged with your constituent directly to explore potential collaboration and information sharing opportunities.

- Q1b. What else can Department of Energy do to help with research and development for carbon fiber composites, particularly for the aerospace sector?

- A1b. The Department is currently investing in composites through several efforts. For example, through a separate competitively-selected effort under the Advanced Manufacturing R&D Projects subprogram, AMO is collaborating with manufacturers both in the automotive and aerospace industries to develop energy efficient thermoplastic composite molding technologies. The Advanced Manufacturing R&D Projects subprogram will continue to fund competitively-selected R&D investments in a variety of foundational energy-related advanced manufacturing technologies, including materials widely applicable across multiple clean energy manufacturing industries.

- Q2. Dr. Orr, as you are aware, the threat of cybersecurity has grown aggressively in recent months. Just last week, it was revealed that Office of Personnel Management's (OPM)

data system had been breached. Potentially four million federal employees' data may have been stolen.

When it comes to our nation's mission critical energy infrastructure, there are national security implications to a potential breach of the electric grid or of other energy networks, including energy exploration and delivery systems.

Q2a. How can the federal government, and in particular, the Department of Energy work more effectively to prepare for such cyber incidents?

A2a. The Department identified four areas in the Quadrennial Energy Review that holistically address cybersecurity preparedness: building a robust information-sharing architecture across the energy sector; expanding implementation of best practices and sound investments by owners and operators; developing and deploy cutting-edge technical solutions; and building a strong incident management capability. A strong partnership with the energy sector owners and operators is critical in all these areas.

The FY 2016 Request includes \$52 million for the Cybersecurity for Energy Delivery Systems (CEDS) program to reflect the critical need to accelerate and expand efforts to strengthen the energy infrastructure against cyber threats. Within the CEDS program, \$10 million establishes a virtual collaborative environment for conducting real-time advanced digital forensics analysis for the energy sector. This environment could be used to analyze untested and untrusted code, programs, and websites without allowing the software to harm the host device.

Q2b. S. 1241, the Enhanced Grid Security Act of 2015, would address this issue head on. It would designate the Department of Energy as the lead sector specific agency for the energy sector, as well as establish programs at the Department of Energy on cybersecurity research and development, supply chain testing, emergency capability testing, securing energy networks, and more. Do you think that the Department of Energy would be prepared to implement such legislation as soon as possible, given the very grave threats the vulnerability of our energy networks present?

A2b. The Department of Energy has, for over ten years, carried out its Energy Sector-Specific Agency responsibilities based on executive order guidance. Today, we are deriving benefits from these efforts, but the complexity of today's grid structure poses new threats that must be addressed. To facilitate the transition to practice as a pathway for commercialization, the Department has conducted research, development, and

demonstration of cybersecurity technologies with national laboratories, suppliers and academia in collaboration with energy sector asset owners. Current efforts include supply chain integrity. The Department is a lead participant in national emergency exercises such as GridEx, conducts regional exercises, and provides toolkits that allow asset owners to self-evaluate their organization's cybersecurity maturity. The Department recognizes the threats to our energy networks and is prepared to work with Congress to ensure these vulnerabilities are addressed.

## QUESTIONS FROM SENATOR JOE MANCHIN, III

Q1. I understand that the loan guarantee program is not under your direction. However, in your testimony you mention your role in overseeing research, development, demonstration, and deployment; so you know the importance of investing in new technologies. As I just mentioned, DOE has had \$8 billion in advanced fossil loan guarantee money since 2008 that has yet to be spent. Can you talk about the importance of early investment in new technologies?

A1: The Department of Energy's Loan Programs Office (LPO) administers the Title XVII program which issues loan guarantees to finance deployment of innovative energy projects in the U.S. These projects and facilities are critical to moving the United States towards a clean energy future where it is a global leader in clean energy technology, which will create economic opportunities and address the threat of climate change.

Commercial banks and bondholders are often unwilling to finance the first few commercial-scale projects that use a new technology since there is not yet a history of credit performance or operation. As a result, the initial commercial deployment of new energy technology is often limited by a project developer's inability to secure sufficient long-term debt financing to build the project.

The Title XVII program was established to fill this critical role in the marketplace by financing the first deployments of a new technology to bridge the gap for commercial lenders. Once the technology is proven at commercial scale, the Department of Energy stops providing financing and lets the private market take over.

Loan authority available through LPO is in addition to investments being made via the Office of Fossil Energy's carbon capture and storage (CCS) research, development and demonstration program. The program began in 1997 and has included investments in CCS that span from laboratory breakthroughs to commercial scale demonstrations at fossil-fueled power plants. This early investment has provided a strong science and technology foundation for CCS. This work has been managed by DOE and funded primarily through public-private partnerships.

Early investment in CCS is critical to accelerating the process of innovation and enabling market adoption. This includes investment in large-scale CCS demonstration projects as well as investment in the associated infrastructure, including pipelines. The Quadrennial Energy Review released in April 2015 included two recommendations related to CCS infrastructure:

- 1) *Work with states to promote best practices for siting and regulating CO<sub>2</sub> pipelines. DOE, in cooperation with Federal public land agencies, should take a convening role to promote communication, coordination, and sharing of lessons learned and best practices among states that are already involved in siting and regulating CO<sub>2</sub> pipelines, or that may have CO<sub>2</sub> pipeline projects proposed within their borders in the future.*
- 2) *Enact financial incentives for the construction of CO<sub>2</sub> pipeline networks. The President's Fiscal Year 2016 Budget Request proposes the creation of a Carbon Dioxide Investment and Sequestration Tax Credit in order to accelerate commercial deployment of carbon capture, utilization, and storage, as well as to catalyze the development of new carbon capture, utilization, and storage technologies. Specifically, the proposal, part of the President's POWER+ Plan to invest in coal communities, would authorize \$2 billion in refundable investment tax credits for carbon capture technology and associated infrastructure (including pipelines) installed at new or retrofitted electric generating units that capture and permanently "sequester" CO<sub>2</sub>. Congress should enact this proposed tax credit."*

Q2. While DOE is not traditionally a permitting agency, S.1293 simply places DOE as a coordinating agency for clean coal and advanced coal technology projects, as you all are the agency with the most expertise in the area. Can you discuss the kind of expertise that DOE would bring to clean coal permitting?

A2. The DOE Office of Fossil Energy manages the clean coal research and development (R&D) program, which includes the competitive selection of commercial demonstration projects and management of the cooperative agreements that provide federal financial assistance to support them. As demonstration projects mature through various milestones, DOE project managers monitor technical progress and DOE contracting officers manage cooperative agreements to ensure appropriate use of federal funds. One of the milestones which DOE is responsible for in this process is compliance with the National Environmental Protection Act (NEPA). DOE implements this process for projects in the clean coal R&D portfolio.

DOE managers also have extensive technical knowledge regarding clean coal and a familiarity in permitting milestones built by working with various project proponents

over several decades. DOE does maintain staff-to-staff relationships with the Environmental Protection Agency (EPA) headquarters to discuss the development of new regulations, directives and processes but EPA remains the expert on regulations within its purview such as the Clean Air Act, the Federal Water Pollution Control Act, and the Safe Drinking Water Act.

## QUESTIONS FROM SENATOR MAZIE HIRONO

- Q1. Hawaii ranks first in the nation per capita for the use of energy savings performance contracts (ESPCs). The contracts allow building owners to work with outside companies who will design and install energy efficient equipment, then be repaid through the guaranteed energy savings. A study by Oak Ridge National Laboratory found that 156 ESPCs awarded by the Department of Energy have saved taxpayers \$215 million dollars. I introduced, S. 1277, the Federal Energy Savings Enhancement Act, along with Senator Wyden, to allow agencies to make use of energy savings contracts for uses besides buildings, such as energy efficiency improvements to naval vessels, aircraft, vehicle fleets, or portable generators.

Can you describe some of the benefits the federal government has had with ESPCs and explain whether you agree with some of the military energy officials who have told me that expanding the use of ESPCs beyond buildings could be a useful tool for increasing federal energy savings?

- A1. Energy savings performance contracts (ESPCs) help Federal agencies meet energy efficiency, renewable energy, water conservation, and emissions reduction goals by streamlining contract funding for energy management projects. DOE's Oak Ridge National Laboratory performs annual assessments of the realization rate of energy and cost savings from the ESPC program and publishes the findings in annual performance reports. (Full report accessible at: <http://www.energy.gov/eere/femp/downloads/reported-energy-and-cost-savings-espc-program>)

As of May 15, 2015, in alignment with the goals of the 2013 Presidential Performance Contracting Challenge, Federal agencies have developed a pipeline of about \$4.78 billion in projects, which exceeds the \$3.97 billion commitment. Working with DOE's Federal Energy Management Program (FEMP), agencies have awarded a total of 207 projects with an investment value of \$2.07 billion and an estimated pipeline of \$2.71 billion. This Challenge has helped reinvigorate use of ESPCs and Utility Energy Service Contracts throughout the government.

Non-building applications account for a much larger share of Federal energy use than building applications, as approximately 65% of Federal energy use is from vehicles and equipment. Currently, the statutory authority limits the use of ESPCs to improvements

applied to Federal buildings that are owned by the government. Section 518 of the Energy Independence and Security Act (EISA) of 2007, required the DOE and the Department of Defense to conduct and submit to Congress and the President a study of and a report on the potential for the use of ESPCs to reduce energy consumption and provide energy and cost savings in non-building applications. This report is complete. Any authority expanding the use of ESPCs however, would need to be closely examined for potential budgetary scoring impacts.

- Q2. The federal government spends about \$24 billion per year on energy in total. One solution for cutting energy bills and using more renewable energy is for agencies to sign long-term contracts to buy energy from outside companies. However, most agencies are limited to 10 year contracts, which can be too short to provide outside companies the certainty they would need to invest in a new renewable energy or cogeneration project. I introduced S. 1274 to allow all federal agencies to be able to sign contracts of up to 30 years, the same length of time that Congress has already given to the Department of Defense.

Can you describe how federal agencies have used long-term energy contracts, and do you agree other that federal agencies could benefit from the same long-term contracting authority enjoyed by the Department of Defense?

- A2. High capital requirements combined with limits on Federal agency energy contracts create challenges for funding renewable energy projects. For an example, solar developers typically require long-term contracts (15-20 years) to amortize the initial investment. In the private sector, 20-year contracts have been developed, vetted, and accepted. In the Federal government, the U.S. Department of Defense is permitted up to 30-year terms under 10 USC 2922a. Longer contract terms are critical to the success of these projects since payments on shorter-term contracts make renewable projects, especially solar PV projects, economically unattractive compared with conventional generation. In several instances however, the Federal sector has utilized innovative funding tools that allow long-term contracts or has created a project package that is economically attractive within a shorter contract term.

The Federal Energy Management Program provides information, training, and assistance to help agencies successfully use on-site renewable energy power purchase agreements (PPAs). PPAs can also be signed with renewable generators located on private land.

This type of renewable energy is often called “grid-based green power.” Whether on-site or off-site, PPAs allow federal agencies to fund renewable energy projects with minimal up-front capital costs incurred. With on-site PPAs, a developer installs a renewable energy system on agency property under an agreement that the agency will purchase the power generated by the system. The agency pays for the system through these power payments over the life of the contract. After installation, the developer owns, operates, and maintains the system for the life of the contract.

PPAs were used to fund the following Federal on-site renewable energy projects:

- 14.2 megawatt (MW) photovoltaic (PV) array at Nellis Air Force Base (the largest Federal PV system in the U.S.)
- 2 MW PV system at U.S. Army Fort Carson
- 2.3 MW from four PV systems at the National Renewable Energy Laboratory (NREL)
- 500 kilowatt (kW) PV rooftop system on the General Services Administration’s (GSA) Sacramento Federal Building
- 850 kW PV system at the U.S. Coast Guard Petaluma site

While these examples are all PV projects, PPAs can be implemented for projects using other renewable energy resources.

**U.S. Senate Committee on Energy and Natural Resources  
June 9, 2015 Hearing: Energy Accountability and Reform Legislation  
Questions for the Record Submitted to the Honorable Colleen McAleer**

**Questions from Senator Maria Cantwell**

**Question 1:** Commissioner McAleer, in the next decade, many advanced manufacturing and energy workers will need to be replaced with skilled workers who are trained in math, science, and technology. Many companies have stated that they face a “skills gap”, in that potential employees do not have the needed skills and training for open positions.

- What role do you think community colleges play in training the next generation of skilled workers for jobs in advanced manufacturing?

*The Skills Gap:*

According to the Department of Labor, 60-70% of the new jobs being created are “middle skills” jobs, which do not include open jobs that go unfilled. These jobs require education and training beyond a high school diploma, but short of a bachelor degree, such as a certificate, associate’s degree, or apprenticeship program. Advanced manufacturing relies upon automation and robotics, which drives continually upgraded skillsets for this “middle skills” workforce.

*The Current Situation:*

Every large manufacturer needs a strong and reliable supply chain. But currently, large manufacturers often hire employees for their “middle skill” job openings from within their own supply chain and only a relatively small percentage come from community colleges. As an example to resolve this, Boeing’s goal by 2020 is to source their future “middle skill” workforce 50% from community colleges and 25% from high schools.

*The Community College Solution:*

This new demand requires that the education system be more efficient and responsive by collaborating and partnering with industry, small businesses and trade associations in a variety of ways. The Composite Recycling Technology Center in Port Angeles is a great example of an industry and community college partnership designed to address these needed skillsets.

*Partnerships:*

Community colleges, more than ever, are working side-by-side with industry and small businesses so students will choose manufacturing careers and graduate with the skills they need. Businesses are providing subject matter experts to colleges to validate certificate programs and develop relevant, highly technical curriculum. They donate equipment that community colleges could otherwise not afford; and they provide facility tours that give students facility tours of sophisticated automated machinery and processes. Businesses more often need to offer internships, externships and part-time jobs with reasonable wages.

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Unions and other business groups can use apprenticeships and journeyman programs to help close the skills gap.

*Credentialed Educational Pathways:*

The education system can develop various credentialed educational pathways for students that are validated by industry and aligned to specific career paths. In Washington State, community colleges offer a wide variety of choices for students to address the “middle skills gap” by providing short-term modular and stackable certificates that can help fulfill an associate degree requirement or serve an intermediate career path.

*Nationally recognized certificates:*

Within educational pathways, nationally-recognized certificates to streamline the hiring process need to be the norm rather than the exception. The National Association of Manufacturers partnered with Washington State’s Center of Excellence for Aerospace and Advanced Manufacturing to create industry-recognized credentials that will help students land jobs in the manufacturing industry. Individual companies then work with our colleges to establish a certification system already endorsed by the association.

- How have composites contributed to economic development in Port Angeles and the Peninsula region?

*Composites Impact on the Olympic Peninsula*

In 1988 the Port first invested in buildings and equipment designed to support advanced composite manufacturers. Today the Olympic Peninsula hosts dozens of manufacturers that use composite materials in products ranging from recreational products and aerospace parts, to small boats and large yachts. This industry diversification ushered in numerous companies creating living wage jobs because of the local know-how, resident workforce training programs and a local supply chain support. The local composite ecosystem drives one of our most important and promising economic sectors. Its health is critical for improved employment and a prosperous local economy.

**Question 2:** Commissioner McAleer, given your background as the former Director of Business Development at the Port of Port Angeles, and your background as the owner of a successful family business, you have experience obtaining financing.

The Department of Energy’s Loan Program Office has been credited with singlehandedly launching utility scale solar in the United States. In 2009, there was not a single photovoltaic solar facility larger than 100MW in the country. The Department of Energy’s Loan Programs Office guaranteed \$4.6 billion in loans to support the first five

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utility scale solar projects. Following those projects, ten additional photovoltaic projects larger than 100 mw were financed solely by commercial lenders.

However, the Loan Programs Office's average loan size is \$1 billion, and the smallest loan guarantee they have provided is \$200 million.

I understand that the Washington State Department of Commerce has worked with small businesses and entrepreneurs in Washington State to obtain financing on a much smaller scale. Additionally, there are many energy efficiency projects that technically would not qualify as "innovative" projects, but if completed, would enable significant energy efficiency savings.

- How can the federal government work more effectively to leverage the knowledge base and familiarity of the state to better deploy responsible and smart loan guarantees to Washington State entrepreneurs and small businesses?

Washington's Clean Energy Fund:

The Washington State Department of Commerce administers a \$15 million Clean Energy Revolving Loan Fund that supports the widespread use of proven building energy efficiency and renewable energy technologies now inhibited by lack of access to capital. The state contracted with two experienced nonprofit lenders to operate these loan funds. These lenders expect to leverage these state funds to generate more than \$100 million in residential loans and \$60 million in commercial loans. If the Department of Energy Loan Program Office were able to expand the eligibility and streamline the application process to allow for smaller projects, (e.g. \$5 to \$25 million), or aggregate smaller projects to qualify, the \$40 billion of remaining federal loan authority would be more easily delivered to their intended recipients in a much more efficient and accelerated process. Washington State's Department of Commerce would be a good partner in helping to market and support such a program.

- Do you think that there would be a net benefit if the federal government figured out how to support the already existing energy finance offices in many states across the country, which support energy efficiency projects, and not just innovative energy projects?

Driving energy efficient projects:

Commercial property owners have been slow to use energy efficient technologies. The long payback period often exceeds a short investment horizon, so property owners typically maintain the status quo since they see the investment as a poor use of their capital. If this trend continues, the nation will not meet the Administration's goal of improving energy efficiency in commercial buildings by 2020. Leveraging states' existing

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energy finance offices would allow property owners to take advantage of the lower interest programs to meet the federal goals.

**Question 3:** Commissioner McAleer, thank you for touching on the importance of carbon fiber composites and what the Port of Port Angeles is doing to attract investment and create sustainable economic growth through the use of composites.

Industries like the aerospace and automotive industry are continuing to rely on carbon fiber composites for lighter aircraft and vehicles that use less fuel. As the demand for carbon fiber increases, this will present new commercial opportunities for recycled carbon fiber.

- What are some of the energy and economic benefits associated with recycled carbon fiber?

*Energy Benefits of Recycled Carbon Fiber:*

Lightweight carbon fiber composites reduce the weight of a product, thus reducing the energy consumption. Experts in the field estimate the waste from current carbon fiber manufacturing operations are in the 25-35% range, depending on the industry. Recycling carbon fiber would effectively add this amount of additional raw material into the market at a significantly lower price point. According to the Department of Energy, a ten percent weight reduction in a vehicle results in a six to eight percent increase in fuel economy. Low-cost recycled carbon fiber would allow cost competitive replacement of steel and aluminum components at significant weight savings, thus driving substantial national energy savings.

*Economic Benefits of Recycled Carbon Fiber:*

The highest economic benefit is achieved when products and components made from recycled carbon fiber are developed, manufactured and assembled in the United States. Many aluminum and steel components are manufactured using inexpensive labor overseas. Substituting low cost recycled carbon fiber reduces production and energy costs and “reshores” jobs back to the United States. The advantage Washington State offers as a collection site of recycled carbon fiber lies in its unique concentration of companies that generate carbon fiber scrap in a relatively small geographic area, making transportation cost-effective. However, this model can be replicated in many other areas in the nation that also have a high concentration of manufacturers using carbon fiber.

- Are there areas or examples where the Department of Energy and its national labs can do an even better job at working with local entities like Ports and economic development entities?

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National labs have enormous technological resources, industry-recognized expertise, specialized research equipment, unique facilities, and the know-how to navigate regulatory processes. These competencies could be better leveraged to accelerate carbon fiber recycling processes and product development. The first challenge to be overcome is that small businesses often lack awareness of national labs' capabilities. Second, the ease and affordability of contracting with national labs are often assumed to be out of reach for small businesses.

*Getting the message out:*

The first barrier can be overcome with proactive partnerships with local economic development entities, such as Ports. It's about knowing which of the thousands of companies across a region would most likely benefit from the national lab's capabilities and letting them know what the national labs' capabilities are. That takes boots on the ground in many local areas across a national lab's region. Leveraging local knowledge of existing economic development entities to spread the word makes absolute sense.

As a side note, there was an unexpected benefit to small businesses and national laboratories that partnered in an Institute proposal for similar grant programs: small businesses became aware of the national labs' catalyzing capabilities, and national labs generated potential commercialization opportunities for clean energy research with the private sector partners.

*Ease and Affordability of Access:*

The second barrier can be overcome through continued successes and expansion of Department of Energy's National Laboratory Impact Initiative programs like Lab-Corps, the Small Business Voucher Program, and Technologists-in-Residence.

Additional source material and detail is available upon request.

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Questions for the Record Submitted to Mr. Norman Augustine**

**Questions from Chairman Lisa Murkowski**

**Question 1:** Mr. Augustine, you currently serve on a congressionally directed commission that is reviewing the effectiveness of the National Labs. In the commission's interim report, the challenging relationship between the Department of Energy (DOE) and the Labs is highlighted. What do you believe are the most difficult problems to resolve between DOE and the Labs? Why do you think previous recommendations in previous reports were not implemented by the Department?

The Commission to Review the Effectiveness of the National Energy Laboratories understands the significance of the relationship between National Laboratories and DOE for national security and scientific innovation. The Commission has effectively identified the most difficult problems facing the development of this relationship, as well as potential explanations for why past recommendations have not been implemented.

Due to an apparent lack of confidence in the Labs, the DOE often inhibits work in the National Laboratories through risk aversion and micromanagement. This overly conservative management of risk harms the suitable development of the public-private partnership. Through this increased DOE involvement, the labs are pushed to focus on compliance rather than the goal of mission delivery. These challenges also include excessive budget controls and exceedingly prescriptive regulations, both of which pose significant roadblocks towards the improving laboratories' capabilities for production of efficient and substantive results. The Commission also noted the presence of unnecessary and often redundant audits and inspections. This also impedes the development of satisfactory results. As described in the interim report, the Commission finds that the "excessive level of transactional oversight and control by DOE... stems from what appears to be a high level of risk aversion exacerbated by disparate attitudes on risk management at DOE headquarters and the field/site offices" (Interim Report, Feb. 2015, iv).

All of the aforementioned problems are worsened by confusion around responsibilities within the relationship.

The Commission determined that the most effective way to solve these issues are through trust, communication, and a comprehensive understanding of the roles of DOE headquarters and the National Laboratories themselves.

In terms of the second question, there are a number of reasons why the Commission feels that earlier recommendations have not been effectively implemented. One stems from the simple fact that the underlying factors producing these issues are difficult to identify and thus even more challenging to rectify. Systemic problems are also apparent, both within the DOE and beyond, contributing to difficulties with enacting changes. In addition, there is currently no institutionalized system or body within

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DOE to monitor the or implementation of recommendations. There is a persistent lack of understanding of the DOE's role with the labs, which itself is a significant problem, therefore generating great difficulties for the application of the Commission's recommendations. The Commission has noted that it plans to develop approaches to measure the implementation of past recommendations and identify additional factors inhibiting effective change.

However, the Commission does note that the current Secretary of Energy is visibly attempting to make improvements to the relationship between DOE and the National Laboratories, including resolving some of the issues suggested in past reports. Yet overall, much work remains to be accomplished to improve this relationship and produce desired results.

**Question 2:** Can you describe the importance in maintaining America's leadership in supercomputing? What are the biggest challenges to creating exascale computers? What other countries are pursuing this level of computing and is the United States ahead of them in research and development?

Although research in high-performance computing may be an abstract-sounding endeavor, past work related to this subject has produced extremely constructive impacts on our economy and our personal lives. It was earlier generations of such work that helped enable the human genome to be deciphered, criminals to be apprehended through computer matching of fingerprints, and medical imaging devices that "see" in three- dimensions. In my own early career as an aeronautical engineer, we used giant wind tunnels requiring enormous amounts of power to determine the aerodynamic characteristics of potential aircraft designs. Today, this is accomplished in microseconds using computational methods. Given the massive databases that exist today, it is only through high-performance computing that we will be able to fully realize the benefits these data potentially offer. One of the most exciting capabilities that exascale could unlock is the ability to do real-time simulation of the human brain. Additionally, clean energy research can advance with progress in high-performance computing technologies; be that designing new classes of photovoltaic materials, simulating next-generation nuclear reactors, or unlocking unprecedented combustion efficiency in engines and turbines.

In simple terms, the challenges to creating exascale computers are fundamentally about technology breakthroughs, rather than technology incrementalism. Power and cooling cost constraints effectively limit microprocessor clock speeds, so the path to exascale computing is through advancing the number of parallel operations on a single microprocessor as well as new architectures and programming to enable effective operations. This calls for several orders of magnitude of intensification: exascale computing requires billion-way parallelism, in contrast to the million-way parallelism in petascale systems today. This, in turn, will require both hardware breakthroughs and programming breakthroughs—it calls for a fundamentally

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different kind of computational science. And because this is all on the frontier of science and engineering, there is a massive challenge to managing uncertainty and exploring multiple technology paths to the goal, knowing that a singular approach could ultimately be dead-ended.

The U.S. has traditionally enjoyed globally technology leadership, including in computing, although that position is now insecure. Chinese and Japanese researchers are competing to operate the first exascale system, which is expected by 2020. (I should note that the U.S. DOE works in partnership with the Japanese on the software R&D of their system.) In contrast, it is my understanding that expert opinion says the U.S. will not first operate such a system before 2022. It seems to me that the companies who stand to benefit from such technologies will first look to these other countries to partner and undertake product development, ultimately affecting the locus of business activity and jobs. Additionally, as high-performance computing increasingly informs the design of aircraft and other defense assets, the race to exascale computing is fundamentally one of national security—and thus central to the mission of our National Laboratories.

Nevertheless, being first is not everything. U.S. researchers have dominated high-performance computing for many years. While the U.S. may not be the first to operate an exascale system, I have no doubt that American scientists and engineers will continue to make important contributions to the field and at least for the foreseeable future derive great competitive value from such systems—provided we continue to sustain them through consistent and growing investments, including those at our National Laboratories. On the other hand, if neglected, exascale computing could join other scientific and technological fields wherein the U.S. held a leadership position since World War II, only to relinquish it in recent decades.

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Questions for the Record Submitted to the Honorable Karen Harbert**

**Questions from Chairman Lisa Murkowski**

**Question 1: As former Assistant Secretary for International Affairs at the Department of Energy, do you believe there is demand overseas for U.S. crude oil? We often hear the claim that there is no market. How wide a breadth of industries would benefit from oil exports? Would manufacturing, steel, and other sectors benefit?**

**ANSWER:**

There is tremendous interest and potential demand for U.S. origin crude in many regions throughout the world. While it is always difficult to predict exactly how any one business may react to a change in policy, such as removing the ban on U.S. crude oil exports, there are some countries and markets that represent likely destinations for U.S. exports and some foreign governments have expressed interest in importing U.S. crude.

A March 2015 study, *Unleashing the Supply Chain*, produced by IHS concluded that lifting the crude export ban could result in U.S. oil production increasing by as much as 2.3 million barrels per day with a significant portion of that potentially being exported. Any U.S. exports would go to recipient under contractual terms that may be based on price, duration, grade of crude, amongst other factors. It is difficult to predict specific market reaction, but the type of oil being produced in the U.S. has a higher specific gravity and is low in sulfur content ("light sweet crude") making it especially sought after in regions that employ less complex refineries, including areas in Asia, Europe, and South America.

Not only are there operational reasons U.S. crude could be in demand, there are also geopolitical reasons as well. Many countries already seek trade relationships with the United States knowing its companies are governed by law where contracts are durable and predictable and not at risk for arbitrary government intervention. Additionally, many importing countries have little to choice but to purchase their oil supplies from exporting nations that use this leverage to further political and economic interests leaving the importing country with little choice. While U.S exports could not displace all exports from these other exporters, U.S. exports would offer a competitive alternative to countries and companies looking for a stable and reliable supply of oil.

Allowing U.S. oil exports is expected to increase domestic production by as much as 2.3 million barrels per day. Oil exploration and production is capital and labor intensive and such a

significant increase in production would undoubtedly benefit operators and the service companies they rely on. However, the oil industry depends on a very long supply chain that spans the entire country and includes industries most Americans would not inherently associate with benefiting from the oil industry. Unleashing the Supply Chain projects significant job creation and capital expenditures in industries varying from computer hardware and steel manufacturing to lodging and catering. In total, IHS estimates that nearly one-third of the 394,000 annual average of new jobs supported by oil exports will be in the greater supply chain.

**Questions from Chairman Lisa Murkowski**

**Question 2:** Permitting for energy infrastructure development, improvement, and maintenance in the United States is often slow, costly, and unpredictable for U.S. businesses. Can you speak to the importance of certainty and speed for businesses when undertaking a federal permitting process?

**ANSWER:**

An unpredictable regulatory environment is one of the greatest barriers to capital investment in all sectors, but especially the energy industry. Arbitrary and changing permitting requirements stand out as the longest deterrents to investment in, and construction of, new infrastructure projects.

The Hoover Dam was built in five years. The Empire State Building took one year and 45 days. The Pentagon, one of the world's largest office buildings, took less than a year and a half. The New Jersey Turnpike needed only four years from inception to completion. Fast forward to 2015, and the results are much different. By contrast, the Cape Wind project has needed over a decade to obtain the necessary permits to build an offshore wind farm. After obtaining federal leases in 2005, it took Shell Corporation seven years to obtain oil and gas exploration permits for the Beaufort Sea. And the Port of Savannah, Georgia spent thirteen years reviewing a potential dredging project.

These are not outlier projects – these projects represent the “rule” and not the “exceptions” when it comes to our federal environmental review and permitting process. According to an April 2014 report issued by the U.S. Government Accountability Office (GAO), when there is information available on review times under the National Environmental Policy Act (NEPA), the process is a slow one with the average preparation time for the environmental impact statements (EISs) finalized in 2012 running 4.6 years. This is the highest average since 1997.

The ever-increasing delays caused by NEPA analysis, while providing no additional environmental protections, is the genesis behind that S. 280, the “Federal Permitting Improvement Act”, a bipartisan bill sponsored by Senators Portman and McCaskill, and strongly supported by the U.S. Chamber. By streamlining the environmental review and permitting process, this legislation would get projects back on track, and allow for job creation and economic growth. This bill – a commonsense approach that builds on successful provisions for environmental review management found in previous transportation legislation – is a critical component to improving and reforming this country's regulatory process. By cutting the “red tape” that has hindered development and maintaining meaningful environmental reviews, S. 280 will allow for the advancement of important projects that could also provide jobs for millions of Americans.

**Questions from Chairman Lisa Murkowski**

**Question 3:** Do you have any information or data on the costs imposed on your constituent businesses as a result of federal permitting? Additionally, do you have any information or data on how much potential GDP is lost as a result of businesses not even being willing to undergo the United States permitting processes and as a result simply investing elsewhere (i.e. what is the opportunity cost of the slow and unpredictable federal permitting process)?

**ANSWER:**

The unpredictable and time-consuming regulatory process is having an increasing impact on the decision of businesses to invest in the U.S., when accumulated across both time and business sectors has had a staggering impact on economic growth.

The delays and inefficiencies in our country's federal environmental review and permitting process are systemic problems that are pervading our country across geographic and industry lines. In the World Bank and International Finance Corporation's most recent "Ease of Doing Business" index, the United States ranks 34th in the world in the category "Dealing with Construction Permits" (in other words, permitting and building projects). If this ranking and the problems with the permitting system persist, real dollars will continue to be lost, along with good-paying jobs.

A ground-breaking 2013 study, "Federal Regulation and Aggregate Economic Growth," conducted by economists John W. Dawson and John J. Seater concluded that the accumulation of federal regulations in the United States between 1949 to 2005 slowed economic growth by an average of 2% annually, resulting in an accumulated reduction in GDP of \$38.8 trillion through 2011<sup>1</sup>.

Another pioneering study on the macro-economic impacts of regulatory burden is, "Regulation and Growth," which quantifies the impacts of regulatory quality and quantity on economic growth. The study found that, moving from the first (worst) quartile to the fourth (best) of business regulations according to the World Bank's Doing Business index translated to a 2.3 % increase in average annual GDP growth.<sup>2</sup>

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<sup>1</sup> John W. Dawson and John J. Seater, "Federal Regulation and Aggregate Economic Growth," *Journal of Economic Growth* 18 (2013): 137-77

<sup>2</sup> Simeon Djankov, Caralee McLiesh, and Rita Maria Ramalho, "Regulation and Growth," *Economics Letters* 92, no. 3 (2006): 400

**Questions from Senator Joe Manchin**

**Question 1** Thank you for supporting S.1293. In your testimony you mention that clean coal technologies have faced regulatory burdens in addition to the obstacles faced by all new technologies. As you may know, this bill is one of five that Senator Heitkamp and I introduced to invest in the future of clean coal. Beyond the framework in S.1293, do you see other regulatory changes that could be made to encourage investment in clean coal?

**ANSWER:**

The most important regulatory change that can be made to encourage additional investment in clean coal would be to return the implementation of the Clean Air Act to Congress' original goal of facilitating advanced technology development and deployment. However, EPA is using the CAA to mandate adoption of costly and unproven technologies that effectively force the closure of existing coal plants and block the construction of new plants. EPA's actions are clearly hindering clean coal development.

There is no better example of the reverse outcome of CAA regulations than EPA's pending new source performance standards (NSPS) for carbon emissions from coal-fired power plants. Rather than encouraging adoption of the latest commercially available coal technologies, EPA's requirement that coal plants can only be built if they are equipped with commercially unproven carbon capture and sequestration (CCS) technologies amounts to an effective ban on new coal-fired power. This is not consistent with the Clean Air Act. Most important, this actually reduces market incentives that companies currently have to invest in and make improvements to carbon capture and sequestration, and could result in the U.S. falling behind other nations in development of this important technology.

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Questions for the Record Submitted to & Answered by Mr. Duane Highley**

**Question 1: Could you please elaborate on the different roles NERC and Reliability Coordinators play? Also, please discuss which is better placed to create Reliability Impact Statements (RIS) and why?**

As defined by NERC, the Reliability Coordinator (RC) is the entity that is the highest level of authority who is responsible for the Reliable Operation of the bulk electric system (BES), has a wide-area view of the BES, and has the operating tools, processes and procedures, including the authority to prevent or mitigate emergency operating situations in both next-day analysis and real-time operations. The RC has the purview that is broad enough to enable the calculation of Interconnection Reliability Operating Limits, which may be based on the operating parameters of transmission systems beyond any Transmission Operator's vision. See page 6 at [http://www.nerc.com/FilingsOrders/us/RuleOfProcedureDL/Appendix\\_5B\\_RegistrationCriteria\\_20150319.pdf](http://www.nerc.com/FilingsOrders/us/RuleOfProcedureDL/Appendix_5B_RegistrationCriteria_20150319.pdf)

The RC maintains the Real-time operating reliability of its RC Area and in coordination with its neighboring RC's wide-area view. The wide-area view includes situational awareness of its neighboring RC Areas. Its scope includes both transmission and balancing operations, and it has the authority to direct other functional entities to take certain actions to ensure that its RC Area operates reliably. See page 30 at [http://www.nerc.com/pa/Stand/Functional%20Model%20Archive%201/Functional\\_Model\\_V5\\_Final\\_2009Dec1.pdf](http://www.nerc.com/pa/Stand/Functional%20Model%20Archive%201/Functional_Model_V5_Final_2009Dec1.pdf)

The 16 entities that fulfill the RC function include ISOs/RTOs, electric utilities, NERC Regional Entities and others. Their primary responsibility is operational for maintaining Bulk-Power System (BPS) reliability across a defined region/footprint.

While RCs can certainly contribute technical information for the development of a RIS, it is not the appropriate entity to be charged with developing the RIS. NERC, in its role as the electric reliability organization (ERO), is the most appropriate entity to develop a RIS. Under Section 215(b)(2) of the Federal Power Act (FPA), the ERO must assure its independence from the users and owners and operators of the bulk-power system. Additionally, under Section 215(g), the ERO, through reliability reports is charged with conducting periodic assessments of the reliability and adequacy of the bulk-power system in North America. In order to fulfill this requirement, NERC issues a variety of assessments that address the reliability of the BPS; seasonal, annual, long-term (10 year) and special assessments. Because of this existing authority and role and the required independence of the ERO, NERC should be the entity responsible for the development of RISs.

In conclusion, RCs are operational entities at a regional level, whereas NERC, in its role as the ERO, focuses at a national level with existing responsibilities for ensuring compliance with its reliability (including cyber and physical security) standards, and also for issuing reliability assessments as already required by Section 215 of the FPA. As a national organization with responsibilities and authorities already in place, NERC is the logical organization for performing Reliability Impact Statements.

**Question 2: Should the Electricity Sub-sector Coordinating Council's (ESCC) role be expanded? If so, how? What do you see as its current strengths and weakness?**

The ESCC's current role and charter are appropriate and useful for the electricity industry. The ESCC is focused on policy and should not have a role in the development of a RIS.

The greatest strength of the ESCC is providing a forum for electricity industry CEOs/GMs to work closely with senior agency leaders on an array of important policy issues. The ESCC has furthered the development and deployment of useful products such as the Cyber Risk Information Sharing Program

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(CRISP) and improved information sharing and incident response coordination with government. The primary weakness of the ESCC is that it is not yet 2 years old in its current form and has not yet fully exploited the benefits that can be had from strong government-industry coordination.

**Question 3: What cumulative impacts have the growing set of overlapping rules such as Mercury and Air Toxic Standards (MATS) and the Clean Power Plan (CPP) had so far on Arkansas Electric Cooperative Corp. and what impact are they likely to have going forward?**

Arkansas Electric Cooperative Corp. (AECC) currently experiences impacts associated with MATS, the Regional Haze Rule (RHR), and the Coal Combustion Residuals (CCR) Rule. Impacts from the environmental rules on AECC can be seen clearly at three co-owned, coal-fired power plants where AECC has a substantial interest (nearly \$800 million): Flint Creek Power Plant (operated by AEP), White Bluff Steam Electric Station (operated by Entergy), and Independence Steam Electric Station (operated by Entergy). Current impacts to AECC through these three plants total \$239.1 million in capital costs. All costs shown below regarding current impacts are for AECC's ownership shares.

**Figure 1 - AECC Committed Capital Costs for MATS Compliance Through 2016 (in millions):**

Unit	Controls	Capital Costs
Flint Creek Unit 1	Activated carbon injection (ACI), baghouse	\$91.9
White Bluff Units 1 & 2	ACI, electrostatic precipitator (ESP) upgrades	\$8.3
Independence Units 1 & 2	ACI, ESP upgrades	\$7.2
	Subtotal	\$107.4

**Figure 2 - AECC Committed Capital Costs for RHR Compliance Through 2016 (in millions):**

Unit	Controls	Capital Costs
Flint Creek Unit 1	Dry scrubber <sup>1</sup>	\$112.2
	Subtotal	\$112.2

**Figure 3 - AECC Committed Capital Costs for CRR Rule Through 2017 (in millions):**

Unit	Controls	Capital Costs
Flint Creek Unit 1	Conversion to dry ash handling <sup>2</sup>	\$19.5
	Subtotal	\$19.5

<sup>1</sup> In discussions with EPA, AEP learned that EPA agreed that a dry scrubber was best available retrofit technology to comply with RHR. Since AEP was required to install a baghouse for MATS compliance at Flint Creek, AEP and AECC agreed that it was prudent to go ahead and construct and install the baghouse and dry scrubber concurrently.

<sup>2</sup> AEP and AECC agreed to begin the conversion to dry ash handling in 2012 in anticipation of the requirements of the CCR Rule.

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Other costs may also be impacted from these rules at the seven AECC-operated fossil-fired plants – all of which contain natural gas- and/or oil-fired units.

Anticipated Impacts

AECC anticipates additional impacts from the following rules: RHR, the Cross-State Air Pollution Rule (CSAPR), the Clean Water Act Section 316(b) Rule (316(b)), and the CPP.

**Figure 4 - AECC Anticipated Additional Impacts from RHR (in millions)<sup>3</sup>:**

Unit	Controls	Capital Costs
White Bluff Units 1 & 2	Dry scrubbers and baghouses	\$350.0
	Subtotal	\$350.0

**Figure 5 - AECC Anticipated Additional Impacts from CSAPR (in millions):**

Unit	Controls	Capital Costs
White Bluff Units 1 & 2	Dry-low NOx burners and supplemental over-fire air	\$11.8
	Subtotal	\$11.8

**Figure 6 - AECC Anticipated Impacts from 316(b) rule (in millions):**

Plant	Controls	Capital Costs
Flint Creek	Modified traveling screens and a fish return system	\$5.0
White Bluff	Modified traveling screens and a fish return system	\$1.4
Independence	Modified traveling screens and a fish return system	\$1.4
	Subtotal	\$7.8

If the State of Arkansas' state implementation plan for the CPP is similar to what EPA proposed, there will be impacts both in increased costs and, more importantly, reduced reliability of service. Most of the cost impact to Arkansas will come from fuel switching from coal-fired generation to natural gas-fired generation. The reliability impacts will be due to an increased reliance on a natural gas infrastructure that is already having problems delivering gas to existing power plants at times of winter peak demand. The precise impact on reliability cannot be calculated with the same precision as cost impacts, but the Southwest Power Pool (SPP) has produced a report that states widespread blackouts and voltage collapse could be possible if the CPP is implemented as proposed in the draft rule. The SPP reliability study can be found at

<sup>3</sup> Based upon the proposed federal implementation plan (FIP) for Arkansas issued by EPA in April 2015. The draft FIP also proposes controls on Independence Units 1 and 2 (which AECC believes should not be subject to the first phase of the RHR). If the FIP is finalized as proposed, then the anticipated impact of RHR to AECC would double.

**U.S. Senate Committee on Energy and Natural Resources  
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Questions for the Record Submitted to & Answered by Mr. Duane Highley**

[http://www.spp.org/publications/2014-10-09\\_SPP%20Comments\\_EPA-HQ-OAR-2013-0602.pdf](http://www.spp.org/publications/2014-10-09_SPP%20Comments_EPA-HQ-OAR-2013-0602.pdf)

EPA's CPP Integrated Planning Model (IPM) shows that the White Bluff and Independence plants would be prematurely shutdown prior to 2020. If so, controls anticipated for those facilities would likely not be installed. However, the costs associated with those controls would be replaced with stranded costs on those two plants plus costs to build new natural gas combined cycle plants and renewable energy facilities to make up for the lost generation.

AECC's analysis shows that the CPP as written would increase AECC's wholesale costs to members 18% in 2025. This is based on EIA's forecast for natural gas prices. If natural gas prices are increased by \$1/MMBTU over the EIA forecast, the result is an increase in wholesale costs of 33% in 2025.

**Question 4: Does the growing labyrinth of federal rules and regulations increase the risk of power outages or negatively impact the reliability of the grid?**

Depending on the content of certain federal rules and regulations, there can be instances where such rules and/or regulations can impact the reliability of the BPS. The industry works closely with legislators and regulators to ensure that they are clear on the potential BPS reliability impacts new or revised rules and regulations can have. As discussed in Question 3, the draft Clean Power Plan may have significant impacts on reliability in Arkansas and across the Midwest, as stated in reports from the Southwest Power Pool and NERC. The link for the SPP report may be found in the response to question 3. The NERC report can be found at

<http://www.nerc.com/pa/RAPA/ra/Reliability%20Assessments%20DL/Potential%20Reliability%20Impacts%20of%20EPA's%20Proposed%20Clean%20Power%20Plan%20-%20Phase%20I.pdf>

**Question 5: Would it be helpful to have NERC or other elements of the Electricity Reliability Organization weigh in on potential federal rules, whatever agency they might come from, in order to ensure the needs of the electric grid are included as part of the conversation?**

It would be helpful to have NERC provide a RIS for potential federal rules that could impact BPS reliability as NERC is in the best position to make this evaluation.

**Question 6: To what extent are major federal regulations a risk right now to the reliability of the bulk-power system? How does this risk compare to other risks that you see for the grid?**

There are numerous major federal regulations that are either being proposed or implemented at any one time. At the current time, the EPA's CPP, if implemented as proposed, could have significant impacts on the reliability of the BPS. In April of this year, NERC issued its report entitled "Potential Reliability Impacts of EPA's Proposed Clean Power Plan Phase I". This report is an excellent example of the analysis NERC can perform on major federal regulations impacting reliability of the BPS. The link for the NERC report can be found in the response to question 4.

Another risk presented by the labyrinth of federal regulations is that of uncertainty. Electric utilities are capital intensive businesses that build infrastructure to remain in service for decades. Many of these rules/regulations are extensively litigated, delaying the date at which utilities can know how to proceed. In the absence of a good long-term view of the future, utilities must react with short-term plans that do not always produce the best long-term solution to improving reliability or keeping power affordable. This uncertainty forces utilities into short-term thinking when they really need to be making decisions not just for today or tomorrow, but decisions that our children and grandchildren will be living with for decades.

**U.S. Senate Committee on Energy and Natural Resources  
June 9, 2015 Hearing: Energy Accountability and Reform Legislation  
Questions for the Record Submitted to Mr. Mark Mills**

**Questions from Chairman Lisa Murkowski**

**Question 1:** The Institute for Energy Research reports that processing time on federal lands was 154 days in 2005 and 307 days in 2012. Of course, this was prior to the most recent federal hydraulic fracturing rule. Juxtaposed, a 2011 state oil and gas summary noted permitting time in Ohio was 14 days, and a similar report from Colorado from 2011 indicated 28 day turn around on permitting. Do you have a sense of the financial burden placed on projects as a result of duplicative permitting? Are those costs flat or do they increase with the scale of a project?

**Mills Answer:**

First, businesses – especially smaller businesses that tend to dominate the hydraulic fracturing industry -- have done and will do their best to avoid the financial burden of onerous and duplicative regulations, and in the case of hydraulic fracturing, this means simply not developing on federal lands. The consequence of waiting for one-half to a full year for a permit for a small business can be fatal for that business. Thus the principle burden, or negative economic consequence, is the impact on the country and consumers in the form of jobs not created and federal tax receipts never generated from production that could have been, but was never put in place.

If the permitting on federal property were roughly as efficient as state land and private land, it is almost certainly the case that, rather than decline, production of oil & gas on federal lands would have increased and tracked the remarkable growth on private lands. That this did not happen means that billions of dollars in federal tax receipts and royalties have been lost – and will continue to be lost under current processes. (A sense of the federal revenue and GDP potential that has been lost from federal lands is implicit in the data in the CBO’s December 2014 “The Economic and Budgetary Effects of Producing Oil and Natural Gas From Shale.”)

Second, with regard to the scale issue: history shows that bigger projects tend to take far longer to emerge from federal bureaucratic processes, thus any scale ‘advantage’ is often non-existent. More importantly with regard to the shale industry, the individual projects themselves are inherently small scale, and often undertaken iteratively since each well or individual project is very small compared traditional mega-scale oil & gas projects. This is a distinct advantage in a commodity-price driven market since projects can be pursued, or halted, quickly as market condition change. But this advantage is destroyed on federal lands with the prospect of facing iterative delays from long approvals for every (relatively small) project decision.

**Question 2:** Do you think an energy storage portfolio standard, such as the one S. 1434 would establish, should be mandated at the federal level at this time? If a federal standard was implemented, what would need to be done to appropriately address the wide ranging geographic variability of the electric grid across the country? If established, what

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other issues would you foresee a federal energy storage standard needing to address in order to be effective?

**Mills Answer:**

I do not think a federal energy storage portfolio standard is appropriate at this time. The technology is not yet mature or cheap enough. This would be the equivalent of requiring in the 1950s a federal standard for, say, automotive airbags (which were not required until 1989 model year). Even though the first airbag was patented in 1953, it took decades before the technology matured and became viable technically and economically.

Despite a very long history for many other applications, batteries for utility-scale electricity storage are still in infancy. The available technologies are neither affordable nor sufficiently reliable (nor in some cases safe enough) for wide-spread utility-grade use.

The technical issues with large-scale electricity storage are not ones of insufficient demand for batteries per se (often an argument for a federal portfolio requirement) since the world already produces tens of billions of dollars of batteries a year. The problem is that batteries are not suitable for utility-level metrics at a national level. (They are useful and deployed in off-grid and specialty situations, from military operations to data centers.) More basic research is needed to advance the underlying technologies in order to achieve the necessary huge reductions in cost and increases in reliability to rise to a national utility grid hardware level of safety and of decades-long operations.

Nonetheless, maintaining the stability and reliability of the electric grid – the key area where batteries could contribute -- has long been a preeminent technology challenge, and continues to grow in complexity and necessity with society's rising dependence on electricity. Society today is more electrified and in greater need of a high-reliability grid. U.S. demand for kilowatt-hours has grown 50% in three decades, while non-transportation energy use has not risen 10%.

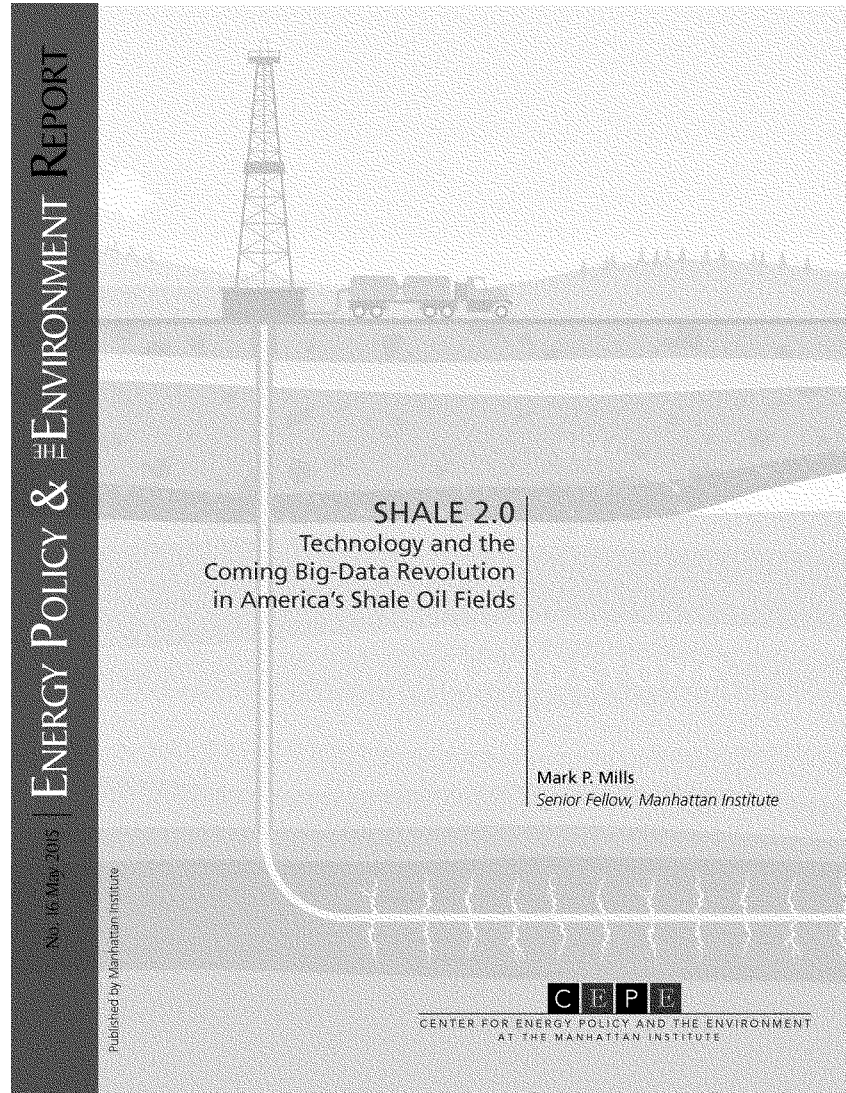
Advanced high-power semiconductor switching and controls, and enterprise-level software, are the most effective and important technology domains where grid reliability can be improved.

If there are domains where federal action may be considered with regard to grid stability, it would be to:

- a) Revisit the underlying definitions of "reliability" and the reporting standards that are in place that were promulgated 50 to 100 years ago when society was far less electrified, and our economy was not dependent on (as it is today) information systems that require continual and near perfect electric supply.
- b) Have a national laboratory evaluate the impact on stability and reliability from the various mandates to force more unreliable and destabilizing wind and solar power onto the public grids and determine at what levels episodic power production

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poses public risk and harm given the overlapping and cascading impacts of state and/or regional grid instabilities (as was the case in the 2003 blackout that impacted numerous states and millions of citizens). Such an evaluation would be useful to determine physics limits for grid stability given today's technologies, identify solutions that are currently feasible and affordable to mitigate instabilities, and finally it would provide 'ammunition' for funding basic research in new technologies, including but not limited to, batteries for future improvements in grid stability.



With petroleum prices down 50 percent over the past year, many analysts and pundits are predicting the end of America's shale oil boom. Recent headlines include: "Oil Price Fall Forces North Dakota to Consider Austerity" (*New York Times*);<sup>1</sup> "Oil Price Drop Hurts Spending on Business Investments" (*Wall Street Journal*);<sup>2</sup> "The American Oil Boom Won't Last Long at \$65 per Barrel" (Bloomberg Business);<sup>3</sup> and "The Shale Oil Revolution Is in Danger" (*Fortune*).<sup>4</sup>

High prices, shale skeptics argue, created a bubble of activity in unsustainably expensive shale fields. As shale-related businesses contract, consolidate, and adjust to the new price regime, a major shale bust is inevitable, they add, with ghost towns littering idle fields from Texas to North Dakota.

It is true that the oil-price collapse was caused by the astonishing, unexpected growth in U.S. shale output, responsible for three-fourths of new global oil supply since 2008. And as lower prices roil operators and investors, the shale skeptics' case may seem vindicated. But their history is false: the shale revolution, "Shale 1.0," was sparked not by high prices—it began when prices were at today's low levels—but by the invention of new technologies. Now, the skeptics' forecasts are likely to be as flawed as their history. This paper explains how continued technological progress, particularly in big-data analytics, has the U.S. shale industry poised for another, longer boom, a "Shale 2.0."

### The End of the Beginning

John Shaw, chair of Harvard's Earth and Planetary Sciences Department, recently observed: "It's fair to say we're not at the end of this [shale] era, we're at the very beginning."<sup>5</sup> He is precisely correct. In recent years, the technology deployed in America's shale fields has advanced more rapidly than in any other segment of the energy industry. Shale 2.0 promises to ultimately yield break-even costs of \$5–\$20 per barrel—in the same range as Saudi Arabia's vaunted low-cost fields.

The shale industry is unlike any other conventional hydrocarbon or alternative energy sector, in that it shares a growth trajectory far more similar to that of Silicon Valley's tech firms. In less than a decade, U.S. shale oil revenues have soared, from nearly zero to more than \$70 billion annually (even after accounting for the recent price plunge). Such growth is 600 percent greater than that experienced by America's heavily subsidized solar industry over the same period.<sup>6</sup>

Shale's spectacular rise is also generating massive quantities of data: the \$600 billion<sup>7</sup> in U.S. shale infrastructure investments and the nearly 2,000 million well-feet drilled have produced hundreds of petabytes of relevant data. This vast, diverse shale data domain—comparable in scale with the global digital health care data domain—remains largely untapped and is ripe to be mined by emerging big-data analytics.

Shale 2.0 will thus be data-driven. It will be centered in the United States. And it will be one in which entrepreneurs, especially those skilled in analytics, will create vast wealth and further disrupt oil geopolitics. The transition to Shale 2.0 will take the following steps:

1. Oil from Shale 1.0 will be sold from the oversupply currently filling up storage tanks.
2. More oil will be unleashed from the surplus of shale wells already drilled but not in production.
3. Companies will "high-grade" shale assets, replacing older techniques with the newest, most productive technologies in the richest parts of the fields.
4. As the shale industry begins to embrace big-data analytics, Shale 2.0 begins.

Further, if the U.S. is to fully reap the economic and geopolitical benefits of Shale 2.0, Congress and the administration should:

1. Remove the old, no longer relevant, rules prohibiting American companies from selling crude oil overseas.
2. Remove constraints, established by the 1920 Merchant Marine Act, on transporting domestic hydrocarbons by ship.
3. Avoid inflicting further regulatory hurdles on an already heavily regulated industry.
4. Open up and accelerate access to exploration and production on federally controlled lands.

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## ABOUT THE AUTHOR

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**MARK P. MILLS** is a senior fellow at the Manhattan Institute, CEO of the Digital Power Group, a tech-centric capital advisory group, and Faculty Fellow at Northwestern's McCormick School of Engineering and Applied Science. He is also a member of the advisory board of Notre Dame's Reilly Center for Science, Technology, and Values. Earlier, he cofounded and was chief tech strategist of Digital Power Capital, a boutique venture fund, and served as chairman and CTO of ICx Technologies, helping take it public in a 2007 IPO.

Mills is a contributor to *Forbes.com* and is coauthor of *The Bottomless Well: The Twilight of Fuel, the Virtue of Waste, and Why We Will Never Run Out of Energy* (Basic Books, 2005), which rose to #1 on Amazon's science and math rankings. His articles have been published in various popular outlets, including the *Wall Street Journal* and *New York Times Magazine*. Mills is also a frequent guest on CNN, FOX, NBC, and PBS, and has appeared on *The Daily Show with Jon Stewart*.

Earlier, Mills was a technology adviser for Bank of America Securities, and a coauthor of a successful energy-tech investment newsletter, the *Huber-Mills Digital Power Report*. He has testified before Congress and has briefed many state public service commissions and legislators. Mills served in the White House Science Office under President Reagan, and subsequently provided science and technology policy counsel to numerous private sector firms, the Department of Energy, and U.S. research laboratories.

Early in his career, Mills was an experimental physicist and development engineer, working at Bell Northern Research (Canada's Bell Labs) and the RCA David Sarnoff Research Center on microprocessors, fiber optics, missile guidance, nuclear energy, and non-proliferation. He earned several patents for his work in these fields. Mills holds a degree in physics from Queen's University, Canada.

