AUTHENTICATED
U.S. GOVERNMENT
INFORMATION
GPO

THE FEDERAL GREEN JOBS AGENDA

HEARING

BEFORE THE

SUBCOMMITTEE ON OVERSIGHT AND INVESTIGATIONS

OF THE

COMMITTEE ON ENERGY AND COMMERCE
HOUSE OF REPRESENTATIVES

ONE HUNDRED TWELFTH CONGRESS

SECOND SESSION

JUNE 19, 2012

Serial No. 112–152

Printed for the use of the Committee on Energy and Commerce
energycommerce.house.gov

U.S. GOVERNMENT PRINTING OFFICE
82–298 PDF WASHINGTON : 2013

For sale by the Superintendent of Documents, U.S. Government Printing Office
Internet: bookstore.gpo.gov Phone: toll free (866) 512–1800; DC area (202) 512–1800
Fax: (202) 512–2104 Mail: Stop IDCC, Washington, DC 20402–0001

COMMITTEE ON ENERGY AND COMMERCE

FRED UPTON, Michigan
Chairman

JOE BARTON, Texas
Chairman Emeritus
CLIFF STEARNS, Florida
ED WHITFIELD, Kentucky
JOHN SHIMKUS, Illinois
JOSEPH R. PITTS, Pennsylvania
MARY BONO MACK, California
GREG WALDEN, Oregon
LEE TERRY, Nebraska
MIKE ROGERS, Michigan
SUE WILKINS MYRICK, North Carolina
Vice Chairman
JOHN SULLIVAN, Oklahoma
TIM MURPHY, Pennsylvania
MICHAEL C. BURGESS, Texas
MARSHA BLACKBURN, Tennessee
BRIAN P. BILBRAY, California
CHARLES F. BASS, New Hampshire
PHIL GINGREY, Georgia
STEVE SCALISE, Louisiana
ROBERT E. LATTA, Ohio
CATHY McMORRIS RODGERS, Washington
GREGG HARPER, Mississippi
LEONARD LANCE, New Jersey
BILL CASSIDY, Louisiana
BRETT GUTHRIE, Kentucky
PETE OLSON, Texas
DAVID B. McKINLEY, West Virginia
CORY GARDNER, Colorado
MIKE POMPEO, Kansas
ADAM KINZINGER, Illinois
H. MORGAN GRIFFITH, Virginia

HENRY A. WAXMAN, California
Ranking Member
JOHN D. DINGELL, Michigan
Chairman Emeritus
EDWARD J. MARKEY, Massachusetts
EDOLPHUS TOWNS, New York
FRANK PALLONE, JR., New Jersey
BOBBY L. RUSH, Illinois
ANNA G. ESHOO, California
ELIOT L. ENGEL, New York
GENE GREEN, Texas
DIANA DEGETTE, Colorado
LOIS CAPPS, California
MICHAEL F. DOYLE, Pennsylvania
JANICE D. SCHAKOWSKY, Illinois
CHARLES A. GONZALEZ, Texas
TAMMY BALDWIN, Wisconsin
MIKE ROSS, Arkansas
JIM MATHESON, Utah
G.K. BUTTERFIELD, North Carolina
JOHN BARROW, Georgia
DORIS O. MATSUI, California
DONNA M. CHRISTENSEN, Virgin Islands
KATHY CASTOR, Florida
JOHN P. SARBANES, Maryland

SUBCOMMITTEE ON OVERSIGHT AND INVESTIGATIONS

CLIFF STEARNS, Florida
Chairman

LEE TERRY, Nebraska
SUE WILKINS MYRICK, North Carolina
JOHN SULLIVAN, Oklahoma
TIM MURPHY, Pennsylvania
MICHAEL C. BURGESS, Texas
MARSHA BLACKBURN, Tennessee
BRIAN P. BILBRAY, California
PHIL GINGREY, Georgia
STEVE SCALISE, Louisiana
CORY GARDNER, Colorado
H. MORGAN GRIFFITH, Virginia
JOE BARTON, Texas
FRED UPTON, Michigan *(ex officio)*

DIANA DEGETTE, Colorado
Ranking Member
JANICE D. SCHAKOWSKY, Illinois
MIKE ROSS, Arkansas
KATHY CASTOR, Florida
EDWARD J. MARKEY, Massachusetts
GENE GREEN, Texas
DONNA M. CHRISTENSEN, Virgin Islands
JOHN D. DINGELL, Michigan
HENRY A. WAXMAN, California *(ex officio)*

C O N T E N T S

	Page
Hon. Cliff Stearns, a Representative in Congress from the State of Florida, opening statement	1
Prepared statement	4
Hon. Diana DeGette, a Representative in Congress from the State of California, opening statement	6
Hon. Fred Upton, a Representative in Congress from the State of Michigan, opening statement	7
Prepared statement	9
Hon. Tim Murphy, a Representative in Congress from the Commonwealth of Pennsylvania, opening statement	11
Hon. Marsha Blackburn, a Representative in Congress from the State of Tennessee, opening statement	11
Hon. Michael C. Burgess, a Representative in Congress from the State of Texas, opening statement	12
Hon. Henry A. Waxman, a Representative in Congress from the State of California, opening statement	12
Hon. Janice D. Schakowsky, a Representative in Congress from the State of Illinois, opening statement	13

WITNESSES

Molly Sherlock, Specialist in Public Finance, Government and Finance Division, Congressional Research Service	36
Prepared statement	38
Answers to submitted questions	120
David W. Kreutzer, Research Fellow in Energy Economics and Climate Change, The Heritage Foundation	49
Prepared statement	51
Answers to submitted questions	123
W. David Montgomery, Senior Vice President, NERA Economic Consulting	61
Prepared statement	63
Answers to submitted questions	126
Kenneth P. Green, Resident Scholar, American Enterprise Institute	76
Prepared statement	79
Report, dated February 2011, "The Myth of Green Energy Jobs: The European Experience"	83
Answers to submitted questions	128
Michael Breen, Vice President, Truman National Security Project	92
Prepared statement	94
Answers to submitted questions	134

SUBMITTED MATERIAL

Article, dated June 18, 2012, "'Clean energy' is money wasted," by Charles Lane, Washington Post, submitted by Mr. Stearns	15
Report, dated June 4, 2012, "Clean Energy: Revisiting the Challenges of Industrial Policy," Brookings Institution, submitted by Mr. Stearns	17

THE FEDERAL GREEN JOBS AGENDA

TUESDAY, JUNE 19, 2012

HOUSE OF REPRESENTATIVES,
SUBCOMMITTEE ON OVERSIGHT AND INVESTIGATIONS,
COMMITTEE ON ENERGY AND COMMERCE,
Washington, DC.

The subcommittee met, pursuant to call, at 10:22 a.m., in room 2322, Rayburn House Office Building, Hon. Cliff Stearns (chairman of the subcommittee) presiding.

Members present: Representatives Stearns, Murphy, Burgess, Blackburn, Gingrey, Scalise, Gardner, Barton, Upton (ex officio), DeGette, Schakowsky, Green, and Waxman (ex officio).

Staff present: Sean Bonyun, Deputy Communications Director; Todd Harrison, Chief Counsel, Oversight and Investigations; Kirby Howard, Legislative Clerk; Ben Lieberman, Counsel, Energy and Power; Andrew Powaleny, Deputy Press Secretary; Krista Rosenthall, Counsel to Chairman Emeritus; Alan Slobodin, Deputy Chief Counsel, Oversight and Investigations; Sam Spector, Counsel, Oversight and Investigations; Alex Yergin, Legislative Clerk; Alvin Banks, Democratic Investigator; Tiffany Benjamin, Democratic Investigative Counsel; Brian Cohen, Democratic Investigations Staff Director and Senior Policy Advisor; and Alli Corr, Democratic Policy Analyst.

OPENING STATEMENT OF HON. CLIFF STEARNS, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF FLORIDA

Mr. STEARNS. Good morning, everybody, and welcome to the Subcommittee on Oversight and Investigations hearing on the Federal Green Jobs Agenda.

My colleagues today will examine the Federal investment in green energy and the employment and economic returns that were generated by this investment.

When the Federal Government invests taxpayers' dollars in the energy sector, we must make sure we oversee the returns on these investments. In 2008, then-Presidential Candidate Barack Obama promised that as President he would invest $150 billion in renewable energy programs that would create 5 million well-paying jobs, nonexportable jobs, in 10 years.

It is hard to know exactly how much the Obama administration has spent to promote, prop up, and subsidize its green energy agenda, and even harder yet to accurately put a number on the green jobs created as a direct result of this substantial investment.

We know that the President's American Recovery and Reinvestment Act of 2009, the Stimulus Act, included approximately $90

billion in direct spending and tax credits for green energy and associated programs.

In December of 2009, President Obama signed the Consolidated Appropriations Act, which appropriated $8 million to the Bureau of Labor Statistics, BLS, to determine the number of green jobs in the United States. The BLS report, "Employment in Green Jobs, Goods, and Services," was released on March 22, 2012.

The overly broad and seemingly all-encompassing definition of what constitutes a green job used by the BLS, combined with a gimmick accounting method that green job counters appear to have used, resulted in the conclusion that a total of 3.1 million green jobs exist in America today.

The President would like us to believe that he is on his way to keeping his green jobs promise, but the truth is we're nowhere near that today.

Numerous media outlets have scrutinized the BLS report and concluded that many of the jobs being counted as green jobs are not green, are not new, and were not in need of saving. Many of these jobs have been around for decades and were never in need of a green jobs subsidy in the first place. These green jobs include tenured professors, bus drivers, trash collectors, and steel mill workers.

In fact, when the BLS made its proposed definition of a green job available for public comment, it received the following feedback. A trade association stated, for example, that, "It is our determination that the green jobs label is an artificial construct that is being imposed subjectively, used politically, and will in the end be about as successful as trying to collect fog in a cardboard box." A State government agency, for example, stated, "If we overstate or generalize green too much, the resulting data becomes meaningless."

The Recovery Act led to an influx of money into green programs. DOE's Loan Program Office has given out nearly $35 billion, including to recipients such as Solyndra. Many are now bankrupt, and thousands of people have been laid off. In fact, last week, a Department of Labor report revealed that nearly 1,900 people lost their jobs with the shuttering of Solyndra, 800 more than cited by the previous media accounts.

At the same time, Molly Sherlock, in the prepared testimony that she has provided to the committee, has confirmed much of what the committee investigation of the 1603 program had uncovered, this includes the fact that the 1603 grant "as an incentive is of greater value to investors. It is also more expensive from the government's perspective."

The Obama administration supports extending a costly program, yet continues to stress that job creation is not one of its goals, statutory or otherwise. Dr. Sherlock notes that a recent attempt at estimating the economic impact of the 1603 program "does not attempt to estimate how many jobs were created by the section 1603 grant program." DOE's report notes that some projects supported by the 1603 program award most likely would have progressed without the award.

Just how many of these free riders are we talking about? To provide some perspective, Sherlock notes that one early analysis of the 1603 grant program estimated that roughly 25 percent of the wind

capacity installed in 2009 was directly motivated by the grant. Of wind projects that received the grant in 2009, roughly 39 percent were dependent upon the grant. Consequently, Sherlock notes the possibility of job numbers substantially lower than even those estimated by the Department of Energy and Secretary Chu.

To learn more about the economic and employment effects of the Obama administration's green energy agenda, we will hear testimony today from Dr. Molly Sherlock from the Congressional Research Service; Dr. Ken Green from the American Enterprise Institute; Dr. David Kreutzer from the Heritage Foundation; and Dr. David Montgomery with NERA Economic Consulting; and Michael Breen of the Truman National Security Project.

I welcome our witnesses today, and with that I respectfully offer the ranking member an opening statement.

[The prepared statement of Mr. Stearns follows:]

Opening Statement of the Honorable Cliff Stearns
Chairman, Subcommittee on Oversight and Investigations
Committee on Energy and Commerce
"The Federal Green Jobs Agenda"
June 19, 2012

(As Prepared for Delivery)

Today we will examine the federal investment in green energy and the employment and economic returns generated by this investment. When the federal government invests taxpayer dollars in the energy sector we must make sure we oversee the returns on these investments.

In 2008, then-presidential candidate Barack Obama promised that as president he would invest $150 billion in renewable energy programs that would create five million well-paying, non-exportable jobs in ten years. It is hard to know exactly how much the Obama administration has spent to promote, prop-up and subsidize its green energy agenda and even harder yet to accurately put a number on the green jobs created as a direct result of this substantial investment. We know that the president's American Recovery and Reinvestment Act of 2009 included approximately $90 billion in direct spending and tax credits for green energy and associated programs.

In December 2009, President Obama signed the Consolidated Appropriations Act, which appropriated $8 million to the Bureau of Labor Statistics (BLS) to determine the number of green jobs in the U.S. The BLS report, "Employment in Green Goods and Services" was released on March 22, 2012. The overly broad and seemingly all-encompassing definition of what constitutes a green job used by the BLS combined with the gimmick accounting methods that green job counters appear to have used resulted in the conclusion that a total of 3.1 million green jobs exist in America today. The president would like us to believe that he is on his way to keeping his green jobs promise but the truth is that we're nowhere near there.

Numerous media outlets have scrutinized the BLS report and conclude that many of the jobs being counted as green jobs are not green, are not new and were not in need of saving. Many of these jobs have been around for decades and were never in need of a green energy subsidy in the first place. These "green" jobs include tenured professors, bus drivers, trash collectors, and steel mill workers.

In fact, when the BLS made its proposed definition of a green job available for public comment, it received the following feedback: a trade association stated, for example, that "it is our determination that the 'green jobs' label is an artificial construct that is being imposed subjectively, used politically and will, in the end, be about as successful as trying to collect fog in a cardboard box." A state government agency, for example, stated "if we overstate or generalize "green" too much, the resulting data become meaningless."

The Recovery Act led to an influx of money into green programs. DOE's Loan Programs Office has given out nearly $35 billion, including to recipients such as Solyndra. Many are now bankrupt, and thousands of people have been laid off. In fact, just last week a Department of Labor report revealed that nearly 1,900 people lost their jobs with the shuttering of Solyndra, 800 more than cited by previous media accounts.

At the same time, Molly Sherlock, in the prepared testimony that she has provided to the committee, has confirmed much of what the committee investigation of the Section 1603 had uncovered. This includes the fact that the 1603 grant "as an incentive is of greater value to investors, it is also more expensive from the government's perspective."

The Obama administration supports extending a costly program, yet continues to stress that job creation is not one of its goals, statutory or otherwise. Dr. Sherlock notes that a recent attempt at estimating the economic impact of 1603 "does not attempt to estimate how many jobs were created by the Section 1603 grant program." DOE's report notes that some projects supported by a 1603 award most likely would have progressed without the award.

Just how many of these free riders are we talking about? To provide some perspective, Sherlock notes that one early analysis of the 1603 grant program estimated that roughly 25% of the wind capacity installed in 2009 was directly motivated by the grant. Of the wind projects that received the grant in 2009, roughly 39% were dependent on the grant. Consequently, Sherlock notes the possibility of job numbers substantially lower than even those estimated by DOE.

To learn more about the economic and employment effects of the Obama administration's green energy agenda, we will hear testimony from Dr. Molly Sherlock with the Congressional Research Service, Dr. Ken Green from the American Enterprise Institute, Dr. David Kreutzer with the Heritage Foundation, Dr. David Montgomery with NERA Economic Consulting, and Michael Breen of the Truman National Security Project.

###

OPENING STATEMENT OF HON. DIANA DEGETTE, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF COLORADO

Ms. DEGETTE. Thank you very much, Mr. Chairman.

From your opening statement I am going to assume that you are holding this hearing today because of your deep concern that we're not creating enough green jobs and that the Republican majority wants to figure out how to make the Obama green jobs agenda work better so that we can create more green jobs in our economy.

In fact, Mr. Chairman, if this hearing represented a fair assessment of how the Obama administration's green jobs agenda and an honest discussion of how to improve those programs, I would be in full support. However, I'm sorry to say, instead of that, I think we will probably only hear complaints and opposition to President Obama's programs. You would never know that many of these programs were passed with bipartisan support or that they began under President Bush or earlier administrations, again with bipartisan support.

Somehow, it seems to me, having sat on this committee for many years, that the Republicans only came up with their vehement opposition to a government role in green energy when President Obama was elected. Now, every time the Obama administration tries to make a good decision on how to shift our economy to clean domestic energy, we hear nothing but attacks and complaints.

But at the same time, and you could tell I was being sarcastic at the beginning, because I haven't seen any bipartisan legislation or, for that matter, partisan legislation, to create green jobs programs, to improve the programs that we have, or to try to use oversight facilities to build better programs. And, frankly, I think this partisanship is what our constituents are sick of and what they would like to see eliminated.

The witness list for this hearing provides all the evidence we need to determine whether it is truly designed as a fact-finding exercise. There are four different witnesses to describe how the government's estimates of green jobs and green job creation are wrong, useless, or inaccurate, but we don't have a single government witness to respond to these criticisms. Nobody from DOE, nobody from Treasury, nobody from EPA, and even though they've been attacked here, nobody from the Bureau of Labor Statistics. This does not seem to me, as someone who's been on this subcommittee for 16 years, an appropriate way to conduct government oversight.

The programs we're talking about today, like the section 1603 tax grant, the Department of Energy weatherization program, and the DOE loan program, have improved the lives of citizens around this country, creating jobs, heating homes, and providing resources to this Nation's energy innovators. The district or State of every Member of this committee has benefited from the Federal Government's investment in clean energy.

Republican and Democratic Members, including Chairman Upton, have written to DOE in support of companies seeking funds for renewable energy projects. And if there's a way we can make these better, I'd be eager to know that, because they're creating jobs around the country.

Now, because I'm also concerned about clean job creation, last week I had a day where I toured clean-tech companies in Denver. One of the places I went was Coolerado, which is a manufacturer of efficient and quiet air conditioners, using indirect evaporative cooling technology. As well as being a really innovative technology, Coolerado has now 40 employees today, up from 11 employees 5 years ago, and revenue has grown over 500 percent of that during that time.

I also went to RavenBrick on my clean-tech tour. What they do is they produce a smart window technology, sort of like Polaroid glasses for windows, and they began with construction of an automated plant in Denver which is going to increase employment from just a handful of employees now to 200 in 2015.

And so not only do we have tremendous opportunity in all kinds of these industries for increase in job creation, but these attacks by Congress on clean energy in general and clean tech threaten these jobs because they cut down investment, and they cut down consumer confidence and investor confidence.

And so maybe if looking in our districts doesn't prove the case, we should look at our competitors. The Chinese overnment, as we know, is making major strategic investments in renewable energy. And because of these investments, China's market share has grown dramatically from 6 percent of the solar market in 1995 to 54 percent in 2010.

We should not be complicit in ceding the future green market to our foreign competitors. So I'm very pleased that we're working on clean-energy development. I'm pleased we're working on green jobs. I think we can do more. I think we should do more, but the last thing we should do is politicize this whole discussion. Thank you.

Mr. STEARNS. I thank the gentlelady.

I recognize the distinguished full committee chairman, the gentleman from Michigan, Mr. Upton.

OPENING STATEMENT OF HON. FRED UPTON, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF MICHIGAN

Mr. UPTON. Thank you, Mr. Chairman. Today we are going to scrutinize the Obama administration's green jobs agenda.

After borrowing and spending billions upon billions of dollars, and after 40 consecutive months with a national unemployment rate higher than 8 percent, I have no doubt that the American people would welcome any jobs, whether you call them green, blue, or any other shade of the rainbow.

The American Recovery and Reinvestment Act was touted by the President as the most sweeping economic recovery package in history. According to him, it aimed to make investments to put Americans to work, doing the work that America needs done.

Unfortunately, despite spending nearly a trillion dollars, the stimulus failed to achieve its promised job creation and new questions are being raised about programs funded by the stimulus. This committee is dedicated to ensuring that taxpayer dollars are used wisely, an objective that cannot be achieved without fully understanding whether a program is successful before investing additional taxpayer dollars.

There's no better measure of a stimulus program's success than its record at job creation, a metric that the American people are focused on as they watch the stubbornly high unemployment figures emerge virtually every month. That's why we were so surprised when both the Department of Treasury and the Department of Energy confirmed to the committee that a multibillion-dollar stimulus program with section 1603 grants for renewable energy does not even include job creation among its primary objectives.

The number of long-term jobs that DOE estimates may have been created by this program, both direct and indirect, are appallingly low, given the sheer amount of Federal dollars invested in the underlying projects. I say "may have been created," because DOE itself has cast tremendous doubts on the inherent accuracy of the computer model generated estimates.

Yet in spite of these very serious questions, the President has proposed a budget that borrows more and spends more on the 1603 program, not to mention an array of other projects benefiting renewable energy developers. Our Nation cannot afford to double down on costly policies with unproven results, and that's why this hearing is so important, bringing witnesses to discuss the green jobs agenda and determine what it has cost taxpayers and what it has delivered or failed to deliver in return.

Thanks for being here today, and I yield the balance of my time to Mr. Murphy.

[The prepared statement of Mr. Upton follows:]

Opening Statement of the Honorable Fred Upton
Chairman, House Committee on Energy and Commerce
Oversight and Investigations Subcommittee Hearing on
"The Federal Green Jobs Agenda"
June 19, 2012

(As Prepared for Delivery)

Today we are here to carefully scrutinize the Obama administration's green jobs agenda. After borrowing and spending billions upon billions of dollars and after 40 consecutive months with a national unemployment rate higher than eight percent, I have no doubt that the American people would welcome any jobs, whether you call them green, blue, or any other shade of the rainbow.

The American Recovery and Reinvestment Act was touted by President Obama as "the most sweeping economic recovery package in history." According to the President, it aimed to make investments "to put Americans to work doing the work that America needs done." Unfortunately, despite spending nearly $1 trillion, the stimulus failed to achieve its promised job creation and new questions are being raised about programs funded by the stimulus.

The Committee is dedicated to ensuring taxpayer dollars are used wisely, an objective that cannot be achieved without fully understanding whether a program is successful before investing additional taxpayer dollars. There is no better measure of a stimulus program's success than its record at job creation, a metric the American people are focused on as they watch the stubbornly high unemployment figures emerge each month.

That's why we were so surprised when both the Department of Treasury and the Department of Energy confirmed to the committee that a multi-billion dollar stimulus program, the Section 1603 grants for renewable energy, does not even include job creation among its primary objectives.

The number of long-term jobs that DOE estimates *may* have been created by this program, both direct and indirect, are appallingly low given the sheer amount of federal dollars invested in the underlying projects. I say "*may* have been created" because DOE itself has cast tremendous doubts on the inherent accuracy of its computer model-generated estimates.

Yet, in spite of these very serious questions, the President has proposed a budget that borrows more and spends more on the 1603 program, not to mention an array of other projects benefitting renewable energy developers. Our nation cannot afford to double down on costly policies with unproven results. That's why this hearing is so important, bringing witnesses to discuss the green jobs agenda and determine what it has cost taxpayers and what it has delivered, or failed to deliver, in return.

Mr. STEARNS. Mr. Murphy is recognized for 1 minute.

OPENING STATEMENT OF HON. TIM MURPHY, A REPRESENTATIVE IN CONGRESS FROM THE COMMONWEALTH OF PENNSYLVANIA

Mr. MURPHY. Thank you, Mr. Chairman. When President Obama was elected, and I remember—I recall quite clearly, in his 2011 State of the Union address, he talked about his emphasis on clean coal. Recognizing that over half of our electric energy is from coal, I'm still waiting for that promise of green energy to come true.

With regard to Presidential earmarks for companies like Solyndra, we have spent more, subsidized more, and it has cost us more jobs. In this Nation, where we have an abundance of coal and also natural gas, instead of following through on the promise of clean coal and natural gas, this administration has not only abandoned that promise, but blocked it.

New regulations are not cleaning up coal plants but shutting them down. Twenty percent of the energy generated by coal plants will be lost, which will result in an increase of home and factory electric bills by 30 to 40 percent. And the estimates are we will lose between 160- to 200,000 jobs per year. And in the area of natural gas, there's no fewer than 10 Federal agencies now creating more barriers instead of helping.

I still believe in the genius of the American spirit, of our science and creativity and our tenacity to create jobs and work towards clean coal technology, and I hope that's the promise of this administration we follow up on.

I yield back.

Mr. STEARNS. The gentleman yields.

We recognize the gentlelady from Tennessee for 1 minute.

OPENING STATEMENT OF HON. MARSHA BLACKBURN, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF TENNESSEE

Mrs. BLACKBURN. Thank you, Mr. Chairman.

In preparation for the hearing, we did a little research. BLS has identified 333 industries that contribute to green goods and services. These industries have reportedly created a combined 3.1 million green jobs. However, after reviewing the list, it appears that this administration's well-documented policy of picking winners and losers is once again out in full force, as there is a wide discretion into what constitutes a green job. This is what we found.

According to BLS, automobile manufacturing of EPA's smart-way certified vehicles, such as natural gas vehicles, supports green jobs. However, the construction of gas pipelines that transports the fuel to the EPA-certified vehicles does not constitute a green job.

Shellfish farming creates and sustains green jobs. Shellfish fishing does not. Semiconductor and related device manufacturing supports green jobs. Semiconductor machinery manufacturing does not. Manufacturing Energy Star certified light bulbs, such as CFLs that contain mercury, supports green jobs. However, manufacturing batteries only supports green jobs if the batteries are mercury free. We have some discrepancies, and we look forward to looking into it.

I yield back.

Mr. STEARNS. The gentlelady's time has expired.

The gentleman from Texas, Dr. Burgess, is recognized for the remaining time, which I think is a little less than 1 minute.

OPENING STATEMENT OF HON. MICHAEL C. BURGESS, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF TEXAS

Mr. BURGESS. Sure. Well, we are just so glad the witnesses are here today.

Apparently green jobs is as hard to define as a shovel-ready project. Other subcommittees have heard testimony. Mrs. Blackburn commented on this. The Bureau of Labor Statistics testified before an Oversight and Government Reform subcommittee that someone who sweeps the floor of an energy facility may be classified as a green job. Someone who drives a hybrid bus for the city has a green job.

Purveyors of used goods, since apparently all the goods are being recycled, are considered having green jobs. Even an oil lobbyist, if he or she advocates on environmental issues, is deemed working in the green field. Clearly we've got a lot of explaining to do about this program.

The stimulus, as we all know, failed to deliver on the promise. It's up to this committee to get to the bottom of it. I'm glad we have the witnesses here to help us sort through that, and I'll yield back.

Mr. STEARNS. I thank the gentleman, and we recognize the distinguished ranking member, the gentleman from California, Mr. Waxman, for 5 minutes.

OPENING STATEMENT OF HON. HENRY A. WAXMAN, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF CALIFORNIA

Mr. WAXMAN. Mr. Chairman, today's hearing is about the administration's effort to invest in energy and clean-energy jobs, and I commend the Obama administration for its focus on developing America's green job economy. Funding loan programs for renewable energy, encouraging use of energy efficiency technology in our electric grid, and investing in energy efficiency, these investments have made a big difference in the short term and will pay big dividends in the long term.

In the short term, DOE expenditures and loan guarantees under the Recovery Act have supported 100,000 jobs. In the long term, these investments are helping move the economy toward a new, clean-energy industry. The environmental case for a shift to green energy is indisputable, and the economic reasons are just as strong.

Last year, the American Energy Innovation Council, a business group that includes Microsoft Chairman Bill Gates, the CEOs of Xerox and General Electric, and the former CEO of Lockheed Martin, recognized the Federal Government's vital role in promoting clean energy, and here's what they said:

"If the U.S. fails to invest in new technologies and create new markets and new jobs that will drive the transformation and revitalization of the 5 trillion global energy industry, we will have lost an opportunity to lead in what is arguably the largest and most pervasive technology sector in the world."

I agree with these business leaders. America must invest in building a better clean-energy future. We need to do this for environmental and public health reasons, and we need to do it for economic reasons.

Unfortunately, this Congress is moving in the wrong direction. House Republicans are voting for more oil and coal at the expense of renewable energy. House Republicans overwhelmingly deny the scientific evidence of climate change, and House Republicans continue to vote to roll back environmental protections. This Congress has earned its title as the most anti-environmental Congress in history.

Mr. Chairman, a report I released yesterday found that nearly 1 in 5 of the 1,100 legislative roll call votes thus far in this Congress, 247 votes, were votes to undermine environmental protection. In 2011 and in the first half of 2012, the House has voted 109 times on legislation that would enrich the oil and gas industry. This includes 45 votes to weaken environmental, public health, and safety requirements applicable to the oil industry, and 38 votes to prevent deployment of clean-energy alternatives.

This is the wrong path. We have to address this Nation's energy and environmental issues or future generations will lose out.

We have to accept findings of the National Academy of Sciences that "climate change is occurring, is very likely caused primarily by human activities, and poses significant risks to humans and the environment," a statement that the Republicans voted to deny.

We were elected to address the challenges this Nation faces head on. We can't simply stick our heads in the sand and hope these problems go away. We can't simply hope the climate change stops on its own. This Nation needs a strong, green jobs and green energy plan to ensure that its children have a strong future.

The Obama administration has moved in this direction and I commend them for their effort. We should be working with the President, not seeking to obstruct his agenda at every turn.

I have a minute left, and I yield it to Ms. Schakowsky.

Mr. STEARNS. Ms. Schakowsky is recognized for the balance of the time.

OPENING STATEMENT OF HON. JANICE D. SCHAKOWSKY, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF ILLINOIS

Ms. SCHAKOWSKY. Thank you. I look forward to our hearing today, which I believe provides an excellent opportunity to evaluate our energy priorities and to chart the way forward in a manner that will stimulate job growth, improve our air and water quality, promote public health and save lives.

More than 60,000 jobs have already been created as a result of the 1703, 1705 and ATVM programs. Industries that have benefited from these programs include solar, wind, and geothermal, and States from Hawaii to Maine have reaped the benefits. Those investments have spurred private investment on unprecedented levels for alternative energy projects.

The argument from fossil fuel supporters that we can't afford to invest in green energy is incredibly hypocritical. We're going to

spend $40 billion on subsidies to Big Oil in the next decade, and yet these are the highest revenue-earning companies in the world.

So I look forward to hearing the testimony today, and I thank the gentleman for yielding.

Mr. STEARNS. I thank the gentlelady.

Before we go on, I would like to put into the record, by unanimous consent, which I consulted with the minority, a Washington Post opinion piece that appeared today, "Clean Energy is Money Wasted," by Chuck Lane. And also I would like to put in the record the Brookings Institution report earlier this month, which was cited by Mr. Lane called, "Clean Energy: Revisiting the Challenges of Industrial Policy."

By unanimous consent, so ordered.

[The information follows:]

The Washington Post

Back to previous page

'Clean energy' is money wasted

By Charles Lane, Published: June 18, 2012

In blackjack, doubling down is a high-risk, high-reward move. If you think you can win, based on the first two cards dealt, you bet 100 percent more — but you also pay for the privilege by agreeing to take one, and only one, additional card.

Doubling down is also the semi-official metaphor of President Obama's energy strategy, as we know from his speech in Cleveland last week: "My plan would end the government subsidies to oil companies that have rarely been more profitable — let's double down on a clean-energy industry that has never been more promising."

Blackjack pros like doubling down; it's a chance to profit from newly acquired relevant information. Whether that logic applies to the U.S. government's energy bets, however, is a different story. What we've learned so far suggests that the president should fold his cards.

U.S. energy subsidies — spending, tax breaks, loan guarantees — increased from $17.9 billion in fiscal 2007 to $37.2 billion in fiscal 2010, according to the Energy Department. Yet fossil fuels' overwhelming market advantages have produced a litany of clean-energy failures, from electric cars to Solyndra.

The subsidies ostensibly address several issues — dependence on foreign oil, job creation, international economic competitiveness and environmental degradation — but without clear priorities, much less rigorous cost-benefit analysis. Unintended consequences and political influence abound.

The best-laid plans are vulnerable to unforeseen market developments — such as the boom in oil and natural gas "fracking" over the past decade, which Obama has now embraced.

To the extent that it's coherent at all, the federal energy "portfolio" represents a return to industrial policy — governmental selection of economic winners — which was fashionable in the 1970s and 1980s, before it collapsed under the weight of its intellectual and practical contradictions.

As such, current clean-energy programs are no likelier to pay off than President Jimmy Carter's Synthetic Fuels Corp., which blew $9 billion, or President George W. Bush's $1.2 billion program for hydrogen vehicles.

This isn't just my opinion or the finding of some right-wing think tank. Rather, all of the above comes from a new paper by three certifiably centrist Brookings Institution scholars, Adele Morris, Pietro S. Nivola and Charles L. Schultze; Schultze was a senior economic adviser to Presidents Kennedy, Johnson and Carter.

The researchers pick apart clean-energy subsidies rationale by rationale.

Like his predecessors of both parties, Obama argues that the subsidies can help reduce dependence on foreign oil. But even with 100 percent self-sufficiency, we would be vulnerable to price shocks in the global

market for this fungible commodity. Many technologies favored by current policy — wind, solar, geothermal — replace coal and natural gas, in which the United States is already self-sufficient.

Obama also cites the need to compete with other countries in developing the energy industries "of the future." The Brookings scholars argue that higher living standards depend on growing productivity, not the global market share of U.S. industries. Their authority for this is Nobel Prize economist Paul Krugman's 1994 essay in Foreign Affairs, "Competitiveness: A Dangerous Obsession."

Having China or someone else develop clean-energy technology might be to U.S. advantage; let them pay the inevitable start-up costs; then we can adapt the discoveries to our own needs.

Heck, if we want to reduce the most emissions at the least cost, it might be wise to import the means of doing so.

As for job creation, clean-energy subsidies shift demand for labor; they don't increase it. "I'm not aware of a single peer-reviewed economic study that shows these programs create jobs in the long run, and on a net basis," Morris told me. Solyndra and its 1,861 vanished jobs proves her point. Fracking probably created more permanent positions.

Reducing carbon emissions and other environmental goals represent the best rationale for government intervention in the energy market. Market prices for fossil fuels do not capture all costs of consuming them. Also, the private sector underinvests in basic research that might, someday, lead to new commercially viable energy sources.

Higher gas taxes or a tax on carbon could efficiently limit pollution, if those steps weren't politically toxic. Basic research funding is, indeed, part of Obama's strategy, but it should be more focused and insulated from politics, the Brookings scholars argue.

If government does double down on clean energy, it's the federal budget that will end up busted.

lanec@washpost.com

Read more from Opinions: The Post's View: Wind power The Post's View: A viable clean-energy bill at last? Henry A. Waxman, Sherwood Boehlert, Edward J. Markey, Wayne Gilchrest: Carbon emission policy could slash debt, improve environment

Sponsored Links

Zipcar Washington DC
Find Zipcars in Washington DC. Join today and get $75 free driving.
zipcar.com

Great Summer Deals
Plan Your Next Trip With Great Deals, All Summer Long
www.hilton.com/HHonors

One Weird Trick
Could add $1,000s to Your Social Security Checks! See if you Qualify...
www.newsmax.com

Buy a link here

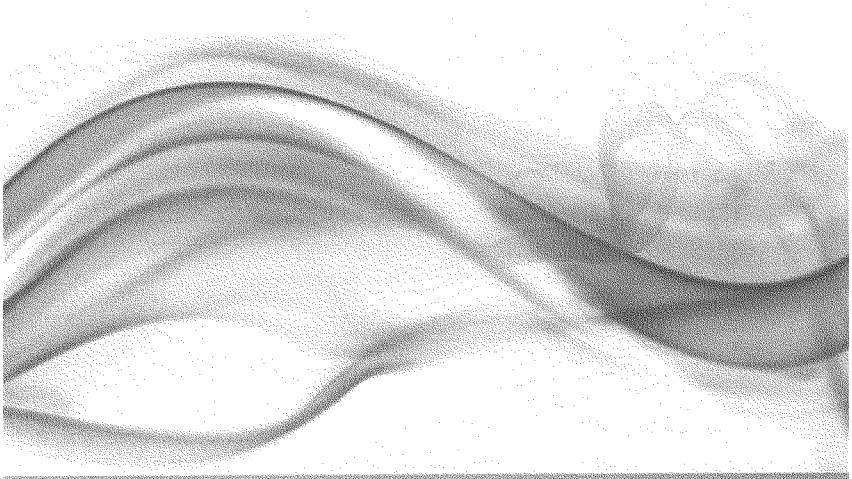
© The Washington Post Company

BROOKINGS

THE CLIMATE AND ENERGY ECONOMICS PROJECT

CLIMATE AND ENERGY ECONOMICS DISCUSSION PAPER | JUNE 4, 2012

CLEAN ENERGY:
REVISITING THE CHALLENGES OF INDUSTRIAL POLICY



ADELE C. MORRIS
The Brookings Institution

PIETRO S. NIVOLA
The Brookings Institution

CHARLES L. SCHULTZE
The Brookings Institution

CLEAN ENERGY:

REVISITING THE CHALLENGES OF INDUSTRIAL POLICY

JUNE 4, 2012

ADELE C. MORRIS
The Brookings Institution

PIETRO S. NIVOLA
The Brookings Institution

CHARLES L. SCHULTZE
The Brookings Institution

1. INTRODUCTION

"We're in a competition all around the world, and other countries -- Germany, China, South Korea -- they know that clean energy technology is what is going to help spur job creation and economic growth for years to come. And that's why we've got to make sure that we win that competition. I don't want the new breakthrough technologies and the new manufacturing taking place in China and India. I want all those new jobs right here ... in the United States of America, with American workers, American know-how, American ingenuity."

