

# MAJUMDAR NOMINATION

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## HEARING BEFORE THE COMMITTEE ON ENERGY AND NATURAL RESOURCES UNITED STATES SENATE ONE HUNDRED TWELFTH CONGRESS

FIRST SESSION

ON

THE NOMINATION OF ARUNAVA MAJUMDAR TO BE UNDER SECRETARY  
OF ENERGY

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DECEMBER 8, 2011



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# CONTENTS

## STATEMENTS

	Page
Bingaman, Hon. Jeff, U.S. Senator From New Mexico .....	1
Franken, Hon. Al, U.S. Senator From Minnesota .....	3
Majumdar, Arunava, Nominee to be the Under Secretary of Energy .....	4
Murkowski, Hon. Lisa, U.S. Senator From Alaska .....	2
Rockwell, Victoria A., President, American Society of Mechanical Engineers, New York, NY .....	17

## APPENDIX

Responses to additional questions .....	19
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## MAJUMDAR NOMINATION

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THURSDAY, DECEMBER 8, 2011

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

The committee met, pursuant to notice, at 9:33 a.m. in room SD-366, Dirksen Senate Office Building, Hon. Jeff Bingaman, chairman, presiding.

### OPENING STATEMENT OF HON. JEFF BINGAMAN, U.S. SENATOR FROM NEW MEXICO

The CHAIRMAN. Why don't we go ahead and get started. Senator Murkowski is on her way, but has been delayed, so she asked us to proceed without her until she can arrive.

The committee meets this morning to consider the nomination of Dr. Arun Majumdar to be the Under Secretary of Energy.

Dr. Majumdar is currently the Director of ARPA-E, the Advanced Research Projects Agency at the Department of Energy. The Senate confirmed his nomination for that position 2 years ago in October 2009. He also serves as Secretary Chu's senior advisor.

The Office of the Under Secretary is one of the most senior at the Department. Its portfolio includes energy efficiency and renewable energy, fossil energy, nuclear energy, and electricity. It has been vacant since October 2010, when Dr. Kristina Johnson resigned.

Since then, its functions have been performed on an acting basis, first by Cathy Zoi until she resigned earlier this year, and since March by Dr. Majumdar.

Dr. Majumdar is a highly distinguished scientist and engineer. Before coming to Washington, he was the Associate Laboratory Director for Energy and Environment at Lawrence Berkeley National Laboratory, and was a Professor of Mechanical Engineering and Material Sciences and Engineering at the University of California at Berkeley.

He holds over a dozen patents. He has authored close to 200 scientific papers. He served as an advisor to both the National Science Foundation and the President's Council of Advisors on Science and Technology, as well as startup companies and venture capital firms in Silicon Valley. He holds a doctorate from the University of California at Berkeley, is a member of the National Academy of Engineering.

We are very fortunate to have such a highly qualified and experienced nominee for this important position, and I strongly support

his nomination. I am pleased to welcome Dr. Majumdar back before the committee this morning.

Since Senator Murkowski is not able to give her statement right now, and I am told Senator Franken has another engagement and wanted to be recognized for a minute or 2 before he had to leave. So Senator Franken, why don't you go ahead.

Senator FRANKEN. Thank you, Mr. Chairman. I note that the ranking member has just arrived and would defer to her, considering that she is the ranking member.

The CHAIRMAN. All right. We will—

Senator FRANKEN. Also, when you say I have another engagement, it sounds like I am doing a roast for, you know, Shecky Greene or something. I have another committee hearing.

The CHAIRMAN. I did not know the nature of the engagement, but I wanted to leave it vague.

Senator FRANKEN. Let me be clear. It is a hearing.

The CHAIRMAN. A hearing, I see.

Senator FRANKEN. Of a Senate Committee.

The CHAIRMAN. I see. Senator Murkowski—

Senator FRANKEN. I would like to make a remark.

The CHAIRMAN. All right, we—

Senator FRANKEN. I am sorry I interrupted you. Back to you.

The CHAIRMAN. That is fine.

Senator Murkowski, why don't you go ahead with any opening statements you would like to make, then Senator Franken had asked that he be allowed to speak for a minute or 2 before he has to go to another hearing. Then we will proceed with the rest of the hearing.

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

Senator MURKOWSKI. Thank you, Mr. Chairman. I appreciate that clarification. It was a little confusing first walking in here.

Thank you for deferring, Senator Franken and good morning, Doctor. I appreciate you coming back to the committee. I thank you again for your willingness to accept an appointment at the Department of Energy.

We have had an opportunity to spend a little time together. You came up to Alaska at my invitation, and that of a friend outside of Fairbanks, to look at low temperature geothermal. I think it is fair to say that we share a genuine interest in those exciting technologies, a little bit of the cutting edge, out of the box type thinking. I appreciate the enthusiasm and the passion that you bring to these issues.

By all accounts, your background as a scientist and engineer makes you a good candidate and certainly a good fit there at DOE. While it is probably not easy, or probably not fun either, to be responsible for a big piece of a Federal Department, we have all benefited from your decision to help implement our Nation's energy policy.

It was just over a couple of years ago, and you took over a tough task in standing up ARPA-E, a new agency with no history, but you were charged with developing some game changing energy

technologies. Then back in February of this year, you agreed to take on even more responsibility as the Acting Under Secretary.

So all of this has led to one of today's greatest scientific mysteries and that is: has Dr. Majumdar figured out how to survive with no sleep? Because I wonder. You have a lot going on and again, you do it with incredible energy, incredible passion. But I wonder where you find the hours in your day. I think you have done a considerable job in balancing the demands of 2 time-consuming jobs for some time.

If you are confirmed as Under Secretary of Energy, as I hope you will be, you are going to continue to face a variety of tough challenges related to program direction, budgeting priorities, funding decisions. It is difficult to advance energy innovation and new technologies under the best of circumstances, and I think particularly so when Federal dollars are in short supply.

But that is exactly what we are going to be asking you to do, and I am glad that you are willing to accept the challenge. I look forward to being able to ask you a few questions this morning. Again, thank you for your willingness to serve.

Thank you, Mr. Chairman.

The CHAIRMAN. Thank you very much. Senator Franken.

**STATEMENT OF HON. AL FRANKEN, U.S. SENATOR  
FROM MINNESOTA**

Senator FRANKEN. Thank you, Mr. Chairman, for holding this important hearing in such a timely manner to consider the nomination of Dr. Arun Majumdar to be Under Secretary of Energy. I would like, also, to thank the Chairman for giving me a minute to congratulate Dr. Majumdar on his nomination before my next engagement.

Dr. Majumdar is exactly the type of person this country needs leading our efforts to develop and deploy energy technologies to meet the challenges of climate change and national security.

Thank you, Dr. Majumdar, for your pioneering role as the first Director of ARPA-E, the only U.S. agency devoted to funding transformational energy R and D. Dr. Majumdar not only led ARPA-E through its first 4 funding opportunity announcements, he also put forward a longer term vision for the agency. This longer term vision can especially be seen in his discussion with stakeholders about how to build a market for ARPA-E technologies, to avoid the dreaded "valley of death" between development and commercialization.

I had the pleasure to host Dr. Majumdar in Minnesota in October when he travelled to join me for an energy summit that I had convened there. This provided a terrific forum for Minnesota's renewable energy leaders to discuss energy policy directly with the Department of Energy. Dr. Majumdar's comments were incredibly well received and I deeply appreciate, sir, your time and efforts.

Thank you, Mr. Chairman, and congratulations once again to you, Dr. Majumdar.

The CHAIRMAN. Thank you very much.

Senator FRANKEN. Thank you.

The CHAIRMAN. Doctor, let me put us through our usual drill, which you have been through before, related to all nominees. The

rules of our committee require that all nominees be sworn in connection with their testimony. So I would ask you to stand and raise your right hand, please.

Do you solemnly swear that the testimony you are about to give to the Senate Committee on Energy and Natural Resources shall be the truth, the whole truth, and nothing but the truth?

Mr. MAJUMDAR. I do.

The CHAIRMAN. Please be seated.

Before you begin your statement, I will ask 3 questions that we address to each nominee who comes before this committee.

First, will you be available to appear before this committee and other congressional committees to represent departmental positions and respond to issues of concern to the Congress?

Mr. MAJUMDAR. I do.

The CHAIRMAN. The second question. Are you aware of any personal holdings, or investments, or interests that could constitute a conflict of interest, or create the appearance of such a conflict should you be confirmed and assume the office to which you have been nominated by the President?

Mr. MAJUMDAR. My investments, personal holdings, and other interests have been reviewed both by myself and the appropriate ethics counselors within the Federal Government. I have taken the appropriate action to avoid any conflicts of interest. There are no conflicts of interest or appearances thereof to my knowledge.

The CHAIRMAN. Very good.

Let me ask the third question then. Are you involved or do you have any assets that are held in a blind trust?

Mr. MAJUMDAR. No.

The CHAIRMAN. At this point, our tradition is to allow the nominee, yourself, Dr. Majumdar, to introduce any guests or family members that might be here with you.

Mr. MAJUMDAR. Unfortunately, my family members could not come here, but I have my DOE family right behind me.

The CHAIRMAN. All right. They are welcome.

Now at this point, we will recognize you to make whatever statements you would like to make to the committee.

#### **TESTIMONY OF ARUNAVA MAJUMDAR, NOMINEE TO BE UNDER SECRETARY OF ENERGY**

Mr. MAJUMDAR. Thank you, Mr. Chairman.

Chairman Bingaman, Ranking Member Murkowski, and distinguished members of this committee. It is my distinct honor and privilege to appear before you today as the nominee for Under Secretary of Energy.

I would like to first thank my wife, Dr. Aruna Joshi, and my 2 daughters, Shalini and Anjali, who have been immensely tolerant over the last 2 years of my bicoastal lifestyle spanning California and Washington. Unfortunately, they could not be here today.

I wish to also thank President Obama for his confidence in me, and Secretary Chu for being a thoughtful mentor, an outstanding boss, and someone I have the honor to call a friend.

As I told this committee over 2 years ago, I spent most of my career as an educator and researcher in science and engineering at



the University of California at Berkeley and Lawrence Berkeley National Labs.

While at Berkeley Labs, I led strategic initiatives in the areas of energy efficiency, renewable energy, and energy storage. In 2005, I was elected to the National Academy of Engineering, the Nation's highest honor in engineering.

The breadth and depth of my knowledge in science and engineering, and management of technological innovation, has served me well in taking on the challenge of being the first Director of ARPA-E, an honor and a privilege I will cherish for the rest of my life. In ARPA-E's short existence, we have stood up an organization with the philosophy of excellence in everything we do.

I would like to briefly describe the 5 core values which I believe are instrumental in ARPA-E's success and which, if confirmed, I intend to bring to my role as the Under Secretary of Energy.

Value No. 1: people. ARPA-E has been able to attract some of the best and brightest scientists and engineers as program directors. We have also assembled a superb administrative staff, support staff.

Value No. 2: speed and efficiency. To be globally competitive, speed is of essence. We have developed a streamlined process where we can execute with a fierce sense of urgency and unprecedented speed and efficiency.

Value No. 3: breakthrough technologies through competition. ARPA-E funds research to translate science into breakthrough energy technologies that are too risky for the private sector, but if successful could create the foundation for entirely new industries. ARPA-E programs have attracted some of the best scientists, engineers, and entrepreneurs to compete against each other and provide a portfolio of approaches that will ensure our national security, economic security, and environmental security.

Value No. 4: stewardship and integrity. All projects are selected purely based on merit. We also engage in active program management and have had the discipline to discontinue projects when they simply did not work out.

Finally, value No. 5: create value for a secure American future. It is important that ARPA-E creates value for society and makes an impact on our economy. For example over the last 2 years, 11 of ARPA-E technologies received \$40 million in funding, which allowed them, the teams, to conduct the research that has subsequently attracted more than \$200 million from private sector investment in 2 years, 5 times leveraging the Federal dollars, and this number continues to grow.

While such innovations in new energy technologies are critical and necessary, they are not sufficient. Cost and scale are equally important to address the significant challenges and opportunities we face in the 21st century.

First the challenges. We import roughly 50 percent of the oil we use and pay about \$1 billion a day. America invented the lithium-ion battery, and in 2009, we manufactured only 1 percent of the world's batteries. We invented the solar cell, and this year we will manufacture only 7 percent of the world's photovoltaic modules.

We have an aging grid infrastructure that needs to be modernized and secured. We have massive coal and natural gas resources

that we must use in environmentally responsible and cost effective way.

We invented nuclear energy as a clean source of electricity, and we must regain our technological lead and become globally competitive.

Now the opportunities. The rising world population and economic growth presents the biggest economic opportunity of the 21st century with trillions of dollars of worldwide investment in the next few decades. Other nations are positioning themselves to take advantage of this opportunity and become energy leaders of the future.

America faces a choice of what to do with the opportunity presented by the global energy race. We can compete in the global marketplace creating American jobs and selling American products, or we can buy technologies of tomorrow from abroad. I believe the road to a secure future is to invent locally, make locally, and sell globally and we need to do this with fierce urgency.