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## SHALE 2.0

### TECHNOLOGY AND THE COMING BIG-DATA REVOLUTION IN AMERICA'S SHALE OIL FIELDS

Mark P. Mills

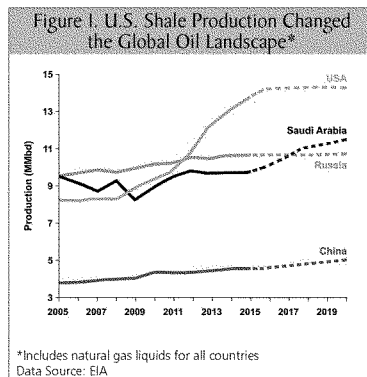
#### INTRODUCTION

**I**n 2014, America's oil production grew by 1.2 million barrels per day (MMbd)—the greatest single-year increase since the oil age began more than a century ago.<sup>8</sup> Over the past half-dozen years, U.S. oil output rose by a total of 4 MMbd, with most of the growth in the past three years (Figure 1).

The invention by American entrepreneurs of a new way to manufacture oil from shale, at volumes and prices that have moved global markets, has been the biggest disruption to the energy landscape in 30 years. If the U.S. shale industry alone were a country, it would rank as the world's fifth-largest hydrocarbon producer.

The last time so much oil was added in such a short period to world markets was in 1986, when Saudi Arabia—which then enjoyed far greater spare capacity than it now does<sup>9</sup>—made a strategic decision to increase output by 3 MMbd. That flood of oil drove global prices down to \$20 per barrel (2014 USD). This time, the plunge in prices was caused not by a foreign oil monarchy but by thousands of American entrepreneurs drilling on state and private lands.

The new American oil landscape is not the result of government programs or incentives; in recent years, the federal government's role in the oil business has been neutral, at best, and oppositional, at worst. America's new oil landscape is also not the result of recent discoveries: the vast hydrocarbon shale fields were discovered and mapped a century ago. Instead, the recent disruption to the global supply-demand balance is the result of the maturation and



deployment of new technologies that enabled the economic production of oil from shale.

Although America's shale industry is new, its scale is such that it is now a permanent fixture of the U.S. techno-industrial base. The U.S. shale ecosystem has exploded—from essentially nonexistent, just over a decade ago—to a \$300 billion component of GDP, featuring thousands of companies. The U.S. shale ecosystem is also a distinctly different industry, in structure, operation, and technique, compared with its cousin, the conventional hydrocarbon industry.

But the price collapse has started to affect U.S. shale oil production. In January 2015, output trended down, by 0.12 MMbbl, compared with the previous month, for the first time since 2010. Lower prices mean that certain shale companies with weak financials will end up being acquired, while others will go bust.<sup>10</sup>

Over the past six months, the tone of media coverage of America's shale industry has shifted, from awe to alarm and pessimism. Recent headlines include: "Oil Price Fall Forces North Dakota to Consider Austerity" (*New York Times*);<sup>11</sup> "Oil Price Drop Hurts Spending on Business Investments" (*Wall Street Journal*);<sup>12</sup> "The American Oil Boom Won't Last Long at

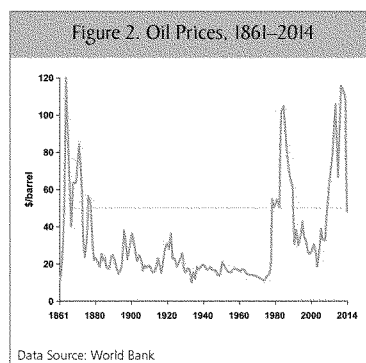
\$65 per Barrel" (Bloomberg Business);<sup>13</sup> "The Shale Oil Revolution Is in Danger" (*Fortune*);<sup>14</sup> and "United States Will Not Become the 'New Saudi Arabia' of Global Energy" (*Telegraph*).<sup>15</sup>

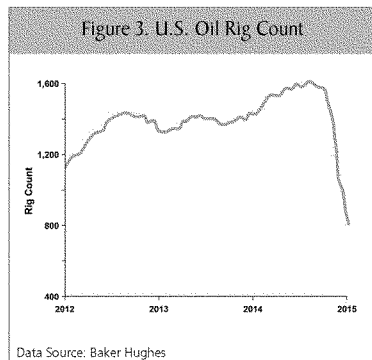
What if—absent exogenous events such as major wars and short-term price oscillations—oil never again sells for much more than \$60 per barrel for decades? This is a real possibility in a world consistently fully or episodically oversupplied with oil, especially if U.S. shale output continues. But can America's shale industry survive?

In fact, in the roughly 150-year history of oil prices, there have been just three short periods where oil sold for more than (inflation-adjusted) \$50 per barrel (Figure 2). Yet over the same period, technological progress has enabled world oil production to soar by 6,500 percent.

But the recent plunge in oil prices has caused a precipitous drop in the use of U.S. drilling rigs (Figure 3). With the rig count the easiest, most widely publicized, measure of activity in the oil and gas industry, numerous media reports and pundits now argue that this is an ominous indicator of future oil output.

But the rig count alone is not a reliable indicator of what the future holds. The shale business is as





different from its predecessor, conventional oil and gas, as the smartphone ecosystem is different from telephony. And just as the smartphone ecosystem is new and rapidly evolving, so, too, is the industrial ecosystem of shale hydrocarbons.

In the end, shale technology, as with any technology, is only useful if it can deliver the goods at ever-decreasing cost. Thus the central questions for analysts and investors about the future of America's young shale industry are: Where is the technology going? Can more oil be unlocked at lower costs and with fewer rigs?<sup>16</sup>

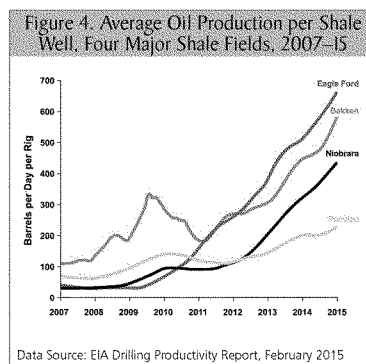
#### I. TECHNOLOGY: THE EPICENTER OF A NEW INDUSTRY

The price and availability of oil (and natural gas) are determined by three interlocking variables: politics, money, and technology. Hydrocarbons have existed in enormous quantities for millennia across the planet. Governments control land access and business freedoms. Access to capital and the nature of fiscal policy are also critical determinants of commerce, especially for capital-intensive industries. But were it not for technology, oil and natural gas would not flow, and the associated growth that these resources fuel would not materialize.

While the conventional and so-called unconventional (i.e., shale) oil industries display clear similarities in basic mechanics and operations—drills, pipes, and pumps—most of the conventional equipment, methods, and materials were not designed or optimized for the new techniques and challenges needed in shale. By innovatively applying old and new technologies, shale operators propelled a stunningly fast gain in the productivity of shale rigs (Figure 4), with costs per rig stable or declining.

Shale companies now produce more oil with two rigs than they did just a few years ago with three rigs, sometimes even spending less overall.<sup>17</sup> At \$55 per barrel, at least one of the big players in the Texas Eagle Ford shale reports a 70 percent financial rate of return.<sup>18</sup> If world prices rise slightly, to \$65 per barrel, some of the more efficient shale oil operators today would enjoy a higher rate of return than when oil stood at \$95 per barrel in 2012.<sup>19</sup>

Extracting hydrocarbons from shale is fundamentally different from extracting hydrocarbons from conventional wells. The former requires two distinct steps: (1) after drilling down vertically, 5,000–10,000 feet, to reach a shale formation, operators drill long, 5,000–10,000-foot horizontal wells; (2) hydraulic pressure is then used to fracture the rock (“frack”), releasing oil and gas.



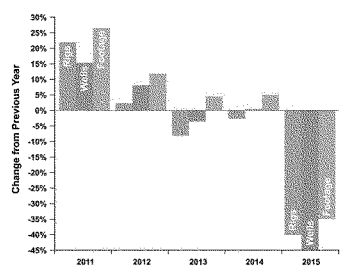
The time it takes to drill wells is a critical component of cost. On this front, the speed of improvement has been remarkable: with virtually no increase in capital costs (in some cases, costs are down),<sup>20</sup> the three key measures of drilling—time to drill, wells per rig, and total distance drilled—have improved by 50–150 percent in less than five years (Figure 5).

The number of feet of shale rock tapped is the first-order determinant of how much oil and gas are produced. Here, the net result of technology and operational innovation is clearly visible: total footage drilled grows faster than the growth in rig count (Figure 6). The inverse is true as well: a forecasted 40 percent drop in rig count will have a more modest (35 percent) decline in total new footage drilled.

The “walking rig” is one technological advance that has contributed greatly to gains in rig productivity. Rather than drill a single well from a well-pad, a walking rig can move around the pad, drilling multiple wells (sometimes dozens) (Figure 7).<sup>21</sup> Since 2006, the use of such so-called pad drilling has grown dramatically, from a few percent to over 50 percent of new wells, with the potential to rise higher.<sup>22</sup>

The use of older, less efficient “Generation 1” (Gen 1) and “Generation 2” (Gen 2) rigs began declining

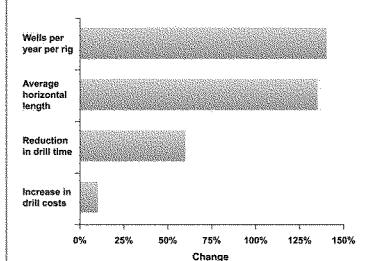
Figure 6. Technology Causes Rig Count to Disconnect from Well-Feet Drilled



Data Source: Drilling Contractor; and Spears & Associates, “Drilling Market Outlook”

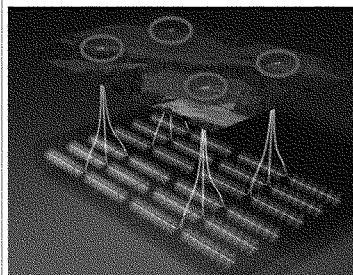
in 2011, long before the late 2014 overall rig falloff. (As of the first quarter of 2015, the number of Gen 1 rigs was down by 60 percent from peak use.) During 2011 to late 2014, as Gen 1 and Gen 2 rig use declined, the number of newer, faster, more powerful “Generation 3” (Gen 3) rigs rose by 60 percent. Even now, the number of Gen 3 rigs is down by only 25 percent, compared with the deeper overall plunge in Gen 1 and Gen 2 rigs (Figure 8).<sup>23</sup>

Figure 5. Shale Rig Drilling Efficacy, Typical Four-Year Changes

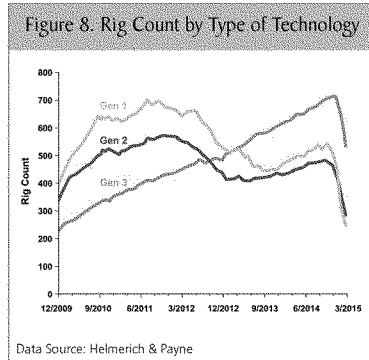


Data Source: Baker Hughes; and Spears & Associates

Figure 7. Drilling Multiple Wells from a Walking Rig



Source: EIA



Once a well is drilled and 1–2 miles of horizontal pipe placed in the shale, the key factor that determines the well's value is the effectiveness of the completion step (i.e., when hydrocarbon-bearing rock is stimulated to produce oil and gas). Spending on completion typically accounts for 50–60 percent of the total development cost of shale wells.<sup>24</sup> Here, too, productivity gains have been remarkable, with a 400 percent rise in output during a well's first month of operation; even two to three years into production, technological advances have boosted output by 200 percent in just a few years.<sup>25</sup>

While all oil and gas wells deplete as they produce, shale wells do so at a faster rate than conventional wells. Half of a shale well's lifetime output typically occurs in the first year and 75 percent during its first three years—investors thus enjoy a very fast return on capital. But a well's cumulative production continues to rise over time. In a typical shale field, because shale wells are so much cheaper and quicker to drill, multiple wells are drilled, yielding steadily rising cumulative production (Figure 9 and Figure 10).

Gains in rig productivity also continue to emerge, thanks to growing operational experience, the application of higher pressures, more effective chemicals, better spacing of multiple wells, more efficient

motors, and better cementing and perforating of pipe.<sup>26</sup> Operators, for example, increasingly use more powerful pumps to move the water-sand mixture faster and at higher pressures, greatly increasing the amount of sand used to keep shale cracks open (Figure 11).

Sand used per well has risen, from 5 million to 15 million pounds, on average; the additional sand adds 2 percent to completion costs but boosts output by 40 percent.<sup>27</sup> A typical shale well, which involves a

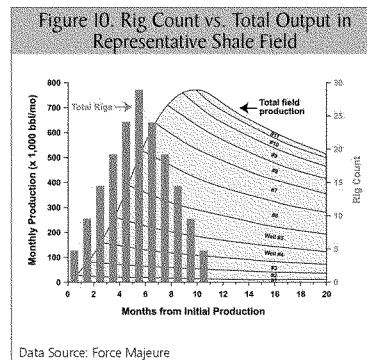
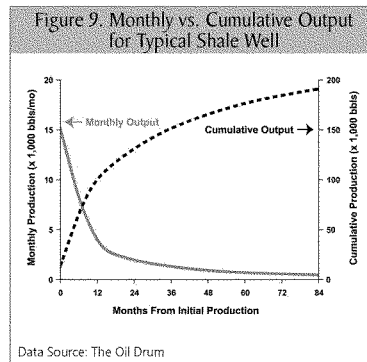
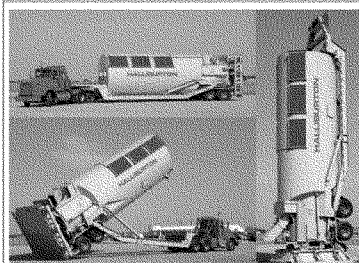


Figure 11. Sand Delivery and Logistics\*



\*Custom-designed truck converts into sand silo.  
Source: Halliburton

bewildering array of pipes, pumps, motors, valves, gauges, engines, tanks, trucks, and people—most onsite only temporarily—truly represents “a study in mechanical excellence.”<sup>28</sup>

## II. RIG COUNT VS. OUTPUT

With rig counts down but rig productivity soaring, what next? The consequences of a price and rig-count collapse have played out before. The shale revolution, in fact, began with the extraction of natural gas in the Texas Barnett shale. In 2008, after natural gas from this abundant new source flooded the U.S. market, gas prices plunged threefold. The gas rig count fell; but gas production kept rising and has been growing ever since.<sup>29</sup> Figure 12 illustrates the effect of radical gains in rig productivity for shale gas.<sup>30</sup>

As for oil, the impact of rising shale-rig productivity was visible before the current, widely publicized drop in rig count. A sixfold rise in shale oil rigs, beginning in 2006, yielded only modest output growth. Then, starting in about 2012, the growth in rigs slowed and nearly stopped, but output soared (Figure 13). Also noteworthy is the fact that when, in 2006, entrepreneurs first began profitably deploying then-nascent shale

technologies, oil sold for less than \$50 per barrel; when production first took off, the price was still below \$60 per barrel.

## III. TECHNOLOGY HIGH-GRADING, THEN SHALE 2.0

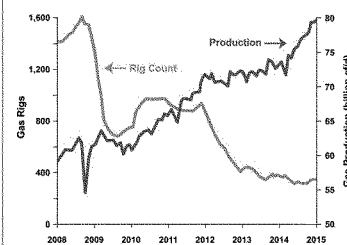
Four developments will likely determine the future supply of shale oil:

- Oil will be sold from the oversupply currently placed in storage tanks.
- Operators will more efficiently unleash oil from wells drilled but not completed.
- Operators will swiftly adopt the best new technologies and use them in the best parts of the shale (“high-grade assets”).
- Operators will embrace big-data analytics, unleashing Shale 2.0—greater production at lower cost.

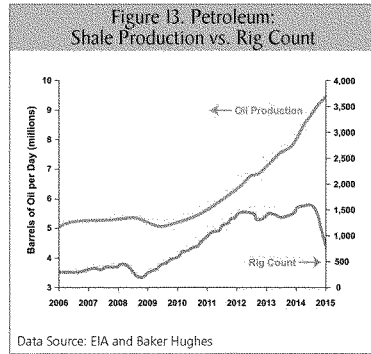
## Peak Storage

The total quantity of American petroleum now parked in huge steel tanks is at levels not seen for 80 years. A decade ago, no one thought that the U.S. would experience challenges associated with “peak storage,” rather than “peak oil.” In February 2015, one massive oil

Figure 12. Natural Gas: Fewer Rigs, Far More Output



Data Source: EIA and Baker Hughes



storage farm, in Cushing, Oklahoma, was 75 percent full; in February 2014, it was 48 percent full.<sup>31</sup>

The current oil storage glut is mainly a consequence of two factors: inadequate infrastructure and misguided law. American oil transport infrastructure, both pipelines and railroads, is still catching up to the recent, radical increase in domestic production. But even if the necessary infrastructure existed, half-century-old federal rules prohibit American companies from selling crude oil internationally—despite the fact that it is legal to sell refined oil (gasoline, diesel, aviation fuel) overseas. This outdated statute not only inhibits private investment in export infrastructure; it also violates the basic market principles that guide U.S. export policy for nearly all other products.<sup>32</sup>

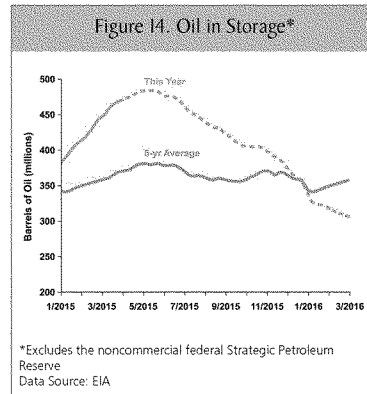
Still, it is unlikely that this law will soon be replaced or that new export infrastructure will be built overnight. In the upcoming 2015 summer driving season, however, oil currently held in storage will likely begin to be sold, as production slows slightly and domestic demand grows and finally surpasses pre-2008 levels.<sup>33</sup> Far from America entering a “post-oil-economy,” U.S. oil demand, as the EIA’s forecast shows, was down in recent years largely because of slow economic

growth (and, accordingly, lower incomes). If oil in storage returns to recent average storage levels (Figure 14), nearly a million barrels of oil per day could enter the market.

### The Fracking Backlog

Even more oil supply is now, de facto, being stored underground. As noted, production begins with the distinct second stage of well construction. Once a shale site is mapped and long horizontal wells completed, operators can delay the expensive step of fracking. Since the latter constitutes 50–60 percent of total costs, significant spending can be deferred with no loss of the core asset. The oil is simply left stored, in situ, until markets and prices make retrieval more attractive. When such sites are eventually stimulated, operators will be able to harness technological advancements that have occurred in the interim.

The U.S. currently has roughly 3,000 drilled wells awaiting completion—likely rising by the end of 2015, to more than 5,000.<sup>34</sup> Given current market realities, many—if not most—such wells will remain idle.<sup>35</sup> The amount of ready-to-flow oil stored in those 5,000 wells is at least four times greater than



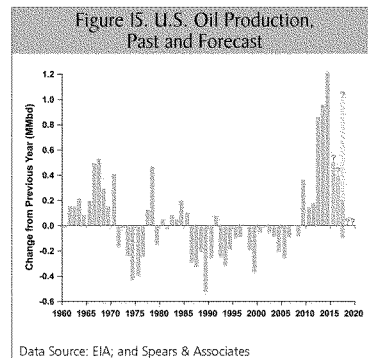
all the oil stored in steel tanks around the country. Because it takes only a few months to complete a well, such wells, once completed, could swiftly add 2–3 MMbd to U.S. supply.

#### Embracing Technology

As operators gained experience during the first shale boom, Shale 1.0, a popular strategy involved duplicating every aspect of the development of a successful well on successive wells within the same field. This repetitive, “factory drilling” strategy made sense during the industry’s expansion because it eliminated the risks associated with continued experimentation. And when factory drilling in new parts of the same field yielded poorer results, due to variations in shale geology, the (coincidental) surge in oil prices reduced the incentive to innovate. (When oil hovered at \$100/barrel, a factory-drilled well that was 30–50 percent less productive than previous factory-drilled wells was still a big money-maker.)

In the new low-price oil environment, however, operators will increasingly—and soon, exclusively—adopt a high-grading strategy that the industry’s top performers have pursued for years. High-grading calls for operators to use analysis not only to modify techniques for each well but also to use the best tools and techniques in only the best parts of the shale. One implication of high-grading is that conventional forecasts for future supply likely represent underestimates because they are based on historical averages that incorporate the previous proliferation of low-performing wells drilled during the price boom.<sup>36</sup>

The effect of so many wells and acres subjected to high-grading will be to maintain output even with declining rig count and to add substantial uncertainty to near-term supply forecasts (Figure 15). Even in the aftermath of the recent oil-price collapse, as the industry cuts spending, consolidates, and cools, output from U.S. shale wells will keep rising—though more slowly than in recent years. If prices edge up, they will stimulate even more production.<sup>37</sup>



#### IV. BIG-DATA ANALYTICS WILL MAKE SHALE OIL CHEAPER

Incremental and dramatic improvements will continue in all aspects of the many technologies used in shale production: logistics, planning, seismic imaging, well-spacing, fluid and sand handling, chemistry, drilling speed, pumping efficiency, instrumentation, sensors, and high-power lasers.<sup>38</sup> Shale fields will increasingly be developed using advanced automation, mobile computing, robotics, and industrial drones. At present, barely 10 percent of projects use fully automated drilling and pressure-control systems, for example.<sup>39</sup>

Largely because of the tremendous scale of investment already in place, there is every reason to believe that such improvements—which portend greater and cheaper American oil production—will collectively be at least as significant in the coming several years as have innovations in the recent past.<sup>40</sup>

But the single biggest disruption now coming to the shale industry, one that will define the emergence of Shale 2.0, comes not from individual technologies or digital connectivity but from the use of big data for radically better asset optimization and operations.

In every sector of the U.S. economy, the availability and collection of data from machines, services, and business operations are growing at an astonishing rate. Still, a large amount of the data remains disparate and disordered. The use of big-data analytics offers nearly all industries the potential for unprecedented insight, efficiency, and economic value. America's shale industry is similar to many other large, complex businesses—such as aviation, agriculture, manufacturing, entertainment, and health care—in the scale and diversity of its operations. What distinguishes shale is its unique combination of youth, the diversity and scale of data associated with its operations, and the variety of environments in which operations occur.

While such challenges could delay the industry's embrace of big-data analytics, the opportunity in oil and gas has not escaped the attention of IT firms such as IBM, Microsoft, Accenture, Cisco, and SAP, as well as various hydrocarbon-service companies. Conferences and books dedicated to the new specialty are rapidly appearing, including a new professional society focused on data-driven petroleum analytics.<sup>41</sup> The CEO of EOG, a shale firm founded in 1999 and now with \$18 billion in revenue, promotes his company's aggressive, proprietary use of big data.<sup>42</sup> ConocoPhillips, founded in the nineteenth century and now with revenues of \$55 billion, was ranked Number Two on InformationWeek's 2013 list of the 500 top IT-using firms.<sup>43</sup>

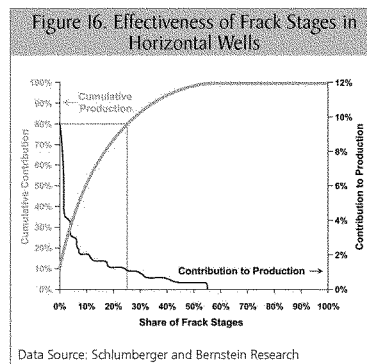
Big-data analytics can already optimize the subsurface mapping of the best drilling locations; indicate how and where to steer the drill bit; determine, section by section, the best way to stimulate the shale; and ensure precise truck and rail operations. Mobile computing, using app-centric analytics, can increase uptime, reduce maintenance, improve workforce productivity, reduce errors and rework, and enable low-cost compliance.

Though many companies are keeping their big-data projects proprietary, some information is publicly available. Halliburton reports that its analytic tools achieved a 40 percent reduction in the cost of delivering a barrel of oil.<sup>44</sup> Baker Hughes says that analytics have helped it double output in older wells.<sup>45</sup>

Schlumberger announced a 50 percent gain in production, thanks to its use of analytics.<sup>46</sup> ConocoPhillips combined the latest sensors (which extract data by the minute rather than daily), wireless networks (often requiring building dedicated remote cell and Wi-Fi towers), and big-data analytics to boost output by 30 percent in existing wells.<sup>47</sup>

Given such results and current low oil prices, it is little wonder that Baker Hughes, for instance, received more inquiries about its big-data analytics in the first quarter of 2015 than in the previous two years combined.<sup>48</sup> This confluence of technological maturity and market opportunity is ideally aligned for the upcoming pivot to data-centric Shale 2.0. Big-data analytics has also arrived at a time when demand and supply are well aligned: global demand for oil continues to rise, while America's shale fields are generating vast new supply.

Perhaps the most portentous indicator of the near-term opportunity for big-data analytics to yield more oil at lower cost is the surprisingly ineffective current mechanisms for stimulating shale to yield oil or gas (Figure 16). At present, each long horizontal well is typically stimulated in 24–36 stages, with, on average, only one-fourth to one-third of those stages productive.<sup>49</sup> At present, in other words, about 20 percent of stages generate 80 percent of output.



The current state of stimulation technology means that, on average, at least 300–400 percent more oil is not extracted. Bringing analytics to bear on the complexities of shale geology, geophysics, stimulation, and operations to optimize the production process would potentially double the number of effective stages—thereby doubling output per well and cutting the cost of oil in half.

At present, break-even costs across U.S. shale fields range from \$10 per barrel–\$55 per barrel.<sup>50</sup> Delivering North Dakota oil to Gulf Coast refineries and ports by rail can add another \$15 per barrel. Using analytics to double output, thus cutting oil costs in half, means that shale break-even costs would drop to \$5 per barrel–\$25 per barrel. America's shale fields would then be competitive in volume *and* in price with Saudi Arabia's vaunted ultralow-cost oil fields.

#### V. \$100 OIL SET THE STAGE FOR SHALE 2.0

That world oil prices reached \$100 per barrel in tandem with the expansion of the shale revolution accelerated the appetite of financial markets to invest in shale wells. The result: extraordinarily rapid expansion of the industry's physical and knowledge assets.

One indicator of just how much shale-related data have been generated is found in the hundreds of billions of dollars invested in data-generating hardware, infrastructure, and equipment. Another indicator of the scale of this new data set is the total distance of horizontal well-feet drilled. Ten years ago, only a handful of horizontal wells in shale formations existed. Two billion feet—enough to circle the earth more than 25 times—have since been drilled horizontally (Figure 17), in hundreds of thousands of wells in U.S. shale fields.<sup>51</sup>

The quantity of shale-related data generated can reach 1 megabyte per foot drilled;<sup>52</sup> the total quantity of data generated per well can vary, from 1 to 15 terabytes.<sup>53</sup> With the proliferation of ever-better sensors and the continued decline in the cost of accessing, transmitting, and storing bytes, such data flows will certainly expand. Data are now collected for all aboveground

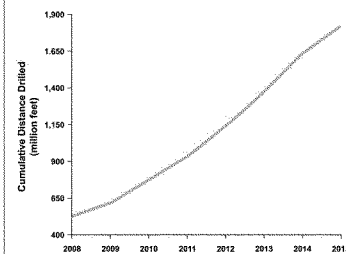
equipment, too. For example, a total of about 15 million horsepower in powerful diesel-driven pressure pumps are used to stimulate shale.<sup>54</sup> Few industries deploy so much engine power—it is more horsepower than used by FedEx's global fleet of trucks and rivals that used by Delta's entire aircraft fleet.<sup>55</sup>

In general, data are associated with and often collected for every foot of well drilled and operated, including: for the seismic subsurface maps; for the sensors used to analyze the earth during drilling; for the trains and trucks carrying sand and equipment to the site; for the pumps and flow meters pushing sand and water underground; for the hardware and software moving the product to market; and for safety and environmental compliance-related equipment. Spread across disconnected operational silos and different companies, there is likely (no one yet tracks it) on the order of 600 petabytes of data—there are, for comparison, about 500 petabytes of global digital health care data<sup>56</sup>—associated with finding, stimulating, extracting, and moving shale hydrocarbons.<sup>57</sup>

#### VI. BIG DATA IS THE NEW OIL

"Data is the new oil!" became a popular metaphor in the big-data analytics community.<sup>58</sup> Big-data analytics, it turns out, can also unlock oil itself.

Figure 17. Cumulative Distance Drilled in Horizontal Shale Wells\*



\*Excludes vertical distances drilled for all classes of wells  
Data Source: Spears & Associates

In 2011, Bill Gates predicted as much: “The one thing that is different today [in energy] is software, which changes the game.”<sup>59</sup> Continuous innovation in materials sciences, basic engineering, and analytics is having a greater impact on oil and gas cost-effectiveness than on solar, wind, and battery technology (Figure 18), despite the fact that the latter are popularly viewed as epicenters of energy innovation.

In terms of energy output, per unit of capital cost, for energy-producing hardware, shale technology has improved by some 500 percent during the past five years;<sup>60</sup> wind turbines, solar cells, and lithium batteries have improved as well, but far less spectacularly.<sup>61</sup> Further, efficiency gains in alternative-energy technologies are slowing,<sup>62</sup> while shale technology shows few signs of a slowdown. Such trends refute the belief that tech progress is bypassing hydrocarbons.

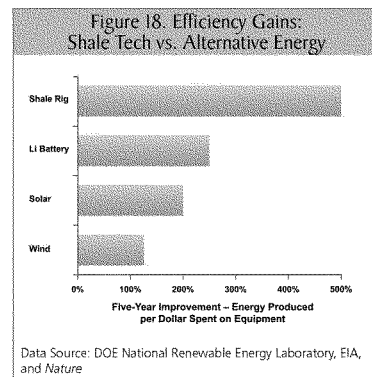
The potential of big data is making analytics among the fastest-growing job categories in all industries, including hydrocarbons.<sup>63</sup> This will make it difficult for oil and gas firms to recruit such talent,<sup>64</sup> forcing shale firms to increasingly purchase services and tools directly from analytic-centric tech firms (such as Teradata, Splunk, Qlik, Palantir, and TIB-

CO Spotfire) and from hydrocarbon-centric tech companies (including FracKnowledge, NEOS Geo-Solutions, Blade Energy Partners, and Austin-based Ayata). All will seek to mine the rich, often untapped data available in the thousands of connected sectors that constitute America’s shale industry.

Physical scale and enormous capital resources are critical for firms engaged in conventional hydrocarbons. Shale fields, on the other hand, are friendlier to start-ups and other small companies because of sharply lower capital costs and scale; ease of access to domestic (often private) land; and domestic infrastructure. Such advantages are now magnified by better sensors, communications, and inexpensive cloud-based supercomputing—a boon for the thousands of small and midsize American oil and gas companies that pioneered the Shale 1.0 revolution.

With data-driven productivity and automation leading Shale 2.0, we will see more jobs, not fewer. During Shale 1.0, as productivity soared, the number of workers per rig remained roughly constant, but the total number of people employed, directly and indirectly, in the shale ecosystem expanded. Indeed, in the six years following the Great Recession, America’s shale sector led the country in job creation.<sup>65</sup>

As the industry adjusts to lower prices, slowing investment, and rising consolidation, however, layoffs are inevitable before the next expansion can begin. U.S. shale oil and gas is now, after software, the largest target for private-equity buy-outs.<sup>66</sup> Much of this activity is below the public radar, though private-equity titans Blackstone and Carlyle have made headlines by launching multi-billion-dollar funds dedicated to the sector.<sup>67</sup> The components are thus in place for a quick return—likely within a year or two—to the production growth rate of 2014. Should such a development materialize, the U.S. will roil global energy geopolitics yet again; but this time, there will be little competition from other countries, which have largely abandoned their own shale projects for lack of expertise and infrastructure.<sup>68</sup>



## VII. THE STRUCTURE OF TECHNOLOGICAL REVOLUTIONS

America's young shale industry is following a well-established historical pattern for technological revolutions. When innovation spawns entirely new industries, from the car to the cell phone, the scale and impact of the technology, as well as the associated businesses deploying and using it, expand in two broad phases. The first involves an initial boom, when new products and production ramp up and experience is gained by trial and error. The second, significantly larger, boom arrives later—sometimes preceded by a bust—spurred by experience and continued innovation.

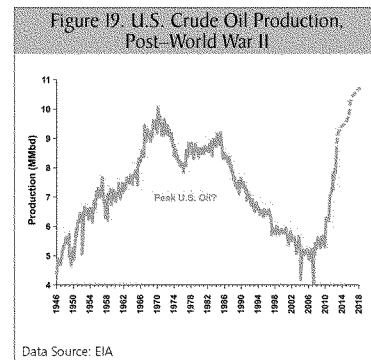
The automobile era progressed from phase one in 1914, year of the first mass-produced cars, to phase two in the early 1950s, with the dominance of low-cost auto-making and associated infrastructure (national highways). The computer industry went from phase one in 1955, year of the first commercially deployed mainframes, to phase two in 1984, year of the first mass-produced personal computers. The cell phone advanced from phase one in 1990, with the first affordable phones, to phase two in 2007, with the introduction of smartphones and associated high-speed infrastructure.

The history of conventional oil started in 1858, with Edwin Drake's 69-foot well in Titusville, Pennsylvania. Drake used a steam engine and salt-well drill, but his breakthrough involved placing iron pipes into the ground to keep the well bore open and drilling inside the pipes. The innovation was quickly copied, and an industry was born. Yet early drills could only make several feet of progress per day; so wells were shallow, and oil remained expensive. Phase two for conventional oil began in 1909 in Goose Creek, Texas, when Howard Hughes, Sr. demonstrated his revolutionary drill bit that could drill faster and deeper. The new technology launched the era of wildcatters, oil riches, and copiously cheap fuel—and with it, the start of a global transportation revolution.

Unconventional oil is set to follow a similar trajectory. Phase one started in 1991 in Texas's Barnett shale, when George Mitchell combined a subsurface seismic map, horizontal drilling, and hydraulic fracturing to stimulate rock to release hydrocarbons. In the process, Mitchell Energy (now part of Devon Energy) unleashed a shale boom similar in scale and character to the first oil era, and similar to previous industrial cycles. Twenty-five years later, history now awaits the name of the person or company that will be identified with launching Shale 2.0. In the meantime, shale's position as an enduring and soon-to-be \$100 billion/year U.S. industry is secure (Figure 19).

## CONCLUSION

In recent decades, developed nations have spent hundreds of billions of government dollars trying, and failing, to invent a cost-effective replacement for petroleum. Yet without taxpayer largesse, American entrepreneurs invented a new method to extract astounding quantities of oil from rock, upending the global hydrocarbon trade in the process. In a world where oil still powers 95 percent of air and ground miles and will remain dominant for decades, this represents a very positive development.<sup>69</sup>



Compared with 1986—the last time the world was oversupplied with oil—there are now 2 billion more people living on earth, the world economy is \$30 trillion bigger, and 30 million more barrels of oil are consumed daily.<sup>70</sup> The current 33 billion-barrel annual global appetite for crude will undoubtedly rise in coming decades. Considering that fluctuations in supply of 1–2 MMbd can swing global oil prices,<sup>71</sup> the infusion of 4 MMbd from U.S. shale did to petroleum prices precisely what would be expected in cyclical markets with huge underlying productive capacity.

While sellers naturally prefer higher prices, the dramatic recent oil-price slump has set the stage for America's upcoming Shale 2.0 revolution. Given petroleum's continued economic and geopolitical importance, what policies should the U.S. pursue to maximize the benefits that it secures from Shale 2.0?

Legislators have yet to recognize and incorporate into law the far-reaching implications of how the energy landscape has fundamentally changed. U.S. energy law remains anchored in the decades-old paradigm of insatiable U.S. demand and resource shortages. The modern reality has instead utterly reversed, with de minimis growth in U.S. oil demand, exploding global demand, and an ascendant second era of American petroleum production. Congress should thus undertake a comprehensive review and rewrite of the 1974 Energy Policy & Conservation Act, which enshrined the now-antiquated paradigm. In the meantime, Congress can:

1. Remove counterproductive rules prohibiting U.S. companies from selling crude oil overseas, as well as rules inhibiting similar shale gas sales.
2. Remove the 1920 Merchant Marine Act's constraints on transporting domestic hydrocarbons by ship. This will require finding a more cost-effective solution to the national security interests associated with subsidizing a domestic shipbuilding industry.
3. Avoid inflicting further regulatory burdens on the already heavily regulated shale industry. Ominously, the U.S. Bureau of Land Management has announced plans for new standards that will affect about one-fifth of shale-based hydrocarbon production.<sup>72</sup>
4. Open up and accelerate access to exploration and production on federally controlled lands. This would boost domestic economic opportunities and send a powerful message about America's oil export ambitions—rivaling, in inverse, the announcement of the 1973 Arab oil embargo.

Further, while Congress works to unshackle a shale industry adjusting to lower prices, hydrocarbon firms might consider launching a "Shale Ready Vets" program—a private alternative to President Obama's new Solar Ready Vets<sup>73</sup>—offering instruction in vital, high-paying shale-related jobs, from machinery and supply-chain logistics to big-data analytics. At a time of growing scarcity for skilled labor in such fields, such a program would help prepare the U.S. workforce for the emergence of Shale 2.0.

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## Energy Policy & the Environment Report

No. 15 February 2015

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# BASIC RESEARCH AND THE INNOVATION FRONTIER

## Decentralizing Federal Support and Stimulating Market Solutions

**Mark P. Mills**, *Senior Fellow*, Manhattan Institute

### Executive Summary

In the modern era, basic scientific research—a “public good,” often involving the pursuit of knowledge for its own sake—has been foundational to innovation and thus, to economic growth and social progress. Fostering yet more open-ended research will give rise to the fundamental breakthroughs needed to revolutionize everything from health care and security to energy and the environment.

But overall, U.S. leadership in basic research is slipping. Funding support, in both absolute and relative terms, has been slowing for decades; in the last few years, this decline has accelerated. The erosion of support for American scientists on the innovation frontier will create a damaging deficit of innovation in the future. And it will only grow worse, with rising congressional pressure to cut “discretionary” spending.

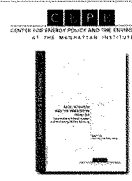
Because the nature of basic research is long-term and indeterminate, it is logical that 90 percent of such funding comes from the federal government. Indeed, barely 5 percent of private R&D spending goes to basic research. Increasingly, too, federal agencies are focused on applied research—which emphasizes near-term problems and projects—competing, in effect, with the private sector, which already spends roughly 400 percent more on applied R&D. This alarming trend represents a de facto conversion of U.S. R&D policy into industrial policy.

Although an array of 29 federal civilian agencies dispense R&D funds, 90 percent of spending decisions are concentrated in just five agencies that are highly susceptible to lobbying and other political pressures. This hyper-concentration has led not only to a decreasing success rate for researchers applying for funds but also to a deeply unproductive bureaucratization of research itself: federally funded researchers now waste nearly half their time performing administrative tasks. Meanwhile, inherently risk-averse federal administrators increasingly focus on funding older, established researchers, leading to a radical decrease in support for young scientists, who constitute a vital part of any intellectually diverse, vibrant, and productive research community.

There is good news: the U.S. still boasts the world’s greatest concentration of scientists and leading research universities. What’s more, entirely new classes of research tools are emerging: from microscopes that view molecules in real time, to big data analytics that model or emulate reality, to cognitive computing that amplifies scientists’ explorations. In addition, private-sector spending on overall R&D—already fourfold greater than federal spending—is rising, although mainly in applied domains. This paper concludes by proposing four high-level policy reforms:

- 1. Decentralize Federal R&D Spending.** Currently, researchers must petition a handful of agencies in Washington, D.C., for funds. Instead, authority for awarding and monitoring the majority of federally funded basic research should be given to the hundreds of extraordinarily capable U.S. research universities and institutions. This would broaden and enliven basic research by leading to more funding for younger researchers, as well as greater variety in the pursuit and administration of the science enterprise.
- 2. Incentivize More Private Spending on Basic Research.** Through tax policies and other means, encourage greater private-sector outlays on basic research in corporate laboratories and (especially) in the nation’s universities.
- 3. De-Bureaucratize Grant Approval and Monitoring.** Use modern information tools to radically reduce the crushing nanny-state policing of scientists.
- 4. Reduce Federal Funding for Industrial-Class Project Development.** A boost for federal support for basic research should come by offsetting cuts in spending in industrial-development types of applied research.

Nobel economist Edmund Phelps has pointed out that the very nature of America’s culture and capitalist model gives it an inherent advantage in capturing the benefits of scientific advances. Private-sector money and the organizational models and talent in U.S. research universities and institutions are all available. It is time to deploy both toward revitalizing the nation’s basic science enterprise.



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**About the Author**

**Mark P. Mills** is a senior fellow of the Manhattan Institute and CEO of the Digital Power Group, a tech-centric capital advisory group. He was the cofounder and former chief tech strategist for Digital Power Capital, a boutique venture fund. Mills cofounded and served as chairman and CTO of ICx Technologies, helping take it public in a 2007 IPO. He is a member of the advisory council of the McCormick School of Engineering and Applied Science at Northwestern University and is a member of the Advisory Board of Notre Dame's Reilly Center for Science, Technology, and Values.

Mills writes the "Energy Intelligence" column for *Forbes* and is coauthor of the book *The Bottomless Well: The Twilight of Fuel, the Virtue of Waste, and Why We Will Never Run Out of Energy* (Basic Books, 2005) which rose to #1 on Amazon's science and math rankings. His articles have been published in various popular outlets, including the *Wall Street Journal* and *New York Times Magazine*. Mills is also a frequent guest on CNN, FOX, NBC, and PBS, and has appeared on *The Daily Show with Jon Stewart*.

Earlier, Mills was a technology adviser for Bank of America Securities, and a coauthor of a successful energy-tech investment newsletter, the *Huber-Mills Digital Power Report*. He has testified before Congress and briefed many state public service commissions and legislators. Mills served in the White House Science Office under President Reagan, and subsequently provided science & technology policy counsel to numerous private sector firms, as well as the Department of Energy and several U.S. national research laboratories.

Early in his career, he was an experimental physicist and development engineer, working at Bell Northern Research (Canada's Bell Labs) and the RCA David Sarnoff Research Center on microprocessors, fiber optics, missile guidance, nuclear energy, and non-proliferation. Mills earned several patents from his work in these fields, and holds a degree in physics from Queen's University, Canada.

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phone (212) 599-7000 / fax (212) 599-3494

May 11, 2015

<p>The Honorable Lisa Murkowski Chairman Senate Energy &amp; Natural Resources Committee 304 Dirksen Senate Office Building United States Senate Washington, DC 20510</p>	<p>The Honorable Maria Cantwell Ranking Member Senate Energy &amp; Natural Resources Committee 304 Dirksen Senate Office Building United States Senate Washington, DC 20510</p>
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Dear Chairman Murkowski and Senator Cantwell:

We are writing today to lend our support to the Smart Manufacturing Leadership Act of 2015, a bill which will facilitate innovation, enhance energy savings and improve the global competitiveness of American manufacturers through the use of smart manufacturing technologies and processes. The companies and associations below support and urge swift passage of this bill's provisions. The bill includes among other provisions, establishing a national smart manufacturing plan, and providing assistance to domestic small- and medium-sized manufacturers as they implement smart manufacturing initiatives in their facilities.

Utilizing informed data and advanced communication technologies to integrate all aspects of manufacturing is primed to transform the US industrial sector at a time when we are seeing positive changes in terms of jobs returning and new investments arising in our manufacturing sector. The global economy will demand a modernized manufacturing sector and we want to make sure that America is part of this new global marketplace. Now is the optimal time to be planning best approaches and methodologies for this integration through our existing resources at the Department of Energy as well as other resources.

Trisha Knych, VP Government Relations, Schneider Electric North America said the following about the Smart Manufacturing Leadership Act: "Small and medium-sized manufacturers often don't see a clear roadmap to deploy energy efficiency projects for myriad of reasons. However, solutions are in place today to help them improve their energy efficiency and leverage their energy spend to reinvest in their businesses, and in turn the US economy. The Smart Manufacturing Leadership Act offers a pathway to support these efforts."

In conclusion, we thank you and support your efforts to pass energy efficiency such as those found in the Smart Manufacturing Leadership Act. We look forward to working with you, and other Senators over the next several weeks to enact important legislation in this Congress for our nation's manufacturers.

Sincerely,

ABB, Inc.  
Brook Crompton  
Danfoss  
Digital Energy and Sustainability Solutions Campaign  
Eaton Corporation  
Honeywell  
Intel Corporation  
Information Technology Industry Council  
Johnson Controls  
National Council for Advanced Manufacturing  
National Electrical Manufacturers Association  
Rockwell Automation  
Schneider Electric  
SEW-Eurodrive, Inc.  
Siemens  
United Technologies Corporation

Cc: All Members of the Energy and Natural Resources Committee

Testimony Submitted to  
United State Senate  
Committee on Energy and Natural Resources  
by  
Advanced Energy Management Alliance

Chairman Murkowski, Ranking Member Cantwell, and members of the Committee, thank you for the opportunity to submit written testimony for the record regarding numerous bills related to energy efficiency, infrastructure, and supply that together can create a vision for and guide our nation's overarching energy policy in the coming years. The Advanced Energy Management Alliance ("AEMA")<sup>1</sup> applauds this effort and looks forward to serving as a resource as a final bipartisan bill is crafted.

AEMA is an association of demand response providers of commercial, industrial, and residential services; consumers that use demand response and advanced energy management tools to reduce the cost of energy; and organizations that provide services and choices to these consumers and providers. Our members are united in an effort to overcome barriers to nationwide use of demand response and other energy management technologies for a more efficient, reliable, and resilient grid.

While our electric grid is considered an engineering marvel, new technologies, applications and business models are changing the way it operates and the manner in which consumers interact with the system. Given the increasing demand for electricity, public policy must allow for innovative applications and technologies to become part of the grid infrastructure

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<sup>1</sup> Advanced Energy Management Alliance website: <http://aem-alliance.org>

in ways that do not compromise the system, but instead provide additional resources. Many of the legislative proposals move toward that goal.

AEMA supports many of the bills introduced by Members on both sides of the aisle. In particular, we support bills that call for grid modernization, such as S. 1207, for transformative grid innovation; S. 1232, the Smart Grid Act of 2015; and S. 1243, the Grid Modernization Act of 2015. Demand response and advanced energy management will be key elements in a smarter grid that can enhance consumer choice while preventing increased customer expense. Allowing for utilities to invest in technologies and applications that provide more flexible solutions will be important to assuring that their business models can evolve and remain robust. We also support including demand response as part of the menu of distributed energy resources states should consider, as in S. 1213, Free Market Energy Act and S. 1201, Clean Distributed Energy Integration Act.

AEMA believes that, with increasingly smarter grid communication and control technologies, the distribution side of the grid can increasingly provide resources that balance the supply side in real time. AEMA agrees with the goals of S. 1044, Access to Consumer Energy Information (E-Access) Act, that would allow for access to energy data by consumers and authorized third parties, spurring innovation in advanced energy products and enabling more informed choices on energy use. We are generally supportive of programs that incentivize energy efficiency—as in S. 523 for school retrofits, S. 600 for non-profit retrofits, S. 720 for strengthened federal energy efficiency, S. 1346 for innovation to reduce energy cost in high heating cost regions—assuming that demand response and advanced energy management are able to participate in those programs. AEMA also supports efforts to increase system resilience

as in S. 888 to encourage regional resilience partnerships and S. 1227 to encourage microgrid development in remote communities. S. 1258, Local Energy Supply and Resiliency Act of 2015, would provide technical assistance and grants to entities considering deployment of demand response and other advanced energy management programs. All of these bills represent varying ways in which innovation can participate to improve and modernize our grid—through local incentives, state regulatory guidance, and bulk power market policies.

AEMA would draw attention to S. 1222, the Continuity of Electric Capacity Resources Act which defines “electric capacity resource” as “an electric generating resource, as measured by the maximum load-carrying ability of the resource, exclusive of station use and planned, unplanned, or other outage or derating.” Based on the current capacity market and operational evidence in organized and regional transmission systems, “electric capacity resource” should have a far broader definition to include any flexible resource (like demand response and other advanced energy management tools such as energy efficiency, distributed generation and storage) that can commit to providing capacity when called upon.

A stark example of such a response was during the 2014 Polar Vortex when demand response was able to supply critical resources to PJM that stabilized the grid at a time when many generators were unavailable. These events demonstrated that rather than investing in additional generation, enabling flexible resources—in this case, demand response—could ensure continued reliability and cost-effectiveness.

In a report titled “Analysis of Operational Events and Market Impacts During the January 2014 Cold Weather Events”<sup>2</sup>, PJM Interconnection asserted that, while the electric grid was stressed during the Polar Vortex, demand response played an important role in maintaining the reliability of the system. During the Polar Vortex, PJM called on demand response three times – the morning and evening of January 7 and the morning of January 8 throughout the Regional

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<sup>2</sup> Report dated May 8, 2014: <http://www.pjm.com/documents/reports.aspx>, report can be downloaded [here](#).

Transmission Organization (“RTO”). The report states that, “demand response, although not required to participate during the winter this year, responded each time it was called upon.” In fact, the report confirmed that demand response “exceeded PJM’s expectations in real time.” AEMA believes that this experience demonstrates the value of demand response as a fast-acting, responsive resource that can help independent system operators and electric utilities maintain grid reliability.

Limiting capacity markets to traditional generation resources would essentially remove the ability of flexible resources like demand response to be called upon to respond. In addition, customers would be limited in their ability to save; demand response and energy efficiency have lowered consumer energy costs in PJM by \$16 billion, based on the State of the Market 2014.<sup>3</sup> In the 2017/2018 auction, demand response is estimated to be the majority of the customer savings from efficiency and demand response combined—close to \$9.3 billion.<sup>4</sup>

In summary, AEMA is in agreement that the Committee should continue to develop bipartisan legislation that moves our electric grid into the future, spurring continued innovation to reduce cost, increase reliability and resilience, and allow for consumer engagement and choice. Including demand response and advanced energy management solutions as part of that smarter grid will provide the appropriate tools for local, state and regional entities to take full advantage of technologies and applications and make that 21<sup>st</sup> century grid a reality.

We look forward to addressing any questions the Committee has about AEMA, demand response, and advanced energy solutions more generally. Thank you for the opportunity to submit this testimony.

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<sup>3</sup> PJM Market Monitor, State of the Market 2014,

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<sup>4</sup> *Analysis of the 2017/2018 RPM Base Residual Auction*, Marketing Analytics, October 6, 2014, page 6:

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Respectfully submitted by,

A handwritten signature in black ink, appearing to read "Katherine Hamilton". The signature is fluid and cursive, with the first name "Katherine" written in a larger, more prominent script than the last name "Hamilton".

Katherine Hamilton  
Executive Director  
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**Statement of the**  
**AMERICAN PUBLIC POWER ASSOCIATION**  
**Submitted to the**  
**SENATE ENERGY AND NATURAL RESOURCES COMMITTEE**  
**For the June 9, 2015**  
**Hearing on "Energy Accountability and Reform Legislation"**  
**(Submitted June 23, 2015)**

The American Public Power Association (APPA) appreciates the opportunity to provide the following statement to the Senate Energy and Natural Resources Committee in relation to the June 9, 2015, Hearing on "Energy Accountability and Reform Legislation." APPA is the national service organization for the more than 2,000 not-for-profit, community-owned electric utilities in the U.S. Collectively, these utilities serve more than 48 million Americans in 49 states (all but Hawaii). APPA was created in 1940 as a nonprofit, non-partisan organization to advance the public policy interests of its members and their customers. Our members provide reliable electric service at a reasonable price with appropriate environmental stewardship. Most public power utilities are owned by municipalities, with others owned by counties, public utility districts, and states. APPA members also include joint action agencies (state and regional entities formed by public power utilities to provide them wholesale power supply and other services) and state and regional associations that have purposes similar to APPA. Collectively, public power utilities deliver electricity to one of every seven electricity consumers. We serve some of the nation's largest cities, including Los Angeles, CA; San Antonio, TX; Austin, TX; Jacksonville, FL; and Memphis, TN. However, most public power utilities serve small communities of 10,000 people or less.

In terms of public power's generation portfolio, in 2013 these utilities generated 169.6 million megawatt-hours (MWhs) of electricity from coal; 76.9 million MWhs from natural gas; 62.78 MWhs million from nuclear; 69.8 million MWhs from hydropower; and 8 million MWhs from other sources such as non-hydropower renewable energy like wind, solar, and geothermal. It is important to note, however, that public power utilities supply approximately 15 percent of electricity to end-users in the United States, but they only produce 10 percent of the megawatt-hours generated. To make up the difference, public power utilities purchase power at wholesale from other entities such as investor-owned utilities, independent power producers, rural electric cooperatives, federal power marketing administrations, and the Tennessee Valley Authority.

More detailed comments on the legislation of concern to public power utilities discussed at the June 9 hearing follow.

#### **S.784 – Microlab Technology Commercialization Act**

APPA supports the goals of this legislation, which would authorize the Department of Energy to establish microlabs located in close proximity to National Laboratories and accessible to the public to: (1) enhance collaboration with regional research groups, such as institutions of higher education and industry groups; (2) accelerate technology transfer from National Laboratories to the marketplace; and (3) promote regional workforce development through science, technology, engineering, and mathematics (STEM) instruction and training.

As the power grid evolves, there will be the need for power system modeling capable of analyzing the effects of variable generation, power storage, and demand response. Efforts to develop such modeling -- by educational institutions, research groups, or industry groups such as APPA -- could be supported by such a microlab framework.

#### **S.1033 – Quadrennial Energy Review Act of 2015**

The legislation would authorize the creation of a Quadrennial Energy Review Task Force -- a high-level government-wide coordination council -- to submit at least every four years a comprehensive review of current domestic capabilities and future energy needs, as well as the resources, technologies, and policy recommendations to meet them. APPA believes in a national planning process for our energy future and supports the goals of this legislation. The legislation is strengthened by requiring input from the energy industry, including public power utilities, and state, local and tribal governments.

APPA and its public power utility members worked very hard to provide input during the most recent Quadrennial Energy Review process, through the submissions of statements, reports and other related documents, and direct testimony at QER public stakeholder meetings throughout the country (as listed below). APPA would hope that the review proposed by the legislation would allow a similar level of involvement.

#### List of Public Power Utility Officials Testifying in QER Proceedings

- John F. Bilda, General Manager, Norwich (CT) Public Utilities; past president of Northeast Public Power Association, New England Regional Infrastructure Constraints, Hartford, Connecticut, April 21, 2014.
- Alex Coate, General Manager, East Bay Municipal Utility District and Randy S. Howard, past Director of Power System Planning and Development, Los Angeles Department of Water and Power, Water-Energy Nexus, San Francisco, California, June 19, 2014.
- Elliott Mainzer, CEO, Bonneville Power Administration; Joel Bladow, Senior Vice President, Tri-State Generation and Transmission Association; Jorge Carrasco, CEO, Seattle City

Light; Arlen Orchard, CEO, Sacramento Municipal Utility District; and Steve Klein, CEO, Snohomish County Public Utility District, Electricity Transmission, Storage and Distribution - West, Portland, Oregon, July 11, 2014.

- Joe Holmes, Lead Energy Trader, Colorado Springs Utilities, Gas-Electricity Interdependencies, Denver, Colorado, July 28, 2014.
- Steve Catanach, Light and Power Operations Manager, Fort Collins Utilities, State, Local and Tribal Issues, Santa Fe, New Mexico, August 11, 2014.
- David Mullett, General Manager, Vermont Public Power Supply Authority and also on behalf of the Transmission Access Policy Study Group, Electricity Transmission, Storage and Distribution – East, Newark, NJ, September 8, 2014.
- Dan Sullivan, CEO and Director of Investments, Grand River Dam Authority, Energy Infrastructure Finance, New York, NY, October 6, 2014.

**S.1068 – To amend the Federal Power Act to protect the bulk-power system from cyber security threats**

APPA supports the goals of this legislation to give DOE broader authority to address grid security emergencies. Public power utilities take very seriously their responsibilities to maintain a strong and secure bulk-power system. We believe the best way to enhance cybersecurity across critical infrastructure sectors is by improving information sharing between the federal government and such sectors, and vice versa.

The emergency authority given to DOE in this legislation is necessary to fully address imminent attacks with possible operational consequences. Specifically, we agree with the immediate action described in Section (b)(1) that the Secretary of Energy should have the authority to order action(s) to avert or mitigate a threat. Additionally, ensuring consultation with the operators and owners of assets impacting the bulk-power system that are impacted by an event along with the Electricity Sub-sector Coordinating Council (ESCC) is essential.

However, APPA remains very concerned about the cost-recovery provision under the proposed Federal Power Act (FPA) Section 224(b)(4). We believe the provision is duplicative and unnecessary, and that the means of implementing the provision is overly broad. FERC uses FPA Section 205 and 206 to determine just and reasonable and not unduly discriminatory rates for jurisdictional costs. Therefore, given that FPA Section 205 and 206 clearly provide existing mechanisms to do so, there is not a need to amend the FPA to provide for a new mechanism for cost recovery related to a cyber-emergency as defined in the bill.

While we do not oppose those with cost-based rates having the ability to recover costs for the emergency actions that could be required under the bill, we cannot support entities with market-based rate authority for power sales being given the additional ability to recover costs over-and-above the market-based rates they are free to charge as previously granted by FERC.

**S. 1181 -- Energy Technologies Access and Accountability Act**

This legislation amends Section 136 of the Energy Independence and Security Act of 2007 (EISA) to expand the existing Advanced Technology Vehicle Manufacturing (ATVM) Program to include commercial trucks and U.S. flagged vessels. The ATVM program is a Department of Energy run loan program to further the development of more efficient vehicles, including electric vehicles. Roughly \$15 billion in lending authority remains from an initial appropriation made in 2009. The legislation would authorize additional appropriations for the program, but sunset the program after 2020.