President Barack Obama
May 6, 2011
Remarks at Allison Transmission Headquarters, Indianapolis, Indiana

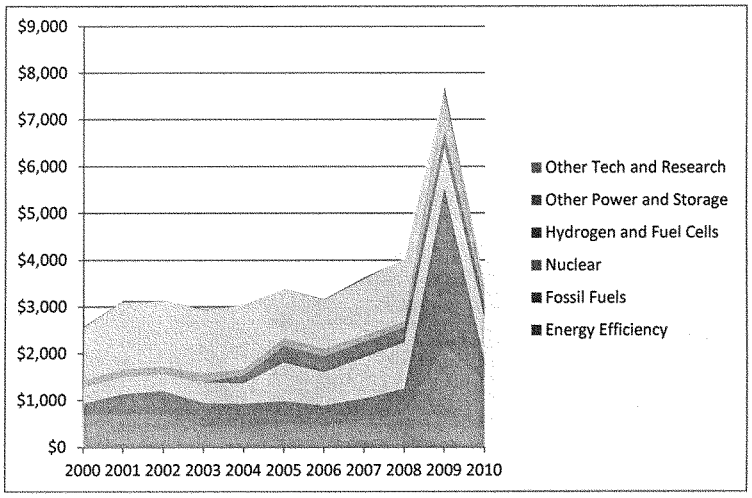
Governments in most industrial countries have stepped up their promotion of clean energy technology in recent years. No longer a laggard, the U.S. government increased energy subsidies from $17.9 billion in fiscal year (FY) 2007 to $37.2 billion in FY 2010, according to the U.S. Energy Information Administration (EIA).[1] The total includes a mix of direct expenditures, tax expenditures, the subsidy associated with loan guarantees, and research, development and deployment (RD&D) spending.

The Energy Improvement and Extension Act (EIEA), passed in late 2008, and the American Recovery and Reinvestment Act of 2009 (ARRA) account for much of the increase. The EIEA expanded or extended tax credits for renewable energy, energy-efficient appliances, plug-in electric vehicles, and liquid biofuels. ARRA, a broad fiscal stimulus package, included $35.2 billion to the Department of Energy (DOE) and added $21 billion in energy tax incentives over the life of the legislation.[2] Using ARRA authority, cumulatively from September 2009 through November 2011, DOE underwrote $35.9 billion in loan guarantees for a range of energy-related technologies.[3]

Figure 1 displays the U.S. spending stream on energy-related research and development over the last decade. The graph shows the dramatic impact of the ARRA package.

[1] U.S. Energy Information Administration, "Direct Federal Financial Interventions and Subsidies in Energy in Fiscal Year 2010," August 1, 2011. http://www.eia.gov/analysis/requests/subsidy/
[2] $11 billion went to grants to state and local governments for weatherization and other programs and $600 million in new research funding.
[3] U.S. Department of Energy (DOE), Loan Programs Office website, accessed November 29, 2011. https://lpo.energy.gov/?page_id=45. The overall value of loans guaranteed by DOE is much larger than the appropriations necessary to account for the value of the subsidized interest rate on the guaranteed loan.

Figure 1. U.S. Energy-Related R&D Spending 2000-2010 (in millions of $2010)[4]



Public investments of these magnitudes, targeted at specific industries, arguably constitute an industrial policy, albeit a sectoral one, unlike the earlier proposals of the 1980's —that is, a government strategy to steer resources toward select producers or technologies. The rationale and efficacy of these clean-energy expenditures call for scrutiny.

Proponents offer numerous reasons for scaling up particular energy technologies at the taxpayer's expense. One set of reasons involves the need to remediate market failures that have not been corrected by other policies. For example, clean-energy technologies are said to emit fewer greenhouse gases than do traditional sources per unit of energy produced. The United States does not have an economy-wide policy to control greenhouse gases, most notably, one that puts a price on CO_2 that reflects the environmental harm associated with use of fossil fuels.

A far more effective policy than subsidies for clean energy research, development and demonstration would be a tax or a cap-and-trade regime that would put an appropriate price on carbon and other greenhouse gases.[5] Properly implemented, this alternative approach would help level the playing field for greener energy sources, for it would require emitters to pay prices that reflect the costs their emissions impose on society. The enhanced efficiency

[4] International Energy Agency, Detailed Country RD&D Budgets. Data downloaded November 29, 2011 from http://wds.iea.org/WDS/ReportFolders/ReportFolders.aspx.

[5] A carbon tax and a cap-and-trade program are theoretically very similar. We favor a carbon tax based on our assessment of the likely actual implementation.

that would result has been widely recognized by economists.[6] True costs would flow to purchasers of goods and services that require energy, suitably inducing conservation. Emitters would have incentives to invest in equipment and new production techniques, use alternative fuels, and seek other methods to reduce emissions. And America's innovators would channel their efforts into inventing, scaling up, and marketing competitive forms of clean energy. However, because existing market signals do not suffice to encourage climate-friendly technologies, carefully targeted federal funding seems warranted. But as we explain later, it is ironically only after incorporating the social costs of energy into market prices that many clean energy subsidies will succeed in deploying new technologies.

Some clean energy technologies, such as electric vehicles and biofuels, are also said to wean the economy from its inordinate dependence on oil, which is both volatile in price and supplied in part from unstable foreign sources. Like environmental damage, the security risks of relying on oil are not fully embedded in its price, and therefore, the argument goes, policies to reduce its use could be efficiency-enhancing.

A second set of reasons for sustaining clean-energy subsidies is less about correcting inefficient market outcomes than about tilting the market toward U.S. interests. In this view, strategic investments in clean energy technologies would increase U.S. firms' market share of a growing industry and thus help American firms and workers win a larger portion of global business. Although the projected market growth of cleaner energy derives from the international community's efforts to protect the environment, the objective here is economic. Proponents imply that capturing a larger market share would boost long-term U.S. "competitiveness" and create jobs in American firms that manufacture the exportable products.

Are these justifications sound? And even if convincing in theory, what happens in practice? That is, can the American political process successfully carry out the envisioned strategy? Section 2 of this paper reviews the history of industrial and energy technology policy since the 1970s. Section 3 examines the environmental and energy- independence rationales, and Section 4 analyzes claims about the potential role for government backing of clean energy to ensure U.S. competitiveness and save or create jobs. Section 5 explores the administrative and political challenges of implementing an efficient clean-energy research and development portfolio, and Section 6 sketches our recommendations.

2. INDUSTRIAL AND ENERGY TECHNOLOGY POLICY, THEN AND NOW

Industrial Policy in the 1970s and 1980s

The years between the mid-1970s and the mid-1990s were a troubled time for most of the world's advanced economies. Inflation averaged higher than in earlier postwar years, and productivity growth slowed. The era saw two deep recessions. These conditions spawned a new economic doctrine that purported to explain the malady and sought to offer a remedy:

[6] For example: Greenstone, Michael and Adam Looney, *A Strategy for America's Energy Future: Illuminating Energy's Full Costs*, The Hamilton Project, The Brookings Institution, May 2011.

industrial policy. It largely arose outside the mainstream of professional economics, gathering support among union leaders and Democratic-leaning thinkers and policymakers. The term meant different things to different people, but enthusiasts accepted several underlying propositions about the faltering economy:

- The share of national output produced by high valued-added American manufacturing industries was declining.
- America was losing its leadership in cutting-edge technology and suffering the decline of critical older industries.
- These developments transpired because the private market was directing investment to the wrong industries, compounded by a mismatch between the skills of dislocated workers and the skills required in growing industries.
- To remedy these problems, wrote two influential advocates, "U.S. companies and the government should develop a coherent and coordinated industrial policy whose aim is to raise the real income of our citizens by improving the patterns of our investments rather than by focusing only on aggregate investment levels." [7]

Industrial-policy adherents contemplated considerable expansion of the federal government's role in the private economy. They believed that in consultation with industry, the federal government could improve investment in new technologies and protect waning manufacturers like steel and automobile companies. In lieu of large direct subsidies, the promotional schemes proposed during the 1980s offered a range of indirect measures to nudge private investment in the "right" direction. The measures included tax breaks, subsidized loan facilities, trade policies (including "voluntary" import quotas, export loans, and other trade actions to obtain better market-shares abroad). For declining industries, some changes in union work rules and wages were countenanced as preconditions for federal assistance.

Beginning in the 1970s and continuing into the 1980s, Japan's formidable growth in output and exports was imputed to that country's supposed strategic government policies, which were suspected of buoying her prosperity at the expense of ours. The machinations of the Ministry of International Trade and Industry, some thought, explained Japan's outstanding economic success during the 1980s. Japan, supposedly, had implemented a smart industrial policy. As output and employment rebounded from the severe recession of 1982, U.S. productivity growth returned to the higher level of the 1950s and 1960s, and Japan's economic performance ceased being exemplary; thus, the allure of industrial policy dimmed by the mid-1990s.[8] However, since its inception, stubborn economic problems have occasionally revived the notion that the government should play a strategic role in the allocation of private investment.

U.S. Energy Technology Policy

The energy sector has long been an object of industrial boosterism. While policymakers have had some successes, the history of the Department of Energy's (DOE) RD&D projects has been

[7] Ira Magaziner and Robert Reich, *Minding America's Business* Harcourt Brace Jovanovich, New York, 1982, p.4
[8] The U.S. government has bailed out individual firms (e.g., Chrysler in 1979, and GM, Chrysler, and financial institutions in 2009) but has arguably never had an economy-wide industrial policy.

checkered since the early 1970s. For example, after the first Mideast oil shock in 1973, various alternative fuel programs were proposed. They proved problematic. President Carter and Congress, for example, created the Synthetic Fuels Corporation that was envisaged to spend up to $88 billion ($200 billion in 2007 prices) and to produce an ambitious two million barrels a day by 1992.[9] Some plants were completed at a cost of $9 billion (2007 dollars) but they never operated commercially.[10] The Clinch River breeder reactor project cost taxpayers $1.7 billion. It was abandoned in 1983; none of the subsidized reprocessing plants became commercial operations.[11] Some more recent federal efforts to fund energy technology have seen similar failures and false starts. For example, from 2004 to 2008 the federal government sank $1.2 billion into hydrogen vehicle programs that so far have resulted in no commercial deliverables.[12]

Budget analysts and technical experts have debated the policy implications of this experience. The Congressional Budget Office (CBO) annually identifies options for spending cuts. Its 2011 report includes a 75 percent reduction in DOE funding for energy technology development, with the cuts concentrated on funding for later stages of development, demonstration projects, and the deployment of new technologies.[13] In contrast, a 2001 National Academy of Sciences (NAS) report reviewing DOE research and demonstration projects takes what appears to be a more upbeat view of their value.[14] The report examined costs and benefits of two categories of DOE programs (17 energy efficiency programs and 22 fossil energy programs) over the period 1978 to 2000. NAS concluded that the projects yielded returns of about $40 billion dollars while spending $17 billion. About $30 billion in benefits came from energy-efficiency projects and $10 billion from fossil fuel projects.

Despite the large net benefits, the report suggests that the overall investment portfolio has not been sound. Just three of the energy efficiency programs produced 75% of the benefits. Taken as a whole, the fossil fuel programs merely broke even. The highest benefit-cost ratios predictably came from initiatives related to residential and commercial construction, an industry not known for rapid energy-saving and environmental innovation. In contrast, DOE's efforts to commercialize large capital-intensive technologies like coal liquefaction have been beset by cost overruns and low net benefits. The report notes that this tendency is not confined to DOE projects, however.[15]

Clean Energy after the Financial Crisis

---

[9] Mufson, Steven, "Before Solyndra, a History of Failures," *The Washington Post*, November 13, 2011, p. B4.
[10] See Linda Cohen and Roger Noll, *The Technology Pork Barrel*, The Brookings Press, 1991 and Peter Z. Grossman, "The History of U.S. Alternative Energy Development Programs, September 16, 2008, Searle Center on Law, Regulation, and Economic Growth; Lyons, Richard D., "Corporation for Alternative Energy Sources Set Up", May21, 1980.
[11] Congressional Budget Office (CBO), *Comparative Analysis of Alternative Financing Plans for the Clinch River Breeder Reactor Project*, September 20, 1983.
[12] Mufson, op. cit.
[13] CBO, *Reducing the Deficit: Spending and Revenue Options*, pp. 101-102, March 2011. http://www.cbo.gov/ftpdocs/120xx/doc12085/03-10-ReducingTheDeficit.pdf.
[14] National Academy of Sciences (NAS), *Energy Research at DOE: Was It Worth It?*, The National Academies Press, 2001.
[15] NAS, op. cit. p. 63.

Inspiration for recent clean-energy assistance reflects environmental concerns but also some of the old economic arguments of the 1980s. For example, once again we hear claims that aiding the development of certain technologies can ameliorate unemployment, stimulate growth, and stem the "offshoring" of manufacturing. The thought is that clean energy investments can improve the pace of the current weak recovery and raise the long run growth of national income, productivity, and U.S. competitiveness by driving resources toward a fast-growing sector of the world economy.

The desire is understandable. In late 2007, the U.S. and most other advanced countries suffered the largest drop in gross domestic product (GDP) since the Great Depression. After two years of declining output, GDP growth gradually began to improve, but the recovery has been sluggish and marked by particularly slow employment growth. Unemployment in the United States rose to 10 percent of the labor force and after two years of recovery is still above 8 percent. The persistence of high unemployment and the record increase in the fraction of the labor force out of work for at least six months has put pressure on public officials to try to generate more jobs. At the same time, legislation to control greenhouse gas emissions with a cap-and-trade program failed in the Senate in 2009, and there is no prospect of a climate policy initiative in the current Congress.

Thus, advocates of a clean-energy agenda not only hope that it will help address global warming and somehow promise greater "energy security," but also deliver thousands of "green jobs." [16] Indeed, the latter motif permeates ads in which sponsors tout their technologies more as job-growth strategies than as answers to the environmental shortcomings of fossil fuels. The claims find a receptive audience among those concerned about America's high unemployment and long term competitive edge. We explore those claims in Section 4 below.

Of course, the jobs projections for clean energy industries are not without counter-claims from their incumbent competitors. Fossil fuel producers cite their sector's strong performance in a weak economy. With propitious policies, they suggest, increased access to fossil reserves could create over a million jobs over the next ten years.[17] The producers point to the recent boom in natural gas made possible through three-dimensional seismic technology, horizontal drilling, and hydraulic fracturing. This development presumably exemplifies the kind of innovation that can drive American competitiveness as much or more than can unproven and expensive renewables. And, it is argued, there is great potential for job creation in policies that further exploit North American resources like Canadian oil sands, and in building a proposed Keystone XL pipeline. The push for government support is not just limited to clean-energy firms, but comes from almost every other kind of energy business as well.

3. MARKET FAILURE: PUBLIC GOODS, POLLUTION AND OIL DEPENDENCE

[16] For example: Pollin R., H. Garrett-Peltier, J. Heintz, H. Scharber, K. Batten and B. Hendricks, "Green Recovery: A Program to Create Good Jobs and Start Building a Low-Carbon Economy," Center for American Progress, September 2008. http://www.americanprogress.org/issues/2008/09/pdf/green_recovery.pdf.

[17] American Petroleum Institute, http://energytomorrow.org/job-creation#/type/all, accessed November 29, 2011.

Environmental and Public Goods Rationales

Perhaps a more persuasive case for clean-energy spending follows from the absence of emission charges on greenhouse gases. Currently, regulation under the Clean Air Act controls toxic and smog-related air pollutants, such as mercury and sulphur dioxide. The United States does not have an equivalent program to reduce greenhouse gas (GHG) emissions. Emerging Clean Air Act rules can mitigate some GHG sources, but the legal authority is not well-suited to GHGs, in part because the command-and-control rules are unlikely to result in prices that reflect the full social costs of emitting activities, including their environmental damage. Inasmuch as traditional energy sources are underpriced and thereby retain a competitive edge, the substitutes for them—many of which are infant industries—could warrant government policy to level the playing field.

Another market failure arises from the under-investment of firms in research and development activities that may produce positive spillovers for other firms and society generally. This phenomenon — under-provision of public goods — is not unique to the energy or environmental arenas, but in this case there is an interplay between the dual inefficiencies that poses novel policy questions. Jaffe and his co-authors (2005) examine the market failures of technology development and how they interact with market failures in the form of environmental pollution.[18] These observers note that technology policy is a poor substitute for directly pricing the external costs of emitting activities, but they emphasize that clean-energy technology policy can be worthwhile under certain conditions: namely, a market wherein carbon is properly priced. In Section 6 below, we offer conclusions about the economically justifiable role for federally funded RD&D in which we draw on this and related work.

Macroeconomic Risks from Oil Dependence

Another frequent justification for government intervention in energy markets is framed in terms of national security, energy security, or energy independence. Nearly forty years ago, Richard M. Nixon proclaimed that "our national goal" should be "to meet our own energy needs without depending on any foreign sources."[19] Even today it is hard to find a leading U.S. politician who does not accept more or less the same quixotic notion.

The only fuel the U.S imports in vast quantities is oil, so energy security as it relates to imports is really about oil. The degree to which oil dependence justifies government investments in clean energy technology is debatable. First, nearly 90 percent of U.S. oil demand is met by domestic wells and those of suppliers outside the unstable Middle East, chiefly Canada and Mexico which sell America more oil than do either Saudi Arabia or Hugo Chavez's Venezuela. Second, the net benefits of importing less oil as a share of total consumption and using less oil

[18] Jaffe, A., R. Newell, and R. Stavins, "A Tale of Two Market Failures: Technology and Environmental Policy," Ecological Economics 54 (2005) pp 164-174.
[19] President Nixon, launching Project Independence in November 1973, quoted in John I. Moore, *Continuing Energy Crisis in America* (Washington, D.C.: CQ Press, 1975), p. 2.

in total are unclear.[20] The oil market is global. Even if Americans purchased *none* from abroad, they would remain vulnerable to any perturbation in the international market because they would still have to pay the world's price. In addition, the key inefficiencies from oil dependence derive from macroeconomic disruptions and market power by oil exporters. Policies that drive down oil consumption in periods without disruptions or significant monopoly pricing could burden consumers while not directly correcting market failures.

Third, the vulnerability of the U.S. economy to oil price fluctuations depends critically on policies outside the energy sector. Two kinds of significant macroeconomic costs arise from oil price spikes: (1) the simple loss of national income from a large jump in oil prices sustained for any length of time; and (2) the effects of large oil price shocks on inflation and output arising from "imperfections" and rigidities of the macroeconomic system. Experience from the past four decades shows that easily the most effective policy to reduce potential macroeconomic social costs from periodic oil supply shocks is the Federal Reserve's determination to respond promptly to any current or prospective inflationary threat. This means that even fairly large oil price increases are now much less likely to set off a wage price spirals.

Finally, the issue of oil dependence and energy security is largely confined to the transportation sector. In the United States, most oil goes into the tanks of motor vehicles in the form of gasoline or diesel fuel. So renewables such as solar, wind, geothermal, and other electricity technologies contribute next to no "energy independence." These alternate sources are substitutes for coal or natural gas, both of which are burned in power plants and both of which are either produced domestically or supplied by America's NAFTA partners. So even if increasing U.S. self-sufficiency in energy were desirable, it does not follow that subsidies for electricity powered by renewable sources advances the goal.

In sum, while a case can be made that subsidizing clean energy policy might help address market failures, the case may be narrower than some assert, and turning theory into sound practice is no simple feat.

4. CLEAN ENERGY: COMPETITIVENESS AND JOBS

Champions of industrial policy for clean energy technologies submit that it serves the country's strategic economic interest. Such a policy, after all, would presumably spur export-led growth and employment. Without primacy in these industries, the advocates fear, the U.S. economy will become less competitive. Americans would forfeit larger market shares to foreign competitors, who would grow dominant thanks, presumably, to their own strategic investments. Framing their claims positively, the proponents argue that clean energy, promoted by subsidies and favorable regulations, will bolster the U.S. manufacturing sector and add to the nation's economic welfare overall.

[20] For more see Pietro S. Nivola with Erin E. R. Carter, "Making Sense of 'Energy Independence'" in Carlos Pascual and Jonathan Elkind, eds., *Energy Security: Economics, Politics, Strategies, and Implications* (Brookings, 2010), pp: 105-118

Japan's success as an industrial exporter in the 1970s and 1980s was sometimes suspected of enhancing that country's prosperity to the detriment of the United States. Today, China is the focus of similar concern. China's booming alternative-energy industries, and the specter that they might come to dominate world markets, are deemed a long-range threat to American leadership and living standards. To those who share this apprehension, the answer is to go head-to-head with Chinese manufacturers and match them in kind with government assistance.

Clean Energy and U.S. Competitiveness

Let us first consider the supposed imperative of matching the Chinese, Germans or others in their quest to be "Number One" in clean energy technologies. In a 1994 essay, Paul Krugman wrote, "The idea that a country's economic fortunes are largely determined by its success on world markets is a hypothesis, not a necessary truth; and as a practical, empirical matter, that hypothesis is flatly wrong."[21] He makes the empirical case that improvements in U.S. living standards derive from the growth rate of domestic productivity -- not market share relative to competitors.

Krugman notes that, while the term "competitiveness" is meaningful when applied to individual firms, it makes little sense when applied to the economic relationships among countries. Coca-Cola and Pepsi struggle for market share, and one succeeds only to the disadvantage of the other. By contrast, international trade consists of transactions that are, by definition, mutually advantageous to the trading partners. Over the long haul, American living standards *improve*, rather than deteriorate, through freer trade. Growth of productivity and real incomes in countries with whom we trade redounds to our benefit, even if some individual domestic firms and workers may suffer in the short or intermediate term.

Advocates for taxpayers' investments to promote U.S. competitiveness often appear to misunderstand how trade affects U.S. output and employment. In periods of sustainable non-inflationary prosperity and high employment, supported by a competent and flexible monetary policy, losses of employment in sectors that are losing business to cheaper imports will tend to be offset by gains in other sectors through an appropriate adjustment in monetary policy. In a normal year the U.S. experiences about 14 million hires from new entrants to the labor force and people changing jobs, and a little under 13 million job separations, from retirements, quits, layoffs, and other causes (the difference is the growth in the labor force). In the churning there are losses and gains for individual workers. But overall, international trade tends to reallocate rather than add or subtract overall jobs in the economy. And if another country expands its exports by keeping its exchange rate with the U.S. dollar artificially low, that will increase the pace of job reallocation in this country, with the accompanying adjustment costs. But with appropriate monetary and fiscal policy it will not, except temporarily, worsen unemployment. Likewise, temporary subsidies to exporting firms won't improve the long run growth of exports.

But what if policies can be devised that enable U.S. firms to get a leg up on foreign competitors, develop the intellectual property, and thereby gain the advantage of being a "first mover"?

---

[21] Krugman, P., "Competitiveness: A Dangerous Obsession", Foreign Affairs, March/April 1994.

Wouldn't that be a boon for the American economy by raising the profits of American firms and, in the current "jobless" recovery, reducing unemployment? Not necessarily. Firms already have the incentive to develop profitable technologies and use patent protection to maximize their payoffs. The question is whether there is a public-policy case for subsidizing these companies both to render them more profitable and maybe also yield a beneficial economic spillover. In theory, that outcome might be possible if, thanks to the government's support, U.S. companies could monopolize world markets at the expense of foreign rivals. Writing in 1993, Krugman explored this possibility thoroughly. He concluded that even if a so-called strategic trade policy could be crafted, and if that policy indeed could maximize the monopoly power of American firms (a big "if"), such a strategy would add less than one percent to U.S. national income. [22]

Finally, is there an indisputable first-mover advantage? It is just as plausible to imagine greater gains from following instead of leading. Going first runs risks. Why not mainly let others incur them? After all, the alternative—pushing home-grown technologies at taxpayers' expense—offers no guarantee that the eventual products ultimately won't be manufactured somewhere else.

The case for consigning clean-energy development to domestic manufacturers, many of which may be high-cost producers, can disappoint on environmental grounds as well. Minimizing the cost of abatement is central to achieving environmental goals. If other countries develop lower-cost clean energy, more of it will be adopted, here and abroad. Indeed, from the standpoint of environmental quality, the willingness of *other* nations to subsidize their clean-tech industries, thereby lowering the costs of clean energy, may ultimately enhance, not lower, U.S. welfare.

Recent anti-dumping cases brought by American firms are moving these very issues to the fore. The firm SolarWorld, along with a coalition of American solar manufacturers, claims that Chinese manufacturers are able to dump photovoltaic panels in the U.S. market because China is unfairly subsidizing its own solar industry. The counter-argument, however, is that the Chinese may actually be doing U.S. consumers a favor by artificially lowering the costs of solar power. [23]

Clean Energy and Green Jobs

Now let us consider the proposition that engineering clean energy programs will generate employment. The debate churns with gray literature studies and counter-studies about how many American jobs could be created or lost by various policies. Of course, energy policies can affect the fortunes and employment levels in individual industries. But will such policies boost employment overall?

---

[22] Krugman, Paul "What do Undergrads Need to Know About Trade", American Economic Review, May 1993.
[23] Cho, Jennifer, "Foul or Fair: U.S. Solar Firms Debate China Solar Subsidies," *Forbes*, December 6, 2011. accessed December 7, 2011 at http://www.forbes.com/sites/jenniferkho/2011/12/06/foul-or-fair-u-s-solar-firms-debate-china-solar-subsidies/.

As mentioned above, during periods of normal high employment, energy policies that divert capital, labor, and materials from other industries claim resources that would otherwise go to providing other valued goods. A similar logic applies to employment in sectors that produce clean-energy technology, a potential export industry. The essential reality of international trade is that it changes the *composition* of jobs, not the total number, at least in the long run. Because output per worker in export industries—such as those that might produce clean high-tech energy products—may be higher on average than in import-competing industries, promoting the former is likely to subtract jobs from the latter. In sum, again, a net gain in employment from subsidizing clean-energy exporters may well prove elusive.

Clean Energy and the Great Recession

The U.S. at present is not at or near full employment. It is recovering slowly from a recession brought on by a severe financial crisis the likes of which have not been seen in ninety years. Might promoting green jobs and clean technology spur growth amid the current economic stagnation?

The implications for policy could, indeed, be different in periods with substantial idle labor and under-utilized industrial capacity. During periods of high unemployment, funding energy-related projects that create jobs which meet the definition of "green" is naturally less likely to disrupt jobs elsewhere in the economy. But the relevant question here is: How does spending related to energy stack up against other forms of fiscal stimulus, all things considered?

The goal of stimulus spending and tax relief is to shore up aggregate demand in a recession (or a tepid recovery). Afterward, natural forces of growth are supposed to kick in. The 2009 stimulus legislation professed to do exactly that. The Obama administration described the legislation as "timely, targeted, and temporary." "Timeliness" and "temporary" matter because resources are slack only during the downturn. If the spendout is too slow, it is not counter-cyclical. If the spending persists long into an economic upturn, the effect risks creating inflationary pressures—and a spike in interest rates. "Targeted" matters because different forms of tax cutting and spending programs absorb slack resources, including unemployed workers, differently. Some types of stimulus have a stronger and faster multiplier effect than others.

By these three criteria, ARRA's $32 billion for Department of Energy (DOE) programs falls short. Take the nearly $16 billion of the stimulus for research. Research is intrinsically ill-suited for a fiscal stimulus. It falters on timeliness grounds. A major research or demonstration project is unlike, say, a "shovel ready" highway project. Research programs require detailed proposals, competitive contract selection, and negotiations over the scope of work. Research also is not ideal for purposes of mobilizing the resources that are most likely to be idle or slack in a recession. Productive research projects are hard to scale up quickly, for they often run into a limited supply of skilled labor and of other specialized input costs. Moreover, obviously research demands skills that the neediest unemployed workers typically lack. A stimulus replete with research initiatives is unlikely to put money into the pockets of people who need it most—and whose marginal propensity to consume would be high if the money were forthcoming.

The imperative that stimulus spending be temporary also does not accord with a well-structured research portfolio. The point of public support for basic research activities is that the market alone tends to underfund them. Government *should* fill the gap, but the choice of projects to back ought to be based on other criteria—the long-range merits of the research activity per se, not how it fits in the business cycle. If there is an exception to this elementary rule, it is that extending federal research dollars in an economic downturn can help compensate for a temporary shortfall of research support by sub-federal entities such as state-funded universities. But even here, it is hard to see how funding "research" can create or save many jobs, at least not in the near-term.

Programs designed to promote the sustained commercialization of new technologies are seldom effectively counter-cyclical, either. Guaranteed loans for expanding commercial operations will help only those firms that are nearly competitive. Otherwise the loan guarantee is a subvention for potentially inefficient investments. In a recession, a temporary increase in risk-aversion by lenders may occur, and can strengthen the case for a federal role. But regardless of the macroeconomic conditions, will the loan guarantee reduce long-term costs and make the firm competitive?[24] According to the Government Accountability Office (GAO), the energy loan-guarantee system has suffered from competing objectives that are baked into the program. The GAO criticized DOE for its slow progress in making guarantees, but it also faulted DOE for its ad hoc program implementation (as well as inconsistent treatment of individual applicants, favoring some and disadvantaging others). [25]

5. INDUSTRIAL POLICY IN PRACTICE

All of which leads us to examine a little more fully the practical difficulties facing policymakers in the real world of American government as they struggle to choose and sustain the right enterprises.

Identifying plausible candidates might be a more dependable process if the commercial prospects of emerging technologies could be accurately predicted. Too often, however, the predictions have foundered. Decades ago the government launched robust programs to develop nuclear breeder reactors and to facilitate synthetic fuels.

These did not appear to be fanciful schemes in the contexts of their times. But they proved to be premised on unreliable forecasts. In the first instance, experts were anticipating continued explosive growth of domestic demand for electricity. (Instead, demand, especially for baseload capacity, settled onto a much slower trajectory.) In the second, the forecasters assumed that the price of petroleum would not plunge far below $40 a barrel, over $100 a barrel in today's money. (Instead, it collapsed by the mid-1980s.) Similar unexpected twists have bedeviled

[24]The relevant costs are the firm's long run *marginal* costs.
[25] GAO, "RECOVERY ACT: Status of Department Energy's Obligations and Spending", GAO-11-483T, March 17, 2011, pp. 9,10.

attempts to foretell the potential market for various forms of cleaner energy. When prices tumble, as they do periodically, the government's best-laid plans get stranded.

The caprice of the marketplace frustrates energy planning. So does the fact that public decisions regarding which producers to favor are all but impossible to insulate from political pressures. For the sake of argument, let us suppose that technocrats in highly competent government agencies were able to foresee and then objectively compare the lead-times for commercializing the multiple options under consideration. With that knowledge, one might think, only the most viable green businesses would be tapped to receive public funds. The power of the purse, however, lies with Congress—and the irresistible temptation there is to distribute resources widely and often injudiciously, not to concentrate them on just a few worthy targets.

Following the energy shocks of the 1970s, the Carter administration mounted the most concerted and sustained campaign to enact national energy laws that, it was hoped, would moderate the use of fossil fuels, especially oil. Scrambling to build the coalitions needed to pass these measures, Congress heard from stakeholders of nearly every conceivable kind seeking a piece of the action. The queue of claimants even included opponents of school integration, who lobbied to graft anti-busing amendments onto bills on the grounds that these would conserve fuel.[26] In the end, not every supplicant got its appetite satisfied, of course, but the prospect of federal subsidies and dispensations had clearly invited a feeding frenzy by interest groups, many of whom would keep circling Washington for decades.

The political dynamics have been similar in nearly every subsequent effort to refine the nation's desultory energy agenda. Thanks to extensive logrolling, proposed legislation before Congress during the past decade has been rather indiscriminately stuffed with loans, loan guarantees, grants, procurement mandates, and tax advantages for seemingly all comers—small businesses, green-building retrofitters, railroads, bicyclists, and electric vehicle manufacturers, as well as renewable energy suppliers that include ethanol plants and planters, biodiesel producers, developers of hydrogen technology, and nuclear power.[27] Even coal producers seek to qualify as a clean energy source on the theory that coal-fired electricity generators might someday be equipped for carbon sequestration.

In short, the American political system seldom sticks to sponsoring and sheltering only genuine industrial winners, green or otherwise. For as the late Senator William Roth of Delaware observed years ago, "The trouble with picking winners is that each Congressman would want one for his district."[28]

Further complicating the situation is the role of new players who may learn to game a regime of subsidies or preferential regulations in unexpected ways. An example: "Tax equity" financiers

---

[26] See, Pietro S. Nivola, *The Politics of Energy Conservation* (Brookings, 1986), Chap. 1

[27] See, as an illustration, the endeavor in 2007. Congressional Research Service, "Omnibus Energy Efficiency and Renewable Energy Legislation: A Side-by-Side Comparison of Major Provisions in House Passed H.R. 3221 and Senate Passed, H.R. 6," September 4, 2007.

[28] Quoted in Pietro S. Nivola, 'More Like Them? The Political Feasibility of Strategic Trade Policy," *Brookings Review*, vol. 9, no. 2 (Spring 1991), p. 19.

profit by charging homeowners slightly below-market electricity prices in exchange for installing residential solar PV systems for which a 30% tax credit applies. Some environmentalists hail the development as buying down the up-front cost of solar systems and making firms, homeowners, and the environment better off. [29] Critics contend, however, that "solar-backed securities," which bundle the returns from such investments into assets sold to third parties, drive demand for Chinese PV panels, risk creating a new financial bubble and encumber properties with uncertain effects on housing markets.[30] Whatever the case, policymakers should not be surprised if the consequences of industrial subsidies can wind up in unanticipated places or take unintended forms.

6. WHAT SHOULD BE DONE?

The functional equivalent of an industrial policy, explicit or de facto, is unlikely to spur an efficient or large scale conversion of the U.S. economy toward cleaner energy. "Getting prices right" is the first step, an essential precondition. The likes of a robust carbon tax or cap-and-trade regime, however, may not necessarily rule out certain supplementary measures, provided they are judiciously designed.

For reasons described earlier, efficient prices alone are unlikely to generate efficient levels of basic research and development by private firms. As a consequence, analysts have argued that, alongside an appropriate, predictably rising price on GHGs, there is a place for government programs that serve to complement private investments in research and demonstration.[31] DOE's present model calls for considerable improvement.

First, inasmuch as DOE remains in the business of promoting technologies, we believe the agency should embrace only those that can demonstrably help meet the challenge of environmental externalities, principally climate change. In pursing this central objective, policymakers should back approaches that will minimize the cost of achieving environmental goals by addressing environmental and technology market failures. With this mission in mind, a stronger investment portfolio for clean energy could evolve.

What complicates attaining the goal, of course, is that political conditions in the United States could frustrate sensible carbon pricing for years. Thus DOE's policy portfolio arguably ought to support the kinds of research and investments that would have been taken by firms in the presence of an effective carbon price. It would both sponsor basic research and, until Congress gets around to setting a meaningful price on carbon, encourage investments analogous to those that firms would undertake if carbon were properly priced. In other words, federal RD&D

[29] "Solar Service Companies Make Solar Affordable and Accessible," Climate Progress website, http://thinkprogress.org/romm/2011/06/15/245944/solar-service-companies-make-solar-affordable-and-accessible/.
[30] Rodgers, T. "Subsidizing Wall Street to Buy Chinese Solar Panels," *The Wall Street Journal*, December 8, 2011, p. A21.
[31] See: Congressional Budget Office, *Evaluating the Role of Prices and R&D in Reducing Carbon Dioxide Emissions.* September, 2006; *Environmental and Technology Policies for Climate Mitigation,* Carolyn Fischer and Richard G. Newell; *Induced Technological Change and Climate Policy,* February 200;, Lawrence H. Goulder, Pew Center on Global Climate Change , Washington DC , October 2004

efforts would invest in technologies with the lowest expected cost of abatement and the highest probability of market penetration.

But this does not appear to be current policy. Instead, of the nearly $40 billion in loan guarantees in the stimulus package, over 43 percent went to two sectors with some of the highest costs of carbon abatement and the lowest projected market shares: solar power and electric vehicles. In the most recent data available, DOE awarded 38 loan guarantees, 23 of them for solar power (19 generation, 4 panel manufacturing) and 9 others spread among wind, geothermal, biofuels, and electrical transmission, plus 6 to auto companies for fuel-efficient vehicles and electric vehicles.

The disproportionate emphasis on funds for solar power does not square with projections of its likely deployment. For example, EIA projects solar power to comprise only about 5 percent of all non-hydro renewable electricity and less than one percent of all renewable electricity by 2035.[32] That implies a very small fraction of all electric-power generation by 2035. In addition, $8.3 billion in loan guarantees (over 23 percent of the total) went to a single company to deploy two new nuclear power projects.[33] The most cost-effective technology category in the 2001 NAS report, energy efficiency, received less than one percent of the loan guarantees. Of course, what matters is the overall spending portfolio outside the unusual context of the stimulus package, but allocations such as those in the ARRA's loan program illustrate our point that resources should instead be directed towards investments that support innovations which minimize the cost of environmental protection.

Second, funding decisions ought to be insulated—as much as possible—from rent-seeking by interest groups, purely political distortions, and the parochial preferences of legislators. The National Institutes of Health and the National Science Foundation, who use peer reviews to screen proposals for research and clinical grants, are among the few federal operations to have achieved such independence— they are potential models.

Deutsch (2011) has addressed interestingly the problem of political demands on DOE.[34] To mitigate influences that reduce the effectiveness of energy RD&D, Deutsch suggests establishing an Energy Technology Corporation to select, manage and fund a limited number of federally supported technology demonstrations. The President would appoint a Board of Directors, and the Senate would confirm them. Congress would vote a ten year appropriation, and managers would be free from executive or congressional interference in project selection, program management, and salary determination. After ten years, an independent review would assess the corporation's success and recommend next steps. Such an arrangement could be less routinely buffeted by politics than DOE's current system.