This requires the Department of Energy to galvanize all its rich resources in science, engineering, and policy from across the whole enterprise spanning the Office of Science, APRA-E, and the applied energy offices, the national laboratories, and university and industrial research labs to catalyze and enable our small and large industries to become globally competitive and ensure a secure future for our children and grandchildren.

If confirmed, I will work diligently within DOE and with Congress to make sure that the DOE will work as an integrated team where the whole is bigger than the sum of the parts to address the challenges and avail the opportunities of the 21st century.

I thank you for the opportunity to testify before you today, and I look forward to answering the questions.

[The prepared statement of Mr. Majumdar follows:]

PREPARED STATEMENT OF ARUNAVA MAJUMDAR, NOMINEE TO BE UNDER SECRETARY OF ENERGY

Chairman Bingaman, Ranking Member Murkowski, and distinguished members of this committee, it is my distinct honor and privilege to appear before you today as the nominee for Under Secretary of Energy.

I would like to first thank my wife, Dr. Aruna Joshi, and our two daughters, Shalini and Anjali, who have been immensely tolerant over the last two years of my bi-coastal lifestyle spanning California and Washington. Unfortunately, they cannot attend today's hearing. I wish to also thank President Obama for his confidence in me and Secretary Chu for being a thoughtful mentor, an outstanding boss, and someone I have the honor to call a friend.

As I told this committee over two years ago, I spent most of my career as an educator and researcher in science and engineering at the University of California, Berkeley and Lawrence Berkeley National Laboratory. While at Berkeley Labs, I led strategic initiatives in the areas of energy efficiency, renewable energy, and energy storage. In 2005, I was elected to the National Academy of Engineering, the nation's highest honor in engineering.

The breadth and depth of my knowledge in science, engineering, and management of technological innovation has served me well in taking on the challenge of being the first Director of the Advanced Research Projects Agency—Energy (ARPA-E)—an honor and privilege that I will cherish for the rest of my life. In ARPA-E's short existence, we have stood up an organization with a philosophy of excellence in everything we do.

I would like to briefly describe the five core values, which I believe have been instrumental in ARPA-E's success and which, if confirmed, I intend to bring to my role as the Undersecretary of Energy. Value #1: People. ARPA-E has been able to attract some of the best and the brightest scientists and engineers as program direc-

tors. We also have assembled a superb administrative support staff. Value #2: Speed and efficiency. To be globally competitive, speed is of the essence. We have developed a streamlined process where we can execute with a fierce sense of urgency and unprecedented speed and efficiency. Value #3: Breakthrough technologies through competition. ARPA-E funds research to translate science into breakthrough energy technologies that are too risky for the private sector, but if successful could create the foundation for entirely new industries. ARPA-E programs have attracted some of the best scientists, engineers and entrepreneurs to compete against each other and provide a portfolio of approaches that will ensure our national security, economic security and environmental security. Value #4 Stewardship and integrity. All projects are selected purely based on merit. We also engage in active program management, and have had the discipline to discontinue projects when they simply did not work out. Finally, Value #5: Create value for a secure American future. It is important that ARPA-E creates value for society and makes an impact on our economy. For example, over the last two years, 11 of ARPA-E technologies received \$40 million in funding, which allowed the teams to conduct research, that has subsequently attracted more than \$200 million of private sector investment—five times leveraging of federal dollars. And this number continues to grow.

While such innovations in new energy technologies are critical and necessary, they are not sufficient. Cost and scale are equally important to address the significant challenges and opportunities we face in the 21st century. First, the challenges our country faces. We import roughly 50 percent of the oil we use and pay about \$1 billion per day. America invented the lithium-ion battery, and in 2009 we manufactured only 1 percent of the world's batteries. We invented the solar cell and this year we will manufacture only 7 percent of the world's photovoltaic modules. We have an aging grid infrastructure that needs to be modernized and secured. We have massive coal and natural gas resources that we must use in an environmentally responsible and cost-effective way. We invented nuclear energy as a clean source of electricity, and we must regain our technological lead and become globally competitive.

Now, the opportunities. The rising world population and economic growth presents the biggest economic opportunity of the 21st century with trillions of dollars of worldwide investment in the next few decades. Other nations are positioning themselves to take advantage of this opportunity and become energy leaders of the future. America faces a choice about what to do with the opportunity presented by the global energy race. We can compete in the global marketplace—creating American jobs and selling American products—or we can buy the technologies of tomorrow from abroad. I believe the road to a secure future is to: invent locally, make locally and sell globally. And we need to do this with fierce urgency.

This requires the Department of Energy to galvanize all its rich resources in science, engineering, and policy from across the whole enterprise spanning the Office of Science, ARPA-E and the Applied Energy Offices, the national laboratories, and university and industrial research laboratories to catalyze and enable our small and large industries to become globally competitive and ensure a secure future for our children and grandchildren. If confirmed, I will work diligently within DOE and with Congress to make sure that the DOE will work as an integrated team where the whole is bigger than the sum of its parts, to address the challenges and avail the opportunities of the 21st century.

I thank you for the opportunity to testify before you today, and I look forward to answering your questions.

The CHAIRMAN. Thank you very much for your testimony.

Dr. Majumdar, as you know, the loan guarantee program at the Department of Energy has been the subject of a lot of controversy and criticism particularly because of the loan to Solyndra. I wanted to just, in order to make a record of, and give you the opportunity to state your position on this, ask you a few questions.

Time Magazine referred to your current agency, ARPA-E, as "The Department of Big Dreams." ARPA-E's job, as I understand it, is to promote transformational technological advances in energy technologies, but not to guarantee loans for commercial deployment of new energy technologies.

As I understand it, the loan guarantee program is managed by a separate office that is not part of ARPA-E, is that accurate?

Mr. MAJUMDAR. Yes.

The CHAIRMAN. Did you personally have any responsibility for guaranteeing or approving the Solyndra loan in your capacity as the Director of ARPA-E?

Mr. MAJUMDAR. No.

The CHAIRMAN. It appears from the Department's organizational chart that the loan program office reports directly to the Secretary of Energy, and not through the Under Secretary.

Did you have any responsibility for guaranteeing the Solyndra loan while serving as Acting Under Secretary?

Mr. MAJUMDAR. I had no role.

The CHAIRMAN. The final question, will you have any responsibility for the loan guarantee program if confirmed as Under Secretary other than providing technical advice if requested?

Mr. MAJUMDAR. If requested, I will provide that. But otherwise, I have no responsibilities.

The CHAIRMAN. Thank you very much.

Senator MURKOWSKI.

Senator MURKOWSKI. Thank you, Mr. Chairman.

Just let me follow up with the Solyndra and the loan guarantee program very briefly here. I appreciate the Chairman asking those very direct questions to you and your succinct answers.

A little over a month ago, Secretary Chu was quoted as saying that, "We can design a program that is actually self-paid and still stimulate the most innovative industries." So I took this to mean that the Department no longer supports the appropriation of funds to cover credit subsidy costs.

I would like to know whether that is an accurate interpretation of Secretary Chu's remarks. Whether or not you can share your perspective, then, on the top 2 or perhaps top 3 changes that you believe are necessary to prevent a similar situation to what we have seen with Solyndra in the future.

Mr. MAJUMDAR. Senator Murkowski, as I just mentioned, I really had no involvement—

Senator MURKOWSKI. Right.

Mr. MAJUMDAR. In the loan guarantee program. I am not sure I am really qualified to say what is the top 2 or the bottom 2 priorities that we should have.

The only thing I would say is that the President has proposed funding or requested funding for the loan guarantee programs in the FY12 budget, and I support the President.

Senator MURKOWSKI. We have been working here in the committee to report out a cyber security bill. We moved the Grid Cyber Security Act that came through this committee on a bipartisan basis.

I do not know whether you have had an opportunity to review that legislation insofar as being able to give us your thoughts, and whether or not you believe that Congress should proceed on a sector-specific basis like we have done with this legislation or, perhaps, via a Government-wide approach. This is something that the Majority Leader has named as a priority. We are trying to figure out how we advance that legislation, but your comments, if any, on cyber security legislation?

Mr. MAJUMDAR. I have not had the chance to look at the actual bill. Cyber security, obviously, as we all know, is a really important

issue. It has, of course, many dimensions; the grid and the energy infrastructure being one of them. The Department of Energy has created a cyber security initiative and there is a roadmap as well. I have not had the chance to review that in detail, but I will be delighted to work with you on cyber security issues, because I think it is a really, really important issue.

Senator MURKOWSKI. We certainly would concur with that.

Another issue that the Chairman and I have been working on are Small Modular Reactors, the nuclear reactors. Give me your thoughts, your perspective. Do you believe that the SMRs are a viable source of energy for our electricity grid and for applications off the grid?

Mr. MAJUMDAR. Senator, I absolutely do. I think this is—there is a global competition going on in nuclear power, nuclear energy and this is a way to move forward. I think we should move forward very aggressively in this.

Small Modular Reactors, as you know, is a way to be able to finance nuclear power plants in a way that is difficult to do if it is a really large plant. Modularizing it, in many ways, could potentially reduce the cost of nuclear or electricity from nuclear power, which has to compete with natural gas electricity which, today, is the cheapest. So I think it will enable to do that.

But as I mentioned, there is a global competition going on, and I think we need to move really fast to be able to take the technological lead in the world. As you know, we have, the President has requested that from the FY11 and FY12 budget, and as soon as that budget is approved, we can have a new start. We will launch and put our efforts in getting the SMR issue resolved as quickly as possible.

Senator MURKOWSKI. I think we also recognize that when we are talking about what the prospects may hold for the SMRs, one of the stumbling blocks that we encounter is how we dispose of the used nuclear fuel and the radioactive waste. So that is something that, clearly, we need to address.

Do you have any thoughts in terms of how we can better advance that discussion?

Mr. MAJUMDAR. I mean as we all know, this is a really serious issue because if we cannot handle the nuclear waste, we have a real problem in the Nation in the long term.

The Secretary of Energy decided when he came in to put together the Blue Ribbon Commission, and the Blue Ribbon Commission has come up with a first draft of the report, and made several recommendations including legislative ones. The final report is going to come out in January of next year, just a month away, and I think it will be premature for me to say anything before the final report comes out, but we are studying the preliminary report very, very carefully.

So I think before that report comes out, it will be very difficult for me to say anything, but I think this issue is a really important one which, as a Nation, we need to resolve very quickly.

Senator MURKOWSKI. Thank you, Doctor. Thank you, Mr. Chairman.

The CHAIRMAN. Senator Wyden.

Senator WYDEN. Thank you, Mr. Chairman.

Doctor, without making this a bouquet tossing contest, let me also say I am very appreciative of the good work that you have been doing. Because you have been doing such good work, we have high expectations for you and you are going to get little tougher questions—

Mr. MAJUMDAR. Thank you, sir.

Senator WYDEN. Both today and in the days ahead.

As I have indicated to you, with millions of Americans getting clobbered by skyrocketing energy prices, I want to see the administration put more of a focus on the question of energy affordability and energy sources being affordable for our people at a time when they are just getting hit so hard in the economy. Let's use natural gas exports as a question to kind of give your sense to us today how you are going to approach it.

As you know, until recently, we have been talking about importing natural gas. Now we are looking at exports. We are excited about the promise of natural gas. I have been a strong supporter of natural gas. At the same time, there is a real question about what is ahead in terms of the prices. The prices in the Asian market are 3 and 4 times the price here and export terminals are going to siphon off natural gas produced here to the highest bidder.

Now, when we had Chairman Bingaman's earlier hearing, we talked about the Department saying a 10 percent increase could be in the public interest. Since that standard, we have had a 5-fold increase in the amount that was being considered for export, and now it is even higher than that. To date, DOE has either approved or is pending LNG export applications for 7 terminals for almost 10 billion cubic feet of natural gas a day. That is like 15 percent of U.S. total demand.

So my first question is: at what price is the Department going to conclude that the impact on our consumers and our businesses is not going to be in the public interest? Tell me how you are going to approach that question because your future colleague, when you are confirmed, frankly did not give me much of an answer. He said, we're doing lots of studies, and we've got contractors, and the like. But if you are, as I say, getting shellacked with these high energy prices, Americans want a better answer than that. So tell us how you would approach it.

Mr. MAJUMDAR. Senator, first of all, I share your concern about the affordability of energy whether it is electricity or gasoline or others. I can tell you what we did in ARPA-E. This is something that we take very seriously.

We launched DOE-wide, the SunShot Initiative, as you know, to reduce the cost of electricity production from solar down to 5 cents a kilowatt hour so they can survive without subsidies. The same thing for battery technology for electric vehicles to reduce the cost of electric cars, and go 300 miles, and be cheaper so they can compete without subsidies. That has been the way that we have approached energy technologies to make it even harder for the scientists and engineers to innovate.

With respect to LNG, I think in the approval of the permits, we are, and what we have done in the past is take one at a time in a case by case basis, and we do market analysis for that to see whether that particular one will affect the natural gas prices,

which depends on a combination of supply, demand, exports, et cetera.

Frankly if I, you know, your question is how would I approach this? I would approach it as looking at whole market global analysis to see at what point does LNG, given the dynamics of the supply and demand and the export, at what point will the LNG export start changing the prices? If it changes too much, I do not think, and I share your concern, that this should not be, you know, we will look at it again. I would love to work with you, if confirmed, on this particular issue.