APPA has long supported the development of electric vehicles. In 1966, the APPA adopted the first of many resolutions in support of electric vehicle and advanced battery research and development and the use of electric vehicles in public and private fleets and by individuals. While APPA's past interest in the ATVM program has primarily been in the development of electric and plug-in-hybrid passenger and "light duty" vehicles, APPA is not opposed to the expansion of the program to include commercial trucks and U.S. flagged vessels, but is concerned about the proposal to sunset the program.

**S.1187 -- America Implementing New National Opportunities to Vigorously Accelerate Technology, Energy, and Science (America INNOVATES) Act**

APPA supports the goals of this legislation to improve management of the National Laboratories, enhance technology commercialization, and facilitate public-private partnerships. The legislation includes common sense changes, such as lowering the signature threshold for projects of less than \$1 million from the Secretary of Energy to the director level. The Secretary is no less responsible under such a regime, but the change would make the process for approving such projects more efficient. The legislation also proposes exempting from cost-sharing requirements non-profit educational institutions (Section 205). Doing so would increase the ability of such organizations to engage in advanced research. Expanding the scope of this provision to include other non-profit organizations, including not-for-profit industry organizations (26 USC 501(c)(6)) would also provide an incentive to such organizations to engage in advanced research.

**S.1216 -- To amend the Natural Gas Act to modify a provision relating to civil penalties**

APPA continues to review this legislation.

**S.1218 --Nexus of Energy and Water for Sustainability (NEWS) Act of 2015**

Public power utilities use water both as a source of power and in the process of power generation. As a result, water availability issues (such as drought, low flow, and competition for water) can restrict hydroelectric and thermoelectric generation. Choices made by electric utilities on the types of power plants they use and the fuel they need to run them, as well as capital investments made in the near term, are likely to establish the course for electric generation's long-term water use. As a result, APPA supports

the goals of this legislation and, in particular, the effort to require the federal government to take a holistic view of energy and water issues.

#### **S. 1221 – Bulk-Power System Reliability Impact Statement Act**

The electric utility sector is facing implementation of more than a dozen major environmental regulations between 2011 and 2020. These include the Mercury and Air Toxics Standards (MATS), Cross State Air Pollution Rule, National Pollutant Discharge Elimination System Cooling Water Intake Structure Rule (316(b)), Coal Combustion Residuals Rule, Effluent Guidelines for the Steam Electric Power Generating Point Sources, New Source Performance Standards for New Fossil Fuel-Fired Power Plants, and Emission Guidelines for Existing Fossil Fuel-Fired Power Plants (Clean Power Plan), among others. Collectively, these air, water, and waste regulations represent the largest number of rules ever promulgated in such a short period of time, with the correspondingly largest cost in the history of the electric power sector. In addition to these environmental regulations, the electric utility industry is subject to regulations by other federal agencies, such as the Army Corps of Engineers and Bureau of Reclamation. Many of these regulations could have implications for bulk-power system (BPS) reliability.

To date, the Federal Energy Regulatory Commission (FERC), the federal agency Congress has charged with ensuring the reliable operation of the BPS, has had no formal role in examining the potential reliability implications of these rules, (other than advising EPA, case-by-case, on requests for EPA administrative orders allowing generators to operate in noncompliance with the MATS rule). APPA believes FERC should have a role in examining the potential reliability implications of major rules. We are very pleased to see that S. 1221 includes language to provide FERC with a formal role in analyzing the potential reliability impacts of major future federal regulations that impact electric generating units (EGUs), and we strongly support enactment of this legislation, with some modest changes discussed below.

Section 3 of the legislation would amend Section 215(g) of the Federal Power Act to direct reliability coordinators to submit reports to congressional committees and FERC every three years on “the state and prospects for reliability and affordability of electricity” in their geographic areas and the “most significant risks to the reliability of the bulk-power system that might arise or need to be monitored..., including risks from proposed or final regulations. Section 4 directs FERC to solicit a reliability impact statement (RIS) from any applicable reliability coordinator registered with the electric reliability organization (ERO) within 15 days of the issuance of a major federal regulation that “may significantly affect the reliable operation of the bulk-power system.”

It could be problematic to assign responsibility to regional coordinators to perform RISs since they have no expertise on affordability and are not in a position to make an assessment about affordability. FERC, on the other hand, could assess affordability. The Committee should consider amending the bill to give that responsibility to FERC.

Section 4(1)(3) refers to the jurisdiction of the reliability coordinator. These entities are not governmental, thus the use of the word “jurisdiction” is problematic. We ask that the language be amended to say “the

geographic area covered by the reliability coordinator.” This would require changing the title of the subsection to “Interregional Coordination.”

With regard to the role of regional coordinators, we ask that the legislation be amended to direct FERC to develop rules on how regional coordinators must develop their assessments to reflect the views within their footprints. Also, some reliability coordinators are Canadian, so the language should be amended to say “reliability coordinator of the United States” (see page 4, line 4 and page 5, line 7).

Lastly, we suggest that the bill language be refined to make it very clear that FERC has responsibility for making the initial determination that a major proposed rule could significantly affect grid reliability.” The way the bill is currently drafted, it is not clear that FERC has that responsibility.

**S.1229 – To require the Secretary of Energy to submit a plan to implement recommendations to improve interactions between the Department of Energy and National Laboratories**

APPA supports the goal of better coordination between DOE and the National Laboratories.

**S.1241 – Enhanced Grid Security Act of 2015**

APPA supports this legislation, because we strongly believe that the DOE is the agency best situated to serve as the lead sector-specific agency for cybersecurity for the energy sector, and we support increased funding towards research and development for energy sector cybersecurity. We appreciate the legislation’s attention to the need to assure the cybersecurity of energy sector supply chain components. APPA also appreciates the effort to encourage expanded information sharing within the current construct of the ES-ISAC/NERC-FERC construct.

**S.1256 – Advancing Grid Storage Act of 2015**

This legislation would create an energy storage research program at the Department of Energy, as well as establish a loan program to demonstrate and deploy energy storage systems. Electric utilities, including public power utilities, would be eligible for such loans. The legislation would also direct the Secretary of Energy, in consultation with the Assistant Secretary for Electricity Delivery and Energy Reliability, to establish a technical assistance and grant program to “disseminate information and provide technical assistance” to eligible entities to “identify, evaluate, plan, and design energy storage systems” and make grants available to those entities so they can contract for such technical assistance.

APPA is supportive of efforts to develop storage technologies and generally supports S. 1256 as drafted. We appreciate that public power utilities would be eligible to receive loans to demonstrate and deploy energy storage systems under the bill. To ensure that all public power utilities would be considered eligible for such loans, and not just municipally owned electric utilities, we would urge the Committee to add a definition of “municipality” to the bill like the one in Federal Power Act Section 796(7) (16 U.S.C.

796) – “‘municipality’ means a city, county, irrigation district, drainage district, or other political subdivision or agency of a state competent under the laws thereof to carry on the business of developing, transmitting, utilizing, or distributing power.”

**S.1258 – Local Energy Supply and Resiliency Act of 2015**

The legislation would establish a distributed energy loan program and technical assistance and grant program at the Department of Energy. The legislation seeks to promote thermal energy and combined heat and power systems, as well renewable energy sources. It would create a grant program to “provide technical assistance for identifying, evaluating, planning, and designing distributed energy systems.” It would also create a loan program to “help states, tribes, utilities, and universities deploy projects that recover or produce useful thermal energy from waste heat or renewable thermal sources, generate electricity locally, distribute electricity in microgrids, distribute thermal energy, or transfer thermal energy to building heating and cooling systems.”

APPA appreciates that public power utilities would be eligible to receive loans for the deployment of distributed energy systems. To ensure that all public power utilities would be considered eligible for such loans, and not just public power utilities that are municipally-owned, the legislation should be amended, for example, by defining “municipality” as it is defined in Federal Power Act Section 796(7).<sup>1</sup>

**S.1274 – To amend the National Energy Conservation Policy Act to reauthorize Federal agencies to enter into long-term contracts for the acquisition of energy**

APPA continues to review this legislation.

**S.1277 – Federal Energy Savings Enhancement Act of 2015**

APPA continues to review this legislation.

**S.1293 – To establish the Department of Energy as the lead agency for coordinating all requirements under Federal law with respect to eligible clean coal and advanced coal technology generating projects, and for other purposes**

The legislation would establish DOE as the lead agency for the coordination of all requirements under federal law with respect to eligible clean coal and advanced coal technology generating projects. APPA supports designating DOE as the lead agency for the coordination of such projects as it is the federal

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<sup>1</sup> 16 USC 796(7) (defining “municipality” as “a city, county, irrigation district, drainage district, or other political subdivision or agency of a State competent under the laws thereof to carry on the business of developing, transmitting, utilizing, or distributing power.”)

agency with subject matter expertise on carbon capture and sequestration technology and already administers advanced clean coal technology research.

**S.1306 – Energy Independence Investment Act of 2015**

The legislation would direct the Secretary of Energy to issue a report to Congress within 180 days of enactment “describing the results of, a study on the effectiveness of the advanced fossil loan guarantee incentive program and other incentive programs for advanced fossil energy of” DOE. APPA supports efforts to conduct research on advanced fossil fuel technologies, which are an important source of baseload power for the generation of electricity. We therefore support having DOE conduct this study and report on its findings to Congress.

**S.1338 – To amend the Federal Power Act to provide licensing procedures for certain types of projects**

Making full use of the nation’s hydropower resources is a key component to ensuring that the nation’s grid remains reliable and resilient, and that utilities can meet emission reduction goals. Hydropower is a source of emissions-free base-load power which is available at most times. Public power utilities have led in hydropower development in recent years. Today, one hundred public power utilities have FERC-licensed hydropower facilities. APPA supports efforts to streamline the lengthy and duplicative regulatory process for licensing hydropower projects and looks forward to working with the Committee to continue to build upon and refine this legislation.

**S.1398 – Energy Title of America COMPETES Reauthorization Act of 2015**

APPA supports the goal of providing additional funding for fusion energy research, mathematics, and nuclear related education.

**S.1405 – To require a coordinated response to coal fuel supply emergencies that could impact electric power system adequacy or reliability**

APPA strongly supports enactment of this legislation directing the Secretary of Energy and FERC to work with the Surface Transportation Board (STB) to quickly alleviate coal shipment emergencies and to work to prevent reoccurrences. Thirty-nine percent of the nation’s electricity is generated from coal, the vast majority of which is transported by rail. A substantial amount of that coal has only one option for railroad transportation for at least a portion of its shipment. Thus, a large amount of the coal used to generate electricity in this country is “captive” to a single railroad for transportation. The monopoly power of the rail carrier is reflected in the frequent unreasonably high costs and poor service.

**S.1407 – Public Land Renewable Energy Development Act**

The legislation would streamline the environmental review of solar, wind, and geothermal projects on public lands and establishes a program at the Department of the Interior focused on making the permitting process more efficient. The legislation also would establish a revenue sharing system that aids local communities that are home to potential projects and would help mitigate the impact construction could have on the land, water, and on wildlife. While APPA appreciates the intent of this legislation, it believes in an “all-of-the-above” approach to power generation. Hence, if Congress decides that certain environmental review processes should be streamlined, it should do so for all power sources, not just some.

**S. 1408 – Vehicle Innovation Act of 2015**

APPA supports the goals of this legislation.

**S.1420 -- Energy Markets Act of 2015**

APPA strongly supports clarity in and oversight of energy markets. The legislation, however, appears primarily focused on petroleum and petroleum-based commodities and commodity markets, while the vast majority of public power utilities do not rely on petroleum-based products as a day-to-day fuel source. Public power utilities that do rely on a petroleum-based product for generation generally use it on an emergency basis with fuel (primarily diesel) stored on site. Public power utilities operating outside the continental U.S. are the exception to this rule, relying primarily on fuel oil as a source for power generation. Chief among their concerns, however, is the cost of shipping that oil, a cost driven by many factors including the artificial inflation due to Jones Act restrictions, which could be addressed through legislation such as the Puerto Rico Interstate Commerce Improvement Act of 2013 (H.R. 2838).

**S.1422 – Energy Workforce for the 21<sup>st</sup> Century Act of 2015**

APPA supports the goals of this legislation. We believe the Committee’s focus on workforce development in the energy sector is important and much needed. Public power utilities employ thousands of people in a variety of jobs that combine public service with a technologically forward-looking industry. New technologies are being developed to generate, deliver, and use electricity; utilities are undertaking new environmental initiatives to meet and exceed customer expectations; and public power systems are becoming fast-paced public enterprises with competitive salaries. Many dynamic career opportunities are available for women and men with diverse educational backgrounds, from high school diplomas to advanced degrees. APPA provides an online job board for both employers and job seekers at public power utilities. APPA’s Demonstration of Energy and Efficiency Developments (DEED) Program provides approximately 20 scholarships each year to high school and university students who seek a career in public power. In 2014, DEED provided over \$80,000 worth of scholarships.

APPA has supported the following in previous statements for the record:

- Congressional and other federal efforts to encourage and provide incentives to high schools and post-secondary institutions to include and promote courses leading to professions and trades in the electricity sector.
- Programs that encourage educational institutions to partner with trade unions and utilities to provide students with the most up-to-date training, information, and job placement services.

#### **S.1434 – Energy Storage Promotion and Deployment Act of 2015**

This legislation would amend the Public Utility Regulatory Policies Act of 1978 (PURPA) to impose a federal energy storage portfolio standard. By January 1, 2021, electric utilities would have to have energy storage capacity “with a power capacity rating equal to at least 1 percent of...[their] annual peak power demand of the system, as measured over a 1-hour period and averaged over” calendar years 2017-2019. By January 21, 2025, utilities would be required to have energy storage capacity of at least 2 percent of their annual peak power demand, averaged over the period of calendar years 2021-2023. Public power utilities and electric cooperatives would be exempt from the requirement.

APPA supports the development of energy storage technology. Public power utilities use a variety of such technologies, including batteries, pumped storage hydro, and water heaters, among others, for energy management, backup power, load leveling, frequency regulation, voltage support, and grid stabilization. Not every storage technology can be used for all applications. Thus, utilities may use a variety of technologies to meet their needs. They may also use non-storage technologies to promote electric system stability, such as natural gas turbines, reciprocating engines, variable inductors, and other technologies that create system inertia or allow low cost active power control using existing system infrastructure.

APPA believes S. 1434 is unnecessary and does not support its inclusion in the comprehensive energy legislation by the Committee. Decisions regarding the use of storage technology are retail decisions and should therefore be left to utilities and the states in which they operate. There is no need for the federal government to impose a one-size-fits-all energy storage requirement on electric utilities. Utilities will increasingly use these technologies where needed as more renewable energy resources are utilized to comply with local or state renewable portfolio standards and the Environmental Protection Agency’s soon-to-be-issued regulations to reduce carbon dioxide emission from existing fossil fuel-fired power plants under Section 111(d) of the Clean Air Act. In addition, California has imposed a state energy storage portfolio standard and other states may follow suit.

If the Committee wants to promote the further development of energy storage technologies, it should consider including legislation, such as S. 1256, the Advancing Grid Storage Act of 2015, by Senator Al Franken (D-MN), in the comprehensive energy bill. Policies that support the research, development, and demonstration of technologies are more effective than policies that force entities to use such technologies through the imposition of a one-size-fits-all approach. A federal energy storage portfolio standard will distort the market for energy storage technologies because it is a de facto subsidy to the industry. As

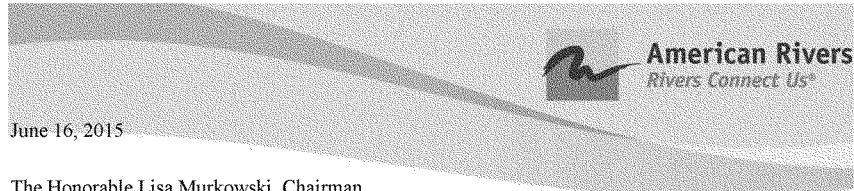
DOE has said in a December 2013 report on energy storage, “energy storage should be cost competitive (unsubsidized) with other technologies providing similar services.”<sup>2</sup>

**S. 1449 – Build Better Trucks Act**

This legislation amends Section 136 of EISA to expand the existing ATVM Program (discussed above) to include medium-duty and heavy-duty vehicles. Section 2(3) of the legislation would increase loan fees from 10 basis points to 50 basis points. Again, APPA’s past interest in the ATVM program has primarily been the development of electric and plug-in-hybrid passenger and “light duty” vehicles, but APPA is not opposed to the expansion of the program to include medium and heavy vehicles and supports the goals of the legislation.

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<sup>2</sup> See Grid Energy Storage, December 2013, by the Department of Energy, page 5, available at <http://energy.gov/sites/prod/files/2013/12/f5/Grid%20Energy%20Storage%20December%202013.pdf>.



The Honorable Lisa Murkowski, Chairman  
 The Honorable Maria Cantwell, Ranking Member  
 U.S. Senate Committee on Energy and Natural Resources  
 304 Dirksen Senate Office Building  
 Washington, D.C. 20510

Dear Chairman Murkowski and Ranking Member Cantwell,

I am writing to express our opposition to S. 1338, the Small HyDRO Act of 2015. Senator King's bill, while well-intentioned, would injure environmental quality, recreational use of waterways, and present a significant safety risk to people and wildlife alike.

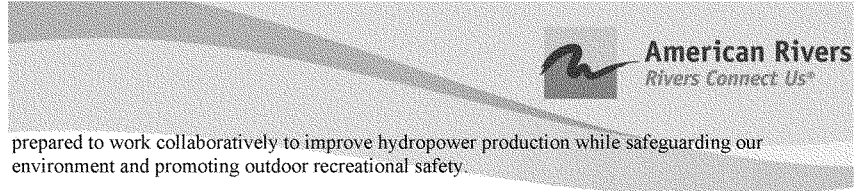
The bill presupposes that small hydropower or "run-of-river" hydropower is necessarily better for the environment than larger hydroelectric dams; this is not necessarily the case. As FERC staff testified before the House Energy and Power Subcommittee in May, dams that produce fewer than five megawatt hours often have significant environmental impacts.

We further disagree with the "rebuttable presumption" that a dam deserves a license. The same fundamental environmental challenges presented by large dams exist with small dams: reducing oxygenation, increasing temperature, blocking fish passage for commercial and recreational anglers, and segmenting ecosystems. Dams should only be licensed if those impacts can be responsibly avoided or mitigated.

Senate Bill 1338 effectively exempts small hydropower dams from the Clean Water Act. It does so by giving FERC the authority to "resolve the differences" between its environmental analysis and the analyses performed by other State and federal agencies. The Clean Water Act gives State agencies and certain Tribes the authority to condition hydropower licenses in order to ensure they comply with state water quality standards. Under existing law, FERC may not reject or modify those conditions. S. 1338 would allow FERC to resolve conflicts in its own favor.

American Rivers supports the responsible development of small hydropower projects. We believe that there is significant untapped potential for new hydropower generation on existing water infrastructure, and have encouraged laws and policies that would help to encourage the responsible development of this potential. Unfortunately, S. 1338 creates a blanket exemption for small hydropower projects that removes critical considerations like environmental impacts, public safety, or impact on fisheries that many American rely on for their livelihoods from dam permitting decisions.

We urge the Committee not to move this bill onto the floor, but instead to work with all affected stakeholders to find solutions that will satisfy the need to develop power with all of the other competing needs of rivers and the communities that depend upon them. American Rivers stands



Sincerely,

A handwritten signature in black ink, appearing to read 'Jim Bradley'.

Jim Bradley  
Vice President for Policy and Government Relations

6/8/2015

The Honorable Dean Heller  
United States Senate  
361A Russell  
Washington, DC 20510

The Honorable Jim Risch  
United States Senate  
483 Russell  
Washington, DC 20510

The Honorable Martin Heinrich  
United States Senate  
702 Hart  
Washington, DC 20510

The Honorable Jon Tester  
United States Senate  
311 Hart  
Washington, DC 20510

Dear Senators Heller, Heinrich, Risch and Tester,

The groups below represent millions of hunters, anglers, fish and wildlife professionals, and outdoor enthusiasts. We thank you for introducing S.1407, the Public Lands Renewable Energy Development Act. Sportsmen are supportive of the development of renewable energy resources on public lands as long as it is done in the right places and in a manner that conserves fish and wildlife habitat. The provisions of the bill that apply a substantial portion of royalty revenue to offsetting impacts to fish and wildlife habitat are essential to balancing development and hunting and fishing opportunities. Also eligible for use of the funds is securing recreational access to Federal land for the purpose of providing enhanced public access to existing land that is inaccessible or restricted. The Public Lands Renewable Energy Development Act would help wind and solar development move forward on appropriate public lands in a way that sustains the West's unparalleled sporting heritage. Again we thank you for introducing this important legislation, and we look forward to working with you and the delegations of other affected states as the bill moves forward.

Sincerely,

American Sportfishing Association  
Association of Fish and Wildlife Agencies  
Backcountry Hunters & Anglers  
Berkley Conservation Institute  
Congressional Sportsmen's Foundation  
Dallas Safari Club  
Delta Waterfowl Foundation  
Mule Deer Foundation

National Marine Manufacturers Association  
National Wildlife Federation  
Northwest Sportfishing Industry Association  
Pope and Young Club  
Public Lands Foundation  
Ruffed Grouse Society  
Theodore Roosevelt Conservation Partnership  
Trout Unlimited

**Written Statement of the Boeing Company in Support of S. 1432****June 9, 2015**

The Boeing Company (“Boeing”) is pleased to have the opportunity to provide a written statement in support of S. 1432, the Carbon Fiber Recycling Act of 2015. This legislation, which would require the Secretary of Energy to conduct a study on potential technologies to recycle carbon fiber, is of particular importance to the aerospace industry because of our industry’s increasing usage of this unique material.

Boeing is the largest aerospace company in the world. We design and manufacture commercial and military aircraft, helicopters, missiles, satellites and related components and equipment. We employ approximately 160,000 workers in the US and several thousand more overseas.

The aerospace industry is bullish on carbon fiber technology. This is because of the material’s unique properties of high strength to low weight ratio and need for less care and maintenance than traditional aerospace materials. As the aerospace industry continues to squeeze out as much fuel efficiency from its products as possible, we expect our reliance on carbon fiber will continue to grow. This increased use presents new opportunities for carbon fiber recycling technologies.

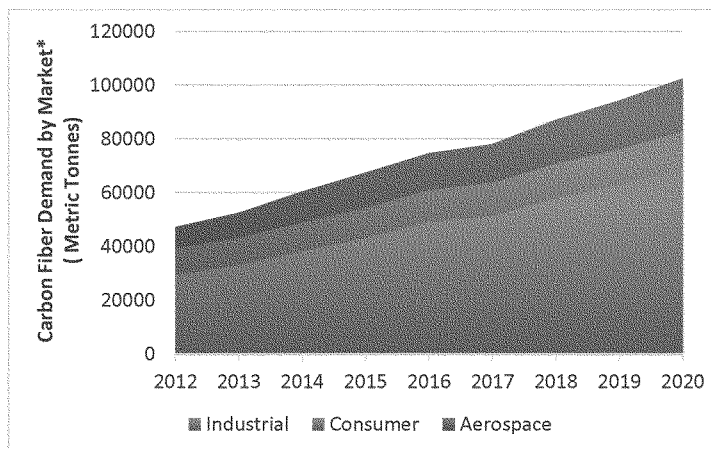
Our research shows there is a substantial opportunity for the use of recycled carbon fiber in new commercial applications. We are aware that many other industries – automotive, sports and leisure to name a few – are also incorporating carbon fiber technologies into their products. This makes sense given the extraordinary performance and reliability requirements for materials made from carbon fiber. As we move forward, it is apparent that industry will need viable commercial markets for products made from reclaimed carbon fibers. Our comments below highlight the importance of S. 1432 in fostering the development of carbon fiber recycling technologies.

**Carbon Fiber in Aviation**

Carbon fiber was developed in the 1960s and 1970s for defense aerospace applications, and commercialized in the 1980s. Carbon fibers are reinforcing fibers produced by the pyrolysis of organic precursor fibers such as polyacrylonitrile (PAN), rayon, or pitch. These precursors are transformed through heating and stretching to create carbon fiber, which is then combined with various resins and plastics to create “carbon fiber reinforced polymers” (CFRP). The incorporation of CFRP in aircraft design significantly improves performance, reduces lifecycle fuel consumption, reduces the complexity of the supply chain through integrated structures, and improves corrosion resistance and damage tolerance.

At Boeing, the use of carbon fiber in our products has resulted in significantly reduced fuel consumption during the lifetime of our airplanes. For example, carbon fiber composite materials make up 50 percent of the Boeing 787 Dreamliner, including the fuselage and wing. The 787 is 20 percent more fuel efficient than the airplane it replaced. Boeing’s new 777X will be the

largest and most-efficient twin-engine jet in the world due in part to the use of carbon fiber composites in its wing. Given these unique performance characteristics, we expect to see a significant increase in demand for carbon fiber. The chart below quantifies the increasing demand for carbon fiber among different markets.



#### Aviation's Commitment to Sustainable Manufacturing

Commercial aviation is poised for tremendous growth, as technology and economic expansion are making air travel more accessible to people around the world. To meet this increasing demand, airlines are investing in more fuel-efficient airplanes, opening routes and improving service. As such, Boeing is designing and building more advanced products. When aviation expands, it generates trade, tourism and further economic growth. The aerospace industry also understands that commercial aviation needs to grow sustainably.

At Boeing, 75 percent of research and development funding supports greater environmental performance in our products, services and operations. Boeing continues to look for opportunities to improve sustainability through an airplane's lifecycle, from design and production to flight operations and end-of-service recycling. This includes:

- Bringing to market the world's most fuel-efficient airplane family – 737 MAX, 747-8, 787 and 777X – and services that improve gate-to-gate efficiency;
- A Design for Environment philosophy that sets ambitious targets and embeds tools into the design process to improve Boeing airplanes' environmental performance;

- Working with many stakeholders to advance our industry's environmental progress, including commercialization of sustainable aviation biofuel;
- Investing in programs, such as the eco-Demonstrator, that accelerate testing and use of new technologies; and
- Aggressive goals to improve our facilities' environmental performance.

With this said, the industry understands that sustainable growth includes a commitment to recycling carbon fiber composite materials. We therefore are exploring methods to utilize recycled carbon fiber in our products.

#### **The Benefits of Recycled Carbon Fiber**

Virgin carbon fiber manufacturing is energy intensive and costly. Reclaiming carbon fiber from CFRP material requires about one-tenth to one-twentieth of the energy compared to virgin carbon fiber manufacturing. Using reclaimed carbon fiber material in place of virgin carbon fiber could also result in a 90-95 percent reduction in CO<sub>2</sub> and other emissions generated from the production of virgin carbon fiber.

In addition, recycled carbon fiber has the potential to offer a much more cost-effective alternative to virgin carbon fiber. Our research shows that incorporating recycled carbon fiber into the manufacturing process could save as much as 40 percent compared to the production of virgin carbon fiber.

Moreover, the use of recycled carbon fiber in the manufacturing process offers a solution to keeping carbon fiber out of the waste stream.

#### **Challenges to Recycling Today**

Today, carbon fiber is recovered from composites either through heat or chemical processes. Neither of these technologies maintains the carbon fiber in its continuous aligned form, which results in a degradation of its performance characteristics compared to virgin fiber. Because of the degradation of the carbon fiber during these recovery processes, most manufacturers utilizing carbon fiber cannot use recycled materials in their manufacturing processes.

Therefore, our most immediate need is for technologies that recycle carbon fiber without the loss of its performance characteristics. We believe there are viable commercial aerospace and non-aerospace markets for products made from recycled carbon fiber. Boeing's long term goal is to use significant volumes of recycled carbon fiber in the production of new aerospace products. We are working with universities, industry associations, and public and private research entities to refine recycling processes in support of new markets and applications for recycled carbon

fiber. However, additional resources are required to successfully commercialize recycled carbon fiber.

**Conclusion**

We believe S. 1432 would provide the necessary impetus to understanding the potential commercial market for recycled carbon fiber, as well as promote the development of technologies that recycle the material so that it can be put to its highest and best use. Diverting carbon fiber from the waste stream into high-profile uses will help accelerate advanced manufacturing, attract investment and present a growth opportunity for the workforce.

We strongly support S. 1432 and thank the Committee on Energy and Natural Resources for the opportunity to submit a written statement. We urge the consideration and passage of S. 1432.




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June 22, 2015

Senator Lisa Murkowski  
 Chairman, Senate Energy and Natural Resources Committee  
 709 Hart Senate Office Building  
 Washington, DC 20510

Re: S.1312 – “Energy Supply and Distribution Act of 2015”

Dear Senator Murkowski:

I am writing on behalf of the Colorado Oil & Gas Association in support of S.1312, the “Energy Supply and Distribution Act of 2015. This is a needed and welcomed bi-partisan bill that would modernize the United States’ federal energy policy. Most notably, it would remove the 1970s prohibition on crude oil exports, which is a relic from an era of scarcity and flawed price control policies.

A repeal of the ban on crude oil exports will greatly benefit Colorado and the United States. In 2012, the oil and gas industry in Colorado generated \$29.6 billion in economic activity. This included over \$1.6 billion in public revenues benefiting Colorado K-12 public schools, higher education, critical infrastructure, and safety-net programs. The industry’s improved technologies and efficiencies have made America the world’s leading oil and natural gas producer, allowing Colorado to record levels of oil and gas production in the last 5 years with fewer permits than the previous 5 years.

America is one of the only nations that do not take full advantage of allowing its domestic crude oil production to freely enter into what is an otherwise a global free market. Allowing American crude oil exports will strengthen U.S. geopolitical influence by giving our trading partners and allies a more secure source of supply and less dependence on crude oil from Russia and the Middle East. As a state that ranks 11<sup>th</sup> in the number of military personnel, we understand the need and benefits to America’s national security interests by decreasing the likelihood that global oil supply can be used internationally as a strategic weapon.

Encouraging a global marketplace will better allow the export of Colorado leadership and expertise, which will ultimately economically benefit all of Colorado, including the thousands of small and large Colorado businesses that support oil and gas development.

Thank you and we look forward to working with you and your colleagues to pass S. 1312.

Sincerely,

cc: The Honorable Cory Gardner, United States Senate  
 The Honorable Michael Bennet, United States Senate

Testimony for the Record  
Senator Chris Coons

Before the  
Senate Energy and Natural Resources Committee

**Hearing on Energy Accountability and Reform Legislation**

June 9, 2015

Thank you, Chairman Murkowski, Ranking Member Cantwell and Members of the committee for allowing me to provide input on several bills that are included in the hearing on energy accountability and reform legislation. I write in strong support of several bills that I have sponsored or cosponsored and would also mention several additional bills that support policies I have advocated for in the Senate.

S. 1033 –Quadrennial Energy Review Act of 2015

As you are aware, the Administration's recently released Quadrennial Energy Review report, or QER, provides a valuable snapshot of our energy infrastructure needs. I am glad that this committee held a hearing on the QER report on April 28, 2015. There are a number of recommendations that would be worthy of congressional action. That said, it is equally, if not more important for this and future administrations to continue to carry out such reviews to inform the national energy discussion. That's why I recently introduced S. 1033 with Senator Alexander to ensure that QERs become codified into law so that each successive administration follows through on this important audit of our nation's energy policies and needs.

This is a well-founded policy idea. Our proposal is based on recommendations in a November 2010 President's Council on Advisors on Science and Technology report. It is also consistent with authorities that require similar periodic reporting by the Department of Defense and Department of Homeland Security. It is also consistent with the strategic reviews being carried out by the State Department and U.S. Agency for International Development in their 2010 and 2014 Diplomacy and Development Reviews. Further, our legislation does not authorize new funding nor does it include recommendations for any specific actions as outlined in the April 2015 QER report. The legislation has been endorsed by the Bipartisan Policy Center.

#### S. 1187 – America INNOVATES Act

As this committee is very aware, the Department of Energy (DOE) carries out much of the agencies' work through an array of 17 national laboratories that are based in 14 different states. The national labs are critical to meeting DOE's mission.

These national laboratories have been home to 115 Nobel Laureates over their history and currently employ 20,000 scientists. They are truly America's national treasures and play a major role in developing innovations that have been and will be critical for America's national competitiveness. These laboratories conduct research on a broad range of topics from cosmology to safeguarding our nuclear weapons to unlocking advanced energy technologies. The scope of their work extends from scientists working individually to large collaborations with industry leaders to bring innovative technologies to market.

The United States' national lab system is a model that is globally renowned, and the America INNOVATES Act is designed to preserve its world-class status. While the labs have grown to encompass a broad range of work, they are not yet fully optimized to participate in today's innovation economy.

The legislation has several beneficial goals:

- Streamlines the management and coordination of the DOE's science and energy programs

- Directs the DOE to implement best practices to improve operations and management across the National Lab complex
- Allows national labs to partner more effectively with the private sector to create new technologies and enhance technology commercialization
- Provides the DOE more flexibility to support applied research and development activities conducted by universities and nonprofits
- Gives startups more access to cutting edge facilities at the national laboratories

This is bipartisan and bicameral legislation that I am excited to have reintroduced with Senator Rubio in the Senate. Companion House legislation, H.R. 1158, has passed through the House Science Committee with a strong, bipartisan vote as well as the full House in May by voice vote. Organizations as diverse as the Information Technology & Innovation Foundation, the Heritage Foundation, and the Center for American Progress have endorsed this legislation. They, among others, agree that as the needs of the economy evolve into the 21st century, the roles of the National Labs must evolve as well.

As economic growth is increasingly driven by innovation, our engine of prosperity must be maintained and expanded. Further, this legislation does not include any new authorizations or call for further regulatory activities. Rather, it gives the labs more tools to partner with the private sector and streamlines DOE's management of the labs.

It is important to note that our legislation is not alone in the desire to optimize the utility of the U.S. national laboratory system. I would also like to highlight S. 784 and S. 1259 from Senator Heinrich and S. 1229 from Chairman Murkowski, all of which focus on making the labs more effective in our modern innovation economy.

#### S. 1398 – Energy Title of America COMPETES Reauthorization Act of 2015

I am also honored to join Senator Alexander and a bipartisan group of other Members, including Chairman Murkowski, Ranking Member Cantwell, and

Senators Gardner and Heinrich as an original cosponsor of the Energy Title of America COMPETES Reauthorization Act of 2015. This legislation is a key piece of the larger legislation known as the COMPETES Act. This bill authorizes federal investments in basic energy and science research at the DOE. More specifically, it calls for increased authorizations for the DOE's Office of Science and the Advanced Research Projects Agency—Energy (ARPA-E), recognizing the need for a reliable and predictable funding stream for federal basic energy science research. Further, this legislation strategically repeals authorities for several programs that were never utilized from the original 2007 COMPETES Act.

The America COMPETES Act has had strong bipartisan support in the past, and we hope that COMPETES can be reauthorized again. The COMPETES legislation first passed the 110<sup>th</sup> Congress with 70 bipartisan Senate cosponsors. This legislation was reauthorized again in the 111<sup>th</sup> Congress and agreed to in the Senate by unanimous consent. The Energy COMPETES Act is a solid contribution to that effort. It has been endorsed by a number of organizations, including the Association for American Universities, the Association of Public and Land-Grant Universities, and the Bipartisan Policy Center, among others.

#### Advanced Manufacturing bills

I would also like to highlight a few other bills before the committee that will support our advanced energy manufacturing sector, a source of high quality jobs and a driver of American innovation. I would like to thank Senator Shaheen for introducing the Smart Manufacturing Leadership Act (S. 1054), Senator Hirono for her Clean Energy Technology Manufacturing and Export Assistance Act (S. 1263), Senator Merkley for his Job Creation through Energy Efficient Manufacturing Act (S. 1275) and Senators Heinrich and Booker for their Energy Workforce for the 21<sup>st</sup> Century Act (S. 1422). I am a staunch supporter of measures that strengthen our advanced manufacturing and innovation ecosystem, and I appreciate their leadership on these bills that will do just that.

In closing, I would like to thank you again for your leadership and attention to the important opportunity that bipartisan energy policy can provide for our country.

Basic research, most of which is government funded, is a necessary and critical foundation to cultivate an innovative ecosystem rich in new knowledge and ideas. This research enables breakthrough achievements in science and technology which are important to U.S. prosperity.

As I know you appreciate, our investments in research in science and technology have been critical to keeping our economy competitive in the 21<sup>st</sup> Century. I am proud to support a number of these bills that can help build on the bipartisan support for scientific research. We must ensure the U.S. keeps pace as global competitors increase their investments in research and development, and these bills represent the right first step. Moving forward, we must continue to champion American investment and leadership in science, technology, innovation, and STEM education, and advanced manufacturing, and I look forward to working with all of my colleagues to do just that.

This committee has demonstrated an ability to provide that leadership in previous congresses through the passage of two major legislative achievements through the Energy Policy Act of 2005 and the Energy Independence and Security Act of 2007. Although our energy challenges are great, I fervently believe we can meet them by working together on sound, common-sense policies, including the legislation provided in my testimony.



*Representing the Interests of America's Industrial Energy Users since 1978*

June 23, 2015

The Honorable Lisa Murkowski  
Chairman  
Senate Committee on Energy & Natural Resources  
304 Dirksen Senate Building  
Washington, DC 20510

Dear Chairman Murkowski,

The Council of Industrial Boiler Owners (CIBO) would like to thank you and the Committee for embarking on the important task of crafting legislation that will update our Nation's energy policy. It has been eight years since Congress passed an energy reform package and, as you have repeatedly stated, this is an important opportunity to take account of the enormous opportunities and challenges in today's energy sector.

CIBO is a national trade association of over 110 members including industrial boiler owners, architect engineers, related equipment manufacturers, and universities representing 20 major industrial and institutional sectors. CIBO has been working since 1978 to (1) promote the exchange of information between industry and government relating to energy and environmental policies, laws, and regulations affecting industrial boilers and the manufacturing and institutional energy base of our country; (2) promote technically sound, cost-effective laws and regulations; and (3) improve energy and environmental performance, reliability and cost-effectiveness of members' operations through technical interchange. CIBO's membership represents industries as diverse as chemicals, paper, cogeneration, metals, automotive, refining, combustion engineering, and food products. CIBO members also include operators of boiler facilities at over a dozen major universities.

In line with our mission of advocating a policy environment conducive to safe, cost-effective, reliable thermal energy, CIBO offers the following comments on the bills that the Committee is considering for inclusion in draft legislation.

**Establishing a Coherent National Energy Policy**

The lack of an effective national energy policy that is coordinated with environmental policy results in environmental decisions that exacerbate the energy supply/demand imbalance. This dynamic is intensified by the uneven allocation of tax incentives. For example, a good national energy policy would promote the use of diverse energy sources, which would moderate interruptions and spikes in individual fuel supply availability and price. Such a policy would also

provide a framework and incentives to advance a true “all of the above” energy strategy that would enable the full use of U.S. energy resources, including our abundant traditional fuel sources. Because we do not have an effective national energy policy, individual fuel decisions are necessarily based on local short-term economics that exacerbate long-term problems.

CIBO has worked closely with EPA, FERC, and Congress for decades to advance the responsible control of air pollutants, wastewater, and solid waste from thermal energy systems. We have improved thermal operations dramatically over this period. Over the next year or two boilers will be brought into compliance with hazardous air pollution requirements based on detailed risk assessments through Federal and State regulatory processes. Industrial thermal energy systems are efficient, clean, and critical to the country’s economic recovery and progress.

Going forward, policymakers should place greater emphasis on economic considerations in both energy and environmental policy. One common objective – efficient, reliable, acceptably clean energy at reasonable cost – needs to drive regulatory policy. Economic progress is of paramount concern to continued improvement in public health; energy policy should reflect this progress and understanding. Accordingly, in furtherance of a national energy strategy, CIBO strongly supports:

- **S. 1033, the Quadrennial Energy Review Act.** We believe it is paramount to set national energy objectives that can be met by establishing short-, medium-, and long-term goals to guide policymaking; and
- **S. 1218, the NEWS Act of 2015.** CIBO’s boilers operate at the nexus of energy production and water use, so we are intimately familiar with the importance of these interactions. The Department of Energy and the Department of the Interior would benefit from considering this all-important nexus when promulgating new rules.

#### **The Importance of Combined Heat and Power Technology**

CIBO supports proposals that value the contributions of efficient combined heat and power (CHP) technology, which combines the myriad advantages of thermal energy with electricity generation. CHP offers an opportunity to improve the efficiency of electricity generation, while also improving environmental performance and advancing the complementary goals of efficiency and sustainability. In fact, CIBO members already operate a large number of CHP facilities. However, more can be done. Accordingly, to enhance the promotion and integration of CHP, CIBO supports:

- **S. 1258, the Local Energy Supply and Resiliency Act of 2015.** This legislation would establish a loan program for distributed energy resources. The legislation correctly includes CHP in its definition of distributed generation.
- **S. 1213, Free Market Energy Act of 2015.** This legislation would establish a general neutral right of interconnection for distributed generation resources, including CHP. CHP facilities deserve equitable access to the electricity grid, so that excess electricity generated by these facilities can be utilized in the most efficient manner possible.
- **S. 1202, the HEAT Act.** This legislation would amend the Public Utility Regulatory Policies Act of 1978 (PURPA) to assist States in adopting updated interconnection procedures and tariff schedules and standards for supplemental, backup, and standby power fees for projects for combined heat and power technology and waste heat to power technology. CIBO has been actively engaged with the HEAT Act since day one.

Additionally, CIBO has serious concerns about the **S. 1037**, a bill to expand the provisions for termination of mandatory purchase requirements under PURPA. Many of CIBO members' CHP facilities are classified as 'qualified facilities' under PURPA. This legislation would disadvantage small power providers by effectively giving State PUCs/PSCs the power to nullify utilities' purchase obligations, which would have the effect of reducing the dispatch of electricity generated at CHP facilities. For all the reasons outlined above, the Committee should exclude S. 1037 from its discussion draft and avoid crafting a bill that penalizes CHP technology.

#### **Avoiding Duplicative and Onerous Regulation**

In the Clean Air Act (CAA), Congress provided ways to ensure environmental protection and at the same time to meet energy demand by allowing dependence on the full range of the nation's diverse energy sources. For the first 25 years of its implementation, the CAA was interpreted, as intended, to allow industry to rely on all energy resources. However, beginning in the mid-to-late 1990's, environmental policymakers began to favor natural gas over other fossil fuels for its cleaner burning properties. Essentially all new power generation was built for natural gas. This policy of favoring natural gas over other fuels was incorporated into CAA rules applicable to the industrial sector as well.

This misguided approach severely punishes the use of energy sources other than natural gas. Standards are set at a point that makes emissions reductions cost-effective for sources burning natural gas, but cost-prohibitive or technically infeasible for sources burning other fuels. Under those circumstances, existing sources under pressure to comply with CAA standards will (if they can) switch to natural gas. As a result, environmental standard-setting has contributed to the increasing dependence on natural gas and the abandonment of coal and other fuels as reliable

alternatives, even though existing facilities have demonstrated that the use of coal is compatible with emissions reductions.

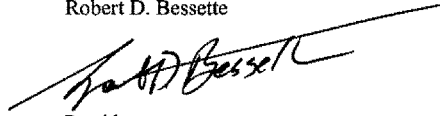
As CIBO members, and the economy as-a-whole, have become increasingly reliant on natural gas, the costs of a supply disruption or a price spike have also increased. The Committee should advance legislation that helps guarantee a reliable, affordable supply of natural gas is available to industry and all consumers by promoting responsible natural gas development, adequate storage capacity and low-cost, efficient transportation and distribution systems for energy. Indeed, it is now the case that regulations have fashioned a widespread condition of substantial dependence on natural gas. Accordingly, CIBO strongly supports:

- **S. 411, the Natural Gas Gathering Enhancement Act.** Getting natural gas to users requires pipelines. Pipelines require permits. Absent change, increasing demand and a supply that is constrained by regulatory obstacles will produce a hazardous price environment for users.

#### **Conclusion**

Thank you for the opportunity to participate in the Committee's efforts to update our Nation's energy laws. We look forward to assisting the Committee as it carries out this vital task and will reach out concerning additional details of draft legislation in the months to come. Please do not hesitate to contact us if you have any questions.

Robert D. Bessette



President

Council of Industrial Boiler Owners

cc: The Honorable Maria Cantwell

June 23, 2015

**Statement for the record submitted by:**

**Domestic Energy Producers Alliance (DEPA)**

PO Box 18359  
Oklahoma City, OK 73154  
Chairman: Harold G. Hamm  
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**Statement submitted to:**

**Senate Energy and Natural Resources Committee**

The Domestic Energy Producers Alliance (DEPA) is pleased to submit a statement for the record to the Senate Energy and Natural Resources Committee in support of lifting the current ban on crude oil exports, a vitally important matter for the US domestic oil and natural gas exploration and production sector, American consumers and the entire US economy.

DEPA is an alliance of independent producers, royalty owners, oilfield service companies, and state and national oil and natural gas associations. America's 18,000 independent producers are responsible for drilling 95% of domestic oil and natural gas wells and account for 67% of oil and gas production.

It is important to note the distinction between independent producers and major, integrated companies. Major oil companies do business both in the US and abroad, not only in exploration and production, but also in refining, transporting and marketing oil, natural gas and refined petroleum products. On the other hand, independents are domestic producers who primarily earn revenue just from exploration and production.

DEPA is proud to represent a majority of the independent oil and natural gas producers primarily responsible for the current renaissance in American oil and natural gas production. The American Energy Renaissance is the single-most defining aspect on this planet today that will shape the next 50 years. Thanks to the genius of America's independent oil and natural gas producers, the world is moving from a concept of "resource scarcity" toward "resource abundance." This is the modern miracle of American oil and natural gas.

But the American Energy Renaissance is at risk. First, due to OPEC's predatory pricing, the US rig count has dropped by more than 50%, capital expenditures have been cut by \$62 billion and 126,000 oil and gas workers have lost their jobs. Second, restricted US refining capacity means high-quality US light sweet oil has no place to go. Foreign

entities now own 28% of US refining capacity—and nearly all of it is configured to refine their heavy sour oil.

Combined with the ban on US oil exports, this refinery mismatch is creating a significant discount for US light sweet oil at no benefit to anyone except refiners and their foreign ownership. In fact, it has cost American states, producers and royalty owners \$125 billion in lost revenue in just four years.

Congress must lift the ban on US oil exports. It's an issue the Domestic Energy Producers Alliance first introduced in 2013 in Washington, D.C. A few months later, along with others, our Chairman Harold Hamm was invited to represent US oil and natural gas producers in the first Congressional hearing on oil exports in 25 years. Since that time, numerous Members of Congress have expressed bipartisan support for allowing oil exports.

At the same time, many studies—from a range of institutions and government agencies, including the Congressional Budget Office and the Energy Information Administration—have shown that lifting the export ban will lower gasoline prices and benefit American consumers. One such study by IHS Global, a leading energy research firm, found that lifting restrictions on crude oil exports would result in an increase of real household disposable income because of an investment-led expansion in economic activity and a lower unemployment rate.

The situation is now urgent. If the ban is not lifted, prices will likely shoot up as a short-supplied market is created. Manufacturing will slow down, America will again become dependent on foreign oil, and our allies will be forced to get supplies from Russia and Iran.

DEPA realizes there are many competing agendas in Washington. However, lifting the crude export ban is a key factor in America's economic, foreign policy and national security strength. Unleashing American oil into the global marketplace is not only a timely way to stimulate economic growth, but also shows our allies that we are willing to be their partners in reducing OPEC and Russian foreign-policy leverage. Without the ability to export crude oil, we are chasing our allies into the open arms of dictatorial regimes.

DEPA urges members of the Senate Energy and Natural Resources Committee to lift the current ban on crude oil exports. If America's interest is stability of supply, peace and prosperity, then our current policy doesn't work. There isn't a more urgent issue affecting the future of our nation and the world than lifting the ban on US oil exports.

**Dr. DAVID A. NYE  
VICE PRESIDENT OF TECHNOLOGY  
DRESSER-RAND CORPORATION**

**STATEMENT FOR THE RECORD  
BEFORE THE SENATE ENERGY AND NATURAL RESOURCES COMMITTEE  
UNITED STATES SENATE**

**HEARING REGARDING ENERGY ACCOUNTABILITY AND REFORM LEGISLATION**

**June 9, 2015**

Madam Chairwoman, Ranking Member Cantwell, and distinguished Members of the Committee, Dresser-Rand is pleased to submit written comments for the record in connection with Advanced Compressed Air Energy Storage Development.

**Background on Dresser-Rand:**

Dresser-Rand is among the largest global suppliers of custom-engineered rotating equipment solutions for long-life, critical applications in the oil, gas, chemical, petrochemical, process, power, military, and other industries worldwide, including the environmental market space within energy infrastructure. Our products are used in oil and gas production, high-pressure field injection and oil recovery, gas liquefaction, gas transmission, refinery process, natural gas processing, petrochemical production, general industry, and U.S. Navy applications.

Dresser-Rand pioneered the development of Compressed Air Energy Storage (CAES) technology and complete CAES solutions more than 20 years ago by designing and supplying the entire turbomachinery train and controls for the first CAES plant in North America, located in McIntosh, Alabama. Dresser-Rand is in the planning and design phases for multiple new domestic and international plants based on upgraded CAES technology, and is developing advanced technologies to further improve operating efficiency while reducing CAES' inherently low carbon emissions.

A CAES system uses excess electricity from wind, solar, coal, or nuclear power to compress air to high pressure and store it in an underground cavern. The compressed air is stored energy. When electricity is needed, the compressed air is brought to the surface, heated, and burned with natural gas before expansion through turbines to drive a generator and generate power. Exhaust waste heat is captured and used to improve system performance.

There are many benefits of a CAES plant over a combined-cycle gas turbine plant. A CAES plant allows for a rapid start through high ramping and turn down rates. For example, a CAES plant can ramp up as fast as 26 to 32 MW per minute. In addition, a CAES plant can operate with as little as 10% capacity, significantly below the minimum level required for a comparable combined-cycle gas turbine plant. Most importantly, when in operation, a CAES plant has a carbon footprint that is approximately 50% smaller than a combined-cycle gas turbine plant. CAES provides a buffer between intermittent renewable power and the grid, allowing wind and solar to become base load generators.

**The Need for Bulk Storage:**

As this committee is well aware, the rapid increase in intermittent renewable power, namely wind and solar, has created a growing need for bulk storage. According to the Department of Energy, only two technologies currently exist to handle bulk storage. While there is currently over 21 GW of pumped hydro storage in the United States,

expansion of this technology is limited as a result of the large geographic footprint necessary to install this type of storage. CAES is the only other mature, grid-scale energy storage technology available today. CAES stores far more energy than other technologies – a typical plant can produce 160 MW for several days, while larger plants can exceed 1,000 MW for a week. Although the technology has been proven in commercial operation for almost 25 years, wide adoption of this technology has been limited for a variety of reasons, including financing, infrastructure, and siting opportunities.

In 2012, the Pacific Northwest National Laboratory (PNNL), in connection with Bonneville Power Administration (BPA) and other partners, including Dresser-Rand, released a report highlighting new geographical formations for CAES storage, such as porous rock, which substantially improve location options for CAES beyond the traditional salt dome. Advanced technology offers the potential to improve efficiency and economics of CAES by reducing use of cooling water, reducing natural gas use and emissions, and improve system efficiency, paving the path to widespread adoption.

#### **Advanced CAES – Program Focus:**

Dresser-Rand proposes a collaborative development program with PNNL that will address several technical limitations and allow for a substantial increase in the number of sites where a CAES plant could economically be sited. These system improvements at the same time will increase efficiency and further reduce an already low carbon footprint and other emissions. As a result, the Advanced CAES system would both improve the life-cycle economics and enable widespread application of grid-scale energy storage with expanded geologic storage options. A CAES plant simultaneously increases the utilization and value of existing wind/solar farms by opening the door to further renewable power penetration as bulk storage provides the necessary storage needed to provide additional grid stability.

The proposed research program would focus on three primary areas:

1. Improve CAES air storage deployment opportunities
2. Storage and re-use of compressor discharge heat to reduce fuel use and increase efficiency.
3. Adaptation of dry low-emissions combustor technology for use in CAES.

Successful completion of the collaborative effort and the resulting Advanced CAES system would significantly increase the number of sites in the United States and the world where a CAES plant could economically be sited. In addition, the program would lay the groundwork toward a future CAES carbon-free version – Adiabatic CAES – in which fuel is completely displaced by stored thermal energy from the compressor train.

#### **Improve CAES Air Storage Deployment Opportunities**

PNNL has developed a new wellbore storage technique that would open up significant new opportunities for CAES siting, allowing the re-use of abandoned wellbores and reducing the cost of air storage. Dresser-Rand would work closely with PNNL to further develop and test this technique, validating the approach and demonstrating its potential.

Regardless of site location, PNNL has expressed its desire to partner with industry and utilize its unique microscopy and spectroscopic capabilities in PNNL's Environmental Molecular Sciences Laboratory (EMSL), supercomputing platforms, and thermal energy storage materials expertise to carry out an in-depth study of CAES deployment opportunities and to support design and sub-scale demonstration of the various novel components of an advanced CAES system targeted at solving today's grid-scale energy storage challenges.

#### Heat of Compression Storage

As the CAES turbocompressor train increases air pressure for cavern storage, substantial heat is produced. Existing CAES systems discard this heat energy to cooling water because the heat at low temperature (250 to 300°F) is not useful to the cycle and also require make-up water as a portion is lost to evaporation. There is an advantage if the compression train is configured to achieve higher compression temperature (e.g. 550°F) and a portion of the heat of compression is stored. This heat can be introduced back into the pressurized air prior to expansion to produce electricity, thus using less fuel for electricity production; this is also a measure of efficiency called heat rate (fuel Btu/kW-hr) which is a standard measure for gas turbine systems. The system roundtrip efficiency also increases since the stored heat returns a portion of previously-wasted compressor shaft input power to the cycle. Rather than using this heat of compression, current CAES systems require natural gas combustion systems that are similar to gas turbine power generation systems.

Furthermore, utilizing heat of compression storage, the Advanced CAES system reduces amount of cooling water consumed along with the associated capital equipment. There is also a significant environmental improvement that is realized through increased cycle efficiency by lowering fuel consumption with reduced carbon and other emissions produced per kW-hr of electricity generated. Taken to the logical conclusion in a fully Adiabatic CAES system, cooling water, fuel, and carbon emissions would be completely eliminated.

New research and development is needed to thermodynamically optimize the compressor performance and heat recovery relationship, investigate thermal storage media and heat exchanger options, and optimize the expansion train configuration to best utilize the lower-temperature heat. A full performance model would then be assembled to predict the overall system performance using the optimized equipment and configuration.

The proposed program offers a significant step on the path to a carbon-free Adiabatic CAES system by developing the technology to store heat from a single compressor section without incurring the cost and schedule associated with full system conversion to adiabatic operation. All tools, lessons, and designs gained in this effort would be applicable to a fully Adiabatic system, setting the stage for future development and demonstration.

Incorporating heat of compression storage and re-use from the high-pressure compression section is predicted to increase the system roundtrip efficiency, which is a measure of the complete CAES system, by two to three full percentage points while simultaneously decreasing the heat rate and carbon emissions by up to ten percent. Reductions in plant output can be offset, if necessary, by increased firing temperature using a new low-emissions combustor, described in the next section.

#### Dry Low-NO<sub>x</sub> Combustor

A portion of Advanced CAES expansion train would continue to use natural gas combustion to increase power output and efficiency. The combustion requirements for CAES, however, are unlike any existing gas turbine or engine – a new type of Dry Low Emissions (DLE) combustor is needed that is capable of keeping emissions at very low levels while operating at the high pressures and uniquely high power variation (90% power turndown from max) needed for Advanced CAES.

The Advanced Vortex Combustor (AVC) configuration is uniquely suited to high turndown applications due to its flow geometry, whereby the active combustion zone is protected from the main air flow region and combustion is maintained by stable rotating vortices. Traditional DLE combustors utilize tuned swirl-stabilized fluid dynamics which break down when conditions depart very far from nominal. AVC is not prone to this problem.

Under Department of Energy funding (DOE Contract DE-FE0000493) an annular AVC system for application in small stationary gas turbines was developed with work currently ongoing in Dresser-Rand's Redmond, Washington, Test Center. For application to Advanced CAES, the AVC would be adapted to a can-style configuration and optimized for the pressure, temperature, and wide flow regime. Similarity testing would occur in the existing Redmond pressure vessel to demonstrate acceptable flame stability, fuel efficiency, and emissions.

Replacing the existing CAES combustors with AVC combustors is expected to increase the system round trip efficiency by approximately a percentage point, completely eliminate the need for combustor water injection, and reduce pre-treatment exhaust NO<sub>x</sub> levels to <10 ppmv.

**Conclusion:**

CAES offers a unique solution to improve grid reliability and further enables the use of solar and wind based renewable energy. Existing renewable sources are frequently curtailed in order to ensure grid reliability at times when the levels of renewable energy on the grid exceed the ability to regulate these inherently variable energy sources. CAES also offers a market competitive solution that can significantly reduce fuel use and exhaust emissions when compared to state-of-the-art gas turbine-based, load-following power plants. Through support from the proposed PNNL collaborative program, CAES would be positioned to advance the state of the technology and provide a compelling solution that responds to the pressing need for grid regulation and bulk energy storage in the US and around the world.

Thank you.