Third, we agree with Jaffe and his colleagues who recommend "continuous, systematic, quantitative assessment" of technology funding with standardized data so that the relative

---

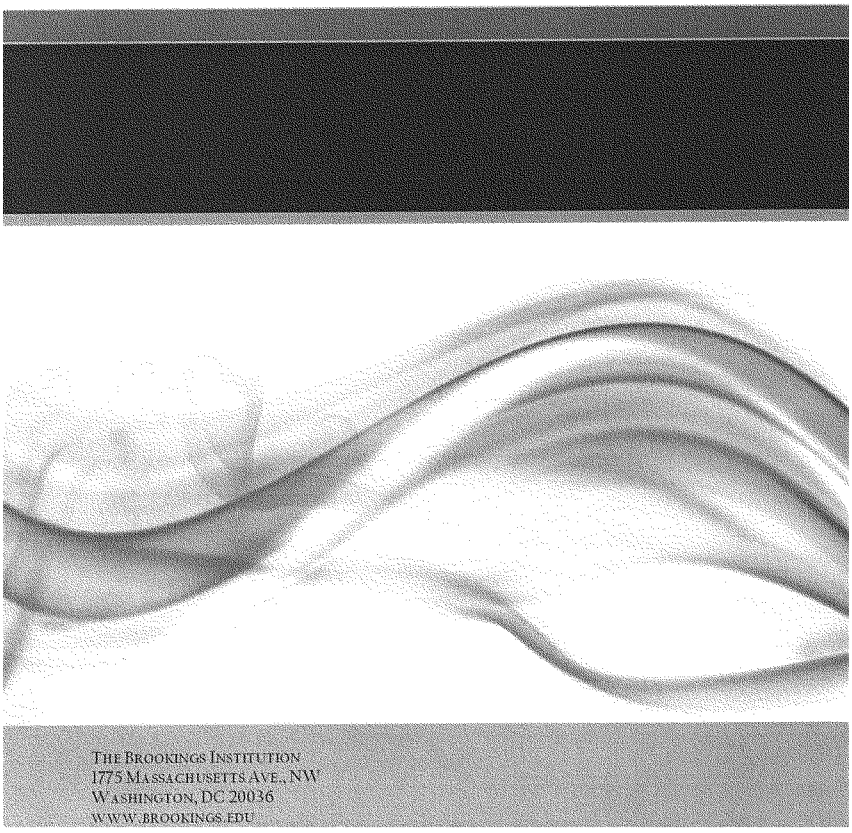
[32] EIA, *Annual Energy Outlook 2011*, Release date April 2011, http://www.eia.gov/forecasts/aeo/source_renewable.cfm.
[33] DOE, Loan Programs Office, op. cit.
[34] Deutsch, John, *An Energy Technology Corporation Will Improve the Federal Government's Effort to Accelerate Energy Innovation*, The Hamilton Project, The Brookings Institution, May 2011 p. 11.

effectiveness of alternative policy approaches can be compared over time and used to improve the program.[35]

Lastly, the choice of policy instruments to advance technologies (tax credits, loan guarantees, grants, and so on) can have a major impact on cost-effectiveness and the extent of unintended consequences.[36] A detailed examination of the relative merits of the various tools is beyond the scope of this paper, but it should be part of a reform agenda.

[35] Jaffe et al, op. cit. p. 60.

[36] For example, a modeling study showed that tax credits for energy efficient household capital produced 1/20 of the carbon emissions reductions that a similar-sized carbon tax produced. McKibbin, W., A. Morris, and P. Wilcoxen, "Subsidizing Energy Efficient Household Capital: How Does It Compare to a Carbon Tax?" *The Energy Journal*. Vol 32. 2011.



The Brookings Institution
1775 Massachusetts Ave., NW
Washington, DC 20036
www.brookings.edu

Mr. STEARNS. With that, we welcome again our witnesses. As you know, the testimony you are about to give is subject to Title 18, section 1001, of the United States Code.

When holding an investigative hearing, this committee has a practice of taking testimony under oath. Do any of you have objection to testifying under oath? It appears not.

The Chair then advises you that under the rules of the House and rules of the committee, you are entitled to be advised by counsel. Do you desire to be advised by counsel during your testimony today? If not, please rise, and we will swear you in. Raise your right hand.

[Witnesses sworn.]

Mr. STEARNS. We now welcome each of you to give a 5-minute summary of your written statement.

STATEMENTS OF MOLLY SHERLOCK, SPECIALIST IN PUBLIC FINANCE, GOVERNMENT AND FINANCE DIVISION, CONGRESSIONAL RESEARCH SERVICE; DAVID W. KREUTZER, RESEARCH FELLOW IN ENERGY ECONOMICS AND CLIMATE CHANGE, THE HERITAGE FOUNDATION; W. DAVID MONTGOMERY, SENIOR VICE PRESIDENT, NERA ECONOMIC CONSULTING; KENNETH P. GREEN, RESIDENT SCHOLAR, AMERICAN ENTERPRISE INSTITUTE; AND MICHAEL BREEN, VICE PRESIDENT, TRUMAN NATIONAL SECURITY PROJECT

Mr. STEARNS. And, Dr. Sherlock, we'll start with you.

STATEMENT OF MOLLY SHERLOCK

Ms. SHERLOCK. Thank you, good morning. Mr. Chairman and members of the subcommittee, I am Molly Sherlock, a specialist in public finance in the Congressional Research Service of the Library of Congress. In this role I research and evaluate the economics of Federal tax policy, including energy tax policy. Thank you for the opportunity to provide testimony on these issues.

I have been invited here today to discuss tax provisions that support renewable electricity. Specifically, I have been asked to address two issues related to renewable energy tax incentives: first, the cost of these provisions; and, second, the potential for these policies to create jobs. Before addressing these issues, I will briefly summarize the renewable energy tax incentives that are currently available, as well as those that have recently expired.

Historically, the primary tax incentives for renewable electricity have been the Renewable Energy Investment Tax Credit, or ITC, and the renewable energy production tax credit, or PTC. The ITC was first enacted in 1978. Currently, the ITC provides a 30 percent tax credit for investments in various renewable energy technologies, including solar.

The PTC was introduced in 1992. The PTC is a per-kilowatt hour incentive paid out over 10 years for the production of electricity, using certain renewable energy resources, including wind. Two new tax-related provisions for renewable energy were introduced as part of the American Recovery and Reinvestment Act of 2009.

Under section 1603 of the Recovery Act, in lieu of either the ITC or the PTC, renewable energy investors were eligible to receive a

one-time grant from the U.S. Treasury. As of the end of 2011, the section 1603 grant option is not available for new projects.

The Recovery Act also provided 2.3 billion in advanced energy manufacturing tax credits, all of which were competitively awarded in 2010.

Regarding the cost of these programs, the Joint Committee on Taxation, or JCT, has estimates that the renewable energy ITC cost $500 million in 2011. Over the 2011 to 2015 budget window, revenue losses for the ITC are projected to be 2.5 billion.

The PTC was estimated to cost 1.4 billion in 2011 with projected revenue losses from the PTC estimated to be 9.1 billion over the 5-year budget window. The PTC is scheduled to expire at the end of 2013 for wind and at the end of 2013 for other eligible technologies.

In 2011 the Treasury Department paid out 4.7 billion in grants under the section 1603 program. From 2011 to 2015, estimates suggest that a total of 17.2 billion will be paid out in section 1603 grants. From the perspective of the U.S. Treasury, the cost of the section 1603 grant program likely exceeds the foregone revenues associated with the underlying tax credit.

The Obama administration's fiscal year 2013 budget proposes to extend the PTC for wind and the section 1603 grant program for 1 year. The JCT has estimated that this would cost $5.7 billion.

Studies that look at jobs in therenewable energy industry tend to highlight jobs supported rather than jobs created. Jobs supported include jobs on projects that may have received a grant, even if the project would have taken place absent the grant option. An estimate of the number of jobs created by the section 1603 grant program can be provided by referring to estimates of the installed capacity that was actually motivated by the grant, as opposed to grant recipients for projects that would have moved forward without the grants.

In my written testimony, I provide an illustrative example that uses estimates of the installed capacity directly motivated by section 1603 to illustrate the differences between jobs supported as opposed to jobs created.

While job creation may be one of the policy objectives of the renewable energy tax incentives, such policies are often designed to achieve other policy objectives in addition to job creation. The section 1603 grant program, for example, was designed to compensate for weakness in tax equity markets during the financial crisis. Tax incentives for renewable electricity may also address environmental concerns and support growth in the renewable energy industry.

Thank you again for inviting me to appear here today. I am happy to respond to your questions.

[The prepared statement of Ms. Sherlock follows:]

Renewable Energy Tax Incentives and Green Jobs:
One Page Summary of Testimony

Statement of Molly Sherlock, Specialist in Public Finance, Congressional Research Service

Before

House Energy and Commerce Committee, Subcommittee on Oversight and Investigations

June 19, 2012

The Subcommittee requested that this testimony discuss two issues related to renewable energy tax incentives: 1) the cost of these provisions; and 2) the potential for these policies to create jobs. As background, this testimony briefly summarizes tax incentives that support renewable electricity.

The primary tax incentives for renewable electricity have historically been the renewable energy investment tax credit (ITC) and the production tax credit (PTC). Two new tax-related provisions for renewable energy were introduced as part of the American Recovery and Reinvestment Act of 2009 (ARRA; P.L. 111-5). Under ARRA, renewable energy investors were eligible to receive a one-time grant from the U.S. Treasury (the "Section 1603" grant program) in lieu of either the ITC or PTC. The PTC is scheduled to expire at the end of 2012 for wind, and at the end of 2013 for other eligible technologies. The Recovery Act also provided $2.3 billion in advanced energy manufacturing tax credits, all of which were allocated in 2010. As of the end of 2011, the Section 1603 grant option is not available for new projects.

The Joint Committee on Taxation (JCT) has estimated that the ITC, PTC, and the Section 1603 grant program will cost nearly $29 billion over the 2011 to 2015 budget window. Of this total cost, the Section 1603 grant program comprises the majority of foregone revenue, at an estimated $17.2 billion, while the PTC and ITC cost $9.1 billion and $2.5 billion, respectively. As the PTC is scheduled to expire and the Section 1603 grant program is closed to new projects, extending either would result in additional revenue losses.

Studies that examine jobs in the renewable energy industry tend to highlight jobs supported, rather than jobs created. Further, such jobs estimates do not generally account for potential job losses in competing industries. An estimate of the number of jobs created by the Section 1603 grant program can be provided by referring to estimates of the installed capacity that was actually motivated by the grant, as opposed to grant recipients for projects that would have moved forward without the grant. However, there may be substantial uncertainty surrounding these types of job creation estimates.

While job creation may be one of the policy objectives of renewable energy tax incentives, such policies are often designed to achieve other policy objectives in addition to job creation.

Statement of Molly Sherlock
Specialist in Public Finance
Congressional Research Service

Before

House Energy and Commerce Committee
Subcommittee on Oversight and Investigations

June 19, 2012

on

Renewable Energy Tax Incentives and Green Jobs

Mr. Chairman and Members of the Subcommittee, I am Molly Sherlock, a Specialist in Public Finance in the Congressional Research Service of the Library of Congress. In this role, I research and evaluate the economics of federal tax policy, including energy tax policy. Thank you for the opportunity to provide testimony on these issues. I should note that CRS takes no position on legislation.

I have been invited here today to discuss tax provisions that support renewable electricity. Specifically, I have been asked to address two issues related to renewable energy tax incentives: 1) the cost of these provisions; and 2) the potential for these policies to create jobs. Before addressing these issues, I will briefly summarize the renewable energy tax incentives that are currently available, as well as those that have recently expired.

Tax Incentives for Renewable Electricity

Tax incentives for renewable energy were first introduced in the late 1970s.[1] Over the past three decades, various provisions in the tax code have been used to support renewable energy. Renewable energy tax incentives that are currently available, as well as those that were introduced as part of the American Recovery and Reinvestment Act of 2009 (P.L. 111-5), are reviewed below.

[1] This testimony addresses tax incentives for renewable electricity. Since the late 1970s, Congress has enacted various tax and non-tax incentives that support renewable transportation fuels, such as ethanol, biodiesel, and cellulosic biofuels. The incentives for renewable fuels are beyond the scope of this testimony.

Investment Tax Credit

The investment tax credit (ITC) for renewable energy was first enacted in 1978.[2] The 1978 version of this incentive was scheduled to expire in 1982. Prior to the scheduled expiration date, the provision was further extended through 1985. Since the mid-1980s, the renewable energy ITC has been modified and extended several times.[3] For most technologies, the ITC is set to expire at the end of 2016.

Currently, several renewable energy technologies qualify for the ITC. A 30% tax credit is available for investments in solar energy property, fuel cells, and small wind systems. Geothermal systems, microturbines, and combined heat and power (CHP) property can qualify for a 10% tax credit.[4] There is a permanent 10% ITC for solar and geothermal that will remain available after the 30% rate expires at the end of 2016.

Production Tax Credit

Since being enacted in 1992, the renewable energy production tax credit (PTC) has been the primary federal incentive supporting wind power. While the PTC is a temporary tax provision, in the past, it has regularly been extended.[5] Under current law, the PTC for wind-produced electricity will expire at the end of 2012. Since the PTC is based on electricity produced during the first 10 years a qualifying renewable energy facility is in operation, under current law, tax credits may be claimed until 2022.

Several other technologies also qualify for the renewable energy PTC, including closed-loop and open-loop biomass, geothermal energy, landfill gas, municipal solid waste, certain hydroelectric, and marine and hydrokinetic technologies.[6] The PTC expiration date for qualifying technologies other than wind is the end of 2013.

Other Tax Incentives for Renewable Energy

A number of other specially targeted tax incentives are available for renewable energy. Technologies that qualify for the renewable energy ITC or PTC also qualify for accelerated depreciation under the Modified Accelerated Cost Recovery System (MACRS). The cost of investments in most renewable energy property is recovered over a five-year period.[7]

---

[2] A history of U.S. energy tax policy can be found in CRS Report R41227, *Energy Tax Policy: Historical Perspectives on and Current Status of Energy Tax Expenditures*, by Molly F. Sherlock.

[3] The investment tax credit for solar was allowed to lapse at the beginning of 1986, before being retroactively extended through the end of 1988. The credit was again extended in 1989 and 1991. In 1992, the 10% investment tax credit was made permanent for solar and geothermal. Legislation in 2005 temporarily increased the renewable energy investment tax credit for solar from 10% to 30%. Subsequent legislation in 2006 and 2008 extended this 30% rate through the end of 2016.

[4] Currently, PTC-eligible property can elect to receive a 30% ITC in lieu of this PTC. This option is available through 2012 for wind, and through 2013 for other PTC-eligible technologies.

[5] The PTC has been extended seven times since 1992. In three of these cases, the PTC was allowed to lapse prior to being extended retroactively.

[6] Open-loop biomass, geothermal energy, landfill gas, municipal solid waste, hydroelectric, and marine and hydrokinetic technologies qualify for a tax credit that is half of the amount available to other qualifying technologies.

[7] Certain biomass property is treated as seven-year property under MACRS. Accelerated depreciation for renewable energy property is a permanent feature of the tax code. The depreciation period for other energy property also varies by property type, but is generally in the 15 to 20 year range.

Further, renewable energy benefits from a number of other tax provisions that are not industry-specific. For example, investments in renewable energy may be eligible for temporary bonus depreciation deductions[8] and those producing electricity using renewable energy resources may qualify for the Internal Revenue Code (IRC) Section 199 domestic production activities deduction.[9]

Tax Provisions for Renewable Energy in the American Recovery and Reinvestment Act

The American Recovery and Reinvestment Act of 2009 (ARRA; P.L. 111-5) introduced two new tax-related provisions for renewable energy.[10] First, under ARRA, investors eligible for the renewable energy PTC or ITC could elect to receive a one-time grant from the Treasury in lieu of these tax benefits. Second, ARRA provided funds for an advanced energy technology manufacturing tax credit. Many of the beneficiaries of this program were in the renewable energy sector.

Under ARRA, property that was generally eligible for the PTC could instead elect to receive a 30% ITC. This option is scheduled to remain available until the current PTC expires at the end of 2012 for wind, and at the end of 2013 for other technologies.

In addition, under ARRA, in lieu of either the PTC or ITC, renewable energy investors could elect to receive a one-time grant from the U.S. Treasury.[11] This provision—commonly referred to as the "Section 1603 grant"—was intended to compensate for weak tax-equity markets.[12] Initially, the Section 1603 grant program was made available for property either placed-in-service or under construction in 2009 and 2010. The construction start date was extended through 2011 as part of the Tax Relief, Unemployment Insurance Reauthorization, and Job Creation Act of 2010 (P.L. 111-312). As of the end of 2011, the grant option is not available for new projects, but grants are still being paid out to qualifying projects as these projects come online.[13]

The advanced energy manufacturing tax credit (IRC § 48C) was also established in ARRA. This provision allowed the Treasury to award up to $2.3 billion in tax credits for qualified advanced energy manufacturing projects. These tax credits were competitively awarded. Selection criteria for projects, as laid out in ARRA, included: 1) commercial viability; 2) job creation; 3) pollution or greenhouse gas emissions reduction; 4) potential for technological innovation; 5) cost-effectiveness; and 6) time to completion.[14]

---

[8] For more information on bonus depreciation, see CRS Report RL31852, *Section 179 and Bonus Depreciation Expensing Allowances: Current Law, Legislative Proposals in the 112th Congress, and Economic Effects*, by Gary Guenther.

[9] For more information on the Section 199 production activities deduction, see CRS Report R41988, *The Section 199 Production Activities Deduction: Background and Analysis*, by Molly F. Sherlock.

[10] For information on all energy-related provisions in ARRA, see CRS Report R40412, *Energy Provisions in the American Recovery and Reinvestment Act of 2009 (P.L. 111-5)*, coordinated by Fred Sissine.

[11] See CRS Report R41635, *ARRA Section 1603 Grants in Lieu of Tax Credits for Renewable Energy: Overview, Analysis, and Policy Options*, by Phillip Brown and Molly F. Sherlock.

[12] Before the recession, large-scale renewable energy projects relied on tax-equity markets to convert tax credits into cash. Tax-equity markets dried up during the recession, making it harder for many market participants to fully realize the value of renewable energy tax benefits.

[13] Tax credits for wind are scheduled to remain available for one year, through the end of 2012. Currently available credits for other technologies are scheduled to expire in 2013 or 2016.

[14] Section 1302 of ARRA.

In January 2010, all of the $2.3 billion available for advanced energy manufacturing tax credits were awarded to 183 projects.[15] There were a number of technically eligible projects that were not awarded tax credits through the competitive process. Specifically, the DOE and Treasury identified 235 technically eligible projects requesting a total of $5.8 billion in tax credits for which funding was not available.[16]

While the advanced energy manufacturing tax credit was available for a range of technologies, renewables accounted for an estimated 69% of credit recipients, in 2010.[17] Manufacturers of solar photovoltaics (PV) and wind turbines and related equipment were among the largest recipients.

The Cost of Renewable Energy Tax Incentives

The Joint Committee on Taxation (JCT) projected that the renewable energy ITC cost $0.5 billion in 2011 (see **Table 1**). Over the 2011 to 2015 budget window, projected foregone revenue from claims of the ITC is $2.5 billion. Prior to 2011, JCT estimates of annual revenue loss from the renewable energy ITC were less than $100 million.[18] The majority of the foregone revenue for the ITC (roughly 90%) is attributable to investments in solar energy property. Recent increases in solar investment have led to increases in the revenue cost of tax credits for solar. Federal incentives, including tax credits, as well as market factors, such as the reduced price for solar panels, have been cited as reasons for recent increases in solar investment.[19]

The JCT has estimated that the renewable energy PTC resulted in $1.4 billion of forgone revenue in 2011 (see **Table 1**). Over the 2011 to 2015 budget window, the JCT estimates that the renewable energy PTC will cost $9.1 billion.[20] Of this $9.1 billion in revenue cost, roughly 75% (or $6.8 billion) is for credits paid for the production of electricity using wind.

Five-year accelerated depreciation for renewable energy investments is scored as a tax expenditure by the JCT. In 2011, an estimated $0.3 billion in federal revenue was foregone due to this provision (see **Table 1**). Over the 2011 to 2015 budget window, the JCT estimates that five-year accelerated depreciation for renewables will cost $1.1 billion.

In January 2010, all $2.3 billion in advanced energy manufacturing tax credits were awarded to 183 projects. The actual cost of the advanced energy manufacturing tax credit program will likely be less than the $2.3 billion in tax credits awarded. This is because some credit recipients may have limited profits, or credits may be carried forward outside of the budget window. When ARRA was enacted, it was estimated that the program would have a 10-year revenue cost of $1.6 billion.[21] Over the 2011 to 2015 budget

[15] A full list of awards was included in a White House press release, available at: http://www.whitehouse.gov/the-press-office/president-obama-awards-23-billion-new-clean-tech-manufacturing-jobs.

[16] Testimony of Senior Advisor to the Secretary of Energy Matt Rogers, in U.S. Congress, Committee on Ways and Means, *Hearing on Energy Tax Incentives Driving the Green Job Economy*, hearings, 111th Cong., 2nd sess., April 14, 2010 (Washington, DC: GPO, 2010). Testimony available online at: http://energy.gov/sites/prod/files/ciprod/documents/Final_Testimony%286%29.pdf.

[17] U.S. Energy Information Administration (EIA), *Direct Federal Financial Interventions and Subsidies in Energy in Fiscal Year 2010*, Washington, DC, July 2011, available at: http://www.eia.gov/analysis/requests/subsidy/pdf/subsidy.pdf.

[18] Past JCT tax expenditure tables are available online at: http://www.jct.gov/publications.html?func=select&id=5.

[19] See Solar Energy Industries Association and GTM Research, *U.S. Solar Market Insight Report Q1 2012*, June 2012, http://www.seia.org/.

[20] This cost likely would have been higher absent the Section 1603 grants in lieu of tax credit program discussed below.

[21] U.S. Congress, Joint Committee on Taxation, *General Explanation of Tax Legislation Enacted in the 111th Congress*, committee print, 111th Cong., March 2011, JCS-2-11. Between 2010 and 2015, JCT estimates suggest forgone revenues of $1.8 (continued...)

window, the JCT estimates that foregone revenues associated with claims of the advanced energy manufacturing tax credit will be $1.4 billion (see **Table 1**).

In 2011, $4.7 billion in grants was paid out under the Section 1603 grants in lieu of tax credits program (see **Table 1**). As of March 15, 2012, more than $11.0 billion had been paid out under the Section 1603 grant program that was enacted in 2009.[22,23] Through the end of 2017, it has been estimated that another $11.5 billion will be paid out in Section 1603 grants,[24] bringing the total estimated cost of the program to nearly $22.6 billion.

Table 1. Projected Cost of Renewable Energy Tax Incentives

billions of dollars

	2011	2012	2013	2014	2015	2011 - 2015
Renewable Energy Investment Tax Credit (ITC)	0.5	0.5	0.5	0.5	0.5	2.5
Renewable Energy Production Tax Credit (PTC)						
Wind	1.1	1.3	1.4	1.5	1.5	6.8
Open-Loop Biomass	0.3	0.3	0.3	0.3	0.2	1.7
Other Eligible Technologies	(ii)	(ii)	(ii)	(ii)	(ii)	0.6
5-Year Cost Recovery for Renewable Energy Property	0.3	0.3	0.2	0.2	0.1	1.1
Advanced Energy Manufacturing Tax Credit	0.7	0.4	0.2	0.1	(i)	1.4
Section 1603 Grants in Lieu of Tax Credits[a]	4.7	4.1	3.9	3.2	1.2	17.2

Source: Joint Committee on Taxation and Department of Treasury

Notes: An (i) indicates a positive revenue loss of less than $50 million. An (ii) indicates that the revenue cost was listed as less than $50 million per year for each eligible technology (other than wind and open-loop biomass). Additional information on the estimated annual cost is not available. Columns and row may not sum due to rounding and due to limited information for provisions with annual revenue cost of less than $50 million.

a. The cost of the Section 1603 grants in lieu of tax credits represents an outlay, whereas the cost of tax incentives indicates foregone revenue.

As noted above, a primary purpose of the Section 1603 grant program was to compensate for perceived weakness in tax equity markets. By providing taxpayers investing in renewable energy with a grant, the demand for tax equity to monetize tax credits would be reduced.[25]

(...continued)

billion due to advanced energy manufacturing tax credit awards.

[22] A frequently updated list of Section 1603 grant awards can be found on the Treasury Department's website, available at: http://www.treasury.gov/initiatives/recovery/Pages/1603.aspx.

[23] This includes $1.7 billion paid out in 2009, $3.3 billion paid out in 2010, $4.7 billion paid out in 2011, and $1.3 billion paid out through March 15, 2012.

[24] See Analytical Perspectives, Budget of the United States Government, FY2013, available at: http://www.whitehouse.gov/omb/budget/Analytical_Perspectives.

[25] When taxpayers investing in renewable energy project have insufficient tax liability to offset credits, taxpayers may turn to tax-

(continued...)

In practice, the Section 1603 grant is often more valuable than the underlying tax credits. Grants are received as a one-time payout from the Treasury when renewable energy property is placed in service. Thus, taxpayers investing in renewable energy do not need to have taxable income in the current year to benefit from the incentive, nor is there a need to turn to tax-equity markets for taxpayers with limited tax liability. Further, investors in projects that believe the PTC over ten years will be more valuable than the one-time grant can elect to receive the PTC.[26] Finally, since the incentive is of greater value than the underlying tax credits, additional marginal projects that would not have been financially viable with the tax credit option might have become economically feasible given the grant.[27] While the grant as an incentive is of greater value to investors, it is also more expensive from the government's perspective.

The Obama Administration supports extending the PTC and the Section 1603 grant program. The JCT has estimated that extending the PTC and the option to elect the ITC in lieu of the PTC for wind through 2013, extending the Section 1603 grant in lieu of tax credit program through 2012, and converting the Section 1603 grant into a refundable tax credit for 2013 through 2016, as proposed by the Administration, would cost an estimated $5.7 billion over the 2012 to 2022 budget window.[28] Extending the PTC alone for one year, through 2013 for wind and 2014 for other eligible technologies, would cost an estimated $4.1 billion over the 10-year budget window.[29]

Renewable Energy Tax Incentives and Jobs

Since 2009, generation of electricity using wind and solar resources has increased. Between 2009 and 2011, net electricity generation using wind increased by more than 60%.[30] Net electricity generation using solar more than doubled over that same time period.[31] Electricity generated using wind and solar resources remains a small share of overall electricity generation, but increased from 2.8% to 3.8% between 2009 and 2011.

(...continued)

equity markets, developing partnerships that provide cash in exchange for tax credits. Requiring renewable energy investors to monetize tax benefits in tax equity markets reduces the value of the incentive that flows directly to project developers.

[26] Mark Bolinger, Ryan Wiser, and Naim Darghouth, "Preliminary Evaluation of the Section 1603 Treasury Grant Program for Renewable Power Projects in the United States," *Energy Policy*, vol. 38, no. 11 (November 2010), pp. 6804-6819.

[27] One estimate suggests that between 20% and 25% of the wind capacity installed in 2009 was directly motivated by the Section 1603 grant. This research also found that more than 60% of wind power projects that elected the grant in 2009 were likely to have moved forward without the grant option. See Mark Bolinger, Ryan Wiser, and Naim Darghouth, *Preliminary Evaluation of the Impact of the Section 1603 Treasury Grant Program on Renewable Energy Deployment in 2009*, Ernest Orlando Lawrence Berkeley National Laboratory, LBNL-3188E, April 2010.

[28] See U.S. Congress, Joint Committee on Taxation, *Estimated Budget Effects Of The Revenue Provisions Contained In the President's Fiscal Year 2013 Budget Proposal*, committee print, 112th Cong., March 21, 2012, JCX-27-12, available at: http://www.jct.gov/publications.html?func=startdown&id=4413. The Treasury estimated that this provision would cost $4.3 billion over the same time period. Both the JCT and the Treasury estimates include outlay effects. The Treasury estimates that outlays resulting from extending the Section 1603 grant program will be $1.3 billion, while the JCT estimates that outlays from extending the Section 1603 grant program under this proposal will be $4.7 billion.

[29] U.S. Congress, Joint Committee on Taxation, *Estimated Budget Effects of S. 2204, the "Repeal Big Oil Tax Subsidies Act" Scheduled for Consideration on the Senate Floor March 26, 2012*, committee print, 112th Cong., March 23, 2012, JCX-29-12, available at: http://www.jct.gov/publications.html?func=startdown&id=4415.

[30] In 2009, 73.9 million megawatt hours of electricity were generated using wind. By 2011, that figure was 119.7 million megawatt hours. Data on annual electricity production can be found in Energy Information Administration (EIA), *Electric Power Monthly*, May 29, 2012. Available at: http://www.eia.gov/electricity/monthly/.

[31] In 2009, 0.9 million megawatt hours of electricity were generated using solar. By 2011, that figure was 1.8 million megawatt hours.

While both the solar and wind industries are supported by renewable energy tax incentives, identifying the number of jobs that were created as a result of specific tax incentives is challenging. Most renewable energy jobs studies look at jobs within a particular industry or jobs that were supported by, rather than created by, certain incentives.

Methodology for Jobs Studies

When interpreting the results of jobs studies, it is helpful to understand what types of jobs were included in the analysis. *Direct employment* includes "jobs created in the design, manufacturing, delivery, construction/installation, projects management and operation and maintenance of the different components of the technology, or power plant, under consideration."[32] *Indirect employment* measures jobs created at various stages in the supply chain, such as the manufacture of raw materials. Indirect jobs may also include related service jobs in the banking or legal sectors, for example. Finally, *induced employment* refers to general economic activity resulting from spending by direct and indirect employees (e.g., spending on food and housing).

Oftentimes, jobs studies are based on models. Input-output (I-O) models are widely used to estimate employment in various industrial sectors. I-O models are intended to model the entire economy and the various interactions between different industries. Within specific industries, I-O models can be calibrated using data on individual projects such as nameplate capacity, location, year of construction, and project cost. Depending on the sophistication of the specific model, I-O models can be designed to estimate net job creation economy-wide resulting from added activity in a certain industry.[33] That is, if growth in the wind sector leads to loss of coal-sector jobs, the net job creation when coal-related job losses are considered would be less than the gross job creation in the wind industry.

Jobs and the Recovery Act's Section 1603 Grant Program

In April 2012, the National Renewable Energy Laboratory (NREL) released a report providing analysis of jobs supported by the Section 1603 grant program.[34] In looking at supported jobs, NREL does not attempt to estimate how many jobs were created by the Section 1603 grant program.[35] Instead, the report estimates the number of direct, indirect, and induced jobs that were supported by wind and solar projects that received the Section 1603 grants from 2009 through November 11, 2011. During this period, $9.7 billion in grants was paid out to 24,711 projects.

---

[32] Max Wei, Shana Patadia, and Daniel M. Kammen, "Putting Renewables and Energy Efficiency to Work: How Many Jobs Can the Clean Energy Industry Generate in the U.S.?," *Energy Policy*, vol. 38, no. 2 (2010), pp. 920-921.

[33] Max Wei, Shana Patadia, and Daniel M. Kammen, "Putting Renewables and Energy Efficiency to Work: How Many Jobs Can the Clean Energy Industry Generate in the U.S.?," *Energy Policy*, vol. 38, no. 2 (2010), pp. 919-931 provides additional details on the use of I-O models in clean energy job creation studies.

[34] Daniel Steinberg, Gian Porro, and Marshall Goldberg, *Preliminary Analysis of the Jobs and Economic Impacts of Renewable Energy Projects Supported by the §1603 Treasury Grant Program*, National Renewable Energy Laboratory, NREL/TP-6A20-52739, Golden, CO, April 2012.

[35] Page 3 of the NREL report states:

> In this analysis, no attempt was made to estimate the number of projects or amount of capacity that would have been built without a §1603 grant, which would be necessary in order to quantify the portion of the total jobs and associated economic impacts attributable to the §1603 program; thus, we report the estimated number of jobs, earnings, and economic output supported by total investment (§1603 investment and non-§1603 investment) in the projects examined. It is clear that some portion of the jobs, earnings, and economic output supported by these projects can be directly attributable to the §1603 program, but the authors make no attempt to estimate that portion in this analysis.

NREL used an I-O model to estimate jobs supported by the Section 1603 grant program.[36] The specific model used in the NREL study is able to estimate supply-chain impacts within the industry, and therefore estimate indirect employment associated with projects that received Section 1603 grants. The model used in the NREL study, however, does not account for job displacement or reduced economic activity in other industrial sectors. Thus, the jobs estimates provided in the NREL study are gross estimates, and do not include potential job losses in other industries that might have resulted as economic resources were redirected to wind and solar.

In sum, NREL concluded that the Section 1603 grant program supported between 52,000 and 75,000 direct and indirect jobs per year during the construction phase (see **Table 2**). During the operational phase, NREL estimated that the Section 1603 grant program supported 5,100 to 5,500 direct and indirect jobs per year. These figures represent jobs supported by grants paid through November 10, 2011.

Table 2. Estimates of Jobs Supported and Created by the Section 1603 Grant Program

Average Jobs per Year

	Construction Phase	Operational Phase
Jobs Supported by the Section 1603 Grant (NREL's Results)		
Direct Jobs	9,400	910
Indirect Jobs	43,000 - 66,000	4,200 – 4,600
Induced Jobs	32,000 - 49,000	4,600 – 4,900
Direct + Indirect	52,000 – 75,000	5,100 – 5,500
Total (Direct + Indirect + Induced)	84,000 – 120,000	9,700 – 10,000
Estimate of Jobs Created by the Section 1603 Grant – Illustrative Example		
Direct Jobs	3,666	355
Indirect Jobs	16,770 – 25,740	1,638 – 1,794
Direct + Indirect	20,280 – 29,250	1,989 – 2,145

Source: National Renewable Energy Laboratory (NREL) and CRS calculations based on the methodology presented in Mark Bolinger, Ryan Wiser, and Naim Darghouth, *Preliminary Evaluation of the Impact of the Section 1603 Treasury Grant Program on Renewable Energy Deployment in 2009*, Ernest Orlando Lawrence Berkeley National Laboratory, LBNL-3188E, April 2010.

Notes: Potential jobs created by the Section 1603 grant are calculated as 39% of the estimated jobs supported, as reported in the NREL study. Induced jobs are not included in the potential job creation section as such estimates are less reliable than those presented for direct and indirect jobs. These figures are provided for illustrative purposes, and may vary according to factors described in the text.

One way to estimate the number of jobs created by the Section 1603 grant program would be to use estimates of the installed capacity that was actually dependent on the grant, as opposed to grant recipients for projects that would have moved forward without the grant. One early analysis of the Section 1603 grant program estimated that roughly 25% of the wind capacity installed in 2009 was directly motivated

[36] The model used in the NREL study known as the JEDI model.

by the grant.[37] Of the wind projects that received the grant in 2009, roughly 39% were dependent on the grant. Using this methodology, an estimate of the number of jobs potentially created by the Section 1603 grant program is the number of jobs supported by the Section 1603 grant program multiplied by 39%, or an estimate of the share of projects took place in direct response to the grant option.[38] If further research on the proportion of projects that moved forward because of the Section 1603 grant program becomes available, this figure may be revised.

The potential jobs created by the Section 1603 grant program, as reported in **Table 2**, may understate actual job creation for a couple of reasons. First, the 39% ratio was derived using only wind projects. If solar projects are more likely to be motivated by the Section 1603 grant option, or if solar projects are more labor intensive, the 39% ratio would understate job creation for solar projects.[39] Second, the 39% ratio was based on wind projects completed in 2009. Many of the projects that took place in 2009 had been planned in earlier years, prior to enactment of the Section 1603 grant program at the beginning of 2009. It is likely that a larger proportion of the projects installed in 2010 were directly motivated by the Section 1603 grant, as there was a longer lead time to allow for planning knowing that the grant option would be available. The estimates of jobs created by the Section 1603 grant program remain gross estimates, and still do not account for potential job losses in other industries.[40]

An alternative methodology for estimating the number of jobs created by the Section 1603 grant program is to use an investment elasticity approach. An investment elasticity measures the percentage change in investment divided by the percentage change in the user cost of capital. Empirical evidence suggests relationship between investment and investment tax incentives is inelastic, implying that induced spending is less than the value of the subsidy that is being given.[41] As an illustration, an investment elasticity of -1 would lead to increased investment in renewable energy of 30% (most empirical evidence suggests an investment elasticity of less than 1 in absolute value, making this a generous estimate).[42] Since moving from the PTC or ITC to a grant option provides a marginal subsidy that is less than the total value of the subsidy, this methodology suggests that the job creation estimates in the illustrative example in **Table 2** may overstate actual job creation.

---

[37] A total of 9,747 megawatts of wind capacity was installed in 2009. Of this, 6,200 megawatts in wind capacity applied for the grant option. By examining the specific financial circumstances for individual projects, it was estimated that roughly 3,766 megawatts of wind power elected the grant without needing the grant, while 2,433 megawatts of wind capacity installations were grant-dependent. See Mark Bolinger, Ryan Wiser, and Naim Darghouth, *Preliminary Evaluation of the Impact of the Section 1603 Treasury Grant Program on Renewable Energy Deployment in 2009*, Ernest Orlando Lawrence Berkeley National Laboratory, LBNL-3188E, April 2010.

