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DOE BUDGET FOR FY 2013

HEARING

BEFORE THE

COMMITTEE ON ENERGY AND NATURAL RESOURCES UNITED STATES SENATE

ONE HUNDRED TWELFTH CONGRESS

SECOND SESSION

TO

RECEIVE TESTIMONY ON THE DEPARTMENT OF ENERGY'S BUDGET FOR FISCAL YEAR 2013

FEBRUARY 16, 2012

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DOE BUDGET FOR FY 2013

THURSDAY, FEBRUARY 16, 2012

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

The committee met, pursuant to notice, at 9:31 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. OK. Why don't we get started?

Thank you all for coming. Today we have an oversight hearing to examine the President's proposed Department of Energy budget for fiscal year 2013. We welcome Secretary Chu to testify and present the Administration's budget to us today.

The priorities laid out in the President's proposed budget reflect a strong commitment to clean energy and the increased security and economic benefits that made-in-America energy can achieve for us through American innovation and as well as manufacturing.

In an overall budget request that seeks to provide substantial government wide deficit reduction, I'm pleased to see that we have a proposed 3.2 percent increase in the Department of Energy budget. This is an investment in the Nation's energy future that will boost our economic growth and global competitiveness, protect the environment and allow the U.S. to continue important nuclear nonproliferation work.

Informed by the Quadrennial Technology Review, which we had a hearing on a couple months ago, the Department of Energy's budget request cuts funding in mature technology areas and provides increased resources for the most promising clean energy innovations. This is an important step toward a national energy policy that invests in critical energy priorities within a framework of a sustainable fiscal policy.

The Department of Energy's budget before the committee today supports a range of cutting edge technologies that will enable us to lead in the global race for clean energy. Increased investment in high performance computing and basic science will increase understanding and spur new energy technology development. Continued investments in ARPA-E will support high risk transformational energy projects, helping them to mature and attract non-governmental funding. Support for solar, wind, geothermal and biomass energy will further develop our portfolio of available energy sources and enable a transition to cleaner technologies. Meanwhile, funding

for research on carbon capture and sequestration, methane gas hydrates and minimization of the impact of shale gas development will allow us to utilize fossil fuel resources in a responsible way.

This budget also provides funding to address critical grid modernization issues through a new Electricity Systems Innovation Hub and significant funding increases for advanced energy efficient manufacturing. This holds the promise of providing jobs for the future.

It's important to recognize that the research and development programs that I mentioned here cannot fully meet the challenges of bringing new energy technologies to the commercial marketplace. The capital requirements to move promising technologies from the lab bench to pilot scale and finally to commercial scale are enormous.

Our overseas competitors have figured this out. They're moving aggressively to gain an edge in clean energy technologies. Much of our effort to support domestic players in this race has occurred through the Loan Guarantee Program—a proposal that Senator Domenici and I jointly made as part of the 2005 Energy Policy Act. At its core the Loan Guarantee Program is intended to allow the government in the case of new technology development and deployment to take on risks that the private investor cannot. Mr. Herbert Allison has just published a useful report with some recommendations for managing the program going forward,and many of these are similar to approaches that Senator Murkowski and I have incorporated into the Clean Energy Deployment legislation the (CEDA) that we've reported from the committee. We'll be having a hearing on this report by Mr. Allison when we return after this next week's recess. I'll have a questions for the Secretary about the Allison report and the State of the loan guarantee program when we get to questions.

Again, thank you, Mr. Secretary, for coming. We look forward to your testimony. Let me also just mention before calling on Senator Murkowski, I appreciate the technical assistance that your staff and the folks at the Energy Information Administration and other parts of DOE provided in helping us develop the proposal for a Clean Energy Standard that I hope we can introduce as legislation in a couple of weeks. The modeling and analysis that has been done in your Department has been very helpful in helping us develop that bill.

So, let me call on Senator Murkowski for her opening statements.

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

Senator MURKOWSKI. Thank you, Mr. Chairman. Mr. Secretary, good morning, welcome to you. Thank you for being here before the committee to speak to the budget as it relates to the Department of Energy.

I was disappointed with the Administration's overall request for fiscal year 2013. I think we all hoped, and I certainly expected, that the President would lead the way by presenting a good plan to reduce our debt, grow our economy. I think it was an opportunity to address the entitlement issue, reform the tax code, make

swift progress in balancing the Federal budget or at least moving in that right direction.

But instead we have a document that, I believe, largely ignores the greatest threat to our economy. That's the more than $15 trillion debt that led the United States' first ever credit downgrade last summer. Last year's budget request lamented the special interest loopholes that riddle our tax code, but this year proposes even more. It describes an economy built to last and yet, is filled with proposals that have virtually no chance of passage.

Unfortunately I look at the energy budget and I think that this is clear within the energy policy as well. I can understand and certainly support many of the proposals that are within the DOE budget. I greatly appreciate the emphasis on science and research. I think that that is key. More money for geothermal research, I believe is a good thing and emphasis on drop in biofuels, clearly a worthy endeavor.

But, I have some heartburn with the decision to reduce the funding for renewable water power. This is an issue that I hope we can discuss in the questions and answers after this. R and D efforts that could help unlock massive volumes of unconventional resources are, again, zeroed out.

I'm also concerned by many of the big ticket expenses that are either directly or indirectly tied to this budget. We've got new and renewed tax credits as an extension of the 1603 program. We've got a billion dollar vehicle deployment program, a $5 billion for advanced manufacturing, $6 billion for home star efficiency programs.

I clearly understand why people would want to fund all of those. I certainly have shown my support in many of these areas. But given the state of the Federal budget, where we are, I would stress that now is a time to differentiate between those things that we might want to fund and those things that we need to fund.

While DOE's discretionary budget grows by just over 3 percent in this request, adding all of the programs and the subsidies that are included in the broader budget is going to nearly double our spending on energy. That concerns me.

I'm willing to support more spending in this area, but only if the revenues are derived from new and not existing production. But that's another problem with the budget. It reignites a fight that the Administration has waged and overwhelmingly lost, I might say, for the past 3 years. Instead of taking steps to extract new domestic energy from our tremendous resource base, the Administration has decided to again, try to extract $40 billion from the consumers of oil and gas and coal regardless of the consequences that they could have for our energy supply, our economy and our security.

The President, in his State of the Union, called for an all of the above approach to energy policy. I think that's certainly something that I have embraced and I think most of our colleagues here. But I'm just not seeing that played out within the budget. I causes me to wonder whether the budget planners were working together with the President when he enunciated those words in his speech.

I'd like to see us get to that point. I, again, appreciate you, Secretary Chu. I think you do try to make a very concerted effort in a difficult area, during difficult times.

Thank you for being here. Look forward to your responses to some of these very critical issues.

Thank you, Mr. Chairman.

The CHAIRMAN. Secretary Chu, why don't you take as much time as you would like to describe the budget and any other points you want to make?

STATEMENT OF HON. STEVEN CHU, SECRETARY, DEPARTMENT OF ENERGY

Secretary CHU. OK. Thank you, Chairman Bingaman and also thank you, Ranking Member Murkowski and members of the committee. Thank you for the opportunity to discuss the President's FY'13 budget request for the Department of Energy.

I want to first begin by thanking Senator Bingaman for his years of leadership. It's been a privilege to work with you. I look forward to continuing our work together this year.

To promote economic growth and strengthen national security, President Obama has called for an all of the above strategy that develops every source of American energy. The President wants to fuel our economy with domestic resources while increasing our ability to compete in the clean energy race.

Although the United States has reclaimed the title of world leader in clean energy investments, we're at risk of falling behind again unless we support our domestic clean energy economy. Our country faces a stark choice. We can create jobs making and exporting the energy technologies of tomorrow or we can cede the leadership to other countries that are investing in these industries. As President Obama has said passing a clean energy standard is a vital step that Congress can take to broaden our clean energy market.

Making the most of the America's energy resources is a pillar of the President's economic blueprint to build an economy that lasts. The Department FY'13 budget requesting $27.2 billion is guided by the President's vision, our 2011 Strategic Plan and our inaugural Quadrennial Technology Review. It supports leadership in clean energy technologies, science and innovation and nuclear security and environmental cleanup.

Trillions of dollars will be invested in clean energy in the coming decades. To seize this opportunity, the budget requests investing in the research, development, manufacturing and deployment of energy technologies. Decades ago the Energy Department's support helped develop the technologies that have allowed us to tap into America's abundant shale gas resources. Today our investments can help advance technologies that will unlock the promise of renewable energy and energy efficiency.

The budget request invests approximately $4 billion in our energy programs. It advances progress in areas from solar, to offshore wind, to carbon capture utilization and storage to smart grid technologies. It helps reduce our dependence on imported oil by developing next generation biofuels, advanced batteries and fuel efficient vehicle technologies.

The budget request invests $770 million in the Nuclear Energy program to help develop the next generation of nuclear power technologies including small modular reactors. It includes funding for

continued Nuclear Waste R&D which aligns with the recommendations of the Blue Ribbon Commission on America's nuclear future.

As we move to a sustainable energy future, America's fossil fuel energy resources will continue to play an important role in our energy mix. The budget requests include $12 million in grants. That $12 million is part of a $45 million priority Research and Development initiative by the Departments of Energy, Interior and EPA to understand and minimize the potential environmental, health and safety impacts of natural gas development through hydraulic fracturing.

The budget also promotes energy efficiency to help Americans save money by saving energy. It sponsors R&D on industrial materials and processes to help American manufacturers cut costs and compete.

To maximize our energy technology efforts, the Department is coordinating research and development across our basic and applied research programs as well as in ARPA-E in areas including batteries, biofuels and electric grid technologies.

To encourage manufacturing and deployment of clean energy technologies, the President has called for extending proven tax incentives including the Production Tax Credit, the 1603 program and the Advanced Energy Manufacturing Tax Credit.

As industry, Congress and the American people make critical energy decisions, it's also important that we adequately fund the Energy Information Administration.

Competing in the new energy economy will require our country to harness all our resources including American ingenuity to help the United States at the forefront of science and technology. The budget includes $5 billion for the Office of Science to support basic research that could lead to new discoveries and help solve energy challenges. These funds are for progress in material science, basic energy science, advanced computing and more.

The budget request continues to support Energy Frontier Research Centers which aim to solve specific scientific problems to unlock new clean energy development. So far these research centers have published more than 1,000 peer reviewed papers and filed more than 90 patent applications or patent invention disclosures.

It also supports the 5 existing Energy Innovation Hubs and proposes a new Hub in electricity systems. Through the Hubs we're bringing together our Nation's top scientists and engineers to achieve game changing energy goals.

Additionally the budget request includes $350 million for ARPA-E to support research projects that could fundamentally transform the way we use and produce energy. ARPA-E invests in high risk, high reward research projects that, if successful, could create the foundation for entirely new industries.

In addition to strengthening our economy the budget request strengthens our security by providing $11.5 billion for the National Nuclear Security Administration.

As the United States begins the nuclear arms reduction required by the new START treaty, the science, technology and engineering capabilities within the nuclear security enterprise will become even

more important into sustaining the U.S. nuclear deterrent. That's why the budget request includes $7.6 billion for weapons activities.

It also includes $1.1 billion for the Naval Nuclear program.

Additionally it supports NNSA's work to prevent nuclear terrorism, one of President Obama's top priorities.

It includes $2.5 billion to implement key nuclear security, nonproliferation and arms control activities.

Finally, the budget request includes $5.7 billion to continue progress cleaning up the Nation's cold war nuclear sites.

The budget request makes strategic investments to promote prosperity and security. At the same time we recognize the country's fiscal challenges and are cutting back where we can. We're committed to performing our work efficiently and effectively.

Countries in Europe, Asia and throughout the Western Hemisphere recognize the energy opportunity and are moving aggressively to lead. This is a race we can win. But we must act with fierce urgency.

So thank you. I'll be pleased to answer your questions.

[The prepared statement of Secretary Chu follows:]

PREPARED STATEMENT OF HON. STEVEN CHU, SECRETARY, DEPARTMENT OF ENERGY,

Chairman Bingaman, Ranking Member Murkowski and Members of the Committee, thank you for the opportunity to appear before you today to discuss the President's Fiscal Year 2013 Budget request for the Department of Energy

I want to begin by thanking Senator Bingaman for his many years of leadership. It has been a privilege to work with you, and I look forward to continuing our work together this year on the important energy issues facing our nation.

To promote economic growth and strengthen national security, President Obama has called for "an all-out, all-in, all-of-the-above strategy that develops every source of American energy—a strategy that is cleaner and cheaper and full of new jobs." The President wants to fuel our economy with domestic energy resources while increasing our ability to compete in the global clean energy race.

Although the United States has reclaimed the title of world leader in clean energy investments, we are at risk of falling behind again unless we make a sustained federal commitment to supporting our domestic clean energy economy. To compete globally, America has to do more than invent technologies, we also have to produce and sell them. Our country faces a stark choice: we can create jobs making and exporting the energy technologies of tomorrow or we can cede leadership to other countries that are investing in these industries. As President Obama re-iterated in his State of the Union address, passing a Clean Energy Standard is a vital step that Congress can take to broaden our clean energy market and promote U.S. leadership.

Making the most of America's energy resources is a pillar of the President's economic blueprint to build an economy that lasts. The Energy Department also supports other key elements of the President's agenda including leading in innovation, reducing our dependence on oil, cutting costs for families, businesses and manufacturers through energy efficiency and reducing nuclear dangers worldwide.

Guided by the President's vision, the Department's 2011 Strategic Plan and our inaugural Quadrennial Technology Review, our FY13 budget request of $27.2 billion invests in the following priorities:

- Accelerating the transformation of America's energy system, and securing U.S. leadership in clean energy technologies;
- Investing in science and innovation to promote our nation's economic prosperity; and
- Keeping Americans safe by enhancing nuclear security through defense, nonproliferation and environmental cleanup.

These priorities will be enabled through a continuing commitment to fiscal responsibility and management excellence.

Leading in the Energy Technologies of the 21st century

Last year, a record $260 billion was invested globally in clean energy, and trillions of dollars will be invested in the coming decades. To seize this market and job

creation opportunity, the President's budget request invests in programs that advance research, development, manufacturing and deployment of the energy technologies of the future.

Decades ago, support from the Energy Department helped to develop the technologies that have allowed us to tap into America's abundant shale gas resources. Today, our investments can help us advance technologies that will unlock the promise of renewable energy and energy efficiency.

The budget request invests approximately $4 billion in our energy programs. It supports the Department's SunShot initiative to make solar energy cost-competitive with any other form of electrical energy, without subsidy, by the end of the decade. It advances technological progress in areas ranging from offshore wind to carbon capture, utilization and storage to smart grid and energy storage. And it helps reduce our dependence on oil by developing the next generation of biofuels and accelerating research in advanced batteries and fuel-efficient vehicle technologies.

Leadership in nuclear energy technologies is also essential to our ability to compete globally. The budget request invests $770 million in the nuclear energy program to help develop the next-generation of nuclear power technologies, including small modular reactors. It also includes funding for continued R&D on the storage, transportation and disposal of nuclear waste, which also aligns with the recommendations of the Blue Ribbon Commission on America's Nuclear Future.

As we move to a sustainable energy future, America's fossil energy resources will continue to play an important role in our energy mix. President Obama is committed to developing our oil and gas resources in a safe and sustainable manner. Last year, our oil import dependence was at its lowest level in sixteen years, oil production reached its highest level in eight years and natural gas production set a new record. Building on this progress, the Energy Department's budget request includes $12 million as part of a $45-million priority research and development initiative by the Departments of Energy, the Interior, and the Environmental Protection Agency to understand and minimize the potential environmental, health, and safety impacts of natural gas development through hydraulic fracturing (fracking).

The budget request also promotes energy efficiency to create jobs and to help Americans save money by saving energy. It supports home weatherization and calls for passage of the HOME STAR program to provide incentives to homeowners to make energy efficiency upgrades. It also invests in research and development to improve building efficiency and supports the President's "Better Buildings" Initiative to catalyze private sector investment in commercial building efficiency. Finally, the budget request sponsors R&D on industrial materials and processes to help U.S. manufacturers cut costs and improve their global competitiveness.

To maximize our energy technology efforts, the Department is breaking down silos and coordinating research and development across our program offices. Modeled after our SunShot initiative, we're bringing together our basic and applied research programs and ARPA-E to harmonize their work in areas including batteries, biofuels and electric grid technologies. And to encourage manufacturing and deployment of clean energy technologies, the President has called for renewing and extending proven tax incentives including the Production Tax Credit, the 1603 cash payment in lieu of tax credit program and the Advanced Energy Manufacturing Tax Credit, known as 48C.

As industry, Congress and the American people make critical energy decisions and require greater understanding of domestic and international energy markets, it's important that we adequately fund the Energy Information Administration, the nation's premier source of independent statistical information about energy production and use. That is why the budget request includes $116 million for EIA.

Unleashing U.S. Innovation to Create Jobs and Lead in the Global Economy

Competing in the new energy economy will require our country to harness all of our resources, including as the President said, the "one critical, renewable resource that the rest of the world can't match: American ingenuity." A key part of our country's success has been our leadership in science and technology, but we can't take that leadership for granted. According to the National Science Foundation's 2010 Science and Engineering Indicators report, from 1996 to 2007, the average annual growth of R&D expenditures in the United States was about five to six percent compared to more than 20 percent in China.

To help keep the United States at the forefront of science and technology, the budget request invests in cutting-edge research that could spur new jobs and industries. This includes $5 billion for the Office of Science to support basic research that could lead to new discoveries and help solve our energy challenges. These funds support progress in materials science, basic energy science, advanced computing and

more. They also provide America's researchers and industries with state-of-the-art tools to help take their work to the next level.

The budget request continues to support Energy Frontier Research Centers. The Energy Frontier Research Centers are working to solve specific scientific problems to unlock new clean energy development. So far, the EFRCs have published more than 1,000 peer-reviewed papers and filed more than 90 patent applications or patent/invention disclosures. Researchers are reporting multiple breakthroughs in areas ranging from advanced battery technology and solar energy to solid-state lighting and nuclear power.

The budget request also supports the five existing Energy Innovation Hubs and proposes a new Hub in electricity systems. Through the Hubs, we are bringing together our nation's top scientists and engineers to achieve game-changing energy goals. The Hubs continue to make progress. For example, the Modeling and Simulation for Nuclear Reactors Hub has released the first versions of its software that, upon completion, will simulate a virtual model of an operating physical reactor. The Fuels from Sunlight Hub has filed multiple invention disclosures and published scientific papers. And the Energy Efficient Building Systems Hub is developing advanced building modeling tools and has built one of the country's first 3-D building design labs.

Additionally, the budget request includes $350 million for the Advanced Research Projects Agency for Energy, known as ARPA-E, to support research projects that could fundamentally transform the way we use and produce energy. ARPA-E has invested in roughly 180 high-risk, high-reward research projects that, if successful, could create the foundation for entirely new industries. These companies and research teams are working toward a prototype of a battery that has double the energy density and one third the cost of batteries in 2010, bacteria that use carbon dioxide and electricity to make fuel for cars, grid scale electricity storage and other potentially game-changing breakthroughs. Eleven projects that received $40 million from ARPA-E over the last two years have done such promising work that they have now received more than $200 million in combined private sector funding.

Taken together, our research initiatives will help rev up America's great innovation machine to accelerate energy breakthroughs.

Nuclear Safety and Security

In addition to strengthening our economy, the budget request also strengthens our security by providing $11.5 billion for the Department's National Nuclear Security Administration. NNSA plays a key role in achieving President Obama's nuclear security objectives.

As the United States begins the nuclear arms reduction required by the New START treaty, the science, technology and engineering capabilities within the nuclear security enterprise will become even more important to sustaining the U.S. nuclear deterrent. The budget request includes $7.6 billion for Weapons Activities, a five percent increase over the FY 2012 enacted levels. This increase provides a strong basis for transitioning to a smaller yet still safe, secure and effective nuclear stockpile. It also strengthens the science, technology and engineering base of our enterprise.

The budget request also includes $1.1 billion for the Naval Reactors program to ensure the safe and reliable operation of reactors in nuclear-powered submarines and aircraft carriers and to fulfill the Navy's requirements for new nuclear propulsion plants that meet current and future national defense requirements.

Additionally, the budget request supports NNSA's critical work to prevent nuclear terrorism—one of the most immediate and extreme threats to global security and of one President Obama's top priorities. It includes $2.5 billion to implement key nuclear security, nonproliferation and arms control activities. It supports efforts to detect, secure and dispose of dangerous nuclear and radiological material around the world. And it will help the Department to fulfill its role in accomplishing the President's goal of securing all vulnerable nuclear materials worldwide in four years.

Finally, the budget request includes $5.7 billion for the Office of Environmental Management to continue progress cleaning up the nation's Cold War nuclear sites.

Fiscal Responsibility and Management Excellence

The Department of Energy's FY13 budget request makes strategic investments to promote our country's future prosperity and security. At the same time, we recognize the country's fiscal challenges and our responsibility to invest in much-needed programs while cutting back where we can. That is why the President's budget request eliminates $4 billion in inefficient and unnecessary fossil fuel subsidies.

Given the urgency of the challenges we face, the Department is committed to performing our work efficiently and effectively. We are streamlining our organization to improve performance and save taxpayer money. For example, the Department achieved approximately $330 million in strategic procurement savings in FY11. We are taking several other steps such as reducing the size of our vehicle fleet, cutting back travel costs and consolidating websites.

We are also breaking down barriers to make it easier for businesses to move technologies from our national labs to the marketplace, which can help the United States seize technological leadership and create jobs. For example, we've started a program which makes it easier, quicker and less costly for start-up companies to sign option agreements to license national lab technologies. And to make it easier to work with the labs, we've reduced the advanced payment requirement, and streamlined the Cooperative Research and Development Agreement contract and approval process.

Throughout American history, the federal government has played a critical role in supporting industries that are important to our prosperity and security, from aviation and agriculture to biotechnologies and computer technologies. We should continue to do so today to lead in the new clean energy economy. Countries in Europe, Asia and throughout the Western Hemisphere recognize the energy opportunity and are moving aggressively to lead. This is a race we can win, but we must act with fierce urgency.

Thank you, and now I am pleased to answer your questions.

The CHAIRMAN. Thank you very much, Mr. Secretary.

Let me start with 5 minutes of questions. I'm sure all the members will have questions.

I gather from the news that yesterday you were visiting the two new nuclear power plants that have been licensed in Georgia. My understanding is that the Loan Guarantee program was, to some extent, involved in the development of those 2 plants. I guess I would be interested in getting your perspective.

I know we've had lots of hearings in Congress on Solyndra and the lost taxpayer dollars there. Looking at the Loan Guarantee program overall, is it important for the country to maintain a Loan Guarantee program to assist with development and deployment of new technologies in the energy area? If so, how do you propose in this budget, how does the Administration propose that we move forward with that?

Secretary CHU. First, Senator, let me say that if you look at the Loan Guarantee program, the 1703, the 1705, the ATVM parts of the Loan Program, overall it helped unleash about $40 billion of investment in these industries, in projects like the 2 new nuclear reactors that are being built in Vogtle. It invested, it helped Ford do a major retooling to build cars that it displayed at the Detroit auto show several months ago, really revolutionized wonderful cars that could be sold worldwide. There are many, many aspects of this Loan Program which have really helped bring back a lot of what we're famous for a century. It's helped stimulate deployment of many renewable energies. So the list goes on.

Now the 1703 loan program is continuing. The ATVM program is continuing. We still think those are worthy projects.

Going forward there—we do see a need as part of an overall plan to finance projects. Projects, for example, where you have a solid technology like onshore wind technology, is a very solid, known technology. A way of financing it so that one can deploy these with power purchase agreements, low risk. There are other—so that's one part.

There are other parts, I think, that really could help drive it forward. Bloomberg New Energy Finance just completed its study

about a month ago to summarize what happened in 2011 and projections for 2012. They said if—and they looked at all forms of energy, new, gas, turbines, coal, wind, solar, all the way down the line. They said if you have 10 percent finance, borrowing charges, for all these forms of energy wind today and this is wind at a site. It's a 4 sight, not a 6th site.

So a moderate site is within 10 or 15 percent of the cost of the lowest form of energy today which is new gas. We expect that to improve still further. So we also expect solar to be coming down. So this is all good news. But you need a financing mechanism even at 6, 8, 10 percent that would really tip the balance.

The CHAIRMAN. Do you know? Let me ask on a somewhat different issue. We had a very good hearing where the Quadrennial Technology Review was presented to us. This was the first of these Quadrennial Technology Reviews.