**Compressed Air Energy Storage Demonstrations  
Draft Language**

Compressed Air Energy Storage Demonstrations

Section 1. General -

- a) The Secretary shall carry out new demonstrations of compressed air energy storage systems.
- b) The demonstrations shall be regionally diversified and expand on existing technology demonstration programs of interest to the Department of Energy.
- c) The demonstrations shall seek to:
  - 1) Increase renewable power penetration
  - 2) Reduce greenhouse gas emissions
  - 3) Improve grid stability
  - 4) Increase efficiency and reduce fuel use
  - 5) Expand the universe of potential siting of compressed air energy storage systems
  - 6) Reduce manufacturing costs of compressed air energy storage systems

Section 2. Grid-scale technology for renewable integration in the Pacific Northwest -

- a) The Secretary is authorized to proceed with the next stage of the regional compressed air energy storage project initiated by the Pacific Northwest National Laboratory in 2012.

b) The project shall build on the success of previous work and –

- 1) Complete research and development of advanced vortex combustor technologies supported by the National Energy Technology Laboratory in collaboration with the private sector.
- 2) Adapt such improved combustor technologies for utilization in advanced compressed air storage systems.
- 3) Research the use of abandoned wellbores in the Pacific Northwest for compressed air energy storage.
- 4) Begin development of a carbon-free compressed air energy storage system.

Section 3. Authorization of Appropriations –

a) \$8,000,000 shall be authorized over three years to complete research and development of innovative combustor technologies within the Office of Fossil Energy.

b) \$11,000,000 shall be authorized over three years to carry out Sec. 2(b)(2), Sec. 2(b)(3), and Sec. 2(b)(4) of this bill within the Office of Energy Efficiency and Renewable Energy (or Office of Electricity Delivery and Energy Reliability).

**STATEMENT OF THE EDISON ELECTRIC INSTITUTE  
SUBMITTED TO THE  
SENATE ENERGY AND NATURAL RESOURCES COMMITTEE  
ON ENERGY ACCOUNTABILITY AND REFORM LEGISLATION FOR ITS JUNE 9  
HEARING**

**Introduction**

The Edison Electric Institute (EEI) appreciates the opportunity to submit this statement for the record on several of the bills considered by the Committee during its June 9 hearing on energy accountability and reform legislation. We also commend the Committee for considering a wide range of public policy issues that are important to the electric utility industry during its hearings.

EEI is the association of U.S. investor-owned electric utilities, international affiliates, and industry associates worldwide. Our members provide electricity for 220 million Americans, directly and indirectly employ more than one million American workers, and operate in all 50 states and the District of Columbia. With more than \$90 billion in annual capital expenditures, the electric power industry is responsible for providing reliable, affordable, and increasingly clean electricity that powers the economy and enhances the lives of all Americans.

The electricity sector is the most capital-intensive industry in the country, as well as a key critical infrastructure industry. The electricity we provide is essential to the well-being of every American, as well as to economic growth and job creation. Because of this, issues raised at the Committee's June 9 hearing are critical to our member companies.

**S. 1068, to amend the Federal Power Act to protect the bulk-power system from cyber security threats (Risch-Heinrich)**

EEI supports S. 1068, introduced by Senators Risch and Heinrich. The bill would grant the Department of Energy (DOE) authority to order owners and operators of the bulk-power system (BPS) to take immediate actions to avert or mitigate an imminent cyber security threat. EEI acknowledges the need for such limited direct federal authority in certain emergency situations.

The language in S. 1068 represents significant improvement over similar proposals in previous Congresses. Because it is designated as the electricity subsector's Sector-Specific Agency (SSA) for critical infrastructure protection purposes, and because it already has authority to address energy supply emergencies under section 202 (c) of the Federal Power Act (FPA), DOE is the appropriate place for cyber emergency authority to reside. The proposed emergency authority is narrowly focused to address imminent threats, or true emergencies that do not allow time for normal reliability processes or industry response. Less-urgent threats and vulnerabilities would continue to be addressed by the processes and authority designated to the Electric Reliability Organization (i.e., the North American Electric Reliability Council, or NERC) under FPA section 215. The bill's requirement that DOE, to the extent practicable, should consult with bulk-power system owners and operators, NERC, the Electric Subsector Coordinating Council

(ESCC), and other appropriate agencies, should contribute to DOE emergency directives being more focused and effective.

EEI also supports the bill language directing the Federal Energy Regulatory Commission (FERC) to establish a mechanism that permits BPS owners, operators or users an opportunity to seek recovery of costs for emergency actions ordered by DOE. The language does not guarantee cost recovery; it merely affords an opportunity to seek it, with the normal FERC procedural and consumer safeguards. Any rate or charge approved by FERC would have to be just, reasonable, and not unduly discriminatory. Given the extraordinary circumstances that would trigger DOE's exercise of authority under the bill (which could not be anticipated in a regular rate proceeding), and similarly extraordinary potential actions that could be required, it is only fair to allow an opportunity to recover the costs incurred from such actions.

EEI would also support the addition of provisions providing liability protections for actions taken to comply with a DOE emergency order, but we understand this may fall outside the Committee's jurisdiction.

**S. 1181, to expand the Advanced Technology Vehicle Manufacturing program to include commercial trucks and U.S. flagged vehicles (Cassidy); S. 1408, to provide for a program of research, development, demonstration, and commercial application in vehicle technologies (Peters); S. 1449, to add certain medium-duty and heavy-duty vehicles to the advanced technology vehicles manufacturing incentive program (Stabenow)**

In previous testimony to the Committee, EEI highlighted the benefits of electrifying the transportation sector. We support both the Stabenow and Cassidy bills to expand the advanced technology vehicle manufacturing (ATVM) program to include medium and heavy-duty trucks. Similarly, EEI is supportive of Senator Peters' bill to reauthorize the Department of Energy's Vehicle Technology Program. The Peters bill, too, includes a section on medium and heavy-duty trucks, as well as a section on non-road mobile equipment. Electrification is not just for transportation vehicles, but can also be used at airports, seaports, mines, and agricultural facilities. For example, the Port of Savannah is replacing its diesel crane fleet. When complete, the all-electric crane fleet will allow the Georgia Port Authority to avoid the use of 6 million gallons of diesel each year, resulting in a net savings of nearly \$10 million annually.

**S. 1221, Bulk-Power System Reliability Impact Statement Act (Murkowski)**

EEI has filed testimony and supplemental comments with FERC on the importance of the Commission exercising an active oversight and coordination role on electric reliability, wholesale electricity markets and operations, and energy infrastructure as the Environmental Protection Agency's (EPA's) proposed Clean Power Plan is finalized and implemented, including working with EPA to develop a Reliability Monitoring and Assessment process. S. 1221 appears to be consistent with this principle, which would be applied to other proposed major rules as well.

EEI agrees with the testimony of Duane Highley, President and CEO of the Electric Cooperatives of Arkansas, that it may be more appropriate for NERC, in its role as Electric

Reliability Organization, to create the reliability impact statements under Section 4 of the bill, instead of the Reliability Coordinators, whose responsibilities are focused more on day-to-day operations of the system.

**S. 1241, Enhanced Grid Security Act (Cantwell)**

The electric sector is actively engaged in initiatives to enhance grid security. EEI does not oppose S. 1241, but we do have questions and concerns about the legislation.

The electric power industry is committed to protecting the nation's electric grid from cyber threats and to enhancing its cyber defenses. The electric sector and nuclear sectors are the only critical infrastructure sectors with mandatory and enforceable cybersecurity standards, which continue to be updated as the threat landscape evolves. Beyond standards, the electric sector has developed close industry and government partnerships to address dynamic threats, including the ESCC, which serves as the principal forum for strategic planning among electric utility CEOs and senior government officials to improve sector-wide resilience for cyber and other grid security threats.

Generally, the legislation includes several provisions related to the identification and mitigation of electric sector vulnerabilities, but the bill does not address the protection of sensitive security information that may be gathered or submitted as part of those processes. In addition, the bill does not address liability protections for utilities that participate in the proposed initiatives. We are also concerned that some of the bill's provisions may duplicate or conflict with existing or ongoing electric sector initiatives, including the strengthening and expansion of participation in the Electric Sector Information Sharing and Analysis Center (ES-ISAC), which is already underway, and development of an Electricity Subsector Cybersecurity Capability Maturity Model, which already exists. Similarly, the Committee should consider whether language directing DOE to establish a new cyber-testing and mitigation program to identify vulnerabilities of energy sector supply chain products could duplicate or conflict with existing energy sector cyber assurance programs, including those at DOE and the Department of Homeland Security.

**S. 1256, Advancing Grid Storage Act (Franken)**

S. 1256 would require DOE to establish programs for research, demonstration and deployment loans, and technical assistance and grants to promote energy storage. Affordable, safe and reliable utility-scale energy storage is important to facilitating the integration of renewable and distributed resources, increasing reliability and resiliency, and providing enhanced grid support services.

As the economics of storage improve, many utilities across the country are making greater investments in storage technology. But, the federal government can play a role in accelerating this trend. EEI believes S. 1256 represents a good start towards an appropriate framework for federal investment in the development and deployment of new energy storage technologies. However, we believe it is important that the bill complement, not duplicate, existing DOE energy storage programs.

**S. 1258, to require DOE to establish a distributed energy loan program (Franken)**

S. 1258 creates a loan program to subsidize the planning, design, and deployment of distributed energy systems, including renewables, combined heat and power (CHP), microgrids, energy storage, and district energy systems. The bill authorizes \$250 million for the period of FY 2016-2020 available until expended. EEI opposes the creation of additional subsidies for mature energy technologies.

S. 1258 also creates a technical assistance and grant program to similarly subsidize the design of distributed energy systems. It is of note that DOE already has seven regional CHP Technical Assistance Partnerships (<http://energy.gov/eere/amo/chp-technical-assistance-partnerships-chp-taps>) that offer technical assistance and market analysis. The mission of the CHP TAPS (formerly called Clean Energy Application Centers) is to “promote and assist in transforming the market for CHP, waste heat to power, and district energy technologies/concepts throughout the United States.” This existing program offers technical assistance, but not in a manner that is as heavily-subsidized as is proposed in the Franken bill.

**S. 1274, to reauthorize federal agencies to enter into long-term contracts for acquisition of energy (Hirono)**

Under current law (40 U.S.C. 501(b)(1)(B)) non-defense federal agencies may sign “a contract for public utility services...for a period of not more than 10 years.” Defense facilities (under 10 U.S.C. 2922a) may enter contracts for up to 30 years “for the provision and operation of energy production facilities on real property under the Secretary’s jurisdiction or on private property and the purchase of energy produced from such facilities.”

Senator Hirono’s bill adds a section Title 42 of the U.S. Code that, notwithstanding the current 10-year term limit for non-defense facilities, contracts “for the acquisition of renewable energy or energy from cogeneration facilities for the Federal Government may be made for a period not to exceed 30 years.” The bill also calls on DOE to publish a standardized energy purchase agreement for agencies to acquire renewables and cogeneration.

We suggest that the bill clarify that these power purchase agreements should be consistent with applicable state laws and regulations regarding the provision of utility services to ensure that federal facilities do not violate state retail electric service laws and regulations. Furthermore, while standardized contracts can help in some cases, contracts for on-site generation often need customized provisions as well.

**S. 1275, Job Creation through Energy Efficient Manufacturing Act of 2015 (Merkley)**

The Merkley bill would set up a \$250 million federal program to create state-based financing programs to subsidize energy efficiency and renewable energy at manufacturing and industrial facilities. If renewable energy and energy efficiency projects at manufacturing and industrial facilities are cost-effective, manufacturers will implement them. These businesses do not need a federal subsidy to install already-mature technologies.

**S. 1277, Federal Energy Savings Enhancement Act of 2015 (Hirono)**

Current law (42 U.S.C. 8287) allows federal agencies to enter into energy savings performance contracts (ESPCs) with utilities and energy service companies. The Hirono bill would expand ESPCs to allow for contracts covering the supply, delivery and transport of fuel for nonbuilding applications. EEI has a number of concerns with S. 1277.

A traditional ESPC is structured so that a federal agency pays back the contract with energy savings. This expanded ESPC for nonbuilding applications contains different savings – not only energy savings but also “secondary savings” that include “environmental benefits,” “the benefits of increased efficiency in the production of electricity,” and “revenues received by the Federal Government from the sale of electricity from production.”

We oppose adding secondary savings to the payback calculation for performance contracting. Existing performance contracting utilizes measurement and verification to account for energy savings; environmental benefits are not so easily measured and verified. We believe energy performance contracts should remain focused on energy savings, using the standard methodology for measurement and verification.

We believe there is merit in being able to use ESPCs and utility energy service contracts (UESCs) to promote alternative fuel vehicles within the federal fleet. However, we have concerns about including in the definition of nonbuilding application, “any federally owned equipment used to generate electricity or transport water.” We believe that this language – first proposed as a study in Section 518 of the 2007 energy bill – is meant to apply only to federally-owned hydroelectric facilities. However, as written, this definition could be much broader than that. If the provision is intended to cover federally-owned hydro facilities, we recommend tightening the language to eliminate confusion.

**S. 1293, to establish DOE as the lead agency for coordinating all requirements under Federal law with respect to eligible clean coal and advanced coal technology generating projects (Heitkamp-Manchin) and S. 1306, Energy Independence Investment Act of 2015 (Manchin-Heitkamp)**

S. 1293 and S. 1306 are intended to promote the development, deployment and commercial viability of advanced clean coal technologies, a goal that EEI supports.

As the electric generation fleet continues to undergo dramatic changes, EEI’s member companies remain committed to their core mission: to provide a reliable, affordable, and environmentally sustainable supply of electricity to their customers. A balanced and diverse mix of fuel sources – including coal – will continue to be a critical part of the industry’s strategy for fulfilling this important mission.

**S. 1405, Severe Fuel Supply Emergency Response Act of 2015 (Franken)**

Utilities are required by DOE to submit an Electric Emergency Incident and Disturbance Report (Form OE-417) for a number of emergency situations, including physical attacks, cyber

events, vandalism, natural disasters and fuel supply deficiencies. For fuel supply deficiencies, utilities file an OE-417 when “Fuel inventories [are]...at 50 percent or less of normal, with projected continued downward trend; emergency generation requiring abnormal use of a particular fuel.” ([https://www.oe.netl.doe.gov/docs/OE417\\_Instructions\\_03312018.pdf](https://www.oe.netl.doe.gov/docs/OE417_Instructions_03312018.pdf))

While this situation is rare, it has happened from time to time. During the winter of 2014-2015, many EEI members had severe disruptions in their railroad shipments of coal. Last year, testifying at the FERC, one EEI member company noted that it was down to four days of coal supply and was forced to shut down four coal-fired units to conserve inventories at larger plants, as well as resort to trucking coal to another plant, all due to backlogs in rail deliveries.

EEI supports Senator Franken’s bill, S. 1405, which would amend the FPA to require DOE to coordinate a federal response to severe fuel supply emergencies. Following the declaration of an emergency – defined as a coal supply deficiency reported to DOE on Form OE-417 that has the potential to affect at least 500 megawatts (MW) of electricity generation or 100,000 electricity customers – DOE is instructed to investigate the circumstances of the disruption; notify FERC and the Surface Transportation Board (STB); convene a meeting with STB, FERC, and others; and post recommendations for action that STB or FERC could consider to alleviate the supply emergency.

#### **S. 1407, Public Land Renewable Energy Development Act (Heller)**

We recognize that identifying areas on public land that are appropriate for the location of wind, solar, and geothermal generation, and streamlining environmental review and permitting of such generation, can facilitate the development of these resources, as can providing for the allocation of revenues received by the federal government related to these facilities.

Our potential concerns with S. 1407 focus on Sections 213 and 218, related to royalty and potential other payments that are to be made as a condition of obtaining a “lease, right-of-way, permit, or other authorization for the development of wind or solar energy on covered lands,” and Sections 214 and 215, which apply provisions of the Federal Oil and Gas Royalty Management Act, including civil and criminal enforcement provisions, to leases, permits, rights-of-way or other authorizations while preserving existing compliance and enforcement authority under the Federal Land Policy and Management Act (FLPMA) and other laws.

Section 213 would establish a royalty payment for use of federal land for wind and solar energy development. Section 213(d) states that such fees would be the only rent or other such payment to the federal government for sale of electricity produced under a lease, suggesting, but not specifying, that the royalties are meant to replace right-of-way fees under FLPMA for use of land under the jurisdiction of the Bureau of the Land Management (BLM) and the U.S. Forest Service (USFS). Section 218 refers back to the FLPMA rent section 504(g), clouding the issue.

Under FLPMA, BLM and USFS charge holders of rights-of-way on federal lands rent payments that reflect the fair market value of the rights-of-way. For non-linear rights-of-way (except for communication), the agencies set the rents through a process based on comparable commercial practices, appraisals, competitive bidding or other methods. The annual rental for a

special use authorization is based on the fair market value of the rights and privileges authorized, as determined by appraisal or other sound business management principles. For linear rights-of-way (except for communication), the rents are based on zonal appraised land values.

Among other things, EEI is concerned that the phrase “development of wind or solar energy on covered lands” is ambiguous as to whether development encompasses the generation facility or whether it also extends to the linear facilities (transmission, distribution, substations) necessary to deliver the electricity to market. Section 367 of the Energy Policy Act of 2005 requires land-use fees for linear rights-of-way to be based on the zonal appraised value of land, a more traditional approach for assessing fair market value of the land. EEI strongly supported Section 367 and would be concerned about any potential for the Section 213 approach, which establishes a royalty payment based on a percentage of the gross value of electricity, to undercut the requirements of Section 367.

With respect to replacing the current method for assessing fees for the use of federal lands for non-linear solar and wind energy and development, EEI is taking no position pending further discussion with its members. Similarly, EEI would like to understand better the implications of Sections 214 and 215 for both linear and non-linear facilities in light of current practices.

**S. 1422, Energy Workforce for the 21st Century Act of 2015 (Heinrich)**

In our previous testimony in support of S.1304, Senator Cantwell’s workforce bill, EEI highlighted the work that utilities are doing through the Center for Energy Workforce Development. We similarly support Senator Heinrich’s workforce bill, S.1244.

The bill calls for making education and training for underrepresented groups for energy and manufacturing jobs a national priority and establishes a comprehensive program to increase the amount of skilled workers for those sectors. EEI supports these goals and this approach for developing a more diverse energy workforce.

**S. 1434, Energy Storage Promotion and Deployment Act of 2015 (Heinrich)**

EEI strongly opposes S. 1434, which would amend the Public Utility Regulatory Policies Act (PURPA) to establish a mandatory energy storage portfolio requirement on certain retail electricity suppliers. The bill would require certain retail electricity suppliers to have available on their systems energy storage devices with power capacity ratings that increase through 2025.

Electric utilities are investing in energy storage because of the benefits energy storage systems can offer. Energy storage systems have a number of major applications that help utilities manage the grid. Some energy storage technologies, such as batteries, flywheels, capacitors, pumped hydro, and compressed air energy storage, can provide grid support services that help maintain the reliability of the electric system. These technologies can help manage the variability in the grid’s frequency, level load, and maintain system frequency stability during emergency operating conditions. Other energy storage technologies can help with load shifting to reduce peak demand, while still others help provide emergency power during outages.

Energy storage systems are becoming increasingly important as more electricity generated from variable renewable energy resources and distributed generation is added to utilities' systems. Utilities cannot control the output from these resources to match electricity demand. As a result, technologies that can store electricity generated from these resources so it is available when needed will help improve electric reliability and lessen utilities' need to build additional generation.

A total of 115 MW of energy storage has been deployed since the first quarter of 2013 across the residential, non-residential, and utility markets. Utilities currently deploy about 97 MW of energy storage, representing the largest market for energy storage technologies.<sup>1</sup> GTM Research estimates that the U.S. energy storage market will grow significantly over the next five years, resulting in an 848 MW annual market in 2019.<sup>2</sup>

One of the biggest barriers to greater deployment of energy storage is the cost. System prices are continuing to drop, but energy storage remains extremely expensive. For example, utility-scale storage system prices are estimated to range from \$800 per kilowatt-hour (kWh) to \$1,250 per kWh; estimated non-residential storage system prices range from \$1,000-\$1,500 per kWh; and estimated residential storage system prices range from \$1,300-\$2,000 per kWh.<sup>3</sup>

On a levelized cost per megawatt-hour (MWh), battery energy storage, for example, is more expensive than virtually every other energy source, including those that provide the same grid benefits. While the levelized cost of gas combined cycle generation ranges from \$61 per MWh to \$87 per MWh, the levelized cost of battery storage ranges from \$265-\$324 per MWh. Even the levelized cost of residential rooftop solar photovoltaic—which is one of the most expensive electricity generation options—ranges from \$180-\$265 per MWh.<sup>4</sup>

Instead of mandating an energy storage portfolio requirement on some utilities, we believe the federal government should focus on investing in energy storage research and development to help reduce system costs and make the technologies more affordable. Utilities have many incentives for investing in energy storage technologies and are already doing so where it makes sense to maintain reliability and help grid operations. However, imposing an expensive mandate on some utilities that will drive up electricity prices for homes and businesses is the wrong public policy approach. Instead, as noted earlier, EEI supports the approach taken by Senator Franken's bill, S. 1256, Advancing Grid Storage Act, which would focus on federal investment in the development and deployment of new energy storage technologies.

Interestingly, S. 1434 does not apply the federal mandate evenly and fairly to all retail electricity suppliers. Instead, the energy storage mandate applies only to shareholder-owned electricity suppliers, but not to government-owned utilities or electric cooperatives. If supporters of a federal energy storage mandate want to boost energy storage throughout the country, as they claim, then the bill's mandate should apply to all retail electricity suppliers, not just selectively to

<sup>1</sup> GTM Research and Energy Storage Association, "U.S. Energy Storage Monitor, Q1 2015: Executive Summary," May 2015, 6.

<sup>2</sup> Ibid, 12.

<sup>3</sup> Ibid, 7.

<sup>4</sup> Lazard, "Levelized Cost of Energy Analysis – Version 8.0," 2014, 2.

some. This approach would unfairly increase electricity prices for consumers of shareholder-owned retail electricity suppliers.

As we have noted in previous statements, our industry has had many bad experiences with congressionally-imposed energy mandates that have raised electricity prices for our consumers. For example, the Fuel Use Act of 1978 prohibited the use of natural gas to produce electricity because natural gas resources were expected to become scarce; that prohibition was finally repealed in 1987. PURPA, which also was enacted in 1978, mandated that utilities purchase certain types of power from certain energy producers at government-determined prices. Electricity consumers continue to pay above-market prices for electricity because of the PURPA mandatory purchase obligation. We do not need a repeat with another federal mandate on electric companies.

#### **Conclusion**

EEI appreciates this opportunity to submit this statement for the record, and commends the Committee for taking a fresh look at the public policy issues facing a changing electric power industry. We look forward to working with the Committee as it moves forward with energy legislation.

Testimony Submitted to  
United State Senate  
Committee on Energy and Natural Resources  
by  
Energy Storage Association

Chairman Murkowski, Ranking Member Cantwell, and members of the Committee, thank you for the opportunity to submit written testimony for the record regarding numerous bills related to energy efficiency, infrastructure, and supply that together can create a vision for and guide our nation's overarching energy policy in the coming years. The Energy Storage Association ("ESA") applauds this effort and looks forward to serving as a resource as a final bipartisan bill is crafted.

ESA is an industry association<sup>1</sup> that was established over 25 years ago to foster development and commercialization of energy storage technologies. Since then its mission has been the promotion, development and commercialization of competitive and reliable energy storage delivery systems for use by electricity suppliers and their customers. ESA members represent a diverse group of entities, including electric utilities, energy service companies, independent power producers, technology developers involved with advanced batteries, flywheels, thermal and compressed air energy storage, pumped hydro, supercapacitors and component suppliers, such as power conversion systems. ESA's members also include researchers who are committed to advancing state-of-the-art energy storage solutions. The

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<sup>1</sup> Energy Storage Association website: <http://energystorage.org>

opinions stated in this testimony represent ESA, not necessarily the views of any individual member of the association.

ESA engages in regulatory, legislative and policy efforts and includes among its membership leaders in the energy storage marketplace. Member companies have firsthand knowledge of the regulatory challenges that need to be overcome to finance and operate commercial-scale energy storage facilities and are working to promote the development and commercialization of competitive and reliable energy storage systems within the United States.<sup>2</sup>

ESA supports many of the bills introduced by Members on both sides of the aisle. In particular, we support bills that call for grid modernization, such as S. 1207, for transformative grid innovation; S. 1232, the Smart Grid Act of 2015; and S. 1243, the Grid Modernization Act of 2015. Energy storage technologies and applications will be key elements in a smarter grid that can enhance consumer choice while preventing increased customer expense. Allowing for utilities to invest in energy storage technologies and applications that provide more flexible solutions will be important to assuring that their business models can evolve and remain robust. We also support including energy storage as part of the menu of distributed energy resources states should consider, as in S. 1213, Free Market Energy Act and S. 1201, Clean Distributed Energy Integration Act. ESA believes that, with smarter grid communication and control technologies, the distribution side of the grid can increasingly provide resources that balance the supply side in real time. ESA also supports efforts to increase system resilience as in S. 888 to encourage regional resilience partnerships and S. 1227 to encourage microgrid development in remote communities. All of these bills represent myriad ways in which innovation can participate

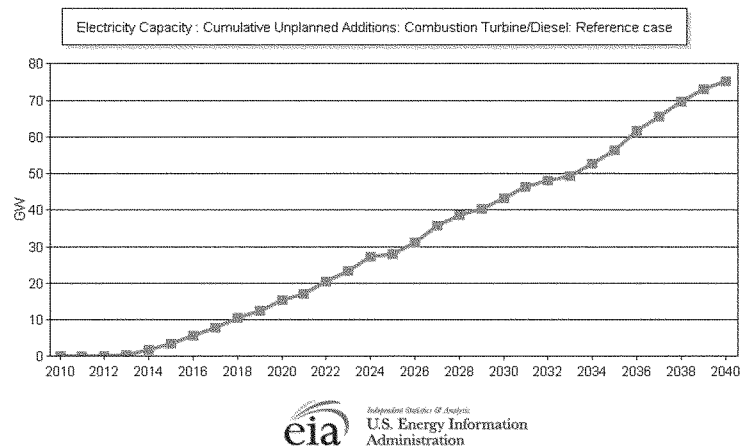
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<sup>2</sup> For detailed information on energy storage projects deployed, see the Department of Energy Office of Electricity Delivery and Energy Reliability's "Global Energy Storage Database" at [www.energystorageexchange.org](http://www.energystorageexchange.org).

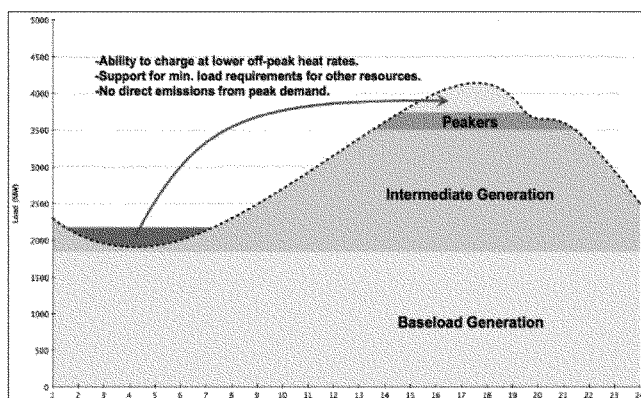
to improve and modernize our grid—through local incentives, state regulatory guidance, and bulk power market policies.

ESA strongly supports S. 1434, Energy Storage Deployment and Promotion Act, that would target 2% of utility average system peak demand to be met with energy storage technologies by 2025. This Act sets an energy storage portfolio standard that would lower the need for peaking generation, save consumers money, and reduce system emissions by deploying U.S. energy storage innovative technologies. The EIA has projected that the U.S. will need 40 Gigawatts of peak generation in the next 15 years (see Figure 1). This peak could be met with cost-effective energy storage technologies, reducing the need for inefficient peaking generation while increasing the capacity for existing resources across the system.

*Figure 1. Energy Information Administration Peak Projections*



Energy storage can provide the ability to shift peaks from times when electric costs are high to times when cost is lower, reducing strain on the grid and allowing all resources to perform more efficiently. Figure 2 show that shift in peak demand.

*Figure 2. Peak Shifting Illustration*

Storage resources also provide a multitude of other benefits that include increasing system flexibility, provision of ramping capability, deferral of transmission and distribution (T&D) capital expenditures, and enhancing overall power supply resiliency. Federal legislation through FERC Order 1000 has already provided the framework for consideration of non-wires alternatives to transmission projects. In addition, at the state level there have been various initiatives to consider energy storage resources in lieu of T&D projects. For instance, in California, the state Commission proposed the idea of “preferred resources” which includes energy storage to address critical system needs in resource constrained areas. Similarly in New York based on the Reforming the Energy Vision (REV) process, several state utilities recently filed plans to consider non-wires alternatives to proposed T&D projects.

ESA believes that, at this critical juncture in the industry where states are moving forward with several initiatives, appropriate federal policies like S. 1434, to incentivize and

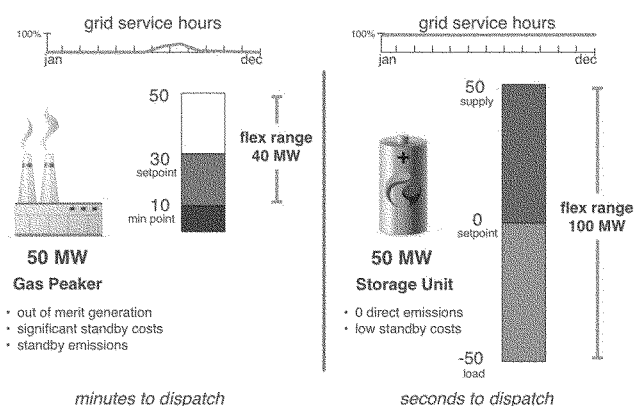
provide market structures for energy storage resources will go a long way in encouraging faster adoption of technological advancements and enabling higher levels of efficiencies in energy markets.

Another legislative proposal supported by ESA is S. 1256, Advancing Grid Storage Act of 2015, that would provide financing in the form of grants and loans for energy storage deployment. This program would help mitigate perceived risk from utilities and public utility commissioners, through technical and financial resources for deployment of energy storage that can enhance the reliability and resilience, and provide ancillary services to the grid. ESA recommends that any incentives and ownership should be open to all market participants, including third party providers. ESA members have technologies that are ready for deployment; this approach will increase the speed and effectiveness with which they are deployed.

While ESA is supportive of many of these legislative proposals, we disagree with the language in S. 1222, the Continue of Electric Capacity Resources Act which defines “electric capacity resource” as “an electric generating resource, as measured by the maximum load-carrying ability of the resource, exclusive of station use and planned, unplanned, or other outage or derating.” ESA would counter that, based on the current capacity market and operational evidence in organized and regional transmission systems, “electric capacity resource” should have a far broader definition to include any resource that commits to providing capacity when called upon. An example of such a resource can be found in the recent Southern California Edison Request for Offer where over 260 megawatts of energy storage will be used to provide resource adequacy and avoid build-out of new peak generation. Operating experience has shown that energy storage can serve as a fast-acting, responsive resource that can help independent system operators and electric utilities maintain grid reliability. Limiting capacity markets to

traditional generation resources would essentially remove the ability of flexible resources like energy storage to be called upon to respond. Figure 3 illustrates how energy storage can provide double the flexible capacity of a traditional generation unit.

*Figure 3: Energy Storage Flexible Range*



In summary, ESA is in agreement that the Committee should continue to develop bipartisan legislation that moves our electric grid into the future, spurring continued innovation to reduce cost, increase reliability and resilience, and allow for consumer engagement and choice. Including energy storage as part of that smarter grid will provide the appropriate tools for local, state and regional entities to take full advantage of technologies and applications and make that 21<sup>st</sup> century grid a reality.

We look forward to addressing any questions the Committee has about ESA and energy storage. Thank you for the opportunity to submit this testimony.

Respectfully submitted by,

Energy Storage Association, Washington, DC

**Statement for the Congressional Record**  
**Supporting The Protecting States' Rights to Promote American Energy Security Act**  
**Office of Senator Orrin G. Hatch**  
*June 9, 2015*

Chairwoman Murkowski and Ranking Member Cantwell, I wish to thank both of you for holding this hearing on energy accountability and reform. I welcome this opportunity to encourage my colleagues to support the Protecting States' Rights to Promote American Energy Security Act (S.15). This bill prevents duplicative efforts to regulate hydraulic fracturing while reinforcing the effective regulatory framework many states already have in place. By curbing wasteful spending and empowering states to create and enforce regulatory programs that meet localized needs, this legislation not only saves the taxpayer money; it also reaffirms the principle of federalism at the heart of our Constitution.

There is no reason the federal government should regulate activities that states already regulate effectively. Such overreach defies common sense and undermines the ability of our states to govern themselves. Unfortunately, the Bureau of Land Management's (BLM) new rules on hydraulic fracturing do exactly that. These rules disregard states' demonstrated ability to properly regulate hydraulic fracturing in a way that strengthens energy development while also protecting the environment.

By superimposing federal regulations over successful state programs, the BLM ignores the millions of dollars states have already invested in developing effective regulatory systems for hydraulic fracturing. Neglecting the states' efforts might imply that state programs are ineffective, but that is simply not the case. For decades, my home state of Utah has safely and successfully regulated hydraulic fracturing in a way that protects the environment. In fact, under state oversight of hydraulic fracturing, there has never been any evidence of harm to human health or groundwater contamination in any state. Just this month, the Environmental Protection Agency (EPA) corroborated this finding when it confirmed that hydraulic fracturing activities in the U.S. have not led to any significant impacts on the quality of drinking water. The EPA's report is based upon nearly five years of research—the most complete set of scientific data to date on the effects of hydraulic fracturing on water quality. In this study, the agency could not find a single instance of a properly drilled well that contaminated water resources.

Oil and gas producing states have demonstrated time and again that they are more than capable of regulating hydraulic fracturing activities. Given the states' proven track record, the BLM's new rules are both unnecessary and duplicative; they are a solution in search of a problem that does not exist. Moreover, these rules are a financial burden that will hamper the economy by increasing costs for development on public lands.

My bill recognizes the states' demonstrated ability to regulate hydraulic fracturing and allows them to continue regulating this activity without federal government interference. Importantly, however, this bill allows the BLM to promulgate baseline standards in states where regulations over hydraulic fracturing do not already exist. This bill ensures that the federal government can do its job without encroaching on the ability of state governments to regulate

their own activity. Most importantly, it preserves our environment while strengthening our ability to develop our country's rich supply of natural resources.

Under the responsible stewardship of state regulators and industry, hydraulic fracturing is a boon to the US economy. Supporting states in their efforts to regulate hydraulic fracturing will allow us to reap the full benefits of this growing industry and usher in a new era of domestic energy development that is both safe and appropriately regulated. Passing this bipartisan bill is as sensible as it is necessary. I strongly urge the committee to support this legislation.

**PUBLIC WITNESS TESTIMONY BY THE HEALTH PHYSICS SOCIETY TO THE  
SENATE ENERGY AND NATURAL RESOURCES COMMITTEE ON A HEARING HELD  
ON JUNE 9, 2015 THAT RECEIVED TESTIMONY ON ENERGY  
ACCOUNTABILITY AND REFORM LEGISLATION.**

On behalf of the Health Physics Society (HPS), this written testimony for the record on energy accountability and reform legislation is submitted.

The Health Physics Society is a nonprofit scientific professional organization with over 4,000 members nationwide whose mission is excellence in the science and practice of radiation safety. Since its formation in 1956, the Society has represented the largest radiation safety society in the world, with a membership that includes scientists, safety professionals, physicists, engineers, attorneys, and other professionals from academia, industry, medical institutions, state and federal government, the national laboratories, the military, and other organizations. Society activities include encouraging research in radiation science, developing standards, and disseminating radiation safety information. Society members are involved in understanding, evaluating, and controlling the potential risks from radiation relative to the benefits it offers the general population.

On the subject of H.R. 35, the Low-Dose Radiation Research Act of 2015, which passed the House of Representatives on January 7, 2015, the Society considers the most important aspect of this bill to be the research itself, and while a sound research plan is necessary to conduct quality research, it would be counter-productive to allow the planning phase to overshadow the actual conduct of research. The detailed planning of experimental design and endpoints is best left to the scientists conducting the specific research, with guidance as to those broad areas that should be investigated (specifically, both radiobiology and epidemiology should be included at a minimum). As to the best entity to develop a plan, the Society does not take a position, but does note that there are many

competent bodies, including the National Council on Radiation Protection and Measurements (NCRP), and the National Academies of Sciences (NAS), as well as the Department of Energy, Office of Science.



## HEALTH PHYSICS SOCIETY

*"Specialists in Radiation Safety"*

**Barbara L. Hamrick, CHP, JD**  
**President, Health Physics Society**  
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February 10, 2015

Sen. Lisa Murkowski  
 Chairperson  
 Energy and Natural Resources Committee  
 United States Senate  
 Washington, DC 20510

Sen. Maria Cantwell  
 Ranking Member  
 Energy and Natural Resources Committee  
 United States Senate  
 Washington, DC 20510

Dear Senators,

As the President of the Health Physics Society, I am writing you to express the Society's strong support of H. R. 35, the Low-Dose Radiation Research Act of 2015, which passed the House of Representatives on January 7, 2015.

The Health Physics Society is a nonprofit scientific professional organization with over 4,000 members nationwide whose mission is excellence in the science and practice of radiation safety. Since its formation in 1956, the Society has represented the largest radiation safety society in the world, with a membership that includes scientists, safety professionals, physicists, engineers, attorneys, and other professionals from academia, industry, medical institutions, state and federal government, the national laboratories, the military, and other organizations. Society activities include encouraging research in radiation science, developing standards,

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HEALTH PHYSICS SOCIETY

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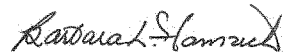
As passed by the House of Representatives, H.R 35 ensures the continuance and enhancement of the Department of Energy's (DOE) Low-Dose Radiation Research Program, which focuses on the health effects of ionizing radiation in the low dose range. The bill also directs the National Academies of Science to formulate a long-term strategy to resolve the extent to which low-dose radiation may pose health risks to humans, and requires DOE to develop a five-year research plan that responds to the Academies' recommendations.

A greater understanding of the effects of low dose radiation on humans will not only add to our body of knowledge on the subject but it will also enable us to make better decisions on what are the proper levels, procedures, and protections needed when our citizens are subject to exposure to sources of low dose radiation.

Previously, while the program was fully funded by DOE, great strides were made in understanding the biological responses of human (and other animal) cells to low dose radiation. The research identified several protective responses by the cells exposed to low dose radiation, in contrast to the damaging changes in cells induced by high radiation dose. It is critical that additional research be conducted to link these responses at the cellular level to changes in cancer frequency in humans. The United States was once the leader in radiobiology research, but due to DOE's decision to withhold funding from the program, we have fallen woefully behind, and the vast amounts of data generated by the research already performed is sitting idle, waiting for more study and analysis.

Please feel free to get back to me with any questions you may have on this legislation or any subject involving radiation safety. Both the entire Health Physics Society and myself stand ready to assist you as issues of radiation safety come before you and your staffs.

Sincerely,

A handwritten signature in black ink, appearing to read "Barbara L. Hamrick". The signature is fluid and cursive, with the first name "Barbara" being more prominent.

Barbara L Hamrick, CHP, JD  
President, Health Physics Society



Testimony

Submitted By

The

Independent Petroleum Association of America

To

The

Committee on Energy and Natural Resources

U.S. Senate

Hearing

On

Energy Accountability and Reform Legislation

June 9, 2015

This testimony is filed on behalf of the Independent Petroleum Association of America (IPAA), the American Association of Professional Landmen (AAPL), the Association of Energy Service Companies (AESC), the International Association of Drilling Contractors (IADC), the International Association of Geophysical Contractors (IAGC), the National Stripper Well Association (NSWA), the Petroleum Equipment Suppliers Association (PESA), and the following organizations:

- Arkansas Independent Producers and Royalty Owners Association
- California Independent Petroleum Association
- Coalbed Methane Association of Alabama
- Colorado Oil & Gas Association
- East Texas Producers & Royalty Owners Association
- Eastern Kansas Oil & Gas Association
- Florida Independent Petroleum Association
- Idaho Petroleum Council
- Illinois Oil & Gas Association
- Independent Oil & Gas Association of New York
- Independent Oil & Gas Association of West Virginia
- Independent Oil Producers' Agency
- Independent Oil Producers Association Tri-State
- Independent Petroleum Association of New Mexico
- Indiana Oil & Gas Association
- Kansas Independent Oil & Gas Association
- Kentucky Oil & Gas Association
- Louisiana Oil & Gas Association
- Michigan Oil & Gas Association
- Mississippi Independent Producers & Royalty Association
- Montana Petroleum Association
- National Association of Royalty Owners
- Nebraska Independent Oil & Gas Association
- New Mexico Oil & Gas Association
- New York State Oil Producers Association
- North Dakota Petroleum Council
- Northern Montana Oil and Gas Association
- Ohio Oil & Gas Association
- Oklahoma Independent Petroleum Association
- Panhandle Producers & Royalty Owners Association
- Pennsylvania Independent Oil & Gas Association
- Permian Basin Petroleum Association
- Petroleum Association of Wyoming
- Southeastern Ohio Oil & Gas Association
- Tennessee Oil & Gas Association
- Texas Alliance of Energy Producers
- Texas Oil and Gas Association
- Texas Independent Producers and Royalty Owners Association
- Utah Petroleum Association
- Virginia Oil and Gas Association

West Slope Colorado Oil & Gas Association  
 West Virginia Oil and Natural Gas Association  
 Western Energy Alliance

Collectively, these groups represent thousands of independent oil and natural gas explorers and producers, as well as the service and supply industries that support their efforts. Independent producers drill about 95 percent of American oil and natural gas wells, produce about 54 percent of American oil, and more than 85 percent of American natural gas.

In addition to the specific statements made herein, we support testimony submitted separately by the participants in this testimony.

While this hearing addressed a broad array of bills, this testimony addresses our support for S.1312, The Energy Supply and Distribution Act of 2015. Among the provisions of this legislation are sections that would expand America's opportunity to export surplus volumes of U.S. crude oil. We strongly support enactment of S.1312. The reasons are numerous.

**The United States ban on the export of its crude oil is unnecessary**

In 1975, the United States government enacted limitations on the export of crude oil to protect American consumers from price volatility on the world market. Today, America has an abundance of energy supplies, brought on by the advancement of hydraulic fracturing and horizontal drilling technology. The United States is now the world's largest producer of oil and natural gas – surpassing Saudi Arabia and Russia. However, the laws that govern America's crude oil exports are outdated and inconsistent. While the surplus of American crude oil cannot be exported, there are currently no restrictions on exporting U.S. gasoline, diesel, jet fuel, and other forms of fossil energy.

**Crude oil exports will not adversely impact America's gasoline prices**

*Gasoline prices are tied to international oil prices and set by the global market.* U.S. Secretary of Energy Ernest Moniz confirmed at a February 2015 Senate hearing that if the United States exported its surplus of crude oil, there would be no change or even “minor decreases” in the price of U.S. gasoline. Adding more reliable American energy supplies to the global market will reduce market volatility and help stabilize international oil prices. Today, the export ban puts United States companies at a competitive disadvantage, preventing them from competing on equal footing with international state-owned and private competitors in the very global marketplace that sets the energy prices driving their businesses.

**The economic benefits of exporting crude oil are extensive**

Exporting the surplus of American crude production will unleash the full potential of America's energy renaissance. Numerous independent and non-political economic studies have confirmed that repealing the crude oil export ban will lead to more good-paying American jobs, reduced pressure on gasoline prices, increased American energy production, greater national security, and will strengthen America's credibility around the world. Additionally, repealing the crude exports ban would provide America's energy producers with competitive access to the global trade market, which will further reduce the impact of global unrest on the price of oil and is consistent with the Obama Administration's broad free trade policy priorities.

#### **American consumers benefit from crude oil exports**

The U.S. Energy Information Administration and numerous independent economic studies have confirmed that expanding U.S. crude oil exports would lead to lower gasoline prices for consumers, allowing American families to pocket more of their hard-earned dollars instead of paying more to fill-up their cars each day. Granting the export of America's energy supply surplus will encourage U.S. producers to reinvest their money into generating more American-made energy, which powers the economy, increases national energy security, and keeps energy costs down for the consumer.

#### **Exporting crude oil affect benefit the United States' foreign policy and national security**

Allowing the export of surplus American crude oil production would result in sharp reductions to the trade deficit and reduce the need for the United States and its allies to import oil from volatile regions of the world. Given the increased security threats facing the nation and its allies, the United States must leverage its abundant energy resources to further enhance its economic and national security. Lifting export restrictions would provide America with greater foreign policy influence and would strengthen its trading position worldwide. In a recent op-ed, Leon Panetta, former CIA Director and former Secretary of Defense, stated the issue well:

Ignored is a powerful, nonlethal tool: America's abundance of oil and natural gas. The U.S. remains the great arsenal of democracy. It should also be the great arsenal of energy.

#### **Conclusion**

For these and many other reasons, the enactment of The Energy Supply and Distribution Act of 2015 would dramatically benefit the American economy and enhance its ability to influence energy and global security policy around the world.



## Industrial Energy Consumers of America

*The Voice of the Industrial Energy Consumers*

1776 K Street, NW, Suite 720 • Washington, D.C. 20006  
Telephone (202) 223-1420 • [www.ieca-us.org](http://www.ieca-us.org)

June 8, 2015

The Honorable Lisa Murkowski  
Chairman  
Committee on Energy and Natural  
Resources  
U.S. Senate  
Washington, DC 20510

The Honorable Maria Cantwell  
Ranking Member  
Committee on Energy and Natural  
Resources  
U.S. Senate  
Washington, DC 20510

***Re: IECA Supports S. 15, the "Protecting States' Rights to Promote American Energy Security Act"***

Dear Chairman Murkowski and Ranking Member Cantwell:

On behalf of the Industrial Energy Consumers of America (IECA), we support passage of S. 15, the "Protecting States' Rights to Promote American Energy Security Act." States with regulatory authorities over hydraulic fracturing are doing a very good job and should not have new federal regulations imposed. If states do not have regulatory programs in place, then federal requirements should apply. It is important to remember that all regulatory costs are passed onto us, the consumer.

IECA represents energy-intensive trade-exposed (EITE) companies, which are significant consumers of natural gas. EITE industries consume 75 percent of the entire manufacturing sector's use of natural gas (29% of U.S.).

This issue is not just about federal lands. The Bureau of Land Management's (BLM) proposed hydraulic fracturing rule sends the wrong message to stakeholders in non-federal land states, which implies that state designed regulatory programs are inadequate – all without justification. In proposing its rule, BLM failed to identify any specific shortcomings for existing state regulation. As a result, the BLM rule overlays a myriad of duplicative and costly requirements.

As EITE companies, our competitiveness is largely dependent upon the cost and availability of natural gas. We thank you for your leadership on this important legislation.

Sincerely,

Paul N. Cicio  
President

cc: Senate Committee on Energy and Natural Resources

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*The Industrial Energy Consumers of America is a nonpartisan association of leading manufacturing companies with \$1.0 trillion in annual sales, over 2,900 facilities nationwide, and with more than 1.4 million employees worldwide. It is an organization created to promote the interests of manufacturing companies through advocacy and collaboration for which the availability, use and cost of energy, power or feedstock play a significant role in their ability to compete in domestic and world markets. IECA membership represents a diverse set of industries including: chemical, plastics, steel, iron ore, aluminum, paper, food processing, fertilizer, insulation, glass, industrial gases, pharmaceutical, building products, brewing, independent oil refining, and cement.*



June 18, 2015

Senator Lisa Murkowski  
Chairman, Senate Energy and Natural Resources Committee  
709 Hart Senate Office Building  
Washington, DC 20510

Re: S.1312 – “Energy Supply and Distribution Act of 2015”

Dear Senator Murkowski,

On behalf of the Louisiana Oil & Gas Association, I want to express our strong support for the “Energy Supply and Distribution Act of 2015” (S.1312) which you have introduced with fourteen colleagues. That legislation would modernize and rationalize federal energy policy regulating the supply and distribution of energy in the United States, including most notably allowing the export of domestic crude oil—an objective now long overdue. The independent oil producers in Louisiana very much support your legislation and its goal of repealing the counter-productive, 1970’s era crude oil export ban.

A repeal of the ban on crude oil exports will not just benefit our producers in the oil sector. By generating \$750 billion in additional capital investment for oil exploration and production, allowing oil exports will help the entire national economy. Between 2016 and 2030, a repeal of the crude oil export ban is projected to save consumers \$265 billion due to lower fuel prices. During the same time period, lifting the export ban is estimated to produce an average annual increase in jobs of 394,000 throughout the country, of which 24 percent will be in states that do not produce crude oil. Crude oil exports are also projected to increase the U.S. Gross Domestic Product by \$135 billion and increase government revenues by \$1.3 trillion by 2030. Beyond these economic and employment benefits, it is now clear that allowing our allies and trading partners to buy US crude oil will strengthen America’s geopolitical relationships with countries that very much want to rid themselves of the leverage exerted on them as a result of having to rely on hostile, unstable and unfriendly sources for their energy supplies.

We look forward to working with you and your colleagues on S. 1312 and hope that it can move expeditiously through the congressional process.

Sincerely Yours,

Don Briggs  
President  
Louisiana Oil & Gas Association

LOGA is Louisiana's Oil & Gas Industry

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Mark N. Fox  
Office of the Chairman

**MANDAN, HIDATSA & ARIKARA NATION**  
Three Affiliated Tribes \* Fort Berthold Indian Reservation  
Tribal Business Council

**Testimony of the Honorable Mark N. Fox, Chairman**  
**Mandan, Hidatsa and Arikara Nation of the Fort Berthold Reservation**

**Hearing on Energy Accountability and Reform Legislation**  
**Before the Committee on Energy and Natural Resources**  
**U.S. Senate**

**June 23, 2015**

**I. Introduction**

Chairwoman Murkowski, Ranking Member Cantwell, and Members of the Committee on Energy and Natural Resources, thank you for the opportunity to testify on “Energy Accountability and Reform Legislation.” My name is Mark Fox. I am the Chairman of the Mandan Hidatsa and Arikara Nation (MHA Nation) of the Fort Berthold Reservation. The MHA Nation needs your help to unlock the true potential of our Indian energy resources for the benefit of our communities and to contribute to the Nation’s domestic energy supply.

Just this month, in a June 2015 report entitled, “Indian Energy Development – Poor Management by BIA has Hindered Energy Development on Indian Lands,” the Government Accountability Office (GAO) found that “Indian energy resources are underdeveloped relative to surrounding non-Indian resources.” GAO focused on poor management by the Bureau of Indian Affairs (BIA), but also cited the Bureau of Land Management (BLM), the Fish and Wildlife Service (FWS), the Environmental Protection Agency (EPA), the National Environmental Policy Act (NEPA), and the Endangered Species Act (ESA) as a part of the “complex regulatory framework” that limits Indian energy development. GAO also cited a lack of access to capital, dual taxation of Indian energy resources by state governments, tribal capacity and infrastructure limitations as barriers to Indian energy development.

The MHA Nation knows most of these issues first hand. The MHA Nation and our Fort Berthold Reservation are in the heart of the Bakken Formation—still one of the most active oil and gas plays in the United States. Our Reservation, located in west-central North Dakota, is the equivalent of about the 7th highest producing oil and gas state in the Country. In less than 7 years, North Dakota, including our Reservation, became the second highest producing state in the Country. Only Texas produces more. Currently, there are 8 drilling rigs, more than 30,000 semi-trucks, and about 1,300 oil and gas wells producing about 200,000 barrels of oil per day on our Reservation.

The MHA Nation struggles daily with BIA, BLM and other Federal agencies for every

single permit needed to get oil and gas wells into production and to keep them operating. For too long, Indian energy has been subject to a bureaucratic maze of Federal agencies. As Chairman of the Senate Committee on Indian Affairs, former Senator Dorgan estimated that every single oil and gas permit had to make its way through 4 agencies and a 49-step process. We now count 7 agencies and 100 or more steps. In addition to these permitting issues, the MHA Nation and other Indian tribes are left out of important programs within the Department of Energy that we could use to better manage our energy resources and promote energy security for our communities.

Under Chairman Barrasso, the Indian Affairs Committee recently marked up a bill, S. 209, “Indian Tribal Energy Development and Self-Determination Act Amendments of 2015” that would address some of these issues, but much more is needed. The MHA Nation asks that the Energy and Natural Resources Committee consider and pass legislation that would address barriers and shortcomings in the many other agencies involved in Indian energy.

Regulation of Indian energy development and Indian energy programs are spread across multiple agencies. The Energy and Natural Resources Committee has jurisdiction over most of these agencies. The MHA Nation asks that the Committee look to the extensive record developed by the Indian Affairs Committee since 2008. The MHA Nation, other tribes and Administrative officials have all testified before the Indian Affairs Committee on numerous issues related to energy development and managing energy resources. For example, in 2011, the MHA Nation submitted 31 legislative proposals to the Indian Affairs Committee improve Indian energy development and management.

Most of our proposals still need to be addressed and many of them fall squarely within the jurisdiction of the Energy and Natural Resources Committee. In particular, solutions are needed to coordinate the overly complex regulatory process cited by GAO and also to open up Department of Energy programs to Indian tribes. To address these issues and more, the MHA Nation asks that the Energy and Natural Resources Committee include Indian energy provisions in its accountability and reform efforts.

## **II. Proposals to Overcome Barriers to Indian Energy Development**

The following proposals are based on the MHA Nation’s work over the last 7 years with Congress, the Administration and other tribes to develop and refine solutions to Indian energy development and management. Many of these proposals are based on the 31 legislation proposals the MHA Nation originally submitted to the Committee on Indian Affairs, but are more likely under the jurisdiction of the Energy and Natural Resources Committee. In many cases, we have included or attached legislative text for these proposals.

### **A. Indian Energy Regulatory Office**

The MHA Nation, the Coalition of Large Tribes (COLT), and the National Congress of American Indians (NCAI) all support establishing a new Department of the Interior Indian Energy Regulatory Office in Denver, Colorado to provide additional staff and expertise to support energy permitting at the local level. As the GAO report concludes, for too long Indian

energy has been limited by poor BIA oversight and management as well as a lack of staff with energy expertise. A new focus is needed to provide the staff, resources and expertise so that Indian tribes can effectively participate in this important part of the economy and contribute to the Nation's domestic energy supply.

A new Interior Indian Energy Regulatory Office could use existing resources and staff to co-locate all of the Federal agencies involved in energy permitting in a single location. This Office would be similar to BLM's Permit Processing Improvement Offices developed in this Committee and most recently made permanent by S. 2440 in the 113<sup>th</sup> Congress. The MHA Nation and other tribes are already working with the Administration to create a similar office, but legislation is needed to provide a Director for the Indian Energy Regulatory Office, to combine Federal agency authorities and to restructure energy permitting on Indian lands. Attached to my testimony is a legislative proposal for this Office that has been approved by NCAI and COLT.

This new Office needs to be led by a Director who has all the authority necessary to issue permits and approve energy development on Indian lands—everything from permitting oil and gas wells, to environmental review of renewable and transmission projects. Staff with energy expertise would ensure that permits and approvals keep moving and do not get hung up by a lack of direction, understanding or experience. The staff of this Office would provide technical assistance to local BIA Agencies and tribes doing work on the ground. We also ask that you direct this new Interior Office to enter into a Memorandum of Understanding with EPA, the Army Corps of Engineers, and the United States Department of Agriculture to provide staff and expertise for the new Office.

Legislation should also direct this Office to be guided by basic Indian trust principles that have been lost in the current unorganized Federal system for overseeing energy development on Indian lands. In particular, Indian lands are not public lands. While both Congress and Interior have been clear on this point in the past, over time, Federal agencies have attempted to apply public land management standards to Indian lands. Current examples include the application of NEPA to Indian lands, BLM's regulation of hydraulic fracturing on Indian lands, and FWS's implementation of the ESA on tribal lands without considering tribal interests and the Federal government's trust responsibility. This Office would end these practices, treat Indian lands according to Federal trust management standards, and finally provide resources within Interior and BIA for the efficient processing of Indian energy permits and approvals.

The Office we are proposing is long overdue. In recent years, Congress approved, expanded and made permanent BLM's Permit Processing Coordination Offices for energy development on Federal lands. The same should be provided for Indian lands where the benefits of energy development far exceed the benefits on Federal lands. Energy development on Indian lands provides badly needed jobs, economic development, revenues for tribal governments, and, if managed properly, long-term investment in reservation infrastructure.

#### **B. Indian Lands are Not Public Lands**

The MHA Nation asks that the Committee specifically prohibit BLM from implementing regulations developed for public lands on Indian lands. Indian lands are held in trust for the use

and benefit of Indian tribes and the Committee should develop legislation that either precludes BLM from exercising its public lands authority on Indian lands, or require that BLM develop regulations consistent with its trust responsibility to Indian tribes and not public interest standards. At a minimum, the Committee should require BLM to allow tribes to opt out of the proposed regulations so that tribes may determine whether and how best to regulate hydraulic fracturing on their lands.

The modern day BLM was established by the Federal Land Policy and Management Act of 1976 (FLPMA). FLPMA provided BLM with authority over public lands, but specifically excluded Indian lands from BLM's authority. *See* 43 U.S.C. § 1702 (e) and (e)(2). In violation of FLPMA, the Secretary gradually delegated responsibilities to BLM on Indian lands. In the most recent example, the BLM developed regulations for hydraulic fracturing activities for public lands, based on public interest considerations, and, this week, will begin applying those regulations to Indian lands. The MHA Nation asks that the Committee take action to prevent BLM from managing Indian trust resources according to public interest standards.