Senator WYDEN. You are giving a better answer than your future colleague did a few weeks ago, and we will be following up with you, because I think we need to know. Obviously, there are a host of issues that go into how you put your arms around it. We need to know that the Department is going to be more aggressive in defending Americans from these escalating prices. I consider that one of the areas where the administration needs to have a much more vigorous approach.

Let me get one other question in, if I could, Mr. Chairman. It is on something we all care about on this committee and that is energy storage.

This is one of the real breakthrough opportunities because the other side of the coin of promoting renewables. As you know, solar and wind, these are intermittent sources and there is a real opportunity to create good paying jobs, make energy more affordable.

It has been hard to get the administration to put together a real roadmap from moving forward in energy storage. In other words there is a role, obviously a dramatic role, for the private sector, and we want to see how the Government can complement it.

What can you do to help us promote that? You have already invested, made some good investments at ARPA-E. But what more can be done to get a real roadmap in place for an energy storage strategy for the country?

Mr. MAJUMDAR. Senator, that is a very fair question. Let me tell you what we are doing within the Department of Energy. You know, there are a lot of questions about what is going on at the Office of Science, what is going on in ARPA-E investment that you talked about, what is going on in EERE in the battery vehicle technology program?

One of the first things that I did as an Acting Under Secretary is to look at it holistically because there is all battery basic science going on in this, in basic energy science, et cetera. Formed an integrated team, integrated technology team on batteries and electrification to make sure that, again, that 1 plus 1 plus 1 is greater than 3 so that the whole is bigger than the sum of the parts. We have formed this team.

This team has come together, just like the SunShot, which is also a holistic team effort from the whole of DOE that we launched. The same thing is happening in electrification batteries to create a roadmap. In fact, we have had several workshops, one of them is what is called, just like you are proving with SunShot, a penny a mile. So if you are going to go to 40 miles on an electric vehicle, and pay only a penny a mile, that is about \$125 a kilowatt hour on a battery, and today it is not far from that.

The question is can we get a penny a mile by the end of this decade? If we can do that, U.S. will be competitive in battery technology and electrification. So that is the—now the question is if we are to get that, which is a bold goal, what is the roadmap? That is what we are coming at today.

I would be happy, I would like to work with and to sort of engage in this discussion of what should be the national roadmap for battery technology?

Senator WYDEN. My time has expired. I just would like to work with you on making sure we can pin down an understandable plan for how the private sector can be involved with Government. Thank you, Mr. Chairman.

The CHAIRMAN. Senator Barrasso.

Senator BARRASSO. Thank you very much, Mr. Chairman.

Doctor, congratulations.

I agree with Senator Wyden. We have great concerns about energy affordability, and just a number of weeks ago, we met in this room with Bill Gates and with others to talk about energy affordability. I have concerns when the President was then a Senator running for President. He said under his plan, electricity rates would necessarily skyrocket. To me, I do not think that bodes well for the country, and I have concerns about all of the regulations that we are facing as a Nation and the impact that they have on the cost and on energy affordability.

In just over a week, the Environmental Protection Agency is going to issue its final Utility MACT rule. By the EPA's own estimates, the annual cost of compliance with the rule will be about \$11 billion. That is the annual cost of compliance, \$11 billion. The EPA estimates the total savings from the mercury reductions in the Utility MACT rule will amount to just over \$6 million; that is opposed to \$11 billion of the cost.

Some of the Nation's largest power producers have said that they cannot comply with the rule in accordance with the EPA's deadlines. Of course, the Utility MACT rule is just one of a number of different forthcoming regulations on America's power sector; these regulations are looming over them. There is growing concern that perhaps the EPA's regulations will actually affect not just the affordability, but also the reliability of America's electric grid. So I wanted to get to that issue with you.

Tuesday's Wall Street Journal published an editorial entitled, "If the Lights Go Out." That editorial discusses the North American Electric Reliability Corporation's, NERC's, 2011 reliability assessment, which was recently published. In that report they say, "Environmental regulations are shown to be the No. 1 risk to reliability over the next 1 to 5 years." NERC has also said, "the nation's power grid will be stressed in ways never before experienced." Somebody might ask, "So where is the Department of Energy on this?"

Unfortunately, I think the Department has been on the sidelines. The DOE only decided to address the issue of reliability recently. I think they have a 40-page study which was released earlier this month, and I understand that this study was only begun this past August. That is a year after a FERC Commissioner raised concerns about reliability.



So as the senior advisor to the Secretary of Energy, the American people want to know, will the lights go out? I'd be interested in your thoughts on that study, where the Department of Energy has been, and our reliability in terms of energy and electricity?

Mr. MAJUMDAR. So Senator, first of all, I could not agree more about, with you, about the affordability of electricity. I think we all agree that that is, (A), reduce the cost of energy for our people. In fact, more so we have, that gives us a competitive edge in terms of bringing back manufacturing in the United States and creating jobs. I mean, that is something that we all, I think, share. That that is we are losing that, and we need to bring that back, and energy cost is a big issue in that.

So all the things, as I mentioned, all the things that we have done, for example, in my real job, the one hundred percent job that I have is ARPA-E, is to look for technologies to reduce the cost of electricity and provide options for the Nation whether solar electricity or wind. We have invested in drilling technology to reduce the cost of geothermal, and this is a combination of laser and drill bits so that you reduce the cost of drill bits for that. The cost of nuclear energy, that is the Department of Energy is trying to do; that is the SMR part. All to reduce the cost of electricity down to about 5 cents a kilowatt hour, and have them compete, and give options for the Nation.

Now, the question about the EPA one that you are talking about, yes, we did a study. If you look at the conclusion, this is a very macroscopic study. The question is: would the grid be reliable or not? The grid has many problems whether you get a hurricane, or whether you have an ice storm in the Northeast has issues. That is a very major issue for our Nation that we need to address.

With regards to the EPA, as I said, the study looked at whether we have the adequate resources to be able, on a macroscopic gross scale. The answer is yes, we possibly have those resources. What it has not done is to look for individual plans, and that is a business decision that the utilities would have to make.

What we will do in DOE, if confirmed, is to put together, I will commit to you, to put together a team and we are actually putting that together right now, to help the utilities, and all the PUCs, and the stakeholders to make sure that the grid remains reliable. That is the role of the Department of Energy.

Senator BARRASSO. I appreciate your comments, and Bill Gates said exactly what you said in terms of being a competitive economy and having manufacturing opportunities. Low cost electricity is a big part of that.

Following up on that in terms of energy affordability, coal: available, reliable, secure source of energy and clearly affordable energy. So I am wondering about EPA is unprecedented steps that seem to be aimed at eliminating coal fired electric generation in this country.

What steps are you going to take to ensure that coal fired electric generation still has a bright future in this country for affordable energy?

Mr. MAJUMDAR. Senator, as you know, we have the world's largest reserves of coal, and we should be using it in an environ-

mentally responsible and affordable way. I mean, that is just my philosophy of this.

We have, in my work at ARPA-E, we have developed programs to reduce the cost of carbon capture down to below the price of carbon dioxide in the market, so that there is actually business opportunity in carbon market. Since we do not have a carbon price, it is decided by enhanced oil recovery.

So if you could reduce the cost of carbon capture below the price, you could then sell it for enhanced oil recovery, so that we can use domestic sources of oil. We have roughly about 80 billion barrels of oil stuck in the rocks onshore. That will address, also, national security and oil imports issue. So this is a carbon capture, utilization, and sequestration, which will affect, which will positively impact both the coal, electric energy from coal, as well as our oil imports.

Senator BARRASSO. Thank you, Mr. Chairman.

The CHAIRMAN. Senator Sanders.

Senator SANDERS. Thank you, Mr. Chairman. Welcome, Dr. Majumdar.

I happen to believe that from a global warming perspective, and energy independence perspective, and a job creating perspective there is huge potential in terms of transforming our energy system away from fossil fuel to sustainable energy and energy efficiency.

Now the media has been talking a lot lately about sustainable energy and some of the problems that have occurred, but the truth is, as I suspect you know, the solar industry in recent years has been thriving. We have doubled the number of solar jobs in America since 2009. More than 100,000 Americans today are working in the solar industry. The solar industry grew at a rate of 69 percent annually in the last year, and it is one of the fastest growing industries in the United States, creating jobs all over this country. In fact, the cost of solar panels has fallen 30 percent over just the last 2 years.

Wind is also exploding. Quite incredible. Texas alone has more than 10,000 megawatts of wind energy installed, equivalent in capacity to 10 nuclear power plants; 10 nuclear power plants in Texas alone. Iowa, 20 percent of their electricity is generated from wind.

So my question to you is when you become Under Secretary, what are you going to be doing to significantly expand the role of sustainable energy in this country?

Mr. MAJUMDAR. Senator, first of all, I could not agree more with you about the role of solar and sustainable sources of electricity because (A), I think it is good for the environment. Second, it is a huge, trillions, multitrillion dollar world market.

In terms of solar, as you know, we launched the SunShot Initiative which brings together, internally within the DOE, the resources in the Office of Science, and energy efficiency, and renewable energy, and ARPA-E. The power electronics effort from ARPA-E fits into that and that is why we created a program on Solar ADEPT. That is all to reduce the cost of solar so that we can be competitive.

Senator SANDERS. Doctor, would you not, in recent years, the cost of solar panels has plummeted. Do you believe with new technology

and new research that we can continue the decline of price in solar to make it competitive with the more, the older and more mature technologies?

Mr. MAJUMDAR. Yes. The cost of solar, the cost of electricity, the price will be determined by the market. But the cost of production of electricity from solar is going down to the point that it is, in some parts of the country, it is already competitive. But if you look ahead in a few years from now, it will be competitive in large parts of the Nation.

So, I think that is the question really would be then: is the integration of the solar onto the grid? That is one of the challenges that we have.

Senator SANDERS. Which takes me to my next question and that is an issue I know that you have been working on, we worked with you on, but the concept of the smart grid and sustainable energy. Could you say a few words on that?

Mr. MAJUMDAR. I think if you look at the grid today as a whole, if you just step back for a moment. Many of the assets, there were trillions of dollars of assets on our grid. The average age of a transformer on a grid is 42 years. It is 2 years beyond its lifetime. We buy most of our transformers from overseas, and there is a backlog behind it. That transformer is not that different from what Nikola Tesla invented in the 1890s. We have not really taken that quantum leap.

That is why we created a program in ARPA-E called On Power Electronics, which uses silicon carbide-based transistors, and which operates at much higher frequency, reduces the size. Something which is today 10,000 pounds will be 100 pounds in the future. By the way, we are the biggest manufacturers of silicon carbide in the world. That is a competitive advantage, so leveraging that. I think that is the kind of quantum leap that we need to take, and that is what we are trying to do right now.

Once you make that and you have put that in these smart devices, which are cheaper, lighter, and smarter into the grid, then you look at the whole system as a grid. On one end, you have the smart meters in the homes, et cetera. On the other hand, you have these fluctuating supply from wind and solar and base load. How do you take that whole system of transmission distribution and manage it in a way that is reliable, that is secure, et cetera?

Which is why in ARAP-E, we created a program called GENI, which is the Green Electricity Network Integration to address that. In the Office of Electricity, we have several programs looking at the model. It is a very hard computational problem. I will not go into the technical details.

Senator SANDERS. Please.

Mr. MAJUMDAR. But that is the kind of thing that we need to take. Again, a quantum leap in our technologies, and integrating that, and having the right policies.

Senator SANDERS. I think that is very exciting. Say a very brief word, and my time limit is expired, on the potential of wind as you see it.

Mr. MAJUMDAR. I am sorry, the potential?

Senator SANDERS. On the potential of wind energy.

Mr. MAJUMDAR. I think in many parts of the country when the wind resources are clearly onshore, the cost of electricity from wind is almost at the same level as electricity from natural gas and sometimes cheaper.

The question is the offshore wind, and offshore is still expensive. I think we need to put our resources to reduce the cost of electricity from offshore wind, which is a huge resource and make it reliable, because we cannot send ships out there to be able to repair it every few years or so. So it has to be extremely reliable and that, again, needs technology to be able to do that. That is the kind of thing that we are doing at the Department of Energy right now.

Senator SANDERS. Thank you very much. Thank you, Mr. Chairman.

The CHAIRMAN. Thank you very much. Senator Murkowski, did you have additional questions?

Senator MURKOWSKI. Just very quickly in following up from my friend from Vermont who is always keyed-in and I appreciate his focus on the opportunities with solar, and wind, and some of our other renewable resources. The administration has clearly put a focus on that, and I think we have seen some gains there, which is important.

But can you discuss, just very briefly, the role that you think that unconventional fossil fuels might play, such as methane hydrates, which we believe in Alaska have enormous potential, oil shale. Where do they fit into the picture?

Mr. MAJUMDAR. Oh, I think we should look at all options. There is not a silver bullet in this. In terms of unconventional, shale gas is often considered—shale gas and shale oil—are often considered unconventional. As you know, the President asked Secretary Chu to lead an effort, a multiagency effort, in trying to make sure that it is environmentally responsible. I think that in the first draft of the report came out, we are looking at that, and trying to get together across the agencies to be able to address that.