[38] This methodology is used in Mark Bolinger, Ryan Wiser, and Naim Darghouth, *Preliminary Evaluation of the Impact of the Section 1603 Treasury Grant Program on Renewable Energy Deployment in 2009*, Ernest Orlando Lawrence Berkeley National Laboratory, LBNL-3188E, April 2010.

[39] In NREL's 2012 study of job creation, solar PV received 13% of total Section 1603 funds and comprised 5% of the generation capacity. Of the jobs direct estimated to have been supported in NREL's 2012 study, 41% were for solar during the construction phase, while 16% were for solar during the operational phase (the NREL 2012 study on job creation looked only at wind and solar).

[40] It is also possible that falling prices for wind turbines and solar panels led to increased installations of renewable electricity capacity in recent years. Falling prices would have made more projects financially viable with tax credits only, but also would have made more marginal projects attractive given the grant option.

[41] For further discussion, see CRS Report R41034, *Business Investment and Employment Tax Incentives to Stimulate the Economy*, by Thomas L. Hungerford and Jane G. Gravelle.

[42] The 30% is derived as follows. A demand function is given as $Q=AP^{-e}$. Demand after the investment subsidy is given as $Q^*=AP^{*-e}$. Assuming an investment subsidy of 30%, P is multiplied by (1 – 0.3). Dividing Q* by Q, and solving for the percentage change in Q (or investment), investment is found to increase by 30% with an investment elasticity of -1.

What Other Metrics Could be Used to Evaluate Renewable Energy Tax Incentives?

While "job creation" may have been one of the policy objectives of the Section 1603 grant program and the advanced energy manufacturing tax credit, job creation was not necessarily the primary policy objective. Congressional intent when enacting the Section 1603 grant program was to provide incentives for energy resources that address the environmental concerns associated with fossil fuels, and to support continued growth in the renewable energy industry during the economic downturn.[43] In contrast to the Section 1603 grant program, the potential for job creation was one of the selection criteria in the advanced energy manufacturing tax credit program. Other selection criteria for the advanced energy manufacturing tax credit included reduced emissions, technological innovation, and time to completion.[44]

To fully evaluate renewable energy tax incentives, it is important to carefully consider the policy's objectives. In the case of renewable energy, tax incentives have been promoted as a tool for addressing environmental concerns, enhancing energy security, and as compensation for the unpriced costs associated with the use of electricity generated using fossil fuels. In this sense, job creation may be an ancillary benefit of supporting growth in the renewable energy sector.

Thank you again for inviting me to appear today. I am happy to respond to your questions.

---

[43] The JCT published the following rationale for the Section 1603 grant program:

> The Congress believes that incentives for the production of electricity from renewable resources will help limit the environmental consequences of continued reliance on power generated using fossil fuels. The Congress understands that some investors in renewable energy projects have suffered economic losses that prevent them from benefitting from the renewable energy production credit and the energy credit. The Congress further believes that this situation, combined with current economic conditions, has the potential to jeopardize investment in renewable energy facilities. The Congress there believes that, in the short term, allowing renewable energy developers to elect to receive direct grants in lieu of the renewable electricity production tax credit and the energy credit is necessary for continued growth in this important industry.

See U.S. Congress, Joint Committee on Taxation, *General Explanation of Tax Legislation Enacted in the 111th Congress*, committee print, 111th Cong., March 2011, JCS-2-11, pp. 109-110.

[44] See U.S. Congress, Joint Committee on Taxation, *General Explanation of Tax Legislation Enacted in the 111th Congress*, committee print, 111th Cong., March 2011, JCS-2-11, p. 129.

Mr. STEARNS. Dr. Kreutzer, just pull the thing a little closer to you, and just put the mike up. That's super. Thank you.

STATEMENT OF DAVID W. KREUTZER

Mr. KREUTZER. OK. Chairman Stearns, Ranking Member DeGette and other members, thank you for inviting me to address the subcommittee on the issue of green jobs. My name is David Kreutzer. I am Research Fellow in Energy Economics and Climate Change at the Heritage Foundation. The views I express in this testimony are my own and should not be construed as representing any of the Heritage Foundation.

I would like to address several aspects concerning green jobs and the economy. First, counting jobs is an unsatisfactory measure of economic policy. A more direct measure, such as national income, gives us a better picture.

Second, measures of job creation or income creation should be done on a net basis. Studies of green jobs created by regulatory burdens or subsidies consistently ignore the offsetting job losses the regulations or subsidies impose on the economy.

One study of the impact of regulation on the coal-fired power industry, cited by EPA Administrator Lisa Jackson, showed the more burdensome a regulation was, the greater would be the employment increase. For instance, a regulation whose compliance cost was 100 times greater created 100 times as many new jobs.

A study done for the Wind Energy Association and another done by the renewable—excuse me, the National Renewable Energy Laboratory, came to similar conclusions regarding subsidies. As my colleague John Fleming noted, these studies always start with step two. That is, they assume the money just appears. They skip the part where taxpayers have to finance subsidies, or stockholders and ratepayers have to pay for retrofitting power plants.

Of course, in reality, the money comes out of somebody else's pockets, which reduces their spending and the job-creating impact that their spending would have had.

I would like to spend the remainder of my few minutes discussing the Bureau of Labor Statistics' Green Jobs Report. The headline number that has been mentioned here already several times is that the U.S. economy has 3.1 million green jobs. What many do not know is what jobs were included to get that 3.1 million total.

For instance, there are over 13,000 green jobs in the septic tank and portable toilet servicing industry. That total is 33 times the 400 green jobs in the solar utility industry and almost three times the number of jobs in all renewable power utilities combined.

Even wind power utilities, with 2,200 green jobs, rank well below septic tank servicing and barely above the 1,900 green jobs in hog farming. That the 3.1 million green jobs total is used as an argument in favor of subsidizing renewable energy is grossly misleading.

For instance, the solar power industry has received subsidies of some sort for most of the last 30 years. Simple division shows that the subsidies have created about one job per month at most in the solar utilities industry. According to the BLS figures, 35,800 or

fully 80 percent of the jobs in the power utility industry are in the nuclear sector.

The numbers make no more sense in the manufacturing sector where the single largest contributor of green jobs is the steel mill industry, half of whose jobs are counted as green. And I want to emphasize this is not the steel fabricating industry, but rather the part of the industry that makes the raw steel.

The 30,000 plus green jobs in the pulp paper and paper-board industry is 50 percent higher than the number of green jobs in turbine and power transmission equipment manufacturing, which manufacturers turbines for steam, gas and hydro, in addition to turbines for wind power.

The BLS calculations for the service sector seem almost comedic. There are over 160,000 green jobs in school and employee bus transportation. There are over 116,000 green jobs in trash collection. There are over 106,000 green jobs in used merchandise stores. Those three categories combined have more than doubled the green jobs of engineering services and architectural and related services combined.

Though bus driving, trash collecting, steel and paper making are all important jobs, they have little to do with green policy and are not what most people think of when policymakers talk about a green energy future.

In summary, green job counts are poor measures of the effectiveness of green subsidies and mandates. That said, the studies that have been done are consistently biased towards green subsidies and mandates because they ignore the significant job losses that these mandates and subsidies will cause in other parts of the economy.

And, finally, the BLS green jobs study is absolutely worthless as any sort of measure of the policy effectiveness or importance of green industries to our overall economy.

Thank you, and I look forward to answering your questions.

Mr. STEARNS. Thank you.

[The prepared statement of Mr. Kreutzer follows:]

214 Massachusetts Avenue, NE • Washington DC 20002 • (202) 546-4400 • heritage.org

CONGRESSIONAL TESTIMONY

The Federal Green Jobs Agenda: What the Job Counts Actually Tell Us

Testimony Before
The Committee on Energy and Commerce
Subcommittee on Oversight and Investigations
United States House of Representatives

June 19, 2012

David W. Kreutzer, Ph.D.
Research Fellow in Energy Economics and Climate Change
The Heritage Foundation

My name is David Kreutzer. I am Research Fellow in Energy Economics and Climate Change at The Heritage Foundation. The views I express in this testimony are my own, and should not be construed as representing any official position of The Heritage Foundation.

Introduction

Jobs seem to be the metric by which most, if not all, policy is measured in Washington. So it is worth reminding ourselves what is good about a job. The benefit of a job is not the effort expended or the need to get out of bed Monday morning, rather it is the compensation received by the employee and the value of the labor's product to the employer. For a job to be a good thing, the compensation must be high enough to induce the employee to provide the labor. At the same time, the compensation cannot be larger than the value of the labor's contribution to output or the employer will go bankrupt. A job that violates either of the above conditions will be a form of either slavery or welfare.

It should be noted that both employer and employee can be better off when output per worker is higher. This is the foundation of economic growth—increasing output per worker. The increase is generated by greater and more effective investment in both human and physical capital. Though markets are not perfect, policies that ignore the signals provided by markets do so at great peril.

Where Signals Were Ignored

In October of 2010, the director of the Department of Energy's Loan Program Office, David Frantz, gave an update of the department's loan-guarantee programs funded by the American Recovery and Reinvestment Act.[1] The criteria he outlined highlight the problems with allocating capital via the political process. Two of the criteria presented were mutually exclusive. The first criterion was funded projects should be commercially viable. The second was that those seeking funding must demonstrate the projects cannot get private financing. For many economists, the inability to get private financing would be the definition of not being commercially viable.

Government loans and loan guarantees alter the paths of capital allocation toward loans with greater political rates of return relative to actual financial rates of return. In the slides presented that October, Mr. Frantz listed four projects for which the loan processes had been finalized. It is illuminating to review the paths those projects have taken since receiving loans.

- The first, Solyndra, received a loan guarantee for $535 million in the fall of 2009. In the spring of 2010, it failed to complete its initial public offering after an independent audit questioned the ongoing viability of the firm.[2] Then, in the fall of 2010, the firm closed one of its manufacturing facilities and laid off 180 workers.[3] In the fall of 2011 Solyndra filed for bankruptcy and laid of all but a handful of its remaining employees.

---

[1]U.S. Department of Energy, "Loan Guarantee Program Status Update," October 29, 2010, at *http://www.uschamber.com/sites/default/files/issues/environment/files/LGP%20Update%20_Chamber_102910_Final.pdf* (April 10, 2011).
[2]David Freddoso, "Obama's Big Green Gamble: Solyndra," *The Washington Examiner*, July 14, 2010, at *http://washingtonexaminer.com/node/65146#* (April 10, 2011)
[3]Ronnie Greene and Matthew Mosk, "Green Bundler With the Golden Touch," *The Huffington Post*, March 30, 2011, at *http://www.huffingtonpost.com/2011/03/30/green-bundler-with-the-golden-touch_n_842863.html* (April 10, 2011).

- The second, Beacon Power, received a $43 million loan guarantee in July of 2009. Beacon Power also filed for bankruptcy in the fall of 2011.[4]
- The third, First Wind Holdings, received a $117 million loan guarantee in March of 2010 but withdrew its initial public offering in October of 2010.[5]
- The fourth was Nevada Geothermal Power's Blue Mountain geothermal project. Since Mr. Frantz's slide show, the price of Nevada Geothermal Power has fallen more than 90 percent to $0.04 per share.[6]

Counting Green Jobs

Perhaps frustrated with the public's unwillingness to absorb the higher energy costs that climate legislation would impose, proponents of such climate policies offered them instead as job-creation policies. However, imposing restrictions and regulations on energy use does not increase economic growth, income, or employment. They lead to less of all three. This is not just the conclusion of economists at conservative think tanks.

In September of 2009, a panel of economists from the Brookings Institution, the Environmental Protection Agency, the Congressional Budget Office, the Energy Information Administration, and The Heritage Foundation presented their different findings on the economic impact of cap-and-trade policies. Though not all of the economists directly addressed employment, none of the economists argued that cap-and-

[4] Reuters News Service, "Beacon Power bankrupt; had U.S. backing like Solyndra," October 31, 2011, accessed at http://www.reuters.com/article/2011/10/31/us-beaconpower-bankruptcy-idUSTRE79T39320111031 (June 14, 2012).
[5] Steven Syre, "First Wind IPO Sputters Suddenly," *The Boston Globe*, October 29, 2010, at *http://articles.boston.com/2010-10-29/business/29332105_1_ipo-market-ipo-expectations-stock* (April 10, 2010).
[6] Bloomberg/Business Week Stock Quote, accessed at http://investing.businessweek.com/research/stocks/charts/charts.asp?ticker=NGP:CN (June 14, 2012).

trade would stimulate the economy. Instead, the debate was over how much the economy would be harmed.[7]

There have been published studies that purport to show increased employment from environmental regulation and subsidies for alternative energy. These studies consistently ignore the job-destroying impacts of the policies. As my colleague John Fleming phrases it, they always start with step two. That is, they count the jobs from the subsidy spending or from spending that is necessary to meet regulations, but they skip the part of how to get the money and ignore the offsetting job losses that occur when the funds for this spending are extracted from other parts of the economy.

A few of the better known examples of this flawed analysis are: A study from the Political Economy Research Institute (PERI) that has been cited by EPA Administrator Lisa Jackson; a study done for the American Wind Energy Association (AWEA); and study prepared by the National Renewable Energy Laboratory (NREL).[8]

The PERI study is notable for its implication that the more burdensome and costly is a regulation, the more jobs it creates. For instance, a rule that imposed compliance costs of $100 billion would create 100 times as many jobs as a rule with $1 billion in compliance costs. This absurd conclusion arises because the PERI study made no accounting of the

[7] "Cap and Trade: Comparing Cost Estimates," Heritage Foundation event, September 21, 2009, at *http://www.heritage.org/Events/2009/09/Cap-and-Trade-Comparing-Cost-Estimates*.

[8] James Heintz et al., "New Jobs—Cleaner Air: Employment Effects Under Planned Changes to the EPA's Air Pollution Rules," Ceres and the Political Economy Research Institute, February 2011. Navigant Consulting, "Impact of the Production Tax Credit on the U.S. Wind Market," Navigant reference 152362, December 11, 2011. Daniel Steinberg et al., "Preliminary Analysis of the jobs and Economic Impacts of the Renewable Energy Projects Supported by the §1603 Treasury Grant Program," National Renewable Energy Laboratory, Technical Report NREL/TP-6A20-52739, April 2012.

impacts of lost expenditure in other parts of the economy or of the impacts of higher electricity costs.

The AWEA study traces the flow of the production tax credit and the NREL study traces the flow of the Section 1603 grant funds. Again, they start at step two, as though the grants and credits are funded by some source of free money. To their credit, the authors of the NREL study acknowledge that their report does not measure the net jobs impact and that there is an opportunity cost to the expenditure. However, that caveat was generally lost in the promotion of the study's findings.

Using similar logic to the three studies above, it could be claimed that a crime lord's bank robbing creates jobs. He hires some thugs, creating jobs and income for them. He also has to give the thugs some guns, so the gun manufacturers see an employment increase, as do the suppliers to the gun makers and the suppliers to those suppliers, etc. There are also jobs in the production process for making the ski masks the robbers wear, the jobs producing and servicing the getaway car, the jobs at the motel where the thugs lie low, etc.

In this example, we ignore the losses to the bank and its depositors, the increased security costs that crime imposes on banks, the impact of higher interest rates on borrowers (that's one of the ways banks cover losses from robberies), and every other negative impact of bank robbing, and then conclude bank robbing is an unambiguous gain for the economy.

The BLS Green Jobs Count

On March 22, 2012, the Bureau of Labor Statistics (BLS) issued a news release to report the results of their green jobs count. Their total of 3.1 million green jobs has been cited as reason to continue subsidies and mandates to promote green energy. However, digging just a little into the actual numbers shows that the BLS green-jobs count has absolutely no policy relevance at all.

There are at least two reasons for this lack of relevance. First, the count is a snapshot and gives no indication of trends or growth rates. But the second reason is more fundamental and would eliminate the usefulness of the count regardless of how many times it is repeated—the definition of a green job is so broad as to make any green-job total meaningless. The BLS counts Salvation Army employees, school bus drivers, and even, according to the acting administrator's testimony, oil-industry lobbyists.[9] It is not clear that the report would have been much less useful had the definition of a green worker been anybody who wore green clothing on St. Patrick's Day.

It is not simply the types of jobs that are counted in the BLS report, but the relative numbers of them in the different categories as well. According to the BLS, there are 400 green jobs in the solar utility industry. So, if this number is used to support subsidies to solar power, we would have to conclude the more than three decades of support for solar power has generated about one job per month in the solar utility industry. Including the

[9] U.S. House of Representatives Committee on Oversight and Government Reform, hearing "Addressing Concerns about the Integrity of the U.S. Department of Labor's Jobs Reporting," Panel 2, June 6, 2012, accessed http://oversight.house.gov/hearing/addressing-concerns-about-the-integrity-of-the-u-s-department-of-labors-jobs-reporting/ (June 15, 2012).

huge number of school bus drivers in the total does not strengthen the argument for renewable subsidies.

Adding all the green jobs from solar to those in the wind, biomass, and other renewable power utilities (excluding hydroelectric) gives a total of 4,700 green jobs. This is less than one-seventh the number of green jobs in the nuclear power industry (35,800).

Since nuclear power generation emits no particulates or oxides of sulfur or nitrogen (or carbon dioxide) it should be considered a green energy source. However, no new plants have been both licensed and built in the past 30 years. Though two construction operations licenses have recently been issued, the green jobs noted above are associated with current power generation. So those jobs are clearly not the result of any green energy or green jobs programs. Plus, the Obama Administration has stalled and nearly killed Yucca Mountain without offering an alternative for nuclear waste disposal. Without resolution to the waste disposal problem, revival of nuclear power and its associated jobs will be severely limited.[10]

Another set of comparisons illustrates the problem with using the BLS green-jobs total as justification for more green policies. The total green jobs in wind power utilities (2,200) is barely more than the number in hog and pig farming (1,900) and is decidedly less than the 13,313 green jobs in the septic tank and portable toilet servicing industry.

---

[10] Jack Spencer, "Blue Ribbon Commission on Nuclear Waste: Missing Opportunity for Lasting Reform," Heritage Foundation *Backgrounder* No. 2600, August 22, 2011, http://www.heritage.org/research/reports/2011/08/blue-ribbon-commission-on-nuclear-waste-missing-opportunity-for-lasting-reform

In the manufacturing sector the largest single contributor (aggregating at the 4-digit NAICS code level) of green jobs is the steel mill industry with 43,658 green jobs. Fully 50 percent of jobs producing primary steel, iron, and alloys are counted as green. In addition, pulp, paper, and paperboard mills account for 30,473 green jobs, which are more than the 20,360 green jobs in the turbine and power transmission equipment manufacturers (a category that includes manufacturers of wind, gas, hydro, and steam turbines). So the cheerful claims about the large number of green jobs in manufacturing must also be discounted.

In the service sector, both engineering services and architectural and related services have total green jobs (100,847 and 71,891) and percentages of green jobs (11.6 and 17.8) that are exceeded by used merchandise stores (106,865 and 85.2 percent), school and employee bus transportation (160,896 and 88 percent), and waste collection (116,293 and 83.8 percent). If the BLS is measuring what we can expect to see in the clean-energy future, then more of us will be working at thrift stores, on trash trucks, and driving buses than will be designing high-tech equipment and buildings.

Conclusion

The studies allegedly showing job creation from renewable-energy subsidies and the BLS green jobs report are grossly misleading when used to support renewable or green energy programs. In the case of the former, they ignore the significant offsetting job losses from

the subsidies and regulations. In the latter case, the definition of "green" is so broad as to be useless for addressing policy questions.

****

The Heritage Foundation is a public policy, research, and educational organization recognized as exempt under section 501(c)(3) of the Internal Revenue Code. It is privately supported and receives no funds from any government at any level, nor does it perform any government or other contract work.

The Heritage Foundation is the most broadly supported think tank in the United States. During 2011, it had nearly 700,000 individual, foundation, and corporate supporters representing every state in the U.S. Its 2011 income came from the following sources:

Individuals	78%
Foundations	17%
Corporations	5%

The top five corporate givers provided The Heritage Foundation with 2% of its 2011 income. The Heritage Foundation's books are audited annually by the national accounting firm of McGladrey & Pullen. A list of major donors is available from The Heritage Foundation upon request.

Members of The Heritage Foundation staff testify as individuals discussing their own independent research. The views expressed are their own and do not reflect an institutional position for The Heritage Foundation or its board of trustees.

Mr. STEARNS. And Dr. Montgomery.

STATEMENT OF W. DAVID MONTGOMERY

Mr. MONTGOMERY. Thank you. I also want to thank the committee for the invitation to testify today.

My name is David Montgomery. I'm a senior vice president of NERA Economic Consulting, and likewise my testimony today represents my own conclusions, may not necessarily be shared by all of my colleagues.

The question I was asked to address is how is it possible to create jobs by means of burdensome regulations and programs that replace less costly energy with more costly energy? I agree with the key points that were made by Dr. Kreutzer, so I will summarize that part of my testimony very quickly.

Green job studies would be harmless, except they create the appearance of creating—of increasing the total number of persons employed in the U.S. economy. That's where they go wrong because they do that only by telling half the story, and, as Dr. Kreutzer described, they ignore what these workers would have been doing otherwise.

I don't think you will find anyone to deny this. Everyone knows that this is the game in calculating green jobs, and it's not just green jobs. This half-truth is found in almost every green jobs study, but it's also found in most of the claims from industry about how many jobs they create, simply a question of what else would they—all of these claims ignore what else it is that the workers would have been doing, and that's the critical question for what the opportunity cost is to the economy.

The second point is that some studies do find job benefits using a comprehensive model; that is, they do take into account what it is that workers would have been doing otherwise. But they get to their conclusion about job benefits by assuming the conclusion, which is basically that government agencies know better than businesses and consumers what is in their own private economic interests.

For that I would cite in particular EPA's most recent regulatory impact analysis of the economic benefits of fuel economy standards. But here I would make a further note because it's not—in addition to being highly paternalistic, these analyses are based on excessive certainty. They're all forecasts. Job impact studies are all forecasts of what's going to happen in the future.

In several of its recent regulatory impact analyses, EPA has based its favorable conclusions about the costs and benefits of regulation on one set of official forecasts of future energy prices. One thing that I think we can also agree on is that government agencies have a consistent track record of being wrong on what future energy prices are going to be.

But EPA never tested what the outcome for consumers would be if they offered—if the official gas prices were wrong. This requires a broader scenario analysis, which could reveal that taking away the freedom of consumers to make choices based on their own diverse opinions, by taking that choice away, EPA actually imposes a uniformity that leaves the economy unhedged against the possibility, for example, that oil prices might fall. After all, natural gas

prices just fell dramatically after everyone was sure they would never do that.

In reflecting on my testimony last night, I realized, though, that I had left out the most important part. The jobs are not an appropriate measure of the merits of energy and environmental policies. The BLS'—the report is valuable in an ironic way because it pushes the obsession to counting jobs to an extreme.

The valid reason for environmental regulations is not job creation. We should be concerned about the current level of unemployment, but environmental regulations and energy subsidies make no contribution to solving it. They are more likely to move and employ people from one job to another, and they don't address the underlying causes of unemployment.

Job creation is a little irrelevant to them. The reason for environmental regulation is to deal with externalities, cases in which the market is not sufficient to get the maximum benefit for society. And in order to get that maximum benefit for society regulations like ambient air-quality, standards need to be set at levels that balance benefits for health in the environment against the other goods that must be given up to provide those benefits.

Part of the cost of environmental regulations is the labor that's diverted from other productive activities, so jobs are part of the cost. They need to be paid attention to, but on that side of the ledger. I'm much more skeptical that economic justification can ever be found for the complex of energy subsidies and mandates that now masquerade as energy—environmental and energy security policies.

But if it's to be found, it won't be in treating these programs as engines of job creation or new economy, but by evaluating whether they provide energy security and environmental benefits worth more than their cost. And even more important, by comparing the current policies that pick the winners among technologies based on political and bureaucratic evaluations, with policies that address the alleged environmental and energy security issues directly, and create a level playing field for all the solutions.

So my conclusion from the job estimates tell us nothing about any of the matters that have to be considered in an attempt to design energy and environmental policy that makes the largest contribution to our national welfare.

Thank you, Mr. Chairman.

Mr. STEARNS. Thank you.

[The prepared statement of Mr. Montgomery follows:]

Prepared Testimony of
W. David Montgomery, Ph.D.
before the
Subcommittee on Oversight and Investigations
Committee on Energy and Commerce
United States House of Representatives

Hearing on the Federal Green Jobs Agenda
June 19, 2012

Mr. Chairman and Members of the Subcommittee:

I am honored by your invitation to appear today to testify on the Federal Green Jobs agenda. I am Senior Vice President of NERA Economic Consulting, and my work for over 40 years has addressed economic issues in energy and environmental policy. I have published many papers in peer-reviewed journals dealing with design and economic impacts of those policies, and I was honored by the Association of Environmental and Resource Economists with their 2004 award for a "publication of enduring quality." I taught environmental economics at the California Institute of Technology and economic theory at Caltech and Stanford University. My testimony today will address the question of whether it is possible to create new jobs by issuing more regulations, mandating or subsidizing the introduction of uneconomic "green" technologies, and relabeling existing jobs as "green." My statements in this testimony represent my own opinions and conclusions and do not necessarily represent the views of other consultants at NERA.

Introduction

A recent report from the Bureau of Labor Statistics describes employment "in businesses that produce goods and provide services that benefit the environment or conserve natural resources." It concludes that "GGS jobs accounted for 2.4 percent of total employment in 2010. The private

sector had 2.3 million GGS jobs and the public sector had 860,300."[1]

Several points are striking. Since this calculation is based on classifying industries as producing "green" goods and services, it includes jobs that exist because of normal market demand for such goods and services as outdoor recreation and organic produce as well as those that are attributable to government "green jobs" programs. Thus the numbers do not tell us anything directly about claims that environmental regulations and energy technology mandates, subsidies and incentives have or will create large numbers of new jobs. Although many public sector jobs were involved in provision of public goods like national parks, almost 300,000 of the state and federal jobs were in the administration and enforcement of environmental regulations. The report itself notes that this was the largest single category.

The report is presented as a simple statement of numbers, but their meaning is subject to a great deal of interpretation. Therefore, I would like to address several potential misinterpretations before they become too firmly entrenched in readers' minds.

The most misleading interpretation would be to leap from the statement that green jobs represented 2.4% of public and private employment in 2010 to the conclusion that unemployment would have been 2.4 percentage points higher without green jobs. Nothing could be further from the truth. Like other green jobs studies that claim to estimate jobs created by specific government programs, the report does not address the question of what the individuals counted in the BLS report would have been doing if it were not for government energy and environmental programs and regulations. It is clear that many would have been doing exactly the same thing, because all the BLS study does is relabel existing jobs.

[1] BLS News Release, Thursday, March 22, 2012 USDL-12-0495

But some of the activities cited in the BLS discussion of its data exist for one or more of these reasons:

- Regulatory programs that mandate installation of pollution control equipment or other investments and operating costs to reduce emissions or energy use
- Mandates, subsidies and other incentives to produce and use energy sources classified as "Green"
- Increased employment in government agencies and contractors to write and administer regulations or provide services classified as "Green"

A number of studies of green jobs released over the past few years would have us believe that these governmental actions and activities do cause net increases in employment and offer that as a rationale or defense of their adoption.

I have discussed examples of green jobs studies in previous testimony,[2] and my conclusion in each case was that the job estimates told only half, or less, of the story. In this testimony I mention some key points from those discussions and cite two additional examples, one taken from testimony in a hearing on Green Jobs held by a Senate subcommittee last year and one from the Regulatory Impact Analysis for the MATS rule just issued by EPA.

What is common to all these claims of job growth due to government regulation and subsidization is that they leave out of their calculations all the jobs lost in the rest of the economy because of regulatory costs and higher energy costs.

[2] R. Pollin, H. Garret-Peltier, J. Heintz, and H. Scharber, "Green Recovery," Political Economy Research Center and Center for American Progress, September 2008 and J. Heintz et. al., New Jobs - Cleaner Air: Employment Effects Under Planned Changes to EPA's Air Pollution Rules, Ceres and PERI, February 2011.

What Is Wrong with Green Job Studies?

The critical error in calculations of green jobs created by regulation, subsidies or mandates is their failure to balance the jobs lost in the rest of the economy against those that may be gained as a result of the specific projects or expenditures in the studies. For example, in testimony last year before Senate Environment and Public Works Committee's Subcommittee on Green Jobs and the New Economy, a representative of the UAW[3] claimed that

> "..,the regulation of mobile sources has been a "win-win" that results in greater oil independence for our nation; a cleaner, healthier environment for ourselves and our children; and an increased number of jobs in the auto sector. The simple equation for understanding how this job creation occurs is that the new technology required to meet tailpipe emissions standards represents additional content on each vehicle, and bringing that additional content to market requires more engineers, more managers, and more construction and production workers.

What her statement leaves out is the conclusion of every study of these standards, including those done by EPA, that past tailpipe emission standards imposed a net cost (even after their claimed health benefits are taken into account) on the economy.[4]

There is no paradox in the observation that a regulation that increases jobs in one industry can impose net costs on the economy as a whole. They are one and the same thing. More "content" and more labor hours required for each vehicle produced raise the cost of the vehicle. Any jobs created in the auto industry come directly from the pockets of consumers who must pay those higher prices for new vehicles. Moreover, unlike design changes that respond to consumer demand,

---

[3] Barbara Somson, Legislative Director, International Union, United Automobile, Aerospace & Agricultural Implement Workers Of America (UAW) on the subject of Clean Air Act And Jobs before the Senate Committee on Environment and Public Works Subcommittee On Clean Air and Nuclear Safety And the Subcommittee on Green Jobs and the New Economy United States Senate March 17, 2011

[4] The Benefits and Costs of the Clean Air Act from 1990 to 2020 - EPA Washington, D.C., March 2011; Prepared Testimony of W. David Montgomery, Ph.D. before the Subcommittee on Clean Air and Nuclear Safety and Subcommittee on Green Jobs and the New Economy Committee on Environment and Public Works United States Senate Hearing on Clean Air Act and Jobs March 17, 2011.

this added cost does not improve the transportation services or amenities provided new cars in any way. (Indeed, many of the cumulative tailpipe emission standards degraded performance and imposed additional costs on consumers over and above the increase in sticker prices). As Ms Somson pointed out, the purpose of the standards was to improve air quality: whether they represented a win-win depended entirely on whether the health benefits of the tailpipe standards outweighed their out of pocket costs to consumers. [5] Setting standards purely for the sake of saving consumers money assumes that regulators have better insight into consumer preferences and superior ability to forecast future oil prices, and thus are entitled to impose their views on entirely private choices of consumers.

Ms Somson also failed to mention the other counterproductive effects of standards applied to new vehicles – by raising prices of new vehicles they reduce sales and delay turnover of the fleet, which has been the most effective mechanism for reducing total fuel consumption and emissions – and by forcing changes in size and design of vehicles that have reduced the value to consumers of the vehicles for which they pay higher prices. Thus it is not even a zero-sum game between consumers and auto workers – the cost imposed on consumers by emission and fuel economy standards for vehicles is larger than the benefit to auto workers. So even as a welfare program for auto workers, these standards are inefficient compared to straight transfers of cash.

There is a paradox in this example. Ms Somson did recognize that "... greater fuel efficiency allows consumers to spend less on fuel, which frees up that money to be spent on other goods and services." That, of course, is the point that needs to be investigated – where does the money come from? Thus Ms. Somson was right on the general point but has the direction wrong – when

[5] In my earlier testimony, I discussed how the EPA's own analysis (Benefits and Costs of the Clean Air Act, 2011, op cit) reveals that the tailpipe emission standards for ozone did not provide benefits greater than their costs.

regulations increase the total cost of buying and using a vehicle, consumers have less money to spend on other things, scarce resources of labor and capital used to produce more costly vehicles are not available to produce other things, and overall the productive potential and real output of the economy are reduced. And since unlike fuel economy standards, tailpipe emission standards provide no compensating savings in auto operating costs whatever, they are also a net cost to the economy.

EPA also has estimated job benefits by using a one-sided calculation of only the jobs required to comply with its regulations. I have taken a description of the EPA analysis from a study done by my colleagues at NERA.[6]

> The consequences of the MATS Rule are not just limited to the electric sector. The electric sector has to invest significant capital to comply with the MATS Rule. This capital and other added spending for compliance will induce lower industrial output (because the cost of power, natural gas, and other commodities will increase) and hence drive down income for workers. Although the investments also will create jobs installing the retrofits and building new power plants, the net effect of complying with the MATS Rule will be an increase in the costs of electricity and natural gas, and will produce a drag on the economy as a whole. EPA did not evaluate the MATS Rule using a macroeconomic model so they could not produce a net impact on jobs; instead they cited an estimated 46,000 short-term jobs and 8,000 long-term utility jobs created.[7]

Similar calculations of job benefits of air regulations affecting electric utilities were done by the Political Economy Research Institute. [8] Any study that estimates only the jobs created by a policy is grossly misleading. PERI's study at least tries to work around this truth by mentioning the loss of a small number of jobs associated with operation of retired coal-fired powerplants, but these are the smallest part of the story. Why PERI did not include the decline in coal production and coal mining employment that goes along with replacing coal-fired generation with other energy

[6] Dr. Anne E. Smith, Dr. Paul Bernstein, Scott Bloomberg, Sebastian Mankowski, and Dr. Sugandha Tuladhar An Economic Impact Analysis of EPA's Mercury and Air Toxics Standards Rule 1 March 2012
[7] Regulatory Impact Analysis for the Final Mercury and Air Toxics Standards, p. 6-1.
[8] PERI 2011, op. cit.

sources is a mystery. But this too is only a small part of the story. The important story is that consumers will have less real income to spend, because of increases in the cost of electricity and of all other goods that are produced by means of electricity. Worker productivity will rise more slowly, as investment is diverted away from productivity-enhancing investments, so that wages that employers can afford to pay will fall relative to what they otherwise would have been. Energy-intensive U.S. industries will lose market share to overseas industries not subject to these requirements, and will therefore shrink in size. These impacts will lead to job losses in all the rest of the economy, as the effects of more costly energy ripple through the economy.

NERA's analysis of the rule used a comprehensive model that embeds the electric sector in the entire economy that incorporates all these effects, and accounts for the labor and capital resources used to retrofit existing powerplants and build new ones to replace those forced to retire. The effect of requiring these compliance investments, which create no net increase in electricity generation, is to divert capital away from other, productivity-enhancing investments. As a result, labor productivity is reduced and total worker compensation falls. The return to capital investment also falls, since the same total amount of investment is producing fewer marketed goods and services (the same amount of electricity and less of everything else). When these two sources of income fall, and there is no offsetting increase in national income from other sources – such as an increase in the value of exports and a favorable movement in the terms of trade – GDP and total real personal income must also fall.

The green jobs studies only recognize the first category of effects, counting only the number of jobs directly involved in those construction activities and sometimes the "indirect" jobs created in industries supplying components and materials. Any comprehensive analysis must ask the question

of where these resources come from, and when that question is asked the task becomes one of determining whether the activity from which the resources are drawn in producing greater or less value than that to which the resources are assigned.

In order to shed some light on this issue, our practice at NERA is to characterize the net change in wage income throughout the economy in terms of "job equivalents." That is, we divide the total reduction in wage income nationwide by average compensation per worker to indicate how many workers at the average wage it would take to earn this much income. This calculation is intended only to indicate the magnitude of labor market impacts in terms that are comparable to the job gains or losses in other studies, and it shows in the case of the MATS rule that the likely change in labor compensation is large compared to the job gains estimated by EPA.

Technology mandates and subsidies

Thus far, I have discussed how claims that regulations create additional jobs in the economy are invalid, principally because they fail to account in any way for the jobs lost elsewhere in the economy. The same is true of studies that allege job benefits from mandates, subsidies and other incentives like loan guarantees to promote specific energy technologies. These studies have exactly the same problem, in that they add up the jobs involved, for example, in producing and installing wind generators and the components and raw materials that go into them (they also tend to make the factual error that the generators, components and raw materials will be produced in the United States, which they generally are not). In the process, they lose sight of the fact that these resources – labor, capital, and materials – are no longer available for producing other goods and services. And when the energy sources supported by mandates and subsidies require more resources to produce the same number of Btus of energy than existing alternatives, the net effect of replacing

less costly energy with more costly is to reduce the resources available for producing other goods and services. The higher cost of favored form of energy may be concealed from consumers by means of subsidies and tax breaks, but the cost simply reappears elsewhere in their budgets – most often in the form of higher taxes now or in the future to pay for the government's support of uneconomic technologies.

Although there may be the same number of workers employed either way, the net result of diverting resources to produce the same thing in more costly ways is that the economy will be producing less goods and services and real personal income will fall. Thus studies of job creation through programs to create "green industries" and a "new economy" suffer from exactly the same problem of telling only half the story.

There is a way to reach the conclusion that regulations and subsidies can improve the performance of the economy, and that is to assume it. Some studies, though not typically "green jobs" studies that look no further than the "green" activity, do start with the assumption that consumers and businesses are not capable of making decisions that are in their own economic interest – including studies that claim fuel economy standards will make consumers better off by forcing them to purchase higher levels of fuel economy justified by official government forecasts of gasoline prices and new vehicle costs.

The problem with this assumption is that there is no clear evidence that consumers do make erroneous choices, only that simple engineering models of the cost of vehicles do not take into account all the attributes that consumers value. And there is overwhelming evidence that

government forecasters have never gotten future fuel prices right, and fuel economy standards take away from consumers the option of basing purchases on their own diverse opinions.