#### **C. Inclusion of Tribes in Well Spacing Decisions**

Instead of treating Indian lands like public lands, BLM should commit staff resources to actually regulating well spacing on Indian lands and involving Indian tribes in oil and gas well spacing decisions. Currently, BLM defers the ability to determine well spacing on Indian lands to state well spacing forums and practices. Although BLM ultimately approves the oil and gas well spacing that was originally proposed in state forums, BLM should defer to, directly consult with and include Indian tribes in spacing determinations on Indian lands. BLM's current practice ignores its Federal authority, its trust responsibility to Indian tribes, and takes away any benefits that a tribe could have received by determining well spacing on its reservation lands.

The MHA Nation asks that the Committee consider and approve legislation that would direct BLM to enter into oil and gas well spacing agreements with Indian tribes. These agreements would provide tribes every opportunity to participate in and ultimately determine spacing units on its reservation. The opportunity to participate in well spacing decisions and ultimately determine well spacing on Indian lands would involve tribes in an important aspect of regulating oil and gas development.

#### **D. Delays in Communitization Agreements**

The Secretary of the Interior has also delegated the approval of oil and gas Communitization Agreements to BLM. Instead of creating new unneeded regulatory responsibilities, like its hydraulic fracturing rule, BLM should fulfill its current obligations to timely review and approve Communitization Agreements. The Committee should require Communitization Agreements to be submitted at the time an Application for Permit to Drill is filed. This is possible where the oil and gas resource is well known. When this is not feasible, BLM should require that royalty payments from producing wells be paid within 30 days from the first month of production into an interest earning escrow account.

Under current law, royalties are due within 30 days of the first month of production. However, without any authority, BLM has allowed royalty payments to be delayed for months and years pending the approval of Communitization Agreements. This violation of the law cannot be allowed to continue. The MHA Nation asks that the Committee consider and approve legislation to address BLM's delays in payments of oil and gas royalties due to approval of Communitization Agreements.

#### **E. Environmental Review of Energy Projects on Indian Lands**

As the GAO report concludes, the environmental review of energy projects on Indian land is more extensive than on comparable private lands. This extensive review acts as a disincentive to energy development on Indian lands particularly in light of the understaffed Federal agencies overseeing Indian energy development.

There are a number of ways legislation could improve environmental review of energy projects on Indian lands. Similar to the Clean Water Act, Clean Air Act and others, NEPA should be amended to include treatment as a sovereign (TAS) provisions. The new provision could allow a tribe to submit an application to the Council on Environmental Quality and once approved, Federal authority for performing environmental reviews under NEPA would be delegated to tribal governments.

In addition, NEPA review and comment for major federal actions on Indian lands should be limited to members of an Indian tribe and members of the public who live in the affected area. This would align the purposes of an Indian reservation and the Federal government's trust responsibility with any review pursuant to NEPA. Members of the public who live within the affected area would still be able to comment so that the primary purpose of NEPA is maintained. A new section could be included in NEPA that defines Indian lands and provides that for any major federal action on Indian lands public review and comments will be limited to an affected area defined in regulation or by the agency performing the NEPA review.

Currently, by providing for national public review of actions on Indian lands, NEPA provides the opportunity for the public to assess and influence proposed actions on Indian lands. This national review can result in the Federal government being forced to take actions that conflict with its trust responsibility to Indian tribes and obligations to manage tribal lands for the benefit of tribes. Indian lands are held in trust by the Federal government for the benefit of Indian tribes and NEPA must be aligned with the purpose of Indian lands.

NEPA could be amended by adding at the end the following:

#### **SEC. XXX. REVIEW OF MAJOR FEDERAL ACTIONS ON INDIAN LANDS.**

- (a) **IN GENERAL.** — For any major Federal action on Indian lands requiring the preparation of a detailed statement by a responsible official pursuant to Section 102 of the Act, the statement shall only be available for review and comment by members of the Indian tribe

on whose Indian lands the major federal action is proposed and any members of the public living within the affected area.

- (b) TRUST RESPONSIBILITY.—In preparing a detailed statement pursuant to Section 102 of the Act, and responding to any comments provided on that detailed statement, the Federal Government shall ensure that its trust relationship to Indian tribes is fulfilled, and that the purposes of an Indian reservation are fulfilled.
- (c) REGULATIONS.—The Chair of the Council on Environmental Quality shall develop regulations to implement this section, including descriptions of affected areas for specific major Federal actions, in consultation with Indian tribes.
- (d) DEFINITIONS.—For the purposes of this section, the terms “Indian tribe” and “Indian land” have the meaning given the terms in section 2601 of the Energy Policy Act of 1992 (25 U.S.C. 3501).

#### **F. Indian Energy Loan Guarantee Program.**

As the GAO report concludes, Indian tribes lack access to capital to finance energy projects. Congress attempted to solve this problem 10 years ago by including an Indian Energy Loan Guarantee Program in the Energy Policy Act of 2005. In the 10 years since, the Department of Energy has not developed regulations to implement the program or included funding for the program in its budget requests.

We already know loan guarantee programs work in Indian Country. For example, Interior’s Office of Indian Energy and Economic Development already runs a small but highly successful loan guarantee program for Indian economic development with about \$10 million per year. With this small amount of funding Interior is able to leverage 13 to 14 times this amount, about \$130 million, in project financing. Imagine what tribes could do with the \$2 billion in financing the Congress already authorized in Section 503 (a) of the Energy Policy Act of 2005.

To solve this problem, the MHA Nation asks that the Committee replace the implementing language in the Indian energy loan guarantee program with the implementing language used for the Department of Energy’s “Title XVII” loan guarantee program. In other words, change “may” to “shall” and direct that the Department of Energy develop regulations to implement the program within one year after the passage of the legislation. If the Department of Energy does not take action to implement this program, tools that Congress already passed to support Indian energy development cannot be used.

#### **G. Transmission Partnership with Federal Power Marketing Agencies**

Despite the enormous potential for generating traditional and renewable energy on Indian lands, in many cases, tribes are unable to develop these resources because they are in remote locations far from population centers where additional energy is needed. The Committee can help to solve this significant barrier to Indian energy development by requiring Federal Power Marketing Agencies, including the Western Area Power Administration and the Bonneville Power Administration, to treat energy generated on Indian lands as Federal energy generated or acquired by the United States for the purposes of transmitting and marketing such energy. This

solution would allow the MHA Nation and other tribes the ability to get our tremendous energy potential to the people and markets that need energy resources.

Indian tribes and our energy resources were not considered when National energy policies and infrastructure were being developed. Instead, the MHA Nation and many other tribes, had our lands flooded to provide cheap hydroelectric power to far off places. In our case, our most valuable lands were flooded by the Pick-Sloan Program and its dams along the Missouri River. The MHA Nation is now interested in developing its own energy resources to contribute to the Nation's energy supply and, finally, benefit from the infrastructure developed around these hydroelectric projects. In order to do this, the Committee must open the door to Federal transmission, much of it built on our lands, and require Federal Power Marketing Agencies to treat Indian power as Federal power.

#### **H. Distributed Generation and Community Transmission**

The MHA Nation also asks that the Committee support new and emerging ways for tribes to beneficially use our energy resources and provide energy security for our communities. We know that there are some places in Indian Country where energy transmission will never be built. In many of those places we have energy resources that could be put into use now. For example, the MHA Nation could immediately use the loan guarantee program described above and support for distributed generation to capture natural gas currently being flared on our Reservation and generate power from that gas.

We need a new approach to capture and not waste these valuable resources. The MHA Nation asks that the Committee direct the Department of Energy to conduct no fewer than 10 distributed energy demonstration projects to increase the energy resources available to Indian and Alaska Native homes, communities, and government buildings. Priority should be given to projects that utilize local resources, avoid wasting energy resources and reduce or stabilize energy costs.

Proposed legislative text could require:

(a) Definition of Indian Area.—In this section, the term “Indian area” has the meaning given the term in section 4 of the Native American Housing Assistance and Self-Determination Act of 1996 (25 U.S.C. 4103).

(b) Energy Demonstration Projects.—The Secretary of Energy shall conduct not less than 10 distributed energy demonstration projects to increase the energy resources available to Indian tribes for use in homes and community or government buildings.

(c) Priority.—In carrying out this section, the Secretary of Energy shall give priority to projects in Indian areas that—

- (1) reduce or stabilize energy costs;
- (2) benefit populations living in poverty;
- (3) provide a new generation facility or distribution or replacement system;
- (4) have populations whose energy needs could be completely or substantially served by projects under this section; or

- (5) transmit electricity or heat to homes and buildings that previously were not served or were underserved.
- (d) Eligible Projects.—A project under this section may include a project for—
  - (1) distributed generation, local or community distribution, or both;
  - (2) biomass combined heat and power systems;
  - (3) municipal solid waste generation;
  - (4) instream hydrokinetic energy;
  - (5) micro-hydroelectric projects;
  - (6) wind-diesel hybrid high-penetration systems;
  - (7) energy storage and smart grid technology improvements;
  - (8) underground coal gasification systems;
  - (9) solar thermal, distributed solar, geothermal, or wind generation; or
  - (10) any other project that meets the goals of this section.
- (e) Incorporation Into Existing Infrastructure.—As necessary, the Director shall encourage local utilities and local governments to incorporate demonstration projects into existing transmission and distribution infrastructure.
- (f) Exemptions.—
  - (1) IN GENERAL.—A project carried out under this section shall be exempt from all cost-sharing requirements of section 988 of the Energy Policy Act of 2005 (42 U.S.C. 16352).
  - (2) APPLICATIONS.—An application submitted to carry out a project under this section shall not be subject—
    - (A) to any maximum generation requirements; or
    - (B) to any requirements for maximizing benefits in relation to the population served.
- (g) Reports.—Not later than 2 years after the date on which funds are made available for a project under this section, and annually thereafter, the Secretary shall submit to Congress a report describing—
  - (1) the activities carried out under the project, including an evaluation of the activity; and
  - (2) the number of applications received and funded under this section.

#### **I. Tribal Energy Efficiency**

Despite a longstanding state energy efficiency program, there is no ongoing program to support tribal energy efficiency efforts. Tribal governments have the same energy efficiency needs as state governments. The MHA Nation asks the Committee to direct the Department of Energy to allocate not less than 5 percent of existing state energy efficiency funding to establish a grant program for Indian tribes interested in conducting energy efficiency activities for their lands and buildings.

A tribal energy efficiency program could be modeled after the successful Energy Efficiency Block Grant (EEBG) program. Despite its success, the EEBG program was only funded one time—under the American Reinvestment and Recovery Act of 2009. To ensure an ongoing source of funding for tribal energy efficiency efforts, tribes should be provided a portion of the funding for state energy efficiency efforts. This program could lower tribal governmental energy costs and ultimately lower the Federal funding used by tribes to administer Federal programs at the local level.

#### J. Weatherization of Indian Homes

The MHA Nation asks that the Department of Energy's weatherization program be reformed consistent with the Federal government's trust responsibility and to recognize the weatherization needs of Indian tribes. Under current law, the Department of Energy requires Indian tribes to obtain Federal funding through state governmental and non-profit entities administering weatherization programs. Tribes can only receive direct funding from the Department of Energy if a tribe can prove that it is not receiving funding that is equal to what the state is providing its non-Indian population. Currently, out of 566 federally recognized tribes, only two tribes and one tribal organization receive direct weatherization funding from Department of Energy. As a result, tribes are effectively excluded from the Federal government's weatherization program.

Weatherization funding does not benefit tribal homes for a number of other reasons. In particular, Indian tribes lack energy auditors to assess the weatherization needs of Indian homes. The Department of Energy's weatherization program must be reformed to provide direct funding to tribal governments, provide training for energy auditors in Indian Country and to reflect the unique weatherization needs of tribal homes. These reforms are needed to get weatherization funding to those who need it most.

While the MHA Nation appreciates the weatherization changes included in Senator Barrasso's bill, S. 209, much more is needed. Proposed legislation should amend Section 413 of the Energy Conservation and Production Act (42 U.S.C. 6863) is amended by striking subsection (d) and inserting the following:

“(d) Direct Grants to Indian Tribes for Weatherization of Indian Homes.—

“(1) DEFINITIONS.—In this subsection:

“(A) INDIAN AREA.—The term ‘Indian area’ has the meaning given the term in section 4 of the Native American Housing Assistance and Self-Determination Act of 1996 (25 U.S.C. 4103).

“(B) INDIAN TRIBE.—The term ‘Indian tribe’ has the meaning given the term in section 4 of the Indian Self-Determination and Education Assistance Act (25 U.S.C. 450b).

“(2) IN GENERAL.—Of the amounts made available for each fiscal year to carry out the Weatherization Assistance Program for Low-Income Persons established under part A of title IV, the Secretary shall allocate for Indian tribes not less than 10 percent.

“(3) REGULATIONS.—

“(A) PROPOSED REGULATIONS.—Not later than 90 days after the date of enactment of the Indian Energy Parity Act of 2010, the Secretary, after consulting with the Secretary of the Interior, the Secretary of Housing and Urban Development, the Secretary of Health and Human Services, the Secretary of Labor, Indian tribes, and intertribal organizations, shall publish in the Federal Register proposed regulations to carry out this subsection.

“(B) FINAL REGULATIONS.—

“(i) IN GENERAL.—Not later than 120 days from the date of enactment of the Indian Energy Parity Act of 2010, the Secretary shall promulgate final regulations

to carry out this subsection, taking into consideration the comments submitted in response to the publication of the proposed regulations described in subparagraph (A).

“(ii) CRITERIA. —Final regulations promulgated by the Secretary to carry out this subsection shall—

“(I) provide a formula or process for ensuring that weatherization funding is available for any Indian tribe that submits a qualifying weatherization funding application under paragraph (4)(C);

“(II) promote efficiency in carrying out this subsection by the Secretary and Indian tribes; and

“(III) consider—

“(aa) the limited resources of Indian tribes to carry out this subsection;

“(bb) the unique characteristics of housing in Indian areas; and

“(cc) the remoteness of Indian areas.

“(4) ALLOCATION OF FUNDING. —

“(A) IN GENERAL. —The Secretary shall provide financial assistance to an Indian tribe from the amounts provided under paragraph (2), if the Indian tribe submits to the Secretary a weatherization funding application.

“(B) CONTENTS. —A weatherization funding application described in subparagraph (A) shall—

“(i) describe—

“(I) the estimated number and characteristics of the persons and dwelling units to be provided weatherization assistance; and

“(II) the criteria and methods to be used by the Indian tribe in providing the weatherization assistance; and

“(ii) contain any other information (including information needed for evaluation purposes) and assurances that are required under regulations promulgated by the Secretary to carry out this section.

“(C) QUALIFYING WEATHERIZATION FUNDING. —A weatherization funding application that meets the criteria under subparagraph (B) shall be considered a qualifying weatherization funding application.

“(D) INITIAL DISTRIBUTION OF FUNDING. —The Secretary shall distribute funding under this subsection to Indian tribes that submit qualifying weatherization funding applications—

“(i) on the basis of the relative need for weatherization assistance; and

“(ii) taking into account—

“(I) the number of dwelling units to be weatherized;

“(II) the climatic conditions respecting energy conservation, including a consideration of annual degree days;

“(III) the type of weatherization work to be done;

“(IV) any data provided in the most recent version of the Bureau of Indian Affairs American Indian Population and Labor Force Report prepared pursuant to Public Law 102-477 (106 Stat. 2302), or if not available, any similar publication; and

- “(V) any other factors that the Secretary determines to be necessary, including the cost of heating and cooling, in order to carry out this section.
- “(E) COMPETITIVE GRANTS.—For each fiscal year, if any amounts remain available after the initial distribution of funding described in subparagraph (D), the Secretary shall solicit applications for grants from Indian tribes—
- “(i) to carry out weatherization projects and weatherization training;
  - “(ii) to supply weatherization equipment; and
  - “(iii) to develop tribal governing capacity to carry out a weatherization program consistent with this subsection.
- “(F) REMAINING FUNDING.—For each fiscal year, if any amounts remain available after distribution under subparagraphs (D) and (E), the amounts shall remain available to fulfill the purpose of this subsection in subsequent fiscal years.
- “(G) RENEWAL OF QUALIFYING WEATHERIZATION FUNDING APPLICATIONS.—
- “(i) IN GENERAL.—To achieve maximum efficiency in the allocation of funding, an Indian tribe that submits a qualifying weatherization funding application may request that the weatherization funding application of the Indian tribe be renewed in subsequent fiscal years.
  - “(ii) CONTENTS.—A request to renew a qualifying weatherization funding application shall contain such information as the Secretary determines to be necessary to achieve efficiency in the allocation of funding under this subsection.
- “(5) USE OF FUNDS.—
- “(A) IN GENERAL.—An Indian tribe shall use funds provided under paragraph (4) to carry out weatherization and energy conservation activities that benefit the members of an Indian tribe in Indian areas.
  - “(B) ELIGIBLE ACTIVITIES.—The weatherization and energy conservation activities described in subparagraph (A) include—
    - “(i) the provision of existing services under this section;
    - “(ii) the acquisition and installation of energy-efficient windows and doors and heating and cooling equipment; or
    - “(iii) the repair, replacement, or insulation of floors, walls, roofs, and ceilings.
  - “(C) APPLICABILITY OF REQUIREMENTS.—
    - “(i) IN GENERAL.—Notwithstanding any other provision of law, the use of funds under this paragraph by an Indian tribe shall be subject only to—
      - “(I) the requirements of this subsection; and
      - “(II) implementing regulations of the Department of Energy.
    - “(ii) OTHER REQUIREMENTS OF ACT.—In accordance with the government-to-government and trust relationships between the United States and Indian tribes, the income, energy audit, grant limitation, and other administrative and eligibility requirements of this Act shall not apply to the use of funds under this paragraph by an Indian tribe.
- “(6) REPORT.—Not later than 90 days after the closing date of each applicable project year, each Indian tribe that receives funds under this subsection shall submit to the Secretary a simple outcome report that describes, for that project year—
- “(A) each activity carried out by the Indian tribe under this subsection, including the amounts used for each such activity;

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“(B) the number of Indian households benefitted by the activities of the Indian tribe under this subsection; and

“(C) the estimated savings in energy costs realized in the communities served by the Indian tribe.

“(7) TRAINING AND TECHNICAL ASSISTANCE.—The Secretary shall carry out technical assistance and training activities relating to weatherization under this subsection, including—

“(A) orientation sessions for Indian tribes;

“(B) workshops on planning, operations, and procedures for Indian tribes to use the funding provided under this subsection;

“(C) training relating to carrying out weatherization projects; and

“(D) the development and dissemination of training and technical assistance materials in printed form and over the Internet.”.

### **III. Inclusion of Indian tribes in Legislation Under Consideration by the Committee**

The MHA Nation requests that the Committee keep Indian tribes in mind as it considers and develops national energy legislation. In many cases, Indian tribes need the same authorities and opportunities that legislation provides to state governments. In addition, because Indian tribes also operate as energy developers, tribes should be included in financing and grant programs provided to the energy industry. The MHA Nation asks that Indian tribes and tribal interests be included in bills under consideration by the Committee.

For example, S. 15, the Protecting States’ Rights to Promote American Energy Security Act, should be amended to recognize the substantial energy development on Indian lands and tribal authority to regulate hydraulic fracturing on those lands. The Tribe requests that the Committee include language in S. 15 to prohibit the Secretary from regulating hydraulic fracturing on Indian lands and instead defer to a tribe’s regulation of hydraulic fracturing on its lands. Tribes should be provided the same opportunity as states to regulate hydraulic fracturing on our lands.

This addition is needed for at least two reasons. First, development of energy resources on Indian lands is already delayed and limited by too many Federal regulations and too few Federal agency staff to implement those regulations. Tribal regulation of hydraulic fracturing would help to streamline approvals, promote local decision-making, and ensure protection of tribal resources.

Second, the bill should recognize tribal authority over tribal lands to clarify the bill’s provisions regarding state authority to regulate hydraulic fracturing on “Federal lands.” While they are not the same, in some cases Federal lands are thought to include Indian lands because of the status of Indian lands as Federal reservations. By specifically including tribal authority over tribal lands in the bill we can avoid any confusion over the term “Federal lands.”

The MHA Nation also asks that, S. 1346, establishing an e-prize competition pilot program, be amended to include Indian tribes as eligible entities. In addition, a separate e-prize competition pilot program should be created to address the unique needs of Indian tribes. S.

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1346 is intended to support entities that lower the cost of electricity and heat space in a high cost area. Such a program is needed in Indian Country where Indian tribes are subject to some of the highest electric rates in the Nation and often have a high need for heating.

The MHA Nation asks that the Committee amend these and other bills to specifically include Indian tribes and to recognize tribal interests.

#### **IV. Conclusion**

The GAO report concluded that, "The development of Indian energy resources has the potential to provide significant benefits to Indian tribes, tribal members, and the Nation through both tribal economic development opportunities and by contributing to the Nation's energy production." However, GAO found that a number of factors, including poor management by BIA, limits the ability of Tribes to develop their resources. GAO recommended that, "Federal policy calls for providing enhanced self-determination and economic development opportunities for Indian tribes by promoting tribal oversight and management of energy resource development on tribal lands."

The MHA Nation asks that the Committee follow GAO's recommendation and take action to help tribes overcome barriers to Indian energy development. Legislative changes are needed to provide the staff, expertise and resources to effectively oversee and manage Indian energy resources. Changes are also needed to open the doors to Federal energy infrastructure and programs that have long overlooked the importance of Indian energy resources.

Thank you for the opportunity to provide this testimony.



**COALITION OF LARGE TRIBES**

Mandan, Hidatsa and Arikara Nation / Oglala Sioux Tribe / Crow Tribe / Navajo Nation / Sisseton Wahpeton Sioux Tribe / Blackfeet Tribe of Montana / Rosebud Sioux Tribe / Spokane Tribe / Cheyenne River Sioux Tribe / Ute Indian Tribe

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**COALITION OF LARGE TRIBES  
RESOLUTION # 1-5-21-14**

**Title: A New Interior Office to Promote Indian Energy, Sovereignty, Self-Determination and American Energy Independence**

**WHEREAS**, the Coalition of Large Tribes (COLT) was formally established in April 2011, and is comprised of tribes with a large land base, including the Mandan, Hidatsa and Arikara Nation (MHA Nation), the Oglala Sioux Tribe, the Crow Tribe, the Navajo Nation, the Sisseton Wahpeton Sioux Tribe, the Blackfeet Tribe of Montana, the Rosebud Sioux Tribe, the Ute Indian Tribe, the Shoshone-Bannock Tribes, the Colville Confederated Tribes, Spokane Tribe, and the Cheyenne River Sioux Tribe. COLT is chaired by Chairman Tex Hall of the MHA Nation; and

**WHEREAS**, COLT was organized to provide a unified advocacy base for tribes that govern large trust land bases and that strive to ensure the most beneficial use of those lands for the tribes and individual Indian landowners; and

**WHEREAS**, several COLT members are currently located in the Bureau of Indian Affairs' (BIA) Phoenix, Rocky Mountain, Great Plains, and Albuquerque Regions and are energy producing tribes or are among those tribes with potential for energy production that rely or might rely in the future on conventional or renewable energy resource development to support infrastructure, economic development, jobs, government revenues and income; and

**WHEREAS**, at the COLT DC Impact Meetings held in Washington, D.C. from March 5 to 6, 2014, with a quorum present, COLT adopted Resolution #3-3-6-14 entitled "Request that the Department of the Interior Create a New Office for Energy Producing Tribes;" and

**WHEREAS**, the United States Congress is currently considering and the Department of the Interior (DOI) and the Bureau of Indian Affairs (BIA) are currently developing a proposal for a new Indian energy office; and

**WHEREAS**, it is in the best interest of COLT to provide the Congress, DOI and BIA with additional information and detail about the proposed office to ensure that the office will effectively serve Indian tribes; and

**WHEREAS**, COLT proposes to amend Section 2602(a) of the Energy Policy Act of 1992 (25 U.S.C. 3502(a)) to create a new Indian Energy Regulatory Office (Office) that would be centrally located in Denver, Colorado and utilize and refocus the existing staff, resources and office space of the Office of Indian Energy and Economic Development's (OIEED) Division of Energy and Mineral Development; and

**WHEREAS**, establishing the Office in Denver, Colorado provides adequate housing and ease of recruiting new employees to a major metropolitan area, and proximity to other federal agencies involved in

the energy permitting process; and

**WHEREAS**, the Office would be established within the Secretary's Office, similar to the Indian Water Rights Office, to ensure that the Director of the Office has authority over the various agencies involved; and

**WHEREAS**, the Office would serve as a new BIA Regional Office that energy producing Indian tribes may voluntarily select to replace an Indian tribe's existing BIA Regional Office for review and approval of all energy related projects and would not result in duplicative review and approval of energy projects; and

**WHEREAS**, the Office would not replace current BIA Regional Offices nor the Farmington Federal Indian Minerals Office authorities and responsibilities except for those energy producing Indian tribes that elect to utilize the Office; and

**WHEREAS**, the Office would provide energy resource assessments and feasibility studies, technical assistance and training in energy development proposal review, increase federal permitting capacity and permit streamlining, provide support for permitting conducted by federal Agency and Field Offices, improve coordination within Interior agencies and with other Departments, provide technical assistance and training in the oversight and management of energy and financial resources, and ensure that Indian lands are not managed according to Federal public land management standards; and

**WHEREAS**, Indian tribes seeking greater DOI support in the areas of energy development, oversight, management, proposal review and energy related financial management could elect to be served by this Office or could elect to contract the functions of this Office in a manner consistent with P.L. 93-638; and

**WHEREAS**, existing BIA Regional Offices would continue to provide Indian tribes that have elected to utilize the new Office with support and oversight for all non-energy related issues; and

**WHEREAS**, to coordinate and streamline permitting, the Office would also include staff from other DOI agencies and offices involved in energy permitting on Indian lands, including: the Bureau of Indian Affairs, the Bureau of Land Management, the Office of Valuation Services, the Office of Natural Resources Revenue, the Fish and Wildlife Service, the Office of Special Trustee, the Office of the Solicitor, mining engineering and minerals realty specialists from the Office of Surface Mining, and any other DOI offices involved in energy permitting on Indian lands; and

**WHEREAS**, the establishment of the Office would utilize existing funding and resources from the OIEED's Division of Energy and Mineral Development and from each of the agencies and offices listed above, and allow for supplemental funding from industry partners in addition to new federal appropriations; and

**WHEREAS**, within one year or less, the Office would enter into agreements with other Federal agencies to coordinate and streamline permitting, including: the Environmental Protection Agency, the United States Department of Agriculture, and the Army Corps of Engineers; and

**WHEREAS**, on May 21, 2014, the Senate Committee on Indian Affairs approved with amendments S. 2132, a bill to amend the Indian Tribal Energy Development and Self-Determination Act of 2005 and for other purposes, however, the bill, as amended, would only study energy permitting delays for a year, meanwhile, Congressional action is immediately needed to reform and restructure federal oversight and permitting of Indian energy development.

**NOW, THEREFORE, BE IT RESOLVED**, COLT calls upon Congress to pass legislation and that DOI take administrative action pursuant to a Secretarial Order to establish and implement an Indian Energy Regulatory Office as described in this resolution and the attached legislative proposal; and

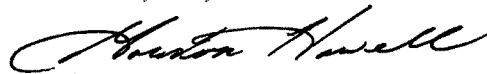
**BE IT FURTHER RESOLVED**, COLT calls upon Senator Tester, the Chairman of the Senate Committee on Indian Affairs, and other members of the Committee and the Senate to work with COLT and amend S. 2132 before it comes to the Senate floor to include the attached legislative proposal; and

**BE IT FINALLY RESOLVED**, this resolution shall be the policy of COLT until it is withdrawn or modified by subsequent resolution.

**CERTIFICATION**

This resolution was enacted at a duly called meeting of the Coalition of Large Tribes held in Washington, D.C. on May 21, 2014, at which a quorum was present, with 4 members voting in favor, 0 members opposed, 0 members abstaining.

Dated this 21st day of May 2014.



Secretary, Coalition of Large Tribes

Attest:



Tex G. Hall, Chairman, Coalition of Large Tribes

**Proposed Legislative Language for Indian Energy Regulatory Office**

**Attached to COLT Resolution #1-5-21-14**

Section 2602(a) of the Energy Policy Act of 1992 (25 U.S.C. 3502(a)) is amended—

(1) by redesignating paragraph (3) as paragraph (4);

(2) by inserting after paragraph (2) the following:

“(3) INDIAN ENERGY REGULATORY OFFICE.—

“(A) ESTABLISHMENT.—To assist the Secretary in carrying out the Program, the Secretary shall establish an ‘Indian Energy Regulatory Office’ within the Secretary’s Office to be located in Denver, Colorado. The Office shall utilize the existing resources of the Department’s Office of Indian Energy and Economic Development Division of Indian Energy and Mineral Development.

“(B) DIRECTOR.— The Office shall be led by a Director who shall be compensated at a rate equal to that of level IV of the Executive Schedule under section 5315 of title 5, United States Code and who shall report directly to the Deputy Secretary.

“(C) FUNCTIONS.—The Office shall serve as a new Bureau of Indian Affairs (BIA) Regional Office that energy producing Indian tribes may voluntarily select to replace an Indian tribe’s existing BIA Regional Office for the following functions:

(i) notwithstanding any other law, oversee, coordinate, process and approve all Federal leases, easements, right-of-ways, permits, policies, environmental reviews, and any other authorities related to energy development on Indian lands.

(ii) support BIA Agency Office and tribal review and evaluation of energy proposals, permits, mineral leases and rights-of-way, and Indian Mineral Development Agreements for final approval, conducting environmental reviews, and conducting surface monitoring;

(iii) review and prepare Applications for Permits to Drill, Communitization Agreements and well spacing proposals for approval, provide production monitoring, inspection and enforcement, and oversee drainage issues;

(iv) provide energy related technical assistance and financial management training to BIA Agency Offices and tribal;

(v) develop best practices in the area of Indian energy development, including, standardizing energy development processes, procedures, and forms among BIA Regions and Agency Offices;

(vi) minimize delays and obstacles to Indian energy development and,

(vii) provide technical assistance to Indian tribes in the areas of energy related engineering, environmental analysis, management and oversight of energy development, assessment of energy development resources, proposals and financing, development of conventional and renewable energy resources.

“(D) RELATIONSHIP TO BUREAU OF INDIAN AFFAIRS REGIONAL AND AGENCY OFFICES.—

(i) The Office shall have the authority to review and approve all energy related matters for those tribes that elect to utilize the Office, without subsequent or duplicative review and approval by other BIA Regional Offices or other Interior agencies. Existing BIA Regional

Offices shall continue to oversee, support and provide approvals for all other non-energy related matters for those tribes that elect to utilize the Office.

(ii) BIA Agency offices and Bureau of Land Management (BLM) State and Field offices shall continue to provide regional and local services related to Indian energy development including, local realty functions, on-site evaluations and inspections, direct services as requested by Indian tribes and individual Indian and any other local functions to related to energy development on Indian lands.

(iii) The Office shall provide technical assistance and support to the BIA and BLM in all areas related to energy development on Indian lands.

“(E) DESIGNATION OF INTERIOR STAFF.—The Secretary shall designate and transfer to the Office existing staff and resources of the Division of Energy and Mineral Development, the Bureau of Indian Affairs, the Bureau of Land Management, the Office of Valuation Services, the Office of Natural Resources Revenue, the Fish and Wildlife Service, the Office of Special Trustee, the Office of the Solicitor, mining engineering and minerals realty specialists from the Office of Surface Mining, and any other Interior agency or office involved in energy development on Indian lands to provide for the review, processing and approval of:

(i) permits and regulatory matters under the Indian Mineral Leasing Act of 1938 (25 U.S.C. §§ 396a *et seq.*), the Indian Mineral Development Act of 1982 (25 U.S.C. §§ 2101 *et seq.*), the Indian Tribal Energy Development and Self-Determination Act, included as Title V of the Energy Policy Act of 2005 (25 U.S.C. §§ 3501 *et seq.*), the Surface Mining Control and Reclamation Act of 1977 (30 U.S.C. §§ 1201) and its provisions on Tribal Primacy; the Indian Right-Of-Way Act of 1948 (25 U.S.C. § 323 to 328) and its implementing regulations at 25 C.F.R. Part 169, leasing provisions of 25 U.S.C. 415, and surface leasing regulations at 25 C.F.R. Part 162;

(ii) the consultations and preparation of biological opinions under section 7 of the Endangered Species Act of 1973 (16 U.S.C. § 1536) (ESA);

(iii) the preparation of analyses under the National Environmental Policy Act of 1969 (42 U.S.C. §§ 4321 *et seq.*) (NEPA); and,

(iv) providing technical assistance and training in various forms of energy development on Indian lands.

“(F) MANAGEMENT OF INDIAN LANDS.— The Director shall ensure that all environmental reviews and permitting decisions comply with the United States’ unique legal relationship with Indian tribal governments as set forth in the Constitution of the United States, treaties, statutes, Executive Orders, and court decisions, and are exercised in a manner that promotes tribal authority over Indian lands consistent with the federal policy of Indian Self-Determination. The Director shall also ensure that Indian lands shall not be considered to be Federal public lands, part of the public domain or managed according to federal public land laws and policies.

“(G) INDIAN SELF-DETERMINATION.—Programs and services operated by this Office shall be provided pursuant to contracts and grants awarded under the Indian Self Determination and Education Assistance Act of 1975 (25 U.S.C. § 450f).

“(H) TRANSFER OF FUNDS.—To establish the Office and advance these efforts, the Secretary

shall authorize, for a period of not to exceed two years, the expenditure or transfer of such funds as are necessary from the annual budgets of:

- (i) the Bureau of Indian Affairs;
- (ii) the United States Fish and Wildlife Service;
- (iii) the Bureau Land Management;
- (iv) the Office of Surface Mining;
- (v) the Office of Natural Resources Revenue; and,
- (vi) the Office of Mineral Valuation.

“(I) BASE BUDGET.—Following the two year periods described in (G) above, the combined total of the funds transferred pursuant to those provisions shall serve the base budget for the Office.

“(J) APPROPRIATIONS OFFSET.—All fees generated from Applications for Permits to Drill, inspection, nonproducing acreage, or any other fees related to energy development on Indian Lands shall, commencing on the date the Office is opened, be transferred to the budget of the Office and may be utilized to advance or fulfill any of its stated duties and purposes.

“(K) REPORT.—The Office shall keep detailed records documenting its activities and submit an annual report to Congress detailing, among others:

- (i) the number and type of federal approvals granted;
- (ii) the time it has taken to process each type of application;
- (iii) the need for additional similar offices to be located in other regions; and,
- (iv) proposed changes in existing law to facilitate the development of energy resources on Indian lands, improve oversight of energy development on Indian lands.

“(L) COORDINATION WITH ADDITIONAL FEDERAL AGENCIES.—Within one year of establishing the Office, the Secretary shall enter into a memorandum of understanding for the purposes coordinating and streamlining energy related permits with—

- (i) the Administrator of the Environmental Protection Agency;
- (ii) the Assistant Secretary of the Army (Civil Works); and,
- (iii) the Secretary of Agriculture.



# NATIONAL CONGRESS OF AMERICAN INDIANS

## The National Congress of American Indians Resolution #ANC-14-011

### TITLE: Supporting and Providing Additional Detail for New Bureau of Indian Affairs Regional Office to Serve Energy Producing Tribes

#### EXECUTIVE COMMITTEE

**PRESIDENT**  
**Brian Chasnochy**  
*Sawtooth Indian Tribal Community*

**FIRST VICE-PRESIDENT**  
**Michael O. Finley**  
*Cyflke Tribe of Garfield Reservation*

**RECORDING SECRETARY**  
**Robert Shepherd**  
*Sacred Wapahum Caste*

**TREASURER**  
**Dennis Welsh**  
*Colorado River Indian Tribe*

#### REGIONAL VICE-PRESIDENTS

**ALASKA**  
**Jerry Isaac**  
*Tanana Chiefs Conference*

**EASTERN OKLAHOMA**  
**S. Joe Gittenden**  
*Cherokee Nation*

**GREAT PLAINS**  
**Laurel McDonald**  
*Spirit Lake Tribe*

**MIDWEST**  
**Aaron Payment**  
*Sault Ste. Marie Tribe of Chippewa Indians*

**NORTHEAST**  
**Randy Naka**  
*Nipmuc Tribe*

**NORTHWEST**  
**Pawn Sharp**  
*Zenaido Indian Nation*

**PACIFIC**  
**Rosemary Morillo**  
*Shoshone-Bannock Tribes of Northern Indians*

**ROCKY MOUNTAIN**  
**Ian Povey**  
*Eastern Shoshone Tribe*

**SOUTHEAST**  
**Ron Richardson**  
*Holston-Sage Indian Tribe*

**SOUTHERN PLAINS**  
**Stephen Smith**  
*Sowa Tribe of Oklahoma*

**SOUTHWEST**  
**Manuel Heart**  
*Ute Mountain Ute Tribe*

**WESTERN**  
**Arian Melendrez**  
*Pima-Sonora Indian Colony*

**EXECUTIVE DIRECTOR**  
**Jacqueline Johnson Pata**  
*Tribal*

#### NCAI HEADQUARTERS

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**WHEREAS**, we, the members of the National Congress of American Indians of the United States, invoking the divine blessing of the Creator upon our efforts and purposes, in order to preserve for ourselves and our descendants the inherent sovereign rights of our Indian nations, rights secured under Indian treaties and agreements with the United States, and all other rights and benefits to which we are entitled under the laws and Constitution of the United States, to enlighten the public toward a better understanding of the Indian people, to preserve Indian cultural values, and otherwise promote the health, safety and welfare of the Indian people, do hereby establish and submit the following resolution; and

**WHEREAS**, the National Congress of American Indians (NCAI) was established in 1944 and is the oldest and largest national organization of American Indian and Alaska Native tribal governments; and

**WHEREAS**, several Tribes located in the Phoenix Region, the Rocky Mountain Region, the Great Plains Region and the Southwest Region, as well as the Alaska Native communities, and are energy producing tribes or among those tribes with potential for energy production that rely or might rely in the future on mineral revenue income for infrastructure, economic development, jobs and income from the development of their mineral resources; and

**WHEREAS**, at the 2013 Annual Session of NCAI held at Cox Business Center from October 13 to 18, 2013 in Tulsa, Oklahoma with a quorum present, the General Assembly adopted Resolution #TUL-13-012 entitled "Requesting the Bureau of Indian Affairs Create a New Regional Office for Energy Producing Tribes;" and

**WHEREAS**, the United States Congress is currently considering and the Department of the Interior (DOI) and the Bureau of Indian Affairs (BIA) are currently developing a proposal for a new Indian energy office; and

**WHEREAS**, it is in the best interest of NCAI to provide the Congress, DOI and BIA with additional information and detail about the proposed office to ensure that the office will effectively serve Indian tribes; and

**WHEREAS**, NCAI proposes to amend Section 2602(a) of the Energy Policy Act of 1992 (25 U.S.C. 3502(a)) to create a new Indian Energy Regulatory Office (Office) that would be centrally located in Denver, Colorado and utilize and refocus the existing resources and office space of the Office of Indian Energy and Economic Development's (OIEED) Division of Indian Energy and Mineral Development; and

**WHEREAS**, establishing the Office in Denver, Colorado provides adequate housing and ease of recruiting new employees to a major metropolitan area, and proximity to other federal agencies involved in the energy permitting process; and

**WHEREAS**, the Office would be established within the Secretary's Office, similar to the Indian Water Rights Office, to ensure that the Director of the Office has authority over the various agencies involved; and

**WHEREAS**, the Office would replace current BIA Regional Office authorities and responsibilities for energy producing Indian tribes, and would not result in duplicative review and approval of energy projects; and

**WHEREAS**, the Office would provide energy resource assessments and feasibility studies, technical assistance and training in energy development proposal review, increase BIA permitting capacity and permit streamlining, support for permitting expertise within BIA Agency Offices, improved coordination with other agencies, technical assistance and training in the oversight and management of energy and financial resources, and ensure that Indian lands are not managed according to Federal public land management standards; and

**WHEREAS**, Indian tribes seeking greater BIA support in the areas of energy development, oversight, management, proposal review and financial assistance could elect to be served by this Office; and

**WHEREAS**, existing BIA Regional Offices would continue to provide Indian tribes utilizing the new Office with support and oversight for all non-energy related issues; and

**WHEREAS**, to coordinate and streamline permitting, the Office would also include staff from other DOI agencies and offices involved in energy permitting on Indian lands, including: the Bureau of Land Management, the Office of Mineral Evaluation, the Office of Natural Resources Revenue, the Fish and Wildlife Service, the Office of Special Trustee, the Office of the Solicitor; and

**WHEREAS**, the establishment of the Office would not increase the deficit because it would utilize existing Federal resources in Denver, Colorado and existing funding from each of the agencies and offices listed above; and

**WHEREAS**, the Office would enter into agreements with other Federal agencies to coordinate and streamline permitting, including: the Environmental Protection Agency, the United States Department of Agriculture, and the Army Corps of Engineers.

**NOW THEREFORE BE IT RESOLVED**, that NCAI requests that Congress pass legislation requiring the Secretary of the Interior to establish and implement an Indian Energy Regulatory Office as described in this resolution and as reflected in the attached legislative proposal; and

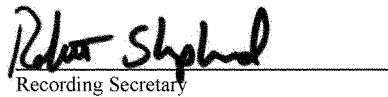
**BE IT FURTHER RESOLVED**, that this resolution shall be the policy of NCAI until it is withdrawn or modified by subsequent resolution.

**CERTIFICATION**

The foregoing resolution was adopted by the General Assembly at the 2014 Mid-Year Session of the National Congress of American Indians, held at the Dena'ina Civic & Convention Center, June 8-11, 2014 in Anchorage, Alaska, with a quorum present.

  
President

ATTEST:

  
Recording Secretary

**Proposed Legislative Language for Indian Energy Regulatory Office  
Attached to NCAI Resolution #ANC-14-011**

Section 2602(a) of the Energy Policy Act of 1992 (25 U.S.C. 3502(a)) is amended—

- (1) by redesignating paragraph (3) as paragraph (4);
- (2) by inserting after paragraph (2) the following:

“(3) INDIAN ENERGY REGULATORY OFFICE.—

“(A) ESTABLISHMENT.—To assist the Secretary in carrying out the Program, the Secretary shall establish an ‘Indian Energy Regulatory Office’ within the Secretary’s Office to be located in Denver, Colorado. The Office shall utilize the existing resources of the Department’s Office of Indian Energy and Economic Development Division of Indian Energy and Mineral Development.

“(B) DIRECTOR.— The Office shall be led by a Director who shall be compensated at a rate equal to that of level IV of the Executive Schedule under section 5315 of title 5, United States Code and who shall report directly to the Deputy Secretary.

“(C) FUNCTIONS.—The Office shall serve as a new Bureau of Indian Affairs (BIA) Regional Office that energy producing Indian tribes may voluntarily select to replace an Indian tribe’s existing BIA Regional Office for the following functions:

- (i) notwithstanding any other law, oversee, coordinate, process and approve all Federal leases, easements, right-of-ways, permits, policies, environmental reviews, and any other authorities related to energy development on Indian lands.
- (ii) support BIA Agency Office and tribal review and evaluation of energy proposals, permits, mineral leases and rights-of-way, and Indian Mineral Development Agreements for final approval, conducting environmental reviews, and conducting surface monitoring;
- (iii) review and prepare Applications for Permits to Drill, Communitization Agreements and well spacing proposals for approval, provide production monitoring, inspection and enforcement, and oversee drainage issues;
- (iv) provide energy related technical assistance and financial management training to to BIA Agency Offices and tribal;
- (v) develop best practices in the area of Indian energy development, including, standardizing energy development processes, procedures, and forms among BIA Regions and Agency Offices;
- (vi) minimize delays and obstacles to Indian energy development and,
- (vii) provide technical assistance to Indian tribes in the areas of energy related engineering, environmental analysis, management and oversight of energy development, assessment of energy development resources, proposals and financing, development of conventional and renewable energy resources.

“(D) RELATIONSHIP TO BUREAU OF INDIAN AFFAIRS REGIONAL AND AGENCY OFFICES.—

- (i) The Office shall have the authority to review and approve all energy related

matters without subsequent or duplicative review and approval by other BIA Regional Offices. Existing BIA Regional Offices shall continue to oversee, support and provide approvals for all other non-energy related matters.

(ii) BIA Agency offices and Bureau of Land Management (BLM) State and Field offices shall continue to provide regional and local services related to Indian energy development including, local realty functions, on-site evaluations and inspections, direct services as requested by Indian tribes and individual Indian and any other local functions to related to energy development on Indian lands.

(iii) The Office shall provide technical assistance and support to the BIA and BLM in all areas related to energy development on Indian lands.

“(E) DESIGNATION OF INTERIOR STAFF.—The Secretary shall designate existing staff and resources of the Division of Energy and Mineral Development, and other Interior staff and resources to the Office, including: Bureau of Land Management, Office of Mineral Evaluation, Office of Natural Resources Revenue, Bureau of Reclamation, Fish and Wildlife Service, Office of Special Trustee, and the Office of the Solicitor to provide for the review, processing and approval of:

(i) permits and regulatory matters under the Indian Mineral Leasing Act of 1938 (25 U.S.C. §§ 396a *et seq.*), the Indian Mineral Development Act of 1982 (25 U.S.C. §§ 2101 *et seq.*), the Indian Tribal Energy Development and Self-Determination Act, included as Title V of the Energy Policy Act of 2005 (25 U.S.C. §§ 3501 *et seq.*), the Indian Right-Of-Way Act of 1948 (25 U.S.C. § 323 to 328) and its implementing regulations at 25 C.F.R. Part 169, leasing provisions of 25 U.S.C. 415, and surface leasing regulations at 25 C.F.R. Part 162;

(ii) the consultations and preparation of biological opinions under section 7 of the Endangered Species Act of 1973 (16 U.S.C. 1536) (ESA);

(iii) the preparation of analyses under the National Environmental Policy Act of 1969 (42 U.S.C. 4321 *et seq.*) (NEPA); and,

(iv) providing technical assistance and training in various forms of energy development on Indian lands.

“(F) MANAGEMENT OF INDIAN LANDS.— The Director shall ensure that all environmental reviews and permitting decisions comply with the United States’ unique legal relationship with Indian tribal governments as set forth in the Constitution of the United States, treaties, statutes, Executive Orders, and court decisions, and are exercised in a manner that promotes tribal authority over Indian lands consistent with the federal policy of Indian Self-Determination. The Director shall also ensure that Indian lands shall not be considered to be Federal public lands, part of the public domain or managed according to federal public land laws and policies.

“(G) TRANSFER OF FUNDS.—To establish the Office and advance these efforts, the Secretary shall authorize, for a period of not to exceed two years, the expenditure or transfer of such funds as are necessary from the annual budgets of:

- (i) the Bureau of Indian Affairs;
- (ii) the United States Fish and Wildlife Service;

- (iii)the Bureau Land Management;
- (iv)the Office of Natural Resources Revenue;
- (v) the Office of Mineral Valuation; and
- (vi)the Bureau of Reclamation.

“(H) BASE BUDGET.—Following the two year periods described in (G) above, the combined total of the funds transferred pursuant to those provisions shall serve the base budget for the Office.

“(I) APPROPRIATIONS OFFSET.—All fees generated from Applications for Permits to Drill, inspection, nonproducing acreage, or any other fees related to energy development on Indian Lands shall, commencing on the date the Office is opened, be transferred to the budget of the Office and may be utilized to advance or fulfill any of its stated duties and purposes.

“(J) REPORT.—The Office shall keep detailed records documenting its activities and submit an annual report to Congress detailing, among others:

- (i) the number and type of federal approvals granted;
- (ii) the time it has taken to process each type of application;
- (iii)the need for additional similar offices to be located in other regions; and,
- (iv)proposed changes in existing law to facilitate the development of energy resources on Indian lands, improve oversight of energy development on Indian lands.

“(L) COORDINATION WITH ADDITIONAL FEDERAL AGENCIES.—Within three years of establishing the Office, the Secretary shall enter into a memorandum of understanding for the purposes coordinating and streamlining energy related permits with—

- (i) the Administrator of the Environmental Protection Agency;
- (ii) the Assistant Secretary of the Army (Civil Works); and,
- (iii)the Secretary of Agriculture.



June 9, 2015

The Honorable Lisa Murkowski  
Chairman  
Energy and Natural Resources Committee  
United States Senate

The Honorable Maria Cantwell  
Ranking Member  
Energy and Natural Resources Committee  
United States Senate

**Statement for the record regarding the June 9, 2015 hearing on Accountability and Reform legislation, including the “*Small Hydropower Dependable Regulatory Order Act*” (S. 1338) and the “*Hydropower Improvement Act*” (S. 1236).**

Chairman Murkowski and Ranking Member Cantwell:

The Modesto Irrigation District (MID) and Turlock Irrigation District (TID) of California appreciate the opportunity to express our strong support for the overarching principles embodied in S. 1236, to modernize and improve the hydropower licensing and relicensing process, as well as efforts by Sen. Angus King (I-ME) to address the permitting process for smaller projects.

MID and TID are co-owners and licensees of the Don Pedro Project on the Tuolumne River in California’s Central Valley. Owned 31.54% by MID and 68.46% by TID, the project was placed into service in 1971. It consists of a 2.03 million acre-foot reservoir and a powerhouse capable of generating 203 megawatts. The Federal Energy Regulatory Commission (FERC) issued the Districts a license for the original Don Pedro Project in 1966, and that license expires on April 30, 2016. Since 2009, the Districts have been working toward acquiring a new license following the procedures under FERC’s Integrated License Process (ILP). Following extensive consultation with FERC, resource agencies, Tribes, and conservation groups, the Districts filed a draft license application on Nov. 26, 2013, and a final license application with FERC on April 28, 2014.

In addition to the hydropower generated by the Don Pedro Project, MID and TID meet the needs of their electric power customers with a variety of generation, including wind, solar and natural gas.

To date, the MID and TID have spent six years and more than \$20 million on the FERC relicensing process for the Don Pedro Project. They expect to spend several more years and millions of dollars more in the expectation of a new license that will allow MID and TID to continue to cost-effectively operate the very same hydropower facility that they have been operating for the last 45 years. Because MID and TID are public agencies, the costs associated with the relicensing process, and meeting any additional conditions imposed by a new license, will be borne by the communities we serve.

Securing a new FERC license is not only crucial to providing California's Central Valley with a clean and sustainable energy supply, it is also a fundamental component of the MID and TIDs' long-term effort to meet the State's aggressive greenhouse gas reduction goals and to fulfill other energy and environmental mandates. Although large hydropower systems are not included within California's regulatory definition of renewable energy, Don Pedro's generation emits no greenhouse gases, so it helps limit our carbon footprint. Moreover, Don Pedro is our most economical energy source and, because of its operating flexibility, it is a critical resource for meeting demand and stabilizing the regional grid.

MID and TID strongly support the National Hydropower Association's (NHA) statement submitted on June 2, 2015 as well as testimony provided by the American Public Power Association (APPA), addressing hydropower improvements at the Committee's hearing on energy supply on May 19, 2015.

NHA noted that *"Protecting the environment and natural resources is important, and is a commitment the hydropower industry takes very seriously, but the amount of information that is requested can be excessive and not directly related to the project or its potential impacts."*<sup>i</sup>

In our experience, gained first-hand over the last six years, the cost of licensing and relicensing hydropower projects is in large part driven by two factors:

- The large number of very costly studies of natural resources *potentially* affected by the operation of the project; and
- The amount of time and money devoted to carefully developing the study scopes and methods, all done in close concert with resource agencies and interested parties, to ensure that studies are performed to strict scientific standards.

Separately, APPA noted the environmental, cyber and security benefits of hydropower generation, and the need to make full use of the Nation's hydropower resources to help support the affordable and reliable operation of the nation's power grid.

*"Hydropower is a source of emissions-free base-load power which, unlike variable renewable resources, is generally available 24/7. Moreover, hydropower's "black start" capability makes it highly valuable from the standpoint of cyber and physical security; in instances of outages or disruptions to the grid, hydropower units can cycle back on quickly and help support full power restoration,"*<sup>ii</sup> APPA said.

In order to do so, APPA expressed support for the concept of having FERC as the lead agency, including instituting a schedule to allow for a more cost effective and efficient hydropower relicensing process.

#### *MID/TID Experience with Don Pedro Relicensing*

As part of the relicensing process for Don Pedro, MID and TID have developed appropriate study plans and performed 38 separate studies<sup>iii</sup>, so far, with the cost of some individual studies exceeding \$1 million. These studies examine the project's potential effects on, among other values, historic properties, Native American cultural sites, public recreation, federally protected species, state protected species, water quality, water temperature, instream flow, resident and

anadromous fish populations both in the reservoir and downstream of the project, terrestrial species and regional socioeconomic resources.

Each of these 38 studies was developed by MID and TID in consultation with multiple federal and state agencies, numerous interest groups during countless meetings and conference calls, which in combination generated thousands of pages of information and comments. In addition, MID and TID have held more than a dozen public workshops on the studies and their findings since 2013. After each study is performed, a draft report is shared with all the participants in the relicensing process to provide an additional opportunity for review and comment. The Districts then respond to every comment, modify the draft report and issue a final report.

The great amount of care, time and money committed by MID and TID, and the scientists and engineers we retained, to performing rigorous studies using accepted methods vetted by all the relicensing participants would be well worthwhile if the results were then actually used by the participants to inform their opinions and the recommended terms and conditions that they want FERC to impose on the new license.

However, in our case, these carefully executed studies have been routinely ignored or worse yet, criticized as faulty, when the results do not confirm participants pre-conceived notions or beliefs about environmental impacts. We have found the exception to this is the FERC staff itself, which give every indication of being objective reviewers that use and reference all of the resulting studies, and do not seem to have pre-conceived notions about project impacts.

Both MID and TID agree with the NHA assertion that demands for numerous studies and extensive information “are sometimes used as a negotiating tactic” by interests groups and resources agencies seeking to force acceptance of their goals, which may not be in the broader public interest. In our experience, once the scientific studies are completed, resource agencies and interest groups have generally not accepted study results that run counter to their interests, agendas, or agency missions, no matter how much scrutiny the study plan and study methods were given by the same entities prior to the performance of the study.

It has become apparent to both MID and TID during this relicensing process that the extensive information developed through rigorous study and planning is often ignored and discounted when it does not serve the “needs” of some interested parties. This refusal to consider the science can and does occur because certain resource agencies have the ability to unilaterally override FERC’s objective review of the record (mandatory conditioning agencies). Such mandatory-conditioning resource agencies, and the interest groups whose goals are closely aligned with theirs, only have to cite the slimmest of evidence to impose costly and unwarranted measures and operating restrictions on a licensee, even if the overall weight of the evidence does not support the measure. It is only FERC that weighs the entire record of evidence that licensees have spent many millions of dollars developing under rigorous rules and guidelines. Under these circumstances, it is imprudent public policy to allow a resource agency with a narrow mission and armed with only the slightest bit of evidence to drive national energy policy and, in the case of MID and TID, national agricultural and water supply policy.

S. 1236 would restore FERC’s ability to do what it is well suited to do -- fairly balance a variety of public interests using all the information before it -- by giving FERC exclusive authority to

enforce and administer all license terms and conditions. The importance of this improvement to federal licensing and regulation of hydropower projects cannot be overstated.


MID and TIDs' experience is that resource agencies are always inclined to use their essentially absolute conditioning authority. The overall result is a significant distortion of the intent of the Federal Power Act's mandate that FERC's licensing decisions give "equal consideration" to a diversity of interests affected by proposed and existing hydropower projects. When any single-purpose agency can impose its agenda without regard to other legitimate public purposes and interests, "equal consideration" has little meaning. Vested with mandatory conditioning authority, resources agencies, have no incentive to consider the entire record of evidence, and are instead inclined to cherry-pick the record for bits of information that appear to support their mission. Furthermore, this absolute conditioning authority, independent of FERC's authority, precludes fair negotiation with other stakeholders, and redirects resources to less environmentally beneficial and practical purposes. In the face of mandatory conditions, FERC is unable to offer recourse to adversely affected stakeholders, and thus is unable to fulfill its "equal consideration" mandate and its overall duty to serve the public interest.

MID and TID have found while resource agencies have knowledge that should be included in the licensing process, however they should be encouraged to consider the full record before FERC, just as FERC does. The discussion drafts recognize and respect the missions of the resources agencies and their importance in the licensing process. By making FERC the final decision-maker, the drafts would ensure that the resources agencies engage more fully, in a timely fashion and on an equal footing with other stakeholders. The likely result is not less protection of environment or fish, but better, more practical protections with a broader base of stakeholder support.

Modesto and Turlock Irrigation Districts have the highest regard for the professionalism and dedication of the FERC staff. It is the regulatory process, not the agency that needs to be fixed.

We look forward to working with the Committee to further refine your proposals to improve the federal hydropower licensing process by increasing transparency and accountability and reducing redundancy and inefficiencies.

Sincerely,



Roger VanHoy, P.E.  
General Manager  
Modesto Irrigation District



Casey Hashimoto, P.E.  
General Manager  
Turlock Irrigation District

<sup>1</sup> Statement for the Record on behalf of The National Hydropower Association before the U.S. Senate Energy and Natural Resources Committee Regarding Full Committee Hearing on Energy Supply Legislation on May 19, 2015

<sup>17</sup> Susan N. Kelly, President and CEO, American Public Power Association, Testimony before the Senate Committee on Energy and Natural Resources Hearing on Energy Supply Legislation, May 19, 2015.