To what extent were the conclusions in that Quadrennial Technology Review used to influence what you've presented to us in this budget? Does this budget reflect the same priorities that the Quadrennial Technology Review identified?

Secretary CHU. To a large extent, yes. I think with the Quadrennial Technology Review, the first one in the history of the Department of Energy, we wanted to step back. Said—say a slightly different question, what are the things we should be funding?

But what are the things we should fund where the taxpayer dollars will do the most good? If we find that there are certain areas that the private sector is well invested in we have to say well, we really shouldn't be funding that. They've taken the ball. They're running with it. This is good.

We did this with research in shale gas. The 1978–92 industry didn't want to touch it. They didn't think it was feasible, horizontal drilling or fracturing rock. Then Schlumberger got into it. We got out of it. Industry picked it up.

So that's the attitude we have in doing this that where could we put our dollars that would actually stimulate the research and the development to a point where the private sector starts to run with it and grow American industries. So that Quadrennial Energy Review, the Technology Review, was very useful in helping us find out by pulling back and looking across all of our funding arms, Energy, Office of Science and now ARPA-E. Are we putting the dollars where we think they can do the most good?

So that is beginning to shape. We hope as it goes on further that it, just like the Quadrennial Reviews of the Pentagon and State, actually start to set in long term plans that can help our country. Energy investments are 60, 70 year investments. They can't be decided year to year to year. When you build, you build a new gas plant, a transmission line, you name it. These are long term investments.

The CHAIRMAN. Thank you very much.

Senator Murkowski.

Senator MURKOWSKI. Thank you, Mr. Chairman.

Secretary, the Chairman has asked you some questions about the Loan Guarantee Program. I appreciate the fact that we will be having a hearing when we return from the recess. I am one, who believes that there is a useful role to be played in the financing and

the deployment of our advanced energy technologies and that the Loan Guarantee Program can be helpful. But we need to make sure that we get it right.

So the question that I would ask you this morning, we can certainly work around your schedules, but will you make yourself available to come testify at the hearing when we are able to schedule one?

Secretary CHU. There are several hearings. There's going to be one in the House, I guess one in the Senate. I think if this committee wishes me to appear I will appear.

Senator MURKOWSKI. I would think it would be helpful. I would certainly welcome you there.

Let me ask you about hydro power. I mentioned that in my opening statement. This is one of those areas when we're talking about renewable resources. I certainly classify hydro power as a renewable resource and want to work to make sure that that is clear in our policies here.

But funding for hydro power is down 66 percent. At the same time all the other renewable accounts are slated for an increase. Both you and the President have made statements supporting the growth of hydro power here in this country. But it really appears, to me, that we're leaving hydro power behind in this budget.

Can you address that?

Secretary CHU. I would divide hydropower into—first we have to make really tough decisions. The thinking behind hydropower is the following.

First, we don't anticipate any new large dams being built. But there is potential for hydropower in the United States of 2 forms.

One is what I would call run of the river generation, which we think is environmentally compatible.

Also, turbines on existing dams built for flood control where we don't have turbines where it's economically feasible. We think that's also a potential.

But those are areas which are very mature technologies. So, again, based on the philosophy should we invest in, you know, like we've diverted wind research from onshore wind to offshore which is not as a mature technology. So that's one class.

The other class of hydropower is essentially what I would call kinetic devices, hydropower that tries to extract energy from wave motion, tidal motion, things of that nature. We have this program that we invested in. We will continue investing in it. But we feel in these severe marine environments while we will continue in investing in it, we don't see in the near term, in the next 5 or 10 years, these things taking off. We hope they do.

If it really looks like some of this hydropower attempts do look more promising we will respond. But that's the thinking we were going through.

Senator MURKOWSKI. I think the concern is that the funding is pretty anemic in not only the conventional but in the marine and hydro kinetic technologies as well. This is something, I know that Senator Wyden and I have had an opportunity to be in discussion about some of that.

Let me ask you in my remaining time about a budget increase, a $2 million increase, in natural gas technologies R and D. It's my

understanding that this effort would fund an initiative with EPA and USGS to look at the impacts of fracking. We had the Advisory Committee, the President's Advisory Committee, came, reported to us, had, you know, a pretty comprehensive, I felt, report. They presented 20 specific recommendations for how any impacts can be mitigated.

So I guess the question to you is what was the flaw in that Advisory Committee's report and recommendations that you felt were insignificant and now warrant a second investigation that we need to increase the funding. It's my understanding that the Advisory Board's recommendations are already finalized. Most of their proposed directives actually fall on the States, not necessarily on the Federal side.

So why are we doing a second run on this? It raises some concern by some that there's an effort to try to find a smoking gun about some bad news about fracking out there and that's why we're going do a second investigation. So I'm curious as to why this funding increase in this area.

Secretary CHU. Senator, it's actually the exact opposite. I think the committee you're referring to is the subcommittee of the Secretary of Energy Advisory Board?

Senator MURKOWSKI. Right. Right.

Secretary CHU. Led by John Deutch.

It's our view in the Department of Energy, first, I think that was an excellent report.

Second, it's our view in the Department of Energy that if you look at the assets of the U.S. Government particularly thinking of USGS and the Department of Energy, and the intent is can we help drive the technology development forward to help with the environmentally responsible fracking so that the risks decrease. You can still continue to mitigate any potential risks to water tables, environmental impacts. So the tenor of that report and the attitude we have in the Department of Energy is exactly that. That in helping—with the technology there are rapid advances in seismic technologies that tell companies exactly what is happening in fracking.

There's a lot of recommendations. We can have a coordinating role to help as information clearing houses so that industries can share best practices with each other. So the intent is—of that fund was not another study to look around. The intent is as we helped BP stop an oil leak in the Gulf of Mexico, we—the intent is actually to work with industry to help improve practices when and if possible so that we can actually extract this resource in an environmentally responsible way.

Senator MURKOWSKI. I'll follow up with you. My time is expired. My concern is is it does appear that we're directing an additional $2 million for yet a follow on study to one that you have agreed and I would agree was a pretty good study.

Thank you, Mr. Chairman.

The CHAIRMAN. Thank you.

Senator Wyden.

Senator WYDEN. Thank you, Mr. Chairman. Welcome Dr. Chu.

I wanted to ask you first about natural gas pricing, particularly with respect to American business and American consumers. Now I've been a supporter of natural gas. It's a cleaner fossil fuel, of

course and potentially a huge boon for American business, steel, plastic, chemicals and of course, our consumers.

I do believe that there are substantial questions that have to be addressed before our country starts allowing significant natural gas exports. You made some statements a few days ago that are troubling me. I want to, kind of, walk you through it.

As you know under the Natural Gas Act your Department has an obligation to evaluate whether natural gas exports are in the public interest. So you are, in effect, the regulator. The comments that you made the other day suggest to me that you've sort of made up your mind.

You were quoted here as saying, I'll just quote you here. "Exporting natural gas means wealth comes into the United States." Now that's not what we've heard from our businesses like steel and chemical and plastics. They had representatives sitting where you did the other day.

A very troubling study just came out from the Energy Information Administration, a part of your Department, indicating that natural gas exports could increase prices by more than 50 percent and cost American industry and our natural gas customers as much as $43 billion. Now I'm looking at the chart that estimates, for example, what we'd be dealing with in terms of the applications on offer now. It's about 13 billion cubic feet of gas exported per day. That's what we're talking about now.

So the applications exceed the amount that EIA made that study based on. They looked at about 12 billion cubic feet per day. So I want to get your sense of how you're going to objectively look at this question.

I'd like you to disabuse me of the theory that you've already made up your mind because when I looked at that quote coming from the recent meeting, I said, shoot, looks like Dr. Chu has already made up his mind. To me, for example, 13 billion cubic feet of gas exported per day when 12 billion could raise prices 54 percent. That would be a huge shock to the American economy.

So tell me how you're going to approach this issue. Particularly give us a sense of how you're going to approach it objectively and look at both sides.

Secretary CHU. Sure. So I think the full quote, I'm going to paraphrase myself as I've said this a couple of times. The full quote is that certainly we don't want to see natural gas prices rise dramatically as we have seen in the price because that has an appalling effect. It creates great difficulties for businesses, for people who heat their homes with natural gas.

So, and I said that a major focus on everybody's mind is if we start to export natural gas, liquefied natural gas, if not done right that could have that effect, I said. But there's another side because whatever we decide it has to be in the best public interest. There's a flip side to this that we also have to consider that it does create American jobs. If the prices are kept moderate then it does bring money into the United States. It helps our balance of trade. It creates jobs.

Right now the natural gas prices, I don't know what they are today, but over the last week or so they were $2 dollars, $2.50 a million cubic feet, phenomenally low. It is usually, you know, EIA

is saying something on the order of $4 to $6 in the coming decade or 2. We're hearing reports of gas extraction companies now pulling their rigs out, moving them, because the prices are too low.

So what we need to do and we're not—so first, let me assure you, my mind isn't made up. If you read the full quote——

Senator WYDEN. I did, Mr. Secretary. There doesn't appear to be anything in the article——

Secretary CHU. OK.

Senator WYDEN. With respect to what you said like the public interest test. It makes it out that exporting natural gas is an unmitigated plus. It says and I quote "Supporting natural gas means wealth comes into the United States." That's your quote on the subject.

Secretary CHU. OK. Then the article you're reading from certainly doesn't capture the full——

Senator WYDEN. Fair enough. Fair enough.

Secretary CHU. OK. So, I think. So certainly our minds are not made up.

Senator WYDEN. Good.

Secretary CHU. We're not going to be making up our minds because before we do anything to any—first let me first, very quickly say that there are two classes of countries. Countries we have free trade agreements with, and countries we don't. The countries we have free trade agreements with, we're obligated by law to say yes.

But for the countries we don't have fair trade agreements with , we have to ask what's in the best interest of the United States. Before we do anything and I talked to people who are concerned about high gas prices. I also talked to the gas industry. I talked to many people and said we are not going to do anything until we make a determination on what the impacts would be.

As we permit, we permitted one liquefied natural gas terminal. We determined that that would have a de minimis impact. Before we——

Senator WYDEN. Ten percent.

Secretary CHU. We—my—we can get back to you on the details. But I was told by the EIA that that would have a very, very small impact on the price of natural gas in the United States.

Senator WYDEN. Thank you, Mr. Chairman.

The CHAIRMAN. Thank you.

Senator Barrasso.

Senator BARRASSO. Thank you very much, Mr. Chairman. Mr. Secretary, thank you for being here.

We sat close to each other at the State of the Union. During that address I was happy to hear the President say quote, "This country needs an all out, all of the above energy strategy that develops every available source of American energy." I'm encouraged to hear you echo those comments today in your testimony.

Unfortunately the President's rhetoric rarely matches the reality. Monday, Congress learned the lesson once again, of course, with the President's fiscal year 2013 budget. Specifically to the tens of billions of dollars in new taxes and fees on American energy, oil and natural gas, you know, it's hard to understand how the President can impose tens of billions of dollars in new taxes on Amer-

ican energy and still pursue the quote, "all out, all of the above strategy," that develops every available source of American energy.

I know the American people realize that doesn't make sense. You know, we all support renewable energy. What I see though is that this President, this Administration ignoring the everyday concerns of American families.

Today the average price of regular, unleaded gasoline is over $3.50 a gallon. USA Today, the morning after the Super Bowl, chaotic spring predicted for gas, average prices likely to hit over $4 a gallon. This morning's Wall Street Journal, front page, oil rise imperils budding recovery. It goes on to say that the average price of a gallon of regular gasoline has jumped 13 cents to $3.51 a gallon in the past month, so up 13 cents in the last month.

Some parts of the country have seen even bigger increases, prices approaching $4 a gallon in parts of California. Then the impact on the families. Higher prices at the pump force consumers to cut back spending on discretionary items like restaurant meals, haircuts, family vacations, hurting those industries. A prolonged increase can drive up inflation and drive down hiring.

We're trying to get people back to work in this country. It just seems if we're going to try to get the economy going again we need affordable transportation fuel. We do know that the President, when he was running for office, said under his energy—under his policies specifically electricity costs, he said quote, "would necessarily skyrocket." People have seen that. So that's why I'm hoping that the Congress has a chance to vote on and then reject the President's budget.

So I come with a number of questions. One is in terms of how the policies of this Administration have played out. So I'd like to ask you about Solyndra.

President Obama promised his Administration, as he said, would be the most transparent Administration in history. The American people still haven't received all the answers on how their taxpayer dollars were wasted on projects like Solyndra. So I know that tomorrow my colleagues in the House are going to consider whether to subpoena 5 Administration officials. It's my understanding that these House colleagues will cancel that meeting and that vote if the White House just makes these officials available to speak with the investigators.

Have you asked the White House to make the officials available?

Secretary CHU. No, I haven't. I wasn't asked to ask them.

Senator BARRASSO. Will you ask the White House to make these officials available because I'm asking you now.

Secretary CHU. I think the White House can make that decision. They're very capable of that.

Senator BARRASSO. Yes. The American people still have lots of unanswered questions. So you're not asking the White House and have not asked the White House to make those officials available, just so I'm clear?

Secretary CHU. I work for the White House. So, it will be their decision.

Senator BARRASSO. Now I want to move to Keystone XL pipeline. A number of us today met with Daniel Yergin, who as you know wrote The Prize and The Quest, a national expert on energy. He

talked about I think, roughly 170,000 miles of pipeline moving liquid in the United States, petroleum products. Keystone is about 1 percent of that, about 1,700 miles.

It's my understanding the Keystone XL pipeline would ship up to 100,000 barrels per day of oil produced in North Dakota and in Montana. We heard earlier this morning about made in America energy. Is it fair to say that the Keystone XL pipeline would facilitate oil production in the United States?

Secretary CHU. There's, first let me back up and say if you look at the oil pipelines in the United States the U.S. Government makes a decision on not only those parts of the pipelines. The State Department makes its decision that goes across borders. Within the United States there—a lot of companies have the latitude, the pipelines that are taking the oil from Wyoming, North Dakota down south to refineries are up and running.

The biggest bottleneck in the United States apparently right now is from Cushing to the Gulf States. The market is responding. New pipelines are being built. Pipelines are being reversed so that oil from Wyoming and North Dakota, another pipeline from Chicago to Cushing back down to the Gulf States where the major refineries are.

So those all are going forward. It's my understanding that the State Department has asked to look at other alternatives for environmental impacts on the part of the pipelines that cross the border.

Senator BARRASSO. It seems to me it is fair to say that the Keystone XL pipeline would facilitate oil production in the United States. Then my question to you is should the Keystone XL pipeline be part of an all out, all of the above strategy that develops every available source of American energy which is what the President has actually called for?

Secretary CHU. There are pipelines being built and upgraded as I said, from Wyoming and from North Dakota. Again, I was trying to point out where some of the bottlenecks are and how the pipeline works. We're all for this. This is why the oil production in the United States is at an all time high compared to the last 8 years.

We think, we're projecting, first that the oil production has gone up about a half a million barrels a day in the United States over the last several years. We think again because of the technology DOE invested in decades ago, that shale oil production may lead to another million barrels a day increase. You know, we're in the top 3 oil producers in the world. We could be either 1 or 2.

This is good news for the United States. All that is within the continental United States. So those pipelines being built there are, you know, these investments are going forward.

Senator BARRASSO. Thank you, Mr. Secretary.

Thank you, Mr. Chairman.

The CHAIRMAN. Senator Franken.

Senator FRANKEN. Thank you, Mr. Chairman.

The ranking member referred to the first ever downgrade of our treasuries. I would remind the ranking member that the expressed reason given by S&P was the dysfunction of some in Congress who seemed willing to threaten to go into default.

I think that we need to invest in energy. I think we need to invest in energy of the future. I think that all of the above doesn't mean all of all of the above.

As the BP spill in the Gulf showed us that not exercising judgment, some judgment about environmental and safety impacts, can undermine the economic well being and the very goal of energy independence. I think what your budget shows to me is a sensible investment in innovation in energies of the future including energy efficiency which brings me to the 1703 Loan Guarantee Program.

I see that you didn't really ask for additional appropriations for that just that program is for energy efficiency projects and innovation in energy efficiency.

I see you just asked for $38 million to cover Administration costs. It seems the justification for this is that you have funds left over in this program that you haven't yet distributed. In fact it seems that there are funds left over in this program because there are approved projects that still haven't yet received loan guarantees that have been promised.

One such project is from a company in Minnesota called SAGE Electrochromics. I know you're aware of that. SAGE has developed energy efficient windows that are cutting edge, better than anything in the world and uses photovoltaic cells to control the window. How dark it gets during the winter—during the summer to block out UV light and to lower air conditioning costs and to let it all in and lower heating costs in the summer. It's really—I've been there and it's just an amazing technology.

In the spring of 2010 the Department of Energy promised the company it would receive a $72 million loan guarantee under the 1703 program to build a new manufacturing facility that would create 160 manufacturing jobs and 200 construction jobs in Southern Minnesota. It's now been 2 years since SAGE has been notified that it will receive a loan guarantee. The deal has not yet been closed.

While the Department of Energy prolongs closing the deal, time and money are running out for SAGE. There are high tech manufacturing construction jobs at stake here. It's been going forward with the project assuming they get this loan guarantee, but they're running out of time and they may to sell themselves to a French company.

My first question is the SAGE loan guarantee was going to be submitted to the Credit Committee on August 23rd, but it was stopped. Why is the Department of Energy continuing to delay closing and executing the SAGE loan guarantee?

Secretary CHU. Senator, as you know first, yes, I'm very aware of that company. Actually the technology was developed by the laboratory I used to be the director of. So I know about it. It is very good technology.

But Senator you will also know that I can't really speak of the particulars of a loan. This is confidential information. We'd be willing to work with SAGE and get them to talk to you on what they would be willing to divulge and—but it has to go through them. We can't really talk about the details of why.

Senator FRANKEN. OK. I have been through them. I've been going back and forth, as you know, with DOE and the White House on this.

The Treasury Department view on the Loan Guarantee portfolio conducted by Herb Allison concluded recently that the program is on sound footing and that the 1703 and the 1705 programs will cost the payers $2 billion less than initially expected. If that's the case why isn't the DOE moving full force ahead issuing new loan guarantees with and SAGE, I believe, is first in line for that under 1703.

Secretary CHU. Yes. The bulk of the 1703 loans are applicants. We would expect to have been people like Vogtle, like the Vogtle project, nuclear power plants, also carbon capture, sequestration projects. There is some concern there because—and we're working with the companies. But we have low gas prices and so that affects business decisions.

So we're working. You got it right. We actually didn't request more funds except for the management of the program because we do have funds available. Now in terms of carbon capture, and sequestration, what we are finding is that there are companies who are willing to invest because these require a lot of matching funds from companies.

They're willing to invest in that part if there would be a utilization aspect to the carbon capture where the Department of Energy would pay for the measurement, the monitoring, the verification of where the carbon dioxide is going. We could help. All those things are necessary in a capture and sequestration project.

We could help with the capture technologies that would be needed to capture carbon because by mid century, we're going to have to be capturing carbon from a lot of sources, all the large point sources. But the utilization part, in particular enhanced oil recovery, is enough of a stimulus for those companies to say, alright, we'd be gloom to look at those projects. So we're again working with companies to look at that.

It still carries the agenda forward on what we believe is necessary, to develop the technologies of carbon capture, storage in geological sites that both would give the public comfort and help us determine, you know, understand the flow of carbon dioxide in geological strata.

Senator FRANKEN. OK. My time is up. But I'm not sure how I would really want to talk about DOE moving full force on 1703 in regard to this one technology which is about energy efficiency for buildings which buildings consume almost 40 percent of all our energy in the country. I think that it's absolutely essential that we pursue energy efficiency in our buildings and that this technology does just that.

So thank you, Mr. Secretary.

The CHAIRMAN. Senator Coats.

Senator COATS. Thank you, Mr. Chairman.

Mr. Chairman, I'd note that this will be the last budget hearing of the Energy Committee that you'll chair. You've spent a lot of years, investing a lot of time in this subject. I think we're all appreciative of your service. I know we'll have several hearings and this is not a good bye.

The CHAIRMAN. You're going to have lots of chance to see me around here for many months, but thank you.

Senator COATS. That's good. We'll take the opportunity to thank you for your years of service. I just wanted to mention that.

Secretary, last year at a similar hearing I mentioned to you that it was unlikely that we were going to be able to reach the targets of the President's budget. As a matter—and suggested that you needed to go to a—was there a plan B in place or some thought of if we don't reach this how are we going to triage or how are we going to make decisions about where the money ought to be spent? It turned out that that was true. The vote against the President's budget was unanimous, 97 to nothing for 2012 fiscal year.

This new budget has been offered. It's unlikely that we'll even debate or vote. The Majority Leader has said he's not going to bring it for a vote. But if it does I think it will probably have the same fate.

So my question to you is are you looking at a plan B for FY'13 fiscal year? If not, why not? If you are could you share that with us either today or in subsequent hearings or work with us to try to address the fact that the country just simply can't afford to do everything that we would like to do?

Secretary CHU. As what happened last year, I think you, I hope that you felt that there was willingness to work with Congress. Ultimately it's Congress, appropriations that determine what we do and what we get and with the consent of the President. So I think that we will, you know, as the budget process unfolds, we certainly are willing to work with all the Members of Congress and the House and the Senate.

Senator COATS. Thank you. I think we're going to need to do that. This plan is a billion more than last year, this budget. I just don't see the possibility given our current fiscal situation of being able to fund everything that you've requested. So I look forward to doing that.

Let me just turn to the issue of loans and guarantees and subsidies and so forth and so on. I want to try to take it out of the political. Whether it's Republican Administration or a Democratic Administration there have been a number of embarrassing moments where winners and losers have been selected on the basis of not doing basic research which I think is a function of government, but in transferring that research to a specific industry, specific company.

It's embarrassing to you. It's embarrassing to the President. It's embarrassing to Congress. It's embarrassing to the way in which money is allocated.

Talk a little bit about how we can avoid—and the problem is that the political gets involved. Then there are headlines. There's allegations of crony capitalism and favoring one company over another for political reasons accompanied with well, maybe this is the future and we ought to invest this money.

I know your Department has taken some second looks at some of the proposed loan guarantees. One of those was as a result of a letter Senator Toomey and I sent to you. I thank you for doing that second look, that due diligence which resulted in a different

decision, saving potentially, the taxpayer well over a half a billion dollars. So I thank you for that.

Can you talk a little bit about what I'm suggesting here? That is 2 things.

One, the due diligence needed to take second looks at what programs are currently being evaluated.

Second, the whole concept of, you know, should the government be involved in the, I think it was Larry Summers who said, you know, pardon the language here. You know, Government picking winners and losers is a crappy way to invest money. I think we've had some examples of that.

So could you address the role of government being involved in basic research as opposed to selecting specific companies to develop a particular product when we continue to run into, as I said, whether it's Republican or Democratic Administration, continue to run into embarrassing situations on the taxpayer's dime.

Secretary CHU. First Senator let me say that I'm very glad to hear you are very supportive of research and development. That is a proper role for the government because in many instances not all of the investments in research and development are captured by the company that makes that investment. Because of that not only this country, but countries all over the world feel that it is a government responsibility to help with the competitiveness of the businesses in their home countries to continue research and development.

As you go more toward piloting and especially toward deployment that becomes increasingly a larger responsibility of the private sector to decide what they want to invest in. But having said that, there have been policies in the United States that go back a century or more that do help beginning industries start off. This has been part of the tradition.

If you think about going back again, about 100 years and the beginning oil industry in the United States. There were incentives to help early investments and develop this. These are continuing, but certainly those incentives were there to spur new technologies.

There were incentives in the airplane industry. There were lots of things in, you know, how to help the semiconductor issue. But in the last analysis I think the most effective programs are ones which can guide and stimulate private investment.

You know, Senators Bingaman and Murkowski are, I think, supportive of sort of a CEDA-like program, a loan program, but in addition to that there are other things that we can do which can actually, again, just help guide those investment choices. Mostly what we want to do, in my opinion, what we'd like to do is guide the investment choices that could really stimulate high technology manufacturing in the United States. There's no reason why we cannot be competitive with any country in the world.

Germany remains competitive in high technology manufacturing. I believe they have higher labor costs than we do. So we're at least as innovative and inventive as any country in the world. I would say more so.

Senator COATS. My only response would be I think the market makes a better decisionmaking process than the government based

on the record. If it's not the taxpayer's money at stake it's the stockholder's money that's at stake.

Secretary CHU. Right.

Senator COATS. With the winners and the losers and I just personally think that's the way it ought to be.