Jobs not a good measure of economic benefit

Any analysis that aspires to be objective must take into account the extent to which "green jobs" are offset by the number of other jobs that the regulations would destroy elsewhere in the economy or from which workers would be diverted into activities supported by technology subsidies and mandates. Calculating these "net" jobs accurately is frustrated by the problem of how "jobs" are counted. There are many different kinds of jobs, with different skills, working conditions, and most importantly pay.

The entire job debate is confused by the lack of a clear definition of a "green job," and the BLS report furthers that confusion. For example, how would one classify a job supporting coal-fired power with carbon capture, or nuclear generation? The indirect jobs contained in the PERI calculations and in the BLS report include, for example, steel workers producing materials that go into pollution control equipment and turbines. But when a slab comes out of a steel mill, it could equally well be fabricated into a part for a scrubber or a part for a coal-fired boiler. So when investment switches from building new coal- fired powerplants to building scrubbers, some number of steel workers find themselves in "green jobs" even though no one is doing anything different in the mill (and some lose their jobs because of higher energy costs and foreign competition). Regardless of these definitional concerns, however, the fact remains that workers in aggregate will face lowered earnings potential under a policy that pulls investment away from expansion of capacity to produce final goods and services and raises energy costs. The net effect of lower productivity also ultimately translates into overall losses in average

household spending power, and into reductions in GDP relative to what they would be if no such policy were in place.

Talk of "jobs" diverts attention from the important problem of how much workers earn to a largely irrelevant activity of counting heads. The question that we address in NERA's modeling of economic impacts is whether the balance of the many economic effects of EPA regulations is to increase or decrease total labor income in the United States, and the answer is that total labor income will decrease.

Net versus direct jobs

Misleading studies that leave out the opportunity cost of resources devoted to a specific project have been around for a long time. A respected regional economist[9] has pointed out that proper use of such models requires that both the positive and negative impacts of a proposed policy must be addressed. He gives an example of how looking only at positive impacts biases the results to find that any government expenditure will create additional jobs. A study by KPMG found that expanding a Chicago convention center would create a net 6000 new permanent jobs. When an academic economist redid the study using all the same assumptions as KPMG except for taking account of jobs displaced by the expansion and increased local taxes to pay for the project, she found a net loss of 348 jobs. Mills points out that the most common mistake in these job studies is assuming that the project is paid for by money from outside the region where it is built. He comments that "the zero-sum character of outside money multipliers should be taken into account in federal spending programs" because payment for those projects comes from within the U.S. economy. PERI and EPA make the same error by examining only industries that receive the orders for pollution control and new generating equipment and ignoring where the investment

[9] Edwin Mills, "The Misuse of Regional Economic Models," *Cato Journal*, XII:1, 1993.

comes from and how other industries are affected.

The Luddite Fallacy

There is another basic fallacy in chasing down which industry has the highest number of jobs per dollar of output, as in PERI's claims that energy efficiency has 2.5 times as many jobs per dollar as oil and gas. I call it the Luddite fallacy, remembering the radicals during the early industrial revolution in England who went around smashing machines because of their belief that machines put laborers out of work. What we have learned over the ensuing two centuries is that capital deepening – increasing the amount of capital per worker – is a major driver of economic growth and of increasing productivity, and that having more output per worker is the reason that living standards of workers have risen so dramatically in the past 100 years. Indeed, we measure productivity increase as the rate of increase in output per worker.

Studies like those done by PERI conceal their glorification of low labor productivity by talking about favoring industries that employ more workers per dollar of output. But driving the economy toward industries with more workers per dollar of output is a choice to favor industries with lower labor productivity over industries with greater labor productivity. Reducing average labor productivity translates directly into lower output and slower economic growth, since the basic equation for economic growth is that growth in income is the product of the rate of increase in labor productivity times the rate of growth in the labor force. Moreover, since wages are set by the marginal productivity of labor, shifting to industries with lower labor productivity leads directly to lower wages per worker.

Jobs are simply not a relevant measure of economic benefits. Indeed, the more workers it takes to produce something, the more it will cost and the less of it the nation will be able to afford.

There is an opportunity cost to diverting the labor force to producing pollution control equipment and replacing useful electric powerplants. Labor is a scarce resource and diverting labor to less productive activities harms workers first, by causing wages to fall, and further limits what the economy overall can produce.

Conclusion

In content, the BLS study is a mere curiosity, a feel-good report that some businesses are doing nice things, but it could be misused in misleading ways to support the completely erroneous conclusion that environmental regulations and energy subsidies are a cure for unemployment. My proposed remedy for this, and many other confusions created by the great Green Jobs debate, is that all economists should adopt a self-denying resolution, to refuse ever to produce an estimate of job gains or losses for any change in regulatory or technology policy. The quality of public debate would be immensely improved if we simply dropped this way of measuring effects of specific policies.

Mr. STEARNS. Dr. Green, welcome.

STATEMENT OF KENNETH P. GREEN

Mr. GREEN. Chairman Stearns, Ranking Member DeGette, thank you, and members of the subcommittee, thank you for inviting me to testify today.

I am Kenneth Green. I'm a resident scholar at the American Enterprise Institute and I can, in fact, define a green job. That is one of these jobs that I hold, since all of my jobs, of course, have been green jobs, and my family has been Green for many generations now.

So as with the others, my testimony reflects my views only and should not be construed as reflecting the views of any organization I may affiliate with.

I have appended a study with my testimony on the subject of green jobs conducted in 2011, and I would request that that be added to the official record when my testimony is submitted.

Mr. STEARNS. By unanimous consent, so ordered.

Mr. GREEN. Thank you. Much of my commentary will derive from that study and the research that went into it.

Three fallacies underpin the green jobs agenda. The first fallacy is that there is a compelling reason for the government to reorder the private sector economy to make things more green more quickly. The second fallacy is that the government can intervene in the economy and create new jobs on net. And the third fallacy is that bureaucrats make good venture capitalists.

I will take them in order. In the United States and in virtually every other developed country, we have seen the same trends play out while people engage in ordinary nongreen jobs using nongreen technology to pursue development. At first they degrade their environment, but as they meet their basic needs, they clean up their environment.

Hence, environmental improvement in the United States has been spectacular in virtually all parameters. Our air and water pollution levels are bare fractions of what they were. The burden of persistent chemicals in the environment is down. Deforestation was reversed. Wildlife is largely protected, and the U.S. leads the world in reduction of emissions of greenhouse gases without, I might point out, either being part of an international coalition or having national legislation.

To be sure, some of these improvements are driven by regulations, particularly local regulations. But what made them possible was the underlying reality, which is free market economies naturally seek to use less energy and resources per unit of production simply out of a desire to make a profit, and the democratic market economies follow a predictable cycle of environmental repair as people are free to express their values for environmental quality.

Indeed, there is evidence that we are far past the point of diminishing returns on many environmental regulations, and we should be seeking ways to reform them so that they impose less burden on our economy rather than looking to pile on still more in the name of a green agenda.

The second fallacy is that government intervention in markets can improve them to the point where they create more jobs. Well,

to create a job at point A, the government must, as my other panelists have pointed out, must take money from the productive economy at point B. The government doesn't have money, its own money, so it has to take the money out of the economy.

Since the government also has—imposes costs to operate, they must take a cut of the money that passes through their hands on the way from point A to point B. And since they tend to create union-wage jobs rather than competitive market-wage jobs, at the end of the day the result is less jobs on net.

The third fallacy is that bureaucrats can direct taxpayer capital to uses rejected by private venture capitalists, and through special knowledge, only privy to them, pick the technologies that will win in the marketplace of the future and find consumer demand.

Government certainly has a role, a legitimate role to play in funding basic R&D. The military is particularly good with this, in producing technologies that later have commercial potential. But evidence suggests government is a very poor venture capitalist when it comes to investing in R&D, and even worse in trying to help self-proclaimed technologies of tomorrow cross over the valley of death, which all the technologies that we have today somehow manage to get over without much help from government. The landscape is positively littered with the debris of the President's green technology investment programs, with billions of dollars of taxpayer money thrown into businesses that were of dubious potential from the start.

According to one list published in May of this year, failed efforts included: Solyndra, Beacon Power, Ener1, Range Fuels, Solar Trust of America, Spectrawatt, Evergreen Solar, Eastern Energy, Unisolar, Bright Automotive, Olson's Crop Service, Energy Conversion Devices, Sovello, Siag, Solon, Q–Cells, and Mountain Plaza.

I could go—there's another list in my testimony of companies teetering on the brink of bankruptcy, and these include Abound Solar, A123 Systems, Brightsource Energy, Fisker Automotive, First Solar and more.

Now, I was asked to quickly discuss how the green job agenda is played out in other countries that have tried it, I'll start in Spain. In March of 2009 researchers at the Universidad Rey Juan Carlos calculated that from 2000 to 2009 Spain spent about $800,000 to create each green job, and the cost of wind energy jobs was $1.5 million. That meant that in the general economy, for every green job created, 2.2 jobs were foregone or destroyed.

In Italy, a study performed by the Bruno Leoni Institute found that because green jobs are so expensive to create there, for every job in the green sector created, 5 to 7 jobs would have been foregone in the general economy, and 60 percent of those jobs created were temp jobs.

In the U.K., they found the value of 3.7 jobs foregone in the general economy for every green job created, and this was using the government's own model of job creation and loss based on tax revenues and monetary flows.

In conclusion, the idea that we need the government to engineer our massive reorganization of the private sector economy in the name of greenness, the idea that government can create jobs on net in the economy, and the idea that bureaucrats make good venture

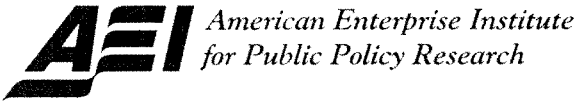
capitalists are fallacious and pursuing them is likely to do more harm than good.

The experience of Europe, which has preceded us in embracing these fallacies, is uniformly negative, causing increased prices for power, industry flight, and increasingly high levels of energy poverty. The green agenda has been shown to be itself unsustainable and rife with corruption and cronyism.

Thank you again for the opportunity to testify. I look forward to your questions.

Mr. STEARNS. Thank you.

[The prepared statement of Mr. Green follows:]



Statement before the Committee on Energy and Commerce
Subcommittee on Oversight and Investigations

The Federal Green Jobs Agenda

Dr. Kenneth P. Green

Resident Scholar

American Enterprise Institute

June 19, 2012

The views expressed in this testimony are those of the author alone and do not necessarily represent those of the American Enterprise Institute.

Chairman Upton, Ranking Member Waxman, Members of the Subcommittee:

Thank you for inviting me to testify today. My testimony represents my personal views only, and should not be construed as the official position of any other persons or organizations I may affiliate with. I have appended a study on the subject of Green Jobs that I authored in 2011. Much of my commentary derives from that study, and the research that went into it.

Three fallacies underpin the green job agenda: The first fallacy is that there is a compelling reason for the government to re-order the private-sector economy to make things more "green," more quickly; the second fallacy is that the government can intervene in the economy to create new jobs on net; and the third fallacy is that bureaucrats make good venture capitalists.

I will take them in order.

In the United States, and in virtually every other developed country, we have seen the very same trends play out while people engaged in ordinary non-green jobs, using non-green technologies to pursue their development: at first they degrade their environment, but as they meet their basic needs, they clean up their environment.

Environmental improvement in the United States has been spectacular in virtually all parameters. Our air and water pollution levels are bare fractions of what they were; the burden of persistent chemicals in the environment is down; deforestation was reversed; wildlife is protected; and the US leads the world in reducing the emissions of greenhouse gases without, I might add, being part of either an international coalition or even having national greenhouse gas control legislation.

To be sure, some of these improvements were driven by regulations, particularly local regulations, but what made them possible was the underlying reality that free-market economies naturally seek to use less energy and resources per unit of production, and democratic market-economies follow a predictable cycle of environmental repair. Our existing regulatory regime and our efficient market-economy will see us into a green future: no government re-ordering of the energy economy is necessary.

Indeed, there is evidence that we are far past the point of diminishing returns on many environmental regulations, and we should be seeking ways to reform them so that they impose less burdens on our economy rather than looking to pile on still more.

The second fallacy is that government intervention in markets can improve them, to the point where they create more jobs. To create a job at point A, the government must take resources

out of the productive economy at point B. The government must take a cut of the money that it transfers to finance its operations, and government tends to create jobs at elevated union-sector wages rather than competitive private sector wages. The result is, invariably, less jobs on net.

The third fallacy is that bureaucrats can direct taxpayer capital to uses rejected by private venture capitalists, and through special knowledge, pick technologies that will win in the market and find consumer demand.

Government certainly has a legitimate role in funding basic research and development - military R&D has a particularly good record at producing technologies that have commercial potential down the line.

But evidence suggests government is a very poor venture capitalist when it comes to investing in applied R&D, and even worse in trying to help self-proclaimed "technologies of tomorrow," cross over the so-called "Valley of Death." The landscape is positively littered with the debris of the President's "green technology" investment programs, with billions of dollars of taxpayer money thrown into businesses that were of dubious potential from the start.

According to one list published in May of this year, failed efforts included: Solyndra, Beacon Power, Ener1, Range Fuels, Solar Trust of America, Spectrawatt, Evergreen Solar, Eastern Energy, Unisolar, Bright Automotive, Olson's Crop Service, Energy Conversion Devices, Sovello, Siag, Solon, Q-Cells, and Mountain Plaza.

Companies teetering on the brink include: Abound Solar, A123 Systems, Brightsource Energy, Fisker Automotive, First Solar, Nevada Geothermal, SunPower, Nordex, The Bard Group, Amonix, NRG Energy, Alterra Power, Enel Green Power, and Sunpower Corp.

Now, I was asked to discuss how the green jobs agenda has played out in other countries that have tried it.

I'll start with Spain.

In March of 2009, researchers at the Universidad Rey Juan Carlos calculated that from 2000 to 2009, Spain spent about $815,000 dollars to create each "green job," rising to $1.5 million per wind industry job.

The study showed that far from creating jobs, 2.2 jobs were destroyed (or not-created) for every "green job" created.

Now to Italy, where a study performed by the Bruno Leoni Institute, found that because green jobs were so expensive to create, for every job created in the green sector, 5 to 7 jobs would have been created in the general economy. And at least 60% of the green jobs were temporary.

In the United Kingdom, a report by consultancy Verso Economics found that for every job created in the UK in renewable energy, 3.7 jobs were foregone in the general economy.

In conclusion, the ideas that we need the government to engineer a massive re-organization of the private sector economy in the name of "green-ness;" the idea that the government can create jobs on net in the economy; and the idea that bureaucrats make good venture capitalists are fallacious, and pursuing them is likely to do more harm than good.

The experience of Europe, which has preceded us in embracing these fallacies, is uniformly negative, causing increased prices for power, industry flight, and increasingly high levels of energy poverty. The green agenda has been shown to be unsustainable, and rife with corruption and cronyism.

I thank you again for this opportunity to testify, and look forward to your questions.

American Enterprise Institute for Public Policy Research

No. 1 • February 2011

Energy and Environment Outlook

The Myth of Green Energy Jobs: The European Experience

By Kenneth P. Green

With $2.3 billion in Recovery Act tax credits allocated for green manufacturers, President Barack Obama and other Democratic politicians have high hopes for green technology. But their expectations clash with both economic theory and practical experience in Europe. Green programs in Spain destroyed 2.2 jobs for every green job created, while the capital needed for one green job in Italy could create almost five jobs in the general economy. Wind and solar power have raised household energy prices by 7.5 percent in Germany, and Denmark has the highest electricity prices in the European Union. Central planners in the United States trying to promote green industry will fare no better at creating jobs or stimulating the economy.

Green is the new black, in both the United States and Europe. Virtually everyone on the left has thrown on the green pants, green shirts, and green cloak of what we are assured is the future of life on earth as we know it.

President Obama regularly references the green economy in his speeches. The Obama/Biden New Energy for America document released in 2008 focuses on green jobs, green technology, green manufacturing, green buildings, and even green veterans. In a speech to the Democratic National Committee in September 2010, Obama boasted, "We'd been falling behind and now we are back at the forefront of [research and development]. We made the largest investment in green energy in our history so that we could start building solar panels and wind turbines all around the country."[1]

In an August 13 speech, Vice President Joe Biden also sang the praises of greenness: "It's not enough to just rescue the economy, we have to rebuild it better—and that work begins with giving American manufacturers the resources to produce the clean, green energy technology that will be the foundation of our 21st century economy. With the launch today of $2.3 billion in Recovery Act tax credits for green manufacturers, we are going to ramp up manufacturing of green energy materials in this country, while creating thousands of new jobs right here in our own backyard. From wind and solar power to electric vehicle technology, our recovery is going to be fueled by the Recovery Act incentives we are offering businesses today that will be the engine of our economy tomorrow."[2]

Former speaker Nancy Pelosi (D-CA) also supports the green cause. A blurb describing a

Kenneth P. Green (kgreen@aei.org) is a resident scholar at AEI.

Key points in this *Outlook*:

- The Obama administration, its allies in Congress, and the environmental community champion the benefits of green technology and the creation of green jobs to alleviate unemployment.
- Green jobs merely replace jobs in other sectors and actually contribute less to economic growth.
- Experiments with renewable energy in Europe have led to job loss, higher energy prices, and corruption.

speech Pelosi gave to the Stanley School in Waltham, Massachusetts, begins, "For a brighter and more prosperous future, we must invest in a green infrastructure, a green economy, and green schools to create a workforce of good-paying green collar American jobs."[3]

Governments do not "create" jobs; the willingness of entrepreneurs to invest their capital, paired with consumer demand for goods and services, does that.

Of course, Senator Harry Reid (D-NV) was not left out. At a Senate Democratic Green Jobs Summit in 2009, Reid boasted of his green accomplishments: "We have made unprecedented investments in clean, renewable energy and new, green jobs that can never be outsourced. In 2007 we passed a landmark energy bill that led to the development of clean, renewable fuels here at home, and the creation of critical American manufacturing jobs. We raised fuel-efficiency standards for the first time in a generation, and set new energy-efficiency standards for lighting, appliances, and federal office buildings and vehicles. In the economic recovery plan we passed this year, we invested $67 billion to develop clean energy, and $500 million more to train a new 'green-collar' workforce—Americans who each day will make our nation more energy efficient and energy independent."

So, at least on the left, it is unanimous: the world's future is green: green energy powering green technologies, creating green houses, buildings, cars, and jobs, jobs, jobs. But is this thinking based on realistic economics, realistic understanding about green technology, or realistic expectations of the growth potential of the green movement? This *Outlook* examines whether the government creates jobs through subsidies of any sort and then looks at the troubling European experience with green energy and job creation.

Green Energy and Green Jobs

To understand the fallacy of the government creating green jobs through subsidies and regulations, we have to refer to the writing of French economist Frédéric Bastiat. Back in 1850, Bastiat explained the fallacy that underlies such thinking in an essay about the unseen costs of such efforts. He called it the "broken window" fallacy.

The fallacy works as follows: imagine some shopkeepers get their windows broken by a rock-throwing child. At first, people sympathize with the shopkeepers, until someone claims that the broken windows really are not that bad. After all, they "create work" for the glassmaker, who might then be able to buy more food, benefiting the grocer, or buy more clothes, benefiting the tailor. If enough windows are broken, the glassmaker might even hire an assistant, creating a job.

Did the child therefore do a public service by breaking the windows? No. We must also consider what the shopkeepers would have done with the money they used to fix their windows, had those windows not been broken. Most likely, the shopkeepers would have plowed that money back into their store; perhaps they would have bought more stock from their suppliers or hired new employees.

Were the windows not broken, the town would still have had jobs created by the shopkeepers' alternate spending, plus the shopkeepers would have had the value of their original windows. Because the value of the windows was destroyed, however, they—and the village as a whole—have been made poorer.

It is well understood, among economists, that governments do not "create" jobs; the willingness of entrepreneurs to invest their capital, paired with consumer demand for goods and services, does that. All the government can do is subsidize some industries while jacking up costs for others. In the green case, it is destroying jobs in the conventional energy sector—and most likely in other industrial sectors—through taxes and subsidies to new green companies that will use taxpayer dollars to undercut the competition. The subsidized jobs "created" are, by definition, less efficient uses of capital than market-created jobs. That means they are less economically productive than the jobs they displace and contribute less to economic growth. Finally, the good produced by government-favored jobs is inherently a non-economic good that has to be maintained indefinitely, often without an economic revenue model, as in the case of roads, rail systems, mass transit, and probably windmills, solar-power installations, and other green technologies.

To understand how this works in practice, I now turn to European countries that went hog wild for renewables, while singing the praises of green jobs: Spain, Italy, Germany, Denmark, the United Kingdom (UK), and the Netherlands.

Spain

Spain has long been considered a leader in the drive to renewable power. Indeed, Obama singled out Spain as an example in a 2009 speech. The president said, "We have enormous commercial ties between our two countries and we pledged to work diligently to strengthen them, particularly around key issues like renewable energy and transportation, where Spain has been a worldwide leader and the United States I think has enormous potential to move forward."[4]

But the story of Spain's green-job leadership took a series of hits shortly after the president's speech. In March 2009, researchers Gabriel Calzada Alvarez and colleagues at the Universidad Rey Juan Carlos released a study examining the economic and employment effects of Spain's aggressive push into renewables. What they found confounds the usual green-job rhetoric:[5]

- Since 2000, Spain spent €571,138 on each green job, including subsidies of more than €1 million per job in the wind industry.
- The programs creating those jobs destroyed nearly 110,500 jobs elsewhere in the economy (2.2 jobs destroyed for every green job created).
- The high cost of electricity mainly affects production costs and levels of employment in metallurgy, nonmetallic mining and food processing, and beverage and tobacco industries.
- Each "green" megawatt installed destroys 5.28 jobs elsewhere in the economy on average.
- These costs do not reflect Spain's particular approach but rather the nature of schemes to promote renewable energy sources.

Spain has found its foray into renewable energy to be unsustainable. *Bloomberg* reports that Spain slashed subsidies for new solar power plants.[6] As analyst Andrew McKillop observes in the *Energy Tribune*:

> In Spain, where subsidies to the country's massive windfarms and their dependent industries is estimated to have attained as much as 12 billion Euros in 2009, either directly or through "feed-in tariff" subsidy for power sales, government proposals target at least a 30% cut in subsidies. Major wind energy producer firms, such as Gamesa, have begun cutting their workforces, while trying to find sales outside Europe, helped by a weaker Euro. In addition and due to Spain's highly exposed deficit finance status, making it a target for market speculators betting its bond rates must rise, the Spanish government is also likely to cut financial backing to existing renewable energy power plants, built with an expectation of guaranteed prices and government subsidies for 25 years.[7]

And then, there is the matter of corruption. As *Bloomberg Businessweek* reports, "An audit of solar-power generation from November 2009 to January 2010 found that some panel operators were paid for doing the 'impossible'—producing electricity from sunlight during the night."[8] Further, it appears that the solar power producers "may have run diesel-burning generators and sold the output as solar power, which earns several times more than electricity from fossil fuels." Nineteen people have been arrested in Spain's "clean energy" sector on charges ranging from bribery, to unsavory land deals, to issuing licenses to friends and family, to simple construction fraud. As the *Guardian* reports, "When Spain's National Commission for Energy decided to inspect 30 solar gardens, it found only 13 of them had been built properly and were actually dumping electricity into the network."[9]

Italy

A similar situation has played out in Italy, also a leader in wind and solar-power deployment. A study performed by Luciano Lavecchia and Carlo Stagnaro of Italy's Bruno Leoni Institute found an even worse situation:

> Finally, we have compared the average stock of capital per worker in the RES [Renewable Energy Systems] with the average stock of capital per worker in the industry and the entire economy, finding an average ratio of 6.9 and 4.8, respectively. To put it otherwise, the same amount of capital that creates one job in the green sector, would create 6.9 or 4.8 if invested in the industry or the economy in general, respectively—although differences exist between RES themselves, with wind power more likely to create jobs than

> [photovoltaic] power. This fact is particularly relevant because we didn't even consider the non-trivial value of the renewable energy produced, but we focused on pure subsidies. If we had considered the energy value, the average stock of capital per worker would result even higher. Since subsidies are forcibly taken away from the economic cycle, and allocated for political purposes, it is especially important to have a clear vision of what consequences they beg.[10]

The researchers also found that the vast majority of green jobs created were temporary: "Using what we see as inflated estimates, from various sources, of already-existing green jobs, we take between 9,000 and 26,000 jobs in wind power, and between 5,500 and 14,500 in photovoltaic energy, as our starting point. From there, we have calculated that thanks to the subsidies Rome has promised, the number of people working in the green economy will rise to an aggregate total of between 50,000 to 112,000 by 2020. However, most of those jobs—at least 60%—will be for installers or other temporary work that will disappear once a photovoltaic panel, or a wind tower, is operative."[11]

And like Spain, Italy has experienced rampant corruption in the renewable sector. Rather than having numerous individuals defrauding the government, however, the mafia is involved. As Nick Squires and Nick Meo report in the *Telegraph*, "Attracted by the prospect of generous grants designed to boost the use of alternative energies, the so-called 'eco Mafia' has begun fraudulently creaming off millions of euros from both the Italian government and the European Union."[12] They go on to report:

> Eight people were arrested in Operation "Eolo," named after Aeolus, the ancient Greek god of winds, on charges of bribing officials in the coastal town of Mazara del Vallo with gifts of luxury cars and individual bribes of €30,000–70,000.
>
> Police wiretaps showed the extent of the mafia's infiltration of the wind energy sector when they intercepted an alleged mafioso telling his wife, "Not one turbine blade will be built in Mazara unless I agree to it."
>
> In another operation last November, code-named "Gone with the Wind," fifteen people were arrested on suspicion of trying to embezzle up to €30 million in European Union funds. Among those arrested on fraud charges was the president of Italy's National Wind Energy Association, Oreste Vigorito.

Wind and solar power have raised household energy prices by 7.5 percent in Germany, and Denmark has the highest electricity prices in the European Union.

Germany

Germany's foray into renewable energy started in earnest in 1997, when the European Union adopted a goal of generating 12 percent of its electricity from renewable sources.[13] Germany's method for achieving such targets was the institution of a feed-in law, which required utilities to purchase different kinds of renewable energy at different rates. In a study of the effects of Germany's aggressive promotion of wind and solar power, Manuel Frondel noted that the German feed-in law required utilities to buy solar power at a rate of fifty-nine cents per kilowatt-hour, far above the normal cost of conventional electricity, which was between three and ten cents. Feed-in subsidies for wind power, he observed, were 300 percent higher than conventional electricity costs.[14]

Needless to say, this massive subsidizing of wind and solar power attracted a lot of investors: after all, if the government is going to guarantee a market for several decades, and set a price high enough for renewable producers to make a profit from, capital will flow into the market. Germany became the second-largest producer of wind energy after the United States, and its investment in solar power was aggressive as well.

But according to Frondel, things did not work out as Germany's politicians and environmentalists said they would. Rather than bringing economic benefits in terms of lower-cost energy and a proliferation of green-energy jobs, the implementation of wind and solar power raised household energy rates by 7.5 percent. Further, while greenhouse gas emissions were abated, the cost was astonishingly high: over $1,000 per ton for solar power, and over $80 per ton for wind power. Given that the carbon price in the European Trading System was about $19 per ton at the time, greenhouse gas emissions from wind and solar were not great investments.

Frondel concludes that "German renewable energy policy, and in particular the adopted feed-in tariff scheme, has failed to harness the market incentives needed to ensure a viable and cost-effective introduction of renewable energies into the country's energy portfolio. To the contrary, the government's support mechanisms have in many respects subverted these incentives, resulting in massive expenditures that show little long-term promise for stimulating the economy, protecting the environment, or increasing energy security. In the case of photovoltaics, Germany's subsidization regime has reached a level that by far exceeds average wages, with per-worker subsidies as high as 175,000 €(US$240,000)." He adds:

> In conclusion, government policy has failed to harness the market incentives needed to ensure a viable and cost-effective introduction of renewable energies into Germany's energy portfolio. To the contrary, Germany's principal mechanism of supporting renewable technologies through feed-in tariffs imposes high costs without any of the alleged positive impacts on emissions reductions, employment, energy security, or technological innovation. Policymakers should thus scrutinize Germany's experience, including in the US, where there are currently nearly 400 federal and state programs in place that provide financial incentives for renewable energy. Although Germany's promotion of renewable energies is commonly portrayed in the media as setting a "shining example in providing a harvest for the world" (*The Guardian* 2007), we would instead regard the country's experience as a cautionary tale of massively expensive environmental and energy policy that is devoid of economic and environmental benefits.

As with Spain and Italy, Germany is finding it hard to continue to subsidize wind and solar power at existing levels. In May, the German parliament cut back the subsidy for domestic rooftop solar photovoltaic systems by 16 percent, with free-standing systems cut by 15 percent.[15]

Denmark

Denmark is yet another country that has made wind power a hallmark of its energy policy. Obama praised it for its aggressive wind-power program, telling an Earth Day audience in Iowa that "America produces less than 3 percent of our electricity through renewable sources like wind and solar—less than 3 percent. Now, in comparison, Denmark produces almost 20 percent of their electricity through wind power."[16] The US Energy Information Administration tells America's children that "Denmark ranks ninth in the world in wind power capacity, but generates about 20% of its electricity from wind."[17] That sounds impressive, but is it true?

Green programs in Spain destroyed 2.2 jobs for every green job created, while the capital needed for one green job in Italy could create almost five jobs in the general economy.

Not according to CEPOS, a Danish think tank, which issued a 2009 report entitled *Wind Energy, the Case of Denmark*.[18] The CEPOS study found that rather than generating 20 percent of its energy from wind, "Denmark generates the equivalent of about 19% of its electricity demand with wind turbines, but wind power contributes far less than 19% of the nation's electricity demand. The claim that Denmark derives about 20% of its electricity from wind overstates matters. Being highly intermittent, wind power has recently (2006) met as little as 5% of Denmark's annual electricity consumption with an average over the last five years of 9.7%."

The CEPOS study revealed that Denmark can only produce and consume as much wind power as it does due to a convenient circumstance: neighboring countries have a lot of hydro power that can quickly and effectively balance the flow of electricity on its energy grid, allowing it to export surplus wind capacity. "Denmark manages to keep the electricity systems balanced due to having the benefit of its particular neighbors and their electricity mix. Norway and Sweden provide Denmark, Germany and Netherlands access to significant amounts of fast, short term balancing reserve, via interconnectors. They effectively act as Denmark's 'electricity storage batteries.' Norwegian and Swedish hydropower can be rapidly turned up and down, and Norway's lakes effectively 'store' some portion of Danish wind power. Over the last eight years West Denmark has exported (couldn't use), on average, 57% of the wind power it generated and East Denmark an average of 45%. The correlation between high wind output and net outflows makes the case that there is a large component of wind energy in the outflow indisputable."

Finally, the CEPOS study found that Danish consumers are the ones who take it on the chin. Denmark's electricity prices are the highest in the entire European Union. And the greenhouse gas reduction benefits? Slim to none, since the exported wind power replaces hydro power, which does not produce significant greenhouse gas emissions. The wind power consumed in Denmark does displace some fossil-fuel emissions, but at some cost: $124 per ton, nearly six times the price on the European Trading System.

Regarding green jobs, CEPOS found "that the effect of the government subsidy has been to shift employment from more productive employment in other sectors to less productive employment in the wind industry. As a consequence, Danish GDP is approximately 1.8 billion DKK ($270 million) lower than it would have been if the wind sector work force was employed elsewhere."

Not surprisingly, Denmark is also finding renewable power unsustainable and is backing away from the technology. As Andrew Gilligan reports in the *Telegraph*, the Danish state-owned power industry will no longer build onshore wind turbines, and consumers are complaining about high energy rates and environmental despoliation. "Earlier this year, a new national anti-wind body, Neighbours of Large Wind Turbines, was created. More than 40 civic groups have become members. 'People are fed up with having their property devalued and sleep ruined by noise from large wind turbines,' says the association's president, Boye Jensen Odsherred. 'We receive constant calls from civic groups that want to join.'"[19]

The United Kingdom

Our Commonwealth cousins across the pond have also embraced the "green power means green jobs" theory. The UK (Scotland particularly) has pursued an ambitious wind-power agenda.

Former prime minister Gordon Brown told a Labor Party conference, "I am asking the climate change committee to report by October on the case for, by 2050 not a 60% reduction in our carbon emissions, but an 80% cut and I want British companies and British workers to seize the opportunity and lead the world in the transformation to a low carbon economy and I believe that we can create in modern green manufacturing and service one million new jobs."[20]

Ed Miliband, current leader of the opposition, is also big on wind, announcing, "With strong government backing, the UK is consolidating its lead in offshore wind energy. We already have more offshore wind energy than any other country, we have the biggest wind farm in the world about to start construction, and now we'll see the biggest turbine blades in the world made here in Britain. . . . Our coastline means the offshore wind industry has the potential to employ tens of thousands of workers by 2020."[21]

Party does not seem to be a factor in green-job boosting. Prime Minister (and Conservative Party leader) David Cameron, discussing a deal to work on wind turbines with India, said, "The innovation and creativity of business won't just help us save the planet, but is expected to create millions of jobs and billions of revenue in the green goods and services market."[22]

Referring to offshore wind, Cameron is equally bullish: "I want us to be a world leader in offshore wind energy," he said, announcing a national infrastructure plan. "We are making these investments so that major manufacturers will decide that this is the place they want to come and build their offshore wind turbines. This investment is good for jobs and growth, and good for ensuring we have clean energy."[23]

Alas, the UK and Scotland have fared no better than the other countries discussed above in their pursuit of the new green-energy/green-jobs economy, as a recent report by consultancy Verso Economics points out.[24] The study is particularly interesting because its methodology is touted as superior to the methodology used in the Spanish and Italian studies. Verso uses what economists refer to as "input/output" tables to estimate the number of jobs that were foregone in the UK general economy in favor of the green jobs "created" through government subsidies.

Verso's conclusion aligns neatly with those of the Spanish and Italian studies discussed above:

- "The report's key finding is that for every job created in the UK in renewable energy, 3.7 jobs are lost. In Scotland there is no net benefit from government support for the sector, and probably a small net loss of jobs."

- "The main policy tool used to promote renewable energy generation is the Renewables Obligation, which effectively raises the market price paid for electricity from renewable sources. This scheme cost electricity consumers £1.1 [billion] in the UK and around £100 [million] in Scotland in 2009/10."

- "This report uses the Scottish Government's own macroeconomic model for Scotland to assess the impact of identified costs on jobs. A similar model was used by the Scottish Government to measure the opportunity cost of the cut in [the value-added tax] implemented in 2008–09. Based on this, policy to promote renewable energy in the UK has an opportunity cost of 10,000 direct jobs in 2009/10 and 1,200 jobs in Scotland."

- "In conclusion, policy to promote the renewable electricity sector in both Scotland and the UK is economically damaging. Government should not see this as an economic opportunity, therefore, but should focus debate instead on whether these costs, and the damage done to the environment, are worth the candle in terms of climate change mitigation."[25]

While the UK and Scotland may have avoided the problems of corruption that afflicted Spain and Italy, they learned something that the warmer countries did not: wind turbines can freeze in winter. Not only do they cease to put out power in very cold weather, they actually need to be heated. As reporter Richard Littlejohn points out in the UK *Daily Mail*, "Over the past three weeks, with demand for power at record levels because of the freezing weather, there have been days when the contribution of our forests of wind turbines has been precisely nothing. It gets better. As the temperature has plummeted, the turbines have had to be heated to prevent them seizing up. Consequently, they have been consuming more electricity than they generate. Even on a good day they rarely work above a quarter of their theoretical capacity. And in high winds they have to be switched off altogether to prevent damage."[26]

The frozen turbine problem has also occurred in Canada. As Greg Weston of the *Telegraph-Journal* explained in February 2011, "A $200-million wind farm in northern New Brunswick is frozen solid, cutting off a supply of renewable energy for NB Power. The 25-kilometre stretch of wind turbines, 70 kilometres northwest of Bathurst, has been shut down for several weeks due to heavy ice covering the blades. GDF Suez Energy, the company that owns and operates the site, is working to return the windmills to working order, a spokeswoman says."[27]

The Netherlands

The Netherlands is yet another country that went big for wind power; it is the world's third-largest producer of offshore wind power. And while no data are available about green jobs in the Netherlands, there is evidence that it will not be producing many through its green power plants. The new conservative government has radically reversed course and is slashing subsidies to wind and solar power.

According to the journal *Energy Debate*, the Dutch government has lost its faith in windmills. The new government in the Netherlands has taken exception to the massive subsidies required to build and operate wind farms—and, in this case, to the expected export of €4.5 billion in subsidies to a German company (Bard Engineering) that would have built, owned, and operated those wind farms. The new prime minister of the Netherlands, Mark Rutte, is reported to have said, "Windmills turn on subsidies."[28]

On November 30, 2010, the government unveiled its new renewables plan, slashing annual subsidies from €4 billion to €1.5 billion. And not only are the subsidies cut back, what remains will be redirected well away from wind power. As *Energy Debate* explains:

> In the new system (somewhat misleadingly called SDE-plus), which will take effect halfway through 2011, the government will allocate subsidies in an entirely different, and rather complicated way. Subsidies are made available in four "stages" (on the basis of first-come, first-served).
>
> 1) In the first stage, a government subsidy of 9 eurocents per kWh (or 79 cents per m^3 for gas) is offered, but only to producers of technologies that have "deficits" of less than 9 eurocents. Based on the figures from ECN, these are: biogas ("green gas"), hydropower, power from waste processing installations, and gas from fermentation processes.
>
> 2) If there is still money left after this first stage, the second stage will be opened up, in which a subsidy of 11 eurocents per kWh (or 97 cents per m^3) will be offered. This stage will be open to producers of onshore wind power and fertiliser-based gas.