But I think we need to address all our other natural resources that we have, whether it is methane hydrates. There is a project that we have in Alaska on that, and see what the capacity is, whether we can extract it in a cost effective way, and supply our Nation with affordable energy. I agree with you on that.

Senator MURKOWSKI. Thank you, Mr. Chairman. I look forward to working with you, Doctor.

Mr. MAJUMDAR. Thank you.

The CHAIRMAN. Senator Coons had wanted to ask a question, but had to go to another hearing himself. So we will go ahead and conclude the hearing, and advise all members that they will have until 5 tomorrow to submit additional questions for the record.

Thank you very much, Doctor, for your testimony, and we look forward to acting quickly on your nomination.

Mr. MAJUMDAR. Thank you very much indeed.

The CHAIRMAN. That will conclude our hearing.

[Whereupon, at 10:20 a.m., the hearing was adjourned.]

[The following statement was received for the record.]

Hon. HARRY REID,  
Majority Leader, U.S. Senate, 522 Hart Senate Office Building, Washington, DC.

Hon. JEFF BINGAMAN,  
Chairman, Energy and Natural Resources Committee, 703 Hart Senate Office Building, Washington, DC.

Hon. MITCH MCCONNELL,  
Minority Leader, U.S. Senate, 317 Russell Senate Office Building, Washington, DC.

Hon. LISA MURKOWSKI,  
Ranking Member, Energy and Natural Resources Committee, 709 Hart Senate Office Building, Washington, DC.

DEAR SENATE MAJORITY LEADER REID, MINORITY LEADER MCCONNELL, CHAIRMAN BINGAMAN, AND RANKING MEMBER MURKOWSKI:

On behalf of ASME, I am writing to offer the endorsement of Arun Majumdar for the nomination of the Under Secretary of Energy at the U.S. Department of Energy. Our nation's ability to compete at a global level in the field of energy technology research will require visionary thinking of the level that Dr. Majumdar would bring to this position. During his time as the first-ever Director of the Advanced Research Projects Agency-Energy (ARPA-E) Dr. Majumdar has demonstrated the leadership traits, and skills, necessary for his nominated position.

Founded in 1880, ASME is a more than 120,000 member not-for-profit professional society promoting the art, science, and practice of mechanical and multidisciplinary engineering and allied sciences. ASME also conducts one of the world's largest technical publishing operations, holds more than 30 technical conferences and 200 professional development courses each year, and has developed more than 500 industrial and manufacturing standards, many of which are considered to be global technical standards. ASME has long believed that the nation's ability to develop and maintain a balanced energy mix is critical to the country's future economic growth.

As you know, ARPA-E was authorized under the bipartisan "America COMPETES Act" (P.L. 110-69), but did not receive its first funding until the "American Recovery and Reinvestment Act" (P.L. 111-5). According to a recent report by The Breakthrough Institute, ARPA-E investments now total \$521.7 million in awards for 180 different projects, which have attracted a cumulative \$285 million in additional private capital investment.

If confirmed, Dr. Majumdar will bring a lifetime of experience in leading edge energy science, and research, to the position. Dr. Majumdar has served on the advisory committee of the National Science Foundation's engineering directorate, was a member of the advisory council to the materials sciences and engineering division of the Department of Energy's Basic Energy Sciences program, and was an advisor or nanotechnology to the President's Council of Advisors on Science and Technology. Additionally, Dr. Majumdar was the founding chair of the ASME Nanotechnology Institute.

Dr. Majumdar is a recipient of the Institute Silver Medal, NSY Young Investigator Award, ASME Melville Medal, the Best Paper award of the ASME Heat Transfer Division of ASME, Gustus Larson Memorial Award of the ASME, and Distinguished Alumni Award from IT-B. He is a fellow of ASME and AAAS, and is a member of the U.S. National Academy of Engineering.

I urge you to support Dr. Majumdar's confirmation. Should you have any question, please do not hesitate to contact ASME Government Relations Director Kathryn Holmes at [HolmesK@asme.org](mailto:HolmesK@asme.org) or at 202/785-3756.

Sincerely,

VICTORIA A. ROCKWELL,  
ASME President.



## APPENDIX

### RESPONSES TO ADDITIONAL QUESTIONS

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#### RESPONSES OF ARUNAVA MAJUMDAR TO QUESTIONS FROM SENATOR MURKOWSKI

*Question 1.* General Research Priorities: Given your time at ARPA-E, what are the technologies that you believe offer the greatest future potential for economic renewable energy development over the next decade? What are you excited about right now? Beyond that, what are the most appropriate stages of development for DOE to be focused on—research, deployment, or a combination of both?

Answer. There are multiple technologies that offer great future potential for affordable renewable energy development. A few examples are given below:

- a) DOE's Sunshot initiative is focused on reducing the cost of electricity from solar energy to 5 cents/kWh within this decade, so that clean solar electricity can be sold without subsidies and be cost-competitive with other sources.
- b) Batteries that will enable electric vehicles have comparable range and lifecycle cost as gasoline-based cars, so that EVs could be sold without subsidies.
- c) New low-cost drilling technologies that will make geothermal energy cost-effective and competitive with other sources of electricity
- d) New approaches to use microbes for making cost-effective and scalable renewable transportation fuels from domestically produced electricity.
- e) Plants engineered to directly produce infrastructure compatible biofuels at high yield and low cost.
- f) Electrical power management devices and systems for a future reliable, resilient and secure electric grid that allows for high renewable penetration.
- g) Grid-scale electricity storage at a cost that is comparable to pumped hydro and/or compressed air
- h) New magnetic materials and motor/generator designs that eliminate the need for rare earths
- i) Energy efficient lighting, HVAC and whole building energy management that can reduce energy consumption by 50% with a payback period of less than 5 years.

The goal of DOE is to ensure a secure American energy future. This includes national security, economic security and environmental security. DOE has multiple roles to play in this regard. First, it should fund research in basic science as well as research to translate science into breakthrough technologies that are too risky for the private sector, but if successful, could lead to technologies that will make US globally competitive. Second, it must fund research for innovations in manufacturing technologies, ones that reduce cost and enable scaling within the US, and those that will make US globally competitive in manufacturing. Third, DOE can use its ability to create standards, such as appliance standards, that will lead to an energy efficient economy and create a market for innovative technologies.

With regards to deployment, DOE's goal should be to catalyze and enable industry and business, so that deployment can occur via businesses that are sustainable in the long run. The DOE's funding should be highly leveraged by the private sector both for manufacturing and deployment of energy technologies.

*Question 2.* Nuclear Waste—How to dispose of used nuclear fuel and highly radioactive waste remains a key stumbling block to the development of new nuclear reactors. What do you believe needs to happen to resolve this issue? Are used fuel recycling or fast neutron technologies viable options?

Answer. Secretary Chu has determined that a proposed geologic repository at Yucca Mountain is not a workable solution for the disposition of used nuclear fuel and high-level radioactive waste. As Secretary Chu stated in his February 11, 2011 letter to Co-Chairs Hamilton and Scowcroft of the Blue Ribbon Commission on America's Nuclear Future (BRC),

any workable policy to address the final disposition of used fuel and nuclear waste must be based not only on sound scientific analysis of the relevant geologies and containment mechanisms, but also on achieving consensus, including the communities directly affected.

The Department is committed to meeting the Government's obligation to safely manage and dispose of our Nation's used nuclear fuel and high-level radioactive waste. The BRC was established by the Secretary to conduct a comprehensive review of policies for managing the back end of the nuclear fuel cycle and provide advice and make recommendations on issues including alternatives for the storage, processing, and disposal of civilian and defense used nuclear fuel and high-level radioactive waste. The BRC issued their draft report on July 29, 2011. The BRC's final report is expected by the end of January 2012. The Department will carefully review and evaluate the final findings and recommendations of the BRC. The Department is evaluating integrated fuel cycle system options as part of its Fuel Cycle Research & Development Program. Some of these options include used fuel recycling and fast neutron reactor technologies.

*Question 3. EMPs—As we consider cyber security issues, what has DOE done to counter threats from electro-magnetic pulses, natural or man-made? Should EMP protections be included in cybersecurity legislation? Do we have enough information on how an EMP attack would work to protect our electrical grid, or mitigate the damage?*

Answer. There is a distinction between Electromagnetic Pulse (EMP) weapons and the naturally occurring phenomena known as Geomagnetic Disturbance (GMD) that is caused by solar storms. The Department of Energy (DOE) is aware of this naturally occurring phenomena and the potential risk to the Nation's electricity generation and supply. We also are aware of the threat posed by EMP weapons.

DOE is working with agencies across the Federal Government as well as industry leaders in identifying protection and mitigation strategies. The Department has partnered with the Federal Energy Regulatory Commission, the Departments of Homeland Security and Defense, and Oak Ridge National Laboratory to develop these strategies specifically in response to GMD. DOE has also co-sponsored the High Impact/Low Frequency Event Workshop with the North American Electric Reliability Corporation (NERC) to further address these risks. The Department is also working closely with industry owners and operators, the National Aeronautics and Space Administration, the National Oceanic and Atmospheric Administration, the United States Geologic Service and our National Labs to enhance early warning capabilities and advanced modeling and simulation to more accurately project the time, location and effects in the event of a GMD incident.

NERC is addressing the availability and adequacy of spare transformers and has created a Spare Equipment Database Task Force and a Task Force on Geomagnetic Disturbances. Several transformer manufacturers including ABB, Siemens, Prolec-GC, Mitsubishi and EFACEC are participating in these initiatives. Additionally, DOE has been working with the Department of Homeland Security, the Electric Power Research Institute and ABB on a Recovery Transformer Project. This project is testing units that are lighter and more easily transportable than existing transformers.

EMP is only one aspect included in the High Impacts Low Frequency events that the electric sector is addressing. An EMP attack would affect other sectors beyond the electric sector. Comprehensive legislation on EMP, standard setting, research, and protection/mitigation should be separate and comprehensive across all the affected sectors.

*Question 4. Cyber Security—This spring, the Committee reported out S. 1342, The Grid Cyber Security Act, on a bipartisan basis. The bill takes an electricity-sector approach to the issue of cyber security, tasking DOE to respond to imminent threats and FERC, through the ERO stakeholder process, to respond to emerging vulnerabilities. What are your thoughts on the legislation: do you believe Congress should proceed on a sector-specific basis like S. 1342 or via a governmentwide approach? If Congress decides to address cyber security government-wide, presumably under the auspices of the Department of Homeland Security, what role do you see for the Energy Department? What role do you see for FERC and for the ERO stakeholder process? How does DOE interact with DHS on cyber-related matters now? Should Congress proceed on a sector-specific basis like S. 1342 or via a governmentwide approach?*

Answer. DOE supports the Administration's cybersecurity legislative proposal. Recognizing the interdependencies between different sectors and the unique cybersecurity challenges associated with the reliable delivery of electricity (e.g., high



availability and low latency communications), we believe it is important to have a comprehensive, government-wide approach to cyber security.

*Question 4a.* If Congress decides to address cyber security government-wide, presumably under the auspices of the Department of Homeland Security, what role do you see for the Energy Department?

Answer. DOE supports a strategic comprehensive approach to enhance cybersecurity for the grid. In September 2011, DOE released the updated Roadmap to Achieve Energy Delivery Systems Cybersecurity to provide a collaborative strategy for improving cyber security, prioritizing cyber security needs, and focusing actions under way throughout Government and the private sector to secure control systems. The Roadmap vision is focused on resilient energy delivery systems that are designed, installed, operated, and maintained to survive a cyber incident while sustaining critical functions. The Roadmap strategies are also fully integrated into the Energy Sector-Specific Plan. DOE uses the Roadmap to focus its activities on the following key areas: public-private partnerships to accelerate Energy Sector cybersecurity efforts; research and development of advanced technology to create a secure and resilient energy infrastructure; cybersecurity standards to provide a baseline to protect against known vulnerabilities; facilitating timely sharing of relevant and actionable threat information; risk management; incident management and response; and development of a highly skilled and adaptive workforce.

Due to the unique cyber security challenges of the electric grid, DOE has worked closely with its national laboratories, utility partners, and control system vendors to develop advanced technology solutions to secure the grid. The real-time cyber control of physical power systems and the highly interdependent nature of the electric grid with other critical infrastructure, creates a unique challenge that requires specialized technical knowledge that is present in DOE's Electricity Delivery and Energy Reliability cyber programs. With the development of Smart Grid, which is accelerating and expanding the use of digital devices that control the grid, DOE's role in developing and coordinating cyber security solutions has become more important.

Under Homeland Security Presidential Directive 7 (HSPD-7), DHS is responsible for leading, integrating, and coordinating the overall national effort to enhance critical infrastructure and key resources (CIKR) protection, and is also a focal point for the security of cyberspace. HSPD-7 also designates DOE as the sector-specific agency (SSA) for energy responsible for collaborating with all federal agencies, state and local governments, and the private sector.

*Question 4b.* What role do you see for FERC and for the ERO stakeholder process?

Answer. Under the Energy Policy Act of 2005 (EPAct 2005), FERC promulgates and enforces reliability standards for the bulk electric system. FERC designated the North American Electric Reliability Corporation (NERC), as the Electric Reliability Organization (ERO) with the responsibility to develop technical standards associated with the reliable operation of the bulk power system.