Second the historical comparison made might not work now because we weren't drowning in debt when those loans were made. Today we're drowning in debt. We just can't keep going and having headlines that have half a billion or a billion dollars are lost again to the taxpayer.

My time is more than expired, Mr. Chairman, thank you.

The CHAIRMAN. Senator Stabenow.

Senator STABENOW. Thank you, Mr. Chairman.

First, welcome Secretary Chu. Let me just indicate first, that I appreciate the efforts in working with us on a clean energy manufacturing strategy. It's clearly leading the recovery for the country.

Our efforts, the Chairman and I, championing the Advanced Manufacturing tax credit, 48C and the loan program that you mentioned, where Ford is actually now bringing jobs back from Mexico because of their efforts around advanced batteries and retooling. We're seeing jobs coming back from a number of countries because we're focused there. So I would encourage you to continue that and I would use the tools available.

I want to talk specifically today though about a very, very important project, I believe, for the country and certainly for Michigan. That's the facility for rare isotope beams project that Michigan State won in a very rigorous competition, as you know, a number of years ago. They're at a critical point. We're coming into the fifth year of funding on this national project.

It's a core piece of our research for the United States research infrastructure with broad benefits to science, homeland security, medicine, industry and not only will the project develop the next generation of Nuclear Physics work for us, as you know. But it will create thousands of jobs and really address our U.S. competitiveness and energy securities. So we have to move forward. If we don't, other Nations will. They will be the ones attracting the best and the brightest scientists and researchers, not the United States.

So as you know I've talked to you numerous times about this, as have my colleagues in Michigan. You've heard from the scientific community. I'd like to hear from you today, what is the Department of Energy's level of commitment to this project?

Secretary CHU. Senator, yes, you have certainly have talked with me many times and feel the same, I think, as the entire Michigan delegation feels. We agree with that FRIB is a worthy scientific project. What we're trying to do is to try to figure out within the constraints of the Nuclear Physics budget in the Office of Science how to best appropriate all the precious dollars.

So the question is precisely that. Ultimately it's going to be the Nuclear Physics community that will be deciding what to do. Iit's not a targeted effort, it's the entire Nuclear Physics program.

We think Nuclear Physics, and High Energy Physics are important parts of the Department of Energy portfolio. But the budget has said that we have constraints. We also need to use our budget in the Office of Science to help other mission oriented research that

could lead to energy solutions and could lead to more a competitive America in the near term.

So we recognize the value of the Michigan State project. We have asked for a budget that's at the same level as was appropriated last year. We will continue this, but in the end we need, you know, the Nuclear Physics community writ large to comment in all the projects, not only on projects, but the program in general.

Senator STABENOW. Mr. Secretary, let me ask you though to clarify this because the President has indicated support for this in his budget. It's not at the level that will allow them to proceed as they have been planning.

Secretary CHU. Right.

Senator STABENOW. To be able to break ground this year which is critically important. Again this is going into fifth year of commitment in the United States on this particular project. They've been through numerous reviews and competitive reviews and in fact to come out with stellar recommendations in the past.

So I'm very concerned that about what you're now calling another review process and whether this is just an effort to slow down or stop progress on this incredibly important project. So can you describe the review process and how does this fit with the fact that there is, in fact, a commitment in the President's budget to continue this?

Secretary CHU. The fact that there is a commitment in the project means precisely what you just said. We're not prepared to abandon this project. The review project is not—the review will not be a review of just this. I want to make that clear.

We have 3 large projects but we have a large Nuclear Physics program as well. Within the constraints of our budget we need the Nuclear Physics community to tell us what they value the most. This panel review is not going to affect what happens in FY'13.

Senator STABENOW. So it's not affecting what happening in FY'13. So that means the project and the funding moves forward for this year?

Secretary CHU. We have an amount in FY'12 and what we requested depends, of course, on what Congress says. But we've requested the same amount for FY'13 that was appropriated.

Senator STABENOW. Alright.

Secretary CHU. We got an amount——

Senator STABENOW. Just—so for the record and as a member of the Budget Committee and moving forward with Appropriations Committee, it's my intent to make sure that we do everything possible to make sure they have the full commitment to be able to move forward with this project. I hope that the Department is going to keep its commitment going into the fifth year of a very important, not only science project, but economic development project that's going to create over a billion dollars in economic activity. It makes no sense to me why, as we go into the fifth year, that we're having this conversation when those conversations were conducted at the very beginning of all of this and priorities were set, decisions were made, dollars were spent.

Now we go into the fifth year. It's in the budget. It seems to me we ought to be talking about what we need to have to break ground and to be able to move forward with this rather than another eval-

uation. I'm all for evaluations. But this project has been evaluated and evaluated and in fact has come out with stellar reviews at every step of the way.

I would hope that the Department will keep its commitment.

Thank you, Mr. Chairman.

The CHAIRMAN. Senator Paul.

Senator PAUL. Secretary Chu, thank you for coming today.

As you know we're in the midst of a great recession with 12 million people out of work. I'm very concerned about 1,200 jobs in particular though that are in Paducah, Kentucky. They work for a nuclear enrichment plant there. It's been in operation for many years.

Over 50 years we have accumulated 40,000 cylinders of uranium. Uranium waste, it's sitting on the ground. Something has to be done with it. These are 14 ton canisters of uranium.

We'd just like to enrich them. If we were able to enrich them you could save these 1,200 jobs. These 1,200 jobs in all likelihood will be lost this year if the company goes under which it's predicted to go under within 6 to 12 months if we are not allowed to enrich this uranium.

It's my understanding that it is under your discretion to decide to enrich this uranium. I'd like to ask you today here in public whether you'll help us with these 1,200 jobs and whether or not the Department of Energy will allow us to enrich this uranium.

Secretary CHU. It's—Senator, I see it's not a matter of first, this company, USEC, which is running the Paducah plant. For them they say it's going to be a business decision that we're talking about some depleted uranium and whether they're going to use the enrichment facility to generate the uranium. What they are asking for is government assistance to say we have some depleted uranium. We can give it to them and have them enrich it.

It's certainly true we're very concerned about those jobs. But we're also concerned of a number of other things. Because in order to provide the funds to allow this to go forward we would, for example, be using we would have to be essentially be putting some of our uranium that we have on the open market.

We have to do this very carefully because we have a commitment that any use of our uranium, U.S. owned uranium, onto the open market might have an effect on the uranium markets that would affect the miners.

Senator PAUL. But if we allow this to happen it really doesn't cost the taxpayer anything because the payment for enriching it comes out of the proceeds of the sales of the uranium.

Secretary CHU. It does, but you have to take that a little bit further because the market for uranium has changed after Fukushima as you all know. The Japanese have had their reactors down for a number of months. It's going to be, as they bring them up, it's going to be quite slow.

The Germans have decided they're going to bring down the reactors more quickly than they had thought possibly.

So the market for uranium and for reactors has changed over the last couple of years.

Senator PAUL. But if you're concerned about how much you sell could you not increase your stockpile. As you increase your stockpile then sell it over time?

Secretary CHU. But the way we see it this is a very complex process. The way we see it we're going to be giving or we'll be using taxpayer money to pay for the use and services. That will keep the Paducah plant running.

Let's just suppose there's a grow in the market of uranium. You've got to separate uranium. The value is not as high, and then in the end the taxpayer has to foot that bill.

So the analysis, for example, the CBO's Office says this is not a money maker, in fact it could be a big liability for taxpayers.

So we have to work through all those things.

Senator PAUL. But the GAO says that the uranium there has a value of $4 billion and that would be returned to the taxpayer if we were to enrich it. It's also—you've got a lot of problems here. I mean we've got 50 years of waste and we're providing you with an alternative that brings money back to the Treasury and helps you get rid of a waste problem.

We have, I think, 700,000 tons of uranium that's just a waste product now sitting on the ground. I mean, many in the Administration say you all are a green Administration. You're for recycling. We're giving you a chance here to save jobs, not on some kind of loan program. Save jobs, existing jobs and recycle something and cut the amount of uranium waste in half.

I mean, these are all problems we face if we do nothing. I believe you have the power to save these jobs. This is on you.

I mean, basically these 1,200 jobs are yours to save if you choose to save them, but if you don't it's going to cost the taxpayer. It's $100 million a year to put things into cold storage there. It's also $100 million a year because someone has to guard that uranium. Then the surveillance costs all come out of the company now.

So I think this is a win/win situation for the taxpayer. As you know I'm not a big fan of expending new taxpayer dollars. But the taxpayer dollars here come out of the sales of the uranium.

If we were to temporarily raise the limit which I think you're allowed to do also under law. That's under your discretion, that we're talking about 1 percent of the world market. I don't think we're talking about affecting the price in a significant degree if we were allowed to do that.

Secretary CHU. Just very quickly in closing:

First, the GAO report came out several years ago before Fukushima. So there was a sea change, quite candidly, in prospects for the demand of uranium. Because of Fukushima, because of the German decision, because of the slower startup of the Japanese, who are still trying to figure out to what extent they're going to be starting all their reactors.

So I would be a little surprised, very surprised, if their analysis of 3 years ago would be the same as it is now.

Senator PAUL. But there's a brand new one, June 13, 2011, nuclear material. DOE's depleted uranium tales could be a source of revenue for the government. That's one still talking $4 billion worth of——

Secretary CHU. I'd be happy to spend some time. Be happy to meet with you as I indicated in a letter about that.

Senator PAUL. I just want it to be said for the record that these 1,200 jobs are 1,200 jobs that you could save with a stroke of the

pen if you choose to do so. This isn't $500 million or, you know, billions of dollars being sent, spent on something where we might get jobs and we have it. We have lost it.

These are 1,200 existing jobs in a long standing nuclear trade. There are defense considerations for why we have to enrich uranium. Uranium is not a purely open market. We don't sell it to just anybody. There are strict controls on this market.

So I think it is something where the government could do something that costs no money. I just hope you will help us there. I mean the 1,200 families in Paducah are sitting there and they're listening to you today. They know you have it in your power to save their jobs.

I just hope you'll consider this. It doesn't cost the taxpayer anything ultimately because the proceeds will come out of the sales of the uranium.

Secretary CHU. If the sales keep at a certain price. Again, Senator, I'd love to talk to you at length about this. We've thought deeply. But we also see a potential hundreds of millions of dollars liability in the future and that we have to work through that as well.

The CHAIRMAN. Senator Cantwell.

Senator CANTWELL. Thank you, Mr. Chairman.

Secretary Chu, good to see you here this morning. Thank you for visiting the Hanford site and the Vit plant specifically. Obviously you know that it is one of the most complex and largest contaminated sites in the world. Our concerns about making sure we continue to get clean up done in a timely fashion is of critical importance, not just to the State of Washington, but to the Nation.

Are you confident that with this level of funding, we will have the Waste Treatment Plant open and operational in 2019?

Secretary CHU. Senator, again, within the budget constraints we're essentially working hard to keep the Environmental Management budget essentially for that. It went down a fraction of a percent at 0.7 percent, but essentially flat. We are trying very hard to make some tough decisions there. There's the protection of the Columbia River, the waste plant, the tanks and WTP.

So we first feel that we're going to meet all our legal obligations for FY'13 with this budget. But as you know, I spoke to you about this, that there was an ideal funding profile for the completion of the WTP plant, the vitrification plant would call for more aggressive spending this year, next year and the following years so that you just like in a commercial building when you build a building you don't mess around. If you've got it engineered you build it. You build it very quickly.

That funding profile is not in the cards anymore because of our budgets. So because of that we know that there's a risk that could slip schedule. But on the flip side we are also have to prioritize and we have to make sure that the waste tank farms are cared for as well.

So it's a tough decision. As you well know we take these responsibilities very seriously.

Senator CANTWELL. So 2019—that's your committment?

Secretary CHU. We can't say right now. But we're working through some of the issues. We have a pilot program for testing,

for example, the so called pulse jet mixing and things of that nature that perhaps 2 or 3 years ago we felt that—we've determined with the defense of the Board and others it would be prudent to go through a more comprehensive testing.

So we acknowledge that. So these are some of the issues on this very, very complex project. This is, in my mind, the most complex nuclear project the world has undertaken, literally, in the United States.

Senator CANTWELL. I couldn't agree more. Regarding the questions have been raised about the vit plant, Do you think we have the right oversight to address issues that have been brought up by whistle blowers?

Because obviously once the plant goes operational we won't be able to fix any problems that arise, it will be too hot to fix.

Secretary CHU. Yes. I think we've worked very hard, both the Deputy Secretary and I, have worked very hard to make sure that we have essentially our A team in place and the direct oversight of the contractors, Bechtel. Dale Knutson is a truly outstanding project manager, has had a long track record. We were able to talk him into doing this.

We have a new head of the Office of River Protection. We have a lot—Scott Samuelson. We have a lot of respect for. Dave Huizenga, again, is superb manager person. So all the way up and down the chain we are putting in place what we believe is a very good team.

Because of the importance of this project, a lot of these discussions go right into my office. I've spoken to the CEO of the head contractor, Bechtel, Riley Bechtel, probably now 4 times in my office on making sure that he, too, has an A team as the contractor. From my discussions with the people on the ground they say that Bechtel has also been doing their job and trying to get the right people there.

Senator CANTWELL. Thank you for that level of detail in your answer, because I think that is what it takes. I've often said you should be made the Energy Secretary for life, or until Hanford is cleaned up, just so we don't continue to change horses in midstream.

But can I get your viewpoints on whether we can dispose of military waste first. What we don't want is for Hanford to become a de facto disposal site for 90 percent of the waste. You know, the Blue Ribbon Commission was before the committee a few weeks ago. Senator Domenici basically put that consideration out on the table after my colleague, Senator Wyden, got him talking about it. I tried to follow up with Senator Domenici about whether the Waste Isolation Plant in New Mexico might be an ideal place for Hanford waste.

So, do you agree with him on that?

Secretary CHU. First, we're going to keep separate the civilian and the nuclear waste issues. I think they're, you know, that we, it would be prudent to treat it differently. We are considering, I'm not sure where in the status of it, but the WIP.

First, it's for low level radioactive waste. So one would need to do some studies to make sure that that would be safe for the high level waste. So we'd need to do something along those lines.

But I'm glad you pointed out WIP because this is a success story. It's been there operating for about a dozen years. There have been no incidents. The local people are—feel confident that we're running this in a very safe way. It's good for the local economy. It's good for the economy of the State of New Mexico.

So, again, this is something where we can show that we can develop repositories for nuclear waste which has the acceptance of the local people.

Senator CANTWELL. I will follow up with you on the details of that for the record.

Secretary CHU. Sure.

Senator CANTWELL. I'd appreciate it. I'd also like to follow up with you on the 1,000 acres we're trying to get transferred over from DOE to the community, know, as the cleanup progresses, for energy parks. I think it's a proposal that's moving its way through. But we would like to follow up with you on both of those. Thank you.

Thank you, Mr. Chairman.

The CHAIRMAN. Thank you.

Senator Risch.

Senator RISCH. Thank you, Mr. Chairman.

Secretary Chu, first of all, let me just say for the record that. I know this falls on deaf ears. But and this is simply philosophical disagreement. But your budget request of 3.2 percent increase for the year, but yet decreases the nuclear energy component by 10 percent. I find that particularly discouraging as we look to the future.

I know that that is not the Administration's position that nuclear is our future. I do. A lot of other people do. I suppose that's not going to change until the Administration changes at some point in time.

So for the record just take my objection to the decrease while increasing other of the boutique type energy production systems that you have.

I want to ask particularly about one part of that. I noticed that in the budget you increased or you decreased the fuel cycle research and development by 10.8 percent. Yet yesterday when you were in Georgia you announced that there was going to be a new $10 million advanced nuclear, innovative, cross cutting, research and development for advanced nuclear reactor and fuel cycle technologies.

It seemed to be a little inconsistent. On one hand you're asking for a $10.8 million decrease and yet yesterday you said there was going to be new funding. What is this new funding? I didn't quite—that came out kind of gray.

Secretary CHU. OK, so in the first, I have been very supportive of nuclear since I walked in office.

Senator RISCH. I understand that. I believe that. But I also understand you're carrying the Administration's water, so.

Secretary CHU. So in terms of the fuel cycle. We believe that first, as the Blue Ribbon Commission pointed out that the technologies for fuel recycling today, we don't think are economically viable and non-proliferation resistant. There are other examples

of—so this is UREX, PUREX, methods that the U.S. developed actually, and AREVA uses.

But as we've seen from both, especially from the Japanese experience, that's well over budget. They believe it was a $6 billion investment. It's north of $22 billion today, and still not operational. This is the Rokkasho plant.

There are other technologies like pyro processing which we think have promise. They had good laboratory experiences. Then we went up and did the next step. It didn't quite work as well as we thought it would in order to be.

It is more proliferation. It's not proliferation proof. But it's more proliferation resistant. Had that worked well we would have been encouraged.

It's not to say that we're going to abandon that. In fact I'm personally getting very interested in why it's not working. So in my little spare time, I'm trying to figure out if I can help them. But never mind that.

Senator RISCH. You may resolve that in your garage.

Secretary CHU. It's going to be up here. It's not going to be in a garage. I don't think the IRC would like it for me to be experimenting in my garage.

But I would say that this doesn't like—it doesn't open up. It still doesn't mean we shouldn't be looking for other good ideas because we are very interested in. If nuclear is going to be part of this century's mix we would like to not use 1 percent of the fuel, energy content of the fuel, to generate a certain amount of electricity. If we can use 20 percent, 20 times more, so you have a similar waste product, but you've got 20 times more electricity.

So this is hanging out there. We would like very much to solve that.

Senator RISCH. We're all in agreement about it. We're all in agreement.

Secretary CHU. So we do feel that it does make sense to invest in new technologies. We're going to have to come back a little bit and try to figure out why some of these earlier promising things at the lab scale doesn't go into the mini pilot scale.

Senator RISCH. Then the one question I have is why was the announcement made in Georgia since as you know the INL in Idaho has as one of its strong missions the actual work that you have described?

Secretary CHU. I happened to be in Georgia and you know, I—yes, I can be in only 2 places at once.

[Laughter.]

Secretary CHU. So that would happen to be Georgia and Oak Ridge.

Senator RISCH. So I can take the message back to the Idaho people that this ten million dollars is coming?

Secretary CHU. We announced competitive bids. Idaho is free to compete with that money.

Senator RISCH. Mr. Secretary, my time is up. But you and I had a discussion at your confirmation hearing about the contract for cleanup at the Idaho National Laboratory. You weren't familiar with that, but promised that you would get up to speed on that.

I've got some questions about that from the budget which is really not very clear as to where we're headed with that.

But if you'll take those questions for the record, I'd appreciate it.

Secretary CHU. Sure, I will.

Senator RISCH. We'll—Thank you.

Thank you, Mr. Chairman.

The CHAIRMAN. Thank you.

Senator Udall.

Senator UDALL. Good morning, Mr. Secretary.

I can speak for Senator Risch, I know he would volunteer his garage if you need it.

I wanted to—I know he represents INL. I represent NREL. You know I'm very proud of their accomplishments. I want to continue to work with you to see that their good work continues.

In your budget, in my estimation, you go a long way toward supporting that lab's critical programs, which are focused on developing innovative renewable energy technologies that clearly have translated into lasting, well paying jobs, a more comprehensive energy portfolio and the national security that comes with energy independence. So kudos to you. I know this is a tough fiscal environment, a tough budgeting process. But I want you to know I support what the President and you have put together.

Now I mentioned how important NREL is. Financing is also really crucial to our energy future. Would you speak to the fact that we're at a really critical juncture here in regards to the PTC, the production tax credit?

It's been very instrumental in the expansion of wind deployment around our country. Every State has a stake in this whether the States are producing wind in any significant amounts because of the supply chain this developed. This very important policy expires at the end of 2012. Would you speak to the ramifications if we don't extend the PTC in the timeframe that we have left?

Secretary CHU. Sure.

Yes, very quickly, I think things like production tax credits are a way to stimulate moving forward to get deployment in the marketplace. There—because Europe is in or I would say even perhaps even worse economic straits than we are. Because you see some countries like Spain decreasing a lot of their feed-in tariffs, a lot of their subsidies for renewables, there's a diminution of the market.

But it's the local markets that actually help stimulate manufacturing in a particular country. So these—and this is why when Spain took away their subsidies and other countries are decreasing.

China put in feed-in tariffs for their market in wind and solar. So they ratcheted it up because they recognized that they want to nurture their industries. They need a home market to make sure that they're going to be.

They want to catch up in wind turbine technology. They are becoming a dominant force in solar technology. But they see both of those at risk.

So as we saw in Europe's subsidies decrease. We say, OK, we're going to have—we want to develop our home market. The world is expecting this year that China will be the biggest deployer of renewable energy in the world.

Let's go back to the United States. If we don't have a home market for these things, industries will not be motivated to develop manufacturing at home. They would not be—they would be less motivated to develop those technologies, such as the next generation of solar.

For example, NREL was the developer that essentially inventor/developer of the Cadmium telluride cells. There's a number of solar companies making thin film Cad telluride technology. Those technologies are continuing to improve. One doesn't know whether silicon or Cad tel or some other technology will dominate. But they're certainly a player in that field and they're certainly in a competitive race.

So I think to have a home market for a clean energy standard, a production tax credit. Those are mechanisms that can stimulate private sector investment that then stimulates manufacturing in the United States. This is why, yes, China wants to export. But they also realize that we have to create a home market as well. It's this mixture they need.

Senator UDALL. You're implying if we don't extend the PTC that home market mission that we've all agreed in a bipartisan way is crucial would——

Secretary CHU. It goes to ways of how do you get a market draw. How do you help bring slightly lower cost financing to these projects? All those things.

You talk to any supplier of wind, they would rather set up a supply chain in the country where these things are being installed. This is heavy stuff. So in the solar world it's more like a commodity that can be shipped worldwide. But it is going to be heavily be influenced.

Now as wind technology, as I noted before, is getting very, very close to price parity with new gas. New gas, let me be careful, new gas at $4 to $6 a million cubic feet now which is considered, you know, if you average over the next 10 or 20 years this is where EIA is projecting.

Solar has dropped by more than 75 percent. The solar modules have dropped by more than 75 percent in the last 3 years. Everybody anticipates another 50 percent drop, at least, in the next 5 to 8 years.

So solar is going to be competitive with any new form of energy. So again, we need to spur this market because this could be. This is clean energy without subsidy that the world will want. As I said repeatedly we're either going to be buying or selling. I'd rather be selling.

Senator UDALL. Selling. We all would.

I know my time is about to expire. But on the critical minerals Hub what are you doing at DOE to ensure that the DOE labs, university partners and industry are working together on the hubs? Can you give a brief answer and then expand your answer for the record?

Secretary CHU. Very brief answer. Even the design of the Hubs or if we select a Hub. They have to come in with a design. What are they doing at the get-go to have industry and the National Labs and universities?

I was just visiting a hub, a Consortium for nuclear reactors simulation. It was wonderful because they said at the very beginning, what are the problems that industry is interested in? Let's say a premature aging of the fuel rods.

How do you extract more energy from those fuel rods?

How do you make those dual reactors safer?

Those are the things that industry actually sits with everyday. Can you simulate this? Can you simulate erosion processes of HC?

So from its very design it was—we can use the powers of high performance computing, the intellectual powers of the people in universities, national labs, to help industries solve these problems. So the Hubs are specifically designed for that.

The other thing I very quickly should mention is that we have also been easing the way to have technology transferred from National Laboratories, and universities, but National Laboratories, since we help control the technology transfer policies.

We've just had a very exciting meeting. About 250 people attended. People from industry on the materials you would need for solving a lot of the energy challenges.

This is not from tank materials. This is light weight steels and alloys and composites, everything because it's going to be dominated by new materials. Two hundred and fifty people came. A lot of companies, a lot of excitement, immediately the first week of payoff was, you know, venture capitalists are inviting people from the Labs to come.

The other Labs are saying this really works. We're going to do this too. We have another one on advanced computation. How that can help in the industry. Just to tie, so the people in the National Labs know what the industry problems are and that they can be excited about helping them solve those problems.

So this again is something that has been occurring over the last year——

Senator UDALL. I take from you that this is really important. You're really focused on it.

Secretary CHU. Right.

Senator UDALL. You're going to work with all these stakeholders.

Thank you, Mr. Secretary.

Secretary CHU. Right. Thank you.

The CHAIRMAN. Senator Manchin.

Senator MANCHIN. Thank you very much.

Secretary, and let me just say I know it's been mentioned before. The President, in his State of the Union Address, said that that country needs an all out, all of the above strategy and develop every available source of American energy. A strategy that we all agree is cleaner, cheaper, but full of all new jobs and also, hopefully, keeping the jobs we already have.