<sup>18</sup> Studies and all other documents related to Don Pedro Project – FERC No. 2299 – are available here: <http://www.donpedro-relicensing.com/default.htm>



May 26, 2015

The Honorable Lisa Murkowski  
Chairman  
Committee on Energy and Natural Resources

The Honorable Fred Upton  
Chairman  
Committee on Energy and Commerce

The Honorable Bob Corker  
Chairman  
Committee on Foreign Relations

The Honorable Ed Royce  
Chairman  
Committee on Foreign Affairs

The Honorable Maria Cantwell  
Ranking Member  
Committee on Energy and Natural Resources

The Honorable Frank Pallone, Jr.  
Ranking Member  
Committee on Energy and Commerce

The Honorable Ben Cardin  
Ranking Member  
Committee on Foreign Relations

The Honorable Eliot Engel  
Ranking Member  
Committee on Foreign Affairs

United States Senate  
Washington, DC 20510

U.S. House of Representatives  
Washington, DC 20515

Dear Chairmen Murkowski, Upton, Corker and Royce, and Ranking Members Cantwell, Pallone, Cardin and Engel:

The National Association of Manufacturers (NAM), the largest manufacturing association in the United States representing small and large manufacturers in every industrial sector in all 50 states, believes exports are critical to the growth and success of our nation's manufacturing base. We do not believe the government should be imposing artificial, market-distorting barriers to the operation of open markets. For this reason, the NAM urges you to take action to remove the outdated U.S. export ban on crude oil.

Since its origin, the United States has recognized the importance of exports to promoting industrial and economic growth and supporting jobs. Early on in its history, the United States banned taxes on exports and then, in the 1940s, led the world in crafting international rules to prohibit countries from imposing quantitative restraints on exports. Those rules, now enshrined in the 160-member World Trade Organization (WTO), are critical to ensure a fair and level playing field for manufacturers throughout every sector of the U.S. economy, particularly in the face of other countries' efforts to restrict access to key materials, such as China's export restrictions on rare earths and raw materials that the United States successfully challenged under WTO rules. As a Member of the WTO, the United States is also bound to comply with these same rules with respect to all products, including crude oil exports. The decades-old ban on crude oil exports is clearly contrary to these basic provisions of the WTO, that were created to help prevent unfair distortions to trade. It is long past time for the United States to lift the crude oil ban and put itself into compliance with its international commitments. Taking this action will also send a strong message to the global community that exports restrictions are contrary to the basic rules of the global economy and help prevent other countries from taking similar actions with respect to a variety of exported materials.

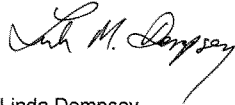
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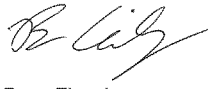
Lifting the crude oil export ban is but one of a broader set of measures the Congress should take now to make manufacturers more competitive in the global economy. From new trade negotiating authority, export financing legislation and investments in infrastructure to the reform of the U.S. tax code and regulatory rules that undermine the competitiveness of our manufacturers, there are many important areas for Congress to act. On energy specifically, Congress should take a holistic approach that promotes and protects a strong and robust energy sector. Increasing access to and availability of fossil, renewable and alternative energy sources while restoring balance to costly new regulations on ozone, greenhouse gases, "waters of the United States" and others will make the U.S. truly energy secure and benefit the entire manufacturing supply chain.

Manufacturers urge Congress to eliminate the WTO-inconsistent crude oil export ban in order to promote the export of all products from the United States that will advance America's economic and broader interests.

Sincerely,



Linda Dempsey  
Vice President  
International Economic Affairs



Ross Eisenberg  
Vice President  
Energy and Resources Policy

Cc: Members of the Senate Committee on Energy and Natural Resources  
Members of the Senate Committee on Foreign Relations  
Members of the House Committee on Energy and Commerce  
Members of the House Committee on Foreign Affairs



Testimony  
To the  
U.S. Senate Committee on Energy and Natural Resources  
Hearing On  
Energy Accountability and Reform Legislation June 9, 2015  
Submitted By  
The National Association of Royalty Owners (NARO)  
15 W. 6<sup>th</sup> Street Suite 2626 Tulsa, OK 74119  
Contact Jerry R. Simmons 918-794-1660

The National Association of Royalty Owners (NARO) has members in all 50 states and educates and advocates for the rights of an estimated 8.5 to 12 million citizens who receive royalty income from the production of their private property – their oil and natural gas minerals. The average NARO member is 60 years old, a widow and makes less than \$500 per month in royalty income. About 70 percent of the mineral estate in the lower 48 states is owned by individual citizens. In 2012, it was estimated that roughly 77 percent of oil and 81 percent of natural gas produced onshore was produced on private property. Therefore, the approximately 77% of crude oil produced was owned by private citizens who have leased the right to produce their mineral to a company who we believe should be able to compete on the world market with our product.

Of all the wells ever drilled around the world, the vast majority have been drilled in the United States – a nation that values private ownership of minerals and that also encourages both risk and the pursuit of profit.

This hearing addressed a broad array of bills, this testimony addresses our support for S.1312, The Energy Supply and Distribution Act of 2015. Among the provisions of this legislation are sections that would expand America's opportunity to export surplus volumes of U.S. crude oil. We strongly support enactment of S.1312. The reasons are numerous.

**The United States ban on the export of its crude oil is unnecessary**

In 1975, the United States government enacted limitations on the export of crude oil to protect American consumers from price volatility on the world market. Today, America has an abundance of energy supplies, brought on by the advancement of hydraulic fracturing and horizontal drilling technology. The United States is now the world's largest producer of oil and natural gas – surpassing Saudi Arabia and Russia. However, the laws that govern America's crude oil exports are outdated and inconsistent. While the surplus of American crude oil cannot be exported, there are currently no restrictions on exporting U.S. gasoline, diesel, jet fuel, and other forms of fossil energy.

**Crude oil exports will not adversely impact America's gasoline prices**

*Gasoline prices are tied to international oil prices and set by the global market.* U.S. Secretary of Energy Ernest Moniz confirmed at a February 2015 Senate hearing that if the United States exported its surplus of crude oil, there would be no change or even "minor decreases" in the price of U.S. gasoline. Adding more reliable American energy supplies to the global market will reduce market volatility and help stabilize international oil prices. Today, the export ban puts United States companies at a competitive disadvantage, preventing them from competing on equal footing with international state-owned and private competitors in the very global marketplace that sets the energy prices driving their businesses.

**The economic benefits of exporting crude oil are extensive**

Exporting the surplus of American crude production will unleash the full potential of America's energy renaissance. Numerous independent and non-political economic studies have confirmed that repealing the crude oil export ban will lead to more good-paying American jobs, reduced pressure on gasoline prices, increased American energy production, greater national security, and will strengthen America's credibility around the world. Additionally, repealing the crude exports ban would provide America's energy producers with competitive access to the global trade market, which will further reduce the impact of global unrest on the price of oil.

**American consumers benefit from crude oil exports**

The U.S. Energy Information Administration and numerous independent economic studies have confirmed that expanding U.S. crude oil exports would lead to lower gasoline prices for consumers, allowing American families to pocket more of their hard-earned dollars instead of paying more to fill-up their cars each day. Granting the export of America's energy supply surplus will encourage U.S. producers to reinvest their money into generating more American made energy, which powers the economy, increases national energy security, and keeps energy costs down for the consumer.

**Exporting crude oil affect benefit the United States' foreign policy and national security**

Allowing the export of surplus American crude oil production would result in sharp reductions to the trade deficit and reduce the need for the United States and its allies to import oil from volatile regions of the world. Given the increased security threats facing the nation and its allies, the United States must leverage its abundant energy resources to further enhance its economic and national security. Lifting export restrictions would provide America with greater foreign policy influence and would strengthen its trading position worldwide.

**Conclusion**

For these and many other reasons, the enactment of The Energy Supply and Distribution Act of 2015 would dramatically benefit the American economy and enhance its ability to influence energy and global security policy around the world. It would allow our privately owned product to compete on the world market. So we therefore urge Committee Members to support passage of S.1312.



HAL QUINN  
President & CEO

July 15, 2015

The Honorable Lisa Murkowski  
Chairman  
Committee on Energy and  
Natural Resources  
304 Dirksen Senate Building  
Washington, DC 20510

The Honorable Maria Cantwell  
Ranking Member  
Committee on Energy and  
Natural Resources  
304 Dirksen Senate Building  
Washington, DC 20510

Dear Chairman Murkowski and Ranking Member Cantwell:

Thank you for your efforts in developing broad energy legislation to promote affordable and reliable energy across America. This legislation, in conjunction with the Committee on Environment and Public Works' valuable, and complementary, approach to S. 1324, the "Affordable Reliability Electricity Now Act (ARENA)," make important strides toward the continuation of affordable and reliable energy across America.

As you continue the Committee's work on the four general titles – efficiency, infrastructure, supply and accountability – the National Mining Association (NMA) and its membership urge you to continue to support efforts to improve the reliability of the electric grid, ensuring a diverse energy mix that maintains baseload energy and provides an ideal environment for continued growth in future technology advancements. According to an analysis performed by IHS Energy, our diverse electric grid saves Americans \$93 billion each year and reduces the volatility of their utility bills by half.

Electric reliability requires adequate capacity to generate electricity, reserve capacity that can be tapped when demand increases and a functioning grid to deliver electricity to users. The reliability of the nation's power system is of utmost importance to U.S. national security, economic growth and the basic health and welfare of our citizens. Toward that end, NMA supports S. 1221 and S. 1222 and encourage their inclusion in a broader energy package.

S. 1221, the "Bulk-Power System" Reliability Impact Statement Act requires an assessment of the potential impact of any major federal regulation on the reliability of

Chairman Murkowski and Ranking Member Cantwell  
 July 15, 2015  
 Page Two

the nation's bulk power system. It requires existing Reliability Coordinators to prepare a Reliability Impact Statement (RIS) assessing the impact of proposed major federal rules on grid reliability and submit the RIS to the Federal Energy Regulatory Commission (FERC) for submission by FERC to the federal agency issuing the rule.

There is a broad and well-documented consensus that the reliability of the nation's power system is of national importance and should be fully considered by Federal agencies before new major federal regulations are adopted that could impact reliability. S. 1221 requires issuing agencies to provide in the final rule a detailed statement on the impact and any adverse effects of the proposed rule on reliability of the bulk-power system if the proposed rule was implemented, and alternatives to cure any adverse impacts identified.

The need for such assessments is readily apparent from the lack of an independent FERC analysis for the Environmental Protection Agency's (EPA) 2012 Mercury and Air Toxics Standards (MATS) for Utilities. EPA predicted that the rule would force the closure of less than 5,000 megawatts of coal-fired baseload capacity. In fact, as the Energy Information Administration and other analysis demonstrated, the MATS rule will force almost 60,000 megawatts of capacity off the grid. Two years after EPA issued MATS, the bulk power system came close to the edge of breaking as diminished baseload capacity, combined with the underperformance of intermittent resources, struggled to meet increased demand during the winter of 2014. Many of the coal-fired generation plants that supplied the increased demand that winter have been permanently closed this year due to the MATS rule.

S. 1222, the "Continuity of Electric Capacity Resources Act," promotes diversity of electric supply, continuity of electric capacity, and compliance with "must-run" orders that may be issued by the Secretary of Energy. Existing "baseload" capacity units, such as coal-fired power plants that are capable of operating continuously and providing much-needed grid reliability services, are increasingly at risk from government regulations and other market-distorting policies. In certain Regional Transmission Organization (RTO) markets, capacity revenues have been essential to enable baseload units to run because the RTO market rules, as approved by FERC, require electrical entities to show that they have sufficient capacity to meet reliability requirements and serve their loads. S. 1222 will promote greater reliability and fuel diversity in our bulk power system. With the right policy and proper market designs, existing baseload capacity units are capable of operating continuously and provide a foundation for the reliable energy vital for economic growth. We look forward to working with you on these efforts.

Additionally, striving for innovation within our nation's power fleet and continuing to provide affordable power to meet the nation's energy demands are not mutually exclusive goals. In fact, America needs to keep moving forward on new technologies for coal-based electricity generation if both goals are to be achieved. Unfortunately, the

Chairman Murkowski and Ranking Member Cantwell  
July 15, 2015  
Page Three

series of recent and upcoming emission regulations directed at coal-fired electricity generation have gravely impaired the development and deployment of new high efficiency, low emissions coal-based electricity.

Today's investments to accelerate research and development of transformational technologies will support the long-term use of coal both here and abroad. Both developed and emerging nations abroad are continuing to build new, higher efficiency coal-fired power plants to generate low cost, reliable electricity. Legislations such as S. 1293, S. 1283, S. 1282, S. 1306, and S. 1285 introduced by Sens. Joe Manchin (D-W.Va.) and Heidi Heitkamp (D-N.D.) will position the United States to once again set an example for the rest of the world through American innovation and advanced technologies. We look forward to working with the Committee to address this goal in conjunction with your efforts to alleviate the cumulative effect of onerous federal regulations.

Thank you again for your work to date on these important issues. NMA looks forward to continuing a productive dialogue on any legislation that pursues a pathway for a reliable energy future through the long-term utilization of our nation's abundant coal reserves.

Sincerely,

A handwritten signature in black ink, appearing to read "Hal Quinn", with a stylized flourish at the end.

Hal Quinn



**Statement for the Record**

Senate Energy and Natural Resources Committee

June 23, 2015

Re: S. 1312, Energy Supply and Distribution Act of 2015

Submitted by: National Stripper Well Association Chairman Mike Cantrell

Chair Murkowski, Ranking Member Cantwell, Members of the Committee:

The National Stripper Well Association (NSWA) is the only national trade association which represents producers and operators of marginally economic crude oil and natural gas wells in the United States. The U.S. has more than 770,000 marginal wells currently in production, which makes up nearly 20% of all U.S. oil and natural gas, making a significant contribution to the nation's economic security, and our local communities. Worldwide, it should be noted that the United States is the only country with significant production of stripper wells, and one of the few countries in the world with private ownership of mineral rights that makes it possible. Nationwide, approximately 400,000 jobs are directly or indirectly dependent upon marginal or stripper oil and gas wells. In fact, U.S. stripper wells collectively produce 1.2 million barrels per day.

Today, we are here to add our voice to the growing chorus of Americans calling on Congress to allow domestic energy producers to sell their products to America's allies and the world. Stripper well producers, like many in America's oil and gas industry, have for decades been in an economic struggle with international forces beyond our control bent on setting the world price of oil. Much of the internationally traded oil of the world is controlled by a combination of foreign governments and state-run corporations who collude together to control the price of oil to benefit their own agendas, with no regard for the impact on the American people or businesses.

This was most prominently highlighted in the 1970s, when our nation was suffering from energy shortages and long gasoline lines. It was then that U.S. energy policymakers established the first ban on exports in the 1975 Energy Policy and Conservation Act. It was seen as a tool to protect America then, but is a barrier to protecting America now.

America's oil and gas sector has undergone a tremendous renaissance in the 21st Century. Technology advancements have changed the international dynamic of energy reasserting America as the world leader in energy development. These tremendous scientific achievements, along with billions and billions in domestic investment, are taking place all across the oil and gas industry. This includes our nation's stripper wells, which have benefited from advancements in well design, fracturing and flooding that are enhancing recovery of both old and new wells. The reality is that all across the oil and gas sector, America has just started to open a new era of energy abundance.

However, just as many stripper well operators and companies are making massive new investments into driving this new era of abundance the same global forces that have driven world oil prices for the last 40 years are once again colluding together to stifle our energy development. And the U.S. ban on crude oil exports is hurting our ability to finance, invest, and advance our energy production.

The massive expansion of domestic light oil has flooded our refineries, storage facilities, and pipelines with more oil than it can handle already at certain times of the year, and will overwhelm our entire domestic refining capacity in the near future. This puts added pressure on both producers and refiners to find solutions to this oil glut. And while producers are making new investments, it will take time and investments by

refiners to build up their capacity to use all this new resource that is coming to the market. This lack of sufficient domestic capacity leaves producers little choice but to sell at a discount to world prices, threatening new investment and forcing many producers to consider reducing their production capacity. For NSWA members, this is a disaster for many because once they are forced to stop production, is it unlikely much of that production will ever be restarted.

This not only affects stripper well producers, but will ripple through the economy as a whole as well. According to the Interstate Oil and Gas Compact Commission, an organization of the governors 38 oil- and gas-producing states, if all marginal oil and gas wells were plugged and abandoned, the estimated lost output in direct production and indirect and induced economic effects would total \$52.4 billion, with 241,733 jobs lost.

There is a solution to this challenge: Allow our domestic energy producers to compete with those foreign state-owned corporations on the international market. When America competes on the world market, Americans win. When given the opportunity, our skills, work ethic and abilities make the United States the most productive and successful nation on earth. The energy industry is no exception.

Allowing American energy producers the opportunity to challenge the world will once again provide an opportunity to prove American excellence. In addition, it will compete with the global forces that seek to control and command the world oil price. For that reason, it is clear through multiple studies from Government Accountability Office, the Congressional Budget Office, IHS, Brookings Institute, and a host of other independent voices that American consumers will benefit from the approval of crude oil exports.

NSWA is the only national association that represents *solely* the interests of the marginal well producers and operators before Congress, the Administration and the Federal bureaucracies. Established in 1934, NSWA has been at the forefront of the battles in Congress to promote domestic industry, to decontrol the price of stripper oil, helped lead the fight to eliminate the windfall profit tax on stripper well producers and recapture precious ground lost in the seemingly never-ending battle over the percentage depletion allowance.



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June 22, 2015

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The Honorable Lisa Murkowski  
U. S. Senator  
Chairman, Senate Energy and Natural Resources Committee  
709 Hart Senate Office Building  
Washington, D. C. 20510

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Re: S.1312 – Energy Supply and Distribution Act of 2015

Tucker Bayless  
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Cliff Brunson  
BBC International, Inc.

Dear Senator Murkowski:

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*Past Chairman*

Steve Henke, President

On behalf of the oil producing members of the New Mexico Oil and Gas Association, I want to express our strong support for the "Energy Supply and Distribution Act of 2015" (S.1312) which you have introduced with fourteen colleagues. That legislation would modernize and rationalize federal energy policy regulating the supply and distribution of energy in the United States, including most notably allowing the export of domestic crude oil—an objective now long overdue. The oil producers in New Mexico very much support your legislation and its goal of repealing the counterproductive 1970s era crude oil export ban.

A repeal of the ban on crude oil exports will benefit our oil-producing members and the state of New Mexico in numerous ways. In particular, the oil and gas industry in New Mexico supports more than 100,000 direct, indirect, and induced jobs while contributing \$2.1 billion or 35% of the state general fund budget in 2014.

But allowing crude oil exports will not just benefit our state and its oil sector. By generating \$750 billion in additional capital investment for oil exploration and production, allowing oil exports will help the entire national economy.

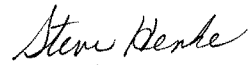
Between 2016 and 2030 a repeal of the crude oil export ban is projected to save consumers \$265 billion due to lower fuel prices. During the same time period, lifting the export ban is estimated to produce an average annual increase in jobs of 394,000 throughout the country, of which 24% will be in states that do not produce crude oil. Crude oil exports are also projected to increase the U.S. Gross Domestic Product by \$135 billion and increase government revenues by \$1.3 trillion by 2030.

The Honorable Lisa Murkowski  
June 23, 2015  
Page Two

Beyond these economic and employment benefits, it is now clear that allowing our allies and trading partners to buy U.S. crude oil will strengthen America's geopolitical relationships with countries that very much want to rid themselves of the leverage exerted on them as a result of having to rely on hostile, unstable and unfriendly sources for their energy supplies.

We look forward to working with you and your colleagues on S. 1312 and hope that it can move expeditiously through the congressional process.

Sincerely,

A handwritten signature in cursive script that reads "Steve Henke".

Steve Henke  
President



June 22, 2015

Senator Lisa Murkowski  
709 Hart Senate Building  
Washington, D.C. 20510

Dear Senator Murkowski,

The North Dakota Petroleum Council is a state trade association representing more than 550 companies in all aspects of the oil and gas industry, including oil and gas production, refining, pipeline, transportation, mineral leasing, consulting, legal work, and oilfield service activities in North Dakota. Our industry represents 65,000 direct and indirect jobs in North Dakota. We stand in support of the oil export bill, S. 1312.

The current ban on the export of United States crude oil, instituted in 1973 at the height of the OPEC oil embargo, is outdated. Congress banned the export of U.S. crude oil in response to several concerns – to support domestic price controls, to conserve what was perceived as dwindling domestic supplies, and in response to the embargo. More than 40 years later, none of these conditions exist, but the ban lives on.

As a result of 1973 and the energy landscape that followed it, U.S. refineries were built or converted to process heavy, sulfurous crude oils that we imported from Canada, Mexico or the Middle East. They are not built to handle the light, sweet crude oil we produce in the Bakken. A May 2014 study from leading research and consulting firm IHS warns that the inability of the US refining system to efficiently process the growing volume of light crude is causing a “widening discount, which will reduce drilling investment, jeopardizing oil production growth, reducing jobs, and hurting the U.S. economy.” The good news is there are refineries that want our oil, and they belong to friends and allies in Europe.

Thanks to major advances in technology in the Bakken and shale plays across the nation, U.S. oil production has surged to more than 10 percent of the world’s total. We’re less reliant on foreign energy than ever before, and production is still rising. As a result, we’ve become a net exporter of refined petroleum products for the first time in over 60 years. This great rise in production has lifted the U.S. from an era of energy scarcity to an era of energy abundance. However, we find ourselves in a price war with countries we’ve allowed to monopolize the global markets. Lifting the export ban would enhance our ability to compete with OPEC in the global market and take away their ability to manipulate oil prices.

But, we’re not just talking energy security. There are other benefits, too – namely jobs, economic growth and lower energy prices – that would come from lifting the export ban. If crude exports are allowed, the US economy could gain up to 300,000 additional jobs in 2020. It’s clear that allowing domestic energy producers, like those here in the Bakken, to sell crude oil on the world market would greatly benefit our nation. For these and many other reasons, the enactment of The Energy Supply and Distribution Act of 2015 would dramatically benefit the American economy and enhance its ability to influence energy and global security policy around the world.

Sincerely,

Ron Ness, President  
North Dakota Petroleum Council

## Ohio Oil and Gas Association

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Columbus, Ohio 43215  
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Fax (614) 824-4329  
www.ooga.org

June 18, 2015

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- JOHN C. WRIGHT

## • EXECUTIVE COMMITTEE

The Honorable Lisa Murkowski  
United States Senate  
709 Hart Senate Building  
Washington, D.C. 20510

Dear Senator Murkowski,

On behalf of the Ohio Oil and Gas Association and its 3,100 members involved in all aspects of the exploration, production and development of crude oil and natural gas resources within the State of Ohio, we are pleased to endorse The Energy Supply and Distribution Act of 2015 (S. 1312). We commend you for introducing this legislation that will end the unnecessary prohibition on crude oil exports and help create new, good-paying jobs here in Ohio.

This ban on exportation dates back to 1975 when Congress banned the sale of crude oil in response to the Arab oil embargo. Since then, thanks to technological improvements, Ohio and the U.S. have undergone an energy renaissance and our oil and natural gas production has increased dramatically.

We strongly believe that lifting the export ban is the best way to spur new energy production, grow the economy and make our nation more energy secure. In addition, Ohioans would directly benefit from this change in policy. According to a study released last year by ICF International, Ohio could add up to 15,948 jobs and \$2.68 billion to the state economy in 2020 if the ban were lifted.

S. 1312 will modernize our federal energy policy and allow oil producers here in Ohio and the rest of the United States to make significant contributions to the world oil market. The facts are clear -- ending the ban on the exportation of crude will only benefit Ohio, the United States, and our allies. The increase in capital investment resulting from lifting the ban would permeate all levels of America's economy and provide a significant boost to our sluggish economic recovery.

Thank you for introducing this legislation and we support its immediate passage by both the Senate Energy and Natural Resources Committee and the full Senate.

Sincerely,



Shawn Bennett  
Executive Vice President  
Ohio Oil and Gas Association





May 13, 2015

The Honorable Lisa Murkowski  
United State Senate  
Washington, DC 20510

The Honorable Heidi Heitkamp  
United State Senate  
Washington, DC 20510

Dear Senators Murkowski and Heitkamp:

As representatives of the Nation's oil industry, we want to express our strong support for your newly-introduced "Energy Supply and Distribution Act of 2015." Growing U.S. production of shale formation oil and natural gas creates economic opportunities that have not existed for over five decades. Artificial limits on market options could restrict U.S. benefits. Exports have a key role in keeping the development of U.S. production on course.

Production growth cannot continue at expected rates if the market is curtailed. Much like the export of gasoline and diesel fuels from American refineries now helps keep refining jobs in America, oil exports will enable the U.S. to invest in more American shale development and keep those good jobs here. Moreover, because American gasoline prices are determined based on the international marketplace rather than the U.S. market, exports of U.S. crude oil will have a stabilizing effect on gasoline prices as those increased oil supplies put downward pressure on the world marketplace and reduce price volatility for refined petroleum products.

Similarly, from a national security perspective, the nation's geopolitical interests are best served by providing a more stable market for international allies and trading partners. Providing U.S. crude exports to our allies and trading partners weakens the power of unstable and unfriendly nations to manage crude oil supply, to dictate prices and to use their oil as a lever against our allies to the detriment of our nation's international interests.

The Energy Supply and Distribution Act draws a carefully crafted balance by opening the world marketplace to the export of U.S. crude oil while reaffirming the authority of the President to constrain exports when compelling national interests require it. This balance assures that the American economy can benefit from the vast crude oil resource base that is now available for development while being protected if there is ever a need to do so.

We are very pleased to see your leadership on this bipartisan legislation and we urge Senators from both parties to follow your lead.

Sincerely,

Barry Russell  
President and CEO,  
Independent Petroleum  
Association of America

George Baker  
Executive Director,  
Producers for American  
Crude Oil Exports

Jack N. Gerard  
President and CEO,  
American Petroleum Institute

Albert L. Modiano  
President,  
US Oil & Gas Association

V. Bruce Thompson  
President,  
American Exploration &  
Production Council

R. Bruce Josten  
Executive Vice President for  
Government Affairs,  
U.S. Chamber of Commerce



June 23, 2015

Statement for the record submitted by:

Oklahoma Independent Petroleum Association (OIPA)  
500 N.E. 4<sup>th</sup> Street  
Oklahoma City, OK 73104  
Chairman: Jeff McDougall, JMA Energy  
President: Mike Terry  
mterry@oipa.com  
405-942-2334

Statement submitted to:

**US Senate Energy and Natural Resources Committee**

The Oklahoma Independent Petroleum Association (OIPA) offers the following statement for the record to the Senate Energy and Natural Resources Committee on the issue of eliminating the nation's ban on crude oil exports.

OIPA represents more than 2,700 members from Oklahoma's independent oil and natural gas industry, including crude oil and natural gas producers and operators, drilling contractors, and service and supply company owners and managers.

Independent producers are now, more than ever, aggressively searching for more oil and natural gas reserves with new technology helping independents find and recover more domestic oil and natural gas. Small oil operators are using new technology to enhance mature oil fields and unconventional plays are receiving new attention. Our members work daily to make our country more energy secure and less reliant on foreign sources of energy.

In Oklahoma alone, crude oil production has doubled over the past decade, reversing three decades of decline in the state and reaching output levels not seen since 1990. Without increased markets for Oklahoma's light sweet crude, exploration and production will slow. Removing man-made crude oil market restraints set in the Energy Policy and Conservation Act of 1975 would increase U.S. drilling operations, adding tens of thousands of direct and support jobs across the country and in Oklahoma.

Allowing exports should give a boost to the depressed crude oil prices that have hamstrung our state and sent thousands of oil and gas professionals to the unemployment line. By allowing American crude oil to enter the worldwide market, Oklahoma producers can benefit from the increased prices worldwide oil producers have received for the better part of a decade.

500 N.E. Fourth Street, Oklahoma City, OK 73104  
405-942-2334    [www.oipa.com](http://www.oipa.com)

Today, worldwide oil trades 10 percent higher than American crude oil prices. In the world of depressed commodity prices we live in, that 10 percent price differential could mean the difference between an economic and at-risk well. It will save jobs. It would also mean an increase in Oklahoma gross production tax payments by roughly \$4 million per month at a time when every state budget penny is significant

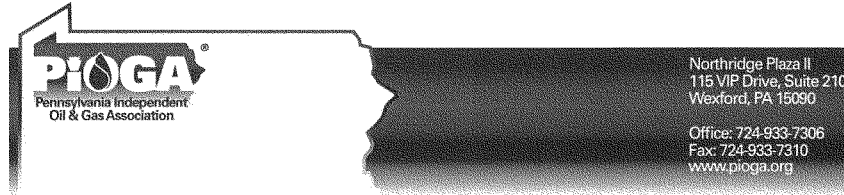
It is important to note the increased value of American crude oil will not impact consumer costs. Because gasoline and all other refined goods can be sold worldwide, the price we pay at the pump is based on worldwide oil prices. If anything, the price at the pump may be reduced even more by putting more oil in the world market.

The bottom line is crude oil exports are good for Oklahoma and the nation. Eliminating the antiquated federal law that puts a manmade restriction on American crude oil production will enable independent producers to invest in more American oil and natural gas development.

Sincerely,

A handwritten signature in black ink, appearing to read "Mike Terry", with a long, sweeping horizontal line extending to the right.

Mike Terry  
President



June 19, 2015

Senator Lisa Murkowski  
709 Hart Senate Building  
Washington, D.C. 20510

Dear Senator Murkowski,

The Pennsylvania Independent Oil & Gas Association is proud to support S. 1312, The Energy Supply and Distribution Act of 2015. This is a critical piece of legislation that will end the decades-old ban on crude oil exports, an antiquated policy that is stifling economic growth and ignores the current abundance of U.S. energy.

With over 40 years of experience, I've seen firsthand how oil and gas production has created tens of thousands of good-paying jobs in our state and contributed substantially to local economies. I've also witnessed the tremendous advancements in technology that have revolutionized our industry.

The world's first commercial oil well was drilled in Pennsylvania in 1859 by Col. Edward Drake in Titusville. Things have changed significantly over the past 150 years, not only in the techniques we use to develop oil and gas resources but in the amount we are now able to produce. Our ability to reach oil and gas deposits that were once inaccessible, especially in shale formations, has taken the U.S. from a net importer of oil to the world's leading oil producer.

I remember when the crude export ban was put in place during the "oil crisis" of the 1970s. I can say with certainty that these are different times and that the U.S. is missing out on tremendous opportunities by keeping this export ban on the books.

Lifting the crude oil export ban would further expand U.S. energy production, create new jobs, grow our economy and strengthen our energy security. The people and businesses in Pennsylvania would directly benefit from the free trade of crude oil and I urge all Senators to join you in supporting S. 1312.

Sincerely,

Louis D'Amico  
President and Executive Director



June 23, 2015

Senator Lisa Murkowski  
Chairman, Senate Energy and Natural Resources Committee  
709 Hart Senate Office Building  
Washington, DC 20510

Re: Statement for the Record - Hearing on Energy Accountability and Reform  
Legislation, S. 1312 - Energy Supply and Distribution Act of 2015

Dear Senator Murkowski,

The Permian Basin Petroleum Association appreciates the opportunity to submit these written comments in support of S. 1312 to the Senate Committee on Energy and Natural Resources. As the largest regional oil & gas association in the United States, with over 1,000 members in Texas and New Mexico, PBPA is truly the voice of the nation's most prolific oil producing region.

As such, the topic of ending the outdated ban on crude oil exports is of particular importance to us. Our members are not large, multinational companies. Rather, the vast majority of PBPA companies are independent, family owned, and absolutely integral to driving quality, sustainable economic growth in the United States.

Our member companies create high paying, stable jobs that allow workers to buy homes, save for retirement, and send their kids to college. Additionally, we contribute billions of dollars to the tax base and add significantly to GDP. Simply put, the American oil industry is an essential platform for a healthy US economy in the decades to come.

It is for all of these reasons that I write today in support of S. 1312 – the Energy Supply and Distribution Act of 2015. The energy renaissance brought about by emerging shale technology is at risk if action is not taken now to update federal policy regulating energy supply and distribution in the US. – particularly the outdated ban on the export of crude oil.

In the past year alone, Columbia University, Rice University, the Brookings Institute, ICF International, the US GAO, and countless others have weighed in on this issue, all in favor of lifting the ban. The benefits are substantial, and include saving US consumers an estimated \$265 billion at the gas pump between 2016 and 2030. That savings is in addition to an estimated 300,000 new jobs by 2020 and the potential to increase GDP by as much as 1%.

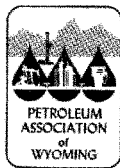
Allowing crude oil exports would be a game-changer geopolitically as well. Our newly created crude oil abundance affords us the opportunity to help our allies around the world that have, until now, been forced to rely on hostile, unstable regions and governments to meet the energy needs of their growing economies. Additionally, as the largest crude oil producer in the world, surpassing Russia and Saudi Arabia, the US could significantly impact OPEC's stranglehold on the world energy economy and push prices down for everyone by adding to global supply and trading on the international Brent standard.

Opponents of lifting the ban are short on substantive arguments. The one they offer most often is that domestic refiners rely on the "discounted" price of oil purchased from US producers to make their business model work. It is simply not acceptable to disadvantage one industry in order to subsidize another. Additionally, no industry has ever thrived as a result of government shielding it from market forces. It didn't work for the airlines, it hasn't worked for Amtrak, and it isn't working here. Successful businesses must be agile and able to respond to market forces.

The Permian Basin Petroleum Association fully supports S. 1312 and looks forward to assisting you and your colleagues in advancing this groundbreaking legislation through Congress and to the President's desk.

Sincerely,

Ben Shepperd  
President  
Permian Basin Petroleum Association



## PETROLEUM ASSOCIATION of WYOMING

951 Werner Court, Suite 100  
Casper, Wyoming 82601  
Phone (307) 234-5333

Fax (307) 266-2189  
E-mail: [paw@pawyo.org](mailto:paw@pawyo.org)  
[www.pawyo.org](http://www.pawyo.org)

June 18, 2015

The Honorable Senator Lisa Murkowski  
709 Hart Senate Building  
Washington, D.C. 20510

Dear Senator Murkowski:

On behalf of our members, the Petroleum Association of Wyoming would like to offer our support for your legislation, S. 1312, the Energy Supply and Distribution Act of 2015. Lifting the decades-old crude oil export ban is not only smart policy, but will help provide jobs and economic growth for the people and businesses of Wyoming.

Wyoming has a long, rich history in oil and natural gas production and it is the backbone of our economy. It directly employs over 25,000 people, supports thousands of indirect jobs, and contributes billions of dollars to state and local governments through tax and royalty payments. Allowing the export of U.S. crude oil to new world markets would increase oil production in our state and throughout the country. It would also provide growth opportunities for our independent producers as well as companies throughout the supply chain. Furthermore, studies and research show that the people of Wyoming would also benefit by paying lower prices at the gas pump.

S. 1312 recognizes the energy renaissance our country is experiencing and the need to bring our energy policy into the 21<sup>st</sup> century. By removing the export ban, the legislation would increase our energy security, help our global allies, and create new jobs and economic opportunities here at home.

We urge all Senators and President Obama to support S. 1312 and applaud your continued leadership on this issue.

Sincerely,

A handwritten signature in black ink, appearing to read "Bruce A. Hinchey", is written over a horizontal line.

Bruce A. Hinchey  
President  
Petroleum Association of Wyoming

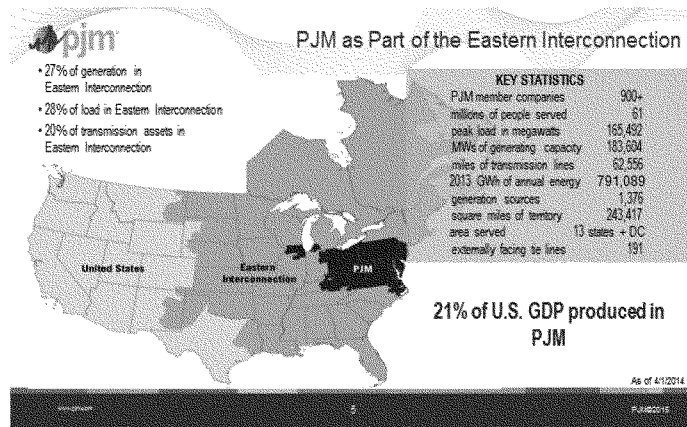
cc: Senator John Barrasso



Craig Glazer  
 Vice President, Federal Government Policy  
 1200 G Street, N.W., Suite 600  
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**2015 Energy Legislative Proposals: PJM Analysis and Comments**

PJM Interconnection, L.L.C. ("PJM") appreciates the opportunity to provide information to Members of the Senate Energy Committee members concerning the various energy policy bills that have recently been introduced before the Committee. PJM is the FERC-regulated Regional Transmission Organization responsible for ensuring the reliability of the bulk electric system in all or parts of the states of New Jersey, Pennsylvania, Delaware, Maryland, Virginia, West Virginia, North Carolina, Tennessee, Kentucky, Michigan, Ohio, Indiana and Illinois and the District of Columbia. In addition, PJM operates the world's largest competitive wholesale electricity market and is responsible for planning for expansion of the grid to meet future reliability and public policy needs. The PJM region serves approximately 61 million customers from over 183,000 MW of generation.



PJM provides this brief White Paper as an information resource to the Committee. PJM does not present this White Paper in order to advocate for or against a particular bill but instead presents this information in order to ensure that:

- any adopted legislation enhance the overall reliability of the power grid;
- the complex federal-state interaction that is so integral to grid reliability is not inadvertently changed in a manner that would make it more difficult to ensure the continued reliable and efficient operation of the power grid;
- any future legislation avoid unintended consequences that could adversely affect the efficient and reliable operation of the grid; and

- those past decisions of the courts or the Federal Energy Regulatory Commission (“FERC”) are taken into account as the Congress considers whether to make changes to those decisions through its choice of legislative language.

PJM very much appreciates the Committee members’ keen focus on proposing legislation that advances key issues associated with reliability, evolution of the grid and long term price stability. PJM shares those interests and welcomes the Committee’s inquiry on these important subjects. Given the limited timeframe for hearings, PJM is providing these initial comments in writing to aid the Committee members and Congressional Staff. However, PJM welcomes continued dialogue with the Committee members as well as Staff so that legislation provides clear policy guidance and is adopted in a form that can be seamlessly implemented by the nation’s grid operators.

#### Analysis of Submitted Legislation

PJM presents this brief analysis of the legislation which has been introduced to date and posted on the Committee’s website. As a number of bills do not directly affect grid operations, this paper will be limited to those introduced bills which potentially impact PJM’s markets or operation or where we believe our comments and background in grid operations could be helpful as the Committee considers a draft bill in the mark-up process. This White Paper provides that analysis with reference to the bills in the order that they are listed on the Committee’s website.

#### Legislation Introduced by Chairman Murkowski

##### S. 1217—Electric Transmission Infrastructure Permitting Improvement Act

This legislation establishes a series of extremely helpful measures to coordinate the permitting of electric transmission infrastructure among various federal permitting agencies. Given that in the PJM region, any projects needed for reliability or market efficiency are thoroughly and publicly vetted through an open stakeholder process as required by FERC Order 890, this legislation will help to avoid constant re-litigation before each permitting agency as to the need for a given transmission facility. The legislation will also help to streamline and coordinate environmental reviews.

PJM’s comment on this particular legislation involves more of a drafting matter rather than substantive concern. In Section 2(b) (2), the legislation assigns to an Interagency Rapid Response Team for Transmission the task:

*“to facilitate the performance of maintenance and upgrades to electric transmission lines on Federal land and non-Federal land.”*

By contrast, Section 3(b) (1) appears to assign that task to the Ombudsperson at FERC created for this purpose (among others). Given that transmission owner access for needed maintenance and repair of transmission lines needs to happen on an expedited basis, the IRC suggests that the legislation make clear the ability of the FERC Ombudsperson to act quickly, working directly with any affected permitting agency, without having to formally convene or otherwise involve the entire Rapid

Response Team before taking action to ensure transmission owner access in order to effectuate timely transmission maintenance and repair.

*S. 1219—Interconnecting Distributed Resources and Examining Net Metering*

This legislation appropriately recognizes the impact of a growing number of distributed resources on efficient grid management. Distributed resources are “behind the meter” resources which directly affect the operation of the distribution grid and the provision of distribution services. On a large scale, the amalgamation of a large number of distributed resources can begin to impact transmission grid operations. This is an area where close coordination of federal and state policies are needed.

The legislation as drafted contains a provision in Section 1(B) (ii) assigning to each state regulatory authority a directive to:

*“(ii) prescribe appropriate measures to ensure adequate ancillary services so that grid interconnection for distributed resources is safe, reliable and efficient.”*

The legislation defines “ancillary services” in Section (A) (i) as including: (I) reactive supply; ((II) regulation and frequency response; (III) energy imbalance; (IV) operating reserves; (V) generation imbalance; and (VI) flexibility and ramping services. These defined ancillary services are critical to the operation of the interstate bulk power electric grid. They are provided today pursuant to Regional Transmission Operator (“RTO”) and Independent System Operator (“ISO”) tariffs approved by FERC and are designed to ensure RTO/ISO compliance with reliability standards of the North American Electric Reliability Corporation (“NERC”). The provision of these services needs to be consistent within the RTO/ISO footprint and coordinated with its neighbors so as to ensure bulk power reliability.

As drafted, the legislation may have the unintended effect of appearing to transfer this responsibility, which is integrally intertwined with the interstate nature of the grid and compliance with nationwide reliability standards, to individual states. As a drafting matter, PJM would respectfully suggest that the directive to the states under PURPA be redrafted away from a responsibility “to prescribe appropriate measures to ensure adequate ancillary services” and instead focus on drafting net metering standards that:

- a. do not impair the provision of reliable electric service at the distribution level (which is solely within state jurisdiction); and
- b. are coordinated with any FERC/NERC and RTO/ISO requirements so as not to impair the ability of the grid operator to meet its tariff responsibilities to ensure the provision of ancillary services needed at the transmission level.

Although this may well be a simple drafting change, we believe it is consistent with the intent of the bill while avoiding disturbing the existing regulatory regime governing the provision of ancillary services needed to ensure bulk power reliability.

S. 1221--Bulk Power System Reliability Impact Statement Act

The goal of this legislation, namely to ensure that impacts on reliability are considered as part of any federal rulemaking, is consistent with long-standing arguments that PJM has highlighted on the need for consideration of reliability impacts in the drafting and administration of environmental regulations. Codification of such a requirement will help to address legal issues as to the ability of various federal and state environmental agencies to consider reliability impacts and the role of FERC in that agency's rulemaking process where reliability may be impacted.

PJM points out several drafting issues with the legislation for the Committee's consideration:

Section 3(2) assigns to NERC Reliability Coordinators the task of preparing a report addressing:

(A) *"The state of and prospects for the reliability and affordability of electricity within the geographic area covered by the reliability coordinator"*

Projections of affordability of electricity require an analysis of, among other factors, trends emanating from the RTO electricity markets as well as trends resulting from an analysis of fuel and emission allowance markets. Section 215 of the Federal Power Act as originally enacted by the Congress kept the ERO and its affiliates (the Reliability Coordinators) singularly focused on reliability while leaving issues of affordability to the federal and state regulators. Inclusion of an analysis of affordability could blur those lines and involve the Reliability Coordinators in a task which they are not necessarily well-suited to perform and one which would distract from their primary mission. Although large scale financial impacts of environmental regulations are key considerations, the analyses of these impacts are best performed by market operators and economic regulators at the state and federal level. By contrast, issues as to "affordability of electricity" are issues largely focused on the impacts on retail customers and are best issued addressed by state economic regulators.

In addition, PJM notes that the legislation limits FERC's role to merely receipt and transmittal of the request to the relevant permitting agency. Given FERC's unique role in both overseeing energy markets and reliability of the bulk power system as well as the siting of certain natural gas infrastructure, the Committee may wish to expand on FERC's role and define a role for FERC if it wishes to provide its own input to the affected permitting agency

S. 1222 Continuity of Electric Capacity Resources Act

Consistent with its reliability responsibilities, each Regional Transmission Organization ("RTO") is required to ensure that adequate capacity has been procured to ensure that customer demand for electricity can be met during peak periods. As recognized in other legislation, the structure of such procurement among RTOs/ISOs differs largely on whether generation is procured in restructured electric markets or in more traditional vertically integrated markets. However, even in areas where the vertically integrated structure still dominates (such as the Midwest ISO), provisions exist in the applicable FERC tariffs to provide a means for the RTO/ISO to be assured of adequate capacity plus a reserve margin.

This legislation both calls for a report and mandates various new tariff filings to meet a list of objectives set forth in the legislation. As to the report provisions in (Section 2(b) (2)), the legislation appears to call for information which the RTOs/ISOs already report publicly. PJM suggests clarifications to the language, given the competitively sensitive nature of this information, that the reporting RTO/ISO be allowed to report aggregated information as opposed to prognostications of “financial health, viability and projected remaining years of service” of individual units.

In Section 2(c), the legislation calls for comprehensive tariff amendments to be filed within 180 days that, in some cases, could change the function of capacity procurement as it exists today. It is unclear if some of the defined objectives could continue to be achieved through market-based solutions or if FERC is being empowered to adopt more “command and control” type measures more akin to integrated resource planning.

For example, Section 2(c) (2) (A) sets as an objective of the newly-filed tariffs, procurement of a “diverse generation portfolio.” PJM has been successful in obtaining a mix of baseload, mid-merit and peaking units through both energy and capacity market mechanisms that utilize a single clearing price mechanism that incents the development of an array of generation. Over 42,000 MW of new generation has been integrated onto the PJM grid to replace generation that retired as a result of the EPA’s MATS rule, local environmental rules and price pressure resulting from extremely low natural gas prices. The generation fleet has become more diverse with coal and nuclear expected to continue to play a significant role in the market going forward. Through PJM’s Capacity Performance proposal at FERC, fuel security will be appropriately rewarded through the capacity market. By focusing on *fuel security*, the inherent benefits of those resources (such as coal and nuclear with on-site fuel), will be recognized without empowering FERC or RTOs to choose specific tranches of fuel types. Because it is unclear if the legislation seeks a change to what FERC has developed to ensure fuel security under existing law, the addition of a new “fuel diversity” criteria could be read as changing existing law and empowering FERC to adopt non-market command and control solutions that would be more akin to integrated resource planning than market-driven capacity procurement. Clarification that Congress is not necessarily rejecting FERC’s action to date, could help to avoid questions as to the reach of this new criterion associated with fuel diversity.

By the same token, it is unclear if the directive that each transmission organization “shall file” with FERC “1 or more tariff amendments that would achieve the objectives” allows the flexibility for RTOs/ISOs and stakeholders to make a demonstration that these objectives are being achieved through existing tariff mechanisms. The IRC respectfully requests that the legislative language be flexible enough to permit this outcome. Given the potential for uncertainty in the investment community should this language be read as signaling wholesale changes in RTO/ISO capacity procurement, the Committee may want to be especially careful to not appear to pre-judge whether *existing* RTO tariff provisions are achieving the stated objectives but instead leave that fact-intensive inquiry to FERC, the agency with expertise in this area.

By the same token Section 2(B) calls for “an enhanced opportunity for self-supply” for electric cooperatives, Federal power marketing agencies and state utilities with a service obligation. The

courts and FERC have examined this issue extensively and found that there could be instances where “enhanced opportunities for self-supply” could adversely affect FERC’s obligation under Section 205 and 206 of the Federal Power Act to ensure that the markets it oversees are producing just and reasonable rates for all wholesale customers, not just those exercising self-supply options.<sup>1</sup> The proposed language, as drafted, could be read as pre-deciding the issue as to the proper balance between self-supply and just and reasonable rates by directing “enhanced opportunit(ies)” for self-supply without recognition of the balance to ensure just and reasonable rates for all wholesale customers, not just those exercising a self-supply option.

Rather than signaling to the courts that the decisions made in *New Jersey v. FERC*, interpreting the Federal Power Act, may need to be reversed, PJM would suggest that this complex matter be left to the FERC without use of the judgmental term “enhanced” opportunities. While supporting the concept of Congress recognizing legitimate self-supply as one objective, PJM points out that legislation that appears to pre-judge the outcome or signal a reversal of the present state of the law before FERC’s analysis under the proposed statute has even been undertaken could cause considerable uncertainty at a critical time when investment in new and existing generating infrastructure is critically needed.

Finally, PJM would note that the legislation defines electric capacity resources in section (a) (2) as “an electric generating resource”. Passage of this legislation would essentially determine that demand response and energy efficiency resources could not serve as capacity resources, a matter which is presently pending before the US Supreme Court in *EPSA v FERC*.<sup>2</sup> Moreover, the tight definition of “electric capacity resource” would also preclude a suite of emerging technologies such as batteries and other forms of energy storage as a capacity resource, an outcome which may limit the options available to the RTOs/ISOs to ensure long term system reliability.

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PJM appreciates the Committee’s consideration of this informational White Paper. Additional White Papers will analyze the legislative proposals submitted by Ranking Member Cantwell as well as those of Committee members.

For more information or to discuss these issues further, please contact Craig Glazer, PJM Vice President of Federal Government Policy at 202-423-4743 or by e-mail at [Craig.Glazer@PJM.COM](mailto:Craig.Glazer@PJM.COM).

June 9, 2015

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<sup>1</sup> *N.J. Bd. of Pub. Utils. v. FERC*, 744 F.3d 74 (3d Cir. 2014).

<sup>2</sup> *Elec. Power Supply Ass’n v. FERC*, 753 F.3d 216 (D.C. Cir. 2014), *cert. granted*, (U.S. May 4, 2015) (Nos. 14-840 and 14-841).



June 15, 2015

The Honorable Lisa Murkowski  
Chairman  
Energy and Natural Resources Committee  
United States Senate  
Washington, D.C. 20510

The Honorable Heidi Heitkamp  
United States Senate  
Washington, D.C. 20510

Dear Senators Murkowski and Heitkamp:

On behalf of the Small Business & Entrepreneurship Council and our nationwide membership of entrepreneurs and small businesses, I am writing in strong support of the Energy Supply and Distribution Act of 2015 (S.1312), which would end the ban on U.S. crude oil exports. Thank you for your leadership in introducing this important legislation.

Back in the 1970s, Congress imposed restrictions on U.S. crude oil exports in response to the Arab oil embargo. That was a debatable step entangled with other energy policy decisions at the time. However, it is clear today that given the energy revolution in the U.S., thanks to technological advancements, the crude oil export ban is outdated. The ban is detrimental to U.S. investment, small business growth, new business creation and job growth.

Regarding energy production, the U.S. is in a far different position than it was some four decades ago, or even just a decade ago. This year, for example, the U.S. is expected to produce 85 percent more crude oil than in 2008. For good measure, the U.S. now stands as the globe's largest producer of oil and natural gas. In fact, one estimate places the U.S. as the largest crude producer.

Economic common sense, confirmed by study after study, tells us that expanding U.S. crude exports would be a major boost for U.S. energy production, investment, economic growth, income growth, and job creation, while also reducing prices paid at the pump.

All of this would be good news for America's small businesses. Small firms have played a big role in recent energy innovations. In fact, small firms dominate key energy sectors. For example, employer firms with less than 20 workers account for 91.1 percent of firms among oil and gas extraction businesses, 79.8 percent of those among drilling oil and gas wells businesses, 83.3 percent among support for oil and gas operations businesses, 65.5 percent among oil and gas

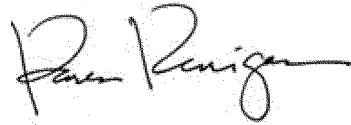
pipeline and related structures construction businesses, and 57.6 percent among oil and gas field machinery and equipment manufacturing businesses.

In addition, increased crude production by the U.S., if incentivized by lifting the crude exports ban, would reduce the global price for oil. And given that the price of crude oil is the main driver of the price of gas at the pump, gasoline prices benefit (i.e., experience downward pressure) as a result of lower oil prices. That, too, is good news for U.S. consumers and small businesses.

The Energy Supply and Distribution Act of 2015 (S.1312) deserves to be passed, as it would be a huge positive for U.S. investment, small businesses, growth and jobs.

Please feel free to contact SBE Council if we can help to further this important legislation, and thank you for your support of America's entrepreneurs.

Sincerely,

A handwritten signature in black ink, appearing to read "Karen Kerrigan". The signature is fluid and cursive, with the first name "Karen" and last name "Kerrigan" clearly distinguishable.

Karen Kerrigan  
President & CEO

*301 Maple Avenue West • Suite 100 • Vienna, VA 22180 • (703)-242-5840 • sbecouncil.org  
@SBECouncil*

Protecting Small Business, Promoting Entrepreneurship



June 26, 2015

Senator Lisa Murkowski  
Chairman, Senate Energy and Natural Resources Committee  
709 Hart Senate Office Building  
Washington, DC 20510

Re: S.1312 – “Energy Supply and Distribution Act of 2015”

Dear Senator Murkowski,

On behalf of STEER, the South Texas Energy and Economic Roundtable, I want to express our strong support for the “Energy Supply and Distribution Act of 2015” (S.1312) which you have introduced with fourteen colleagues. That legislation would modernize and rationalize federal energy policy regulating the supply and distribution of energy in the United States, including most notably allowing the export of domestic crude oil—an objective now long overdue. The Oil and Gas industry in South Texas very much supports your legislation and its goal of repealing the counter-productive, 1970s era crude oil export ban.

A repeal of the ban on crude oil exports will benefit our Eagle Ford Shale area producers in numerous ways. According to a recent study, in 2013, the oil and gas industry in the Eagle Ford Shale region brought 155,000 jobs to the area with an economic impact of \$87 billion while producing 1.5 million barrels of oil per day. Allowing crude oil exports will not only benefit Texas but the entire country.

Between 2016 and 2030, a repeal of the crude oil export ban is projected to save consumers \$265 billion due to lower fuel prices. During the same time period, lifting the export ban is estimated to produce an average annual increase in jobs of 394,000 throughout the country, of which 24 percent will be in states that do not produce crude oil. Crude oil exports are also projected to increase the U.S. Gross Domestic Product by \$135 billion and increase government revenues by \$1.3 trillion by 2030. Beyond these economic and employment benefits, it is now clear that allowing our allies and trading partners to buy US crude oil will strengthen America’s geopolitical relationships with countries that very much want to rid themselves of the leverage exerted on them as a result of having to rely on hostile, unstable and unfriendly sources for their energy supplies.

We look forward to working with you and your colleagues on S. 1312 and hope that it can move expeditiously through the congressional process.

Regards,

Omar Garcia  
President and CEO, STEER

# SPORTSMEN FOR Responsible Energy Development

June 8, 2015

The Honorable Lisa Murkowski  
Chairman  
Committee on Energy and Natural Resources  
United States Senate  
304 Dirksen Senate Building  
Washington, D.C. 20510

The Honorable Maria Cantwell  
Ranking Member  
Committee on Energy and Natural Resources  
United States Senate  
304 Dirksen Senate Building  
Washington, D.C. 20510

**RE: Support for S.1407, the Public Lands Renewable Energy Development Act**

Dear Chairman Murkowski and Ranking Member Cantwell:

We are writing on behalf of the Sportsmen for Responsible Energy Development (SFRED) coalition and to thank you for scheduling a hearing on S.1407, the Public Lands Renewable Energy Development Act.

SFRED is a coalition led by Trout Unlimited, National Wildlife Federation and the Theodore Roosevelt Conservation Partnership, made up of more than 1,500 businesses, organizations and individuals dedicated to advancing federal policy and practices that ensure responsible energy development on public lands. We work with our sportsmen and conservation partners, states, local communities, industry, and federal agencies to find a balance that provides for production of energy while ensuring the protection of key fish and wildlife habitats on public lands.

All forms of energy development, both traditional and renewable, can have impacts on fish and wildlife habitat and hunting and angling opportunity. However, SFRED supports the kind of approach to energy development promoted by this legislation. S.1407 will help to ensure that large-scale wind and solar developments are balanced with other public land uses by facilitating proper siting decisions, as well as providing a framework – including funding – to mitigate unavoidable impacts.

Public lands management is a complex, often contentious issue. Adding large-scale wind and solar projects will only add to the challenge of balancing multiple uses, but it is important to ensure that our sporting heritage is not sacrificed. One of the novel aspects of S.1407 is that it includes tools to ensure a thoughtful, orderly development while also protecting and restoring fish and wildlife habitat in regions affected by development. One of the ways that S. 1407 would do this by dedicating 35% of leasing revenues to a fish and wildlife conservation fund. These funds could be used for a variety of activities,

including habitat improvement, securing additional access to public lands, and water resource enhancements.

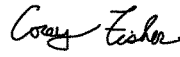
The SFRED coalition supports S. 1407 and we are encouraged that it promotes a balanced approach to energy development that will help to ensure a bright future for our public lands hunting and fishing heritage.



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Testimony Submitted to  
United State Senate  
Committee on Energy and Natural Resources  
by  
SunEdison, Inc.

Chairman Murkowski, Ranking Member Cantwell, and members of the Committee, thank you for the opportunity to submit written testimony for the record regarding proposals for a larger energy bill that will holistically consider energy efficiency, infrastructure, and supply, and guide our nation's overarching energy policy in the coming years. SunEdison applauds this effort and looks forward to serving as a resource as a final bipartisan bill is crafted.

SunEdison, with our operational headquarters in Belmont, California, is the world's largest renewable energy development company, employing nearly 2500 in the U.S. alone across our manufacturing, deployment, and finance vehicles. We are transforming the way energy is generated, distributed and owned around the globe. Our company manufactures solar products ranging from the polysilicon that makes solar cells to complete solar panels, and develops and operates grid scale wind, solar, hydropower, distributed solar, and energy storage projects in the United States and at over 1000 locations around the globe. Federal and state policies, such as tax credits, net energy metering, renewable portfolio standards, and other provisions that allow for financing and interconnection of these resources, have been critical to the growth of this industry. In fact, these policies have enabled renewable energy to build a renewable energy sector that employs 250,000 and is a growing source of U.S. jobs. These and other policies have

facilitated our industries to drive prices down, to secure additional investment, and to scale manufacturing and deployment that benefit the U.S. economy and all Americans.