*Question 4c.* How does DOE interact with DHS on cyber-related matters now?

Answer. DOE coordinates with DHS in accordance with HSPD-7. Given the interdependencies among sectors and reliance on the electric sector, DHS is a strategic partner for DOE. DOE interacts with DHS regularly on cybersecurity initiatives through both formal and informal means. Some examples include:

- The Roadmap to Achieve Energy Delivery Systems Cybersecurity.
- DOE, in coordination with DHS and other Federal agencies, has conducted several cyber threat information sharing workshops to analyze classified information, determine the impact to the sector, and develop mitigations that were specifically designed to work in the sector.
- DOE, in coordination with the National Institute of Standards and Technology (NIST), DHS and NERC, is leading a collaborative effort with representatives from across the public and private sectors to develop a cyber security risk management guideline. The objective of this effort is to provide a consistent, repeatable, and adaptable process for the electric sector, and enable organizations to proactively manage risk.

#### *Critical Minerals*

*Question 5.* I often say that minerals are the building blocks of our society—especially for clean energy and other advanced technologies—and yet, our dependence on foreign suppliers continues to grow more and more severe.

*Question 5a.* Would you agree that the United States needs an effective, holistic policy to promote the responsible production of critical minerals and a strong supply chain?

*Question 5b.* If we refuse to produce minerals here at home, what do you think that will mean for manufacturers' ability to obtain the raw materials that go into their products?

*Question 5c.* As Under Secretary, I expect you'll be involved in the Department's updated critical minerals strategy. Will the update include the Department of the Interior? Will you look at permitting and other issues that need to be addressed if we're going to be successful in this area?

Answer. Yes, policies focused on the development of a robust domestic critical material supply chain will be an important component for strengthening American industries. To accomplish this DOE is focusing on three pillars to address the challenges associated with critical materials in the clean energy economy. These three pillars form the basis of an effective, holistic policy. First, substitutes must be developed. Research and entrepreneurial activity leading to material and technology substitutes improves flexibility to meet the material demands of the clean energy economy. Second, recycling, reuse and more efficient use can significantly lower global demand for newly extracted materials. Research into recycling processes coupled with well-designed policies will help make recycling economically viable over time. Finally, diversified global supply chains are essential. To manage supply risk, multiple sources of material are required. This means encouraging other nations to expedite alternative supplies and exploring other potential sources of material in addition to facilitating environmentally sound extraction and processing here in the United States. With all three of these approaches, we must consider all stages of the supply chain: from environmentally-sound material extraction to purification and processing, the manufacture of chemicals and components, and ultimately end uses.

Production within the United States is important for at least two reasons. First, the United States' considerable reserves of some critical materials could add significantly to total global production and to greater diversity in the global supply of these materials. Second, U.S. technology and best practices developed during mine operations can help promote safe and responsible mining in other countries, further contributing to supply diversity and the sustainable development of resources.

In the past six months, DOE and interagency colleagues have had several conversations with the Department of Interior concerning critical materials, in updating our Critical Materials Strategy and otherwise. Among the topics addressed have been general and specific permitting issues. DOE intends to continue these conversations.

*Question 6.* I know you have visited Alaska's lone working geothermal project at Chena Hot Springs, and I thank you for taking the time to visit my home state two summers ago. My question is what do you feel that DOE should be doing to further geothermal development nationwide? The program has been concentrating on enhanced geothermal system research and on geothermal heat pump technology. But what other, if any, areas are you interested in focusing Department assistance on, especially given the likelihood of declining funding for all renewable energy and energy efficiency projects in future years?

Answer. It is critical that the Nation continue to develop its geothermal resources. The program should be developing replicable exploration tools that today's industry can use to reduce uncertainty and risk regarding the quality of this base load renewable resource prior to committing to costly exploration and drilling. This would be analogous to what the oil and gas industry has done to reduce resource uncertainty. The U.S. Geological Survey estimates that there are still 30 GW of undiscovered hydrothermal resources; ten times today's installed capacity, plus significant additional potential which could come from success in developing enhanced geothermal systems. With successful DOE-sponsored development and demonstration of advanced exploration technologies (e.g., seismic, magnetic, optical, etc.) that more accurately characterize the resource, we help tackle another critical barrier to geothermal power growth—affordable financing. With reduced risk and cost, the private sector will be more willing to provide financing at affordable rates, leading to an expansion of the geothermal industry.

*Question 7.* As you prepare now your FY 14 budget, since the FY 13 budget submission should be all but finished, I would encourage you to consider funding to provide additional grants under Section 625 of the Energy Independence and Security Act of 2007. That provision set up a matching grant program for high-cost geothermal projects nationwide. I happen to think geothermal has significant upside for supplying baseload power, if the high initial capital costs can be reduced. What is your view on the technology's future efficacy, and where it will fit in your personal priorities for DOE funding when building a budget for renewable energy for submission to the President and Congress?

Answer. Geothermal Energy plays a vital role in our Nation's energy mix, and it has the potential for further growth. The Geothermal Technologies Program funding is focused on those technologies which have the greatest potential to help realize this opportunity. In the likelihood of declining budgets, we believe that investment in research and development will provide the maximum rate of return on taxpayer investment as compared to more expensive, location-specific demonstration and deployment. The EISA 625 grants are for design, engineering and commercial applications which can be done by the private sector. It's also imperative that we help develop solutions for Americans who are paying excessive costs for energy, especially those who are relying on high-priced diesel to produce electricity. This situation is further compounded by additional fuel transportation costs for those living in remote areas such as Alaskan villages. In consideration of these factors in high-cost areas, the DOE Geothermal Technologies Program (GTP) has included EISA Section 625 as a special program policy factor in its funding opportunity solicitations. While we have not awarded EISA 625 grants per se, there have been five projects selected in high-cost areas of the State of Alaska (one is currently being negotiated). These projects include:

Awardee	Title	DOE Funding
Hattenburg, Dilley, and Linnell, LLC	Identifying Fractures with Geochemical Techniques	\$ 313,858
Hattenburg, Dilley, and Linnell, LLC	Methodologies for Reservoir Characterization Using Fluid Inclusion Gas Chemistry	\$ 331,174
University of Alaska	Pilgrim Hot Springs(Innovative Exploration Technologies)	\$4,274,792
Naknek Electric Association	Implementation of a Demonstration EGS Project at Naknek, Alaska	\$12,376,568
The Trabits Group	Development of an Improved Cement for Geothermal Wells	\$2,154,238

The Office of Energy Efficiency and Renewable Energy has assigned an expert, Dr. Brian Hirsch, from the National Renewable Energy Laboratory, to assist the Denali Commission, Alaska Energy Authority and other State agencies and organizations in developing resources such as biomass, wind, hydro, and marine, as well as geothermal. We plan to continue this project and policy support as Alaska embarks on achieving 15% energy efficiency improvement by 2020 and 50% renewable energy generation by 2025. Achieving these goals will help make electricity more affordable and decrease the price volatility associated with the diesel market. Based on recent discussions with the Alaska Governor and Lieutenant Governor, the state of Alaska and DOE are considering a more formal relationship through a Memorandum of Understanding and DOE will continue Dr. Hirsch's efforts and possibly expand support.

*Question 8.* Coming from Alaska, I am a big supporter of wave, current, and tidal power. I think over the long-term, marine hydrokinetics offer considerable upside for low-cost renewable energy so I support the Department providing a majority of the water power budget to marine hydrokinetics. At the same time, I think there are a whole host of ways that we can still get more lower-cost renewable energy from conventional hydropower projects with additional government assistance—not just incremental hydropower. What is your view as to how the Department should be spending its water power budget, and what are your priorities for the future?

Answer. The Department believes that continued funding of research and technology development projects for both conventional hydropower and emerging marine and hydrokinetic (MHK) energy technologies is needed to meet the nation's immediate and long-term energy needs. The President's request includes \$38.5M for marine and hydrokinetic and conventional hydropower technologies. The President's request is essentially split between these two technology areas. The Senate appropriations mark eliminates conventional hydropower activities.

### *Conventional Hydropower Opportunities*

The Department agrees that there are significant opportunities to increase electricity generation by optimizing existing hydropower facilities, adding power to non-powered dams, and developing new (small) hydropower. The nation's current hydropower fleet is aging, and many facilities have not been upgraded in decades to take advantage of modern technologies. The Department works to remove market barriers by developing technology for efficiency upgrades to encourage investment, and to remove environmental barriers by demonstrating technologies such as the fish-friendly Alden turbine. Also, the Department's assessment of non-powered dams found that there is potential to add more than 12 GW of hydropower capacity by powering existing nonpowered dams.

In addition to supporting research to make use of opportunities at existing dams, the Department supports activities to harness new energy resources such as small hydropower and pumped storage hydropower. To this end, in FY2011, the Department selected 11 multi-year projects to develop innovative small hydropower technologies and two projects to deploy state-of-the-art pumped storage hydropower technologies, which can help in integrating high penetrations of variable renewable energy into the electric grid. The Department is also undertaking an assessment of opportunities to develop new hydropower facilities across the United States.

### *Marine Hydrokinetic Opportunities*

The Department's current MHK priorities include ongoing R&D activities targeted at developing cost benchmarks and technology pathways to cost-competitiveness for MHK technologies. There are also activities addressing key environmental, siting, and market barriers and a comprehensive set of resource assessments and detailed techno-economic assessments for emerging MHK technologies.

The Department has recently concluded studies finding that the technically recoverable resource potential is approximately 1,170 TWh/yr for wave energy and 180 TWh/yr for tidal energy. This resource potential represents about one-third of U.S. electricity demand. Assessments of ocean thermal, ocean current, and river hydrokinetic energy will be completed in 2012. The completion of these studies, in addition to the results of demonstration projects and continued research over the next decade will put industry in a position to offer more cost competitive and reliable electrical generation options with this nascent technology.

*Question 9.* While wind power is a wonderful source of supplemental electrical energy in rural Alaska, nationwide I have the sense that wind is an increasingly mature technology. What do you see as the future for research into wind turbine technology and for integration of wind into the electrical grid? In your view, should wind funding be increased, decreased, or stay the same as a percentage of the Department's renewable energy budget?

### *Technology Maturity of Land and Off-shore Wind*

Answer. The DOE Wind program has been successful in enabling the cost competitiveness of land-based systems which has gone from 0.1% in 2000 to over 2% by 2011 (~42GW installed). With the success of the land-based deployments, the Department is now prioritizing and shifting a significant portion of the RD&D portfolio to off-shore systems. In FY12, the President's budget reflects an increase to develop immature off-shore systems to take advantage of high resource potential and proximity to high population centers (~4,000 GW potential), and to enable land-based wind to be cost competitive with fossil sources on an unsubsidized basis (noting that PTC expires at the end of 2012). In addition, more work needs to be done to increase domestic manufacturing of wind energy technologies and components throughout the supply chain. Currently, four of the top ten (and seven of the top 15) leading global suppliers of wind turbines in 2010 are from China, while only one U.S. company, GE, is in the top 15.

Regarding offshore wind, there are currently 3 GW of offshore wind technology installed worldwide, but none are installed in the U.S. For the offshore wind industry to be viable in the U.S., a number of technology hurdles need to be overcome. Current technology solutions exist for shallow water in the 3-5MW range but to be cost effective offshore technology must be scaled to the 8-10MW range and be able to be deployed in deeper water. Developing the nation's offshore wind energy resources could deliver substantial amounts of clean electricity to U.S. consumers, especially in transmission-constrained coastal areas with high energy costs, while creating thousands of jobs and stimulating billions of dollars in new economic activity.

### *Future Research Investment*

Further research is needed to harness the considerable market potential for off-shore wind energy in the United States, as described in the National Offshore Wind

Strategy released by the Departments of Energy and the Interior in 2011. As the U.S. industry develops, projects will presumably tap into the high wind resource potential available in deep water locations. To address this need and support this new industry, the Department is focusing on developing cost-effective technologies for deep water floating offshore systems in addition to exploring demonstration areas where technologies can be showcased and evaluated. The increase in machine size for offshore applications will require innovation in drivetrain topographies that are lighter and more reliable; blade geometries that are larger (up to 100m), but lighter and capture more energy; and "smart" control and health monitoring systems that not only optimize energy capture but characterize and predict system behavior when system failures are realized. The Department's recent funding opportunity awards in offshore wind technology, innovative drivetrains, and market barriers, totaling \$50 million, are key to ensuring the success of this emerging industry. Some of the specific technology research areas that DOE is supporting to advance the offshore wind industry include marinization of the structure and power electronics; moorings and foundations for deepwater systems; and control systems that provide stability and high efficiency for floating wind energy systems. DOE-supported R&D will allow domestic wind technology developers and manufacturers to enter the global market by leapfrogging further development of conventional offshore turbine technologies and produce next generation designs tailored to the unique conditions off the coasts of the United States.