I want to show you a chart that we put together. This information is taken from the EIA, your own Department, showing where we are as far as the first through 2010.

Twenty-four percent of our energy coming from natural gas.

Ten percent renewables.

Forty-five percent coal.

Twenty percent from nuclear and oil and other liquids. This is from your agency.

Going out to 2035, 2 more decades this is where we are.

Twenty-seven percent will be coming from natural gas.

Renewables 16 percent.

Coal still at 39 percent.

The rest at 18 percent.

With that being said the President's budget basically had 2.7 billion that you all submitted for the energy efficiency. Renewable Energy at 47 percent increase from current levels.

If you'll hold this one up, Tom, so you can see the comparison. Stand up.

This is where your money is going. This is what you're going to get out of the investment. This is by your own.

Then you have the Office of Nuclear Energy. Nuclear is right here. It's where you're going. This is where you are.

You've cut, I mean, the greatest cut has been right here. You're still going to be dependent on it. We can do it much cleaner.

I can't figure the rationale. What I would say is when you look at take all of the above that the President said and you look at the energy strategy when you're cutting funding to resources that will continue to provide the energy that we're dependent upon by your own estimation. It doesn't make sense, sir.

It doesn't make any sense at all. That we can't do it better, cleaner and work together because you sure are putting this out to where we're going to be able to depend on it. We need it.

So I don't know if you have a comment on this in relation. It seems like there's not a balance here at all.

Secretary CHU. What we're doing, as you know, during the Recovery Act there was very large investments in clean coal partnerships and helping test, deploy some clean coal technologies. But unfortunately a lot of the companies who had supplied matching funds, at least 50 percent, have pulled out. But there's some hope and we're still pushing this as much as we can because we do believe that we have to develop technologies to use coal cleanly which means not only the normal pollutants, but also to capture the carbon dioxide.

So we still remain committed to that. However, because of this changing landscape of companies not wanting to invest in large projects, sometimes hundreds of millions to billion dollar projects or multi-billion dollar projects, but we do see a path forward in having carbon capture utilization and sequestration.

Senator MANCHIN. Sir, I hate to interrupt you on it because our times are so limited here. But you can keep those up. That's very important.

With what—there's no coordination as I can see from the Environmental Protection Agency trying to work with you all to develop policies and be able to use the energy that we're depending upon. That's where the disconnect comes. What we're asking for is somebody has got to be talking to somebody coordinating it so we can continue from what you're depending upon to be able to use it and use it cleaner within the environmental standards that we're setting. There's no one working together.

I will say this. Last year when you came before us you said the Department of Energy was eager to promote research on coal to liquids that blended biomass into the fuel and had carbon capture

and sequestration technology. Then you said also coal to liquids with carbon capture and sequestration actually makes very clean fuels. Then once you start blending in biomass it becomes a real plus. It becomes carbon neutral in the tailpipe emissions.

So for that reason the Department of Energy is very eager to promote that type of research. Last year, your budget had $5 million in funding for that research. This year, zero.

Have you changed your position? What is the Administration's position now? Why would you have such a reversal?

Secretary CHU. I'm going to have to look at that and get back to you on that.

Secretary CHU. I do think that any coal to liquids with carbon capture and as you blend in biofuels and that this is also true of coal firing bio-matter with a coal plant and if you capture the carbon dioxide after a certain percentage it does, it goes with the carbon capture. It actually goes negative. So you're actually net sucking carbon out of the air.

Senator MANCHIN. Right. That's all. I think you testified last year.

Secretary CHU. Right.

Senator MANCHIN. We have people wanting to do this type. The road blocks are insurmountable because it looks like the Administration is saying one thing but they're pushing and promoting because of your, where you're making your investments. I think this shows completely where you're making your investments without taking into consideration what brought you to the dance and what you're expecting.

If you look at natural gas and coal and what we have there you're talking about 66 percent of the energy for the next two decades with very little money going into it.

Secretary CHU. As I said, the research for carbon capture and storage technologies we can fund, when it gets to be very expensive is it gets to be on the deployment side. This is a chart of electricity which is a major part of energy. But about 38 percent of our energy is from oil. If you took that, as I tried to point out before, our budget doesn't reflect the percentage of energy we use. Therefore those dollars go into that percentage.

The oil industry is a very mature industry. So we don't think, even though it's 38 percent of our total energy budget, we're not going to put 38 percent of our DOE budget into that.

We do think that carbon capture, getting coal clean, is very important. But as I said——

Senator MANCHIN. Oil recovery? Enhanced oil recovery? There's so many things we can use it for.

Secretary CHU. I absolutely agree with you. That's——

Senator MANCHIN. But sir, your budget doesn't reflect that. I'm sorry. We just, I know we have a difference. Thank you.

The CHAIRMAN. Senator Shaheen.

Senator SHAHEEN. Thank you, Mr. Chairman.

Thank you, Mr. Secretary, for being here. I, for one, would never say that you have deaf ears. I have found you to be very responsive. So I appreciate that.

I want to pick up on the line of questioning that Senator Udall was pursuing relative to the production tax credits and the 1603

program, the Advanced Manufacturing program because I was pleased to see that the budget included continuing those programs and expanding them. We have some real success stories in New Hampshire under at least 2 of those programs.

We have a company called Revolution Energy in my hometown of Dover where they've used the 1603 program to put solar installations in schools, save a significant amount of money.

We have a wind farm in a community of Lempster in the Western part of the State. One that they're working on that have used the production tax credits. It's made a difference not just in the jobs that go into building those wind farms, but also in reviving the communities because of the economic activity that goes on around those projects.

So I think they're very important and agree with your comments about the importance of continuing these investments in these markets. Have been concerned, as I know many of us in the Senate are, about the fact that these are going to expire at the end of this year. At this point the extension of the payroll tax cut and unemployment have not included a package of tax extenders that address these taxes.

So can you talk a little bit about, adding to what you said to Senator Udall, about what happens to the market when we see this kind of interruption in support for these new energy technologies?

Secretary CHU. I think as you talked and I'm sure, I know you have, as you talked to industries out there what industry wants more than anything else is they want to see stable government policies. They don't want to seem on again/off again. They want to see something because a lot of these investments, just to plan them and get them permitted and licensed, could go well beyond a 2-year cycle.

So the production tax credit and the 1603 have, by most people's accounts, not everybody's, been very successful in stimulating investments in these new clean energies. With the end of the Recovery Act the Administration is very concerned about a roll off of these investments. You see this in the financial newspapers, Bloomberg, New Energy. You find all these things that there's going to be a real concern or is it just going to roll off and stop.

Again, I go back and reiterate that it's very important that America develop a home market for the development of the industries of manufacturing in America. You know, one of the great things about the U.S. automobile industry is we had a very large home market and that actually stimulated a lot of the development into automobiles.

Senator SHAHEEN. Is it fair to say that if that uncertainty exists because we let these tax credits expire that there's a good likelihood that we're going to see a number of jobs lost as part of that?

Secretary CHU. Yes. I think there are early returns on that already because——

Senator SHAHEEN. Right.

Secretary CHU. Again, if you read the financial pages of various newspapers around the country and around the world, where there are continuing policies to allow investments, you see growth. Otherwise there is a pulling back.

Senator SHAHEEN. I was also very pleased to hear the President in his State of the Union and to see that in action as well, the commitment to energy efficiency which is something that I believe is very important. Senator Portman and I have a bill S. 1000 that addresses energy efficiency in the industrial sector and government and buildings.

But one of the best ways to encourage energy efficiency is by supporting the expansion of co-generation or combined heat and power. These are the technologies used are generally off the shelf. They exist right here in the United States. The jobs that are created are here in the U.S.

So can you talk to what the position of the Department is on combined heat and power and how you address that in this upcoming budget?

Secretary CHU. We are very bullish in combined heat and power. You know, in today's modern, let's say gas turbine generation, you can get 55, 60 percent efficiency in converting that energy into electricity. But it's at best 60 percent efficient. I guess some companies claim 61 or 2, but I'm not going to quibble. In combined heat and power you go up to 80 percent.

It can be now where we think that—and if there's any way to encourage people to do that that would be great. There's also new ideas and new innovations being deployed now that seem to work. Some people could—here's the issue. Sometimes you want the electricity you don't want the processed heat or maybe you want the heat you don't want the electricity.

I was visiting a project we supported in Recovery Act funds in Houston, Texas. It powers this collection of medical centers that is about the 12th largest city in the United States, just the medical centers. Everything is big in Texas. Anyway, what they had is they had a very efficient gas generator, but single cycle. They had high temperature process heat that could be used for heating or air conditioning.

Now the beauty of what they did is they took that process heat and they used it. You can actually use heat to cool. So they used it to chill water. They would store this cold water in this big tank right there.

They found that it took about less than 10 percent of the energy, even in on a hot, Houston summer day to keep that tank cold. So they would run it so that that would balance. It's like a big battery, but it's a battery of heat that they would use to air condition their complex.

OK. So and it was very cost effective. So they were operating this plant 80 percent efficiency, recovering all of that, very fuel efficient and again, drives down the cost to their customers, the medical centers, the hospitals. So that's an excellent example of how combined heat and power can be used in a way.

I mean, buildings, new buildings now, many of them, especially if you have real time pricing of electricity. They use the electricity at night. Chill some water, even may turn into ice. Use the ice to cool the building during the daytime.

So you're buying electricity where it's inexpensive. You decrease your electricity bill. The asset of generation are used, you know,

you're getting a better return in your investment because you're using the asset in a more even way.

So the good news is combined—so this all is about energy efficiency essentially. So combined heat and power in any city, any university, any hospital, that has an integration of steam and chilled water tunnels or a big complex could use combined heat and power. We'd love to see it go in that direction because now you're going to 80 percent efficiency.

Senator SHAHEEN. Thank you.

The CHAIRMAN. Senator Portman.

Senator PORTMAN. Thank you, Mr. Chairman.

Dr. Chu, thank you for being before the committee again and for working with me and other members of the committee on some important projects.

I like some things in the budget. One is energy efficiency as Senator Shaheen has just talked about. With buildings using about 40 percent of the energy in this country, I think what you're talking about there is consistent with the legislation which, as you may know, was introduced in the House, a companion bill yesterday. So we're hopeful that S. 1000 can make its way to the floor. I appreciate the support of the ranking member and the chair on that as well.

I'm concerned about some other aspects of the budget, but let me focus on something else positive which is the small modular reactor licensing technical support program. You've funded that at 65 million bucks. These SMRs are really, I think, an exciting innovation. As you know, have safety advantages as well as economic advantages.

I know that the Nuclear Regulatory Commission has just licensed a plant and another one coming with larger reactors. But it seems to me that this is a good investment. Something that will be very beneficial to energy mix going forward. So I thank you for that.

With regard to carbon capture technologies, I don't know if you've had this question from other colleagues. I apologize if I'm repeating something here. But the CCS programs, I think still, are lacking direction in this budget. I don't think there's a pathway here as to how long and how much it's going to cost to be able to develop carbon capture technologies.

I would like to see the budget laid out. But in the absence of that I would hope that the Department would do so. I did introduce an amendment last year that would require the Department to assess how successful the CCS programs have been and how much time and what the cost would be to get them to the commercial level. Senator Shaheen, again, was part of that and adding the assessment with some of the barriers are for large carbon capture and storage.

So my question to you there would be, you know, what is the pathway and what can the Department give us in terms of information as to what your scientists believe is the way to move to a commercially viable demonstration projects?

Secretary CHU. Sure.

First, the carbon capture technologies that are being tested today and of the viable two categories this is, you know, after combustion

you capture the carbon. There are MEA type technologies or chilled ammonia type technologies. Those are being pilot tested. In a sense they're by and large in the commercial sector.

We feel that we would like to develop less expensive means because if you make, if you put in an estimate of how much it would increase the electricity bills, we think that this would not spur, not in the United States, but it would not spur China or India into using these technologies. So we would like to improve them. We think there are potential ways of improving them.

One of the potential ways is to—but it's these very large, high, surface areas. So we're investing a lot of research to decrease the size of these capture stacks. Totally different ways of doing it, so instead of that being absorbed material you can use small particular matter at the nano scale. So we're investing a lot of research in that.

We're investing in ways of—another way is to separate oxygen from nitrogen.

Senator PORTMAN. Dr. Chu, I guess what I would ask. This is a danger of having someone who actually knows something about science testifying.

Secretary CHU. OK. I'll try to sub miss it.

Senator PORTMAN. I guess I would ask you, if you're willing, is I'll submit a question for the record. I know a lot of members of the committee would be interested in your response both on the specific, you know, technological improvements that you would recommend, but also just what the Department sees as the pathway forward here. I don't see it in the budget again. I think it would be very valuable to the committee.

Secretary CHU. In short, the very brief time, I say the path forward is to take advantage of the industry's interest on the piloting side in the carbon capture utilization and sequestration.

Senator PORTMAN. Yes. We want it to be cost effective. It seems to me that there is an opportunity here. We're not taking advantage of it.

With regard to uranium enrichment I appreciate the fact that in the budget you do talk about the need for us to have a domestic source. In fact, provide in the Defense Nuclear and Non-Proliferation Account, $150 million for domestic uranium enrichment development demonstration research. You and I talked about this a number of times before. It's interesting you include it under NNSA rather than the Nuclear Energy Account because I think it would also be appropriate under the Nuclear Energy Account.

Is there a reason for that?

Secretary CHU. No. That was assigned by people more like you than me.

[Laughter.]

Senator PORTMAN. Uh oh——

Secretary CHU. No, I think that—pardon?

Senator PORTMAN. I see what you're saying.

Secretary CHU. No, I'm just saying that you had to park somewhere. It was certainly appropriate to put it in NNSA budget.

Senator PORTMAN. OK. We'd be very interested in working with you on that. I do think there's some appropriators who are particularly interested in knowing which account it's going to come out of.

Secretary CHU. Right.

Senator PORTMAN. Where it's coming from. I think, you know, a conditional loan guarantee would be a far better solution. But given where we are and needing to have a domestic source of enriched uranium, I think it's important that we move forward. The more information, the better.

With regard to enriched uranium, if you could just talk for a moment about why you think it's so important. Obviously we need it for our nuclear power plants. At one point we had a majority of the enriched uranium in the world being produced by the United States. I think we're down to about 25 percent of the world's supply of enriched uranium now.

Maybe a place to start is, you know, where do we get it now in that we aren't producing nearly as much as we used to?

Secretary CHU. There are 2 parts to this.

One is the military side, the secured side. We have international treaties which we want to abide by, non-proliferation treaties which says that the uranium used in nuclear security, for nuclear security purposes actually has to be indigenous to that country. It's a very wise treaty because you don't want one country to be using technology of another country to enrich uranium that they can turn into weapons.

Senator PORTMAN. Right.

Secretary CHU. So we need our own indigenous source of uranium for our—to maintain our side. Also uranium that we need to produce tritium for that——

Senator PORTMAN. For the duration.

Secretary CHU. Then there's a larger issue about the civilian nuclear side, much larger amounts of uranium. We think that if the United States, certainly the United States will be a player. The United States is well respected for its safety record, for its care in the way it handles its own civilian nuclear industry and for the technologies that it has developed, companies like GE and Westinghouse.

It would also benefit if we had a home grown, new technology for enriching uranium for, again, so that we can offer for sale to other countries, other developing countries, you know, France is a player in this. Russia is a player in this. We think that if the United States is a supplier of this uranium that we could have a moderating effect again on non-proliferation instruments.

So it's for that reason as well.

Senator PORTMAN. In essence, discouraging emerging economies from developing their own enrichment capabilities.

Secretary CHU. Right.

Senator PORTMAN. Saying that the fuel they need for a peaceful nuclear power facility can come from the United States. It will be a stable, affordable supply through a domestic origin.

Secretary CHU. That's correct. In fact, if you put yourselves in the shoes of another country who might want to have nuclear technology, they would want to see several suppliers. So they would not be beholden to one or two. We also feel that the United States can lead by example, helping do what we can do in order to decrease the risks of proliferation.

So it's the whole nuclear supply issue. We will be a player no matter what. But it would certainly benefit from that respect as well.

Senator PORTMAN. My time is up. Mr. Chairman, I'm sorry. Thanks, Mr. Chairman, for giving me a little time there. But I appreciate the follow up and we'll be following up.

The CHAIRMAN. Senator Sanders.

Senator SANDERS. Thank you, Mr. Chairman. Welcome, Mr. Secretary and thank you for all that you are doing.

Let me begin by saying that I agree with Senator Shaheen and many others that it is absolutely imperative that we pass the Production Tax Credit in 1603. It is beyond comprehension to me that we are not moving forward aggressively. I thank the Administration for their support on that.

I also want to thank you for your help in Vermont's smart grid. I think we will be probably the first State in America to have almost universal smart meters within a few years. We think if we're serious about energy efficiency and using electricity as efficiently as we can, this will be a major step forward. I hope Vermont can learn and that the Nation can learn from what Vermont will be doing. We want to share that with the rest of the country.

Mr. Secretary, it seems to me that one of the sad moments in terms of what's happening in our country today is the degree to which, as a Nation, as a Congress, we are not dealing with the horrendous planetary crisis of global warming. It is—and I say this not to be terribly partisan here. But it is very sad that we have a major political party where many of its leading members actually reject what the, virtually, the entire world scientific community is saying.

A, about the reality of global warming.

B, that it is significantly caused by manmade activities.

C, that if we are aggressive we can begin the process of leading the world in reversing greenhouse gas emissions.

Without getting partisan it's just sad to me that we have so many people rejecting what is very clear scientific evidence, not only in this country, but from scientists all over the world.

In terms of cutting greenhouse gas emissions I think that energy efficiency is a huge step forward. I don't think there's much disagreement on that. I think weatherization is a very important part of that.

I come from a cold weather State. We are making some progress in retrofitting homes. When we do it well what we are seeing is often working families lowering—we've got people saying, you know, I've cut my fuel bill by 20 or 30 percent. I'm saving money as a consumer. We are emitting less greenhouse gas emissions. You know what? We're creating jobs because people are working on those homes.

If there's any win/win/win situation that I see in this country, being aggressive about weatherization is it. Yet within a pretty good budget you guys have cut weatherization. Why?

Secretary CHU. Actually if you look at our request I believe it is up from what was given to us for FY'12.

Senator SANDERS. Here's the story. The budget before us actually invests only half as much in weatherization for 2013 as we did in 2008. That was the last year of the Bush Administration.

In 2012 Congress approved huge cuts to weatherization dropping funding to $68 million in 2012, down from $227 million in 2008. Now you're right. You went up from last year. But we're significantly below where we were in 2008.

Would you agree with me that investing in weatherization is a win/win/win situation?

Secretary CHU. I agree. So we have asked for an increase. It's not quite double. But a big increase from what we were authorized.

But and I think we're also trying to promote programs that with not only the Federal dollars, but also programs because I really think if done right weatherization can actually save money. The money one needs to borrow whether you're a business or a homeowner, if paid back in moderate interest loans can actually decrease your bills.

Senator SANDERS. Right. We certainly agree. I hope that you will work with us.

Because I don't know that there's any much partisan disagreement on that one. It's just common sense, if I lower your fuel bill by 30 percent, why not? Right?

Secretary CHU. Right.

Senator SANDERS. If we create jobs as part of that process that's a winner.

Let me ask you this question. I am working on a concept again, which should not be partisan. It's called on bill financing because one of the problems we have in terms of weatherization.

If Ron Wyden here wants to reduce his fuel bill in his home and knows that retrofitting will do that, but he doesn't have the upfront money. If we can get him the $15,000 he needs to cut his fuel bill by 30 percent and pay it back by the reduced amount of money he's spending on fuel we're just lending him money. He's paying it back.

What ideas do you have about how we can get middle class, working families that upfront money so they can weatherize, lower their fuel bill and save money in the long run?

Secretary CHU. A number of things.

First, usually one is most motivated and has the capacity when they are buying a house. We have in the toolbox, I think it's HUD has, energy mortgages, which are not widely appreciated, not widely known. One way to stimulate that is to encourage lenders.

Lenders, they ask for a person's income.

They want to know they can pay the mortgage, of course.

They ask for the property taxes because that's the cost of owning the house.

They ask for a lot of things.

They ask for a structural engineer.

Senator SANDERS. Right.

Secretary CHU. Because they don't want their asset, the bank's asset, to fall down.

It would not be too much to say, why not get a structural and energy audit from the engineer. To make a wiser homeowner that can know——

Senator SANDERS. I agree. But it is not only people who are just purchasing a home.

Secretary CHU. Right.

Senator SANDERS. You have, people have older homes instead. Will you work with us on this concept of on bill financing?

Secretary CHU. Yes.

Senator SANDERS. Coming up with loans that will be repaid as a result of lowered billing?

Secretary CHU. Right.

Senator SANDERS. I think it's just a win/win situation. Will you work with us on that?

Secretary CHU. Absolutely. Just very briefly I think utility companies can play a role in this as well.

Senator SANDERS. Yes, they can.

Secretary CHU. OK.

Senator SANDERS. Yup.

Secretary CHU. Because they have access to moderately low cost capital.

Senator SANDERS. Yup, that's correct.

OK, thank you.

The CHAIRMAN. Senator Hoeven has arrived but he has asked for a few minutes to review his notes. I know that some of us have additional questions. I had one additional question, Mr. Secretary, that I wanted to ask. Then I will see if others do as well. Then Senator Hoeven can ask his questions when he's ready.

I wanted to ask about the Department's plans at Los Alamos National Lab now that the chemistry and metallurgy nuclear facility has been put on hold. For many years now we've been told that the replacement nuclear facility was necessary. Now we are told there may be alternatives that the Department wants to pursue.

Could you describe what changes in operations and staffing you anticipate at Los Alamos now that the CMRR has been delayed?

Secretary CHU. Much of the staffing I don't think is directly. So what we plan to do is go ahead and complete substantially the design of that building. So what we have been putting in previously was mostly engineering design. We're going to get to perhaps 90 percent of the engineering design part of it. That's very prudent for a number of reasons because before you start construction it's best you have most of it designed.

But you're correct we are now putting that on hold a while. Because of the budget constraints of the NNSA we have to look at all the other projects. We could not simply, we felt we could not simply start CMRR and UPF, the Uranium Processing Facility at Oak Ridge. We felt there was more compelling reasons to begin that.

We're looking at ultimately the plans we can consolidate. The footprint is there. There could be other parts of this.

We're looking at, as we look toward new start and beyond new start, whether, you know. Working with the Defense Department as to what our requirements to fulfill our duties to the Defense Department for the nuclear future will be. So as that gets worked out that will be folded into it.

So we'll essentially begin to complete this engineering design and then try to figure out how we can reposition. Again, because of

the—and what is different as you well know, is that we have severe budget constraints and we do have a deficit.

The CHAIRMAN. But you are not real clear as to what additional actions the Administration would expect to take to meet its needs, the needs it was expecting to meet, through the construction of this CMRR?

Secretary CHU. There are—yes. We're looking at some of the things the CMRR building would have done. We are looking perhaps to offload some of that to other sites. For example, I forget even what the name of it is called. It used to be called the Nevada Test Ground. They have a new name for that also some issues in with.

So we are looking very closely at how we can best fulfill our obligations and the needs for our nuclear security. We believe that and so our overall plutonium strategy but there will be some CMRR in Los Alamos, we feel. But again, we don't know whether there are other options.

The CHAIRMAN. Let me ask Senator Hoeven. Are you ready for your questions before I ask others if they have a second round of questions?

Senator HOEVEN. I am, Mr. Chairman. Thank you very much.

The CHAIRMAN. Why don't you go ahead?

Senator HOEVEN. I appreciate it.

Mr. Secretary, good to see you again. Thank you for being here.

I'd like to ask you a little bit about gasoline prices. I'm sure you're well aware that the average price for gasoline in the country right now is over $3.50 cents according to both Triple A and the Lundberg Survey. That's up 90 percent since the current Administration took office.

So my question relates to why aren't we advancing projects like the Keystone XL pipeline to provide more supply and help bring gasoline prices down. You were asked to review that project or the Department of Energy was asked to review that project by the State Department. Your expert, Dr. Carmine, I'm going probably miss on the last name.

You might have to help me, Difiglio? Is that? Dr. Carmine Difiglio, does that sound about right?

Secretary CHU. Sounds about right.

Senator HOEVEN. Alright.