We see a massive opportunity for the U.S.: Over the next decade, carbon-free power will become the primary new generation resource both at the utility scale and as a distributed resource. Renewable energy and energy storage technologies and applications will be key elements in an electric grid that enhances customer choice while hedging energy costs for decades, reducing greenhouse gas emissions, and avoiding water use in power generation. While federal tax policies, such as the Investment Tax Credit and Production Tax Credit, have been pivotal long-term signals that enable companies like ours to invest in the energy market, overarching national energy policy is also critical. Allowing for utilities to invest in technologies and applications that provide more flexible solutions, side by side with private market solutions, will be important to assuring that business models can evolve and remain robust.

SunEdison supports bills that continue to spur innovation in clean distributed energy, such as S. 1201, the Clean Distributed Energy Grid Integration Act; S. 1207, the Next Generation Energy Systems Act; S. 1232, the Smart Grid Act of 2015; and S. 1243, the Grid Modernization Act of 2015. We also support S. 1264, a national renewable energy standard that is modeled after successful and cost-effective state provisions that were largely met years ahead of schedule and cost-effectively for ratepayers.

Transmission lines and smooth interconnections are key to connecting utility-scale wind and solar resources to communities in need of those resources. To that end, SunEdison supports S. 1017 for FERC backstop authority and S. 1217 enhancing Department of Energy with a Rapid Response Teams that handle transmission requests. S. 1407 will encourage development of renewables on public land, much of which has high potential for wind and solar resource.

SunEdison has faced myriad siting and permitting issues with several rules taking effect over the next several months that can have serious impact on the cost of operations; we recommend common-sense provisions that mitigate environmental and wildlife impact while allowing for continued responsible renewable energy development. Our team has been working across political lines to develop solutions to these potentially devastating permitting issues.

The Public Utility Regulatory Policies Act (PURPA) contains key provisions that allow renewable energy developers to have access to the market and are still needed today. The “qualifying facility” provision has enhanced our ability to secure financing and negotiate Power Purchase Agreements with utilities, adding clean and renewable grid resources while keeping ratepayer costs down. PURPA Section 111(d) has given consistent tools to regulators for consideration of a variety of new technologies as they evaluate the appropriate benefits and costs of regulated utility resource investments. Distributed energy resource provisions, as in S. 1213, Free Market Energy Act and S. 1201, Clean Distributed Energy Integration Act, enable consumer choice and private investments, cleaner energy, and a more resilient grid. Moreover, distributed energy resources become sited in all American cities and counties, offering access to clean energy and job opportunities for all Americans. Distributed resources are also increasingly able to provide flexible capacity that balances supply and demand sides in real time. SunEdison supports efforts to increase system resilience, such as S. 888, to promote clean energy resilience partnerships and S. 1227, to encourage microgrid development in remote communities. All of these bills represent myriad ways in which innovation can participate to improve and modernize our grid and build economic development opportunities for export—through local incentives, state regulatory guidance, and bulk power market policies.

SunEdison supports S. 1434, Energy Storage Deployment and Promotion Act, that would target 2% of utility average system peak demand to be met with energy storage technologies by 2025, and S. 1256, Advancing Grid Storage Act of 2015, that would provide financing in the form of grants and loans for energy storage deployment. As with any innovation, policies that encourage its development and drive down perceived risk will be important to the continued growth in that sector.

Finally, SunEdison has taken a strong leadership role in our industries on the energy workforce of the future, providing millions of dollars and equipment resources to GRID Alternatives, a non-profit organization that trains women, minorities, and others in low-income communities to create a skilled workforce for rooftop solar. S. 1422 and S. 1304 will be important to the continued preparation of a workforce that can meet the growth of this sector while enhancing economic opportunities for underserved communities.

In summary, SunEdison is encouraged that the Committee is taking steps toward crafting bipartisan legislation that recognizes the importance of renewable energy resources and continues to support innovation to reduce costs and emissions while increasing reliability and resilience. We look forward to working with the Committee and to serving as a resource as the Committee considers national energy policy. Thank you for the opportunity to provide testimony for the record.

Respectfully submitted by,

SunEdison, Inc.



*Statement In Support Of Legislation That Would  
Repeal The Ban On Crude Oil Exports From The U.S.*

to the

**U.S. Senate Energy and Natural Resources Committee**

presented by

The Texas Alliance of Energy Producers

June 24, 2015

The Texas Alliance of Energy Producers represents some 3,300 members in 34 states and most are small independent oil and gas producers. Sixty (60) percent have 10 or less employees and 95 percent have less than 100 employees. Independents drilled 96 percent of the wells in Texas in 2013. They are small entrepreneurs in a very competitive business.

American oil producers are locked in a battle with other producers around the world for a share of the market. This competition has individual companies in the U.S. fighting against the nations of the Organization of Petroleum Exporting Countries (OPEC).

The member countries of OPEC decided on June 5 to continue their current oil production rate. It is a strategy that many analysts believe will put more downward pressure on crude oil prices, which will create more pain for U.S. oil producers, and result in an increase in market share for OPEC.

Already the average price of West Texas crude oil has declined from \$97.46 during the month of September 2014 to a low of \$45.90 for the month of February 2015 following OPEC's first announcement in November that it would continue its production target of 30 million barrels per day (b/d).

The price decline sent the oil industry in Texas and throughout the U.S. into a downward spiral. Drilling programs were put on hold, workers were laid off, the Texas Petro Index declined more than 20 points, and the industry went into a recession.

The primary reason for the worldwide price decline was the incredible increase in crude oil production in the U.S. and especially in Texas. The domestic oil industry determined that by drilling

horizontally into shale formations and then conducting multiple hydraulic fractures, they could increase oil and gas production dramatically. In a matter of just three years, oil production in the U.S. reversed a 40-year decline, and increased from 5 million b/d to 9 million b/d.

OPEC, the major oil exporting organization, viewed the production increase in the U.S. as a threat to their market share. OPEC said its share of the global crude oil market last year declined to the lowest level since 2003, underscoring the motive for the cartel's current push to defend sales volumes. Its share of the global crude market dwindled to 41.8% in 2014, from 43.3% the previous year.

OPEC Secretary General Abdallah Salem el-Badri pointed out following OPEC's recent meeting all of this happened when oil sold for \$100. Now that oil is selling for half that price in a matter of months, the world will find out how resilient the U.S. oil industry can be during this new era.

How low will prices go, and how long will they stay low?

OPEC has the ability to put pressure on the market place by simply doing nothing. Countries that make up OPEC have many advantages over U.S. oil companies. The governments own and run their oil companies, and they own the oil beneath the ground. In the U.S., most of the oil is owned by individuals and oil companies have to negotiate royalty payments, which can amount to 20 to 25 percent of the revenues right off the top. In Texas, there are production taxes of 3.6 percent of value. State, federal, and even cities implement environmental regulations that add to the costs.

In many cases, the U.S. government has had an adversarial relationship with oil companies. Historically, the federal government has implemented price controls, placed "windfall profit tax" on U.S. oil production, and enacted regulations that make it very difficult to compete in the global marketplace. One example is the federal government's ban on U.S. companies exporting U.S. crude oil to foreign countries. In the current over supply situation, the ban has added to the differential in price for U.S. crude oil compared to crude oil prices traded on foreign exchanges.

Everyone knows, however, that OPEC has many advantages and the financial staying power to increase and prolong our pain.

The Texas Alliance of Energy Producers urges the Senate Energy and Natural Resources Committee to pass legislation that will allow U.S. producers to export the oversupply of crude oil in the U.S. to other countries. Allowing U.S. companies to export crude oil will level the playing field a little as U.S. producers compete against foreign countries for a piece of the market.

Thank you for allowing the Texas Alliance of Energy Producers to submit this statement.

*Alex Mills, President \* Texas Alliance of Energy Producers \* 900 8<sup>th</sup> Street, Suite 400 \* Wichita Falls, TX*

*Telephone: 940-723-4131 \* e-mail: [alexm@texasalliance.org](mailto:alexm@texasalliance.org) \* [www.texasalliance.org](http://www.texasalliance.org)*



**Texas Independent Producers and Royalty Owners Association**  
919 Congress, Suite 1000, Austin, Texas 78701, (512) 477-4452, fax (512) 476-8070

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June 16, 2015

The Honorable Lisa Murkowski  
Unites States Senate  
709 Hart Senate Office Building  
Washington, DC 20510

RE: Support of S. 1312, the "Energy Supply and Distribution Act of 2015"

Dear Senator Murkowski:

On behalf of the Texas Independent Producers & Royalty Owners Association (TIPRO) and our nearly 3,000 members, I write to express our strong endorsement of S. 1312, the Energy Supply and Distribution Act of 2015. We value your leadership on this important issue and greatly appreciate your dedication to modernizing federal energy policy.

Thanks to advancements in technology related to hydraulic fracturing and horizontal drilling, our country is officially the largest producer of oil and natural gas in the world. With this abundance, we now have the ability to fuel all of our domestic energy needs while offering supply diversity and support to our allies abroad.

As one of the largest trade associations in the country representing independent oil producers and royalty owners, lifting the crude oil export ban is considered one of our highest priorities. The Energy Supply and Distribution Act of 2015 will enhance our geopolitical influence, strengthen national security, lower gasoline prices, and provide a significant boost to the U.S. economy.

This is a new era for American energy, but outdated policies from 1970s are preventing our country from fully capitalizing on the benefits of increased domestic oil production. Thank you again for your leadership and attention to this issue.

Best regards,

Ed Longanecker  
President  
TIPRO



D. Todd Staples  
President

June 26, 2015

The Honorable Lisa Murkowski  
United States Senate  
709 Hart Senate Office Building  
Washington, DC 20510

Dear Chairman Murkowski,

On behalf of the Texas Oil & Gas Association, I write to express our support for S. 1312, the Energy Supply and Distribution Act of 2015.

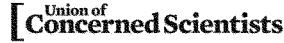
Energy development has been a vital part of our nation's history and this legislation will allow our legacy as innovative job creators to continue. The Energy Supply and Distribution Act of 2015 represents good public policy that will not only promote economic growth but will enhance our geopolitical influence and provide energy security to both ourselves and our allies abroad.

Thank you for your continued leadership and dedication to ensuring U.S. oil and natural gas remains a strong and vibrant part of our country's success story.

Sincerely yours,

A handwritten signature in black ink that reads "Todd Staples". The signature is written in a cursive, flowing style.

Todd Staples  
President, Texas Oil and Gas Association



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June 5, 2015

The Honorable Lisa Murkowski  
 Chairman  
 Senate Energy and Natural Resources Committee  
 709 Hart Senate Office Building  
 Washington, D.C. 20510

The Honorable Maria Cantwell  
 Ranking Member  
 Senate Energy and Natural Resources Committee  
 511 Hart Senate Office Building  
 Washington, D.C. 20510

Dear Chairman Murkowski and Ranking Member Cantwell:

The Union of Concerned Scientists is writing to offer support for S. 1434, the *Energy Storage Promotion and Deployment Act of 2015*. Incorporating energy storage at the utility scale promises to further promote the deployment of clean renewable energy, which can grow the economy and reduce our contribution to climate change, while increasing the resilience and reliability of the electricity grid. By setting national targets requiring state regulated utilities to deploy energy storage equal to 1 percent of peak demand by 2021 and 2 percent by 2024, S. 1434 offers a clear opportunity to expand the deployment of this important technology.

The electric grid is a complex system requiring the careful management of supply and demand. Energy storage promises to play an increasingly important role in this balancing act as it helps to create a more flexible and reliable electricity grid. Energy storage is valued for its rapid response, with most storage technologies able to begin discharging power to the grid very quickly, ensuring stability of the grid when fluctuations in demand occur either from unexpected conditions. This is in contrast to fossil fuel sources, which tend to take longer to ramp up. Increased energy storage capacity also has the potential to reduce the need to make costly investments in infrastructure.

While studies have shown that the electric grid can already accommodate a sizeable increase in variable generation from renewable energy, the further deployment of energy storage technologies can help support the further integration of renewable energy. Emerging storage capacity will allow power providers to store energy generated from wind and solar resources on shorter time frames to smooth variability, and on longer cycles to replace increasing amounts of dirty fossil fuels used for generating electricity.

The *Energy Storage Promotion and Deployment Act of 2015* makes progress toward expanding the deployment of energy storage by creating a clear policy framework which

would provide the certainty that utilities require to invest in large scale energy storage capacity. The bill notably allows utilities to meet the proposed standard with any combination of, or competition between, storage technologies, including pumped hydro, hydrogen fuels cells, compressed air, superconducting magnets, and spinning flywheels, providing a flexible range of compliance options that can be adopted based on specific circumstances. Moreover, it allows utilities to meet the standard with any combination of storage ownership, including ownership by homes and businesses, allowing them to leverage the increasing demand for distributed energy resources.

UCS supports the policies in S. 1434 as a tool to incentivize the deployment of energy storage technologies on a large scale. Batteries and other advanced energy storage technologies have begun to be deployed on a small scale throughout the nation; however, more must be done to increase existing capacity so that future needs are met. With the support of strong federal policies such as the one proposed in this bill, energy storage technologies can aid the increasing deployment of clean renewable energy sources, and help store an ever-growing amount of clean, renewable energy in the future.

Sincerely,

Robert Cowin  
Director of Government Affairs, Climate and Energy  
Union of Concerned Scientists

**Statement for the Record  
United States Department of the Interior**

**Senate Committee on Energy and Natural Resources**

**S. 15, Protecting States' Rights to Promote American Energy Security Act,  
S. 1218, Nexus of Energy and Water for Sustainability Act of 2015,  
S. 1230, Memoranda of Understanding with State Oil & Gas Programs,  
S.1310, Deficit Reduction Through Fair Oil Royalties Act  
S. 1311, The Oil Spill Deterrent Act,  
S. 1340, Coal Oversight and Leasing Reform Act of 2015,  
S. 1407, Public Land Renewable Energy Development Act of 2015**

**June 9, 2015**

**Introduction**

The following is the Department of the Interior's Statement for the Record on seven bills pertaining to energy accountability and reform: S. 15, the Protecting States' Rights to Promote American Energy Security Act; S. 1218, the Nexus of Energy and Water for Sustainability Act of 2015; S. 1230, a bill to require Memoranda of Understanding with State Oil & Gas Programs; S. 1310 the Deficit Reduction Through Fair Oil Royalties Act; S. 1311, the Oil Spill Deterrent Act; S. 1340, the Coal Oversight and Leasing Reform Act of 2015; and S. 1407, the Public Land Renewable Energy Development Act of 2015.

This statement is being submitted in response to the third hearing convened by the Committee, with very short notice, that addressed a large number of significant bills. The following statement represents an initial review and analysis of the legislation; however, the Administration may identify additional concerns with the bills.

**Background**

The Department's mission affects the lives of all Americans. Interior stewards 20 percent of the Nation's lands, oversees the responsible development of 21 percent of U.S. energy supplies, is the largest supplier and manager of water in the 17 western States, maintains relationships with 566 federally recognized Tribes, and provides services to more than two million American Indian and Alaska Native peoples. In 2013, Interior's programs contributed an estimated \$360 billion to the U.S. economy and supported more than two million jobs in activities including outdoor recreation and tourism, energy development, grazing, and timber harvesting.

The Department protects and enables development of America's shared natural resources to supply the energy that powers the Nation's future. The Department's efforts are critical to ensure all development – energy, timber, forage, and non-energy minerals – is managed safely, smartly, and in compliance with the highest scientific and environmental standards. As a steward of lands, water, wildlife, and cultural heritage, Interior strives to ensure the sustainability of these assets to support the American economy, communities, and the wellbeing of the planet.

To encourage these resource stewardship and development objectives, Interior is shifting from a reactive, project-by-project resource planning approach to a more predictable and effective management of its lands and resources. The goal is to provide greater certainty for project developers when it comes to permitting and better outcomes for conservation through more effective and efficient project planning. This approach to smart development is being incorporated into all of Interior's energy and natural resource planning and is an important part of the plan to accomplish President Obama's all-of-the-above energy strategy. Interior's focus on powering America's energy future supports an all-inclusive approach – one that responsibly balances the development of conventional and renewable resources on the Nation's public lands.

**Oil & Gas** – Secretary Jewell has made it clear that as we expand and diversify our nation's energy portfolio, the development of conventional energy resources from BLM-managed lands will continue to play a critical role in meeting our energy needs and fueling our economy. Facilitating the safe and efficient development of these resources is one of the BLM's many responsibilities and part of the Administration's broad energy strategy, outlined in the President's *Blueprint for a Secure Energy Future*. Environmentally responsible development of these resources will improve economic conditions by increasing supplies for consumers and reducing our nation's reliance on oil imports, while also protecting our federal lands and the environment. As part of this effort, the Department is working with various agencies in support of Executive Order 13604 to improve the performance of Federal permitting and review of infrastructure projects by increasing transparency and predictability of infrastructure permitting and reviews.

In recent years, the BLM has overseen a significant increase in oil production, while also supporting continued natural gas production. Oil production from the Federal and Indian lands for which the BLM has permitting and oversight responsibility rose twelve percent in 2014 from the previous year and is now up 81 percent since 2008 – from 113 million barrels in 2008 to 205 million barrels today. By comparison, nationwide oil production over the same period increased 73 percent. The BLM is proud to be a leader in this area and of its efforts to make public lands available for oil and gas development in excess of industry demand.

**Coal** – The BLM is responsible for coal leasing on approximately 570 million acres of the 700 million acres of mineral estate that is managed by the BLM for the American people. Although only a fraction of these acres are actually leased for coal development, they comprise an outsized portion of domestic coal production, with roughly 40 percent of the coal produced in the United States in recent years coming from Federal lease tracts. The BLM works to ensure that the development of coal resources is done in an environmentally sound manner and that American taxpayers receive fair market value (FMV) for those resources. The BLM's coal program manages approximately 310 active leases covering 475,692 acres.

During the last decade, Federal coal leases produced 4.56 billion tons of coal with an approximate market value of \$55.4 billion, generating \$6 billion in royalty payments that were split between the states and the U.S. Treasury. During the same period, 46 Federal coal lease sales were held, covering 71,165 acres and containing 5.3 billion tons of recoverable coal. Approximately \$4.5 billion in bonus bids were collected for these 46 leases.

The Department is focused on addressing concerns about the Federal coal program raised by the Government Accountability Office (GAO) in a December 2013 report, the Department's Office of Inspector General (OIG) in a June 2013 report, Members of Congress, and others. The BLM recently published new guidance based on recommendations from the GAO and OIG regarding procedures for coal lease sale valuations and the inspection and enforcement of coal leases, permits, and licenses. Given the significant revenues at stake within the Federal coal program, we appreciate the Congressional focus on these critical issues and look forward to a continued and robust dialogue.

**Renewable Energy** –Facilitating the responsible development of renewable energy resources on public lands is a cornerstone of the Administration's broad energy strategy. Due in large part to effective collaboration among the Federal agencies, the BLM successfully accomplished the Energy Policy Act of 2005's (EPAct) goal of authorizing over 10,000 megawatts (MWs) of renewable energy on public lands – three years ahead of schedule.

Since 2009, The BLM has approved significant utility-scale renewable energy generation and transmission projects, including 32 utility-scale solar facilities, 11 wind farms, and 12 geothermal plants, with associated transmission corridors and infrastructure to connect with established power grids. If fully built, these projects will provide more than 14,000 megawatts of power, or enough electricity to power nearly 5 million homes, and will provide over 20,000 construction and operations jobs. Further, in support of the President's Climate Action Plan to ensure America's continued leadership in clean energy, the BLM is continuing to work to reach 20,000 MWs of permitted renewable energy capacity on public lands by 2020.

Renewable energy projects authorized by the BLM constitute a major contribution not only to the nation's energy grid, but also to the national economy. Projects on public lands have already garnered an estimated \$8.6 billion in total capital investments, and the potential for approved projects pending construction is estimated at \$28 billion. Through efficient and environmentally-responsible permitting, the BLM is helping to bring tens of billions of dollars in investments to the United States economy.

The BLM is furthering these contributions by moving from an application-by-application approach for solar energy projects to a competitive leasing process in designated development areas called Solar Energy Zones (SEZs). In October 2012, the Department finalized the Western Solar Plan, a Solar Energy Programmatic Environmental Impact Statement that identified 17 SEZs and established a blueprint for fast track utility-scale solar energy permitting with access to existing or planned transmission infrastructure. On June 1, 2015, three projects within the Dry Lake SEZ in Nevada were approved and were the first to benefit from this streamlined permitting process. Using the expedited review process made available by the Western Solar Plan, reviews of these three projects were completed in less than 10 months; this is less than half the amount of time it took to review and approve projects under the previous system. The Western Solar Plan also provides the foundation for the BLM's current rulemaking process to implement competitive solar and wind energy leasing within designated areas.

In authorizing existing projects, reviewing proposed projects, and developing a competitive leasing rule, the BLM has focused on managing renewable energy development in an accelerated but environmentally sound and responsible manner to ensure the protection of landscapes, wildlife habitats, and other natural and cultural resources. This “smart from the start” approach is consistent with the Administration’s goal of authorizing environmentally sound and sustainable geothermal, wind, and solar energy projects on public lands. The BLM achieves these goals through close working relationships with local communities, state regulators, private industry, key stakeholders, and other Federal agencies.

**Energy Revenue** – The Department of the Interior manages the public lands and federal waters that provide resources critical to the Nation’s energy security; is responsible for collecting and distributing revenue from energy development; and ensures that the American taxpayer receives a fair return for development of those federal resources. Authorities to assess and collect penalties for violation of lease terms, permit conditions, regulations and orders are principally provided, for onshore production in the Federal Oil and Gas Royalty Management Act of 1982 (FOGRMA), and for offshore production in the Outer Continental Shelf Lands Act of 1953 (OCSLA). FOGRMA and OCSLA cover a broad array of violations, including oil spills.

**Energy and Water** – The Department recognizes the importance of the energy-water nexus and supports a closer level of communication and coordination between the Department of the Interior, Department of Energy and the broader federal community. The Department of the Interior appreciates the Committee’s leadership on the energy-water nexus issue. Energy and water issues intersect across a range of Interior activities, including hydropower generation, energy development, electricity generation, and water treatment, distribution, and conservation. Interior has a variety of programs that address the energy-water nexus, including USGS monitoring systems and research programs (including the National Water Census), Reclamation Basin Studies, and WaterSMART Grants. Understanding the value of interagency coordination, Interior has partnered with the Department of Energy and the Department of the Army (working with the U.S. Army Corps of Engineers) to recently renew the 2010 Memorandum of Understanding (MOU) to collaboratively address a host of energy-water nexus issues related to hydropower. By coordinating efforts, the signatory agencies have completed a number of projects that promote sustainable hydropower development, including hydropower resource assessments, unit-dispatch optimization systems, climate change studies, integrated basin-scale opportunity assessments, and funding opportunities to demonstrate new small hydropower technologies.

The Department is committed to integrating energy and water policies to promote the sustainable use of all resources, including incorporating water conservation criteria and the water/energy nexus into the Department’s planning efforts. On May 20, 2015, the Department announced that Reclamation will make \$24 million in WaterSMART Water and Energy Efficiency Grants available to 50 new and ongoing projects in the Western United States for activities such as conserving and using water more efficiently, increasing the use of renewable energy, improving energy efficiency, encouraging water markets, and carrying out activities to address climate-related impacts on water. Reclamation also announced that it will make \$23 million for seven water reclamation and reuse projects in California, and nearly \$2 million for seven water reclamation and reuse feasibility studies in California and Texas. These announcements support

the President's Climate Action Plan by providing tools for states and water users to create water supply resilience to meet future water and energy demands in the face of a changing climate.

Water and Energy Efficiency Grants and Basin Studies are part of the Department's WaterSMART Program. WaterSMART Grants provide cost-shared funding to States, tribes, and other entities with water or power delivery authority for water efficiency improvements, with additional consideration given to proposals that include energy savings as a part of planned water efficiency improvements. Water management improvements that incorporate renewable energy sources are also prioritized for WaterSMART Grant funding. These grants directly address the energy-water nexus and provide a concrete means of implementing on-the-ground solutions to energy-water issues. The FY 2014 Water and Energy Efficiency Grant projects are expected to conserve more than 67,000 acre-feet of water annually and 22.9 million kilowatt-hours of electricity — enough water for more than 250,000 people and enough electricity for more than 2,000 households.

In addition to long-standing USGS efforts in water supply and availability and in energy resource assessments and research, several of which are highlighted in the recently published USGS Circular 1407, "The Water-Energy Nexus—An Earth Science Perspective," and which provide an essential foundation for understanding issues related to the energy-water nexus, the USGS participates in a number of interagency efforts. The USGS has been working with the Energy Information Administration (EIA) since 2010 to improve estimates of water withdrawals and consumptive use associated with cooling water at thermoelectric generating plants across the Nation. Cooling water for such plants is the largest sector of water withdrawals in the United States, at 49% of all water withdrawals nationwide, according to USGS Circular 1344, Estimated Use of Water in the United States in 2005. A recent USGS report, Methods for Estimating Water Consumption for Thermoelectric Power Plants in the United States (Scientific Investigations Report 2013-5188), documents the model that the USGS developed with the assistance of the EIA for estimating electric generating plant water withdrawals and consumptive use, which are currently not consistently reported. This ground-breaking model, which incorporates the heat budget of each of the approximately 1,300 thermoelectric generating plants that rely on water for cooling, can be used both to estimate current and historical water use and to forecast future water use with different plant configurations and cooling water technologies.

In addition to the efforts above, the FY 2016 President's Budget requests an additional \$1.5 million for the USGS to provide water use grants to States that will increase availability and quality of water use data – including data related to water used for energy. These grants would provide financial resources, through State water resources agencies, to improve the availability and quality of water use data that they collect and would integrate those data with the USGS Water Census. Funding provided to States through these grants would be targeted at improvements to water use data collection and integration that will be of the greatest benefit to a national assessment of water availability and use. As the energy sector is a primary user of water, increased availability of water use information related to energy will be an important part of this effort.

In mid-April 2014, the USGS released an expanded and updated version of the USGS oil, gas, and geothermal Produced Waters Database and Map Viewer; the revised database contains

nearly 100,000 new samples from conventional and unconventional well types, including geothermal. The availability of more samples and more types of analyses will help farmers determine the quality of local produced water available for possible remediation and reuse, will enable local and national resource managers to track the composition of trace elements, and will help industry plan for waste-water injection and recycling.

Although industry interest in coalbed natural gas development has declined in recent years as development of shale gas resources elsewhere has grown, the Powder River Basin in northern Wyoming and southern Montana experienced a rapid expansion in the development of coalbed natural gas between 2002 and 2011. During this period, about 90 billion liters of water were produced annually in the Wyoming portion of the Basin as part of the extraction process. Produced waters from this development are moderately saline and have high proportions of sodium relative to calcium and magnesium, thus rendering the waters unsuitable for irrigation without treatment. USGS studies have examined the environmental impacts of different disposal options. Results indicated that infiltration impoundments had the potential to contaminate underlying fresh groundwater supplies, but that with specific treatment the produced waters could be used in subsurface drip irrigation operations that minimized potential for groundwater contamination and provided beneficial use of the waters to enhance agricultural production in this semiarid region.

Other Departmental programs and activities relate directly to the energy-water nexus, including hydropower development, water treatment and desalination, pumping and water delivery, BLM energy permitting, and USGS research on energy resources and induced seismicity. We are happy to provide the Committee with additional information on these programs as needed.

#### **S. 15, Protecting States' Rights to Promote American Energy Security Act**

S. 15 amends the Mineral Leasing Act to prohibit the Department of the Interior from enforcing Federal regulations regarding hydraulic fracturing activities on any land in any state that has existing regulations on hydraulic fracturing. This deferral to state authority would occur regardless of the quality or comprehensiveness of the state rules, even if the rules are less protective or otherwise in conflict with Federal guidelines.

#### **Analysis**

The Department strongly opposes S. 15 as it would prevent the BLM from ensuring that hydraulic fracturing activities on public lands operate under consistent standards that provide an appropriate level of environmental protection. The increasing use of hydraulic fracturing on BLM lands, and the deployment of new drilling technologies, has necessitated that the BLM update its framework for managing the extraction of fluid minerals from the Federal and Indian mineral estate. The BLM's recently issued hydraulic fracturing rule – which becomes effective on June 24, 2015 – is the culmination of four years of work by the BLM that began in November 2010 when it held its first public forum on this topic. Since that time, the BLM has published two proposed rules and held numerous meetings with the public and state officials, as well as many tribal consultations and meetings. Informed by the experience of its experts and the technical expertise and concerns of state regulators, tribes, industry, and the public, the BLM's

hydraulic fracturing rule strengthens existing oversight procedures for hydraulic fracturing on lands where the BLM has permitting responsibilities and provides all stakeholders with additional assurance that operations are being carried out safely and responsibly. The BLM has established and maintained regulations governing oil and gas operations on public lands for decades, and has worked successfully with operators, tribes and state governments to avoid duplication and delay in the enforcement and monitoring of these regulations. The implementation of the hydraulic fracturing rule will continue this longstanding practice while also ensuring the BLM satisfies its obligations to ensure federal standards are met. The BLM remains committed to working with states to ensure safe, responsible, and environmentally sound domestic oil and gas production, and recognizes the efforts of states that currently have hydraulic fracturing regulations.

Included in the final rule is a variance process that allows for the application of state and tribal standards on public lands where those standards meet or exceed those proposed by the rule. In addition, the BLM continues to reach out to states to establish new or build upon existing formal agreements regarding implementation of federal and state oil and gas rules. These agreements will leverage the strengths of existing partnerships, reduce duplication of efforts for agencies and operators, and implement the final rule as consistently as possible with state regulations, while fulfilling the Secretary's responsibilities mandated by statute as steward for the public lands and trustee for Indian lands. The BLM State Offices are meeting regularly with their state counterparts and have undertaken state-by-state comparisons of regulatory requirements in order to identify opportunities for variances and to establish Memorandums of Understanding (MOUs) that will realize efficiencies and allow for successful implementation of the rule. The BLM is in active discussions with: the North Dakota Industrial Commission; the Wyoming Oil and Gas Commission; and the states of Alaska, California, Colorado, New Mexico, Nevada, and Utah. The BLM also recently discussed the rule with state representatives at the Interstate Oil and Gas Compact Commission's meeting in Salt Lake City the week of May 18, 2015.

#### **S. 1218, Nexus of Energy and Water for Sustainability Act of 2015**

S. 1218, Nexus of Energy and Water for Sustainability Act of 2015 would create a Committee or Subcommittee on Energy-Water Nexus for Sustainability under the National Science and Technology Council (NSTC), co-chaired by the Secretary of Energy and Secretary of the Interior and require the Office of Management and Budget to submit a crosscut budget report on research, development and demonstration activities to advance energy-water nexus related science and technologies. The Department of the Interior shares the Committee's goals to promote coordination between Federal agencies as it relates to the energy-water nexus. We note that the Department is already working on the energy-water nexus through several interagency bodies and federal processes- for example through the Natural Drought Resilience Partnership and the Build America Initiative. The Department also has a number of existing programs that address many of these energy-water nexus issues, and that many of the activities called for in S. 1218 are within the scope of existing authorities available to the Department of the Interior, and the Administration as a whole. Some of the existing programs are summarized below.

Section 3 of S. 1218 requires the Director of the Office of Science and Technology Policy to establish either a Committee or Subcommittee on the Nexus of Energy and Water for

Sustainability under the NSTC, co-chaired by the Secretary of Energy and Secretary of the Interior. The Committee or Subcommittee is directed to: (1) serve as a forum for developing common federal goals and plans on energy-water nexus research, development, and demonstration activities; (2) issue a strategic plan on energy-water nexus research, development, and demonstration activities priorities and objectives, (3) promote coordination of the activities of federal departments and agencies on energy-water nexus research, development, and demonstration activities; (4) coordinate and develop capabilities and methodologies for data collection, management, and dissemination of information related to energy-water nexus research, development, and demonstration activities from and to other federal departments and agencies; and (5) promote information exchange between federal departments and agencies. Reclamation, USGS, and the Army Corps of Engineers recently identified common research priorities in water resources infrastructure resilience, threatened and endangered species, and measuring and monitoring for knowledge extraction.

Section 4 of S. 1218 requires the Director of the Office of Management and Budget to submit to Congress a report that includes an interagency budget crosscut that displays at the program, project, and activity level for each of the Federal agencies that carry out or support basic and applied research, development, and demonstration activities to advance the energy-water nexus related science and technologies in the President's budget request, expenditures and obligations for the prior fiscal year, and estimated expenditures and obligations for the current fiscal year.

The Department appreciates the Committee's leadership and the opportunity to strengthen capabilities to address the energy-water nexus. Given the breadth and many facets of this issue, we support close collaboration with the DOE and other Federal agencies. Moving forward, we would like to continue working with the Committee to ensure sufficient interagency collaboration and information sharing to support sound decision-making, leverage resources, and reduce duplication. The Administration believes this can be done through more effective and efficient collaboration and program management utilizing existing authorities.

If enacted, it is the Department's view that the committee or subcommittee created under S. 1218 should focus its attention on key vulnerabilities where there is an appropriate federal role and capability to have a positive impact. It is the Department's view that that focus should be on data gaps associated with water use and availability. We appreciate that the Committee narrowed the focus of S. 1218 to focus on energy-water nexus research, development and demonstration activities, and we look forward to working with you to ensure adequate coordination.

Water availability, severe drought, and long-term climate trends have always posed a significant risk to energy development and electric generation. This is one of the broad, systemic risks at the core of the energy-water nexus. Decreased water availability, prolonged drought, and more pronounced climate trends could increase that risk and require the use of accelerated adaptation strategies.

The Department supports the type of coordination and data exchange encouraged under S. 1218 and is already undertaking a number of steps to do so as discussed in the testimony above. Such

efforts could help close existing gaps, increasing our understanding of water supply availability to benefit water and energy decision makers.

While S. 1218 allows for the coordination of federal activities, the Department would like to stress the importance of providing the scientific community with autonomy to design and execute studies. Finally, States play the key role in allocating and administering water, and they must be a partner in energy-water efforts. S. 1218 does not address the important relationships with states and the private sector, where significant work on energy-water nexus projects is accomplished.

The Department shares the Committee's goals to promote coordination between Federal agencies as it relates to the energy-water nexus. We appreciate the leadership of this Committee in engaging Federal agencies. The Department has numerous programs in place that encourage coordination not only within the Federal Government, but as public-private partnerships. These and other existing authorities can provide more effective and efficient collaboration and program management related to energy-water nexus challenges and opportunities. The Federal Government has a role in providing leadership and tools to address the challenges of imbalance between supply and demand. Sustainable water supplies and energy use are important parts of a stable economic base, employment continuity, and smart growth.

#### **S. 1230, Memoranda of Understanding with State Oil & Gas Programs**

S. 1230 directs the Secretary of the Interior to establish a program in which the BLM Director, at the request of a State Governor, would establish a Memorandum of Understanding (MOU) with that state to develop rules and processes for certain oil and gas inspection activities on Federal lands. These activities would include the measurement of oil and gas production, inspection of meters or other measurement methodologies, and other operational activities deemed appropriate by the Secretary. To be eligible for such an MOU with the BLM, the Secretary must determine the state's oil and gas program is sufficient to fulfill the oversight and enforcement responsibilities of the BLM.

#### **Analysis**

The BLM has a longstanding practice of working in partnership with state governments and other partners to enhance public lands and carry out its multiple-use mission. In the oil and gas context, we have memorialized this practice in MOUs with state governments, including CA, CO, MT and WY, which date back as far as 1990. These MOUs recognize the interests, expertise, and jurisdictional responsibilities of both the BLM and our state partners and typically outline respective authorities, roles, and responsibilities. The existing MOUs address issues such as well spacing, surface operations, and data sharing.

In recent years, we have been actively engaged in discussions with State Governors and their respective oil and gas officials to seek ways to further increase efficiencies by developing updates to or establishing new MOUs that will facilitate the efficient oversight of oil and gas operations in those states. The goal of these MOUs is to provide for an effective and coordinated oil and gas application and permitting/approval process. We are in active discussions and have

been meeting regularly with: the North Dakota Industrial Commission; the Wyoming Oil and Gas Commission; and the states of Alaska, California, Colorado, New Mexico, Nevada, and Utah. With respect to the recent hydraulic fracturing rule, these discussions have involved state-by-state comparisons of regulatory requirements in order to identify opportunities for variances and to establish MOUs that will realize efficiencies and allow for the successful implementation of the rule.

That said, the BLM cannot support S. 1230's proposed delegation of the BLM's stewardship responsibilities to state officials. While it is common practice for the BLM to enter into an MOU with states to help achieve better coordination among their respective oil and gas programs, such agreements do not revoke or modify the BLM's obligation to make certain final decisions concerning oil and gas operations on Federal and Indian lands. The BLM regulates oil and gas operations on Federal lands, and on Indian lands held in trust by the Federal government, pursuant to the requirements of several statutes, including the Mineral Leasing Act, the Mineral Leasing Act for Acquired Lands, the Federal Land Policy and Management Act, the Indian Mineral Leasing Act, and the Indian Mineral Development Act.

To ensure the various BLM obligations established by these statutes are met the state-run program envisioned by the bill would still require Federal oversight to ensure Federal responsibilities, including the Secretary's trust responsibilities to the tribes, are being met consistently from state-to-state. The necessary oversight could, instead of creating efficiencies, create an additional layer in the administration of oil and gas operations on public lands. This would result in potential duplication of efforts and additional costs to the taxpayer. S. 123 is silent in regards to how such a state program would be funded.

The highest priority of the BLM oil and gas program is ensuring that the operations it authorizes on public and tribal lands are safe and environmentally responsible. We have established and maintained regulations governing oil and gas operations on public lands for decades, and have worked successfully with operators and in partnership with tribes and state governments to avoid duplication and delay in the enforcement and monitoring of these regulations. The BLM continues to advocate for further coordination with its state partners to maximize efficiency in oil and gas operations on public lands, but does not agree that a legislative remedy is necessary to accomplish our common goals. Instead, the agency believes the best and most efficient results can be achieved by BLM state and field offices working directly with their partners at the state government level to ensure the applicable Federal standards and statutory requirements are met. Ideally the state and Federal partners enter into agreements as appropriate to address the operational activities in the field to ensure that BLM and state oversight responsibilities are met as efficiently as possible.

With respect to the bill's direction that consistent rules be established, it should be noted that the BLM's existing regulatory framework governing oil and gas operations on the lands and mineral resources it manages is robust and longstanding. The BLM's rules were developed consistent with the applicable statutes and have been periodically updated based on BLM's extensive experience in this area. These rules govern operations in over 30 states and were designed to support responsible development using a consistent set of standards across all of the lands managed by the BLM. S. 1230 would create a significant administrative burden as both state and

federal regulations would likely require an extensive overhaul and revisions to achieve that objective; a process that would take a substantial amount of time.

#### **1310, Deficit Reduction Through Fair Oil Royalties Act**

In the previous decade, the Minerals Management Service (MMS), the bureau in the Department then charged with managing energy development on the Outer Continental Shelf, discovered that leases issued in the four offshore lease sales held in 1998 and 1999 did not include price thresholds to cut off royalty relief mandated by section 304 of the 1995 Deepwater Royalty Relief Act (DWRRA). (Consistent with the MMS interpretation of the DWRRA, price thresholds were included in the leases issued in the lease sales held in 1996, 1997, and 2000.) The Department subsequently entered into negotiations with the holders of the 1998 and 1999 leases to amend their leases to include price thresholds on royalty relief and successfully came to agreements with several companies. In the meantime, however, several lessees sued to challenge the legality of the royalty relief price thresholds included in the 1996, 1997, and 2000-issued leases, arguing that the price thresholds did not apply to the mandated royalty relief volumes in the DWRRA. Both the prior Administration and the current Administration disagreed with this interpretation of the DWRRA. Unfortunately, the lessees prevailed in district court, and the price thresholds included in the leases were declared legally invalid. The district court opinion was upheld by the 5<sup>th</sup> Circuit Court of Appeals, and in 2009, this Administration appealed that decision to the Supreme Court, which declined to hear the case.

As a result of the court's decision, successfully negotiated agreements were voided and ongoing administrative attempts to negotiate to amend those leases that did not include prices thresholds have been precluded.

S. 1310 would prohibit the acquisition of new oil or natural gas leases or any interest in existing leases in the Gulf of Mexico by certain persons unless they meet certain conditions. Specifically, it would disallow acquisition by parties that did not agree to renegotiation of existing leases issued between 1996 and 2000 subject to congressionally mandated royalty relief under the 1995 DWRRA. The bill seeks to encourage holders of DWRRA leases to renegotiate their leases to incorporate the price thresholds that the courts had found invalid.

The Administration continues to pursue actions to ensure a better return to taxpayers from oil and gas development both onshore and offshore in a way that ensures a level playing field in the sale and development of public resources. We note that the FY 2016 President's Budget contains a package of administrative and legislative oil and gas management reforms that would encourage diligent development of Federal energy resources as well as provide a fair return to the taxpayer. These royalty and other reforms are estimated to generate \$2.5 billion in savings to the Treasury over 10 years. The Administration is working to implement the administrative components of this package where it has the flexibility to do so. We would like to work with the sponsor and the Committee on the legislative components of this package.

#### **S. 1311, the Oil Spill Deterrent Act**

S. 1311 amends the Federal Oil and Gas Royalty Management Act of 1982 (FOGRMA) and the Outer Continental Shelf Lands Act of 1953 (OCSLA), providing increased penalty authority

intended to deter oil spills. The Department supports the goal of deterring oil spills, and would like to work with the Committee in furtherance of this goal.

#### Analysis

##### *Penalties Authorized by the Federal Oil and Gas Royalty Management Act*

Section 109 of FOGPMA authorizes the Department of the Interior to issue civil penalties when companies fail to comply with applicable rules, regulations and lease terms. Codified in 30 U.S.C. 1719, the authority includes escalated civil penalties for companies that fail to take corrective action, and those that knowingly or willfully violate applicable regulations or laws.

As drafted, the maximum penalty increases provided in Section 2 of S. 1311 would apply to the entire range of violations covered by 30 U.S.C. 1719, the majority of which have no association with drilling or oil spills. While the Department supports to increased administrative flexibility to issue tougher penalties for violations, it is worth noting that the legislation as drafted could have unintended outcomes. For example, the Department notes that increasing the civil penalty amount for failure to take corrective action from \$5,000 to \$100,000, would leave FOGPMA, as amended, with a penalty scheme that authorizes smaller maximum civil penalties (\$10,000 and \$25,000 respectively) for more egregious knowing or willful violations.

The Department supports increasing the maximum civil penalties for all violations in order to provide more realistic deterrent benefits while maintaining the Secretary's discretion to levy civil penalties below the maximum, if appropriate.

##### *Penalties Authorized by the Outer Continental Shelf Lands Act*

The Outer Continental Shelf Lands Act of 1953 (OCSLA) authorizes the Department of the Interior to issue civil penalties of up to \$20,000 per day when companies fail to comply with applicable regulations or laws or with any term of a lease or permit issued pursuant to OCSLA. OCSLA also directs the Secretary of the Interior to adjust the maximum civil penalty amount at least once every three years to reflect any increase in the Consumer Price Index prepared by the U.S. Department of Labor. Through these periodic adjustments, the current maximum civil penalty is \$40,000 per day. Section 3 of S. 1311 substantially increases the maximum penalty from \$20,000 per day to \$250,000 per day for violations and authorizes the Secretary to increase the maximum, after notice and an opportunity for public comment.

While the proposed changes to OCSLA may be broader than necessary to address oil spills, the new authority would authorize increased civil penalties for the entire range of violations covered by 43 U.S.C. 1350. The Department supports increasing the maximum civil penalties for all violations in order to provide more realistic deterrent benefits while maintaining the Secretary's discretion to levy civil penalties below the maximum, if appropriate.

##### **S. 1340, Coal Oversight and Leasing Reform Act of 2015**

S. 1340 would amend the Mineral Leasing Act to establish a new Federal coal leasing program and make various changes to current coal leasing practices. These changes include new requirements to be used in the determination of fair market value for coal leases, increased

royalty and rental rates, and shorter lease terms. The bill also imposes a moratorium on new leases until the new program has been fully implemented.

The Department appreciates the work of the sponsor on these issues. We have recently undertaken a major effort to strengthen the management of coal production on public lands by issuing updates to our Coal Evaluation Manual and Handbook. Additionally, the BLM will be further engaging with stakeholders and the public to discuss how the BLM can best carry out its responsibility to manage coal production on public lands, and help to ensure that taxpayers receive a fair return from the development of these public land resources. Consistent with these efforts, we would like to continue discussions with the sponsor and the Committee on how best to continue these program improvements.

#### *Federal Coal Leasing Program*

S. 1340 (Sec. 10) establishes a new Federal coal leasing program. As currently written, the leasing program would require the Secretary to establish and approve a 5-year leasing plan. The leasing program would have to ensure FMV and maximize both competition for leases and a fair return to the U.S. taxpayer. S. 1340 directs the Secretary to solicit comments from Federal and state agencies and the public, and establishes a timeframe for government officials to review and comment before publication of the leasing plan. The bill provides that the Secretary can only lease those parcels that are included in an approved 5-year leasing plan. The bill also would require the Department to issue regulations to implement the new lease program within 180 days of enactment, and to publish the first leasing plan within 270 days of enactment.

The Department supports the goal of improving the BLM's management of the Federal coal program, but notes that it is important to assess fully the effects of the proposals included in Section 10 on the program's efficiency and ultimately the return to the U.S. taxpayer. We are committed to working closely with the sponsor and the Committee on any legislative changes that are needed to strengthen the management of coal production on public lands.

#### *Lease Terms & Lease Modifications*

S. 1340 (Sec. 12) reduces the primary term of a lease from 20 years to 10 years; the diligent development period from 10 years to five years; the renewal terms of a lease from 10 years to five years, and the period for advanced royalty payments from 20 years to 10 years. S. 1340 (Sec. 9) reduces the maximum size of a lease modification from 960 acres to 160 acres, requires a FMV determination for lease modifications (Sec. 7), and specifies that lease modifications cannot result in a decrease in revenue (Sec. 8). Lease modifications were limited to 160 acres prior to the Energy Policy Act of 2005, and S. 1340 would reinstate that limit. We are open to further discussion and analysis of these issues.

#### *Revenues*

S. 1340 raises the minimum royalty rate for coal and onshore oil and gas production from 12.5 percent to 18.75 percent (Sec. 13), and the rental rate for coal leases from \$3 per acre per year to no less than \$100 per acre per year (Sec. 11). S. 1340 (Sec. 2) also repeals the option for five equal deferred bonus payments. With respect to oil and gas, the Department notes that it has issued an Advanced Notice of Proposed Rulemaking asking the public for input on potential changes to the BLM's royalty rate regulations. The comment period on that notice closes on

June 19, 2015. The Department is interested in working with the sponsor and the Committee to determine the appropriate royalty, rental rates, and other related revenues, and plans to engage stakeholders further on this topic in the very near future.

*Fair Market Value*

S. 1340 (Sec. 5) includes new requirements to determine FMV. The bill requires that the export potential of coal be considered in the FMV determination, and that the Secretary is not to accept any bids for a lease that is less than FMV. Finally, S. 1340 requires the GAO to complete an audit two years after enactment to determine whether the Secretary has complied with the FMV determination requirements.

The Department shares the goal of S. 1340 to capture FMV of leased coal, and the BLM has recently made improvements to its presale estimate process. In December 2014, the BLM published a new Coal Evaluation Manual and a new Coal Evaluation Handbook following the recommendations of GAO and OIG audits. The Coal Manual and Handbook enhance the evaluation process, while ensuring there is adequate and appropriate accounting for coal exports, with a consistent application throughout the BLM. There is also greater transparency, including an independent third-party review of each coal evaluation by the Department's Office of Valuation Services. Taken together, these enhancements will result in more thorough and better-documented coal evaluations for the benefit of the taxpayer. Finally, existing BLM rules provide that the BLM will reject bids that are less than the presale estimated FMV.

*Inspection & Enforcement*

S. 1340 (Sec. 14) requires the development of new regulations to ensure consistent and effective inspection and enforcement by providing additional national oversight of state inspections; standardizing the BLM inspection and enforcement practices; requiring that inspections and enforcement data be stored in a central database; and requiring periodic unannounced inspections. S. 1340 (Sec. 15) also provides the BLM with the authority to assess civil penalties of up to \$100,000 per incident per day. The Department supports establishing the authority to assess civil penalties per incident per day which would provide a useful tool to encourage compliance with applicable coal statutes and regulations. We are interested in working with the sponsor and the Committee to further develop potential improvements to the BLM's inspection and enforcement program.

*Additional Provisions*

Other proposals in S. 1340, include: a confidentiality requirement for consultants (Sec. 3); the requirement for licensees to provide an assertion of accuracy for data developed for exploration licenses (Sec. 4); and the requirement to make coal lease data publicly available (Sec. 6). In each instance, these issues have been addressed by existing BLM or Office of Natural Resources Revenue (ONRR) rules, policies, and guidance, including the recently updated Evaluation Handbook and Manual. While the BLM and ONRR have already addressed these issues administratively, BLM is interested in working with the sponsor and the Committee to provide greater transparency regarding its management of the Federal coal program.

**S. 1407, Public Land Renewable Energy Development Act**

S. 1407 seeks to expedite the development of geothermal, wind, and solar energy projects on Federal lands managed by the Departments of the Interior and Agriculture by designating priority and other variance development areas in Bureau of Land Management (BLM) Resource Management Plans (RMPs), and establishing interagency coordination procedures. The bill also reestablishes a special account for processing geothermal energy authorizations, establishes a royalty system for wind and solar energy authorizations, and creates a conservation fund to address impacts of wind and solar energy development on public lands. The bill's provisions are directed toward public lands that have not been excluded from geothermal, solar or wind energy development through BLM RMPs or Federal law. This statement addresses the provisions relevant to the Department.

The Department and the BLM are committed to responsibly mobilizing the tremendous renewable energy resources available on public lands, and share the Committee's interest in identifying efficiencies in the development of those resources that are consistent with our multiple use and sustained yield mandate under the Federal Lands Policy and Management Act, environmental protection, and public involvement in agency decision-making. The Department supports the goals of S. 1407, and is already utilizing administrative authorities to implement the Western Solar Plan and to expand wind and geothermal development opportunities on public lands where appropriate. We are pleased to continue to work with the Committee and the sponsor to further harness the vast renewable resources on public lands while continuing to ensure a fair return to U.S. taxpayers.

#### Analysis

##### *Land Use Planning, Environmental Review, & Permit Coordination*

S. 1407 (Title II, Sec. 202) requires that within five years BLM update existing land use plans to establish priority and other "variance" areas for geothermal and wind energy development. The bill acknowledges that the BLM completed a wind energy programmatic EIS and land use planning effort in 2005, completed a geothermal programmatic EIS and land use planning effort in 2008, and completed a solar energy programmatic EIS and land use planning in 2012. The BLM's wind energy land use plan identified exclusion areas but did not identify priority or variance areas for wind development. The geothermal planning effort involved both BLM public lands and National Forest System lands that were available and open for geothermal leasing, however, did not designate priority or variance areas for geothermal development. Finally, the BLM's solar energy planning effort designated exclusion lands as well as priority and variance areas for development.

The Department shares goals similar to those advanced by Section 202 and, through its existing authorities, is currently developing a competitive leasing program for solar and wind energy projects on public lands. As part of the Western Solar Plan, the BLM recently completed a successful competitive leasing auction in the Dry Lake SEZ in Nevada, which resulted in \$5.8 million in high bids. Building on the success of the Dry Lake auction, the BLM published a Proposed Rule for a competitive leasing program for wind and solar in September 2014 and expects to publish a Final Rule before the end of the year. This rule will give additional detail to the competitive leasing program for the solar and wind energy programs. The land use planning

requirements as outlined by S. 1407 would require significant time and resources and substantial public involvement if applicable to all BLM lands throughout the West. We would like to work with the sponsor and the Committee on coordinating the Department's existing efforts with those identified in the bill.

S. 1407 (Title II, Sec. 203) directs that in some cases additional review under the National Environmental Policy Act (NEPA) may not be required for renewable energy projects. It is the BLM's responsibility to complete an appropriate analysis of these types of activities before they are undertaken. The BLM believes analysis under NEPA allows for the reasoned consideration of the environmental effects of renewable energy projects and provides opportunity to consider alternatives with less adverse impacts on communities and the environment. Failure to complete an adequate NEPA review reduces transparency in agency decision-making and would impact our ability to identify relevant and useful information for consideration by the public and by the BLM as a decision-maker.

S. 1407 (Title II, Sec. 204) establishes a program to improve renewable energy permit coordination that is similar to the process BLM used to establish oil and gas permitting offices under the provisions of the EPOA of 2005. Combined with increased overall funding, this process has helped to focus and coordinate resources to improve permitting for oil and gas development. Following this model, the BLM has already established renewable energy coordination offices in several state and field offices that have a significant renewable energy workload. While we support the general concept to expedite interagency coordination, it may be more advantageous to utilize existing renewable energy coordination offices and establish an interagency renewable energy team in those additional states with the highest expected renewable energy workload. The BLM should have the flexibility to adjust these offices in the future to adapt to emerging renewable energy workloads across the West. The BLM would like to work with the sponsor and Committee to discuss how best to achieve these goals.

#### *Revenue & Enforcement*

The Department also shares the goal of S. 1407 to capture the fair market value of leased projects as part of its commitment to ensure an appropriate return to U.S. taxpayers. While the BLM currently ensures a fair return to the public from solar and wind energy authorizations through an annual acreage rent and MW capacity fee, the agency is also supportive of efforts which could improve and simplify how that return is captured.

S. 1407 (Title I, Sec 101) amends the EPOA of 2005 to reestablish the geothermal special account, which expired in 2010, through Fiscal Year 2020 to provide funds for the processing of geothermal leases and use authorizations. Under current law, 50 percent of geothermal revenues are directed to the state in which the project is located, with the remaining funds divided evenly between the county in which the project is located and the Treasury. Under S. 1407, the states would continue to receive 50 percent of geothermal revenues; while the BLM would receive an amount subject to appropriation and without fiscal year limitation from the total directed to the Treasury. The BLM estimates the proposed special account would shift approximately \$4 million per year from the general Treasury to supplement discretionary appropriations that currently total roughly \$7 million annually. The Department has generally proposed funding geothermal program operations through a combination of cost recovery fees and the regular appropriations

process. We have concerns about the redirection of Federal receipts traditionally deposited in the Treasury toward this special-purpose account. We look forward to working with this Committee and the Interior appropriations committees in evaluating appropriate funding options for the geothermal leasing program.

S. 1407 (Title II, Section 212) provides for the allocation of all revenues from solar and wind energy authorizations to states (25 percent), counties (25 percent), a new Renewable Energy Resource Conservation Fund (35 percent and increasing after 15 years), and the U.S. Treasury (15 percent and decreasing after 15 years). Under the bill, funds deposited in the U.S. Treasury are to be directed to the BLM or other Federal or state agencies to assist in the processing of renewable energy permits for 15 years, after which the 15 percent is decreased incrementally each year and redirected to the new Conservation Fund. Currently all such revenues from solar and wind energy authorizations on public lands go to the U.S. Treasury. As written, the bill would limit expenditure of funds from the Renewable Energy Conservation Fund to fish and wildlife habitat issues, and access related to fishing, hunting and other forms of outdoor recreation.

The S. 1407 (Title II, Section 213) directs the Secretary of the Interior, in consultation with the Secretary of Agriculture, to establish royalties based on a percentage of the gross proceeds from the sale of MW production. The Department is concerned, however, that the royalty system would not provide a fair return from projects during periods without electric generation. We recommend the Committee consider additional language that would provide for a revenue collection system covering all phases of project development and operation, and also provide some guidelines on the appropriate range of royalty. The Department also wants to note that the current fee structure encourages a limited footprint; by implementing a similar structure for royalties, this key benefit could be reflected in the royalty system. The Department is glad to work with the sponsor and the Committee on exploring appropriate measures to ensure fair return to taxpayers from solar and wind projects' use of public lands.

S. 1407 (Title II, Section 214) would require the development of a comprehensive inspection, collection, fiscal, and production accounting and auditing system by the BLM and Department's Office of Natural Resources Revenue. Replacing the existing annual acreage and MW capacity fee with the system necessary to accurately determine royalties would require the Department to collect, track, and audit significantly different types of information from what is currently collected. The Department would need additional time and resources to develop a robust royalty auditing system capable of ensuring a fair return. The Department looks forward to working with the sponsor and the Committee to determine the best way to meet the revenue capturing objectives of the legislation without creating significant new administrative costs and burdens for the Department.

S. 1407 (Title II, Section 217) would require the Department to carry out a study of mitigation banking on Federal lands. Under Secretary's Order 3330, the Department has been working to update its policies and program direction with regard to landscape-level mitigation. While we believe that mitigation banking is an important tool for offsetting the unavoidable impacts of certain developments on the natural and cultural resources on public lands, we believe a separate study on mitigation banking would be duplicative of ongoing efforts to improve and expand

opportunities for mitigation at this time, including mitigation banking, the establishment of credit exchanges, and other tools being developed by states, private partners, and the Federal agencies. We would prefer to incorporate this review into our ongoing mitigation efforts.