3) Again, if there is money left, there will be a third stage with subsidies of 13 cents per kWh or 114 cents per m^3. This will be open to producers of hydropower and small-scale biomass.

4) The fourth and last stage (15 cents per kWh or 132 cents per m^3) will be open to electricity produced from all-purpose fermentation processes.

Not included in any of the four categories, because they are too expensive, are solar power, large-scale biomass and, indeed, offshore wind power.[29]

Another change in the Dutch attitude toward renewables is how to pay for the subsidies. In the past, subsidies came from the general budget. Moving forward, consumers will see a surcharge on their energy bills. The new direct billing could cool the public's ardor for additional building of "green energy."

According to reports, the new government was planning on a nuclear power renaissance to generate electricity, and one could certainly argue that such a plan would generate "green jobs."[30] However, in the wake of the tragic Japanese earthquake and tsunami in March 2011, such a plan will also undergo a great deal of scrutiny.

The irony here is rich. The Dutch, who have been enamored of wind power for hundreds of years,[31] may have finally had enough tilting at windmills. If even they cannot make it work, one has to wonder if anyone can.

Conclusion

Both economic theory and the experience of European countries that have attempted to build a green-energy economy that will create green jobs reveal that such thinking is deeply fallacious. Spain, Italy, Germany, Denmark, the UK, and the Netherlands have all tried and failed to accomplish positive outcomes with renewable energy. Some will suggest that the United States is different, and that US planners will have the wisdom to make the green economy work here. But there is no getting around the fact that you do not improve your economy or create jobs by breaking windows, and US planners are no more omniscient than those in Europe.

I would like to thank AEI research assistant Hiwa Alaghebandian for her valuable assistance with this Outlook.

Notes

1. White House, "Remarks by the President at DNC Event," news release, September 16, 2010, www.whitehouse.gov/the-press-office/2010/09/16/remarks-president-dnc-event (accessed January 27, 2011).

2. White House, "Statement from Vice President Biden on Launch of $2.3 Billion Recovery Act Green Manufacturer Credit Program," news release, August 13, 2009, www.whitehouse.gov/the-press-office/statement-vice-president-biden-launch-23-billion-recovery-act-green-manufacturer-ta (accessed January 27, 2011).

3. Nancy Pelosi, remarks to the Stanley Elementary School, Waltham, Massachusetts, March 10, 2008.

4. White House, "Remarks by President Obama and President Zapatero of Spain after Meeting," news release, October 13, 2009, www.whitehouse.gov/the_press_office/Remarks-by-President-Obama-and-President-Zapatero-of-Spain-after-meeting (accessed January 27, 2011).

5. Gabriel Calzada Alvarez, Raquel Merino Jara, Juan Ramon Rallo Julian, and Jose Ignacio Garcia Bielsa, "Study of the Effects of Employment of Public Aid to Renewable Energy Sources" (draft, Universidad Rey Juan Carlos, March 2009), www.juandemariana.org/pdf/090327-employment-public-aid-renewable.pdf (accessed January 27, 2011).

6. Ben Sills, "Spain Slashes Prices 45% for New Ground-Based Solar Plants, 5% for Homes," *Bloomberg*, November 19, 2010.

7. Andrew McKillop, "The Bursting of the Green Energy Bubble?" *Energy Tribune*, June 4, 2010, www.energytribune.com/articles.cfm/4264/The-Bursting-of-the-Green-Energy-Bubble (accessed February 1, 2011).

8. Todd White, "Spanish Solar-Panel Trade Group Calls for Fraud Investigation," *Bloomberg Businessweek*, April 12, 2010.

9. Giles Tremlett, "Scandal Sullies Spain's Clean Energy," *Guardian*, March 22, 2009.

10. Luciano Lavecchia and Carlo Stagnaro, *Are Green Jobs Real Jobs? The Case of Italy* (Milan, Italy: Instituto Bruno Leoni, May 2010), http://brunoleonimedia.servingfreedom.net/WP/WP-Green_Jobs-May2010.pdf (accessed January 27, 2011).

11. Carlo Stagnaro and Luciano Lavecchia, "Clean Jobs, Expensive Jobs: Why Italy Can't Afford a 'Green Economy,'" *Wall Street Journal*, May 11, 2010.

12. Nick Squires and Nick Meo, "Mafia Cash In on Lucrative EU Wind Farm Handouts—Especially in Sicily," *Telegraph*, September 5, 2010.

13. Konrad Bauer, "German Renewable Energy Policy," German Energy Agency, October 24, 2007, www.gaccsanfrancisco.com/fileadmin/ahk_sanfrancisco/Dokumente/2007-10_Solar_Delegation/_1__California_Solar_Business_Delegation_Vortrag_Konrad_Bauer_241007.pdf (accessed January 27, 2011).

14. Manuel Frondel, Nolan Ritter, Christoph M. Schmidt, and Colin Vance, *Economic Impacts from the Promotion of Renewable Energies, the German Experience* (Germany: Rheinisch-Westfälisches Institut für Wirtschaft Sforschung, 2009).

15. "German Bundestag Approves Solar Incentive Cuts," Reuters, May 6, 2010.

16. Igor Kossov, "Transcript: Obama's Earth Day Speech," CBS News, April 22, 2009.

17. US Energy Information Administration, "Wind," http://tonto.eia.doe.gov/kids/energy.cfm?page=wind_home-basics-k.cfm (accessed January 28, 2011).

18. Hugh Sharman, Henrik Meyer, and Martin Agerup, *Wind Energy: The Case of Denmark* (Copenhagen, Denmark: Center for Politiske Studier, September 2009), www.cepos.dk/fileadmin/user_upload/Arkiv/PDF/Wind_energy_-_the_case_of_Denmark.pdf (accessed January 28, 2011).

19. Andrew Gilligan, "An Ill Wind Blows for Denmark's Green Energy Revolution," *Telegraph*, September 12, 2010.

20. Paul Eccleston, "Labour Conference: Gordon Brown Says CO_2 Targets Must Be Raised to 80% by 2050," *Telegraph*, September 23, 2008.

21. Hélène Mulholland, "Ed Miliband Announces Boost for Green Jobs," *Guardian*, September 17, 2009.

22. Catherine Airlie, "UK, India to Create Millions of 'Green' Jobs, Cameron Says," *Bloomberg Businessweek*, November 15, 2010.

23. Fiona Harvey, "Go-Ahead for Wind to Generate 70,000 Jobs," *Financial Times*, October 25, 2010.

24. Richard Marsh and Tom Miers, *Worth the Candle? The Economic Impact of Renewable Energy Policy in Scotland and the UK* (Kirkcaldy, Scotland: Verso Economics, March 2011), www.versoeconomics.com/verso-0311B.pdf (accessed March 17, 2011).

25. Ibid.

26. Richard Littlejohn, "You Don't Need a Weatherman to Know Which Way the Wind Blows," *Daily Mail*, December 27, 2010.

27. Greg Weston, "Ice Buildup on Wind Turbines Cuts Reusable Energy," *Vancouver Sun*, February 16, 2011.

28. Jose Mario, "The Dutch Lose Faith in Windmills," *Energy Debate*, January 16, 2011.

29. Ibid.

30. Michael Gassmann, "Holland's Radical U-Turn on Climate and Energy Policy," Global Warming Policy Foundation, February 9, 2011.

31.The Netherlands Board of Tourism and Conventions, "The Land of the Windmills," May 21, 2007, http://us.holland.com/e/7779/The%20land%20of%20the%20windmills.php (accessed March 17, 2011).

Mr. STEARNS. Mr. Breen, welcome.

STATEMENT OF MICHAEL BREEN

Mr. BREEN. Thank you, Chairman Stearns, Ranking Member DeGette, members of the committee, ladies and gentlemen.

I'm honored to appear before you today to discuss the critical national security importance of clean energy development. I am the vice president of the Truman National Security Project, a former Army officer in Iraq, and Afghanistan combat veteran. I'm also proud to be one of the leaders of Operation Free, a nonpartisan national coalition of veterans who believe that our dependence on fossil fuel poses a clear national security threat to the United States.

The men and women of Operation Free have walked the burning oil fields of Iraq and patrolled the mountain roads of Afghanistan, where the fully burdened cost of fuel is $30 a gallon and 1 in 24 fuel convoys ends in an American casualty. They have seen firsthand why it is an established consensus in the defense community that our dependence on oil threatens our national security.

America sends over $1 billion per day overseas for oil. It should not be a surprise, then, that oil is the single largest contributor to our foreign debt, outpacing even our trade deficit with China. Worse, far too many of those dollars wind up in the hands of regimes that wish us harm. According to the CIA, over 50 percent of Iran's entire oil budget—excuse me, Iran's entire national budget—comes from the oil sector.

For every $5 rise in the price of a barrel of crude, Iran receives an additional $7.9 billion annually. That's billions of dollars to build new nuclear facilities, repair centrifuges, and support terrorist groups that threaten Americans and target our Israeli allies. But there's another consensus emerging in the defense community, and it is this: climate change poses a serious threat to our national security.

I know not everyone in this room believes that climate change is real, but our national security professionals do. The Pentagon's Quadrennial Defense Review, the military's most important strategic document, states that climate change is, quote, an accelerant of instability and conflict and that climate change and reliance on fossil fuels are, quote, prominent military vulnerabilities for the Nation.

The CIA has established The Center on Climate Change and National Security. The Council on Foreign Relations, the Center for Strategic and International Studies, the Center for a New American Security, the CNA's Military Advisory Board, the National Research Council and numerous other nonpartisan organizations have all found independently of one another that climate changes poses a serious and growing threat to our national security.

According to a recent study, over 97 percent of climate scientists say that man-made climate change is a reality. Now, I'm not a climate scientist, I'm a former front-line combat leader in the U.S. Military. And as a combat leader, if 97 percent of my intelligence indicated that I would face a lethal danger that would risk the lives of my paratroopers, I would be committing unconscionable military malpractice if I did not listen and act on that information.

Fortunately, we see leaders acting in the same vein today in Kern County, California, and other places across America. Located in the high desert, Kern supplied the crude that fueled much of the mid-20th century oil boom.

Kern County has always been proud to provide American energy. That's why in the 21st century Kern has turned to renewable sources, becoming the largest producer of wind and solar energy in California by a very large margin. Clean technologies are creating jobs in a place where unemployment had been 64 percent higher than the national average.

Two months ago in this very building, I stood with Jeff Duff, the CEO of Air-Streams Renewables, a technical school in Kern County that trains wind turbine technicians. Air-Streams is proud that 70 percent of its graduates are veterans. One of Jeff's students, a naval electrician, struggled to find work after leaving the service. He left a night job at a mortuary to join Air-Streams and then graduated at the top of his class. Now he is serving his community by building the energy economy of the future.

As we debate clean technologies, we often ignore energy's impact on our national security. There will be a lot of emphasis in this room today on cost. But the price of fossil fuels includes more than searching and extracting and shipping; there are security costs that we must recognize.

Fossil fuels fund extremists and breed dependency on nations that don't share our values. We can let stories like Kern County's be what they are today, promising but not commonplace, or instead we can lead by investing in 21st century technologies that keep America safe and prosperous.

Thank you for the opportunity to testify, and I look forward to your questions.

Mr. STEARNS. Thank you.

[The prepared statement of Mr. Breen follows:]

Testimony of Michael Breen, Vice-President, Truman National Security Project

June 19th, 2012

Chairman Stearns, Ranking Member DeGette, members of the committee, ladies and gentlemen, I am honored to appear before this distinguished panel today to discuss the critical national security importance of clean energy development.

I serve as the Vice President of the Truman National Security Project, a leadership institute dedicated to forging strong, smart and principled national security policy for America. As a former Army officer and an Iraq & Afghanistan combat veteran, I am also proud to be one of the leaders of Operation Free, a non-partisan nationwide coalition of patriotic veterans who stand together in the common belief that our dependence on fossil fuel poses a clear national security threat to the United States.

When I last had the honor of testifying in March, I was invited to discuss the national security implications of our nation's dependence on oil as a single source of fuel. The dangers of that dependence are well known to the veterans of Operation Free. These men and women have walked the burning oil fields of Iraq and patrolled the mountain roads of Afghanistan – where the fully-burdened cost of fuel on the front lines is $30 a gallon[i], and 1 in 24 fuel convoys ends in an American casualty.[ii]

America sends over $1 billion per day overseas for oil.[iii] A $10 increase in the price of a barrel of oil costs the Department of Defense an estimated $1.3 billion – almost equal to the entire procurement budget for the Marine Corps.[iv] It should not be a surprise, then, that oil is the single largest contributor to our foreign debt, outpacing even our trade deficit with China. Worse, far too many of those dollars wind up in the hands of regimes that wish us harm.

According to the CIA, over 50% of the Iran's entire budget comes from the oil sector.[v] For every $5 rise in the price of a barrel of crude oil, Iran receives an additional $7.9 billion annually.[vi] That's billions of dollars to build new nuclear facilities, replace centrifuges and support terrorist groups that threaten Americans and target our Israeli allies.

For every $5 rise in the price of a barrel of crude oil, Russia receives more than $18 billion annually.[vii] As ever-rising demand for oil drives the global price ever higher, Russia continues to spend windfall oil profits on weapons and ammunition for President Bashar Assad's shock troops in Syria, where over 10,000 civilians have reportedly lost their lives fighting for their freedom.

It is established consensus in the defense community that our dependence on oil is a threat to our national security. But there is another consensus emerging in the national security community that also bears heavily upon our discussion today. It is simply this: man-made climate change poses a serious threat to our national security.

I know not everyone in this room believes that climate change is real, but our country's national security professionals clearly do. The Pentagon's Quadrennial Defense Review, the military's most important strategic document, states that climate change is "an accelerant of instability and conflict" and that climate change and reliance on fossil fuels are "prominent military vulnerabilities" for the nation.[viii] The CIA has established a Center on Climate Change and National Security. The Council on Foreign Relations, the Center for Strategic and International Studies, Center for a New American Security, the CNA Military Advisory Board, the National Research Council and numerous other non-partisan and highly-respected organizations have all found, independently of one another, that climate change poses a serious and growing threat to our national security.

A 2007 joint study conducted by CSIS and CNAS found "strong and surprising intersections between the two great security threats of the day—climate change and international terrorism waged by Islamic extremists." The study went on to conclude that "both threats are linked to energy use in the industrialized world, and the solutions to both depend on transforming the world's energy economy—America's energy economy in particular." [ix] The connection between our energy posture and the national security threats we face could not be more evident.

According to a recent study, over 97% of climate scientists say that man-made climate change is a reality.[x] I'm not a climate scientist—I'm a former front-line combat leader in the US military. And as a combat leader, if 97% of my intelligence indicated that continuing down the road I was on would pose a lethal danger to my mission and the lives of my paratroopers, I would be committing unconscionable military malpractice if I decided not to listen, and more importantly, to act.

Yet, even in the face of overwhelming evidence and the certain consequences that inaction will bring, some say that we cannot or should not act. The challenge is too great to be overcome, they claim—the pace of progress is too slow, or the costs too high. Fortunately, leaders remember what the nay-sayers have forgotten: if government and industry stand together, there is no new market America cannot master, and no technological revolution America cannot lead.

We see that today in Kern County, California. Located in the high desert, Kern supplied the crude that made California the oil capital of the United States back in the 1920s, and fueled much of the mid-20th century oil boom. Kern County has always been proud to provide American energy. That's why in the 21st century Kern has turned to renewable sources, becoming the largest producer of wind and solar energy in the state of California and creating jobs in a place where unemployment had been 64% higher than the national average.

Two months ago, in this very building, I stood with Jeff Duff, the CEO of Air-Streams Renewables, a technical school in Kern County that trains wind turbine technicians. Air-Streams is proud that 70% of its graduates are veterans. Jeff told me about one of his students, an electrician in the Navy who after being honorably discharged, struggled to find work that used the skills he learned in the service. He left a night job at a mortuary to join Air-Streams and graduated at the top of his class. Now, he's continuing his service to his nation and his community by building the energy economy of the future.

As we debate clean technologies, we often ignore energy's impact on our national security. There will be a lot of emphasis in this room today on cost. But the price of fossil fuels includes more than

drilling and pumping. There are security costs that we must recognize. Fossil fuels fund extremists, and breed dependency on nations that don't share our values. We can let stories like Kern County's be what they are today: promising, but not commonplace. Or instead, we can lead—and invest in 21st century technologies that keep America safe and prosperous.

---

[i] Report from the Pew Project on National Security, Energy and Climate, "From Barracks to the Battlefield," pg. 16 (2011).

[ii] "Casualty Costs of Fuel and Water Resupply Convoys in Afghanistan and Iraq." Army-Technology.com, February 26th, 2010. http://www.army-technology.com/features/feature77200/

[iii] Powers, Jonathan. "Oil Addiction: Fueling Our Enemies." Truman National Security Project, February 17th, 2010. http://www.trumanproject.org/files/papers/Oil_Addiction_-_Fueling_Our_Enemies_FINAL.pdf

[iv] CNA Report on "Powering America's Defense: Energy and the Risks to National Security" (May 2009) http://www.cna.org/documents/PoweringAmericasDefense.pdf

[v] CIA World Factbook. "Iran." CIA, February 21st, 2012. https://www.cia.gov/library/publications/the-world-factbook/geos/ir.html

[vi] Powers, Jonathan. "Oil Addiction: Fueling Our Enemies." Truman National Security Project, February 17th, 2010. http://www.trumanproject.org/files/papers/Oil_Addiction_-_Fueling_Our_Enemies_FINAL.pdf

[vii] Powers, Jonathan. "Oil Addiction: Fueling Our Enemies." Truman National Security Project, February 17th, 2010. http://www.trumanproject.org/files/papers/Oil_Addiction_-_Fueling_Our_Enemies_FINAL.pdf

[viii] Quadrennial Defense Review. Department of Defense, February 2010.

[ix] Report from CSIS and CNAS, "The Age of Consequences: The Foreign Policy and National Security Implications of Climate Change" (February, 2007) http://www.cnas.org/files/documents/publications/CSIS-CNAS_AgeofConsequences_November07.pdf

[x] Anderegg, William R L; James W. Prall, Jacob Harold, and Stephen H. Schneider (2010). "Expert credibility in climate change". *Proc. Natl. Acad. Sci. USA* **107** (27): 12107–9.

Mr. STEARNS. And I will open with my questions.

Dr. Sherlock, let me ask, we have a slide we would like to put up, if you could, and perhaps not everybody can see it, but I will give a copy to the ranking member and anybody other——

Ms. DEGETTE. I don't know, where is this slide from?

Mr. STEARNS. It's from Dr. Sherlock's prepared testimony.

Ms. DEGETTE. OK.

Mr. STEARNS. And if you look at this slide, and Dr. Sherlock, I will have you explain it, you can see that the upper portion of the slide is computer generated by the Department of Energy on construction phase jobs that are created and what they project operational jobs being created. And the lower portion is actually what actually occurred; is that correct, Dr. Sherlock?

Ms. SHERLOCK. It's an illustrative example to demonstrate the difference between a job supported as opposed to a potential job created.

Mr. STEARNS. But it's also to show that the projected, based upon a computer model, isn't it also. And actually what occurred?

Ms. SHERLOCK. It's based on NREL's computer model and then based on earlier research using the estimate of 39 percent where early estimates show that 39 percent of the wind energy capacity installed in 2009 was directly motivated by the grant, rather than resulting from other incentives or other factors.

Mr. STEARNS. Well, let's take one of the most egregious examples. The total direct plus indirect and induced operational phase shows that from 9,700 to 10,000 jobs would be created, but the direct plus, indirect, actually is 1,989 to 2,145 according to the illustrative example estimated by the—I guess, your office; is that correct?

Ms. SHERLOCK. It is the NREL's estimates multiplied by the 39 percent that was found in the earlier Berkeley lab study, yes.

Mr. STEARNS. To what do you attribute the huge difference, for example, between the 10,000 and the 2,000 that was shown on the chart? What do you attribute that to?

Ms. SHERLOCK. The major difference is that a number of projects would have gone forward even if the grant were not available. So, for example, if only the PTC and the ITC had been available, some of the projects that chose to elect to receive the grant would have happened in the alternative world that's not observed, where only the tax credits were available, so those projects that would have happened in the alternative world are jobs that are supported rather than jobs that are directly created.

Mr. STEARNS. So the long and short of it, the computer model is including a lot of jobs that would have occurred anyway?

Ms. SHERLOCK. Essentially, yes.

Mr. STEARNS. How much money so far has been provided under section 1603 to fund these large wind projects?

Ms. SHERLOCK. I don't have the precise number for wind creation in front of me. It's been about $11 billion out the door total, and roughly 90 percent of that has gone to wind.

Mr. STEARNS. And these are the jobs that resulted from that expenditure on your chart?

Ms. SHERLOCK. This is wind and solar jobs, yes.

Mr. STEARNS. Isn't it true that additional money has come from private and other sources without the government?

Ms. SHERLOCK. Yes, yes, so the government grants 30 percent, roughly, and then the rest of that would be from private investments.

Mr. STEARNS. Anything else you would like to add from this chart before we move on?

Ms. SHERLOCK. I think it's really important to emphasize when you are looking at job studies, when you're looking, just to make sure you're comparing apples to apples, that when you are looking at jobs reported, that's what you are looking at. And when you're looking to try to have jobs created, that's what you are looking at. So be careful with the language that's used.

Mr. STEARNS. You know, the stimulus package that provided this 1603 program—wasn't the inducement for instead of getting tax credits, you're going to get sheer payment; isn't that true?

Ms. SHERLOCK. Yes, that was the purpose.

Mr. STEARNS. And isn't that a stronger incentive for the companies because they can get cash from the government, instead of a tax incentive, to be in the 1603 program?

Ms. SHERLOCK. Yes. There were a number of companies that faced financing frictions, weren't able to find partnerships to turn those tax credits into equity. And the tax equity markets may have worked well for some of the larger projects, but especially for smaller companies.

Mr. STEARNS. So basically the government is giving money away rather than putting it as a tax incentive.

Ms. SHERLOCK. It is being paid out as a grant rather than as a foregone revenue.

Mr. STEARNS. OK. Mr. Kreutzer, with regard to the BLS report concluding that there are 3.1 million green jobs, is there a coherent and rational definition of green jobs, or is it so broad that it is meaningless?

Mr. KREUTZER. Well, it seems to be very, very broad. They do give features of a green job that if you do recycling, you know, if you are involved in helping the environment and so on, but when you look at 50 percent of the jobs in the steel mill industry are green, you have to question is there any meaning at all to this.

You can come up with any definition you want. As I mentioned, you could say people who wear green on St. Patrick's Day have a green job, but that doesn't tell us anything.

Mr. STEARNS. Or Dr. Green here, he says from generation to generation he's been working on green jobs.

For example, are jobs producing energy, nuclear energy, are they considered green jobs?

Mr. KREUTZER. Yes. The vast majority of jobs in the nuclear power sector are green, I think it's over 80 percent.

Mr. STEARNS. So aren't the President's anti-Yucca and otherwise anti-nuclear policies actually impeding creation of new green jobs?

Mr. KREUTZER. Yes.

Mr. STEARNS. Under his own definition. If the definition of green jobs is nuclear energy, and he is out there protesting against—put storage in Yucca Mountain, and he also is—his anti-nuclear policies, aren't they actually impeding green jobs?

Mr. KREUTZER. According to their definition, yes.

Mr. STEARNS. Are jobs associated with steel making considered green?

Mr. KREUTZER. About half of them, a little over half.

Mr. STEARNS. And isn't the wave of EPA regulations targeting steel plants likely destroying the potential for green jobs?

Mr. KREUTZER. Yes, I guess if you consider them green jobs.

Mr. STEARNS. Quickly, with regard to claims that the military needs to go green, are alternative energy sources necessarily better for our military today?

Mr. KREUTZER. I think there's a good bit of bait and switch going on in the national security fossil fuel debate. First of all, windmills don't do anything to reduce the costs or the number of convoys——

Mr. STEARNS. You can't run a Humvee with a windmill or with solar panels.

Mr. KREUTZER. In addition, the biofuels have lower energy density and would require more convoys to take those fuels to the front. Third, we can provide securely petroleum from North America. We could provide two or three times as much petroleum as the whole Pentagon uses from the XL pipeline.

Mr. STEARNS. OK. Well, I'll just conclude. But, you know, we're hearing austerity from the Department of Defense, and they're cutting and planning sequestration. But adding the cost of alternative fuel, isn't this a drag on the military and actually diverting funds that they could use for our national defense that they are using instead for these alternative fuels?

Mr. KREUTZER. Yes. And I am absolutely sympathetic to provide as much security for the men and women fighting as possible. But cloaking, you know, cloaking green jobs—excuse me, green energy—in their heroism I think is a disservice.

Mr. STEARNS. My time has expired. The gentlelady from Colorado is recognized.

Ms. DEGETTE. Thank you so much, Mr. Chairman. Mr. Breen, I appreciated your testimony a lot, and one of the places I went on my green energy tour last week in Denver was I went to the Veterans Green Jobs office, which is a national—you're shaking your head. You probably know about that. It's a national nonprofit designed to help place veterans in green jobs.

And their business plan shows that they are going to have placed 600 veterans in these jobs by next year, weatherization jobs as well as in high-tech industry. So, they are doing something practical for veterans.

I was a little bit offended, I'll be honest, by the statement that was just made by Dr. Kreutzer about windmills can't power tanks——

Mr. STEARNS. Humvees.

Ms. DEGETTE. I'm sorry, Humvees. And I'm wondering, Mr. Breen, if you can just briefly say what you mean, very briefly, that it's in America's interest to move towards alternative energy. Did you mean something as shallow as windmills can't power Humvees?

Mr. BREEN. Of course not.

Ms. DEGETTE. What did you mean, Mr. Breen?

Mr. BREEN. We have two very linked problems in the national security space. One is a dependence on petroleum as a single source

of fuel for virtually every platform that we use. It's from Naval to ground base. And again, I think there's a lot of apples to oranges comparisons going on in the analysis. Nobody is talking about moving Navy biofuels to a forward operating base. The Navy doesn't have any forward operating bases; let's be clear on that.

Second, we have the problem of climate change, an acknowledged national security threat of climate change. And taking action on that, certainly wind, solar, other technologies, that allow us to use our resources cleanly have a lot to do with that. But climate change is not the sole reason that, for example, the Air Force is moving many of its installations to wind and solar. They want to be able to continue military operations if they're cut off from the civilian grid for a variety of reasons, many of which are plausible, such as a Chinese cyber attack on the grid, which any cyber expert will tell you is more than possible.

Ms. DEGETTE. Thank you.

I have a couple of other questions. And I agree with what a lot of our witnesses said about the fact that the sole reason for the government to invest in any energy policy, including clean energy and renewable, is to develop renewable energy.

Job creation should be a tertiary benefit. It should be the primary benefit. It should flow from this policy to move us away from foreign fuels and into domestically developed fuel.

So I want to ask—first of all, I want to ask you, Dr. Sherlock, you talked about the statistics, and I think it is an interesting point about would the jobs have been there anyway.

I want to ask you about if you have reviewed the tax credits related to oil and gas, if those same principles apply about job creation from oil and gas industry tax breaks.

Ms. SHERLOCK. If the market prices are going to be the motivating factor generating investment in oil and gas resources, then that may be the factor driving jobs rather than the tax incentives.

Ms. DEGETTE. OK. So just because you are giving tax incentives to the oil and gas industry doesn't mean that is necessarily what is creating jobs, correct?

Ms. SHERLOCK. The same holds for those industries.

Ms. DEGETTE. Right. OK. So that is true for any energy tax credit, right?

Ms. SHERLOCK. Yes.

Ms. DEGETTE. OK. Now, I want to ask a couple of questions about the government role in energy production in general, both from the standpoint of green energy and oil and gas. Several of the witnesses have been critical of the job estimates from the section 1603 renewable energy grant program. So I just want to take a step back.

Mr. Green, do you support any Federal role in supporting green and renewable energy, yes or no?

Mr. GREEN. Yes.

Ms. DEGETTE. Yes. OK, Mr. Kreutzer? Dr. Kreutzer, excuse me.

Mr. KREUTZER. No.

Ms. DEGETTE. No. Dr. Montgomery, yes or no?

Mr. MONTGOMERY. Yes, on R&D and no on production.

Ms. DEGETTE. Thank you. And Mr. Breen?

Mr. BREEN. Yes, of course.

Ms. DEGETTE. Now, let me turn to oil and gas subsidies. Ms. Sherlock—I am about to ask her.

Ms. Sherlock, your testimony describes the subsidies and tax credits that go to traditional fossil fuels. What is the annual value of those tax credits? Do you know?

Ms. SHERLOCK. It depends which incentives are being included, whether you are including things like the section 199 deduction that's assigned.

Ms. DEGETTE. My staff says it was about $2.4 billion in 2010. Does that sound about right?

Ms. SHERLOCK. Yes.

Ms. DEGETTE. Now, Dr. Green, do you support those tax credits and tax breaks for oil and gas, yes or no?

Mr. GREEN. I am on record repeatedly as opposing all genuine subsidies.

Ms. DEGETTE. So your answer is no.

Mr. GREEN. No.

Ms. DEGETTE. Dr. Kreutzer?

Mr. KREUTZER. This is "have you stopped beating your wife" sort of question so I can't give you yes or no.

Ms. DEGETTE. Well, do you support the tax credits and tax breaks for oil and gas? You said you don't support them for renewable fuels. Do you support them for oil and gas?

Mr. KREUTZER. The one that you're talking about for oil and gas applies to renewables.

Ms. DEGETTE. Yes or no?

Mr. GREEN. I don't support genuine subsidies. I don't call the 199 a subsidy.

Ms. DEGETTE. OK. Dr. Montgomery, yes or no?

Mr. MONTGOMERY. Again, it's not a question that can be answered yes or no. It's highly oversimplified and I can't——

Ms. DEGETTE. So you can give a clear answer for the renewables but not for the oil and gas, correct?

Mr. MONTGOMERY. I did give a clear answer that for the renewables I support R&D and the production subsidies.

Ms. DEGETTE. OK. Let me ask about one more thing. The section 263(c) tax deduction is a deduction for intangible drilling costs. This subsidy allows oil producers to deduct business costs like fuel repairs and drilling supplies and then, rather than taking them over the life of the investment, oil companies can claim them in the first year.

Dr. Kreutzer, do you support that tax break for oil companies, yes or no?

Mr. KREUTZER. We are in favor of having everything expensed for everybody.

Ms. DEGETTE. OK. So your answer would be no because it is in one year.

Mr. KREUTZER. No, we're in favor of—yes, we want that and we would like to have those.

Ms. DEGETTE. Dr. Montgomery—Mr. Chairman, you spent a minute and 30 seconds.

Mr. STEARNS. It is the prerogative of the chairman, and I am the chair.

Ms. DEGETTE. Oh, you are going to cut me off sooner?

Mr. STEARNS. Well, you have had a minute and a half over, OK? You are finished.

All right, Dr. Burgess, you're recognized.

Mr. BURGESS. This is a fascinating exchange. I was willing to let it continue for a while.

Ms. DEGETTE. The chairman didn't want it to.

Mr. BURGESS. Well, can I just ask a question on the intangible drilling costs. I mean, there are other industries that are able to deduct the costs of inputs; is that not correct? Dr. Kreutzer.

Mr. KREUTZER. Yes. The question is whether it's a capital expense or a, you know, a continuing expense that you would have. And I think that distinction is not a helpful one to make, and I think it would be better if our whole Tax Code simply had expensing for every dollar that a company spent this year they get to deduct from their revenues before taxes are calculated.

Mr. BURGESS. Well, let me just go on record as being in agreement with you, and I hope fundamental tax reform is undertaken by this Congress in the next term, that we seriously address that, because I think it is a serious shortcoming of the Tax Code we have now, and we wouldn't even be having this discussion if it didn't seem like the Federal Government, both Republican and Democrat administrations, were trying to pick winners and losers using the Tax Code.

Dr. Kreutzer, you mentioned in an answer to a question about the job creation side of the ledger. You also referenced right at the end of your answer to that question that it was offset by job losses and other parts of the economy. Could you elaborate on that?

Mr. KREUTZER. Sure. When you take money to spend in one part of the economy, it has to come out of somebody else's pockets. If it's taxed, you take it from taxpayers today; if it's borrowed, you take it from lenders today, and then taxpayers later when you pay it off. And the money that the taxpayers are not spending because they have to provide the subsidies is money that is not going to be creating jobs as the grocers and the butchers and so on that they would have created had they had kept the money themselves.

Mr. BURGESS. And do you have a sense as to the—a number? We have been talking today about numbers of jobs created, destroyed, enhanced, supported. Do you have a sense of the numbers.

Mr. KREUTZER. We at Heritage have not done a comprehensive study of these green jobs, so I couldn't give you a number on that. We have looked at cap and trade bills in the past where the net impact is hundreds of thousands of jobs lost on net.

Mr. BURGESS. Dr. Green, did you have something you wanted to add to that?

Mr. GREEN. Yes. If you look at the countries where they have studied the question, the estimates range between roughly two and seven. They cluster in such a way, using different economic models suggest that is probably——

Mr. BURGESS. Wait a minute. Could you expand a little bit on the numbers two and seven?

Mr. GREEN. Sure. Well, if you look at, as I said in my testimony, if you look at Spain and you simply add up—these are not terribly complicated, don't misunderstand. If you simply add up what was spent and how many jobs were created by the government's own

accounting, and you ask how many private sector jobs that same amount of money would have supported in the rest of the economy, it is a simple and relatively straightforward division. And Spain found, in a study in Spain, it was found that for every green job that was created, it cost so much that two jobs, 2.2 jobs were foregone in the rest of the economy. That is, it sucked up the money that would have paid for two jobs and only made one. And in Italy the number was even higher. In Italy the numbers ranged from five to seven jobs, because it was particularly expensive to create green jobs in Italy, especially wind jobs. And in the United Kingdom, they found that one green job cost as much to make as 3.7 jobs. So it's somewhere between two jobs and probably five jobs.

Mr. BURGESS. So the green jobs program is in fact a job sink which is pulling jobs out of the broader economy?

Mr. GREEN. Yes, that is correct.

Mr. BURGESS. Let me ask you a question because you referenced the that government doesn't have a place as being a venture capitalist. This committee had a hearing with Jeffrey Zientz and Jonathan Silver. Jonathan Silver was a deputy secretary at the Department of Energy, and Jeffrey Zientz was with—is now the acting director of Office of Management and Budget, but at the time was deputy director of the Office of Management and Budget. And Jeffrey Zeintz, I asked him a question about was it OK that Solyndra—at this point Solyndra had just filed its initial bankruptcy filing—and was this a good investment of taxpayer dollars? And he was very dismissive of the notion and said, any venture capitalist can tell you that sometimes you are going to lose on one of these bets. And my counter to him was, but we, the government, should not be in the business of venture capitalism because if someone loses an investment with a venture capitalist, that is an investment that they voluntarily put forward and money that they felt they could put at risk. We are now talking about taxpayer dollars in the case of Solyndra, money literally take at the tip of a spear from taxpayers under threat of force from the IRS, and we invested it in something which really had no hope of ever returning on equity.

Do you have any feelings about that?

Mr. GREEN. Well yes. You're exactly spot on, which is the key difference between a private venture capitalist and a government venture capitalist is that the private venture capitalist loses their own money and/or money people have entrusted to them and therefore they take the consequence. When the government engages in venture capitalism the bureaucrats at the Department of Energy, for instance, who are giving out the money, are not losing their own money, they're not using their friends' money or their investors' money, they're losing taxpayer money, and there's no market consequence for them. It is not that people are going to say, "Wow, you pretty much suck at investing, I'm not going to put my money with you anymore." Instead, they just go for another round. And so the problem is one of incentives and responsibility.

I wanted to quickly just comment on something Dr. Kreutzer said, and that my position I think was misinterpreted on R&D. I do believe in basic R&D as a legitimate role of government. Gen-

uine subsidies I am against. That is, special treatment I'm against. Uniform tax treatment, I'm for. Thank you.

Mr. STEARNS. The gentleman's time has expired.

The gentlelady from Illinois is recognized for 5 minutes.

Ms. SCHAKOWSKY. Thank you, Mr. Chairman.

The ranking member was asking a question that only Dr. Kreutzer had answered. So let me ask Dr.—Mr. Montgomery and Mr. Green. It was referring to section 193 tax deduction for tertiary well injectants for oil wells and whether or not you support those.

So, Mr. Montgomery? Dr. Montgomery. Sorry.

Mr. MONTGOMERY. Thank you. I was hoping to have a chance to answer that question. I think I have been quite clear in testimony and in presentations at various workshops that it's my conclusion that any subsidy which tilts the playing field in favor of one form of energy versus another is bad energy policy and an excessively costly way of achieving the goals of energy security, environmental protection or——

Ms. SCHAKOWSKY. So, no.

Mr. MONTGOMERY. On the other hand, the Tax Code is very complex. And the simple fact that one particular provision of the Tax Code allows an entity to pay less tax than they would have if they're a different provision is one that requires quite detailed analysis to figure out whether it's a subsidy, and I have not done that on this provision.

Ms. SCHAKOWSKY. It is just really interesting to me how the witnesses of the majority have called are very certain when it comes to how ill-advised it is to subsidize clean energy, green energy, but not so clear when it comes to oil and gas.