Anyway he was asked to review the Keystone XL pipeline project and comment on it as to whether it would help reduce gas prices in the United States. I'll quote from his report. "Gasoline prices in all markets served by PAD1, the East Coast and three, the Gulf Coast refiners would decrease gasoline prices in all markets served by PAD1 in the East Coast and three, the Gulf Coast would decrease, including the Midwest." That was by your expert, Dr. Difiglio, Department of Energy, June 22, 2011.

So my question to you is here we have rising gas prices putting a strain on our consumers, on businesses, on the economy. Yet the Administration turns down a project that would help us reduce gasoline prices. Why is that?

Secretary CHU. First, let me say I'm not aware of this report. So I can get back to you on that. But it is my understanding that as I tried to explain, that the gasoline prices in the United States are

affected by refining capacities and by access of those refiners. The biggest bottleneck was the bottleneck from Cushing, Oklahoma to Houston. That—and there was a very large price differential of crude in Houston and Cushing verses crude in Houston.

So that bottleneck is being taken care of by the pipeline, the people who invest in pipelines. As that is being taken care of as we speak there are numerous pipeline plans for enlarging that pipeline. One pipeline is being reversed so that refined products from Houston and Louisiana can be then ported to the Midwest.

Another pipeline from Chicago to Cushing and also in the Plains is being built as far as I know. So much of the pipelines in the United States that would bring oil from Wyoming, North Dakota and to get the oil to the refineries that have the capacity to refine this oil and back up are being done in the private sector. So we think that this is on a path that is creating jobs, that is going to be helping.

In the end, the gasoline prices, we are very concerned about. The Administration has taken, I mean, this pipeline activity occurs because once you see a big price differential, the industry steps in and says, hey, we can fix that. In addition to that, we are doing a lot. For example, twice we've changed the mileage standards of automobiles. This directly affects the American public.

By 2025 the estimate is the fleet average will be saving on average Americans over the lifetime ownership of that car by $8,000 in gasoline bills.

Senator HOEVEN. Mr. Secretary, so you're saying that while you've been part of this Administration gasoline prices have gone up 90 percent. We're looking at $4 gasoline by Memorial Day, maybe $5 gasoline this summer. You're saying you're willing to build all kinds of pipelines, but you're unwilling to build a pipeline that will bring 830,000 barrels a day into this country from our closest friend and trading partner, Canada, and will help alleviate a bottleneck in my State of North Dakota where we now produce more than 500,000 barrels a day.

But our oil is now discounted $27 a barrel, light, sweet, bach and crude off West Texas Intermediate. $27 a barrel we're discounted because we don't have the pipeline capacity to bring it down to the refineries. We will put more than 100,000 barrels a day in that pipeline.

Instead we have to run trucks over the road. We have traffic fatalities. We have wear and tear on our roads. You just got done saying you're willing to build all these pipelines. Why not the Keystone?

Secretary CHU. The pipelines from Wyoming and North Dakota can be built. The Administration actually has no—there's not a decision the Administration needs make on that. This is all on American territory.

The only part of the pipeline the Administration, the State Department, was asked to weigh in on was the part that went from Canada to the United States. So specifically, and the pipelines I was talking about are actually helping bring the oil from your State down to those refineries. Those things are things we're——

Senator HOEVEN. That's not the case. I just explained to you the pipeline that would help us bring the oil from my State down to the refineries.

Secretary CHU. My understanding is if you look at the pipelines that exist today and you look at the major "bottlenecks" of the pipelines those pipelines and we're talking now specifically about the part of the pipeline that goes from Canada into the United States. My people tell me that for the next decade or so with the anticipated increase in production of Canadian oil that that will not the bottleneck.

We have a bottleneck now that is in the Cushing to Houston. There's another bottleneck from Chicago. There's also pipelines that go from your State to Chicago. That pipeline goes from Chicago to Cushing.

So those things are being built. So those are taken care of as we speak.

Senator HOEVEN. I see I am over my time, Mr. Chairman. I will defer for a second round if that's the wishes of the Chair.

The CHAIRMAN. Alright. Why don't we go ahead with a second round?

Senator Murkowski, did you have questions?

Senator MURKOWSKI. I do, Mr. Chairman. Thank you. Thank you for your patience, Secretary.

Several weeks ago we had a presentation. EIA presented kind of the global picture. I had an opportunity to ask Mr. Gruenspecht his opinion on where Alaska natural gas fit into the bigger picture as we talked about domestic natural gas.

Senator Wyden has on many occasions before this committee asked questions about the export of domestic product here. You, as the Secretary, have the authority to sign off on whether or not export is in the national interest. The question I had asked Mr. Gruenspecht was whether or not, in his opinion, Alaska was viewed separately from the rest of the lower 48 market. Different type of gas, different processes and clearly a different market, Alaska is much closer to the Asian market than we are, most of the lower 48.

It was good to get Mr. Gruenspecht's opinion on it. But you're the guy that ultimately signs off on export licenses. How do you view Alaska's natural gas and whether or not this is something that would be viewed differently than the domestic, the lower 48, natural gas domestic production?

Secretary CHU. Given the charge of the Act and the decisions we would have to make on allowing the export of natural gas it would, again, have to be folded into what would be in the best interest of the United States.

Senator MURKOWSKI. Certainly.

Secretary CHU. So and you correctly pointed out that Alaska is in a different location. But we would have to fold all that in. I actually don't know what Howard said.

But it's very clear that before we license anybody as we deal with these applications we just have to be very conscious of the fact that we don't want to have a significant impact on the gas prices. Again, considering the benefit of the United States in its totality and so,

I really, I can't comment on what is going to be the economics in Alaska.

I guess having said that we are, you know, Alaska does have natural gas.

Senator MURKOWSKI. Lots of it.

Secretary CHU. Yes.

Senator MURKOWSKI. Lots of it. You know, we're still trying to figure out how we access that. That's our challenge in the State right now.

But one of the things that we are looking at is the prospect of rather than sending it through Canada through an extraordinary transportation system to move it through it through the State, liquefy it and move toward export. It's not a decision that has been made yet. We've got a long way to go.

But it is an issue where for us in the State, it is a very different market. It is a very different gas. I look forward to the opportunity to speak with you more about that.

Secretary CHU. Sure.

Senator MURKOWSKI. Just sequeing here. We've also had the chance to talk about Arctic methane hydrates and the great potential that we have. I understand that methane hydrates are going to continue to be a part of the natural gas technologies R and D budget which is good.

We're not the only country, of course, that is working on this. We've got a good partnership going with Japan. I guess the question to you on this is right now there is a—or they're scheduled to conduct a major test up in the Arctic, in Alaska, in partnership with Japan on hydrate flows and pressures.

I know DOE had hoped to follow up on this test. So I'm wondering if you can tell me what the level of commitment is from DOE to continue this public/private, the progress that has been made to advance the research in an area that I think we recognize holds great potential. It may be further out in the distance than some of the technologies that are in front of us. But exciting, if we can get there.

So can you give me any updates?

Secretary CHU. Sure.

Senator MURKOWSKI. Specifically the commitment the DOE has to this.

Secretary CHU. Sure. Sure.

We're going ahead with this test. It's not in conjunction with ConocoPhillips. Japan is very interested because they have methane hydrate reserves off their coast.

As you noted, it can if one can figure out to extract it without plugging gas lines and all those other things, it would be, it could be, as significant or even far more significant than the technology that was developed for shale gas. So we are looking forward to the test. But the test is one part of a program going forward before, quite candidly, before industry actually would want to begin to invest in it on their own.

So again, it's this balance. Right now industry is not, you know, they view methane hydrates more as something that plugs up their lines rather than a potential source. Just like with shale gas as if

it looks like it can be developed and industry gets invested in it as part of our all of the above strategy, then they can take it over.

Right now the program being done in Alaska is actually being directed by DOE's scientists. So it is a research project. But it's just one part of that research project. After this stage we see it continuing.

Senator MURKOWSKI. I think that's important. Because we recognize that apparently there's $12 million now that's proposed in this budget for all methane hydrate research next year. It's my understanding that this test is going to be more expensive. So the commitment then from DOE to continue that is going to be important.

Again, we'll follow up on this conversation.

Thank you, Mr. Chairman.

The CHAIRMAN. Senator Wyden.

Senator WYDEN. Thank you, Mr. Chairman.

Secretary Chu, you've been a patient soul. You have sat in that seat for two and a half hours. As you can tell up on this side of the dais, there are pretty diverse views with respect to energy. Folks who care about wind and solar and folks that care about coal and nuclear and so there is a wide variety of opinion.

I wanted to ask you about an area that I think would be unifying and something I think you, in particular, could champion. That is energy storage. When you look at energy storage, this is something that makes wind and solar, for example, more economic. But it also is hugely beneficial to base load technologies like coal and nuclear because it can help them meet their peak electric demand. It also helps the transmission system operate more efficiently.

So you've got something that is cross-cutting in terms of technology, literally benefits every corner of the country. In other words, I can't find a corner of the country that wouldn't benefit from it. Yet, we haven't been able to get in place a clear strategy to tap the potential of energy storage.

A couple of years ago Dr. Koonin, your Science Advisor, a very distinguished individual, I asked him about energy storage. He said, well, we're going to wait and see what happens. Basically we've gone through a variety of debates.

I'm concerned, for example, then in the Office of Electricity in this budget it looks like energy storage is cut. But I want to set that aside. Ask you what would it take to get you and the Department to lay out for us a significant strategy to tap the potential of energy storage?

I mean, it has the real potential for production and distribution. It's not consumption. It's almost the other side of the coin of energy efficiency. It could be something that would be backed by Democrats and Republicans.

It would be cross-cutting in terms of technology. Yet, so little has been done to lay out an opportunity for a real strategy here. Could we persuade you to do that?

Secretary CHU. You don't have to persuade me. We are doing that. We—this is one of the reasons why one of our Hubs is an energy storage Hub, but not only for automobiles, but for utility. We made it very specific.

It's not only batteries. It's compressed air. It's thermal storage.

I just talked about how you can use nighttime energy to hold processed heat. Sometimes when the wind is blowing there's nowhere to take that electricity. You can put that into lots of kinds of storage either, you know, hydro storage is something I've been pushing very hard to BPA to start doing. Pump from one dam to another dam so there's minimal, essentially no environmental impact, but it's a form of storage.

We have a target. We know that energy stored at the megawatt and megawatt/hour scale would have incredible applications in the electricity distribution system. It would make our electricity distribution system much more efficient because all the little ripples that, you know, you have a few major generating stations. It goes to distribute out here. You purposely overfill today to—and if you had little batteries of, you know, kind of that size scale popped here and there it would have a profound difference.

Right now the energy storage is about 300, $350 a kilowatt/hour. At $100, $150 a kilowatt/hour it goes viral. So energy storage for renewables, energy storage for making a more efficient distribution system, energy storage is for a sounder, more robust grid are all part of that.

So we have a Hub for that. We are trying to coordinate. We're not only looking at battery. We're looking at compressed air. We're looking at thermal storage.

Senator WYDEN. Dr. Chu, if you could send me the document that reflects this strategy. That's what I'm really asking for. Because I've followed this, all I can see in terms of documents——

Secretary CHU. OK.

Senator WYDEN. is the proposed cut in storage at the Office of Electricity. I wasn't interested in debating that. What I wanted to see was something that would lay out a strategy.

As I've said, I've gone back several years with Dr. Koonin and others and we haven't seen such a thing. If you can get that to me, we'll discuss it back and forth. But what I really want to see here that I think would be unifying in this committee is an actual strategy so that everybody would understand what the potential is and where we want to go. Thank you, Mr. Chairman.

Secretary CHU. Just 10 seconds. Yes, the Office of Electricity—OE was cut because what we decided was it was much more appropriate to increase in ARPA-E dramatically, and the Office of Science and in EERE. So we were trying to consolidate where we could think it could do the most good in terms of the level of program management.

So overall if we gathered up all the pieces in energy storage it's actually going up.

The CHAIRMAN. Senator Portman.

Senator PORTMAN. Thank you, Mr. Chairman. To the question as to whether energy storage is part of efficiency, yes, it is and part of using our system more efficiently.

Earlier we talked about your commitment to a new enrichment technology that gives the United States the ability to get back on the cutting edge in terms of our technology. Create great advanced manufacturing jobs. But also be able to supply our energy needs and from a national security point of view to deal with our need

for tritium for the nuclear arsenal which comes from enriched uranium.

That tritium comes from domestic sources of enriched uranium, is that correct?

Secretary CHU. Correct.

Senator PORTMAN.Is that the policy of this Administration that we should have a U.S. source of lowly enriched uranium for tritium production at TVA?

Secretary CHU. It's not in the policy. By treaty we're obligated to have U.S. sources to create our tritium.

Senator PORTMAN. So this is a requirement that we have a domestic source. With regard to other activities at Piketon, which you know, it's a huge campus. By the way would once again extend an invitation to you to come out. I think you'd really enjoy seeing what's going on there and see the incredible work that's been done over the years at that plant.

But there is also a cleanup of the existing technology which is the gaseous diffusion technology still being used at Paducah, but now at Piketon through an effort that Administrations through the years have supported decontamination and decommissioning is going on. They're actually 1,950 workers involved with that. I notice in the budget and very concerned about it that there's a 33 percent cut there from $190 million to $127 million.

Will this reduction in funding allow the Department to maintain the commitment that the Department has made to accelerate a cleanup? It was made, I think, back in 2009?

Secretary CHU. We are looking very hard at this. Yes, there is a decrease in budget. We are looking again at all our options whether we can do some bartering, things of that nature. But again, we have to be very careful about whether that bartering will affect the markets.

So we're trying to figure out with the tools we have how we can move that forward.

Senator PORTMAN. In the past, as you know, you have both barter and sold some of your own stockpile of uranium to provide the additional funding and maintain that accelerated cleanup schedule. It seems to me that that would be the right way forward. When you say you need to analyze it more, what do you need to do?

Secretary CHU. Right now we've already analyzed that if we introduce into the market something 10-percent or below, that we feel safe that won't have a material impact on the markets. We have not gone—we don't know what will happen beyond that. So——

Senator PORTMAN. It sounds like you have done the analysis. You did it in 2011 and it went through the third quarter of calendar year 2013. That and you found, as you say, no adverse impact for the level you were talking about putting on the market.

Secretary CHU. Yes, the 10-percent market. Yes.

Senator PORTMAN. So I would hope that having done that analysis that we could move forward to give the folks at the plant some certainty and also to just to maintain the cleanup schedule on an accelerated basis.

As I talked about, I worked a lot when I was in the House of Representatives on the cleanup at Fernald. In the end we accom-

plished something great working with the Department of Energy on an accelerated cleanup. It was initially opposed by some people including folks who had jobs at the plant to maintain the status quo. But in the end it saved the taxpayers somewhere between $3 and $4 billion by accelerated cleanup.

So I know there is a temptation in these budgets to try to find savings. But I think this is a place where it would be penny wise and pound foolish. In other words, I think for the taxpayer, it's definitely going to cost the taxpayer more over time if we get away from the accelerated cleanup.

So I strongly encourage you, Mr. Secretary, to look at that analysis again and provide the funding through the barter or sales to keep your commitment because I think it's the right commitment. I think it's good for taxpayers.

Secretary CHU. Yes.

Senator PORTMAN. Good for the site and good for the high tech jobs that are there.

Secretary CHU. Yes, Senator, we did do the analysis for barter and sales at the 10-percent level or below. Right now we see us bumping up hard against that. If you want to ask us to do an analysis higher than 10-percent we would be receptive, but I think Senator Barrasso is not here. But he might represent an alternate point of view because——

Senator PORTMAN. That's why I'm asking when he's not here.

[Laughter.]

Secretary CHU. OK.

Senator PORTMAN. No, I think, seriously the analysis done last year was, as I understand it, conclusive as to not having a market impact.

Secretary CHU. At the 10 percent level, but again because of all our obligations we're bumping up against that so we would have to do another analysis to go higher.

Senator PORTMAN. Are you committed to the accelerated cleanup?

Secretary CHU. We're committed to whatever the means we have and the constraints we have to do the best we can. If you want to ask us to do another analysis, we'd be delighted to.

Senator PORTMAN. We certainly would appreciate that analysis if that's what it takes to be able to keep the commitment because I do think it's the right thing to do for the taxpayer. It's also the right thing to do certainly to keep onsite a lot of highly skilled people who are otherwise going to be found without a job or moving on and more difficult to bring them back to continue the good work they're doing.

The other issue, of course, is we are very interested in being able to take some of the materials out of the decontamination and cleanup effort and be able to recycle those materials. We appreciate your continued cooperation with that effort. I know there's a concern with some of the other agencies looking at the safety of that. But we think that that is an enormous benefit again to the taxpayer and also through the processing provides good economic opportunities for our region.

Thank you, Mr. Chairman.

The CHAIRMAN. Senator Franken.

Senator FRANKEN. Thank you, Mr. Chairman. Thank you, Mr. Secretary for your patience.

I want to follow up on what Senator Sanders was talking about in terms of, I call it retrofitting. I've started a retrofitting initiative in my State called Back to Work Minnesota. I really believe that this is a low hanging fruit.

That we—what I'm trying to do is find innovative financing mechanisms to get that upfront money to retrofit commercial buildings, MUSH, you know, Municipals, Universities, schools and hospitals, etcetera, and residential buildings. Knowing that it pays for itself and it puts people back to work. It puts people in the building trades to work who are in depression or a recession right now.

They need the work. It helps our manufacturers in Minnesota and would do this all around the country. So it's sort of part of the President's Better Building Initiatives as well.

I'd like to just bring up a few little areas in this. You talked about utility companies can provide the financing for this. In Minnesota we have a mandate for utility companies that they have to increase the efficiency of their users by 1.5 percent a year.

This is a mandate that actually encourages the utilities to find retrofits that are energy efficient projects that they can help finance. I was wondering if you think there could be, if we legislated that as a national part of maybe the Clean Energy Standard, if that would be helpful?

Secretary CHU. I'm not sure. I think—I don't know whether that has a chance of passing, quite frankly. But let me just say——

Senator FRANKEN. Let's say it did.

Secretary CHU. That would be helpful.

[Laughter.]

Secretary CHU. Here's another thing that would be helpful. It happens now in New York and Massachusetts and California, maybe a couple other States, per the regulatory agencies who set the rates. Let's say that if a utility company gets an equal return on investment if they help a customer, a business, a home owner and they loan them money to retrofit, that that is seen as an investment of the utility company which they're entitled to a return on their investment.

Utility companies, a highly rated utility company, has access to fairly inexpensive capital.

Senator FRANKEN. Yes. That's why this is done.

Secretary CHU. They became a bank for the business, for the homeowner. So a moderate interest rate and you're entitled to recover for your investment in energy efficiency. So instead of building another power plant.

Senator FRANKEN. Oh, exactly. I mean, that's the whole—that's why Minnesota put this in.

Secretary CHU. Right.

Senator FRANKEN. Let me talk to you—I have limited time, PACE, Property Assess Clean Energy Financing. This is basically done for commercial buildings. We say, a State or a county can lend money to a commercial building to do a retrofit sometime and ESCO gets involved in this.

But some part of the financing can be this PACE which puts a property tax on that even if the building gets sold that property tax

continues. It's a great model. Again what I'm trying to do is just find financing models for this.

On residential PACE putting a property tax on doing retrofit, to finance a retrofit, the FHFA will not give mortgages to a residential—to a home with PACE because PACE would get paid back before the mortgage. Do you think that's a wise policy by FHFA? Is there anything you could do like give them—I've written them a letter. Would you join my letter or?

Secretary CHU. I've been talking to Shawn now a lot about this. He and I are trying to be as supportive as possible. I think the issue was that even the lenders don't want to even be pari passu.

Let's say you loan $200,000 to buy a home. The homeowner wants another $10,000 for home energy improvements. To have equal footing in the payback the lenders are fighting back. They say, no, we don't want you to do that.

You have to be high. That has to be—the PACE is viewed as essentially a mortgage and has to be behind the initial mortgage. Even to get it even would be of great help.

So we're trying to work this thing through. But the lenders really feel that nothing should stand in the way of them and the first mortgage.

Senator FRANKEN. Very often the lender would be the city or the county. This isn't when someone is buying the house. But it may be when they've been in the house for a while. It's just about making that home more efficient.

Again, putting people to work, putting people to work who are in the building trades. People who are in the manufacturing and making that home more energy efficient and bringing down the cost of energy in that community.

Secretary CHU. I'd love to talk to you. The time is up.

Senator FRANKEN. Yes.

Secretary CHU. If the Chair would indulge me a minute there are a couple of other ideas we think are worth thinking about.

On the commercial sector there are real estate investment trusts.

Senator FRANKEN. REITs.

Secretary CHU. REITs. We feel that all we need is perhaps just clarification from the Treasury that says that this real estate investment trust of a commercial building wants to invest in a new HVAC system or in more energy efficient windows. Let's just say an HVAC system.

Senator FRANKEN. OK.

Secretary CHU. Would you allow that to be written off, depreciated, as a capital expenditure cost? As differentiated from the depreciation rate for the building: Just the clarification of that, I think, would spur a lot of investment because these REITs, quite often, own office buildings and they pay the energy bill because, you know, occupants come and go and they don't want to separate the meter all the time. Then it goes into the rent.

So a very simple clarification could spur a lot of investment because it will make sense to them. It won't cost the government any money. But that would be good.

There are a couple of other things. I think if sometimes retrofits actually there's a community, a block, that wants to do. You know, a couple of homeowners get together and say, you know, one home-

owner has a good experience. Says, you know, I'm saving a lot of money.

But now you can capitalize on that and have the block party. Talk about it and make it a Groupon like thing, so if you get 5 people, 8 people to say we will do this. But you demand a discount rate, a 30 percent discount on the energy audit and the installation and everything else because to the contractor it's great. They send a truck out. They go bang, bang, bang, bang, down.

So that can greatly reduce the price of retrofitting. Drive it up and actually get some social awareness in this as well. But it's all about saving money by saving energy. The finance part of that, you know, if you lower the price by 20, 30, 40 percent, the finance decreases.

Go back to utility companies. Companies that have access to low cost financing and moderate interest rates, it's a no-brainer. You don't—not out of pocket expenses. You're saving more. In paying back the debt you're saving. The money to pay back the debt is less than the money for your energy bill and it's immediate jobs.

Senator FRANKEN. Exactly.

Secretary CHU. This is immediate jobs that could be for decades. Right? It's going to have 140 million homes.

Senator FRANKEN. Yes. Right.

Secretary CHU. Probably 80 million could use an energy uplift, facelift, or whatever you want to call it. So there are many things that we are mulling about and trying to get programs. We have a number of programs to—those are some of the ideas we're talking about also to stimulate State and local governments to think of better ideas.

Again, a lot of this can be driven by the private sector.

Senator FRANKEN. Absolutely. Absolutely.

Secretary CHU. Because energy efficiency does save money.

Senator FRANKEN. Absolutely. It doesn't need government money. It just needs——

Secretary CHU. Remodel.

Senator FRANKEN. Can my office work with your office because right now I have written down REITs and house parties.

Secretary CHU. Yes. Block parties.

Senator FRANKEN. Block parties. That's what I meant. Block parties, I'm glad you corrected me. Thank you.

Thank you, Mr. Chairman.

[Laughter.]

The CHAIRMAN. Thank you.

Senator Hoeven, you have the final questions. Assuming nobody else wanders in here which I very much hope isn't the case.

Senator FRANKEN. I want a third round on block parties.

[Laughter.]

The CHAIRMAN. I think we'll schedule that for the week after Christmas.

Go ahead, Senator Hoeven.

Senator HOEVEN. Thank you, Mr. Chairman.

Again, Mr. Secretary, thank you for being here. You've been out to our State, I think, several times. We appreciate it. We'd like to have you back.

But I really am looking for help on this vitally important issue of energy infrastructure. In our last question and answer period here we went through pipelines. You said, well we're trying to build all these pipelines. You talked——

If I could finish. You talk about all these pipelines we're trying to build around the United States. So my question to you is if we're—and you'll acknowledge that there's thousands of pipelines under the entire country. So why are we unwilling to build a pipeline that will bring crude in from Canada and will help us move our crude in the country?

Why is that?

Secretary CHU. First we're not unwilling. The President's position and the State Department's position, not the DOE's position, you know, we're not in the decision-making loop. We're asked to give technical advice on certain things, but that they wanted an evaluation of the environmental impact.

The pipelines that are being built in the country are investments of the private sector. I see a lot of healthy movement in the pipeline construction within the United States in large part because of the ability to get oil from shale-like rock. This is the big boom in your State. You've got to get that oil to the refineries. This is also wealth creation and it's decreased oil dependency, all good things.