While it is widely understood that achieving high levels of wind energy penetration into the grid (upwards of 20%) is technically feasible, issues related to project cost effectiveness, electricity grid infrastructure and operations, and siting and environmental concerns must be addressed, and they require government involvement. These issues are increasingly more complicated in an off-shore environment, where both the experience is limited, and technical and market barrier challenges are more complex. Investments to reduce the cost of wind power through technology development and improved reliability are needed to bring wind power closer to unsubsidized market competitiveness. Investments to reduce market barriers to wind deployment are needed to allow wind plants to be sited in higher quality (higher wind speed) resource areas, further lowering the cost of wind and increasing market competitiveness. As the market penetration of land-based wind energy has increased and the first U.S. offshore wind plants are being planned, concerns associated with siting projects—such as potential impacts on wildlife, civilian and military radar systems, communities, and competing land and ocean uses such as fishing and shipping—have also grown. The wind industry estimates that planned projects representing tens of gigawatts of potential capacity have been delayed or otherwise significantly impacted by these issues.

#### *Wind Integration*

DOE efforts to integrate wind energy into the electric grid are coordinated between the Office of Electricity Delivery and Energy Reliability and the Office of Energy Efficiency and Renewable Energy. Regarding the integration of wind into the electrical grid, substantial efforts are needed to improve the capabilities of wind turbines and begin providing services that more closely resemble conventional generation technologies.

These capabilities include a variety of active power controls that allow the possibility for wind turbines to provide regulation service, frequency response, improved voltage control, and a variety of other ancillary services. Mitigation of wind variability through demand response and energy storage also deserves serious investigation. Analysis of existing storage systems and additional demonstrations coupled to wind generation are required to generate reliable data. Furthermore, more analysis studies are needed to better understand the impacts of high penetrations of wind through additional wind integration studies similar to the Western Wind and Solar Integration Study and the Eastern Wind Integration and Transmission Study. These types of studies help planners and system operators better understand how wind energy's variability and uncertainty affect the power grid and provide insights into issues such as what impact thermal unit cycling has on wear and tear to those generators. Also, considerable research is needed to help support the development of decision support tools to aid system operators make more informed operational decisions. Finally, substantial investigation is needed into power system dynamic behavior under a variety of wind deployment scenarios. In rural areas or in areas that have small electrical grids, wind energy can be stored or integrated with other renewables (e.g., biomass, hydrogen, etc.) to provide more continuous power.

DOE believes that the allocation of \$126.9 million in the President's FY2012 Congressional Budget Request for EERE's Wind program is sufficient to address the wind energy R&D needs outlined above.

*Question 10.* Through the 2007 energy bill, Congress set up a matching grant program to help fund the capital costs renewable energy projects in high-cost areas like Alaska. While some have incorrectly considered the program to be Alaska-specific, I believe it allows the department to make grants to actually build wind, solar, geothermal, marine hydrokinetic and some hydro projects nationwide—with funding for lake tap hydro projects clearly being limited to just Alaska. What is your view about the merits of DOE providing financing assistance to actually build renewable energy projects? Will you seek to dedicate some portion of the Department's future budget to implement grant funding for such projects as Under Secretary?

Answer. Section 803, titled "Renewable Energy Deployment," of the Energy Independence and Security Act (EISA) allows 50:50 cost share of renewable energy construction grants. To date, the Department has not requested funding for Section 803. In the likelihood of declining renewable energy technology development budgets at DOE, we believe that, in general, investment in research and development will provide the maximum rate of return on taxpayer investment as compared to more expensive, location-specific demonstration and deployment projects. The total R&D budget for renewable energy is approximately \$600M annually. Even if this amount were matched by private cost share, it would be dwarfed in comparison to what is invested in building renewable energy projects with other policy incentives. However, the Department will look to sponsor special demonstration projects where applying this authority to validate new technology performance and economics in high cost areas could spur follow-on private investment and be replicated at scale.

Some of the other Federal government incentives and financing opportunities for commercializing new technologies and for constructing renewable energy plants include the DOE and USDA loan guarantee programs, Modified Accelerated Cost Recovery System depreciation schedule, production and investment tax credits and the Treasury grants in lieu of tax credit program. For example, under the American Recovery and Reinvestment Act, the Section 1603 Treasury grant program has incentivized over 24,000 projects yielding over 14 GW of renewable energy and \$33 billion in total renewable energy investment by the government and private sectors. As the Treasury grant program and tax credits expire, the DOE looks forward to working with Congress and other government agencies to determine the best policy mechanisms and existing authorities to offset capital costs and to incentivize private investment in building new renewable energy projects.

*Question 11.* Both the Government Accountability Office and the Department of Energy's Inspector General have raised serious concerns regarding the management and effectiveness of the Weatherization Assistance Program. While clearly energy efficiency is a critical tool to reduce energy bills, what will you do to improve the program? Do you believe it has fundamental problems that can be solved?

Answer. More than \$5 billion has been administered through Recovery Act funding of the Weatherization Assistance Program (WAP). The use of these funds to weatherize low income homes has been the subject of 28 audits covering grantees representing \$3.9 billion or 78% of the Recovery Act portfolio by either or both of the Office of Inspector General (OIG) and the Government Accountability Office (GAO). 17 of these audits have been complete and 11 are currently in process.

Most of the completed audit reports (14 of the 17) contained either no recommendations or standard recommendations to improve "Controls" and monitoring. Of the remaining three reports, substantive deficiencies included evidence of substandard performance in workmanship, initial home assessments, contractor billing, financial management, and compliance with laws and regulations, including Davis-Bacon and Historic Preservation issues. The latter issues were new to all grantees, since the Recovery Act added them to the requirements. In many cases these issues were identified prior to the OIG or GAO audits by DOE monitoring and were being addressed.

Since the inception of the Recovery Act, DOE has taken its management responsibility very seriously, designing and implementing a robust monitoring system that could identify problems and take corrective actions without relying on outside audits. This allowed DOE to both systematically identify and respond to the new issues presented by the large increase in funding for WAP. All of the WAP grantees have been visited on a routine basis, with Monitoring Site Visits by DOE program staff totaling 121 as of December, 2011. Any issues identified are addressed until corrected.

DOE will continue to act responsibly and appropriately when monitoring Recovery Act spending. Routine findings are regularly reviewed and used to identify areas of improvement among grantees. Often, the WAP issues additional guidance to clarify or strengthen policies. As in the past, DOE will remain vigilant in our awareness of potential fraud or abuse of services.

*Question 12.* “Duplicative Authorizations— Over the years, Congress has authorized numerous programs at the Department of Energy that can be considered overlapping or duplicative. Has DOE considered any kind of consolidation of programs that may be duplicative? Is that something you would be willing to work with our committee on, if you’re confirmed as Under Secretary of Energy?”

Answer. DOE is working to ensure that its program areas are well coordinated and have minimal overlap or duplication, in order to make federal R&D funding have the highest possible impact. Recently, building on the success of the SunShot program, DOE established a set of cross-cutting technology teams to further this effort. These teams are formed along techno-business lines (such as vehicle electrification) and consist of the senior program managers from ARPA-E, the Office of Science, and the applied technology programs that oversee research that is relevant to each technology area. Working closely with the Office of the CFO, these teams analyze the R&D portfolio DOE-wide, to look for overlap, duplication, or gaps that may not have been apparent when viewed on a program-by-program basis. The work of these teams is ongoing, and if confirmed, I would be happy to work with the Committee on this important topic.

*Question 13.* There is confusion about DOE’s current role in the Energy Star Program. Can you please describe that role, and the associated budget requirements?

Answer. DOE is the technical lead for the ENERGY STAR program through its development of product test procedures and support of the verification testing program. DOE remains committed to work with EPA and stakeholders on creating and updating ENERGY STAR test procedures that are reflective of innovations in the market place and address manufacturers concerns with test procedures. As an example, DOE and EPA are working closely with the Association of Home Appliance Manufacturers (AHAM) and major refrigerator manufacturers in the development of test procedures to support Smart Grid capability in ENERGY STAR refrigerators. In FY2011, DOE’s budget for ENERGY STAR was \$7 million to develop test procedures for ENERGY STAR and verify the performance of ENERGY STAR labeled products through third-party laboratory testing. The President’s FY2012 budget request for ENERGY STAR was \$10 million to support those same to goals above and to work with EPA and participating manufacturers, retailers, and energy efficiency program sponsors on certification and product testing.

*Question 14.* Please describe how the DOE uses the procurement and acquisition system to push energy conservation, and sustainability within the DOE, and throughout the Federal Government.

Answer. As required by Executive Order 13514, DOE is ensuring that 95 percent of its contract actions include sustainable acquisition clauses. DOE also purchases and establishes policies regarding sustainable electronic equipment and energy efficient power management practices, including EPEAT, ENERGY STAR® and FEMP designated products.

In addition to these requirements DOE is making enhancements in its Strategic Integrated Procurement Enterprise System contract writing tool to ensure that contracting personnel can easily select the appropriate green provisions and clauses for procurements to ensure the Department’s prospective contractors and successful competitors are fully aware of DOE’s commitment to sustainable acquisition.

Section 525 of the Energy Independence and Security Act of 2007 requires each Federal agency to procure ENERGY STAR qualified or Federal Energy Management Program (FEMP) designated products in all product categories covered by the Energy Star program or the FEMP program, unless the efficient product is not cost-effective over the life of the product or if no qualified product is reasonably available to the agency. FEMP supports Federal agencies in identifying energy- and water-efficient products that meet this and other Federal acquisition requirements, conserve energy, save taxpayer dollars, and reduce environmental impacts. This is achieved through technical assistance, guidance, and efficiency requirements for energy-efficient, water-efficient, and low standby power products.

FEMP product efficiency requirements set minimum efficiency levels for product categories that have the potential to generate significant Federal energy savings. FEMP dedicates staff and resources to inform Federal buyers, procurement officials, energy managers, and facility engineers of the reasons and requirements to buy energy-efficient products. Several online and other resources are available to facilitate product selection. Technical documents, fact sheets, and web-based tools include covered product category efficiency requirements, cost calculators, and the standby power data center. In addition to online resources, FEMP staff works directly with Federal agencies on a variety of issues, such as guide specifications, Federal supply catalogs, outreach and training, and the Product Procurement Working Group.

*Question 15.* Procurement Guidance: Please describe any guidance that the DOE provides program managers and contracting officers on the purchasing of sustain-

able or green construction services. Are there any requirements prescribed that require the contracting officers to use third party sustainability or green certification services in new construction or through retrofits of existing buildings funded by the DOE?

Answer. DOE provides guidance to program managers and contracting officers in the area of sustainable acquisition, including sustainable construction services, through several channels. Regulatory guidance is provided through the Department of Energy Acquisition Regulation (DEAR), part 923. The DOE Acquisition Guide (chapter 23) provides comprehensive information concerning Executive Order 13514 and its predecessors, responsibilities of various offices in DOE for meeting the goals of the EO, and useful resources for both program managers and contracting officers. The Department also maintains a Sustainable Acquisition Working Group of over 200 members which shares information and best practices in sustainable purchasing through quarterly teleconferences for contractors and federal employees.

DEAR clause 952.223-78 Sustainable Acquisition Program (Alternate 1 for Construction Contracts and Subcontracts) requires a third party sustainable/green certification to the Leadership in Energy and Environmental Design (LEED) Gold level under the LEED rating system most suited to the building type.

*Question 16.* Are federal agencies required to consult the Federal Energy Management Program (FEMP) regarding efficiency opportunities within new construction and the retrofit of existing buildings? For example, if the DOD or GSA procures services to build a new facility or retrofit an existing facility, are they required to consult with FEMP on ways to incorporate energy efficiencies into the design and construction of the building? If not, what role does FEMP play in ensuring that these buildings are incorporating energy savings into their designs?

Answer. Federal agencies are required to conform to efficiency standards for new construction and major renovation as published by FEMP through Federal Rule makings. Additional information on this rulemaking is available at [www.femp.energy.gov/pdfs/75\\_fr\\_29933.pdf](http://www.femp.energy.gov/pdfs/75_fr_29933.pdf)

Agencies are also required to complete assessments of their existing facilities to identify potential energy conservation measures and report those findings to FEMP annually, per §432 of the Energy Independence and Security Act 2007 (EISA 2007). This section required FEMP to develop and manage an online tracking system, the EISA Section 432 Compliance Tracking System (CTS), to track agency performance of energy and water evaluations, project implementation and follow-up measures, and annual building benchmarking requirements. Because this system is just now being implemented, we do not yet have data on agency compliance.

In addition, Federal agencies are required by §548(a) of the National Energy Conservation Policy Act (NECPA (42 U.S.C. 8258(a))) to report annually to FEMP their energy management activities as detailed in the Energy Policy Act of 2005 and EISA 2007. Information and data collected from the agencies is then used to develop DOE's Annual Report to Congress on Federal Government Energy Management.

In addition to reporting requirements, FEMP provides the services, tools, and expertise to Federal agencies to help them achieve their Federal energy management goals. This is delivered through project financing, technical assistance, and communications and training.

*Question 17.* Please describe how FEMP analyzes energy management authorities and develops rules and guidance to help Federal agencies comply with applicable requirements.

*Analyzing Energy Management Authorities:*

Answer. The rulemaking process begins when DOE is directed by Statute or by Executive Order to develop a rule or regulation or is directed to develop guidance or interpretation of a rule or regulation. When a law is enacted or an executive order issued relevant to FEMP's scope of activity (e.g., dealing with Federal energy and water management, fossil fuel consumption, or greenhouse gas emissions), FEMP, working with other relevant DOE offices, as well as other cognizant federal agencies (such as GSA, DOD and EPA), determine FEMP's responsibilities.