Dr. Green.

Mr. MONTGOMERY. I'm sorry. I think you're misstating my testimony. I said that I am opposed to subsidizing——

Ms. SCHAKOWSKY. I know. But you haven't figured this one out.

Dr. Green.

Mr. GREEN. Well, I have three degrees. None are in tax preparation. I am not an expert on the Tax Code so I can't testify in any way to the benefit of one or another——

Ms. SCHAKOWSKY. But aren't you talking about that? Isn't that exactly why you are here, to talk about the subsidies?

Mr. GREEN. In my testimony I spoke about principles, economic principles, as to why can we not be certain about a single tax provision?

Well, I can be fairly certain about very large things, like if I step off of a cliff, I'm going to fall downward. The individual Tax Codes are not an area in which——

Ms. SCHAKOWSKY. No, no. You listed all of the problems with the investments in clean energy, and you seemed very certain about all of those.

Let me go on to another question. In general then, section 613 tax deduction for, quote, percentage depletion of oil and gas wells. Dr. Kreutzer?

Mr. KREUTZER. Yes. I'm not sure that I've looked at all of that but I think we would be opposed to that.

Ms. SCHAKOWSKY. And Dr. Montgomery?

Mr. MONTGOMERY. Yes, I think that the percentage depletion actually has very little effect on oil production because it's so limited in its scope and who can claim it.

Ms. SCHAKOWSKY. So is that a no? You don't support that tax deduction?

Mr. MONTGOMERY. I don't think it's providing any particular benefit.

Ms. SCHAKOWSKY. And Dr. Green?

Mr. GREEN. If it's a unique subsidy that distorts the market and unlevels the playing field, I oppose it.

Ms. SCHAKOWSKY. I see. And I am sure you are aware that since 1918 we have been giving subsidies to the oil and gas industry. So the history of the United States of America actually making investments in gas and oil, not a new thing. We've been doing it for a lot of years, and I don't know if the American Enterprise Institute and the Heritage Foundation have opposed those.

I wanted to ask, Mr. Breen, in your testimony, you talk about a 2007 study that found strong and surprising intersection between the two great security threats of the day: climate change and international terrorism waged by Islamic extremists. Dr. Kreutzer said that was somehow a disservice. I wonder how a reliance on oil and natural gas benefits these groups and does threaten our national security.

Mr. BREEN. Sure. Thank you. First let me say it's hard for me to understand, leading a coalition of over a thousand Iraq and Afghanistan combat veterans, how we're cloaking our arguments in anything. Frankly, that was strange.

On the point that you make, the study was conducted by the Center for Strategic and International Studies and the Center for New American Security, and it found in the most—it basically did three different sets of projections from the most conservative climate projection to the most aggressive possible, it found all three had very serious national security consequences.

The link that it found between terrorism, essentially Islamic or otherwise, and climate was twofold. First it found that the solution to both of those problems was highly linked to our national energy policy, which I think is very germane to this hearing. Second, it found that climate change was extremely likely, overwhelmingly likely in some cases, to act as an accelerant of terrorism.

For example, climate change causes and accelerates certain natural phenomenon like drought, flooding, famine, pandemic disease. All of these things create the conditions of desperation that are necessary for terrorist recruitment. For example, after recent flooding in Pakistan, we saw a threefold rise in al-Qaeda's recruiting numbers out of that region. So anytime that you've got people who are making their living off the land in a very marginal way and that living is disrupted, terrorist recruitment tends to go up.

Ms. SCHAKOWSKY. Thank you. I yield back.

Mr. STEARNS. The gentlelady from Tennessee is recognized for 5 minutes.

Mrs. BLACKBURN. Thank you. And I want to stay with Mr. Breen and the national security issue if I can, because I think that looking at our energy security, economic security, national security, is something that is vitally important, and I know that you all are

doing a little bit of work trying to delve into that. So let me you about this, and this follows right on to the question Ms. Schakowsky had asked you.

The EPA and their war on coal, is that making this Nation more or less secure?

Mr. BREEN. I'm sorry. I don't know what you're referring to when you're talking about the war on coal.

Mrs. BLACKBURN. Oh, you don't——

Mr. BREEN. I am afraid I don't, no.

Mrs. BLACKBURN. Well, the EPA is seemingly developing policies that are against all things coal. Now, there are many of us, like those of us from my region of the country, that feel clean coal technologies need to be used for electric power generation. So if you take coal out, does that make our Nation more or less secure, and should coal be a part of an all-of-the-above energy policy for our country?

Mr. BREEN. As we like to say, that there is no single technological solution. There is no silver bullet to solve the climate problem or the energy dependence problem when it comes to transportation fuels. It's really a silver buckshot solution, if you'll forgive the analogy. So what that means is that——

Mrs. BLACKBURN. I appreciate the analogy because I do understand buckshot.

Mr. BREEN. I'm sure you do.

Mrs. BLACKBURN. You go right ahead. Those of us in Tennessee get that.

Mr. BREEN. Yes. Sure. Didn't mean to imply that you didn't. As a lifelong hunter, I certainly do as well.

Mrs. BLACKBURN. Yes.

Mr. BREEN. My point being that we support any mix of technologies that sufficiently reduces carbon emissions so that it's clean and that it's safe. If clean coal meets that standard, great. I'm not an expert in whether or not clean coal does meet that standard.

Mrs. BLACKBURN. What about natural gas?

Mr. BREEN. Again, if natural gas meets that low carbon standard and is safe, sure. But I would refer you to experts who can tell you whether or not it does meet that using a life-cycle analysis.

Mrs. BLACKBURN. Let's ask some of the experts that are on the panel. Would anyone else like to weight in on this, EPA and their battle against coal? Go ahead.

Mr. KREUTZER. It certainly doesn't make us more energy secure to ignore the energy source that we have in greatest abundance, which we do not need to import as we export it.

Mr. GREEN. I think it's increasingly obvious that the word "green" here in this case really only means low carbon. Therefore, the agenda is one of purely decarbonization and climate change, not really of energy security, not really of air pollution, because if it were about air pollution or just clean energy, you would have uniform support for things like diverse nuclear power, natural gas, and so forth.

And so to repeat what Dr. Kreutzer said, affordability being a critical part of keeping our economy going, which is how we fund our military, which is how we stay secure in a world that is that way, it does not make sense to increase the cost of energy produc-

tion and use in the United States and that does not make us more secure.

Mr. MONTGOMERY. I guess I would make two observations if I could. The first is that it's by no means clear to me that anything the United States does to reduce its greenhouse gas emissions is going to actually deal with any of the problems that Mr. Green is talking about because of the immense growth of emissions from other parts of the world that we don't control.

The second part is that if we cared about climate change, what we would be doing is discussing a way of putting a price on carbon dioxide or putting overall limit on greenhouse gas emissions from all sources. We would not be discussing a mixed bag of uneven and largely ineffective subsidies for different kinds of favored energy that can get votes.

Mrs. BLACKBURN. I appreciate that.

Dr. Kreutzer, let me come to you. Let's talk about jobs, because I look at what has happened with this global warming agenda that we have had in front of us, and a couple of other members and I that are on the dais were over in Copenhagen for that climate summit a couple of years ago. And you just have to wonder what's going on when it comes to jobs, and I know you all have touched on that.

So when you look at this, this administration's global warming agenda and you get to the end of it, would you say it is a net job creator or a net job destroyer; and the EPA, their regulations as you look at this and study the issue, do you see it on net as a job creator or job destroyer?

Mr. KREUTZER. No. It was not on net a job creator and it's not just the Heritage Foundation that would come to that conclusion. We had a panel at Heritage that included economists from the Brookings Institution, the Congressional Budget Office and the Environmental Protection Agency back when we were looking at the cap-and-trade legislation. None of them found that cap-and-trade legislation stimulated the economy. The argument was over how much it costs the economy, and there was disagreement on that. But no, no serious economists really looked at restricting carbon and energy as a job creator.

Mr. STEARNS. The gentlelady's time has expired. Mr. Scalise is recognized for 5 minutes.

Mr. SCALISE. Thank you, Mr. Chairman. I appreciate you having this hearing. Appreciate the panelists for being here. I want to start, Mr. Breen, with you. In your statement, you opened by saying it is an established consensus in the defense community that our dependence on oil threatens our national security. I've heard many people in the Defense Department, and I'd agree with them, frankly, that our dependence on Middle Eastern oil specifically is a threat to our national security. I have heard of no established consensus that our dependence on oil is a threat to our national security. Do you have any data that backs this up, that creates this established consensus you refer to?

Mr. BREEN. I rely on the statements of the Secretary of Defense, the Chairman of the Joint Chiefs of Staff, and all three service secretaries when I say "established consensus."

Mr. SCALISE. I have heard many of them express their concern about foreign oil, and I'd make it even more specific to Middle Eastern oil, but frankly, I would imagine if you asked the Secretary of Defense to count how many billions of dollars that American energy production actually yields to the Federal Treasury to pay for our national security to fund the Department of Defense, I hope you are not suggesting that if we just shut down our oil manufacturing in the United States that that would be a good thing for our national security. Is that what you are saying?

Mr. BREEN. No, of course not. I'm not saying that the use of oil—and I want to be very clear on this point. I'm not saying the use of oil is in any way bad for our national security. What I'm saying, sir, is dependence on a single source of fuel is a threat.

Mr. SCALISE. Well, nobody is talking about—I support an all-of-the-above energy strategy which says that you don't just depend on oil but you absolutely explore for oil, you explore for natural gas, you advance coal, you advance nuclear, you advance wind, you advance solar. You do all of the above. But I would hope that you would recognize that American energy production is really the key to energy independence in this country, and the fact that so many areas of American known reserves and even potential reserves are shut off by Federal policy, a threat to our national security.

That's why I was asking. You say that there is an established consensus. That would imply that you've got some kind of data to back that up and if you do, please get it to me. When I hear people talking about concerns and threats to our national security, it's things like Middle Eastern oil dependency that is a real problem. But the fact that we produce energy, oil, natural gas and others in this country, I haven't heard anybody in the Defense Department implying there is a consensus to the problem because it actually funds our national security.

Mr. BREEN. Sure. As I said, this is a silver buckshot problem, first of all. Nobody is suggesting that oil is not part of the solution.

Mr. SCALISE. No, but your statement is not targeted towards foreign oil. If we open up Keystone tomorrow, which I would hope we would do—unfortunately, President Obama chose a radical approach to saying no—but if we opened up Keystone tomorrow, that is a million barrels a day we would be getting from a friend that we wouldn't have to be getting from some of these countries that don't like us. I think that would advance our energy security. But your statement actually implies the opposite.

Mr. BREEN. Can I respond to that, sir?

Mr. SCALISE. Well, do you have any data? I'm looking for data. I mean, you are making a statement that there is an established consensus about an area that you really haven't supplied any information to back up.

Mr. BREEN. There's data in my submitted written testimony. A $10 increase in a barrel of oil costs the Department of Defense an estimated $1.3 billion. That's because oil is a globally—it is because it is a globally traded commodity. And so you ask——

Mr. SCALISE. My time is running out. I hope you recognize that if we produced more of that in America, that would be billions more. It would not only mean millions more American jobs, which I think is a good thing, some people don't, but it would also be bil-

lions more dollars that would come into the Federal Treasury that would help fund an adequate Department of Defense. That's money that funds our national security. And maybe you don't see it that way.

I want to ask Dr. Kreutzer, because in your testimony you talk about and highlight some of these green energy programs. And I know you had talked with Dr. Burgess and others about this loose definition of a green job which really is very nebulous at best. But you talk about the loan program specifically, and we have had hearings in this subcommittee on the Department of Energy's loan program. The director, Dr. David Frantz, has testified. And you talk about some of the highlights that the administration has used, and there were four in particular that David Frantz had listed. And of course, we have all heard about Solyndra, $535 million just gone, company went bankrupt. The President said, "The future is Solyndra."

Mr. KREUTZER. Right.

Mr. SCALISE. I guess that means he thinks the future is bankruptcy and lost jobs. I sure think we should go a different route.

But you also go further and talk about Beacon Power, First Wind Holdings, Nevada Geothermal. Do you want to expand on what you have seen in terms of what you've seen that the administration highlights as successes in the green energy sector?

Mr. GREEN. The markets are always seeking out cheaper, more effective forms of energy and things that they can make money on. If somebody requires a subsidy, that is a pretty good signal that they couldn't make money in the market. And we saw that played out. The loan administrator had two criteria that were required to get that 1603 loan. And that first one is—not the 1603 but the 1705. You had to be able to prove you couldn't get private financing and you had to have a market-viable project. Those are mutually exclusive. And we saw that play out.

He gave—this was 2 years ago. The four examples he gave were before anybody had gone into—had trouble, were Solyndra, Beacon Power, both of whom have gone bankrupt since then. Nevada Geothermal is having trouble. Their stock price is at 4 cents per share. And I apologize, I don't have the fourth one in front of me.

Mr. SCALISE. First Wind Holdings.

Mr. GREEN. First Wind Holdings. After they got the loan, they had to—they tried to have an initial public offering. But they had to withdraw it because of the problems.

Mr. SCALISE. Appreciate that. Thanks, I yield back, Mr. Chairman.

Mr. STEARNS. Your time has expired.

The gentleman from Texas, Mr. Green, is recognized for 5 minutes.

Mr. GREEN OF TEXAS. Thank you, Mr. Chairman. Sorry I wasn't here. We have an energy subcommittee going on downstairs that also has interest in green jobs. I appreciate the opportunity to ask questions.

My district in Houston is the largest petrochemical complex in the country, in the center of the world, our Nation's energy sector. Many of the energy companies, both large and small, have invested heavily in green technology and renewable energy. Houston is now

the home of nearly 40,000 green jobs, even though we have a huge number of refinery jobs. We have five refineries in our district and at least 20 chemical plants. So we are not complaining about whatever color job they have, whether they are green or not.

Dr. Sherlock, can you speak to the possible consequences of the Federal Government's inconsistent and on-and-off-again support for green and renewable energy over the past two decades.

Ms. SHERLOCK. Especially in industries that have faced expiring incentives or incentives have lapsed and then they've retroactively reinstated, it's hard to plan, it's hard to invest. It's hard to secure financing when you just don't have certainty about what incentives are going to be available going forward.

Mr. GREEN OF TEXAS. Let me give you a benefit, having served on this committee for a good while. A lot of the things that were part of the Recovery Act were just building on the 2005 energy bill or energy law that was passed by a Republican Congress and Republican President. And that is what I am concerned about, the stop and start. We actually started some of that.

In fact, I heard coming in, the testimony—Solyndra—that was authorized, those loans were authorized under the 2005 energy law. And so granted, there was a bad investment. We should have done better, but there are other things that we could be doing.

Do you believe that looming expiration of the tax credits being discussed at this hearing will create uncertainty in the private sector and keep these very companies, some of them in my district, from further investing in new technology and creating these jobs?

Ms. SHERLOCK. Yes. With uncertainty about tax incentives, there's reluctance to invest.

Mr. GREEN OF TEXAS. Following my colleague from Louisiana, coming from our area where obviously we believe in domestic production, I want to ask some questions about national security implications of energy. We cannot continue to depend on hostile nations for a sizable amount of our energy needs, whether it be Iran, Venezuela, or some of them use these profits to build weapons and arsenals against us and our allies.

Mr. Breen, how much money does America send overseas to pay for overseas energy sources every day? Do you have that information?

Mr. BREEN. It's roughly $1 billion a day. Of course it fluctuates as the market changes.

Mr. GREEN OF TEXAS. Now, recently we've seen a reversal of importing domestic oil for lots of reasons. Obviously, we are doing better on conservation, which I think is part of whatever solution we should have. But we are also producing more domestic energy, and particularly liquids that we can use in transportation fuel. Do you believe that increasing our domestic energy production would reduce these costs?

Mr. BREEN. I think increasing our domestic energy production is all to the good and would. But let's remember that this is a globally traded commodity we're talking about. The U.S. demand has been static for quite some time, on the very high, but that global demand continues to rise. So I think it's unrealistic looking down the road to think we are going to see lowering oil prices anytime soon.

Mr. GREEN OF TEXAS. Well, we have seen lowering oil prices in the last few weeks and for a number of reasons. Like you said, it's a world price, and I can tell people if I drilled a well in my backyard, believe me, I'd want to have the world price on oil. So in Texas, I guess a lot of my fellow Texans can say that. They just don't let me drill in my neighborhood.

Can you summarize for us ways in which developing and using more domestic and renewable energy sources could improve our national security?

Mr. BREEN. Sure. There are several, and this varies from the tactical all the way to the strategic. Strategically, it comes down to cost as the point has been made here a couple of times. Our economic prosperity and the amount of money we spend on defense is the underpinning of our national security, right, these things cost money. As you see increasing volatility in the oil market, as you see prices in the long term I think rise and continuing to rise predictably, having alternative sources for the Department of Defense, which is the number one fuel user in the Federal Government, is all to the good and developing advanced technologies is all to the good.

Some of these technologies have tactical applications. At the tactical level, there was some mention made earlier of forward operating bases in biofuels, which is a bit of an apples-to-oranges comparison. But at the tactical level we've seen the highly successful use, under battlefield conditions, of wind and solar projects that are designed to keep tactical forward operating bases free from the need to resupply generators for fuel. So these have direct battlefield implications. Down to the point of a backpack solar panel that India Company, part of the Fifth Marine Corps, is currently using in Afghanistan to great effect.

Mr. GREEN OF TEXAS. OK. Our dependence on energy from hostile nations has dangerous implications for our Nation's security. It makes economic, environmental, and national security sense to transition away from these nations and develop newer, smarter, and domestic sources of energy, like you said, that helps our military. And I know I only have 3 seconds left. So, Mr. Chairman, thank you.

Mr. BURGESS [presiding]. The gentleman yields back.

I recognize the other gentleman from Texas, Mr. Barton, the chairman emeritus of the committee.

Mr. BARTON. Thank you, Mr. Chairman. I didn't—wasn't here at the beginning. I was downstairs on the greenhouse gas hearing in the energy subcommittee. So I have scanned the testimony, but I have missed the oral questioning so far. So if I ask something that is redundant, I want to apologize.

My first question would be a general question. Do we have an agreed-upon definition of what a green job is? I see a lot of shakes of head.

Mr. GREEN. Not that any of us have heard a coherent definition of green jobs. Of course it's very difficult to define a green product or a green thing. To do a life-cycle analysis even on a foam cup would be tricky. To do it on a person's job would be impossible.

Mr. BARTON. Let me give you some examples and you tell me if this is a green job. If a farmer grows corn for food 1 year, and the

next year he on that same land and the same acreage, he grows the same crop of corn but he grows it for ethanol, is that a green job?

Mr. KREUTZER. I have no idea.

Mr. GREEN. I would say it's probably anti-green, given the effect ethanol has.

Mr. BARTON. All right. What if the farmer the next year switches from corn to cotton for fiber. Or a cotton farmer switches to corn. Is that a green job?

Mr. KREUTZER. Yes, I think you're getting straight to the point that it's very difficult to define, and it is not clear that it is a useful exercise in the first place.

Mr. BARTON. If a truck driver is driving a truck that runs on diesel, and that truck switches from diesel to natural gas, is that a green job?

Mr. GREEN. I think green job proponents would say yes, but only because it has a lower carbon footprint.

Mr. BARTON. OK. What about a logger who cuts down trees in the forest and that's all—he's always done that. Is that a green job?

Mr. KREUTZER. Surprisingly, a large fraction of logging jobs, according to the BLS, are considered green. I don't know that I would consider it green.

Mr. BARTON. So we don't, we don't really have a definition of what a green job is. I mean, a commodity trader who is trading in green energy credits, for global warming credits in the European market, would that be a green job? Credits that don't exist, that actually—you know, trees not planted in India or power plants not—you know, coal plants not built in India so they take credit on the market.

Mr. KREUTZER. Yes. I am certainly not going to defend that as a green job, and I don't think the BLS looked at any jobs in the financial sector as being green.

Mr. BARTON. OK. Well, I just—when I was briefed on this hearing, it struck me there is such a thing as a green job. I mean, you know, if you switch from a source that uses a lot of energy to a source that uses less energy, you know, I certainly think somebody going to work in a solar factory that didn't exist, if the solar factory stays in business and actually produces solar panels that are sold and used, I would say that would be a green job.

I think somebody working in the wind energy sector that didn't exist, that actually generates electricity that's actually used, I think that is a green job. So I do think there is such a thing, and I do think you can create green jobs. But I also think there is also a lot of mythology and double-counting about what green jobs are.

Is there a better way for the Federal Government to create green jobs in some of the programs that we talked about today? And if so, what would that way be? I will ask Mr. Montgomery that question.

Mr. MONTGOMERY. Thank you. Yes, I think there clearly is, and it's to focus on what we are trying to accomplish with our energy and environmental policies. If what we care about is greenhouse gas emissions, the way to deal with that is by addressing greenhouse gas emissions, and the way to determine what we are doing is by doing an inventory of our greenhouse gas emissions. We don't

learn anything about greenhouse gas policy by trying to calculate the number of jobs that are being created by it.

Likewise, if our objective is to deal with mercury, what we—you know, our policy to—you know, if we want to, if we want to create green jobs reducing the amount of mercury that's being released into the atmosphere, then our policy needs to address mercury. It needs to address it broadly and evenhandedly, not by picking out the smallest source and regulating it into nonexistence. And it doesn't matter how many people are involved in doing that—actually it does matter, because the more people it takes to do it, the more it costs us, and the less they can do that's actually producing goods and services that people want to consume.

So I think if we want to create green jobs, if we want to create the number of green jobs that is consistent with maximizing the economic welfare of the country, we would stop counting them completely and we would focus our policy attention on solving the problems of energy security and environment in themselves.

Mr. BARTON. I agree. My time has expired, Mr. Chairman. Let me just end up with this editorial note. I do think, however you define a green job, at some point in time it has to be a job that is sustainable in the marketplace with either no government assistance or minimal government assistance. If you can't meet that definition over time, then it is not a job at all and shouldn't be counted.

With that, I yield back.

Mr. BURGESS. I thank the chairman emeritus for his observation and editorial comments.

I recognize the gentleman from Colorado, 5 minutes for questions.

Mr. GARDNER. Thank you, Mr.Chairman, and thank you to the witnesses for being here today.

Dr. Sherlock, I wanted to go back to this estimate of jobs supported and created by the section 1603 grant program that I believe you provided; is that correct?

Ms. SHERLOCK. Yes.

Mr. GARDNER. At the bottom it says Notes and it says, "potential jobs created by the section 1603 grant are calculated as 39 percent of the estimated jobs supported, as reported in the NREL Study. Induced jobs are not included in the potential job creation section as such estimates are less reliable than those presented for direct and indirect jobs. These figures are provided for illustrative purposes and may vary according to factors described in the text."

So you've got induced jobs, direct and indirect jobs, 39 percent of estimated jobs. What does this mean?

Ms. SHERLOCK. It means that the numbers in the bottom half of the table are 39 percent of the numbers presented in the top half of the table. I did not provide the induced jobs in the bottom half of the table, just because it would be extrapolating an uncertainty that I believe was already very uncertain.

Mr. GARDNER. Very uncertain in terms of the number of jobs created?

Ms. SHERLOCK. Induced. Induced jobs. When you're looking at jobs, direct jobs, and then extend the model to indirect jobs, and then to extend the model again to induced jobs, you're just adding

additional variables, additional assumptions, additional degrees of uncertainty at each stage in the modeling process.

Mr. GARDNER. So what is an induced job?

Ms. SHERLOCK. So an induced job would be because the workers who are employed in construction of the solar facility or the wind farm go out and spend on groceries,and so because they're spending more on groceries, the grocery store needs to hire more employees. So that would be—

Mr. GARDNER. And so a direct job would be?

Ms. SHERLOCK. The actual construction work itself.

Mr. GARDNER. And an indirect job would be?

Ms. SHERLOCK. The manufacture of the steel that goes into the facility.

Mr. GARDNER. OK. And then this 1603 program, I believe you stated in your testimony that it cost $17 billion?

Ms. SHERLOCK. That's over the 5-year budget, so yes.

Mr. GARDNER. So $17 billion 5-year budget, and so these 39 percent of the direct, indirect, and induced jobs cost how much a year?

Ms. SHERLOCK. Well, this is only looking at jobs in the first couple years of the program, so this would be about 10 billion, roughly.

Mr. GARDNER. So $10 billion for the first 2 years of the program?

Ms. SHERLOCK. Roughly.

Mr. GARDNER. To create 40,000 jobs.

Ms. SHERLOCK. Depending on which number you're looking at—if you're looking at the induced, the direct, or the indirect.

Mr. GARDNER. Which number should I look at?

Ms. SHERLOCK. It depends what you want to be counting. Do you want to count the direct?

Mr. GARDNER. How many jobs did the 1603 grant create?

Ms. SHERLOCK. What type of jobs?

Mr. GARDNER. Jobs. I just want to know how many jobs were created.

Ms. SHERLOCK. If you're looking at the direct jobs, this one estimate has direct jobs created at 3,666 in the construction phase and direct jobs created at 355. Direct jobs would just be the construction jobs and then the ongoing operations and maintenance jobs. But if you wanted to look at supporting jobs in other industries, then you'd want to look at the other figures.

Mr. GARDNER. So for direct jobs, just if we look at the first few, this is average jobs per year. It is 355 jobs per year. In 2 years, 355 jobs created a year, $10 billion?

Ms. SHERLOCK. That would be jobs per year going forward. So these would be jobs that would be retained, average jobs per year going forward, yes.

Mr. GARDNER. For $10 billion.

Ms. SHERLOCK. Yes.

Mr. GARDNER. Shifting gears and talking a little bit about some of the talk we have had on taxes—and Dr. Sherlock, I will leave you out of this. But Dr.Kreutzer, and I will go down the line, if I could get this answered, do you believe increasing taxes will result in lower costs of energy?

Mr. KREUTZER. No.

Mr. GARDNER. Dr. Montgomery.

Mr. MONTGOMERY. That one I could answer "no."

Mr. GARDNER. Dr. Green.

Mr. GREEN. No.

Mr. GARDNER. Mr. Breen.

Mr. BREEN. You'd have to ask an economist. I'm sorry. That's not why I'm here.

Mr. GARDNER. OK. And then would ask another question about the President made a statement in 2008. As a matter of public policy, does it make—he made a statement in 2008 where he said under his plan—and he was specifically referring to cap-and-trade—electricity rates would necessarily skyrocket. Do we have—you know, we need for our economy to succeed for jobs to grow, we need lower cost energy; is that correct?

Mr. KREUTZER. Yes. It grows better with lower cost energy.

Mr. GARDNER. Dr. Montgomery.

Mr. MONTGOMERY. The real growth in our economy is certainly dependent on the cost of producing energy. The less it costs to produce energy, the more we have left over for doing other things.

Does it affect jobs? No. I think the best estimate is jobs are going to be at full employment in this economy most of the time when we are growing, except for temporary hiccups. None of these programs are going to affect that at all.

Mr. GARDNER. Dr. Green.

Mr. GREEN. Lower cost energy leads to lower cost goods and services, greater consumption, and therefore greater economic prosperity. And I don't think there is anybody really who argues against that option, that notion. And then when the country is growing, of course, we have lower unemployment rates; therefore, there are more jobs.

Mr. GARDNER. Mr. Breen.

Mr. BREEN. Again, I am sure that at the Bureau of Labor and Statistics, there is somebody else you might have called who would have been happy to answer the question, but I can't.

Mr. GARDNER. So do policies that result in higher energy costs hurt the economy?

Mr. KREUTZER. Yes. If we have policies that make energy costs go up, that does not—it makes it more expensive and we're going to get fewer goods.

Mr. GARDNER. Dr. Montgomery.

Mr. MONTGOMERY. Not necessarily. It depends on how they do it, and I know your time is short.

Mr. GARDNER. Dr. Green.

Mr. GREEN. Well, we see this when oil prices spike up, the economy tends to contract. So clearly the relationship is there. Higher priced energy, lower economic output.

Mr. GARDNER. Mr. Breen, I will give you another shot.

Mr. BREEN. Same answer.

Mr. GARDNER. Thank you.

Mr. BURGESS. The gentleman's time has expired. I think if it is OK with everyone, we have dwindled down on the dais here, but I would like to recognize Ranking Member DeGette for a follow-up question.

Ms. DEGETTE. Thank you very much, Mr. Chairman.

So I just wanted to follow up on a couple of things. The first one is I really thought that Mr. Barton actually— too bad he's not here.

I thought he made two good points. The first good point is that if you are going to create green jobs, they should be sustainable over time. Just like any other government support you are going to give to any program, whether it is in traditional fuels or anything else, it should be viewed as a start-up, not as over-time, say since 1918.

But the second thing I think we need to figure out, and I think that Mr. Barton really made a good point about this, is that if we are going to be looking at these renewable energy programs and alternative energy as job creators, we really should kind of nail down the types of jobs. And, Dr. Sherlock, that is the point you are making is, we need to really nail down what types of jobs. And to that end, Mr. Chairman, maybe you can talk to Chairman Stearns about the concept of actually bringing in some of these agencies that are defining these jobs in these ways, like the Bureau of Labor Statistics and the other agencies, so they can explain to us. Rather than just criticizing this in a vacuum, we can find out why they are defining some of these jobs as green jobs and others as not green jobs. That's my only suggestion.

Mr. Breen, I just wanted to ask you, you were trying to answer Mr. Scalise's question about domestic oil versus foreign oil, and did that make a difference in terms of our oil independence? And he didn't really let you get your whole answer out, so I thought I'd give you this opportunity to complete your answer.

Mr. BREEN. Thank you. I appreciate that very much. My answer is that the problem is one of single-source dependence. If you need a single—if you rely on a single globally traded commodity, and again, the foreign domestic distinction is somewhat—somewhat vacuous, right? This is a globally traded commodity. It, again, is dependent on a global market, right? Demand for that commodity is increasing faster than production. I think that is very clear. In some cases, dramatically faster than production.

So if you need that one commodity to run all of your military operations, not to mention 97 percent of your domestic transportation sector, I think you have a national security problem. And so what you ought to be looking for is opportunities to find choice, which is very much a free market thing. So that the Defense Department or a consumer can go to a pump, and if gas costs too much, they can buy something else to power their vehicle. That's not outside the realm of technological or economic possibility. It's just something that we have to invest in because, like many other technologies, these are emerging technologies.Of course at this point, they're nascent and they're expensive. But it's worth investing in these things now.

Ms. DEGETTE. So thank you. That jars my memory. A couple months ago—I don't think Mr. Burgess was there—but I was at a conference in Brazil, and one of the things they were talking—you weren't there? No, he wasn't there.

Mr. BURGESS. Let the record show I was not on that junket. Different bill.

Ms. DEGETTE. It actually wasn't a junket. It was a very interesting conference on Brazil's energy policy. And one of the things that I learned which I hadn't known before was Brazil has a lot of indigenous biofuels. And what they have done is, with their cars they have adapted their fuels, their automobile fuels, so that they

can—and their automobiles, so that they can run on any mixture of petroleum and biofuels and ethanol.

And it was fascinating to me to see, because it is all dependent on market forces. So if oil is low, the price is low, they can fuel up with oil. If there is some kind of a problem or a—you know, if the cartel raises the prices, then they can shift almost entirely to biofuels. And I thought that was just really an interesting concept and one that supports what you are saying.

Thank you very much, Mr. Chairman. I yield back.

Mr. BURGESS. The gentlelady yields back. I thank you for that.

Let me just ask in the way of a follow-up, have any of you had any experience with the RIN program, the Renewable Identification Number program, that has come to this committee's attention? This is a program by the EPA to allow the sale—it reminded me very much of cap-and-trade when I heard about it, except it's an agency-derived program that allows the sale of these renewable identification numbers in order for people to blend their diesel with a certain amount of biofuel. And as it turns out, many of these places that are supposedly biofuel production areas, where companies have brought those RIN credits, in fact don't exist, or a church parking lot, or a rummage sale. But they're not a biofuel producer.

And it really—Dr. Green, I saw in your bibliography that you—and it is quite impressive, very extensive—but you had as one of the pieces that you have written, the intractable flaws of the cap-and-trade scheme, and it jarred my memory about the RIN program and how terribly flawed this was and took all of the glamor of mortgage-backed securities and brought it to the renewable energies market.

Would you care to share with us a little bit about what you wrote on that intractable problem with cap-and-trade?

Mr. GREEN. Sure. Cap-and-trade is actually a venerable way of controlling certain kinds of pollution. If you have a localized pollutant, one pollutant to one sector, one jurisdiction, available control technologies that are affordable, cap-and-trade is a useful technique. None of that is true for the greenhouse gases. And none of that is true, generally speaking, in renewable energy credits, which are another form of cap-and-trade. And what you've pointed out is that because of these complexities, multiple jurisdictions, rivalrous rent-seeking groups, and special interests, disparate pollutants that are non-equivalent in many ways, you just create a very fertile environment for game-playing and for corruption.

And we've seen this with tradeable credits in Europe for carbon reduction. We'll see it wherever it's deployed, simply because you create incentives for people to behave badly, and they'll behave badly.

Mr. BURGESS. So noted. Well, I want to thank the panelists. It has been a very informative morning and certainly appreciate your time.

What do I have to say here? I want to thank the witnesses for coming today and for the testimony, and for members for their devotion to this hearing today. The committee rules provide that members have 10 days to submit additional questions for the record to the witnesses. Without objection, so ordered.

And this hearing stands adjourned.

[Whereupon, at 12:13 p.m., the subcommittee was adjourned.]
[Material submitted for inclusion in the record follows:]

MEMORANDUM July 25, 2012

To: The Honorable Cliff Sterns
Attention: Brian Kirby Howard

From: Molly Sherlock, Specialist in Public Finance, 7-7797

Subject: **Question for the Record**

This memorandum responds to a question for the record submitted following the June 19, 2012 hearing held by the House Energy and Commerce Committee, Subcommittee on Oversight and Investigations. The hearing was entitled "The Federal Green Jobs Agenda."

Question for the Record

The Section 1603 grant program has been much more expensive than originally anticipated, isn't that true? For example, at the time the Section 1603 grant was established, the Joint Committee on Taxation (JCT) estimated 10-year revenue losses resulting from the shift from tax credits to grant payments at $223 million, substantially less than the $11 billion that have been paid out as of today, about three years on, isn't that true?

a. **What accounts for the discrepancy between projected revenue losses and actual costs during that time period?**

b. **Should the Committee be concerned that JCT's projections of the Section 1603 grant program's future cost (at least another $11.5 billion) will similarly fall short of the actual costs to the federal government?**

The Section 1603 grant program was enacted as part of the American Recovery and Reinvestment Act of 2009 (Recovery Act; P.L. 111-5).[1] While Congress was considering the Recovery Act, the Joint Committee on Taxation (JCT) presented a revenue score suggesting that allowing grants for specified energy property would have an outlay effect of $158 million over 10 years[2] and a positive (offsetting) revenue effect of $153 million over 10 years.[3] Thus, the net cost of the grant program alone was estimated at $5 million. Related provisions in that same legislation allowed taxpayers that previously would have qualified for the production tax credit (PTC) to instead claim the investment tax credit (ITC). These

[1] For a complete analysis of the Section 1603 grant program, see CRS Report R41635, *ARRA Section 1603 Grants in Lieu of Tax Credits for Renewable Energy: Overview, Analysis, and Policy Options*, by Phillip Brown and Molly F. Sherlock.

[2] This outlay effect was provided to the JCT by the Congressional Budget Office (CBO).

[3] Joint Committee on Taxation, JCX-9-09, https://www.jct.gov/publications.html?func=startdown&id=1240.

related provisions were estimated to cost $218 million over the 10 years.[4] Thus, the total cost of the Section 1603 grant program, including provisions that allowed taxpayers to elect the ITC in lieu of the PTC, was estimated at $223 million over 10 years.

The cost estimates provided above are incremental, and thus do not reflect the full cost of the Section 1603 grant program. When the JCT scores revenue legislation, it looks at the additional cost of the policy changes enacted by that legislation. A portion of the cost of the Section 1603 grant program was likely offset through reduced PTC and ITC claims.[5] Thus, the JCT scores only reflect the net cost of the program, after reductions in costs associated with the ITC and PTC.

As of June 6, 2012, $11.9 billion dollars had been paid out under the Section 1603 grant program.[6] This $11.9 billion figure does not represent the incremental cost of the Section 1603 program, as a number of these projects would likely have claimed the renewable energy investment tax credit (ITC) or production tax credit (PTC) absent the Section 1603 grant option. Thus, since the federal government would have lost revenues by providing tax credits to projects that elected to receive the Section 1603 grant option, the incremental cost of the Section 1603 grant program is less than the program's total cost (or outlays under the program).

As explained in the preceding paragraphs, there is a difference between the projected cost of the Section 1603 grant program prior to enactment and the outlays under the program. This difference can partially be explained by the fact that the former is an incremental cost, while the latter is an overall outlay cost. Total outlays under the program do not reflect the offsetting revenue effect of reduced claims for the renewable energy PTC and ITC. That said, it appears that JCT's cost estimates for the Section 1603 grant program were increased when evaluating further extension of the program, as evidenced by higher cost estimates associated with proposals to extend the Section 1603 grant program beyond the scheduled 2010 termination.[7] For example, the JCT scored a one-year extension of the Section 1603 grant program as estimated to cost $3.0 billion, as enacted as part of the Tax Relief, Unemployment Insurance Reauthorization, and Job Creation Act of 2010 (2010 Tax Act; P.L. 111-312).[8] More recently, prior to consideration of the Close Big Oil Tax Loopholes Act (S. 2204), the JCT estimated that a one-year extension of the Section 1603 grant program, through 2012, would result in additional outlays of $1.4 billion over the 10-year budget window.[9] Also included in S. 2204 were proposals that would extend the option to elect the ITC in lieu of the PTC. Extending the ITC in lieu of PTC option for wind through 2013, and offshore wind through 2014, would cost an estimated $1.5 billion according to JCT.[10]

Forward looking estimates of the actual cost of (or outlays associated with) the Section 1603 grant program are provided in the President's Budget.[11] The President's FY2010 Budget projected

[4] *Ibid.*

[5] The revenue scores as published do not provide any information on how much PTC or ITC claims were projected to fall as a result of the Section 1603 program.