The private sector is the one that is investing in these pipelines. That's what has brought about the only time the government steps in. There's FERC issues. But in terms of the one you're worried, concerned about is the one that goes across the border.

Senator HOEVEN. Right.

Secretary CHU. Then again that's a State Department issue.

Senator HOEVEN. If I may, Mr. Secretary, you brought up 2 great points.

Your technical advice, again, Department of Energy, this Administration's Department of Energy, the report I cited says that the Keystone XL pipeline will lower gas prices, not may will lower gas prices, East Coast, Gulf Coast even in the Midwest. In addition in that report also says that it concludes that the PAD3 refiners, the Gulf Coast refineries will likely consume additional Canadian oil sands well in excess of what would be provided by Keystone XL pipeline. Again, your experts.

The reason I cite this is because some have said well we'll bring it in from Canada and then export it somewhere else. But your own experts have said that it will be used here and we're going to need more, not less. So it won't be export.

So again on your technical advice you've said, the Department of Energy that it will reduce prices and it will be used here, not exported. Your experts. So I appreciate your technical advice. I think it's very good. I complement you for it and I thank you for it.

Second, private sector investment. This is a $7 billion private sector investment, the Keystone XL pipeline, not one penny of government spending. So again I go back and say given that it would bring us more crude which we otherwise have to get from the Middle East or Venezuela. You know what's going on in the Middle East.

It helps us with the bottlenecks. We have a $27 a barrel crude in my State. Unbelievable traffic up there which because of truck traffic and so forth, oil trucks that we'd like to use a pipeline for.

So not only do we have discounts for our producers. Not only do we have infrastructure problems. We have the consumer and businesses paying $3.50, I think it's $3.52 a day. The highest it's ever been this time of the year in our country which hurts our economy.

Why would we conceivably allow this? I don't understand it? When you said we're willing to build pipelines. I don't understand.

Secretary CHU. Senator, I don't know the particulars. I mean, usually when you have trucks. Trucks are short term, interim solution to a region if you expect sustained oil production. They're very expensive, as you well know as well as being very disruptive.

Senator HOEVEN. I agree.

Secretary CHU. So——

Senator HOEVEN. Which is why we need the pipelines.

Secretary CHU. So again, if we're talking about the trucks in North Dakota and Wyoming, the private sector, I don't know the particulars about this. But I think once you see a lot of truck traffic that's almost the last resort. You know, it goes pipeline then it goes rail and the last is truck.

Senator HOEVEN. Mr. Secretary, I'm looking for help here. Frankly, your experts have been helpful and they've been right on the money, literally. They have. They reported this thing straight up and I appreciate it.

Maybe we conclude with, as you know in our State, when we talk about all of the above of energy development, we don't just talk about it. We do it.

If you go to our State, you'll see wind.

You'll see biofuels.

You'll see ethanol.

You'll see biodiesel.

You'll see shale gas.

You'll see oil, the Bakken.

You'll see hydro.

Biomass.

All of these. In other words, we're really doing it. But the reality is to get to that all of the above that means we have to try to develop all of them, not pick winners and losers. So I'm looking for help in this endeavor.

Let's touch for just a minute on Insitu. Mr. Chairman, I may go over my time just a minute. I hope you'll indulge me.

With the development of the Canadian oil sands oil, 80 percent of the new development is Insitu. Where instead of excavating as is the traditional practice. You actually drill like you drill for conventional oil. You put steam down the hole and so forth.

So your greenhouse gas emission is the same as for conventional drilling, right?

So talk to me in terms of when, with Canada, United States and some help from Mexico we produce about 70 percent of our crude. We add Keystone we immediately go to 75 percent plus and we have the opportunity for much more. We then don't have to rely on the Middle East and Venezuela.

Eighty percent of the new development is Insitu which is the same footprint as conventional. Why wouldn't we be trying to do all of that that we can? From an energy standpoint the concept of North American energy independence isn't this a plan that gives us the opportunity to truly get to all of the above?

Why aren't we doing it? How can you help us get this done?

Secretary CHU. Again, first, I agree that Insitu is environmentally much preferred than the open pit mining that started with the oil sands.

Senator HOEVEN. Right.

Secretary CHU. Because it leaves a lot of the really gunky stuff that we don't want down in the ground.

Senator HOEVEN. But 80 percent of the new development is Insitu.

Secretary CHU. I understand that. It's still a little bit more carbon intensive because you're using fossil fuel to heat up the steam. But having said that, it is much preferred than open pit mining.

Again, it's not a question of why don't we. This is where industry is going because as they develop those sands they're finding out that they're going to have to go deeper. It doesn't make sense economically, the open pit mining.

There's also the environmental cleanup issues that they have to face when you have that open pit mining. So the Insitu recovery is much more desirable.

Senator HOEVEN. You address that problem too with Insitu, correct?

Secretary CHU. Again, because you're using natural gas to heat up the steam that is going to cause more carbon. But the refining issues are much easier, all sorts of issues are easier.

Senator HOEVEN. Thank you, Mr. Chairman. I appreciate it. I appreciate you being here.

The CHAIRMAN. Secretary Chu, you've been——

Senator HOEVEN. Mr. Secretary, excuse me.

Secretary CHU. Yes.

The CHAIRMAN. Yes, you've been very generous with your time. We appreciate you being here. So that will conclude our hearing.

[Whereupon, at 12:27 p.m. the hearing was adjourned.]

APPENDIX

RESPONSES TO ADDITIONAL QUESTIONS

RESPONSES OF HON. STEVEN CHU TO QUESTIONS FROM SENATOR BINGAMAN

R&D

Quadrennial Technology Review

Question 1. The DOE completed the first Quadrennial Technology Review in September 2011.

a. Can you explain how the QTR has influenced the FY2013 DOE budget? Please provide specific examples of programs that received increased or decreased funding based on the recommendations or findings of the QTR.

b. Please comment on the usefulness of the QTR in informing tough budget decisions or providing justification for various projects.

Answer (a). The Department's first QTR provided a framework and principles for planning and budgeting for technology development efforts across the Department's Energy and Science programs. For example, in FY2013, EERE has requested a budget that is consistent with the recommendations of the QTR, rebalancing priorities from mature technologies, such as onshore wind, distributed fuel cells, and conventional hydropower to support the development of newer, advanced technologies, such as off-shore wind and computational modeling of complex environments (coupling of wind and sea states and complex terrain). Additionally, EERE has shifted its investments in the mature, market-ready geothermal heat pump technologies away from technology development in the geothermal program to systems integration in the Buildings Program. The Biomass program is focusing further program shifts to drop-in hydrocarbons.

Answer (b). The DOE-QTR has proven to be a valuable process, leading to a robust framework for the Department's energy programs, as well as principles by which to establish multiyear program plans. These principles are useful in helping the Department judge the priorities of various technology efforts, and guide the budget process in determining priorities.

High Performance Computing

Question 2a. I am a strong supporter of the DOE's exascale initiative to further develop high performance computing. In 2011 I championed a letter, signed by 24 senators from both sides of the isle, asking the Administration to support the exascale initiative. I see in the Office of Science (SC) budget that Advanced Scientific Computing Research is funded at $455 million, an increase of 3.3%. Exascale has also been funded through the National Nuclear Security Administration (NNSA) in recent years' budgets. There is no specific line in either budget for the exascale initiative.

In FY 2013, what fraction of this funding is available for the exascale program? Please provide the budgeted amount for the exascale initiative both from the SC budget and from the NNSA budget.

Answer. Thank you for your continued support of the Department's exascale efforts.

In the FY 2013 NNSA budget request, $48.6 million is for activities that contribute to high performance computing advancements directly supporting NNSA's stockpile stewardship mission but that NNSA considers relevant to the Department's efforts toward exascale.

In the FY 2013 SC budget for Advanced Scientific Computing Research, $68.5 million, will be spent on exascale activities including Research and Evaluation Prototypes partnerships with industry for advancing critical technologies for Exascale, Computer Science research in software environments, Applied Mathematics research in uncertainty quantification, and co-design efforts in Computational Part-

nerships. If FY 2013, funding for hardware research will focus on R&D in breakthrough technologies that will enable novel hardware designs for Exascale computing with priority given to early-stage technology development.

Question 2b. The Chinese and Japanese are investing heavily in high performance computing and the race to exascale capability. Is the DOE still on track to achieve exascale by the end of the decade and does the budgetary commitment for exascale put us in a competitive position?

Answer. The DOE exascale initiative is about enabling certain science and engineering capabilities that we believe will advance the DOE missions and U.S. competitiveness in important areas. This goal has a number of critical milestones that must be achieved along the way. For example, to deliver more advanced computing capabilities, we must significantly reduce the power requirements of computing hardware. Achieving our goals for power reduction will have a significant positive impact throughout the IT sector of our economy and will be particularly important for scientific computing as tomorrow's departmental machines have today's supercomputers' capabilities. Equally important are our investments in applications, software and tools that will open high performance computing to even more research communities. With or without a machine that executes a billion billion operations per second, the investments the Department is proposing in the FY 2013 budget request advance the competitive position of the United States. We believe that the partnership between the NNSA and the Office of Science, with a balance between near-term and long-term efforts, is the right approach.

SMALL MODULAR REACTORS

Question 3a. For Fiscal Year 2013, the Department continues it program to work with industry to help license small modular reactors. How long does the Department believe it will take to successfully license these designs before the NRC?

Answer. The Department will soon be releasing a funding opportunity announcement (FOA) for cost-shared industry partnerships with SMR vendor and licensee teams for technical support for two SMR designs. The current domestic SMR vendors are expected to submit DC applications in the 2013-2014 timeframe, implying that certification can be completed in 4-5 years. Utility operating licenses will be submitted and completed concurrently in this timeframe. However, the actual licensing schedule will be highly dependent on the quality of the application, the extent of safety issues that surface during the review, and the resources that the NRC is able to commit to these reviews.

Question 3b. What progress toward SMR's has been made to date?

Answer. The Department received its FY12 budget for the SMR Licensing Technical Support program in December 2011. A draft SMR FOA was issued for comment in January 2012 to ensure industry understanding of and involvement in the procurement process. Under the current schedule, the Department expects to issue the final FOA at the end of March 2012, conduct a merit review and selection process during summer 2012, and announce award selections by September 2012. The Department is committed to reducing the time required to fund these awards, if possible. Once underway, we expect the financial assistance provided by this program to provide noticeable acceleration in the licensing processes for the selected projects.

DOE is also providing funding for Advanced SMR R&D that is intended to improve the commercialization potential of SMR designs with longer licensing horizons. DOE is taking a deliberate approach to identifying a R&D portfolio that will address SMR-specific issues in areas like instrumentation and control, thermal hydraulics under natural circulation conditions, probabilistic risk assessment for the unique operating characteristics of SMRs, and other areas where there are pronounced technology gaps.

INNOVATION HUBS

Question 4. The Department is proposing the addition of a new innovation hub in electricity systems. Please explain what this hub will add to the Department.

Answer. The Hub will serve as a focal point for many grid activities at the Department. It will establish a platform to test and evaluate innovative grid technologies and concepts on real electricity systems. The types of topics addressed through the Electricity Systems Hub are different from those that have been addressed through the Department's other Hubs, in that conditions and system needs vary throughout the country and must be incorporated into national solutions. In light of this particular challenge, two or three regional hubs rather than one single larger hub may be pursued to address the complex regional and local issues associated with grid modernization. By understanding the unique demands of each region,

we can identify the needs common to all, and develop solutions that apply nationwide but accommodate local differences.

Key stakeholders can convene at the Hub to observe, discuss, and understand the market, regulatory, and institutional implication of these advancements. It will be a leader in transforming our Nation's power system and serve as a center of excellence for sharing information and best practices.

TECHNOLOGY TRANSFER

Question 5a. We hear a lot about the technology "valley of death" and I understand that the DOE has a new program, Agreements for Commercializing Technology or ACT, to try to bridge this gap. Can you describe how this initiative differs from other DOE methods of Technology Transfer?

Answer. The Agreement for Commercializing Technology (ACT) was proposed based on responses and recommendations received from industry to a 2009 Request for Information (RFI). The RFI provided stakeholders, including the private sector and other government entities, an opportunity to comment on the Departments best practices for technology transfer. DOE is piloting a new contractual mechanism to address many of the concerns and recommendations raised by the respondents.

While the general parameters of this proposal would allow greater latitude to M&O contractors for entering into Work for Others (WFO) with outside entities, we are continuing to develop the specifics of this proposal in a manner that will protect taxpayer interests.

Question 5b. Can you talk a little bit about overall DOE efforts to move products from the Department to the market?

Answer. DOE works with the private sector to facilitate industry in its efforts to move technology to market. DOE's objective in the area of technology transfer and commercialization is to facilitate the transfer of laboratory research to the marketplace as quickly and efficiently as possible. To this end, we are working to reduce the actual and perceived barriers to licensing.

DOE is aggressively examining licensing practices to attract and facilitate work with both large and small companies. DOE plans to introduce SBIR-Technology Transfer, which would be a subset of the larger SBIR program. This model was spearheaded by NIST and aims to mature technologies developed at the laboratories. A laboratory will identify a technology along with the corresponding patent portfolio, which will be proposed for funding through an SBIR call. Small companies will be invited to submit their commercialization plans for technologies selected.

URANIUM RE-ENRICHMENT

Question 6. Mr. Secretary, what are the DOE's current plans with respect to re-enrichment of depleted uranium from the existing stockpile?

Answer. The Department has been working diligently to determine the best options and potential agreements with private industry partners with respect to our depleted uranium inventory with highest uranium assay. DOE is committed to working with the Congress as we evaluate alternatives that are beneficial to both the Department's missions and our fiduciary responsibility to the taxpayers.

NEW MEXICO ISSUES

Chemistry and Metallurgy Replacement Nuclear Facility at Los Alamos Laboratory

Question 7a. Secretary Chu, during the hearing you talked a bit about the Department's plans to put the Chemistry and Metallurgy nuclear facility on hold. Can you describe what changes in operations and staffing you anticipate at Los Alamos now that he CMRR has been delayed?

Answer. The decision to defer construction of the CMRR Nuclear Facility (NF) for at least five years and to meet DoD long-term pit production needs requires NNSA to adjust its plutonium strategy by using existing infrastructure to provide for the capabilities originally planned for the CMRR-NF. Over the next several weeks, NNSA will be working with key officials at Los Alamos to identify plans to close out design activities for the CMRR-NF and modify our plutonium strategy to meet the needs of the nation's deterrent. While details of our plutonium strategy continue to develop, initial efforts focus on optimizing analytical chemistry activities in the Radiological Laboratory/Utility/Office Building (RLUOB) and using the Plutonium Facility (PF)-4 for some materials characterization workload. Impacts to staffing are pending Los Alamos Laboratory assessments on the technical and scientific expertise required to maintain its scientific and national security mission in support of the stockpile and required to support the safe and secure execution of the additional capabilities planned and needed for the RLUOB and the PF-4.

Question 7b. Will additional funding for Los Alamos be needed to maintain adequate support to the complex?

Answer. After evaluating the laboratory's proposal on how to address the CMRR-NF deferred capabilities using existing infrastructure, the NNSA will have a better understanding of future funding requirements. In the interim, NNSA requested an additional $35M for FY2013 for Los Alamos to accelerate actions necessary to process, pack, and ship excess material out of the PF-4 vault. The Administrator and the head of NNSA's Office of Defense Programs have made it clear that NNSA intends to work closely with Congress to ensure appropriated resources can be applied to near term alternatives to deliver required plutonium support functions at Los Alamos.

ADVANCED MANUFACTURING

Question 8a. What are the goals of the new Advanced Manufacturing Office (previously the Industrial Technologies Program)? Some manufacturers are concerned that DOE will not be able to continue to provide near term assistance for small to medium sized manufacturers—please address this concern.

Answer. The Advanced Manufacturing Office (AMO) is focused on creating a fertile innovation environment for advanced manufacturing, enabling vigorous domestic development of new energy-efficient manufacturing processes and materials technologies to reduce the energy intensity and life-cycle energy consumption of manufactured products, and promoting a collaborative infrastructure around targeted technical areas that will facilitate the development and scale-up of energy efficient manufacturing technologies. AMO also supports U.S. manufacturers through technology deployment efforts targeted to help those manufacturers overcome specific barriers to adoption of energy efficient technologies and best energy management practices as a path to strengthen their global competitiveness.

As part of its deployment activities, AMO will continue to provide immediate assistance to small and medium-sized enterprise (SME) manufacturers through its ongoing support for the Industrial Assessment Centers, which provide students with critical skills and training to conduct energy assessments in a broad range of facilities, while producing real cost savings for small to mid-size manufacturers. AMO will also help SMEs by preparing and updating a variety of other energy efficiency software tools, training, and guidance materials that SME customers can effectively apply to find energy savings.

Question 8b. What are the goals of the new Advanced Manufacturing Office (previously the Industrial Technologies Program)? Is DOE committed to continuing the Industrial Assessments Centers and Clean Energy Application Centers?

Answer. The Advanced Manufacturing Office is committed to continuing the Industrial Assessment Centers (IACs) as part of its work to help manufacturers overcome specific barriers to adoption of energy efficient technologies and strengthen their global competitiveness. In September, 2011, as part of a competitive funding process, AMO selected a new group of 24 IACs located across the country to carry on and enhance the work of the program.

DOE will also continue to support the Clean Energy Application Centers (CEACs) that provide outreach and technology deployment expertise to industry stakeholders as a strategy to accelerate the adoption of clean energy technologies including, principally, CHP under the funds requested for Industrial Technical Assistance ($31 Million).

Question 9. The recent Innovative Manufacturing Initiative funding opportunity through the Advanced Manufacturing Program received 1400 letters of intent of which 78% were small companies of less than 500 employees. As I understand it, the initiative requires a cost share from industry partners. The successful call showed that industry partners were willing to shoulder $4.3 billion in leveraged funding to develop innovative manufacturing processes and materials, which indicates there is an appetite for increased partnerships between government and small businesses to revitalize manufacturing in the United States. How much of the Advanced Manufacturing Program requested budget is allocated to the Innovative Manufacturing Initiative in 2013 and are there any similar leveraged partnership programs within DOE that you would like to highlight?

Answer. The Advanced Manufacturing Office (AMO) plans to allocate $25 million from its FY 2011 funds to support projects selected through the Innovative Manufacturing Initiative (IMI) funding opportunity during 2012. Funding provided through the IMI solicitation is to extend over three years to help develop transformational manufacturing technologies and innovative materials that can reduce time, cost, and energy requirements associated with manufacturing. AMO's plan is to spend $50 million in support of IMI projects in FY 2013. All solicitations put out

by AMO are designed to require significant cost share depending upon the technology readiness level of the project. AMO views the cost share as an important requirement to encourage leveraged partnerships.

Question 10. The return on investment in Combined Heat and Power Technology has been impressive. For example, a DOE investment of approximately $12 million at Caterpillar resulted in an estimated $3.0—$4.0 Billion in sales and 44% improvement in energy efficiency. Of the $290 million requested for the Advanced Manufacturing Program, how much of that is allocated to developing CHP technology and does this represent an increase or decrease from 2012 enacted levels?

Answer. The Advanced Manufacturing Office (AMO) is committed to supporting Combined Heat and Power projects in its portfolio so long as these projects continue to meet their technical milestones and overall AMO objectives. Existing CHP R&D projects and new CHP R&D activities will be supported through the funds requested for Next Generation Manufacturing Processes $198 million. Funding levels for AMO's CHP projects included in the 2013 budget request will be similar to 2012 levels, as long as the projects demonstrate satisfactory progress and continue to support AMO's core objectives. The Clean Energy Application Centers (CEACs) provide technical assistance, education and outreach, and market development support to industry stakeholders as a strategy to accelerate the adoption of clean energy technologies including, principally, CHP. The CEACs will be supported under the funds requested for Industrial Technical Assistance ($31 Million). The CEACs will also be supported at a level similar to FY12.

Question 11. The President's budget has an increase in the Fossil Energy research and development over the last fiscal year—with much of the focus on carbon capture and sequestration technologies, as well as the safe and environmental exploration and production of unconventional shale gas plays, such as the Marcellus. Please describe a bit more how the Department is spending the funding in this area and how it will leverage the work that the other agencies are conducting on the same areas of research and regulatory development—including the EPA and the Department of the Interior.

Answer. DOE's FY 2013 Natural Gas budget request for shale gas will focus on high priority research recommendations received from the Subcommittee of the Secretary of Energy Advisory Board (SEAB). On April 13, 2012 DOE, the Environmental Protection Agency, and the Department of the Interior's U.S. Geological Survey signed a Memorandum of Agreement formalizing this Multi-Agency Collaboration on Unconventional Oil and Gas Research. Through this collaboration, a robust Federal R&D plan is being developed, taking into account the recommendations of the Secretary of Energy Advisory Board (SEAB) Natural Gas Subcommittee. DOE's role in this initiative will focus on priorities identified by the interagency collaboration in a research plan to be formed over the next nine months within its area of core research competencies, including wellbore integrity, flow and control; green technologies; and systems engineering, imaging and materials.

Question 12. There are several rescissions cited in the FE budget overview—from the FE R&D program—most notably in the area of ultra-deepwater and unconventional natural gas. In the detailed budget—there is a budgetary request of $17 million for FY 2013 for the natural gas program, while the ultra-deepwater unconventional natural gas program appears to be cancelled altogether. I ask this because the Secretary of Energy's Advisory Board Subcommittee on Shale Gas proposed making greater investments into studies, as well as R&D for safe, responsible shale gas extraction. The $17 million that is requested appears to pay for natural gas technologies (at $12million), as well as $5 million for a methane hydrates field test, which is a cut of 50% from the previous fiscal year. That seems like an extremely modest investment for trying to address the range of environmental and human health and safety issues that shale gas production has generated and the challenges associated with methane hydrate extraction. Can you explain why the whole $50 million ultradeepwater/unconventional natural gas program funding wasn't used to more properly address the issues around shale gas development, as well as other unconventional oil/gas production (such as shale oil like the Bakken formation in North Dakota)? That seems like it could fit will within the constraints of the existing program authorizations for the ultradeepwater/unconventional program.

Answer. EPACT Sec. 999 is too inflexible a mechanism to adequately address environmental and safety concerns in the dynamic and rapidly evolving hydraulic fracturing space. The 2013 Budget request focuses the natural gas program on a collaborative R&D effort with the Environmental Protection Agency and the Department of the Interior to understand an minimize the potential environmental, health, and safety impacts of natural gas development through hydraulic fracturing consistent with high priority recommendations of the Secretary of Energy Advisory Board.

ENERGY EFFICIENCY

Question 13. FEMP is bringing back the Federal Energy Efficiency Fund at $5 million in funding. What is the expected leverage of private sector and/or other agency funds for this $5 million investment? (It is my understanding that in the 90s the Navy was able to leverage over 4 times their investment by using ESPCs.)

Answer. Similar to the DOD's Energy Conservation and Investment Program (ECIP), through the Federal Energy Efficiency Fund (FEEF), FEMP would provide direct funding and leveraged cost-sharing for Federal civilian agencies for the most worthy capital projects and other initiatives with the greatest return on investment in order to increase the energy efficiency, water conservation and renewable energy investments at agency facilities. We expect that the leveraging of other civilian agency funds to DOE funds would be about one to one, and FEMP would include this expectation as well as consideration of other private sector leveraging, in our criteria for competitively awarding projects. In the two years that this program had spending authority (FY 1994 and FY 1995), grants of $7.9 million were provided to 37 projects which leveraged $3.6 million in Federal-agency funding and $0.9 million in non-Federal funding.

Question 14. There are a growing number of DOE and other programs that ask manufacturers or private owners of commercial buildings to commit to voluntary energy-saving targets or actions: at DOE alone these include Save Energy Now, Superior Energy Performance and "Global" Superior Energy Performance, and most recently Better Buildings/Better Plants. Prior to these, EPA has had the Energy Star for Buildings and Energy Star for Industry programs. And outside the government, the US Green Building Program's LEED rating for Existing Buildings has a significant energy component. Does this create confusion in the market place, with multiple programs all vying for attention and commitment from the same private companies? What will DOE do, working with EPA and others, to reduce the apparent duplication and confusion?

Answer. DOE recognizes the importance of reducing duplication and confusion in the marketplace and seeks to work with programs like LEED and Energy Star as partners, not competitors. That is why DOE has an MOU with EPA (available at: http://www.energystar.gov/index.cfm?c=partners.mou) recently updated in 2009, to clearly lay out plans (updated annually) for how we will work together, and to articulate these plans to our mutual partners. However, we also recognize that there is always room for improvement. This year, we intend to undertake a comprehensive evaluation of our energy efficiency partnership programs to determine where it makes sense to streamline and consolidate activities to make sure that the programs we support are efficient, robust, and making valuable contributions that complement—rather than duplicate—efforts underway elsewhere.