*Developing rules and guidance to help agencies:*

Consistent with the Federal Register Act, the Administrative Procedure Act, and other applicable legislation, DOE experts develop a draft Proposed Rule consistent with the requirements and intent of the governing authority. The draft Proposed Rule is then subject to an interagency review process. Following that process, the draft is issued as a Notice of Proposed Rulemaking (NPR) in the Federal Register. The NPR provides a specified period of time usually 60 days—for all interested parties to comment on the proposed rule. A public hearing is typically held as well.



Rulemaking documents, public comments and other supporting materials are placed in a rulemaking docket which is made available for public inspection at [www.regulations.gov](http://www.regulations.gov). After due consideration of the public comments, modification of the proposed rule, DOE publishes the final rule. The rule then becomes part of the Code of Federal Regulations, and remains so until it is revised.

Upon completion of a final rule, DOE also develops guidance for Federal agencies that are subject to the rules. This guidance expands on the legal language used in the rules and addresses specific concerns and issues agencies may have, as well as providing agencies direction as to how to show compliance with the new rule. As needed, FEMP works with DOE program offices, other federal agencies, national laboratories, and industry experts to prepare the form and technical aspects of guidance for complying with rules and regulations. Such guidance typically covers both technical (e.g., energy, water, and/or fossil fuel use) and cost-effectiveness based on life cycle costs and published forecasts by energy Information Administration and National Institute of Standards and Technology (NIST). NIST is responsible for developing and maintaining a building life cycle cost model used by federal agencies.

FEMP maintains a website containing information on the rulemaking process at [www.femp.energy.gov/regulations/notices—rules.html](http://www.femp.energy.gov/regulations/notices—rules.html). FEMP also maintains a website containing guidance for Federal rules at [www.femp.energy.gov/regulations/guidance.html](http://www.femp.energy.gov/regulations/guidance.html).

*Question 18.* Is DOE the lead federal agency in ensuring that the goals of Executive Order 13514 (Federal Leadership in Environmental, Energy, and Economic Performance) of October 5, 2009 that relate to energy are being met? Please describe how the DOE will ensure that all federal agencies are reducing their energy intensity throughout their building stock. If the DOE is not the lead within the Executive Order as it relate to energy initiatives, who will be the lead federal agency in ensuring that reductions in energy intensity throughout the federal government are being met?

Answer. Each Federal agency is responsible for meeting the goals of Executive Order 13514. However, the Federal Energy Management Program within the DOE is responsible for tracking agency progress towards meeting these goals and provides the services, tools, and expertise to help them do so. This is delivered through project financing, technical assistance, and communications and training.

*Question 19.* Please describe the role the DOE will play within the Administration to ensure that the President's direction to federal agencies to cut energy costs in agency facilities as part of a broader effort to reduce spending and shrink the Federal Government's real estate footprint will be met.

Answer. FEMP continues to play a central role in guiding agencies to use funding more effectively in meeting Federal and agency-specific energy management objectives. FEMP services are designed to help agencies meet their energy management requirements, however, projects with energy savings may have associated cost savings. FEMP provides the services, tools, and expertise to Federal agencies to help them achieve their Federal energy management goals. This is delivered through project financing services, technical assistance, and communications and training.

DOE Report on Reliability: On December 1, 2011, the Department of Energy released a report entitled "Resource Adequacy Implications of Forthcoming EPA Air Quality Regulations." The report represents an assessment by DOE of the adequacy of U.S. electric generation resources under air pollution regulations being finalized by the U.S. Environmental Protection Agency.

*Question 20a.* When did the Department begin work on this report? When was that work completed? How long was the report under review before it was issued? Who outside of the Department was asked or allowed to provide input or review the final product?

Answer. As part of its core mission to understand and analyze factors affecting the US energy system, the Department has monitored external analysis of EPA regulations on an ongoing basis and has consulted with EPA and other government offices on these topics when appropriate. The Department began drafting the formal written report in October 2011, drawing upon preliminary internal analysis that was initiated over the summer. The report was not completed until shortly before its release on December 1st. It did not undergo peer-review, although DOE consulted EPA to clarify technical details about the rules and asked a small number of experienced external energy experts to provide comments on a draft.

*Question 20b.* Why did the DOE Office of Policy and International Affairs undertake the work for this report? What role did DOE's Office of Electricity Delivery and Energy Reliability have in preparing this report? Did DOE consult with either the Federal Energy Regulatory Commission or the North American Electric Reliability Corporation in connection with preparation of the report, or before the report was released? Please list all persons or entities that DOE vetted this report with.

Answer. DOE's Office of Policy and International Affairs (PI) led the effort to produce this report, with substantive input and consultation with other DOE offices, including the Office of Electricity Delivery and Reliability. PI led this effort because it falls within PI's core mission to understand and analyze policies affecting the US energy system and cuts across multiple DOE technology areas. DOE did not consult with FERC or NERC about this report. It did not undergo peer-review, although a small number of experienced energy experts were asked to provide comments on a draft.

*Question 20c.* Why did DOE examine only two of EPA's air regulations? Why didn't the Department provide an integrated analysis of the multiple environmental regulations?

Answer. The report focused on the two EPA rules—CSAPR and MACT—that are largely anticipated to have the greatest near-term impact on the energy system. The Department did not consider two other proposed rules—316(b) and the Coal Combustion Residuals Rule—because the requirements of these rules are more uncertain. Since these rules could not be modeled explicitly, the analysis instead reflected the uncertainty itself by making conservative assumptions about payback periods associated with pollution control technologies.

*Question 20d.* Do you agree that regarding reliability concerns, local issues are of paramount concern given that many of the retiring units provide location and site-specific services such as black start are done at the local level? If so, why does the DOE report specifically decline to analyze the more important local and location-specific reliability concerns?

Answer. The report acknowledges that specific units may provide important ancillary services and that the localized reliability implications of retiring such units will need to be evaluated as those units are considered for retirement or extended outages. The report did not analyze these aspects of reliability because such an analysis would require knowledge about specific retirement or retrofit decisions at a unit-level that have not yet been made by the owners of those plants. Such analyses should be conducted and reviewed at the appropriate time by regional planning authorities, electric reliability organizations, and additional stakeholders with the best detailed knowledge of the relevant systems. The Department is committed to providing technical assistance to all relevant stakeholders as the rules are implemented.

*Question 21. Transmission*—In the 2005 Energy Policy Act (EPAct), Congress attempted to address the difficult issue of transmission siting by adding Section 216 to the Federal Power Act which provided new Federal authority in this area. Pursuant to EPAct, DOE was tasked with conducting a study of electric transmission congestion and constraints every three years and, based on the study, designating National Interest Electric Transmission Corridors (NIETC or Transmission Corridors) where existing congestion resulted in reliability concerns or rate increases. FERC was granted limited backstop siting/eminent domain authority for transmission lines within those DOE-designated Transmission Corridors. DOE finalized its first study in 2006 and in 2007 designated two Transmission Corridors—one in the Mid-Atlantic region and the other in the Southwest. The 2009 Stimulus bill amended the 2005 EPAct language to expand the basis of NIETC designations by including an analysis of significant potential sources of renewable energy that are constrained by a lack of adequate transmission capacity. With this new directive, the Energy Department completed its second congestion study in September 2009 but basically re-affirmed the previous two Transmission Corridor designations.

Just this past September, in light of decisions on this EPAct provision in the Fourth and Ninth Circuits, the Department sought to transfer its study/designation authority to FERC so that only one federal agency would be in charge. However, rather than notify ENR, the Committee of jurisdiction, DOE simply posted the proposal on its website and asked for stakeholder comments. After significant backlash, including from this Committee's Chairman who noted that any changes to the carefully crafted 2005 compromise should be made by Congress and not the Administration, the Department withdrew its proposal.

*Question 21a.* Do you believe the Department should undertake to rework pieces of energy laws like the 2005 Energy Policy Act or the 2007 Energy Independence and Security Act without at least consulting with the Committees of jurisdiction?

*Question 21b.* I understand that instead of proceeding with its proposal to transfer its transmission authority to FERC, the Department is now undertaking a Memorandum of Understanding with the Commission. What is the status of that MOU and how will it differ from DOE's initial authority transfer proposal?

*Question 21c.* Do you agree that the 2005 statute reflects a clear division of authority between the two agencies and that FERC should not have the ability to trigger its own backstop jurisdiction?

Answer(a). The Department understands that it does not have the authority to “rework” statutes like the 2005 EPA or the 2007 EISA. After receiving the delegation proposal from industry, a number of Federal agencies involved with electric generation and transmission projects decided to post the proposal—without endorsement—for comment. After receiving and carefully considering comments from a wide range of parties, the Department concluded that the proposed delegation would not be an appropriate action.

Answer(b). After further discussion with FERC, the Department has concluded that an MOU on this subject is not needed.

Answer(c). While members of congress have differing views on the congressional intent underlying the 2005 statute, the Department recognizes that the language of the Energy Policy Act of 2005 defines certain roles for the Department and other roles for the Federal Energy Regulatory Commission resulting in a division of authority.

*Question 22.* Loan Programs Office: Who is currently in charge of the day-to-day operations of the Department’s Loan Programs Office?

Answer. David Frantz, a career DOE employee and Director of Origination, is currently serving as Acting Executive Director of DOE’s Loan Program Office, reporting to Deputy Secretary of Energy Daniel Poneman. Mr. Frantz has more than 25 years of experience in project finance and prior to joining DOE, worked at the Overseas Private Investment Corporation, where he managed a team responsible for closing financial transactions to assist U.S. businesses investing overseas and promoting economic development in new and emerging markets.

*Question 23.* ATVM Loans—The Department has entered into a conditional commitment, through the Advanced Technology Vehicles Manufacturing (ATVM) Program, for a \$730 million loan to the domestic subsidiary of a Russian company for a project to produce advanced high-strength steel. This loan commitment is controversial for several reasons, and raises a number of questions about DOE’s interpretation and implementation of the ATVM statute. To the extent that you are unable to answer the following questions on your own, please work with other officials at the Department to do so and return complete answers.

*Question 23a.* When was advanced high-strength steel first produced in the United States?

Answer. This is not within the scope of the Department’s loan program review, as it does not impact the ability of the applicant to meet the objectives of the ATVM program or their ability to repay their loan.

*Question 23b.* When was advanced high-strength steel (AHSS) first used in a light-duty automobile in the United States?

Answer. This is not within the scope of the Department’s loan program review, as it does not impact the ability of the applicant to meet the objectives of the ATVM program or their ability to repay their loan.

*Question 23c.* Is the Department aware of any companies within the domestic steel industry who have produced—or plan to produce—advanced high-strength steel without receiving a loan from the ATVM program? Please list those companies, along with the dates each began or will begin to produce advanced high-strength steel.

Answer. Demand for uncoated AHSS capabilities in higher grades will grow significantly over the next 10 years, due to fuel efficiency and crash safety standards. At this time, ArcelorMittal has the only dedicated continuous annealing line (CAL) to produce uncoated and martenistic steels in the US. Severstal’s expansion at its Dearborn, MI facility will represent the second CAL production projected to come on line in the US, in 2012. Based on market analysis, US demand from AHSS will continue to grow and there is currently insufficient US manufacturing capacity to meet this demand. While other lines have been announced, it is unclear as to their timing and production status. The Department’s loan program welcomes applications from any of these companies.

*Question 23d.* In determining eligibility for loans under the ATVM program, does the Department make any distinction between a vehicle “material” and a vehicle “component”? Why or why not?

Answer. Each ATVMIP application undergoes a thorough review of its statutory eligibility. As a part of this process, DOE has determined that AHSS is reasonably understood to meet the statutory definition of “qualified component” as set forth in Section 136(a)(4) of the Energy Independence and Security Act of 2007 (EISA). “Qualifying components” are “components that the Secretary determines to be (A)

designed for advanced technology vehicles (ATVs) and (B) installed for the purpose of meeting the performance requirements of ATVs.” AHSS meets the requirements of a component for which the Secretary has the statutory discretion to determine qualification. In this regard, AHSS is designed for automotive applications, currently the only major use for these high grades of steel. AHSS is also installed for the purpose of improving fuel economy in ATVs. Prior to reaching a determination on eligibility, DOE confirmed that automotive original equipment manufacturers (OEMs) would use AHSS in qualified ATVs.

*Question 23e.* Did the Department issue any rulemaking—and seek public comment on that rulemaking—before determining that advanced high-strength steel is a “component”? Upon determination that advanced high-strength steel (or any other material or component) qualifies for ATVM awards, does DOE have any responsibility to advertise that expanded eligibility to the general public, including other companies in the industry and other materials suppliers?

Answer. DOE did not issue a rulemaking prior to determining that AHSS is a component. DOE’s determination was made as a matter of statutory interpretation after all due consideration.

*Question 23f.* Please explain if there are any limits to the material/component projects that the Department believes are eligible for ATVM loans. Given that rare earth elements are used in many advanced vehicles, would a project to modify or establish a rare earths processing or beneficiation facility be eligible to receive an ATVM loan based on the Department’s current statutory interpretation?