Finally, S. 1407 (Title II, Section 218) of the bill would revoke the rental fee exemptions provided under the Rural Electrification Act (REA) for solar and wind projects with a capacity of 20 MWs or more. While the BLM has not yet approved any eligible projects under the REA, future projects may qualify for rental exemptions under existing authorities. The BLM supports the removal of the rental fee exemption as provided under S. 1407.

**Conclusion**

Thank you for inviting the Department to submit its views on S. 15, S. 1218, S. 1230, S. 1310, S. 1311, S. 1340, and S. 1407. The Department of the Interior is committed to supporting the responsible supply of energy for our nation.



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**Testimony of the Ute Tribal Business Committee  
Ute Indian Tribe of the Uintah and Ouray Reservation**

**Hearing on Energy Accountability and Reform Legislation  
Before the Committee on Energy and Natural Resources  
U.S. Senate**

**June 23, 2015**

**Introduction**

Chairwoman Murkowski, Ranking Member Cantwell, and Members of the Committee on Energy and Natural Resources, thank you for the opportunity to testify on "Energy Accountability and Reform Legislation." My name is Shaun Chapoose. I am the Chairman of the Business Committee for the Ute Indian Tribe of the Uintah and Ouray Reservation. The Ute Indian Tribe consists of three Ute Bands: the Uintah, the Whiteriver and the Uncompahgre Bands. Our Reservation is located in northeastern Utah.

The Ute Tribe is a major oil and gas producer. Production of oil and gas began on our Reservation in the 1940's and has been ongoing for the past 70 years with significant periods of expansion. The Tribe leases about 400,000 acres for oil and gas development. We have about 7,000 wells that produce 45,000 barrels of oil a day. We also produce about 900 million cubic feet of gas per day. And, we have plans for expansion. The Tribe is in process of opening up an additional 150,000 acres to mineral leases on our Reservation with an \$80 million investment dedicated to exploration.

The Tribe relies on its oil and gas development as the primary source of funding for our tribal government and the services we provide. We use these revenues to govern and provide services on the second largest reservation in the United States. Our Reservation covers more than 4.5 million acres and we have about 3,000 members living on the Reservation.

Our tribal government provides services to our members and manages the Reservation through 60 tribal departments and agencies including land, fish and wildlife management, housing, education, emergency medical services, public safety, and energy and minerals management. The Tribe is also a major employer and engine for economic growth in northeastern Utah. Tribal businesses include a bowling alley, supermarket, gas stations, feedlot, an information technology company, manufacturing plant, and Ute Oil Field Water Services, LLC. Our governmental programs and tribal enterprises employ 450 people, 75% of whom are

tribal members. Each year the Tribe generates tens of millions of dollars in economic activity in northeastern Utah.

The Tribe takes an active role in the development of its resources, however, despite our progress, the Tribe's ability to fully benefit from its resources is limited by the federal agencies overseeing oil and gas development on the Reservation. For example, we need 10 times as many permits to be approved. Currently, about 48 Applications for Permits to Drill (APD) are approved each year for oil and gas operations on the Reservation. We estimate that 450 APDs will be needed each year as we expand operations.

As the oil and gas companies who operate on the Tribe's Reservation often tell the Tribe, the federal oil and gas permitting process is the single biggest risk factor to operations on the Reservation. In order for the Tribe to continue to grow and expand our economy the federal permitting process needs to be streamlined and improved.

It has been 7 years since former Senator Dorgan called for reform of the bureaucratic permit approval process for Indian energy. He reported that a single oil and gas well must navigate a 49-step process involving at least 4 understaffed federal agencies. Since Senator Dorgan highlighted these issues there have been numerous Congressional hearings, testimony and roundtables. There is an extensive Congressional record and there has also been much agreement about the need for change.

Even the Government Accountability Office (GAO) says there is a need for change. Just this month GAO released a report entitled, "Indian Energy Development – Poor Management by BIA has Hindered Energy Development on Indian Lands." The report highlights what we have long known, "Indian energy resources are underdeveloped relative to surrounding non-Indian resources." GOV'T ACCOUNTABILITY OFFICE, INDIAN ENERGY DEVELOPMENT – POOR MANAGEMENT BY BIA HAS HINDERED ENERGY DEVELOPMENT ON INDIAN LANDS 2 (June 2015).

It is important to note, that the report does not just focus on the Bureau of Indian Affairs (BIA). GAO also cited to the Bureau of Land Management (BLM), the Fish and Wildlife Service (FWS), the Environmental Protection Agency (EPA), the National Environmental Policy Act (NEPA), and the Endangered Species Act (ESA) as a part of the "complex regulatory framework" that limits Indian energy development. *Id.* at 15-18. GAO also cited a lack of access to capital, dual taxation of Indian energy resources by state governments, tribal capacity and infrastructure limitations. *Id.* at 18.

We request that the Committee approve legislation to address these issues so that the Tribe can fully benefit from its resources. Under Chairman Barrasso, the Senate Committee on Indian Affairs Committee has already approved a bill, S. 209, "Indian Tribal Energy Development and Self-Determination Act Amendments of 2015" that would address some of these issues, but much more is needed. We need legislation that will address all of the agencies involved in the energy permitting process on Indian lands and will open up energy programs at the Department of the Interior to Indian tribes.

**Indian Energy Regulatory Office**

The most important issue that needs to be addressed is a lack of focus and a single agency or office responsible for Indian energy permitting. Currently, regulation of Indian energy development on our Reservation is spread across multiple agencies, with different missions and with little interagency communication. The Tribe asks that the Committee approve legislation to create an Indian Energy Regulatory Office that would co-locate staff from all the agencies involved in one office to coordinate and streamline Indian energy permitting, and to provide the staff, expertise and resources needed for energy permitting.

The Ute Indian Tribe, the Coalition of Large Tribes (COLT), and the National Congress of American Indians (NCAI) all support establishing this new Indian Energy Regulatory Office within the Department of the Interior. The office would be located in Denver, Colorado and utilize many existing resources to provide staff and expertise that would support energy permitting at the local level. This office would provide the focus, expertise and resources needed so that Indian tribes can effectively participate in this important part of the economy and contribute to the Nation's domestic energy supply.

This office would be similar to BLM's Permit Processing Improvement Offices approved by this Committee in Section 365 of the Energy Policy Act of 2005 and most recently made permanent by S. 2440 in the 113<sup>th</sup> Congress. Attached to my testimony are NCAI and COLT resolutions approving a legislative proposal for this office.

The Ute Indian Tribe and other tribes are also working with the Administration to create an Indian energy "Service Center" that would be similar to our legislative proposal. The Administration submitted a \$4.5 million budget request to develop its Service Center and we ask for your support of this budget request.

However, even with the Administration's effort, legislation is still needed to create a separate Indian Energy Regulatory Office, to provide a Director for this office, to combine Federal agency authorities and to restructure energy permitting on Indian lands. This new office needs to be led by a Director who has all the authority necessary to issue permits and approve energy development on Indian lands—everything from permitting oil and gas wells, to environmental review of renewable energy and transmission projects. Legislation is also needed to direct the office to enter into a Memorandum of Understanding with EPA, the Army Corps of Engineers, and the United States Department of Agriculture to provide staff and expertise for the new office.

We also need legislation to direct the office and Director to be guided by basic Indian trust principles that have been lost in the current unorganized Federal system for overseeing energy development on Indian lands. In particular, Indian lands are not public lands. While both Congress and Interior have been clear on this point in the past, over time, Federal agencies have attempted to apply public land management standards to Indian lands. Current examples include the application of NEPA to Indian lands, BLM's proposal to regulate hydraulic fracturing on Indian lands, and FWS's implementation of the ESA on tribal lands without considering tribal

interests and the Federal government's trust responsibility. This office would end these practices, treat Indian lands according to Federal trust management standards, and finally provide resources within Interior and BIA for the efficient processing of Indian energy permits and approvals.

The office we are proposing is long overdue. In recent years, Congress approved, expanded and made permanent BLM's Permit Processing Coordination Offices for energy development on Federal lands. The same should be provided for Indian lands where the benefits of energy development far exceed the benefits on Federal lands. Energy development on Indian lands provides jobs, economic development, revenues for tribal governments, and, if managed properly, long-term investment our Reservation infrastructure.

#### **No-Cost Reforms to Indian Energy Permitting and Management**

The Ute Tribe requests that the Committee consider a number of no-cost reforms to Indian energy permitting and management. In prior Congresses and in response to requests by former Senator Akaka, Senator Barrasso and, on the House side, Congressman Young, the Tribe developed 32 legislative proposals to improve Indian energy permitting, coordination and financing. These proposals are highlighted in hearings before the Senate Committee on Indian Affairs and the House Subcommittee on Indian, Insular and Alaska Native Affairs. Many of these proposals still need to be addressed. In our testimony today, the Tribe highlights no-cost reforms that are within the jurisdiction of the Committee and would compliment our proposal for and Indian Energy Regulatory Office as well as Senator Barrasso's Indian energy bill.

The reforms we highlight would address gaps in the current system, clarify the authority of tribal governments to oversee energy activities on tribal lands and increase the resources available to tribes to address all aspects of energy development on tribal lands. These proposals are attached to my testimony. They include:

- ensuring that Communitization Agreements do not delay royalty payments;
- including tribes in well spacing decisions on Indian lands;
- ensuring that EPA's new regulation of minor sources in Indian Country will not impede energy development;
- setting aside a portion of existing energy efficiency funding for Indian tribes;
- setting aside a portion of existing weatherization funding for Indian tribes;
- streamlining environmental reviews on Indian lands by providing tribes with "treatment as a sovereign" status under the National Environmental Policy Act (NEPA);
- clarifying that Indian lands are not public lands and therefore are not subject to NEPA;
- preventing BLM's hydraulic fracturing regulations, designed for public lands, from applying to Indian lands;
- ensuring that the Department of Energy implement the Indian Energy Loan Guarantee Program authorized by Congress in 2005; and,
- supporting the capture and beneficial use of Indian energy in remote locations through distributed generation and community transmission on Indian lands.

Through these legislative changes, Congress would greatly streamline energy permitting on Indian lands providing more revenues for tribal governments, on-reservation jobs and increased supplies of domestic energy resources.

On our Reservation, a typical permit can take about 480 days to be processed—more than one year. The Tribe takes delays in the permitting process seriously because the number of permits approved is directly related to the revenues the Tribe has available to fund our government and provide services to our members.

For example, the Tribe understands that oil and gas companies operating on the Reservation are currently limiting operations based on the number of permits the agencies are able to process. In particular, companies are limiting the number of drilling rigs they are willing to operate on the Reservation. Drilling rigs are expensive operations that move from site to site to drill new wells. Oil and gas companies often contract for the use of drilling rigs. Any time a drilling rig is not actively drilling a new well, it amounts to an unwanted expense. Consequently, oil and gas companies will only employ as many drilling rigs as permit processing will support. On our Reservation, the Tribe understands that some oil and gas companies who are currently using one drilling rig would increase their operations to three drilling rigs if permit processing could support this increase.

Anadarko Petroleum Corporation's operations on the Reservation reflect this situation. Anadarko reported that it needed 23 well locations approved per month in 2011 and beyond, but in 2010, their permits were approved at a rate of 1.7 per month. As a result Anadarko informed the Tribe that unpredictable approvals of permits forces the company to alter its operational plans at the last minute and often results in the company temporarily moving its operations off the Reservation to state and private lands. With consistent and reliable permit approvals, the Tribe is hopeful additional drilling rigs will move on to tribal lands and increase the revenues available for the tribal government, our members, and our investments.

#### **Inclusion of Indian Tribes in Legislation Under Consideration by the Committee**

The Tribe also requests that the Committee include tribes in any national energy legislation. In many cases, Indian tribes need the same authorities and programs that legislation provides to state governments. In addition, because Indian tribes also operate as energy developers, tribes should be included in financing and grant programs provided to the energy industry. The Tribe asks that Indian tribes and tribal interests be included in bills under consideration by the Committee.

In particular, S.15, the Protecting States' Rights to Promote American Energy Security Act, should be amended to recognize the substantial energy development on Indian lands and tribal authority to regulate hydraulic fracturing on Indian lands. The Tribe requests that the Committee include language in S. 15 to prohibit the Secretary from regulating hydraulic fracturing on Indian lands and instead defer to a tribe's regulation of hydraulic fracturing. Tribes should be provided the same opportunity as states to regulate hydraulic fracturing on our lands.

**Testimony of Chairman Chapoose  
Ute Indian Tribe**

**June 23, 2015  
Page 6 of 6**

This addition is needed for at least two reasons. First, development of energy resources on Indian lands is already delayed and limited by too many Federal regulations and too few Federal agency staff to implement those regulations. Tribal regulation of hydraulic fracturing would help to streamline approvals, promote local decision-making, and ensure protection of tribal resources.

Second, the bill should recognize tribal authority over tribal lands to clarify the bill's provisions regarding state authority to regulate hydraulic fracturing on "Federal lands." While they are not the same, in some cases Federal lands are thought to include Indian lands because of the status of Indian lands as Federal reservations. By specifically including tribal authority over tribal lands in the bill we can avoid any confusion over the term "Federal lands."

Indian tribes should also be specifically included in S. 1346, establishing an e-prize competition pilot program. Even better, a separate e-prize competition pilot program could be created to address the unique needs of Indian tribes. S. 1346 is intended to support entities that lower the cost of electricity and heat space in a high cost area. Such a program is needed in Indian Country where Indian tribes are subject to some of the highest electric rates in the Nation and often have a high need for heating.

The Tribe asks that the Committee amend these and other bills to specifically include Indian tribes and to recognize tribal interests where appropriate.

#### **Conclusion**

The GAO report highlights the need for accountability and reform in Indian energy permitting. The GAO report concluded that, "The development of Indian energy resources has the potential to provide significant benefits to Indian tribes, tribal members, and the Nation through both tribal economic development opportunities and by contributing to the Nation's energy production." *Id.* at 35. However, GAO found that a number of factors, including poor management by BIA, limits the ability of Tribes to develop their resources. *Id.* GAO recommended that, "Federal policy calls for providing enhanced self-determination and economic development opportunities for Indian tribes by promoting tribal oversight and management of energy resource development on tribal lands." *Id.* at 36.

The Tribe asks that the Committee take action to improve the agencies and laws that we must work with to develop our energy resources. We appreciate your consideration of these proposals. Thank you for the opportunity to provide this testimony.

**Attachment 1:**

**COLT Resolution and  
Legislative Proposal to Create an Indian Energy Regulatory Office**



## COALITION OF LARGE TRIBES

Mandan, Hidatsa and Arikara Nation / Oglala Sioux Tribe / Crow Tribe / Navajo Nation / Sisseton Wahpeton Sioux Tribe / Blackfeet Tribe of Montana / Rosebud Sioux Tribe / Spokane Tribe / Cheyenne River Sioux Tribe / Ute Indian Tribe

**COALITION OF LARGE TRIBES  
RESOLUTION # 1-5-21-14**

**Title: A New Interior Office to Promote Indian Energy, Sovereignty, Self-Determination and American Energy Independence**

**WHEREAS**, the Coalition of Large Tribes (COLT) was formally established in April 2011, and is comprised of tribes with a large land base, including the Mandan, Hidatsa and Arikara Nation (MHA Nation), the Oglala Sioux Tribe, the Crow Tribe, the Navajo Nation, the Sisseton Wahpeton Sioux Tribe, the Blackfeet Tribe of Montana, the Rosebud Sioux Tribe, the Ute Indian Tribe, the Shoshone-Bannock Tribes, the Colville Confederated Tribes, Spokane Tribe, and the Cheyenne River Sioux Tribe. COLT is chaired by Chairman Tex Hall of the MHA Nation; and

**WHEREAS**, COLT was organized to provide a unified advocacy base for tribes that govern large trust land bases and that strive to ensure the most beneficial use of those lands for the tribes and individual Indian landowners; and

**WHEREAS**, several COLT members are currently located in the Bureau of Indian Affairs' (BIA) Phoenix, Rocky Mountain, Great Plains, and Albuquerque Regions and are energy producing tribes or are among those tribes with potential for energy production that rely or might rely in the future on conventional or renewable energy resource development to support infrastructure, economic development, jobs, government revenues and income; and

**WHEREAS**, at the COLT DC Impact Meetings held in Washington, D.C. from March 5 to 6, 2014, with a quorum present, COLT adopted Resolution #3-3-6-14 entitled "Request that the Department of the Interior Create a New Office for Energy Producing Tribes;" and

**WHEREAS**, the United States Congress is currently considering and the Department of the Interior (DOI) and the Bureau of Indian Affairs (BIA) are currently developing a proposal for a new Indian energy office; and

**WHEREAS**, it is in the best interest of COLT to provide the Congress, DOI and BIA with additional information and detail about the proposed office to ensure that the office will effectively serve Indian tribes; and

**WHEREAS**, COLT proposes to amend Section 2602(a) of the Energy Policy Act of 1992 (25 U.S.C. 3502(a)) to create a new Indian Energy Regulatory Office (Office) that would be centrally located in Denver, Colorado and utilize and refocus the existing staff, resources and office space of the Office of Indian Energy and Economic Development's (OIEED) Division of Energy and Mineral Development; and

**WHEREAS**, establishing the Office in Denver, Colorado provides adequate housing and ease of recruiting new employees to a major metropolitan area, and proximity to other federal agencies involved in

the energy permitting process; and

**WHEREAS**, the Office would be established within the Secretary's Office, similar to the Indian Water Rights Office, to ensure that the Director of the Office has authority over the various agencies involved; and

**WHEREAS**, the Office would serve as a new BIA Regional Office that energy producing Indian tribes may voluntarily select to replace an Indian tribe's existing BIA Regional Office for review and approval of all energy related projects and would not result in duplicative review and approval of energy projects; and

**WHEREAS**, the Office would not replace current BIA Regional Offices nor the Farmington Federal Indian Minerals Office authorities and responsibilities except for those energy producing Indian tribes that elect to utilize the Office; and

**WHEREAS**, the Office would provide energy resource assessments and feasibility studies, technical assistance and training in energy development proposal review, increase federal permitting capacity and permit streamlining, provide support for permitting conducted by federal Agency and Field Offices, improve coordination within Interior agencies and with other Departments, provide technical assistance and training in the oversight and management of energy and financial resources, and ensure that Indian lands are not managed according to Federal public land management standards; and

**WHEREAS**, Indian tribes seeking greater DOI support in the areas of energy development, oversight, management, proposal review and energy related financial management could elect to be served by this Office or could elect to contract the functions of this Office in a manner consistent with P.L. 93-638; and

**WHEREAS**, existing BIA Regional Offices would continue to provide Indian tribes that have elected to utilize the new Office with support and oversight for all non-energy related issues; and

**WHEREAS**, to coordinate and streamline permitting, the Office would also include staff from other DOI agencies and offices involved in energy permitting on Indian lands, including: the Bureau of Indian Affairs, the Bureau of Land Management, the Office of Valuation Services, the Office of Natural Resources Revenue, the Fish and Wildlife Service, the Office of Special Trustee, the Office of the Solicitor, mining engineering and minerals realty specialists from the Office of Surface Mining, and any other DOI offices involved in energy permitting on Indian lands; and

**WHEREAS**, the establishment of the Office would utilize existing funding and resources from the OIEED's Division of Energy and Mineral Development and from each of the agencies and offices listed above, and allow for supplemental funding from industry partners in addition to new federal appropriations; and

**WHEREAS**, within one year or less, the Office would enter into agreements with other Federal agencies to coordinate and streamline permitting, including: the Environmental Protection Agency, the United States Department of Agriculture, and the Army Corps of Engineers; and

**WHEREAS**, on May 21, 2014, the Senate Committee on Indian Affairs approved with amendments S. 2132, a bill to amend the Indian Tribal Energy Development and Self-Determination Act of 2005 and for other purposes, however, the bill, as amended, would only study energy permitting delays for a year, meanwhile, Congressional action is immediately needed to reform and restructure federal oversight and permitting of Indian energy development.

**NOW, THEREFORE, BE IT RESOLVED**, COLT calls upon Congress to pass legislation and that DOI take administrative action pursuant to a Secretarial Order to establish and implement an Indian Energy Regulatory Office as described in this resolution and the attached legislative proposal; and

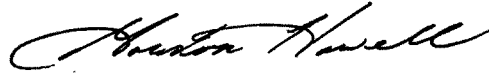
**BE IT FURTHER RESOLVED**, COLT calls upon Senator Tester, the Chairman of the Senate Committee on Indian Affairs, and other members of the Committee and the Senate to work with COLT and amend S. 2132 before it comes to the Senate floor to include the attached legislative proposal; and

**BE IT FINALLY RESOLVED**, this resolution shall be the policy of COLT until it is withdrawn or modified by subsequent resolution.

**CERTIFICATION**

This resolution was enacted at a duly called meeting of the Coalition of Large Tribes held in Washington, D.C. on May 21, 2014, at which a quorum was present, with 4 members voting in favor, 0 members opposed, 0 members abstaining.

Dated this 21st day of May 2014.



Secretary, Coalition of Large Tribes

Attest:



Tex G. Hall, Chairman, Coalition of Large Tribes

**Proposed Legislative Language for Indian Energy Regulatory Office**

**Attached to COLT Resolution #1-5-21-14**

Section 2602(a) of the Energy Policy Act of 1992 (25 U.S.C. 3502(a)) is amended—

(1) by redesignating paragraph (3) as paragraph (4);

(2) by inserting after paragraph (2) the following:

“(3) INDIAN ENERGY REGULATORY OFFICE.—

“(A) ESTABLISHMENT.—To assist the Secretary in carrying out the Program, the Secretary shall establish an ‘Indian Energy Regulatory Office’ within the Secretary’s Office to be located in Denver, Colorado. The Office shall utilize the existing resources of the Department’s Office of Indian Energy and Economic Development Division of Indian Energy and Mineral Development.

“(B) DIRECTOR.— The Office shall be led by a Director who shall be compensated at a rate equal to that of level IV of the Executive Schedule under section 5315 of title 5, United States Code and who shall report directly to the Deputy Secretary.

“(C) FUNCTIONS.—The Office shall serve as a new Bureau of Indian Affairs (BIA) Regional Office that energy producing Indian tribes may voluntarily select to replace an Indian tribe’s existing BIA Regional Office for the following functions:

(i) notwithstanding any other law, oversee, coordinate, process and approve all Federal leases, easements, right-of-ways, permits, policies, environmental reviews, and any other authorities related to energy development on Indian lands.

(ii) support BIA Agency Office and tribal review and evaluation of energy proposals, permits, mineral leases and rights-of-way, and Indian Mineral Development Agreements for final approval, conducting environmental reviews, and conducting surface monitoring;

(iii) review and prepare Applications for Permits to Drill, Communitization Agreements and well spacing proposals for approval, provide production monitoring, inspection and enforcement, and oversee drainage issues;

(iv) provide energy related technical assistance and financial management training to BIA Agency Offices and tribal;

(v) develop best practices in the area of Indian energy development, including, standardizing energy development processes, procedures, and forms among BIA Regions and Agency Offices;

(vi) minimize delays and obstacles to Indian energy development and,

(vii) provide technical assistance to Indian tribes in the areas of energy related engineering, environmental analysis, management and oversight of energy development, assessment of energy development resources, proposals and financing, development of conventional and renewable energy resources.

“(D) RELATIONSHIP TO BUREAU OF INDIAN AFFAIRS REGIONAL AND AGENCY OFFICES.—

(i) The Office shall have the authority to review and approve all energy related matters for those tribes that elect to utilize the Office, without subsequent or duplicative review and approval by other BIA Regional Offices or other Interior agencies. Existing BIA Regional

Offices shall continue to oversee, support and provide approvals for all other non-energy related matters for those tribes that elect to utilize the Office.

(ii) BIA Agency offices and Bureau of Land Management (BLM) State and Field offices shall continue to provide regional and local services related to Indian energy development including, local realty functions, on-site evaluations and inspections, direct services as requested by Indian tribes and individual Indian and any other local functions to related to energy development on Indian lands.

(iii) The Office shall provide technical assistance and support to the BIA and BLM in all areas related to energy development on Indian lands.

“(E) DESIGNATION OF INTERIOR STAFF.—The Secretary shall designate and transfer to the Office existing staff and resources of the Division of Energy and Mineral Development, the Bureau of Indian Affairs, the Bureau of Land Management, the Office of Valuation Services, the Office of Natural Resources Revenue, the Fish and Wildlife Service, the Office of Special Trustee, the Office of the Solicitor, mining engineering and minerals realty specialists from the Office of Surface Mining, and any other Interior agency or office involved in energy development on Indian lands to provide for the review, processing and approval of:

(i) permits and regulatory matters under the Indian Mineral Leasing Act of 1938 (25 U.S.C. §§ 396a *et seq.*), the Indian Mineral Development Act of 1982 (25 U.S.C. §§ 2101 *et seq.*), the Indian Tribal Energy Development and Self-Determination Act, included as Title V of the Energy Policy Act of 2005 (25 U.S.C. §§ 3501 *et seq.*), the Surface Mining Control and Reclamation Act of 1977 (30 U.S.C. §§ 1201) and its provisions on Tribal Primacy; the Indian Right-Of-Way Act of 1948 (25 U.S.C. § 323 to 328) and its implementing regulations at 25 C.F.R. Part 169, leasing provisions of 25 U.S.C. 415, and surface leasing regulations at 25 C.F.R. Part 162;

(ii) the consultations and preparation of biological opinions under section 7 of the Endangered Species Act of 1973 (16 U.S.C. § 1536) (ESA);

(iii) the preparation of analyses under the National Environmental Policy Act of 1969 (42 U.S.C. §§ 4321 *et seq.*) (NEPA); and,

(iv) providing technical assistance and training in various forms of energy development on Indian lands.

“(F) MANAGEMENT OF INDIAN LANDS.— The Director shall ensure that all environmental reviews and permitting decisions comply with the United States’ unique legal relationship with Indian tribal governments as set forth in the Constitution of the United States, treaties, statutes, Executive Orders, and court decisions, and are exercised in a manner that promotes tribal authority over Indian lands consistent with the federal policy of Indian Self-Determination. The Director shall also ensure that Indian lands shall not be considered to be Federal public lands, part of the public domain or managed according to federal public land laws and policies.

“(G) INDIAN SELF-DETERMINATION.—Programs and services operated by this Office shall be provided pursuant to contracts and grants awarded under the Indian Self Determination and Education Assistance Act of 1975 (25 U.S.C. § 450f).

“(H) TRANSFER OF FUNDS.—To establish the Office and advance these efforts, the Secretary

shall authorize, for a period of not to exceed two years, the expenditure or transfer of such funds as are necessary from the annual budgets of:

- (i) the Bureau of Indian Affairs;
- (ii) the United States Fish and Wildlife Service;
- (iii) the Bureau Land Management;
- (iv) the Office of Surface Mining;
- (v) the Office of Natural Resources Revenue; and,
- (vi) the Office of Mineral Valuation.

“(I) BASE BUDGET.—Following the two year periods described in (G) above, the combined total of the funds transferred pursuant to those provisions shall serve the base budget for the Office.

“(J) APPROPRIATIONS OFFSET.—All fees generated from Applications for Permits to Drill, inspection, nonproducing acreage, or any other fees related to energy development on Indian Lands shall, commencing on the date the Office is opened, be transferred to the budget of the Office and may be utilized to advance or fulfill any of its stated duties and purposes.

“(K) REPORT.—The Office shall keep detailed records documenting its activities and submit an annual report to Congress detailing, among others:

- (i) the number and type of federal approvals granted;
- (ii) the time it has taken to process each type of application;
- (iii) the need for additional similar offices to be located in other regions; and,
- (iv) proposed changes in existing law to facilitate the development of energy resources on Indian lands, improve oversight of energy development on Indian lands.

“(L) COORDINATION WITH ADDITIONAL FEDERAL AGENCIES.—Within one year of establishing the Office, the Secretary shall enter into a memorandum of understanding for the purposes coordinating and streamlining energy related permits with—

- (i) the Administrator of the Environmental Protection Agency;
- (ii) the Assistant Secretary of the Army (Civil Works); and,
- (iii) the Secretary of Agriculture.

**Attachment 2:**

**NCAI Resolution and  
Legislative Proposal to Create an Indian Energy Regulatory Office**



# NATIONAL CONGRESS OF AMERICAN INDIANS

## The National Congress of American Indians Resolution #ANC-14-011

### TITLE: Supporting and Providing Additional Detail for New Bureau of Indian Affairs Regional Office to Serve Energy Producing Tribes

#### EXECUTIVE COMMITTEE

**PRESIDENT**  
**Brian Chasnochy**  
*Sawtooth Indian Tribal Community*

**FIRST VICE-PRESIDENT**  
**Michael O. Finley**  
*Cyfle, Tribe of Cherokee Reservation*

**RECORDING SECRETARY**  
**Robert Shepherd**  
*Sacred Wapiti Nation*

**TREASURER**  
**Dennis Welsh**  
*Colorado River Indian Tribe*

#### REGIONAL VICE-PRESIDENTS

**ALASKA**  
**Jerry Isaac**  
*Tanana Chiefs Conference*

**EASTERN OKLAHOMA**  
**S. Joe Gittenden**  
*Cherokee Nation*

**GREAT PLAINS**  
**Laurel McDonald**  
*Spirit Lake Tribe*

**MIDWEST**  
**Aaron Payment**  
*Sault Ste. Marie Tribe of Chippewa Indians*

**NORTHEAST**  
**Randy Nika**  
*Nipmuc Tribe*

**NORTHWEST**  
**Pawn Sharp**  
*Zenith Indian Nation*

**PACIFIC**  
**Rosemary Morillo**  
*Shoshone-Bannock Tribes of Northern Idaho*

**ROCKY MOUNTAIN**  
**Ian Povey**  
*Eastern Shoshone Tribe*

**SOUTHEAST**  
**Ron Richardson**  
*Hawthorn-Sage Indian Tribe*

**SOUTHERN PLAINS**  
**Stephen Smith**  
*Snow Tribe of Oklahoma*

**SOUTHWEST**  
**Manuel Heart**  
*Ute Mountain Ute Tribe*

**WESTERN**  
**Arian Melendez**  
*Pima-Sonoran Indian Colony*

**EXECUTIVE DIRECTOR**  
**Jacqueline Johnson Pata**  
*Tribal*

#### NCAI HEADQUARTERS

1516 P Street, N.W.  
Washington, DC 20005  
202.466.7767  
202.466.7797 fax  
www.ncai.org

**WHEREAS**, we, the members of the National Congress of American Indians of the United States, invoking the divine blessing of the Creator upon our efforts and purposes, in order to preserve for ourselves and our descendants the inherent sovereign rights of our Indian nations, rights secured under Indian treaties and agreements with the United States, and all other rights and benefits to which we are entitled under the laws and Constitution of the United States, to enlighten the public toward a better understanding of the Indian people, to preserve Indian cultural values, and otherwise promote the health, safety and welfare of the Indian people, do hereby establish and submit the following resolution; and

**WHEREAS**, the National Congress of American Indians (NCAI) was established in 1944 and is the oldest and largest national organization of American Indian and Alaska Native tribal governments; and

**WHEREAS**, several Tribes located in the Phoenix Region, the Rocky Mountain Region, the Great Plains Region and the Southwest Region, as well as the Alaska Native communities, and are energy producing tribes or among those tribes with potential for energy production that rely or might rely in the future on mineral revenue income for infrastructure, economic development, jobs and income from the development of their mineral resources; and

**WHEREAS**, at the 2013 Annual Session of NCAI held at Cox Business Center from October 13 to 18, 2013 in Tulsa, Oklahoma with a quorum present, the General Assembly adopted Resolution #TUL-13-012 entitled "Requesting the Bureau of Indian Affairs Create a New Regional Office for Energy Producing Tribes;" and

**WHEREAS**, the United States Congress is currently considering and the Department of the Interior (DOI) and the Bureau of Indian Affairs (BIA) are currently developing a proposal for a new Indian energy office; and

**WHEREAS**, it is in the best interest of NCAI to provide the Congress, DOI and BIA with additional information and detail about the proposed office to ensure that the office will effectively serve Indian tribes; and

**WHEREAS**, NCAI proposes to amend Section 2602(a) of the Energy Policy Act of 1992 (25 U.S.C. 3502(a)) to create a new Indian Energy Regulatory Office (Office) that would be centrally located in Denver, Colorado and utilize and refocus the existing resources and office space of the Office of Indian Energy and Economic Development's (OIEED) Division of Indian Energy and Mineral Development; and

**WHEREAS**, establishing the Office in Denver, Colorado provides adequate housing and ease of recruiting new employees to a major metropolitan area, and proximity to other federal agencies involved in the energy permitting process; and

**WHEREAS**, the Office would be established within the Secretary's Office, similar to the Indian Water Rights Office, to ensure that the Director of the Office has authority over the various agencies involved; and

**WHEREAS**, the Office would replace current BIA Regional Office authorities and responsibilities for energy producing Indian tribes, and would not result in duplicative review and approval of energy projects; and

**WHEREAS**, the Office would provide energy resource assessments and feasibility studies, technical assistance and training in energy development proposal review, increase BIA permitting capacity and permit streamlining, support for permitting expertise within BIA Agency Offices, improved coordination with other agencies, technical assistance and training in the oversight and management of energy and financial resources, and ensure that Indian lands are not managed according to Federal public land management standards; and

**WHEREAS**, Indian tribes seeking greater BIA support in the areas of energy development, oversight, management, proposal review and financial assistance could elect to be served by this Office; and

**WHEREAS**, existing BIA Regional Offices would continue to provide Indian tribes utilizing the new Office with support and oversight for all non-energy related issues; and

**WHEREAS**, to coordinate and streamline permitting, the Office would also include staff from other DOI agencies and offices involved in energy permitting on Indian lands, including: the Bureau of Land Management, the Office of Mineral Evaluation, the Office of Natural Resources Revenue, the Fish and Wildlife Service, the Office of Special Trustee, the Office of the Solicitor; and

**WHEREAS**, the establishment of the Office would not increase the deficit because it would utilize existing Federal resources in Denver, Colorado and existing funding from each of the agencies and offices listed above; and

**WHEREAS**, the Office would enter into agreements with other Federal agencies to coordinate and streamline permitting, including: the Environmental Protection Agency, the United States Department of Agriculture, and the Army Corps of Engineers.

**NOW THEREFORE BE IT RESOLVED**, that NCAI requests that Congress pass legislation requiring the Secretary of the Interior to establish and implement an Indian Energy Regulatory Office as described in this resolution and as reflected in the attached legislative proposal; and

**BE IT FURTHER RESOLVED**, that this resolution shall be the policy of NCAI until it is withdrawn or modified by subsequent resolution.

**CERTIFICATION**

The foregoing resolution was adopted by the General Assembly at the 2014 Mid-Year Session of the National Congress of American Indians, held at the Dena'ina Civic & Convention Center, June 8-11, 2014 in Anchorage, Alaska, with a quorum present.

  
President

ATTEST:

  
Recording Secretary

**Proposed Legislative Language for Indian Energy Regulatory Office  
Attached to NCAI Resolution #ANC-14-011**

Section 2602(a) of the Energy Policy Act of 1992 (25 U.S.C. 3502(a)) is amended—

- (1) by redesignating paragraph (3) as paragraph (4);
- (2) by inserting after paragraph (2) the following:

“(3) INDIAN ENERGY REGULATORY OFFICE.—

“(A) ESTABLISHMENT.—To assist the Secretary in carrying out the Program, the Secretary shall establish an ‘Indian Energy Regulatory Office’ within the Secretary’s Office to be located in Denver, Colorado. The Office shall utilize the existing resources of the Department’s Office of Indian Energy and Economic Development Division of Indian Energy and Mineral Development.

“(B) DIRECTOR.— The Office shall be led by a Director who shall be compensated at a rate equal to that of level IV of the Executive Schedule under section 5315 of title 5, United States Code and who shall report directly to the Deputy Secretary.

“(C) FUNCTIONS.—The Office shall serve as a new Bureau of Indian Affairs (BIA) Regional Office that energy producing Indian tribes may voluntarily select to replace an Indian tribe’s existing BIA Regional Office for the following functions:

- (i) notwithstanding any other law, oversee, coordinate, process and approve all Federal leases, easements, right-of-ways, permits, policies, environmental reviews, and any other authorities related to energy development on Indian lands.
- (ii) support BIA Agency Office and tribal review and evaluation of energy proposals, permits, mineral leases and rights-of-way, and Indian Mineral Development Agreements for final approval, conducting environmental reviews, and conducting surface monitoring;
- (iii) review and prepare Applications for Permits to Drill, Communitization Agreements and well spacing proposals for approval, provide production monitoring, inspection and enforcement, and oversee drainage issues;
- (iv) provide energy related technical assistance and financial management training to to BIA Agency Offices and tribal;
- (v) develop best practices in the area of Indian energy development, including, standardizing energy development processes, procedures, and forms among BIA Regions and Agency Offices;
- (vi) minimize delays and obstacles to Indian energy development and,
- (vii) provide technical assistance to Indian tribes in the areas of energy related engineering, environmental analysis, management and oversight of energy development, assessment of energy development resources, proposals and financing, development of conventional and renewable energy resources.

“(D) RELATIONSHIP TO BUREAU OF INDIAN AFFAIRS REGIONAL AND AGENCY OFFICES.—

- (i) The Office shall have the authority to review and approve all energy related

matters without subsequent or duplicative review and approval by other BIA Regional Offices. Existing BIA Regional Offices shall continue to oversee, support and provide approvals for all other non-energy related matters.

(ii) BIA Agency offices and Bureau of Land Management (BLM) State and Field offices shall continue to provide regional and local services related to Indian energy development including, local realty functions, on-site evaluations and inspections, direct services as requested by Indian tribes and individual Indian and any other local functions to related to energy development on Indian lands.

(iii) The Office shall provide technical assistance and support to the BIA and BLM in all areas related to energy development on Indian lands.

“(E) DESIGNATION OF INTERIOR STAFF.—The Secretary shall designate existing staff and resources of the Division of Energy and Mineral Development, and other Interior staff and resources to the Office, including: Bureau of Land Management, Office of Mineral Evaluation, Office of Natural Resources Revenue, Bureau of Reclamation, Fish and Wildlife Service, Office of Special Trustee, and the Office of the Solicitor to provide for the review, processing and approval of:

(i) permits and regulatory matters under the Indian Mineral Leasing Act of 1938 (25 U.S.C. §§ 396a *et seq.*), the Indian Mineral Development Act of 1982 (25 U.S.C. §§ 2101 *et seq.*), the Indian Tribal Energy Development and Self-Determination Act, included as Title V of the Energy Policy Act of 2005 (25 U.S.C. §§ 3501 *et seq.*), the Indian Right-Of-Way Act of 1948 (25 U.S.C. § 323 to 328) and its implementing regulations at 25 C.F.R. Part 169, leasing provisions of 25 U.S.C. 415, and surface leasing regulations at 25 C.F.R. Part 162;

(ii) the consultations and preparation of biological opinions under section 7 of the Endangered Species Act of 1973 (16 U.S.C. 1536) (ESA);

(iii) the preparation of analyses under the National Environmental Policy Act of 1969 (42 U.S.C. 4321 *et seq.*) (NEPA); and,

(iv) providing technical assistance and training in various forms of energy development on Indian lands.

“(F) MANAGEMENT OF INDIAN LANDS.— The Director shall ensure that all environmental reviews and permitting decisions comply with the United States’ unique legal relationship with Indian tribal governments as set forth in the Constitution of the United States, treaties, statutes, Executive Orders, and court decisions, and are exercised in a manner that promotes tribal authority over Indian lands consistent with the federal policy of Indian Self-Determination. The Director shall also ensure that Indian lands shall not be considered to be Federal public lands, part of the public domain or managed according to federal public land laws and policies.

“(G) TRANSFER OF FUNDS.—To establish the Office and advance these efforts, the Secretary shall authorize, for a period of not to exceed two years, the expenditure or transfer of such funds as are necessary from the annual budgets of:

- (i) the Bureau of Indian Affairs;
- (ii) the United States Fish and Wildlife Service;

- (iii)the Bureau Land Management;
- (iv)the Office of Natural Resources Revenue;
- (v) the Office of Mineral Valuation; and
- (vi)the Bureau of Reclamation.

“(H) BASE BUDGET.—Following the two year periods described in (G) above, the combined total of the funds transferred pursuant to those provisions shall serve the base budget for the Office.

“(I) APPROPRIATIONS OFFSET.—All fees generated from Applications for Permits to Drill, inspection, nonproducing acreage, or any other fees related to energy development on Indian Lands shall, commencing on the date the Office is opened, be transferred to the budget of the Office and may be utilized to advance or fulfill any of its stated duties and purposes.

“(J) REPORT.—The Office shall keep detailed records documenting its activities and submit an annual report to Congress detailing, among others:

- (i) the number and type of federal approvals granted;
- (ii) the time it has taken to process each type of application;
- (iii)the need for additional similar offices to be located in other regions; and,
- (iv)proposed changes in existing law to facilitate the development of energy resources on Indian lands, improve oversight of energy development on Indian lands.

“(L) COORDINATION WITH ADDITIONAL FEDERAL AGENCIES.—Within three years of establishing the Office, the Secretary shall enter into a memorandum of understanding for the purposes coordinating and streamlining energy related permits with—

- (i) the Administrator of the Environmental Protection Agency;
- (ii) the Assistant Secretary of the Army (Civil Works); and,
- (iii)the Secretary of Agriculture.

**Attachment 3:****No-Cost Reforms to Indian Energy Permitting and Management**

**Delayed Royalties Due to Communitization Agreements.** The Secretary of the Interior has delegated the approval of oil and gas Communitization Agreements to BLM. Instead of creating new unneeded regulatory responsibilities, like its hydraulic fracturing rule, BLM should fulfill its current obligations to timely review and approve Communitization Agreements. The Committee should require Communitization Agreements to be submitted at the time an Application for Permit to Drill is filed. This is possible when the oil and gas resource is well known. When this is not feasible, BLM should require that royalty payments from producing wells be paid within 30 days from the first month of production into an interest earning escrow account.

Under current law, royalties are due within 30 days of the first month of production. However, without any authority, BLM has allowed royalty payments to be delayed for months and years pending the approval of Communitization Agreements. This violation of the law cannot be allowed to continue. The Tribe asks that the Committee consider and approve legislation to address BLM's delays in payments of oil and gas royalties due to approval of Communitization Agreements.

**Inclusion of Tribes in Well Spacing Decisions.** Instead of treating Indian lands like public lands, BLM should commit staff resources to actually regulating well spacing on Indian lands and involving Indian tribes in oil and gas well spacing decisions. Currently, BLM defers the ability to determine well spacing on Indian lands to state well spacing forums and practices. Although BLM ultimately approves the oil and gas well spacing that was originally proposed in state forums, BLM should defer to and directly consult with Indian tribes in spacing determinations on Indian lands. BLM's current practice ignores its Federal authority, its trust responsibility to Indian tribes, and takes away any benefits that a tribe could have received by determining its own well spacing on its reservation lands.

The Tribe asks that the Committee consider and approve legislation that would direct BLM to enter into oil and gas well spacing agreements with Indian tribes. These agreements would provide tribes every opportunity to participate in and ultimately determine spacing units on its reservation. The opportunity to participate in well spacing decisions and ultimately determine well spacing on Indian lands would involve tribes in an important aspect of regulating oil and gas development.

**Minor Source Regulation in Indian Country.** Require EPA to delay implementation of its new synthetic minor source rule for two years to ensure appropriate staffing is in place to administer any new permitting requirements.

**Energy Efficiency Reforms.** Despite a longstanding state energy efficiency program, there is no ongoing program to support tribal energy efficiency efforts. Tribal governments have the same energy efficiency needs as state governments. The Tribe asks the Committee to direct the Department of Energy to allocate not less than 5 percent of existing state energy efficiency

funding to establish a grant program for Indian tribes interested in conducting energy efficiency activities.

A tribal energy efficiency program could be modeled after the successful Energy Efficiency Block Grant (EEBG) program. Despite its success, the EEBG program was only funded one time—under the American Reinvestment and Recovery Act of 2009. To ensure an ongoing source of funding for tribal energy efficiency efforts, tribes should be provided a portion of the funding for state energy efficiency efforts. This program could lower tribal governmental energy costs and ultimately lower the Federal funding used by tribes to administer Federal programs at the local level.

**Weatherization Reforms.** The Tribe asks that the Department of Energy’s weatherization program be reformed consistent with the Federal government’s trust responsibility and to recognize the weatherization needs of Indian tribes. Under current law, the Department of Energy requires Indian tribes to obtain Federal funding through state governmental and non-profit entities administering weatherization programs. Tribes can only receive direct funding from the Department of Energy if a tribe can prove that it is not receiving funding that is equal to what the state is providing its non-Indian population. Currently, out of 566 federally recognized tribes, only two tribes and one tribal organization receive direct weatherization funding from Department of Energy. As a result, tribes are effectively excluded from the Federal government’s weatherization program.

Weatherization funding does not benefit tribal homes for a number of other reasons. In particular, Indian tribes lack energy auditors to assess the weatherization needs of Indian homes. The Department of Energy’s weatherization program must be reformed to provide direct funding to tribal governments, provide training for energy auditors in Indian Country and to reflect the unique weatherization needs of tribal homes. These reforms are needed to get weatherization funding to those who need it most. While the Tribe appreciates the weatherization changes included in Senator Barrasso’s bill, S. 209, much more is needed.

**Environmental Review of Energy Project on Indian Lands.** As the GAO report concludes, the environmental review of energy projects on Indian land is more extensive than on comparable private lands. This extensive review acts as a disincentive to development on Indian lands particularly given the understaffed Federal agencies overseeing Indian energy development. Similar to the Clean Water Act, Clean Air Act and others, the Committee could amend the National Environmental Policy Act (NEPA) to include treatment as a sovereign (TAS) provisions. The new provision would allow a tribe to submit an application to the Council on Environmental Quality and once approved, federal authority for completing environmental reviews would be delegated to tribal governments.

**Clarify that Indian Lands are not Public Lands Subject to NEPA.** The 10th Circuit Court of Appeals, in *Davis v. Morton*, 469 F.2d 593 (1972), equated Indian trust land to public lands and thus treats leases on Indian trust land as a major federal action subject to NEPA. The Court stated that exempting Indian lands from NEPA “would preclude all federal lands from NEPA jurisdiction, something clearly not intended by Congress in passing the Act.” Davis supports a sweeping interpretation of NEPA’s application in Indian country and questions the fundamental

differences between Indian lands and public lands. The Tribe asks that the Committee clarify that Indian lands are not “public lands” held in trust for the people of the United States. Indian lands are held in trust or restricted status for the use and benefit of the Indian tribes and its members. All other “federal lands” would still be subject to NEPA.

**BLM Hydraulic Fracturing Regulations.** BLM’s hydraulic fracturing regulations are based on public policy standards set out in the Federal Land Policy and Management Act standards. Not trust standards used to manage Indian lands. The Committee should approve legislation prevents BLM from regulating hydraulic fracturing on Indian Lands. For example, the Committee could including language that “prohibits any Department of the Interior rule regarding hydraulic fracturing, used in oil and gas development or production, from having any effect on land held in trust or restricted status for Indians, except with the express consent of its Indian beneficiaries.”

**Indian Energy Loan Guarantee Program.** As the GAO report concludes, Indian tribes lack access to capital to finance energy projects. Congress attempted to solve this problem 10 years ago by including an Indian Energy Loan Guarantee Program in the Energy Policy Act of 2005. In the 10 years since, the Department of Energy has not developed regulations to implement the program or included funding for the program in its budget requests.

We already know that loan guarantee programs work in Indian Country. For example, Interior’s Office of Indian Energy and Economic Development already runs a small but highly successful loan guarantee program for Indian economic development on about \$10 million per year. With this small amount of funding Interior is able to leverage 13 to 14 times this amount, about \$130 million, in project financing. Imagine what tribes could do with the \$2 billion in financing Congress already authorized in Section 503 (a) of the Energy Policy Act of 2005.

To solve this problem, the Tribe asks that the Committee replace the implementing language in the Indian energy loan guarantee program with the implementing language used for the Department of Energy’s “Title XVII” loan guarantee program. In other words, change “may” to “shall” and direct that the Department of Energy develop regulations to implement the program within one year after the passage of the legislation. If the Department of Energy does not take action to implement this program, the tools the Congress has already approved to support Indian energy development cannot be used.

**Distributed Generation and Community Transmission.** The Tribe also asks that the Committee support new and emerging ways for tribes to beneficially use our energy resources and provide energy security for our communities. We need a new approach to capture and not waste valuable resources that are too far from existing transmission networks. The Tribe asks that the Committee direct the Department of Energy to conduct no fewer than 10 distributed energy demonstration projects to increase the energy resources available to Indian and Alaska Native homes, communities, and government buildings. Priority should be given to projects that utilize local resources, and reduce or stabilize energy costs.

# VOITH

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June 5<sup>th</sup>, 2015

The Honorable Lisa Murkowski  
Chairwoman, Committee on Energy and Natural Resources  
United States Senate  
Washington, DC 20510

Chairwoman Murkowski:

On behalf of Voith Turbo, I would like to thank you for introducing S. 1312, the Energy Supply and Distribution Act of 2015. Voith Turbo is very encouraged that this legislation will be heard during the June 9<sup>th</sup> Senate Energy and Natural Resources Committee hearing.

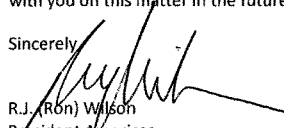
By way of background, Voith Turbo just celebrated 40 years in the United States, headquartered in York, Pennsylvania. Turbo's U.S. presence also includes facilities in Sacramento, California and Houston, Texas, which houses our Power, Oil & Gas group. Collectively across four operation divisions, Voith employs over 39,000 people globally, which includes over 4,000 in the U.S.

With respect to oil and gas, Voith Turbo manufactures components in the upstream, midstream, and downstream areas that include reliable drives for pumps, compressors, gas and steam turbines. As manufacturers of specialized oil and gas components, we believe that lifting the ban on crude oil exports will lead to increased domestic production, thus spurring growth in the U.S.'s energy infrastructure.

The international energy market has drastically shifted in the nearly 40 years since the ban on crude oil exports was passed into law. Now is the time to move forward with common sense public policy that reflects the current energy landscape not only in the United States, but across the globe. Analyses have shown that lifting the ban on crude oil exports could create over 300,000 jobs in the United States by the year 2020.

With your leadership, Voith Turbo is hopeful that this legislation will be passed out of the Energy and Natural Resources Committee, and ultimately signed into law. Thank you, and I look forward to working with you on this matter in the future.

Sincerely,

  
R.J. (Ron) Wilson  
President Americas  
Division Power, Oil and Gas

CC: The Honorable Pat Toomey  
The Honorable Robert P. Casey  
The Honorable John Cornyn  
The Honorable Ted Cruz  
The Honorable Maria Cantwell



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June 11, 2015

Honorable Lisa Murkowski  
Chairwoman  
U.S. Senate Committee on Energy  
and Natural Resources  
304 Dirksen Senate Building  
Washington, D.C. 20510

Honorable Maria Cantwell  
Ranking Member  
U.S. Senate Committee on Energy  
and Natural Resources  
304 Dirksen Senate Building  
Washington, D.C. 20510

Dear Senator Murkowski and Senator Cantwell:

The purpose of this letter is to communicate Western Governors' longstanding support for the sharing of revenues derived from renewable energy leasing on federal lands with impacted states and counties. Language contained in the Public Lands Renewable Energy Development Act of 2015 (S. 1407), sponsored by Senator Heller, Senator Heinrich, Senator Risch and Senator Tester, would enact such revenue sharing. Western Governors appreciate the Committee's consideration of this important legislation.

States and counties incur costs associated with the development and operation of renewable energy projects located on federal lands. Congress recognized this increased burden in the Energy Policy Act of 2005 (42 U.S.C. 15873(a)) when it created a program for the sharing of revenues from geothermal energy production on federal lands. As a result, state and local governments in affected areas have been able to deliver critical governmental services and make needed capital improvements to accommodate development of geothermal energy resources.

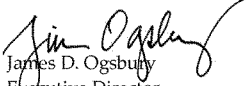
Western Governors support continued and accelerated deployment of renewable energy projects (and the associated growth in clean energy jobs) in western states. Shared lease revenues from renewable energy development can be used by state and local agencies to support land, water and wildlife conservation in affected areas. Western Governors also appreciate the legislation's call for state participation in a program to improve federal permit coordination for renewable energy projects on public lands.

Western states look forward to helping meet the current and future energy needs of the United States while ensuring protection of our precious natural resources. Please let me know if the Governors can be of further assistance

Honorable Lisa Murkowski  
Honorable Maria Cantwell  
June 11, 2015  
Page 2

in promoting the revenue-sharing initiative the Committee is currently considering. With appreciation for your leadership and best wishes for continued success, I am

Respectfully,

  
James D. Ogsbury  
Executive Director

cc: Senator Dean Heller  
Senator Martin Heinrich  
Senator James Risch  
Senator Jon Tester  
Senator Cory Gardner  
Senator Steve Daines



June 11, 2015

Chairwoman Lisa Murkowski  
Senate Energy & Natural Resources Committee  
304 Dirksen Senate Building  
Washington, D.C. 20510

Ranking Member Maria Cantwell  
Senate Energy & Natural Resources Committee  
304 Dirksen Senate Building  
Washington, D.C. 20510

Dear Chairman Murkowski & Ranking Member Cantwell,

The Wilderness Society respectfully submits the following views for inclusion in the record for the Senate Energy and Natural Resources hearing, "Energy Accountability and Reform Legislation." Thank you for the continued effort to review policy proposals aimed at addressing the energy needs of our future and for considering our views.

As you review proposals to reform energy production and enhance the accountability of energy development on public lands, we encourage you to keep in mind the many benefits public lands provide to communities across the United States. In addition to energy production, the public lands are integral to local economies by driving tourism, attracting new residents and businesses seeking improved quality of life, and supporting important outdoor pursuits like hunting, hiking, biking and fishing.

Based on decades of experience, The Wilderness Society knows that we can find ways to reliably and sustainably fuel America's future in a manner that simultaneously invests in the conservation we need and protects the lands we love. Targeted reforms can help ensure better outcomes for producers and the American public.

In your efforts to pull together an energy package, we encourage you to prioritize legislative ideas that encourage responsible development and oversight, such as those in the following bills (in numerical order by bill number):

**S 1311, the Oil Spill Deterrent Act**, which would more accurately assess the value of our public lands and ensure a fair return to taxpayers, communities, and environmental cleanup efforts by increasing the civil fines for oil spill liabilities when these damaging and preventable accidents happen on federal lands.

**S 1407, the Public Lands and Renewable Energy Development Act**, which encourages responsible renewable energy development while also enhancing conservation investments in our public lands and waters. The bill provides the Interior Department new tools needed to develop renewable energy in a "smart from the start" way that will help to more efficiently and effectively permit renewable energy on public lands. We urge the committee to strengthen and advance the legislation as part of an effort to modernize new energy development on American lands.

**S 1033**, which would amend the Department of Energy Organization Act to replace the biennial energy policy plan with a Quadrennial Energy Review (QER), much like the QER recently conducted. This bill would direct the president to establish a QER task force once every four years comprised of members from various relevant departments and agencies. The QER task force would establish integrated, government-wide national energy objectives in the context of economic, environmental, and security priorities. It would provide to Congress an integrated view of short-, intermediate- and long-term objectives for federal energy policy.

**S 1434**, which would call on utilities to hold storage capacity equal to one percent of their peak load by 2021, increasing to two percent by 2025. Storage is an important part of a reliable and resilient energy grid, ensuring maximal use of energy already being generated. A Storage Portfolio will help drive development and deployment of new storage technologies and help support distributed generation of electricity.

**S 1340, the COAL Reform Act of 2015**, which would modernize the decades-old federal coal program, helping ensure “fair market value” is received by taxpayers for development of these publicly-owned resources by considering the full range of economic, social and environmental values. Responding to independent audit findings, the bill would set appropriate royalty and rental rates and require an update every 5 years, and enhance the federal inspection and enforcement regime.

**S 1398**, which would reauthorize funding for the Energy Department programs under the America Competes Act through 2020. It would also tighten provisions regarding the Advanced Research Projects Agency – Energy (ARPA-E) funding for private entities. Congress should support this program to enhance U.S. innovation and competitiveness in the global market, and provide it with adequate funding.

**S 1422, the Energy Workforce for the 21<sup>st</sup> Century Act**, which would direct the Secretary of Energy to create a job program that focuses on training workers from all levels of education and socio-economic status in energy manufacturing jobs. This bill would provide for direct assistance and improve collaboration among secondary schools, universities, the National Labs, and other entities.

Furthermore, elements of the following proposals are of concern as written (in numerical order by bill number):

**S 15, the Protecting States’ Rights to Promote American Energy Security Act**, which would prohibit the Department of the Interior from regulating or enforcing aspects of the drilling process on federal lands, including ensuring well integrity, management of produced water that includes dangerous chemicals and ensuring transparency in disclosing hazardous chemicals, instead deferring to state regulations to process permits for hydraulic fracturing on publicly owned lands.

**S 1216**, which would create a more cumbersome method of implementing civil penalties for Natural Gas Act compliance infractions that could prolong penalty challenges, increasing the uncertainty of completion and collection.

**S 1221**, which would amend the Federal Power Act to provide limited impact statements on proposed rules that would report only on the potential impact on reliability without consideration for other criteria, such as public health risk.

**S 1230**, which would permit the Secretary of Interior to outsource oversight of important stewardship obligations regarding proper development of federal resources. While we support collaboration between the states and federal agencies, we are concerned that this bill could result in scattershot oversight of a variety of issues, including reclamation and hydraulic fracturing.

We appreciate the opportunity to engage in the committee's deliberations and request that this letter be included in the hearing record.

Respectfully,

The Wilderness Society