For the other DOE programs mentioned, they are each related to each other in a complementary manner. For instance, SEP (and GSEP, which is the international companion program) is a technical program that supports and aligns with Better Buildings, Better Plants Program, which is the overarching program (and has replaced Save Energy Now).

Our role is to provide a technically sound, unbiased and transparent program that allows consumers a common comparison of results.

Question 15. With the initiation of the various Research Hubs, DOE's EERE program seems to be much more focused on R&D than on deployment issues. Can you please tell me whether and how much of a role DOE plans to play in deployment of Energy Efficiency technologies?

Answer. EERE supports innovation that will allow U.S. manufacturers and U.S. workers to lead the race and secure the benefits of clean, energy efficient domestic energy systems as a foundation for a prosperous American future. EERE directs and manages a portfolio of activities, including research hubs, to foster and support technological solutions across the research and development (R&D) continuum, bridge gaps by increasing product performance and knowledge, and attract commercial resources necessary for commercialization at a convincing scale. EERE's portfolio includes strategic investments in research areas where risks and other factors stymie immediate private research investment or would otherwise not occur for many years, and areas where programs are developed to overcome market barriers to help important new technologies reach a point where private investment will be able to turn them into profitable business opportunities.

The primary mission of the Building Technologies Program (BTP) is to reduce building energy consumption in the U.S. through the development of advanced, innovative technologies; we will not be able to actually deliver those energy savings to U.S. consumers unless these products are used in the market, at scale. Therefore, the Program also supports market-priming measures to ensure that these tech-

nologies overcome the barriers to widespread adoption, such as first cost, the various building trades' understanding and then acceptance of new technology, and insufficient availability of credible and objective consumer information. BTP has a significant number of deployment related activities, including:

- BetterBuildings Challenge—The BetterBuildings Challenge will document successful models of increased investment in commercial building energy efficiency that improve efficiency by at least 20 percent by 2020.
- High-performance Product Specifications and Markets—DOE will work with commercial building stakeholders to identify and develop high-performance product specifications, and then use the Better Buildings Alliance, composed of companies and stakeholders, to stimulate and drive demand for advanced technologies identified as having large opportunities for energy savings.
- Efficiency Benchmarks, Tools, and Databases—The creation of reliable efficiency benchmarks, tools and databases to facilitate energy efficiency financing, technology deployment, and sustainable business models, and to define efficiency's value-add to consumers (BetterBuildings Residential and Commercial, Energy Star);
- Energy Efficient Buildings Hub—The creation of the Energy Efficient Buildings Hub in Pennsylvania to demonstrate the integration of advanced, energy efficient technologies, systems and techniques into buildings, and to facilitate their scale deployment into the market; and
- Common Test Procedures—Developing common test procedures (i.e., supporting both Energy Star and Federal Standards) and new standards for new energy consuming equipment and new buildings with continually updated equipment and model building codes based on cost effective, higher performing technology that has been successfully commercialized.

Within EERE, the U.S. Department of Energy's Advanced Manufacturing Office (AMO) works specifically to support existing U.S. manufacturers through technology deployment efforts targeted to help manufacturers overcome specific barriers to adoption of energy efficient technologies and best practices as a path to strengthen their global competitiveness. AMO pursues this goal through a combination of education, recognition, and deployment expertise tailored to the particular challenges faced by manufacturers and the energy management industry. Included among these activities are:

- Industrial Assessment Centers (IACs)—A network of university-based, DOE-supported programs that conduct energy audits for small and medium size manufacturers while simultaneously training engineering students to help them become the next generation of energy management professionals.
- Superior Energy Performance—A market-based, American National Standards Institute (ANSI)-accredited energy management certification program that provides manufacturers and industrial facilities with a roadmap for achieving continual improvement in energy efficiency while maintaining competitiveness. The program provides a transparent, globally accepted system for verifying energy performance improvements and management practices, and also serves as an implementation of the International Organization for Standardization (ISO) 50001 energy management system standard.
- Clean Energy Regional Application Centers—These centers provide outreach and technology assistance to industry stakeholders as a strategy to accelerate the adoption of clean energy technologies—principally combined heat and power (CHP)—helping manufacturers save energy and money.
- The Better Buildings, Better Plants Challenge and Program—This is a national partnership program that aims to drive a 25% reduction in industrial energy intensity over 10 years in order to improve energy efficiency and enhance the overall competitiveness of the U.S. manufacturing sector. These public/private partnerships will also help to create energy efficiency oriented American jobs as companies execute energy saving programs, implement technologies, and share best practices as part of their corporate commitment to the program.

Question 16. DOE and OMB have recently begun missing legal deadlines for appliance and equipment efficiency standard rulemakings. Can you tell us what the problems are and what you are doing to catch up so that all rulemakings can get back on track?

Answer. The passage of EISA 2007 substantially increased the workload of the Appliance Standards Program, adding new statutory obligations to the initial multi-year rulemaking schedule in the January 31, 2006, report to Congress. Since EISA 2007 established an aggressive schedule for completing these additional

rulemakings, DOE is working on many more contemporaneous rulemaking proceedings than had been contemplated at the time of the initial report to Congress.

Since publication of the initial report, DOE has issued efficiency standard final rules for 21 of the 22 original backlogged products and completed a determination for the remaining product. Consequently, all the actions required by the consolidated consent decree in State of New York, et al. v. Bodman and NRDC, Inc., et al. v Bodman have been completed. Yet the coincident requirements of the backlog and EISA 2007 strained the standards review and approval process. While DOE met all of its obligations with respect to the consent decree, DOE has missed several deadlines codified in EISA 2007. These rulemakings are priorities for completion, and DOE remains committed to complying with all applicable deadlines. As a result, DOE has further streamlined standards and test procedure reviews and approvals, and is building additional program capacity. DOE is also working closely with the Office of Management and Budget (OMB) to review key rulemaking documents, such as notices of proposed rulemaking (NOPRs) and final rules. The department will continue to monitor and seek to improve the rulemaking review and approval process so as to meet all rulemaking requirements.

Question 17. This budget includes some significant increases for energy efficiency programs, How does energy efficiency programmatic spending compare to other spending with regard to the economic benefits?

Answer. Energy efficiency programs help American families, businesses, and government save money, reduce harmful emissions, as well as reduce energy consumption and our nation's reliance on oil.

For example, the FY2013 request makes a large investment into Advanced Manufacturing, which will support development of innovative energy-efficiency manufacturing processes that will reduce costs of manufacturing by using less energy while improving quality and accelerating product development. Additionally, with buildings representing 40 percent of the nation's energy consumption—costing over $400 billion per year—DOE will make greater investments in partnership with the buildings industry to make buildings more efficient and affordable. DOE believes the energy costs from buildings could be reduced by 20-50 percent or more through a variety of energy efficiency approaches.

Question 18. To what extent would the programs under the Office of Energy Efficiency and Renewable Energy (EERE) be impacted if tax and mandatory spending were not reformed, and the Fiscal Year 2013 sequestration were sustained?

Answer. We urge Congress to enact balanced deficit reduction legislation that avoids sequestration as proposed in the President's Budget.

Question 19. How do energy efficiency initiatives/investments fit in the broader context of the ongoing debate to lower the deficit, strengthen the economy and create jobs?

Answer. Investments in energy efficiency activities and initiatives provide some of the greatest economic benefits per dollar spent. EERE's efforts contribute to these economic benefits by:

- Providing American businesses and households with low-cost energy services by furthering low cost renewable supplies and energy efficient products and systems;
- Developing approaches and supporting industries that can accelerate economic growth and job creation while improving the environment by both reducing greenhouse gas emissions and improving air and water quality;
- Insulating the U.S. economy from the price and supply uncertainties associated with petroleum, and ensuring diversity and choice in the way energy services are produced.

EERE achieves this by developing and accelerating the adoption of a new generation of energy efficiency technologies—buildings, factories, and vehicles that are clean, safe, efficient, and productive. EERE supports innovation that will allow U.S. manufacturers and U.S. workers to lead the race and secure the benefits of clean, domestic energy systems as a foundation for a prosperous American future.

Question 20. Over the last year, you have changed the name of the Industrial Technologies Program to the Advanced Manufacturing Office. How does the new program square with the current deployment needs of today's U.S. manufacturers to become more energy efficient in order to remain competitive and keep operating in the United States? What is the funding level for Combined Heat and Power?

Answer. A continuing part of the mission of the U.S. Department of Energy's Advanced Manufacturing Office (AMO) is to support existing U.S. manufacturers through technology deployment and technical assistance efforts targeted to help manufacturers overcome specific barriers to adoption of energy efficient technologies and best practices as a path to strengthen their global competitiveness. AMO pur-

sues this goal through a combination of education, recognition, and deployment expertise tailored to the particular challenges faced by manufacturers and the energy management industry. Included among those activities are:

- Industrial Assessment Centers (IACs)—A network of university-based, DOE-supported programs that conduct energy audits for small and medium size manufacturers while simultaneously training engineering students to help them become the next generation of energy management professionals.
- Superior Energy Performance—A market-based, American National Standards Institute (ANSI)-accredited energy management certification program that provides manufacturers and industrial facilities with a roadmap for achieving continual improvement in energy efficiency while maintaining competitiveness. The program provides a transparent, globally accepted system for verifying energy performance improvements and management practices, and also serves as an implementation of the International Organization for Standardization (ISO) 50001 energy management system standard.
- Clean Energy Regional Application Centers—These centers provide technical assistance, education and outreach, and market development support to industry stakeholders as a strategy to accelerate the adoption of clean energy technologies—principally combined heat and power (CHP)—helping manufacturers save energy and money.
- The Better Buildings, Better Plants Challenge and Program—This is a national partnership program that aims to drive a 25% reduction in industrial energy intensity over 10 years in order to improve energy efficiency and enhance the overall competitiveness of the U.S. manufacturing sector. These public/private partnerships will also help to create energy efficiency oriented American jobs as companies execute energy saving programs, implement technologies, and share best practices as part of their corporate commitment to the program.

With specific regard to Combined Heat and Power (CHP), AMO is committed to supporting deployment efforts as well as research and development projects in its portfolio so long as these projects: 1) continue to meet their technical milestones, and 2) support AMO objectives. Existing CHP R&D projects and new CHP R&D activities will be supported through the funds requested for Next Generation Manufacturing Processes ($198 Million). The Clean Energy Application Centers (CEACs) will be supported under the funds requested for Industrial Technical Assistance ($31 Million).

Question 21. The budget reorganization at the Office of Energy Efficiency and Renewable Energy means that that there is no longer specific budget information for most programs. Could you provide us with the FY 2012 and proposed FY 2013 budgets for building energy codes, equipment standards and analysis, Energy Star (DOE portion), and superior energy performance?

Answer. Below are the funding levels in FY12 and FY13 for selected Building Technologies programs:

Funding for BTP Subprograms ($000)

Subprograms	FY2012	Proposed FY2013
Building Energy Codes	8,500	9,500
Equipment Standards and Analysis	51,246	81,750
Energy Star (DOE portion)	7,000	7,000
Superior Energy Performance (BTP Portion)	1,750	1,750

Question 22. DOE has helped recent model building energy codes achieve extraordinary success, with 30% savings for both homes and commercial buildings. What are your plans for building on that success? Will you consider making adoption of the new codes a criterion or scoring factor for state and local grants, as you did with the Better Buildings community program?

Answer. With each new edition of the IECC, DOE is required to publish a determination whether the new edition will improve energy efficiency in residential

buildings. DOE published the preliminary determination in the October 19, 2011 Federal Register, that the 2012 IECC would achieve greater energy efficiency in low-rise residential buildings than the 2009 edition. The final determination is currently being developed. Once a final determination is issued, each state will have two years to certify that it has compared the provisions of its residential building code to the 2012 IECC and has determined whether to revise its code to meet the 2012 IECC.

DOE published the ASHRAE 90.1-2010 Final Determination in the October 19, 2011 Federal Register that ASHRAE 90.1-2010 would achieve greater energy efficiency in commercial buildings than ASHRAE 90.1-2007. States have two years after publication of DOE's Final Determination to certify that the state commercial building code meets the provisions of ASHRAE 90.1 2010. Those certification letters are provided to the Office of Weatherization and Intergovernmental Programs that implements the Department's State Energy Program.

DOE participates in advancing codes on the national stage, however adoption, implementation, compliance and enforcement at the state and local level are key to ensuring the full energy savings potential of those codes and standards are realized. The DOE Buildings Technology Program (BTP) facilitates code adoption by providing a robust technical support infrastructure to help states in taking the next step. To make adoption easier for states BTP provides numerous tools and support, ranging from technical analyses of proposed state code amendments to code-compliance software. To ensure transparency in DOE's development and deployment process, and to uphold the economic feasibility of the codes, DOE developed a Residential Cost Database and solicited input to improve its methodology for assessing the cost-effectiveness of residential building energy codes. DOE's Residential Cost-Effectiveness Methodology, which explains how DOE evaluates the energy and economic impacts of codes, was made publicly available via the www.energycodes.gov website, in April 2012. The Residential Cost Database was made available in May 2012.

Question 23. The President recently committed to $2 B in performance based contracting at federal agencies using private sector funds. We are encouraged by this announcement but note that the budget, if you take out the new funding for the FEEF, is actually reduced from last year. Will FEMP have the resources to comply with the Executive Memo and the many other statutory and executive mandates?

Answer. FEMP does not anticipate a need for additional resources to support agencies in attaining this goal. FEMP is currently exploring methods of improving its delivery processes to be able to adequately respond to the Agencies, including both a request for information to improve and lower financing and a review to streamline the ESPC contracting process.

Question 24. How can FEMP gain leverage over the other agencies of the Federal government to comply with their energy related mandates? Or does there need to be someone at the White House that further leverages agency actions?

Answer. FEMP is the lead program in terms of collecting and reporting on federal progress toward the goals, and is the lead program in providing guidance, technical support, training, tools such as ESPCs, as they relate to energy policy implementation. FEMP has not been given further oversight responsibilities relative to other agencies.

However, FEMP does provide support to OMB in assessing agency progress toward achieving energy-related goals, coordinating the Interagency Energy Task Force and its sub-working groups including the Interagency Sustainability Working Group (ISWG). The ISWG was established in August 2001 and includes over 200 members representing 20 major and a number of independent Federal agencies. Through these working groups, FEMP recommends policy and reporting guidelines and develops technical guidance, web-based reporting and other tools to support the implementation of agency energy and sustainability requirements for Federally-owned, operated, and leased buildings. FEMP also provides support to OMB and the Agencies in compiling data and complying with the federal Greenhouse Gas emission reduction targets and OMB Sustainability/Energy Scorecard assessments as directed by Executive Order 13514.

Each year, FEMP reports findings to OMB and the Council on Environmental Quality (CEQ) of calculated scope 1, 2, and 3 GHG emissions from agency-aggregated energy and operations data. FEMP collects required data elements for measuring agency progress towards meeting facility energy intensity reduction goals (42 U.S.C. 8253(a)), renewable electricity use requirements (42 U.S.C. 15852), water intensity reduction (E.0. 13514), facility metering requirements (42 U.S.C. 8253(e)) and compliance with Federal energy efficiency standards for new construction (10 CFR Parts 433, 434, and 435, 72 FR 72565). The results of this data are compiled and used by OMB to track agencies' progress in the OMB Agency Sustainability/ Energy Scorecard.

FEMP also provides services, tools, and expertise to Federal agencies to help them achieve these goals. FEMP's range of services includes project financing, technical assistance, award programs, communications and training.

HYDROGEN AND FUEL CELL TECHNOLOGIES

Question 25. The Department has made great progress in hydrogen fuel cell research, however, this technology is far from mature. Given the continued strong funding of fuel cell research in Japan and Germany, I am concerned about the proposed 20% reduction in hydrogen research for FY 2013. Can you please explain the reasoning behind the proposed budget reductions in this area?

Answer. The budget request for hydrogen and fuel cells has been reduced as part of rebalancing the Department's portfolio of advanced technologies. However, hydrogen and fuel cells research and development remains an integral part of that portfolio. The budget request for fiscal year 2013 allows the Department to focus on hydrogen and fuel cell activities that will yield technology advancements in key areas—including ongoing reductions in the production cost and improvement in the durability of fuel cells, reductions in the cost of renewably produced hydrogen, and improvements in systems for storing hydrogen. Funding has been reduced for aspects of the program with less impact on R&D progress, such as technology validation, codes and standards, and market transformation. Rebalancing the portfolio will allow the Department to focus on nearer term transportation technologies while maintaining a strong effort in hydrogen and fuel cells R&D. The FY 2013 budget request should allow the United States to maintain its leadership position in the emerging hydrogen and fuel cell market.

HYDROPOWER

Question 26. The proposed 66% reduction in funds for the Water Power Program in EERE appears to be a departure from the President's goal of generating 80% of the country's electricity from clean energy sources by 2035 of which conventional hydropower and marine hydrokinetic power together are projected to contribute 15% of that objective. While the budget justification suggests that this is due in part to the successful completion of several conventional hydropower projects, the marine hydrokinetic power program will also suffer shortfalls if this budget is enacted. Would you please describe more fully the Department's justification for cutting this specific program within EERE?

Answer. In FY 2012, the Department will continue and complete a number of important water power technology research and development projects. The $20 million requested in FY 2013 would allow the Department's Water Power Program to continue its ongoing efforts to advance water power technologies and accelerate their market adoption. This funding level would allow DOE to support a number of water power technologies that can be developed for both conventional hydropower and the emerging marine and hydrokinetic (MHK) energy generation.

For hydropower specifically, DOE selected 16 new innovative hydropower technology development projects for funding in FY 2011, and that work will continue into FY 2012 and FY 2013. Additionally, DOE expects to continue its efforts to analytically quantify the benefits that conventional and pumped-storage hydropower provide to the electric grid, which can also support the integration of variable renewable resources like wind and solar.

For MHK technologies, in FY 2013 activities are expected to focus on developing a suite of technologies that harness the energy from wave, tidal, and current resources. Specifically, MHK research is expected to focus on maintenance and development of advanced open water test infrastructure for MHK devices and research into the costs and performance of innovative, early-stage MHK systems and components.

Finally, resource and technology assessments will be conducted in FY 2012 and FY 2013 to accurately characterize all opportunities for water power development. DOE intends to use data from ongoing techno-economic MHK assessments to establish baseline costs, which DOE will use along with resource assessments to evaluate the need for further innovative water power R&D.

RESPONSES OF HON. STEVEN CHU TO QUESTIONS FROM SENATOR MURKOWSKI

FOSSIL ENERGY

Question 1. I disagree with the Administration's proposal to cut funding for fossil fuel work again by $105 million. Alaska's North Slope has an estimated 25 billion barrels of heavy oil, largely in the Kuparuk field, but far more research is needed for the technology to extract that oil out of the ground, even at current prices. Ac-

cording to DOE's own reports, the U.S. and Canada have enough heavy oil to meet our country's total needs and prevent dependence on non-North American sources for 150 years—if the energy can be made more economic to produce. This is research that could help America, not any particular oil company. Why then, is the Administration seeking to reduce this longer-term research that could pay substantial benefits in the future, especially for smaller companies and independents that don't have the research budgets of the larger oil companies?

Answer. America's abundant unconventional oil and natural gas resources are critical components of our Nation's energy portfolio. Their development enhances our energy security and fuels our Nation's economy. Given limited research funding, the Department's current focus is primarily on safe and environmentally sustainable development of unconventional natural gas resources.

METHANE HYDRATES

Question 2. What technological advances are still needed to facilitate large-scale development of methane hydrates, particularly in the Arctic?

Answer. The present challenge is to determine whether methane hydrate deposits can yield methane gas at the rates necessary to make Arctic or deep-water production commercially viable. The next critical step in methane hydrate development in the U.S. Arctic region will be the facilitation of a long-term production test. To be most effective, the test should include comprehensive scientific data acquisition during drilling, extended duration flow testing designed to advance scientific understanding by isolating reservoir response to specific production/stimulation inputs, and extensive monitoring of both reservoir response and potential environmental impacts. The results of this test will support the further development of comprehensive geologic and engineering models. 43

ALASKA TRANSMISSION

Question 3. Alaska probably has the greatest potential of any state to produce renewable energy. According to two recent DOE analyses, my home state has 2,400 known and potential megawatts of geothermal; 90% of the nation's tidal potential—representing 47,437 megawatts of known power; 50% of its potential wave energy—representing 1,360 Terrawats hours; 9 megawatts of in-river hydrokinetic energy; and nearly 400 hydroelectric sites (300 alone in Southeast Alaska), easily able to produce more than 1,100 megawats. The problem is that there is no way to get all of that power to markets in need of clean, renewable energy in the continental U.S. Can the administration assist with possible ways to facilitate and finance the installation of high-voltage transmission to better move this tremendous renewable power to market? It seems to me that we are spending a lot of money on new technology, even though we can develop substantial renewable power with known or n early proven technology if we simply can find a way to economically get it to market.

Answer. The Administration is committed to increasing the use of our country's vast renewable resources, including but not limited to geothermal, tidal, and hydroelectric energy. We are using all of the tools available to tap into these resources. To that end, last year, the Administration created the Rapid Response Team for Transmission whose charge is to expedite the evaluation of high-voltage transmission applications. This team is currently working on seven pilot projects that, if approved, will facilitate the development of more than 3,000 miles of transmission lines and create more than 11,000 direct jobs.

However, the challenges of moving the renewable sources from Alaska to market are significant. The costs of building transmission to connect this mainland infrastructure to the renewable-rich State of Alaska would be very high.

Additionally, there are a number of technical challenges of moving large amounts of renewable-fueled electricity long distances. Transporting energy from the renewable rich state of Alaska to electricity customers in the continental United States would likely require long direct current ("DC") lines. These projects are very costly; however, DOE is conducting research and development on ways to reduce the costs. As costs decline the economics of delivering energy from Alaska to the continental United States will likely improve.

Finally, a major challenge is the lack of cost-effective large-scale storage of electricity. DOE is also conducting significant research and development on grid-scale storage. Unlocking the storage puzzle will greatly improve our ability to integrate more renewables into the electric grid.

WATER POWER

Question 4. If the Department does not continue to invest in new, innovative hydro technologies, modernizing operations, and expanding hydro's contributions to

the nation's electricity supply—currently 8 percent, the largest of all the renewables—how do you propose to meet your own goal to significantly increase renewable energy production? Your budget materials include water power resources under that vision, but your funding levels for the program appear to undermine it. Will it be all through intermittent wind and solar generation?

Answer. Hydropower is currently our nation's largest source of clean, renewable electricity generation, contributing over 60% of our nation's renewable electricity output annually.

DOE is committed to expanding hydropower technologies to both increase the efficiency of current hydropower generation and develop new ways to produce electricity from wave, tidal, and other marine hydrokinetic sources. DOE recently selected 16 new innovative hydropower technology development projects for funding in FY11, and that work will continue into FY 2012 and FY 2013. Additionally, DOE intends to continue its efforts to analytically quantify the benefits that conventional and pumped-storage hydropower provide to the electric grid, which can also support the integration of variable renewable resources like wind and solar.

Question 5. DOE testified before this Committee last year that the Department's estimates indicate that there could be an additional 300 gigawatts of hydropower through efficiency and capacity upgrades at existing facilities, powering non-powered dams, new small hydro development and pumped storage hydropower. Why then, given this tremendous potential of conventional hydropower resources, does the Administration proposed to not only slash funding for this renewable water power resource, but commit the remaining anemic funding to only marine and hydrokinetic technologies?

Answer. In FY 2012, the Department will continue and complete a number of important water power technology research and development projects. The $20 million requested in FY 2013 allows the Department's Water Power Program to continue its ongoing projects to advance water power technologies and accelerate their market adoption. At this funding level, DOE would be able to support a number of water power technologies that can be developed for both conventional hydropower and emerging marine and hydrokinetic (MHK) energy generation.

For hydropower specifically, DOE selected 16 new innovative hydropower technology development projects for funding in FY 2011, and that work will continue into FY 2012 and FY 2013. Additionally, DOE expects to continue its efforts to analytically quantify the benefits that conventional and pumped-storage hydropower provide to the electric grid, which can also support the integration of variable renewable resources like wind and solar. Finally, DOE anticipates conducting resource assessments in FY 2012 and FY 2013 to further refine the 300-GW gross hydropower potential and accurately characterize all opportunities for new hydropower development across the country. In addition, DOE intends to use data from ongoing techno-economic MHK assessments to establish baseline MHK costs, which DOE will use along with resource assessments to evaluate the need for further innovative water power R&D.