Answer. As highlighted above, the Department’s Loan office places great importance on the statutory eligibility of each applicant and carries out a thorough review to determine its eligibility. This review takes place on a case-by-case basis. At this time, ATVM has not carried out a thorough review to determine the eligibility of rare earth elements under the ATVM program.

*Question 23g.* Please explain how low-cost federal financing for one company within the domestic steel industry will not afford it an unfair advantage compared to competitors that do not receive the same low-cost federal financing.

Answer. As set forth in Section 136(a)(4) of the Energy Independence and Security Act of 2007 (EISA), ATVMIP authorizes funding awards and a direct loan program for OEMs and component suppliers that re-equip, expand, or establish manufacturing facilities in the U.S. to produce qualifying vehicles and components. The loan program welcomes applications from any companies that meet the objectives of the statute.

*Question 23h.* Please provide all market analysis for advanced high-strength steel that the Department completed prior to its recent conditional commitment.

Answer. Market analysis is a critical part of evaluating a company’s prospect of loan repayment. Before issuing loans, DOE closely analyzes and considers the competitive landscape and the impact of new, potential competitors on the existing market.

DOE’s market research is extensive and performed by highly regarded, independent engineering and consulting firms in the automotive and industrial manufacturing sectors. The due diligence performed on Severstal Dearborn, as with all other ATVMIP evaluations, included both a top-down and bottom-up market analysis of historical, current and anticipated future market conditions for both commodity and advanced high strength steels (with special focus on martensitic ultra high strength and uncoated steels). Moreover, the project’s construction, production and operations costs were carefully reviewed. The analysis considered the rate of AHSS use abroad, specifically by foreign vehicle manufacturers selling imported vehicles in the U.S., as well as the importation of high tensile strength steels and the costs to OEMs and vehicle consumers. These considerations were determined to be critical inputs in evaluating Severstal Dearborn’s suitability for the program and its ability to repay a loan.

*Question 23i.* Please provide all analysis that the Department completed with regard to potential impacts this loan could have on other firms in the steel industry, before it concluded that the recent \$730 million conditional loan commitment was warranted.

Answer. As highlighted above, DOE carried out extensive top-down and bottom-up market analysis of historical, current and anticipated future market conditions for both commodity and advanced high strength steels. It was determined from this market analysis that US demand from AHSS will continue to grow and that there is currently insufficient US manufacturing capacity to meet this demand. To date, there is only one other domestic supplier of martensitic uncoated steels capable of providing high product volumes in the near term, but it is expected that the supplier will be unable to meet full market demand. In order to meet domestic demand

and ensure dollars and jobs remain within the US, there is a need for additional US manufacturing of AHSS.

*Question 23j.* Please provide the current construction status of all facilities that were to be reequipped, expanded, or established under the project that was awarded a \$730 million conditional loan commitment. To the extent that facilities in the project have already started construction or been completed, please explain why the Department determined that the loan was still necessary and appropriate.

Answer. Severstal decided to modernize and expand its manufacturing facilities for the production of AHSS shortly before a major contraction within the steel industry and the broader financial market. Beginning in late 2007, Severstal Dearborn embarked on a capital improvement program, substantially similar in planning to the first phase of the project considered by the ATVMIP for the production of coated steels using a hot dip coating process. Due to the recession and the contracting credit market, Severstal was forced to stop work in early 2008 and the project was placed on indefinite hold. The extent of the work completed at that time was minimal, consisting of the incomplete framing of a building intended to serve as the improved facility. Due to financial constraints, no additional progress was made on the project until the company submitted its ATVMIP application. The expenses associated with this part of the project were incurred prior to the company's submission of its ATVMIP application and therefore cannot be reimbursed under the ATVM rulemaking.

In September 2009, Severstal's application to the ATVMIP was determined by program staff to be substantially complete. Under the ATVM regulation, eligible project costs incurred and paid between the date of an application's substantial completeness and loan close qualify for reimbursement should the loan be made. Since the project has not yet closed, Severstal has incurred any expenditures to-date at its own risk. For ten months (September 2009-June 2010), the Applicant conducted no project work. In June 2010, Severstal requested permission from the Loan Programs Office NEPA group to begin working on "interim actions" related to facility construction under Phase I of the project. Permission being granted, Severstal embarked on the development of its pickling line and hot dip coating facility, funding at its own risk in hopes of securing a DOE loan, through a combination of equity contributions from Severstal's parent, subordinated debt, and two existing, limited scope, credit facilities from major banks. At no time was Severstal assured of success in its pursuit of a loan. During this phase of the ATVMIP process, DOE conducted financial, market, legal and credit due diligence, and the Office of Management and Budget approved the credit subsidy rate. On July 8, 2011, the DOE approved moving forward with a conditional commitment to Severstal. As noted above, finalization of the loan is still pending.

At the time of the conditional commitment, approximately one year after commencement of interim actions, the Phase I facility was approximately 80% complete, which greatly reduced the credit and execution risk associated with the project, helping protect taxpayer interests by improving the DOE's collateral position and supporting the borrower's prospects for loan repayment. The Phase I facility is still in testing and qualification and has not yet begun volume production. Phase II, the construction of a continuous annealing line facility for uncoated AHSS, has not yet broken ground. The company has represented to the ATVMIP that this phase is dependent on both the completion of Phase I and securing a DOE loan, as the company itself does not currently have the resources to complete the project without government assistance. Assuming a loan is approved, Phase II construction would begin in the late first quarter of calendar year 2012.

#### RESPONSES OF ARUNAVA MAJUMDAR TO QUESTIONS FROM SENATOR BARRASSO

*Question 1.* Do you believe the United States should have a robust uranium mining industry? If so, why?

Answer. Yes, I believe that U.S. power reactors must have access to an adequate supply of uranium to enhance our national security and support the Administration's view that nuclear energy should continue to make a major contribution toward meeting our energy requirements and addressing the challenge of global warming.

*Question 2.* If confirmed, will you communicate the importance of the domestic uranium mining industry to other agencies within the Federal government, including the Department of the Interior and the Environmental Protection Agency? If so, how?

Answer. The Department is supportive of the advancement of nuclear energy, including support for domestic uranium mining, and will communicate that position within the Federal government. On an equal footing, I support the efforts of the De-

partment of Interior and the Environmental Protection Agency to support their missions and protect the public interest.

*Question 3.* If confirmed, you will oversee the Office of Nuclear Energy. The Office of Nuclear Energy has responsibilities, together with the Office of Environmental Management and the National Nuclear Security Administration, for managing and disposing of the Department's excess uranium inventory. If confirmed, what steps will you take to ensure that the Department adheres to its 2008 Excess Uranium Inventory Management Plan?

Answer. If confirmed, I will ensure the Department remains committed to following the principles and policies contained in the 2008 Excess Uranium Inventory Management Plan, whereby the Department will manage its excess uranium inventories in a manner that: (1) complies with all applicable legal requirements; (2) maintains sufficient uranium inventories at all times to meet the current and reasonably foreseeable needs of DOE missions; and (3) supports the maintenance of a strong domestic nuclear industry.

*Question 4.* If confirmed, what steps will you take to ensure that the Department does not dispose of more uranium into the market than that identified in its 2008 Excess Uranium Inventory Management Plan—specifically, 3.8 million pounds in calendar year 2012 and 5 million pounds annually in calendar years 2013 through 2017?

Answer. DOE has established priorities for the transfer of uranium through 2013 consistent with the principles and policies set forth in the 2008 Excess Uranium Inventory Management Plan. On March 2, 2011, Secretary Chu announced that he had determined, based on a market impact analysis, that the planned transfers to fund accelerated cleanup activities at the Portsmouth Site in Piketon, Ohio, will not have an adverse material impact on the domestic uranium mining, conversion, or enrichment industries. The total proposed Departmental transfers through calendar 2013, including previously planned transfers by National Nuclear Security Administration, total approximately 2,000 metric tons of uranium per year, or about 10 percent of U.S. reactor demand, consistent with the guideline or objective the Department set out in the 2008 Plan. I do not anticipate any changes going forward with respect to the principles and policies contained in the Department's 2008 Plan.

*Question 5.* In September of 2011, the Government Accountability Office found that the Department violated Federal law (31 U.S.C. 3302(b)) in a series of transactions with USEC between December 2009 through June 2011. Do you believe the Department violated Federal law with respect to these transactions? If not, why not?

Answer. I am not an attorney, but the Department's response to the GAO report, including its legal analysis, is contained in Appendix IV to the report. I refer you to that response, available at <http://www.gao.gov/new.items/d11846.pdf>, for the Department's position on this matter.

*Question 6.* If confirmed, what steps will you take to ensure that the Department adheres to the miscellaneous receipts statute (31 U.S.C. 3302(b))?

Answer. As stated in its response to the GAO Report, the Department does not believe it violated the miscellaneous receipts statute in the transactions analyzed by GAO. Nevertheless, the Department will take GAO's concerns into account in future transactions.

*Question 7.* The Department has indicated that it is revising its 2008 Excess Uranium Inventory Management Plan. If confirmed, what steps will you take to ensure that the revised plan will promote a strong and stable domestic uranium mining industry?

Answer. As I have indicated in response to a previous question, if confirmed, I will fully support the Department's principles and policies contained 2008 Excess Uranium Inventory Management Plan are reflected in the revision to the Plan. The Plan will incorporate these principles and policies and set forth the Department's intended transfers, which will be conducted in a manner that: (1) complies with all applicable legal requirements; (2) maintains sufficient uranium inventories at all times to meet the current and reasonably foreseeable needs of DOE missions; and (3) supports the maintenance of a strong domestic nuclear industry. It is especially important to note that for certain kinds of transfers or sales of uranium, the Department is subject to requirements under 3112(d) of the USEC Privatization Act, including a determination by the Secretary that the proposed transaction will not have an adverse material impact on the domestic uranium mining, conversion, or enrichment industries.

*Question 8.* If confirmed, what steps will you take to ensure that the revised plan's annual limits on the Department's excess uranium inventory dispositions will be no more than 5 million pounds or 10 percent of annual domestic fuel requirements?

Answer. If confirmed, I will support the Department's general guideline, set forth in both the 2008 Plan and the 2008 Secretary of Energy's Policy Statement on Management of the Department of Energy's Excess Uranium Inventory, to keep the quantity of uranium introduced into the domestic market within 10 percent of average annual domestic demand. The Department believes, as do I, that the introduction into the domestic market of DOE inventories in amounts that do not exceed 10 percent of the annual U.S. fuel requirements should not have any adverse material impact on the domestic industry. The 10 percent guideline was in fact one of industry's recommendations regarding the Department's management of its uranium. As acknowledged in the Plan, however, the Department anticipates that in any given year it may introduce less than that amount into the domestic market and that in some years it may introduce more for certain special purposes. Regardless of whether a particular transfer or sale is above or below the 10 percent guideline, if it is a transaction that is covered by section 3112(d) of the USEC Privatization Act, the Secretary must determine that that a proposed transfer or sale will not have an adverse material impact on the domestic uranium mining, conversion, or enrichment industries in order for that transaction to occur.

RESPONSES OF ARUNAVA MAJUMDAR TO QUESTIONS FROM SENATOR PORTMAN

Dr. Majumdar, as you know, one of the administration's priorities in the energy research portfolio has been the hubs of innovation. Secretary Chu originally sought funding for eight hubs; to date Congress has funded three to examine Fuels from Sunlight, Modeling and Simulation, and Energy Efficient Building. Further funding has been proposed for creation of the Battery and Energy Storage and Critical Materials Hubs.

*Question 1.* How would you assess the progress of these Hubs? Looking forward, I would like to ask for your further thoughts on the proposed Hub for Smart Grid research.

Answer. The Hubs continue to make strong progress in their respective technical areas. By bringing together researchers from a diverse, complementary set of fields under the leadership of strong scientist-managers, the Hubs have succeeded in creating a "critical mass" of research attention on these high-value problems. The Smart Grid Hub will replicate key features of this successful model in the area of grid technologies. However, recognizing the significant regional diversity of the electricity system, DOE is considering the concept of supporting multiple Smart Grid "Hublets", rather than using a "single roof" approach. Under this model, these several "Hublets" would secure partnership and cost-sharing with industry, local governments and other stakeholders in their region, in order to explore regional-level technology and institutional solutions while maintaining coordination for the national interest.

*Question 2.* How do you see the proposed Hub for Smart Grid research interfacing with existing federal funding supporting Smart Grid technologies?

Answer. While the Smart Grid Hub will leverage the activities of existing programs, its general focus would likely be on the unique technology, market, and policy issues at the interface between electricity transmission and distribution. The trend toward increased deployment of distributed generation, electric vehicles, and customer participation in wholesale electricity markets has blurred the traditional boundary between transmission and distribution, introducing new complexity to the grid system. A systems-level, grid-centric approach pursued by the Hub would help realize the full potential of these clean technologies as well as emerging grid technologies.

*Question 3.* Do you see a Smart Grid Hub geared more toward fundamental research or applied research and commercialization?

Answer. The Smart Grid Hub will likely focus on applied research and commercialization, while also exploring the market and institutional issues that are critical for successful deployment of innovative grid technologies and solutions. Education and training for the next generation of grid designers, engineers, and operators is also likely to be a cornerstone of the Hub's efforts.