[6] A frequently updated list of Section 1603 grant awards is maintained by the Treasury. This list can be found online at: http://www.treasury.gov/initiatives/recovery/Pages/1603.aspx.

[7] The Section 1603 grant program was extended for one year, through 2011, as part of the Tax Relief, Unemployment Insurance Reauthorization, and Job Creation Act of 2010 (P.L. 111-312).

[8] Joint Committee on Taxation, JCX-54-10, https://www.jct.gov/publications.html?func=startdown&id=3715.

[9] Joint Committee on Taxation, JCX-29-12, https://www.jct.gov/publications.html?func=startdown&id=4415. Since the legislation included an extension of the PTC, interaction effects between the PTC and the Section 1603 grant program were included in the PTC estimate.

[10] *Ibid.*

[11] The President's Budget, including links to previous year budgets, can be found at http://www.whitehouse.gov/omb/budget.

$3.1 billion in outlays under the Section 1603 grant program in 2010. Actual outlays during FY2010 were $4.5 billion.[12] During the first fiscal year during which the Section 1603 grant program was available, projected outlays were less than actual outlays, by $1.4 billion.

The President's FY2012 Budget projected $4.1 billion in outlays under the Section 1603 grant program in 2012. During the nine months of fiscal year 2012 (through June 8, 2012), outlays totaled $3.3 billion. Thus, recent projections made by the Treasury as to the future cost of the Section 1603 grant program appear relatively accurate.[13] Since the program is only available to projects that were under construction before the end of 2011, it is unlikely that there are a large number of projects that plan on taking the Section 1603 grant that were not included in current cost projections for the program.

All applicants intending on applying for a Section 1603 grant must submit their application to before October 1, 2012. Once all applications are received, the Treasury could theoretically provide an overall forecast of total outlays associated with the Section 1603 grant program for fiscal year 2012.

[12] Figures from the FY2011 Budget are not reported as the data presented in this budget does not reflect the one-year extension of the Section 1603 grant program enacted at the end of 2010.

[13] If there is a surge of grants awarded during the 4th quarter of fiscal year 2012, estimates could again fall short of actual outlays under the Section 1603 grant program. Were there to be a surge of activity, it seems more likely that this would come in the 1st quarter of FY2013, as the placed-in-service deadline for wind facilities under the Section 1603 grant program is the end of calendar year 2012.

Reply to Additional Questions for the Record for the
Hearing before the Subcommittee on Oversight and Investigations if the Energy and Commerce Committee of the U.S. House of Representatives
"The Federal Green Jobs Agenda"
Tuesday, June 19, 2012

David W. Kreutzer, Ph.D.
Research Fellow in Energy Economics and Climate Change
The Heritage Foundation

Questions from the Honorable Cliff Stearns

1. Does the Bureau of Labor Statistics Green Goods and Services study confirm the green jobs-creating potential of the programs the administration has funded through the stimulus? Or does it appear that the President may have spent billions of tax dollars barking up the wrong tree? Is it really true that there are 33 times more green jobs in the septic tank industry than in solar utilities?

Answer:
The definition of green jobs used by the Bureau of Labor Statistics for its Green Goods and Services study is so broad as to provide no useful measure of any policy. In short, it does not confirm the jobs-creating potential of the programs funded through the American Recovery and Reinvestment Act of 2009 or of any other programs.

Paragraph 2 of the report's third page reads:

"The other electric power generation industry, which includes electricity generated from biomass, sunlight, wind, and other renewable sources, had 4,700 GGS private sector jobs. Within this industry, electricity generated from wind had the highest employment with 2,200 jobs, followed by biomass with 1,100 jobs, geothermal with 600 jobs, and **solar with 400 jobs**."[1] [Emphasis added.]

The bottom of the third page of Table 3 shows 13,313 green jobs in the "Septic tank and related services" industry. So, according to the BLS methodology and data, there are 33.28 times as many green jobs in the "Septic tank and related services" industry as in solar utilities.

2. The President calls green jobs the jobs of the future. Are they really the jobs of the future or a repeat of failed energy policies from the 1970s, as referenced in Charles Lane's opinion piece in *The Washington Post* on June 18?

Answer:
As always, there will be many different types of jobs in the future and some of them may be green by any definition. However, the BLS report counts many old and not especially well-

[1] U.S. Department of Labor, Bureau of Labor Statistics, "EMPLOYMENT IN GREEN GOODS AND SERVICES – 2010," Press Release, March 22, 2012, http://www.bls.gov/news.release/pdf/ggqcew.pdf (accessed July 25, 2012).

paying jobs in its "green" category. While we are likely to need septic-tank cleaners, school-bus drivers, and used-merchandise retailers for decades to come, it is unlikely that those jobs will be the engine of economic growth.

A separate issue is the economic impact of subsidies for alternative energy producers. A policy to subsidize alternative energy technologies to provide more abundant and cheaper energy is based on a flawed premise—that there is insufficient motivation for private markets to seek out cheaper alternatives. Seeking out cheaper and superior alternatives is what markets do constantly.

For instance, the world petroleum market is worth about $2.5 trillion per year. A technology that could capture just one percent of that market would earn $25 billion per year. That is a huge motivator and investment repeatedly seeks out such alternatives. Unfortunately, much of the current federal energy policy (as well as in the 1970s) assumes markets do not seek out viable alternatives and new supplies. As a consequence there are subsidies and support schemes for firms that were judged not viable by profit-seeking actors in the market.

3. The President has visited Solyndra as well as many other solar, wind, and other green energy job sites. He has mentioned these alternative energy sources in every State of the Union address. In contrast, he has made fewer visits to growing fossil energy sites, such as the shale gas facilities in Western Pennsylvania or oil wells in North Dakota. And he has said a lot less about fossil fuels in his major speeches except to disparage them as the energy source of the past. How do you compare the job growth potential of traditional energy versus green energy? Does it make a difference to the overall economy that traditional energy is cheaper than green energy?

Answer:
The important question is which leads to greater economic growth. Energy sources that require subsidies to be profitable use resources that, in total, are more valuable than the energy produced. Therefore, the subsidies will reduce overall economic output. Not all alternative energy requires subsidies. Solar power may be the most economical source in places isolated from a power grid and where the demand is not for a heavy load. Powering cell phones and laptop computers in isolated areas with solar cells may be the best option. However, for most uses in the United States, conventional power—fossil fuel, nuclear, hydro—is less costly than solar or wind power. Our job market will not improve by forcing a switch to more expensive energy, even if a significant portion of the higher cost is paid by taxpayers instead of ratepayers.

In spite of the president's claims, hydraulic fracturing technology was developed primarily by private investment and initiative. This new technology dramatically increased access to natural gas which has reduced its price and made energy-intensive manufacturing much more competitive in the U.S. In addition the development of the shale-gas resources in places such as Pennsylvania did not require government subsidies. Rather the shale-gas development generates royalties and tax revenues.

This new technology has been extended to petroleum production and is responsible for moving North Dakota into second place among the states for petroleum production (behind only Texas). Since this petroleum is produced at a cost that is lower than the price of imported petroleum, it

not only provides high-paying jobs in North Dakota, but reduces our trade deficit and helps hold world petroleum prices down—especially when world markets are tight, as they were last winter.

Cheaper energy helps the economy. Expensive energy doesn't. Expensive energy is not made cheaper simply by shifting who pays, which is all subsidies do.

FRED UPTON, MICHIGAN
CHAIRMAN

HENRY A. WAXMAN, CALIFORNIA
RANKING MEMBER

ONE HUNDRED TWELFTH CONGRESS

Congress of the United States
House of Representatives
COMMITTEE ON ENERGY AND COMMERCE
2125 RAYBURN HOUSE OFFICE BUILDING
WASHINGTON, DC 20515–6115

Majority (202) 225-2927
Minority (202) 225-3641

July 12, 2012

Dr. David Montgomery
Senior Vice President
NERA Economic Consulting
1255 23rd Street, N.W., Suite 600
Washington, D.C. 20037

Dear Dr. Montgomery,

Thank you for appearing before the Subcommittee on Oversight and Investigations on Tuesday, June 19, 2012, to testify at the hearing entitled "The Federal Green Jobs Agenda."

Pursuant to the Rules of the Committee on Energy and Commerce, the hearing record remains open for 10 business days to permit Members to submit additional questions to witnesses, which are attached. The format of your responses to these questions should be as follows: (1) the name of the Member whose question you are addressing, (2) the complete text of the question you are addressing in bold, and then (3) your answer to that question in plain text.

To facilitate the printing of the hearing record, please respond to these questions by the close of business on Thursday, July 26, 2012. Your responses should be e-mailed to the Legislative Clerk, in Word or PDF format, at Kirby.Howard@mail.house.gov.

Thank you again for your time and effort preparing and delivering testimony before the Subcommittee.

Sincerely,

Cliff Stearns
Chairman
Subcommittee on Oversight and Investigations

cc: The Honorable Diana DeGette, Ranking Member,
Subcommittee on Oversight and Investigations

Attachment

The Honorable Cliff Stearns

1. Many of the President's green jobs are associated with wind and solar energy and other alternatives. But if these alternative energy sources are more expensive than the conventional ones they replace, can't this cost jobs?

   A. The nation only has finite resources to produce the goods and services that we all want. If the same amount of energy from alternative sources costs more than that from conventional sources, that means more resources must be devoted to producing the same amount of energy and less will be available to produce the rest of the goods and services consumers want. When we see how these costs play out in the rest of the economy, job gains in the alternative energy industries favored by subsidies and regulations are offset by jobs lost in the rest of the economy and overall real personal income has to decline.

2. By picking winners and losers in the green field, isn't the administration actually hurting the cleantech industry? If the market just decided, then the best and most economically sustainable companies would prosper and survive. Instead it is the companies that get government assistance that do well in the short-term, even though they may fail in the long run, while potentially putting out of business other companies that in the long-run have a better shot.

   A. It is hard to think of an example of how the government created a successful industry by substituting the judgment of government employees for that of private equity investors to choose the companies that will get the last stage of funding to start commercial operation. Equity investors using their own money have strong incentives to make accurate and critical assessments of both technology and management. This has attracted highly skilled, knowledgeable and highly paid analysts to investment firms, and created an immense and diverse financial sector whose entire purpose is to make selections and discipline the management of new investments. When government steps and allocates finance in ways that are directed more by political priorities and constituency service, the chances that the best companies will be financed and prosper is much lower.

   B. Moreover, as we saw in the case of Solyndra, giving low cost financing is not enough to keep a company in operation if it does not have a product that it can sell at an adequate price. Even if the government did pour enough money into selected companies with inferior management and products to keep them in operation, their protected status could drive others with better products out of the market. This all supports the lesson that if the country wants green energy, the only way to get it is to create sustained market demand by a policy like a carbon tax that motivates buyers to want products that cost more than conventional energy and leave it to the market and private investors to fight out who has the best product and lowest cost. Any other approach just costs more and gets less.

July 12, 2012

Dr. Kenneth Green
Resident Scholar
American Enterprise Institute
1150 17th Street, N.W.
Washington, D.C. 20036

Dear Dr. Green,

Thank you for appearing before the Subcommittee on Oversight and Investigations on Tuesday, June 19, 2012, to testify at the hearing entitled "The Federal Green Jobs Agenda."

Pursuant to the Rules of the Committee on Energy and Commerce, the hearing record remains open for 10 business days to permit Members to submit additional questions to witnesses, which are attached. The format of your responses to these questions should be as follows: (1) the name of the Member whose question you are addressing, (2) the complete text of the question you are addressing in bold, and then (3) your answer to that question in plain text.

To facilitate the printing of the hearing record, please respond to these questions by the close of business on Thursday, July 26, 2012. Your responses should be e-mailed to the Legislative Clerk, in Word or PDF format, at Kirby.Howard@mail.house.gov.

Thank you again for your time and effort preparing and delivering testimony before the Subcommittee.

Sincerely,

Cliff Stearns
Chairman
Subcommittee on Oversight and Investigations

cc: The Honorable Diana DeGette, Ranking Member,
Subcommittee on Oversight and Investigations

Attachment

The Honorable Cliff Stearns

1. Many on of the other side of the aisle talk of this clean energy future, and that we need to focus on the jobs of the future. However, have you seen much evidence that green jobs are actually the jobs of the future?

   a. Are most countries really switching to alternative energy?

   While many countries are pursuing various alternative energy initiatives with regard to wind power, solar power, and biomass, and several European countries are now fixated on terminating nuclear power, I am not aware of many countries that have made large strides to divorce their energy systems from coal and natural gas.

   b. Is it not the case that even China, often cited as an emerging champion in renewable energy, is mainly using conventional power to fuel its economic growth?

   Yes, that is my understanding. As the Washington Post reports:

   > **In wind power, China both produces and consumes. In 2009, it put up about a third of the world's new wind turbines. But much of this has been for show. A 2008 Citigroup analysis found that about one-third of China's wind power assets were not in use. Many turbines are not connected to the transmission grid. Chinese power companies built wind turbines that they didn't use as the cheapest way of satisfying — on paper — government requirements to boost renewable energy capacity.**
>
> **Consider the bigger picture: 87 percent of the energy produced in China comes from fossil fuels, the vast majority of it from coal, the International Energy Agency found in 2010.**
>
> **The explosive recent growth in Chinese solar and wind generation equates to going from zilch to a small fraction: Wind today generates just 0.05 percent of China's energy, and solar is responsible for one-half of one-thousandth of 1 percent.**

   The link to this article is: http://www.washingtonpost.com/opinions/hold-the-accolades-on-chinas-green-leap-forward/2011/04/19/AFLdZMEE_story.html

c. Given the fact that most countries are continuing to use fossil fuels, would it not make more sense for this country to focus on oil and gas jobs, an industry where U.S. companies are the clear leaders when it comes to know-how and technology, as opposed to green jobs?

To the extent that the U.S. inflates its energy costs through restrictive policies on air pollution, mining, etc., the U.S. becomes somewhat less competitive compared with economies that focus on keeping energy inexpensive. This is particularly true in manufacturing, where energy costs can be a significant share of overall production costs. And as you point out, the U.S. has significant competitive advantage in terms of oil and gas producing "know-how," as well as the private-sector ecosystem of services that allows for rapid exploitation of our resources. There are many job-creation estimates floating about (all of which have their limitations, but one can not argue with success: the national unemployment rate as I write this is 8.2.% The unemployment rate in North Dakota is 3%. Oklahoma, is also experiencing a jobs boom as it exploits its fossil fuel resources, according to the Institute for Energy Research. A report of Oklahoma's growth can be found here: http://www.instituteforenergyresearch.org/2012/07/11/those-booming-sooners-plentiful-energy-low-energy-prices-low-unemployment/

i. Furthermore, the U.S. is now the world's largest or 2nd largest natural gas producer. We are also the 2nd largest coal producer, and the Chinese are just eating up our coal. And finally, our oil production is exploding and Goldman Sachs said we could be the world's largest oil producer by 2017. Is this not just more evidence that we should be sticking to your strengths?

I believe that the U.S. should exploit its energy resources for the betterment of the public, and that our energy resources should be "managed" by private citizens acting in minimally regulated and minimally distorted energy markets. Rather than doing that, the government of the United States has adopted a punitive agenda toward our lowest-cost form of electricity production (coal), and has imposed a "slow-walk" agenda on virtually all forms of U.S. energy production on lands subject to its control. It has diverted massive quantities of taxpayer dollars toward favored forms of energy (wind turbines and solar panels) that are less productive, less reliable, less efficient and often of foreign manufacture. I believe that many of the activities of our government, by distorting energy markets as they have are causing misallocations of capital, and higher energy prices for many Americans.

2. Is there any evidence that these green industries will eventually reach a point where they can stand on their own without additional subsidies, or are they a bubble that bursts as soon as the government handouts end?

I have seen very little evidence that the new "green industries" are sustainable without permanent subsidization. Whether that subsidization is direct, or is the result of so-called "clean energy standards," all that I've observed is that in reality, when the subsidies are removed, the new "green industries" suddenly reveal that their technologies were not ready for market, or that their operating costs were much higher than predicted, and they go bankrupt. Whether they're purchased and operated after that, or simply scrapped, is a matter for case-by-case considerations.

3. To hear the President tell it, China is capturing the future by moving its energy production to wind and solar. Is this really the case? How do China's trends in coal use compare with those of the U.S.?

As I mentioned earlier in my responses, the idea that China is "going green," is more a myth than a reality. As the Washington post reports:

> **In wind power, China both produces and consumes. In 2009, it put up about a third of the world's new wind turbines. But much of this has been for show. A 2008 Citigroup analysis found that about <u>one-third of China's wind power assets were not in use</u>. Many turbines are not connected to the transmission grid. Chinese power companies built wind turbines that they didn't use as the cheapest way of satisfying — on paper — government requirements to boost renewable energy capacity.**
>
> **Consider the bigger picture: 87 percent of the energy produced in China comes from fossil fuels, the vast majority of it from coal, the International Energy Agency found in 2010.**
>
> **The explosive recent growth in Chinese solar and wind generation equates to going from zilch to a small fraction: Wind today generates just 0.05 percent of China's energy, and solar is responsible for one-half of one-thousandth of 1 percent.**

The link to this article is:
http://www.washingtonpost.com/opinions/hold-the-accolades-on-chinas-green-leap-forward/2011/04/19/AFLdZMEE_story.html

4. What about the environmental consequences of "green energy"? Aren't wind and solar land-intensive and don't their construction harm natural habitats?

All forms of energy production alter the landscape to some extent, and have environmental footprints. Wind and solar power, because they are tapping a highly diffuse source of energy must, of necessity, consume vast quantities of landscape. They also consume vast amounts of materials that have environmental impacts of their own, such as concrete, and large amounts of (imported) rare-earth elements produced in China at great environmental harm. As Robert Bryce, a well known energy-journalist has observed:

> **The math is simple: to have 8,500 megawatts of solar capacity, California would need at least 23 projects the size of Ivanpah, covering about 129 square miles, an area more than five times as large as Manhattan. While there's plenty of land in the Mojave, projects as big as Ivanpah raise environmental concerns. In April, the federal Bureau of Land Management ordered a halt to construction on part of the facility out of concern for the desert tortoise, which is protected under the Endangered Species Act.**
>
> **Wind energy projects require even more land. The Roscoe wind farm in Texas, which has a capacity of 781.5 megawatts, covers about 154 square miles. Again, the math is straightforward: to have 8,500 megawatts of wind generation capacity, California would likely need to set aside an area equivalent to more than 70 Manhattans. Apart from the impact on the environment itself, few if any people could live on the land because of the noise (and the infrasound, which is inaudible to most humans but potentially harmful) produced by the turbines.**
>
> **Industrial solar and wind projects also require long swaths of land for power lines. Last year, despite opposition from environmental groups, San Diego Gas & Electric started construction on the 117-mile Sunrise Powerlink, which will carry electricity from solar, wind and geothermal projects located in Imperial County, Calif., to customers in and around San Diego. In January, environmental groups filed a federal lawsuit to prevent the $1.9 billion line from cutting through a nearby national forest.**
>
> **Not all environmentalists ignore renewable energy's land requirements. The Nature Conservancy has coined the term "energy sprawl" to describe it. Unfortunately, energy sprawl is only one of the ways that renewable energy makes heavy demands on natural resources.**

> **Consider the massive quantities of steel required for wind projects. The production and transportation of steel are both expensive and energy-intensive, and installing a single wind turbine requires about 200 tons of it. Many turbines have capacities of 3 or 4 megawatts, so you can assume that each megawatt of wind capacity requires roughly 50 tons of steel. By contrast, a typical natural gas turbine can produce nearly 43 megawatts while weighing only 9 tons. Thus, each megawatt of capacity requires less than a quarter of a ton of steel.**

The source of this quotation can be found here:
http://www.nytimes.com/2011/06/08/opinion/08bryce.html

Response to Additional Question for the Record by Michael Breen

Pursuant to Hearing Entitled "The Federal Green Jobs Agenda," Held June 19, 2012

Submitted to the House Committee on Energy and Commerce, Subcommittee on Oversight and Investigations

July 26, 2012

The Honorable Steve Scalise:

Please submit for the record any statements made by the Secretary of Defense, the Chairman of the Joint Chiefs of Staff, and all three service secretaries, in which each state, as you assert they have, that our dependence on oil is a threat to national security.

Michael Breen:

Thank you for allowing me the opportunity to respond to your question for the record. In my testimony, I referred to "an established consensus in the defense community that our dependence on oil is a threat to our national security." In support of that assertion, I rely upon repeated statements by numerous senior national security and defense leaders of every political persuasion, including those who hold and/or have held the office of Secretary of Defense, Chairman of the Joint Chiefs of Staff, Secretary of the Army, Secretary of the Navy and Secretary of the Air Force.

A selection of those statements follows, including statements made by five Secretaries of Defense, two Chairmen of the Joint Chiefs of Staff, the Secretary of the Army, three Secretaries of the Navy and three Secretaries of the Air Force:

"Oil's status as a strategic commodity undermines U.S. national security and weakens the U.S. economy. Reducing oil's strategic importance requires breaking its virtual monopoly over transportation fuel."

- Official statement of the United States Energy Council, co-authored by the following individuals:

- Hon. Norman Augustine- Former Chairman, Lockheed-Martin; Former Under Secretary of the Army
- Hon. William L. Ball- Former Secretary of the Navy
- Hon. Mary Peters- Former Secretary of Transportation

- Geoffrey Bible- Retired Chairman & CEO Altria Group, Inc.; Retired Chairman, Kraft Foods Inc.
- Hon. John Block- Former Secretary of Agriculture
- Hon. Harold Brown- Former Secretary of Defense
- General Wesley Clark- Former Supreme Allied Commander Europe
- Hon. William P. Clark- Former Secretary of the Interior; Former National Security Advisor
- General Carlton W. Fulford, Jr.- Former Deputy Commander in Chief, United States European Command
- Hon. C. Boyden Gray- Former White House Counsel; Former Ambassador to the EU
- Hon. Alan Greenspan- Former Chairman of the Federal Reserve
- James T. Hackett- Chairman and CEO, Anadarko Petroleum Corporation
- Hon. Stephen Hadley- Former National Security Advisor
- Hon. Jeffrey K. Harris- Former Director of the National Reconnaissance Office
- Hon. Gary Hart- Former Senator from Colorado
- John Hofmeister- Former President, Shell Oil North America
- Hon. J. Bennett Johnston- Former Senator from Louisiana and Chairman of the Senate Energy Committee
- Hon. John Lehman- Former Secretary of the Navy
- Mike Leven- President, Las Vegas Sands
- General Barry McCaffrey- Former Director of the White House Office of National Drug Control Policy
- Hon. Robert C. McFarlane- Former National Security Advisor
- Vice Admiral Dennis V. McGinn- President, American Council on Renewable Energy
- Professor George Olah- Nobel Laureate in Chemistry
- Hon. William Perry- Former Secretary of Defense
- Hon. Governor Tom Ridge- Former Secretary of Homeland Security
- Hon. James G. Roche- Former Secretary of the US Air Force
- Hon. George P. Shultz- Former Secretary of State; Former Secretary of Treasury
- Hon. R. James Woolsey- Former Director of Central Intelligence; Chairman of the Foundation for Defense of Democracies

"Going forward we are also committed to exploring with Israel cooperative ways that the Department of Defense and the Israeli Defense Forces can join together in order to reduce our dependencies on oil. DOD is developing alternative fuels, greening out our fleet, testing planes with bio-blends, and making bases net neutral on the power grid. Together we must find ways to reduce our dependence on oil."

- Leon Panetta, Secretary of Defense, Speech to AIPAC, March 2012

"The dependence of the U.S. on oil creates serious national security vulnerabilities that, if exploited, could result in widespread economic dislocation and increased global instability."

- Robert Gates, Secretary of Defense, Bipartisan Policy Center Crisis Simulation, 2005

"With respect to energy dependence and independence, you're quite right. The questioner is certainly correct. It would be vastly preferable if the United States and our friends and allies

around the world were less dependent on oil from the Middle East. And certainly the administration is interested in finding ways that we can be less dependent, and I suspect that over a period of time we'll find that we are able to successfully reduce the percentage of oil dependence."

- Donald Rumsfeld, Secretary of Defense, C-SPAN Interview, January 8, 2002

"During World War II, supporting one soldier on the battlefield took one gallon of fuel per day. Today, we use over 22 gallons per day, per soldier. We're also more expeditionary than ever. These energy needs require a vast yet vulnerable supply chain that our enemies target."

- General Martin Dempsey, Chairman of the Joint Chiefs of Staff, Speech at the Pentagon Energy Security Forum, October 18, 2011

"We lose soldiers, marines, notably airmen and soldiers, on the roads of Afghanistan going from FOB to FOB…on resupply missions and so forth. So to the extent we can create autonomous or semi-autonomous, in terms of energy consumption, power and energy organizations…net zero in terms of their consumption of power and energy, we'll actually save lives, and become a lot more agile because we won't be as traditional, linear [with our] line of communications."

- General Martin Dempsey, Chairman of the Joint Chiefs of Staff, Senate Armed Services Committee, February 14, 2012

"Many of us here this morning are acutely aware of the cost and challenge in terms of both blood and treasure of providing energy to our forces in Afghanistan today. And recent headlines of NATO fuel convoys being attacked only serve to remind us of these vulnerabilities. DOD is using 300,000 barrels of oil every day. The energy use per soldier creeps up every year. And our number-one import into Afghanistan is fossil fuel. When we consider the estimates of a fully burdened cost of diesel fuel approached $400 a gallon and required 1.3 gallons of fuel to use per gallon delivered at some forward-operating locations, these benefits start to really add up. This translates to fewer Marines maintaining fuel storage and distribution systems, fewer Marines dedicating their lives to protect the convoys in the routes used to deliver the fuel, or as this conference theme tells us: Saving energy saves lives."

- Admiral Mike Mullen, Chairman of the Joints Chiefs of Staff, Speech at the Energy Security Forum, October 13, 2010

"Fuel is a tactical and operational vulnerability in theater; guarding fuel convoys puts our Sailors and Marine's lives at risk and takes them away from what we sent them there to do: to fight, to engage, and to rebuild. The Department is also exposed to price shocks in the global market because too much fuel comes from volatile regions, places that are vulnerable to instability and ruled by regimes that do not support our interests. Every time the cost of a barrel of oil goes up a dollar, it costs the Department $30 million in extra fuel costs. In FY12 alone, in large part due to political unrest in oil producing regions, the price per barrel of oil is $38 more than was budgeted increasing the Navy's fuel bill by over $1 billion. These price spikes must be paid for out of our operations funds. That means that our Sailors and Marines are forced to steam less, fly less, and train less. The threat of price spikes is increased by the vulnerability of choke points. Energy analyst have speculated that if Iran ever succeeded in closing the Strait of Hormuz, the price of oil could rise by 50 percent or more in global markets within days."

- Secretary of the Navy Ray Mabus, Senate Armed Services Committee, March 15, 2012

"In the two years since I came to the department, we have made a vigorous commitment to change how we get and how we use energy. We also now put an energy dimension in everything the Department of the Navy does. The reason is as clear as it is compelling. Energy security is national security. Too much of our oil comes from potentially, or actually, volatile places on earth. We would never allow these countries to build the ships or aircraft that we use. But through our dependence on oil, we give them a vote in whether those ships can sail or those planes fly. Seeking alternative fuels and seeking to use fuel more efficiently makes us better warfighters. That's our principal mission, and that's the main reason we're doing this. Most importantly, it's going to save the lives of marines, of sailors, of soldiers, and of airmen."

- Secretary of the Navy Ray Mabus, Speech to the Naval Postgraduate School, August 29, 2011

"The Air Force is proud to be a leader in America's ongoing quest to use energy more efficiently through better procedures and new technologies while, at the same time, decreasing energy consumption and the nation's dependence on imported oil. Energy availability and security impacts all Air Force missions, operations, and organizations, and is necessary for the support of Air Force priorities. Energy enables the Air Force to develop and care for airmen and families in training and daily living. The Air Force must have reliable energy supplies to meet the demands of the overseas contingency operations and protect our nation from emerging threats. Though there is no silver bullet solution for reducing energy dependence in day-to-day operations, the Air Force is dedicated to integrating energy management across mission areas and implementing a portfolio of renewable and alternative energy projects that will enhance the Air Force's energy security."

- Michael Donley, Secretary of the Air Force, *Air Force Energy Security Plan*, 2010

"We need new sources of energy electricity, but most importantly we need technologies that tackle petroleum and liquid transportation fuels… One of the greatest threats to our economic and national security is the need to secure foreign oil. So, when President Obama confirmed a commitment to develop domestically renewable petroleum replacements from biomass, also known as bio-crude, he put a stake in the ground that alternatives are not just good for the environment, they're critical to our national and economic security."

- Michael Wynne, Secretary of the Air Force, Op-Ed in the *Huffington Post*, February 10, 2011

"We are also working innovatively on the supply side, whether it is putting the largest solar panel field to work out at Nellis, or qualifying our aircraft to use synthetic fuel. Synthetic fuel is manufactured from coal, natural gas, or biological sources, like corn or algae. While we don't plan on being a producer, we have established quality criteria, and a demonstration facility, as we want to be good environmental stewards, and also make sure we can fly our aircraft at expected performance and range criteria. The labs at Wright-Patterson, and the test wing at Edwards are leading the way. Airlines and propulsion companies are partnering with us to extend our efforts. We hope to do our part to reduce our, and maybe America's, dependence on this more and more expensive source of energy, and that is petroleum."

- Michael Wynne, Secretary of the Air Force, *Letter to Airmen Energy Update*, July 14, 2007

"As long as we're dependent on those fossil fuels, we're dependent on the Middle East. If we are not victims, we're certainly captives."

- John McHugh, Secretary of the Army

"But it's more than that -- it's an opportunity to reduce our dependence on foreign oil, yes. But for the Army, for the military, it's something even more important. It's about reducing the threat to our Soldiers, Sailors, Airmen and Marines. Simply put, we view energy security as operationally necessary, as well as fiscally prudent and vital to mission accomplishment. In Iraq and Afghanistan, fuel and water comprise about 70 to 80 percent of ground resupply weight. In Afghanistan, we suffer one casualty for every 46 resupply convoys. Less energy use means fewer convoys, and fewer convoys mean fewer casualties."

- John McHugh, Secretary of the Army, Speech at the GovEnergy Conference, August 10, 2011

"As a Corps, we have become more lethal, yet we have also become increasingly dependent on fossil fuel. Our growing demand for liquid logistics comes at a price. By tethering our operations to vulnerable supply lines, it degrades our expeditionary capabilities and ultimately puts Marines at risk. To maintain our lethal edge, we must change the way we use energy."

- General James Amos, 35th Commandant of the United States Marine Corps. *United States Marine Corps Expeditionary Energy Strategy and Implementation Plan*

"America's dependence on oil constitutes a significant threat– economically, geopolitically, environmentally, and militarily."

- CNA Report, *Ensuring America's Freedom of Movement: A National Security Imperative to Reduce US Oil Dependence*, October 2011. Authored by:

  - General Paul J. Kern, USA (Ret.), CNA MAB Chairman; Former Commander, Army Materiel Command
  - Vice Admiral Lee F. Gunn, USN (Ret.), CNA MAB Vice Chairman; Former Inspector General, Department of the Navy
  - Vice Admiral Dennis V. McGinn, USN (Ret.), CNA MAB Vice Chairman; Former Deputy Chief of Naval Operations
  - General James T. Conway, USMC (Ret.), Former Commandant of the Marine Corps
  - Lieutenant General Ken Eickmann, USAF (Ret.), Former Aeronautical Systems Center
  - Lieutenant General Lawrence P. Farrell Jr., USAF (Ret.), Former Chief Planner, HQ USAF
  - Brigadier General Gerald E. Galloway Jr., USACE (Ret.), Former Dean of Academics, U.S. Military Academy
  - General Ronald E. Keys, USAF (Ret.), Former Commander, Air Combat Command
  - Admiral T. Joseph Lopez, USN (Ret.), Former Command, U.S. Navy Europe
  - General Robert Magnus, USMC (Ret.), Former Assistant Commandant of the Marine Corps

- Admiral John B. Nathman, USN (Ret.), Former Commander, Fleet Forces Command and Vice Chief of Naval Operations
- General Gordon Sullivan, USA (Ret.), Former Chief of Staff of the U.S. Army
- Lieutenant General Richard C. Zilmer, USMC (Ret.), Former Commandant for Manpower and Reserve Affairs, USMC; Former Commanding General of Multi-National Force-West Al Anbar province, Iraq

I also offer for your consideration a partial list of relevant speeches, documents, studies and reports issued by a wide range of highly respected national security leaders and policy organizations, which I will not quote at length here. Note that in many cases, the authors of the policy reports listed are themselves former senior national security leaders.

SOURCE	CITATION and NOTES[1]
Air Force Energy Plan 2010	Pgs. 1, 3, 5
Armed Forces Journal, "The Fuel Gauge of National Security," 2008	Essay on how oil dependence is a threat to the military
Brookings, "Fueling the "Balance," 2009	Pgs. 2
CNA, "Economic Implications of Disruptions to Maritime Oil Chokepoints," 2011	Overview of global threats to oil supply
CNA, "Ensuring America's Freedom of Movement," 2011	Pgs. xi-xvii, 1-10, 13-18
CNAS, "Fueling the Future Force," 2010	Pgs. 3-5, 6-9
CNO Roughead, Navy Posture Statement, 2011	Congressional testimony. See section on Energy and Climate Change
Conaton, "A New Culture: Energy as an Operations Enabler," 2010	Speech to the USAF Energy Forum III
CSIS, "Geopolitics of Energy," 2010	Pgs. 24-26
Gen. Dempsey, Pentagon Energy Security Forum, 2011	General Dempsey on the threat of oil dependence
Defense Science Board Task Force, "More Fight – Less Fuel," 2008	Pgs. 11, 17-18
Department of Defense, "Operational Energy Strategy," 2011	Statement by Deputy Secretary of Defense Will Lynn, Pgs. 4-5, 7
Tom Hicks, Department of Defense Bloggers Roundtable, 2011	Interview with Deputy Assistant Secretary of the Navy for Energy Tom Hicks
Secretary Donley, "Air Force Posture Statement," 2011	Secretary Donley and General Schwartz presentation to HASC
Secretary Donley, "Air Force Posture Statement," 2012	Secretary Donley and General Schwartz presentation to HASC
Stephen Hadley, "Solve the Next Crisis Before it Happens," 2011	Former National Security Advisor Hadley on the threat of oil dependence
Institute of Land Warfare, "US Army Energy Security and Sustainability," 2011	Pgs. 5-6
Deputy Secretary of Defense Lynn, "Operational Energy Strategy," 2011	DOD news briefing addressing energy security and the threat to national security
Secretary of the Navy Mabus, Energy Security Forum, 2010	Speech on the Navy and energy security
Secretary of the Navy Mabus, Naval Energy Forum,	Speech on the Navy and energy security

[1] Page numbers note specific references to the national security threat of single source dependence, the reliance on oil, or the impact of energy security on national security and military policy.

2009	
Secretary of the Navy Mabus, Senate Armed Services Committee, 2012	Secretary Mabus testimony before SASC
Secretary of the Army McHugh, "Army Posture Statement," 2011	Congressional testimony. See section on Energy Security and Sustainability
Secretary of the Army McHugh, "Army Posture Statement," 2011	Congressional testimony. See section on Army Energy Security
Secretary of the Army McHugh, GovEnergy Conference, 2011	Speech at the 2011 GovEnergy conference in Cincinnati, Ohio
Admiral Mullen, Energy Security Forum, 2010	Speech on the threats of oil dependence on national security
Naval War College Review, "The Great Green Fleet," 2011	Pgs. 61-62
Secretary Panetta, AIPAC Speech, 2012	Pg. 4
Secretary Panetta, Environmental Defense Fund Speech, 2012	Speech to EDF on energy and the environment
Gen. Petraeus, "Supporting the Mission with Operational Energy," 2011	Memo to U.S. forces in Afghanistan regarding energy
Pew, "From Barracks to the Battlefield," 2011	Pgs. 12-13, 16, 72-73
Pew, "Reenergizing America's Defense," 2010	Pgs. 4-5, 6-9
RAND, "Imported Oil and U.S. National Security," 2009.	Pgs. xiii, xv, 17-19, 43-57, 59-75, 77-92
Secretary Rumsfeld, C-SPAN Interview, 2002	Interview with C-SPAN. See page 6 for comment on energy security
Strategic Studies Institute, "Addicted to Oil," 2006	Pgs. 3, 10-11
Strategic Studies Institute, "Defense Energy Resilience," 2010	Pgs. vii-viii, 33
USMC, "Expeditionary Energy Strategy and Implementation Plan"	Commandant's Message, 7-10
Secretary of the Air Force Wynne, "Letter to Airmen," 2007	Letter to Airmen on energy

Thank you again for the opportunity to testify before this distinguished committee.

○