NUCLEAR

Question 6a. Within the Office of Nuclear Energy budget request, your budget ends funding for the Integrated University Program, a program that I have heard very good reviews about. Could you explain why you want to end that program?

Answer. The Department sets aside 20% of its nuclear energy R&D funding for work at universities, which is an effective way to get students interested in nuclear energy R&D and introduce them to the work done at DOE and the national laboratory environment. In addition, the Department is confident that expansion of the nuclear industry will create incentives necessary for students to enter nuclear-related education and training programs. The Department is currently evaluating more efficient ways to draw students into its technology missions if needed, including nuclear energy.

Question 6b. Are there more efficient ways to advance student involvement in nuclear programs?

Answer. Yes, the Department believes that there are more efficient methods to advance student involvement in nuclear programs than those employed by the Integrated University Program. Through a DOE-wide coordination effort the Department will be evaluating how it can better coordinate and leverage its existing science, technology engineering and mathematics (STEM) programs, as well as take better advantage of the capabilities at the DOE laboratories and their collaborative relationships with colleges and universities, to more effectively address the Department's critical scientific and technical workforce needs.

Question 7. Within the Office of Nuclear Energy budget request, you propose reducing the Reactor Concepts Research, Development and Demonstration Program by over $40 million. What parts of the program would be reduced and for what reason?

Answer. Within Reactor Concepts, the Department chose to focus its resources on research and technology development activities that have a higher potential for near-term impact. The allocation of available resources is consistent with our goals in the reactor areas, extending the life of the current reactor fleet and improving the affordability of new reactors.

While each of the four subprograms within this budget element were reduced, the Light Water Reactor Sustainability program was least impacted. This program addresses near-term activities supporting the safe, long-term operation of the current fleet of 104 nuclear power plants. These plants provide the vast majority of our carbon-free electricity production and are a vital clean energy asset.

The other programs within Reactor Concepts Research, Development and Demonstration include technologies that have a longer timeframe for commercialization and will depend to a large degree on future fuel cycle, uranium resources and waste management considerations. We will pursue every opportunity to leverage our efforts with universities, industry and the international community.

ARPA–E

Question 8. You are requesting an additional $75 million for ARPA-E's budget, bringing it to $350 million. You are also refocusing ARPA-1.2.'s mission to place a priority on Transportation Systems. With the small fraction of projects that are likely to be successful. given the high-risk high-reward nature of the ARPA-E program, is it wise to so narrowly focus ARPA-E's mission on one topic? If we are looking for game changing technology innovations across the energy spectrum, why should we limit ourselves to one area?

Answer. ARPA-E believes that combining its investments in high-impact solutions that cut across multiple energy-related challenges with its nimble management structure provides it with the flexibility to react to changing market and technological conditions. ARPA-E's investment approach is also consistent with the Quadrennial Technology Review (QTR), which stated in part:

> "Informed by the QTR process, DOE will give greater emphasis to the transport sector, where innovation can impact all three energy challenges [i.e. Energy Security, Environmental challenges, and Competitiveness challenge."[1]

ARPA-E's Recovery Act, FY 2011. and FY 2012 investments are split approximately evenly between the Stationary and Transportation sectors. With the FY 2013 request. ARPA-E seeks to invest about 57% of its funds appropriated for projects in Transportation Systems, 40% in Stationary Power Systems, and the remainder on its Small Business Innovation Research (SBIR)/Small Business Technology Transfer (STTR) program. Specifically, in FY 2013 ARPA-E's Transportation investments would include advanced manufacturing and vehicles research. ARPA-E would continue to invest in both alternative domestic sources of sustainable fuels and electrification of vehicles. ARPA-E believes there are critical "white spaces" within the field of transportation systems.

URANIUM ENRICHMENT

Your budget proposes to reinstate the collection of revenues under the Uranium Enrichment Decontamination and Decommissioning Fund, specifically $200 million per year from utilities while the federal government would pay in $463 million.

Question 9. Has the government fulfilled its financial obligations toward the Fund as directed by the Energy Policy Act of 1992?

Answer. Yes, the Government fulfilled its financial obligation for deposits into the Fund with the FY 2011 appropriation.

Question 10. How much of a shortfall is expected in the Fund?

Answer. The shortfall reported in the 6th Triennial report to Congress in December 2010 was $11.8 billion.

Question 11. If Congress were to reauthorize revenue collection, for how much longer should utilities expect to pay into the Fund?

Answer. Should Congress reauthorize revenue collection from the Domestic Nuclear Utilities, the amount of revenue and the time utilities could expect to pay into the fund would be subject to Congressional determinations of appropriate cost share

[1] U.S. DOE Quadrennial Technology Review Volume 1 (2011). page 124. available at: http://energv.gov/sites/prodffiles/QTR report.ndf, Note, parenthetical information taken from page 123.

with the Government, considering the schedules and costs for the Office of Environmental Management cleanup program.

Question 12. Why should the private sector pay additional money for what is essentially defense waste?

Answer. The utilities agreed to participate in the establishment of the Uranium Enrichment Decontamination and Decommissioning Fund for the first 15 year period of the fund, based upon fuel they purchased when they were legally required to do so from Government enrichment facilities. The reauthorization of the utility contributions is necessary because the balance in the Fund is currently inadequate to fully fund remediation of the three gaseous diffusion plants.

STRATEGIC PETROLEUM RESERVE

Question 13. The proposed budget calls for a $291 million rescission of funds from the SPR petroleum account. This is in addition to the $500 million rescission that was authorized in last year's Omnibus Appropriations Act. Mr. Secretary, is it consistent with the law to use our SPR as an ATM?

Answer. The FY 2013 Budget proposes to use the SPR Petroleum Account receipts to repurchase about 27 million of the 31 million barrels sold in the SPR Drawdown by 2017, which will provide the Nation with sufficient import protection. The remaining funds of $291 million are not required and can be cancelled.

Question 14. The budget also proposes that the remaining balance of the SPR account be used to repurchase 27 million barrels of oil, sold last June. Given that Louisiana Light Sweet crude is trading at around $121/barrel, the remaining $2.4 billion should only be sufficient to repurchase less than 20 million barrels at today's prices. Mr. Secretary, absent the royaltyin-kind program which this budget would repeal, how does the DOE propose to repurchase the remaining oil that was sold last summer? Or does the DOE believe that oil prices are on the decline?

Answer. The SPR stores 696 million barrels of crude oil, which provides adequate U.S. import protection at this time.

The FY 2013 budget assumes the repurchase of about 27 million barrels of crude oil sold in 2011 over the 5-year period from 2013 to 2017. The objective is to reenter the oil market during a time when world oil supplies and market prices are stable and to secure the best price for the American taxpayers.

In 2009, the DOE was able to purchase 11 million barrels at an average price of $52.17 to replace barrels that were sold following Hurricane Katrina in 2005 for about $65 per barrel.

NATURAL GAS/HYDRAULIC FRACTURING

Question 15. DOE's Fossil Energy Office is requesting a $2 million increase (to $17 million total) in Natural Gas Technologies research and development. This effort would fund a DOE initiative with EPA and USGS "to understand and minimize" the impacts associated with fracking. I understand this to be a follow on to your Advisory Committee's report, and we had Dan Yergin and several other board members in to talk about the 90 day report before the final report was finished. In addition to analyzing all of the potential environmental impacts associated with shale gas development, the report presented 20 specific recommendations for how these impacts can be successfully mitigated. Can you please explain what specifically about the Advisory Committee's report and recommendations were insufficient and warrant a second investigation?

Answer. The Secretary of Energy Advisory Board (SEAB) in fact recommended expanded federal research on specific safety and environmental questions. The next step is to more precisely define the specific research questions suggested by the wide set of topics articulated in the SEAB recommendations.

On April 13, 2012 DOE, the Environmental Protection Agency, and the Department of the Interior's U.S. Geological Survey signed a Memorandum of Agreement formalizing this Multi-Agency Collaboration on Unconventional Oil and Gas Research. Through this collaboration, a robust Federal R&D plan is being developed, taking into account the recommendations of the SEAB. DOE's role in this initiative will focus on priorities identified by the interagency collaboration in a research plan to be formed over the next nine months within its area of core research competencies, including wellbore integrity, flow and control; green technologies; and systems engineering, imaging and materials.

Question 15a. Why is there a need to fund this initiative when the advisory board's recommendations are already finalized and most of their proposed directives fall on the states?

Answer. SEAB recommended that specific research be undertaken by the federal government and this budget request would actually implement that recommenda-

tion. On April 13, 2012 DOE, the Environmental Protection Agency, and the Department of the Interior's U.S. Geological Survey signed a Memorandum of Agreement formalizing this Multi-Agency Collaboration on Unconventional Oil and Gas Research.

Through this collaboration, a robust Federal R&D plan is being developed, taking into account the recommendations of the SEAB. DOE's role in this initiative will focus on priorities identified by the interagency collaboration in a research plan to be formed over the next nine months within its area of core research competencies, including wellbore integrity, flow and control; green technologies; and systems engineering, imaging and materials. The three agencies, DOE, EPA, and USGS, each possess discrete and specialized capabilities in particular scientific disciplines and technical areas.

Question 15b. Is this new initiative an attempt to uncover a "smoking gun" that has yet to surface and effectuate new layers of federal rules over hydraulic fracturing?

Answer. The DOE, EPA, and USGS effort will identify research priorities and collaborate to sponsor research that improves our understanding of the impacts of developing our Nation's unconventional natural gas resources and ensure that these resources are developed in a safe and environmentally sustainable manner. Through enhanced cooperation, the agencies will maximize the quality and relevance of this research, enhance synergies between the agencies' areas of expertise, and eliminate redundancy.

NUCLEAR

Question 16. Your budget requests $10 million from the Nuclear Waste Fund for the Office of Nuclear Energy. The Nuclear Waste Policy Act lays out specific purposes for what funds in the Waste fund may be spent on. Could you describe how the Office of Nuclear Energy intends to use expenditures from the Nuclear Waste Fund?

Answer. Consistent with the Blue Ribbon Commission recommendation to promote the better integration of storage into the waste management system, including standardization of dry cask storage, DOE will develop standardized container specifications with industry and award contracts to vendors to design standardized containers. This is also consistent with direction in the FY 2012 appropriations for development and licensing of standardized transportation, aging, and disposition canisters and casks.

In the area of transportation, DOE will finalize transportation procedures for technical assistance to States and tribes consistent with section 180 (c) of the Nuclear Waste Policy Act, will initiate pilot training programs for emergency responders along those routes from decommissioned sites, and will expand interaction with Transportation Stakeholders.

Question 17. Could you please provide more detail on how you intend to utilize the requested $60 million to advance the recommendations of the Blue Ribbon Commission?

Answer. The Blue Ribbon Commission acknowledged the importance of the ongoing work related to used fuel disposition, and recommended the continuation of the activities. The funding within the Used Nuclear Fuel Disposition subprogram in FY 2012 aligns with the Commission's near-term research and development-related priorities. The Department's FY 2013 Congressional budget request builds on these efforts initiated in FY 2012. Specifically, the Department intends to continue systems studies related to consolidated storage and related transportation; continue research and development on the extended storage of spent fuel; expand interactions with transportation stakeholders; continue studies of non-site specific geologic disposal options; and complete a research and development plan for deep borehole disposal.

UNCONVENTIONAL FOSSIL FUELS RESEARCH

Question 18. This budget again zeroes out the unconventional fossil program, I take it as part of the Administration's efforts to end so-called "subsidies" to fossil fuels. But the budget maintains major CCS funding as well as some natural gas R&D funding. Meanwhile, the President has touted DOE's support for research in shale gas as a major success story. What's so wrong with including unconventional fossil fuels in a budget, especially when "unconventional" methods of extracting and using them has turned out to mean cleaner ways of extracting and using them?

Answer. The FY 2013 Fossil Energy research and development budget request, which is about 23 percent more than previous year's does, in fact, focus on unconventional fossil energy resources in light of high priority research recommendations received from the Subcommittee of the Secretary of Energy Advisory Board (SEAB).

These research efforts will help to improve our understanding of the impacts of developing our nation's unconventional natural gas resources and assist in developing new technologies that will enhance safe and environmentally sustainable development of these resources.

ATVM PROGRAM

Question 19. Just five loans have been issued since funding was appropriated to this program in 2008, including just one loan in the past year. DOE initially claimed the program was oversubscribed, but now it's virtually dormant. Last year at this time, DOE stated that it anticipated "offering a number of additional conditional commitments under the program in the near future." What happened to that? Are there no viable projects, or are other factors preventing DOE from making yes-or-no decisions in a timely manner?

Answer. The ATVM Loan Program has closed five loans totaling over $8.3 billion. While the ATVM Loan Program was oversubscribed, certain events occurred over the past year that reduced the applicant pool, including the withdrawal and rejection of several applications. Reasons for rejecting the applications include, but are not limited to, substantial market risk, financial distress and credit risk, and technical development risk.

The program will continue to work with remaining applicants, with an aim to communicating application status in a timely manner. In addition, the program is simultaneously reaching out to additional potential applicants via trade organizations and digital media. The ATVM Loan Program continues to be an attractive source of funding for automotive manufacturers of vehicles and components, receiving new applications and indications of interest regularly. We are striving to allocate a significant portion of ATVM's remaining credit subsidy by the end of the fiscal year.

VEHICLE SUBSIDIES

Question 20. In other parts of the budget, the administration proposes to modify and expand the electric vehicle tax credit. The 200,000 vehicle per manufacturer limit is removed, the per-vehicle limit is raised to $10,000, and more technologies would be eligible based on a formula. That seems incredibly lavish. First-time homebuyers received an $8,000 credit—and now, for a single vehicle, the administration is proposing an even higher subsidy. Can you defend that? How does a $10,000 per vehicle subsidy make sense at a time of trillion dollar deficits, and repeated statements from administration officials that the costs of batteries should come down dramatically over the next several years? How can you square this proposal with the President's statement from last year that the tax code is already too riddled with "special interest loopholes"?

Answer. The electric vehicle tax credit is not within DOE's jurisdiction.

FUEL CELLS

Question 21. According to the budget request, you want to significantly reduce funding for fuel cell technologies because of "substantial progress in research innovations." Can you explain that logic, especially in the context of your request for significantly more funding for electric vehicles, which are now being commercially sold?

Answer. Significant progress has been made in fuel cell technologies, including reducing the modeled cost of fuel cells by more than 80% since 2002.The FY 2013 budget request will allow the Department to concentrate on high impact hydrogen and fuel cell R&D activities that will continue to yield technology advancements in key areas—including ongoing reductions in the cost and improvement in the durability of fuel cells, reductions in the cost of renewably produced hydrogen, and improvements in systems for storing hydrogen. Rebalancing the Department's advanced technologies portfolio will allow a focus on nearer term transportation technologies while maintaining a strong effort in hydrogen and fuel cells.

CELLULOSIC BIOFUELS

Question 22. In early 2010, your Department set a goal to drive the costs of cellulosic ethanol down to $1.76 per gallon in 2012. Can you provide us with an update on any progress made? How close—or how far—is unsubsidized cellulosic biofuel from commercial competitiveness?

Answer. The DOE Biomass Program is on track to meet its major milestone of achieving cellulosic ethanol cost of $1.76/gallon of ethanol by the end of FY 2012. This cost milestone is expected to be validated at the pilot scale at the National Renewable Energy Laboratory during the summer of 2012. The noted cost does not re-

flect the cellulosic ethanol costs from first-of-a-kind pioneer plants but rather the cost attainable after several plants that have been built with the lessons learned and the technology developed by DOE and its partners. Achieving this milestone would mean that the Biomass program would de-emphasize cellulosic ethanol research and that DOE would focus on research for "drop-in" biofuels, which are more infrastructure compatible (e.g, bio-derived gasoline, diesel, and jet fuel). Biobased hydrocarbon fuels can be used in applications like heavy trucks and planes where electrification may not be suitable.

The DOE Biomass program has already started construction at four, commercial scale "drop-in" biofuel pioneer and plans to have them operational in FY 2013 (Abengoa, Mascoma, Ineos, and Poet). These first plants will likely require the currently available cellulosic tax credit of $1.00 per gallon to be initially cost competitive. Once we have operating experience with these plants, we can better project when they can compete on an unsubsidized basis.

NATURAL GAS TAX HIKES

Question 23. I think it would be a mistake to raise taxes on our nation's energy producers by $40 billion over the next ten years, as this budget proposes. But setting aside my general concerns—the impact it would have on supply and prices paid by consumers—I want to ask a more specific question. Why has the Department continued to target natural gas for a tax hike? With natural gas prices at historical lows, we have seen reports that some producers are already considering shutting in their wells because they simply cannot make any money off of them. Did the administration give any consideration to the impacts that its proposed tax increases could have on natural gas production and prices in the longer term?

Answer. The Administration believes these tax code adjustments are appropriate given overall industry revenues and profits and would not have an adverse impact on domestic oil and gas production. These tax changes are small enough they should not have any real impact on domestic natural gas prices.

The tax credits that the Administration proposes to repeal for oil and natural gas distort commercial markets. This market distortion is detrimental to long-term energy security and is also inconsistent with the Administration's policy of supporting a clean energy economy, reducing our reliance on oil, and cutting carbon pollution. Moreover, any tax credit must ultimately be financed with taxes that result in underinvestment in other, potentially more productive, areas of the economy. Furthermore, as the demand for natural gas increases, competitively-priced supplies of natural gas will be available to meet that demand.

BATTERY COSTS

Question 24. The Department has projected that battery costs for electric vehicles will come down dramatically over the next several years. Can you provide the committee with a current breakdown showing how much components, R&D, metals, other materials, labor, and any other costs currently contribute to advanced battery prices? Can you explain where you see substantial cost reductions coming from, especially in the context of each of those categories?

Answer. A September 2011 ANL modeled the costs of lithium-ion batteries for electric drive vehicles, and indicated the following: raw materials, 50%; purchased parts, 16%; depreciation, 9%; direct labor, 4%; variable overhead, 4%; general sales and administration, 4%; R&D, 4%; profit, 4%; and warranty, 5%.

Substantial future cost reductions are expected to be derived from the use of higher-performance, lower-cost raw materials in batteries currently in development (e.g., less nickel and cobalt, more manganese), improvements in battery design (higher cell capacity resulting in fewer number of cells required), better materials processing and cell assembly manufacturing, learning-curve cost reductions, and the economies of scale in mass production.

VEHICLE TECHNOLOGIES PROGRAM

Question 25. In looking at this year's budget request, the Department appears to continue its trend of heavily favoring electric vehicles. What percentage of the $420 million request for the Vehicle Technologies program would go to electric vehicles? What percent would go to other promising technologies, like natural gas vehicles or ultracapacitors?

Answer. Through a comprehensive and coordinated effort among its Office of Science, the Advanced Research Projects Agency-Energy (ARPA-E), and Office of Energy Efficiency and Renewable Energy, the Department supports a broad range of advanced vehicle technologies in various stages of development. The FY2013 request for Vehicle Technologies Program (VTP) activities includes $203 million for

batteries and electric drive components (48% of the VTP total). Of this amount, approximately $4.5 million would focus on ultracapacitor development. The VTP FY2013 request includes an additional $35 million for electric-drive vehicle systems modeling, analysis, and testing activities. It is important to note that the aforementioned funding supports development of technologies for the full range of electric-drive vehicles—including plug-in electric hybrids, extended range electric vehicles, and micro hybrids, as well as battery electric vehicles—and cuts across light-duty and heavy-duty vehicle classes.

VTP supports a portfolio of technologies and approaches to petroleum reduction in addition to electric drive, including advanced combustion, materials technology, and fuels technology research and development, as well as demonstration and deployment of a wide variety of alternative fuels and advanced, fuel-efficient technologies.

COMMUNITY DEPLOYMENT PROGRAM

Question 26. The President's budget proposes a $1 billion community deployment program for advanced vehicles. Which agency would administer that program? What is maximum amount of funding that could be made available to each community? If funding is appropriated to it, how will you ensure that public dollars do not crowd out investments now being made by private companies?

Answer. The Department of Energy would administer the program. As noted in the White House Fact Sheet issued March 7, 2012, the program embraces a strategy proposed by Senators Jeff Merkley (D-OR) and Lamar Alexander (R-TN) in the Promoting Electric Vehicles legislation, but takes a fuel neutral approach and includes the development of up to five liquefied natural gas corridors for long-haul trucks. The Department is working to finalize program details, but envisions that between 10-15 communities would receive funds through an open and competitive process, and a minimum 50% cost share of the total project value would be required.

Funds would encourage, and not crowd out, private investment. Selection criteria would be based on the strength of the local community partnership and its ability to meet program objectives, the demonstrated commitment of partners, the ability to significantly leverage Federal funds, the strength of the business case, and the plans—as well as the team's ability—to ensure project sustainability upon expenditure of Federal funds.

BIOFUEL GRANTS

Question 27. In the Biomass and Biorefinery Systems account, the Department notes that it wants to provide "an additional installment for the full-fledged construction of demonstration and commercial scale integrated biorefinery projects that were competitively awarded in 2007 and 2008 and that will be operational in 2014." Can you provide further details about that proposal? How many projects would this affect, how much funding would.be required, and why is additional funding needed at this time?

Answer. The Biomass Program ran two competitive biorefinery solicitations, one each in 2007 and 2008. These two solicitations resulted in 11 awards: 4 commercial scale cellulosic ethanol biorefineries in 2007 and 7 demonstration scale cellulosic ethanol biorefineries in 2008. The benefits created by these programs will help to promote a new cellulosic biofuels industry that has the potential to replace crude oil consumption, enabling economic activity in rural America, enhancing our energy security, and dramatically decreasing the emissions of GHG from the transportation sector.

These biorefinery projects were all funded incrementally and the awards are contingent on the availability of appropriated funds and ability for recipients to meet cost-share requirements and stage-gate criteria for proceeding to subsequent phases. The four awards from the 2007 solicitation for commercial scale cellulosic ethanol biorefineries have been fully obligated and do not require additional funding. Of the seven awards from the 2008 solicitation, four require a total of $123M to fulfill the total award amount. The FY 13 requested funds would be used to achieve the total amount for three of the four demonstration scale biorefineries.

BIOFUEL PROCUREMENT

Question 28. DOE has requested authority to transfer funds to the Department of Defense for biofuel procurement. How much funding do you anticipate would be transferred? At a time of unprecedented debt—and in a budget request that projects a trillion dollar deficit—do you believe it is appropriate for the government to sign contracts that require it to pay more than $25 per gallon of biofuel?

Answer. The Biomass Program seeks to lower the cost of advanced biofuels by focusing on RD&D across the biofuels value-chain that supports the development of innovative technologies and lowers the financial, technical, and market risks of deploying integrated biorefineries.

The Biomass Program is requesting $40M to be transferred to the Department of Defense to support jointly funded biorefineries for the demonstration of the production of military grade diesel and jet fuels at commercial scale with the military being the first customer for these fuels.

This initiative would not be used to subsidize the military's purchase of fuel. Rather, the Navy, USDA and DOE, would mutually support the missions of each agency in accelerating the capability to produce domestic, bio-based hydrocarbons such as gasoline, diesel and jet fuel. If these fuels meet military specifications, then this would open up other markets for these products and gain the confidence of private sector investors necessary for scaling the industry.

ARPA–E FUNDING

Question 29. In the budget request, "natural gas fueled transportation systems" are listed within the ARPA-E account as a "potential future program." Why are those systems considered appropriate for ARPA-E, instead of the Vehicle Technologies program within EERE?

Answer. ARPA-E's invests in early-stage technologies that have the potential to be transformational, including new vehicle technologies. The Methane Opportunities for Vehicular Energy (MOVE) program is focused on breakthrough research to develop technology that can significantly reduce the cost of natural gas storage systems in vehicles as well as compression systems for home refilling. The projects suppOrted are working on fundamentally different technology than what is being funded within the Vehicle Technologies Program. Today's natural gas vehicle technologies require tanks that can withstand high pressures, are cumbersome, are either too large or too expensive to be suitable for passenger vehicles, and cannot hold sufficient fuel to provide comparable range to today's gasoline powered vehicles. MOVE will fund research into innovative, low-cost Compressed Natural Gas (CNG) storage technologies and methods to lower pressure in vehicles while maintaining the same amount of gas storage.

ARPA-E takes very seriously its statutory requirement to ensure its activities are coordinated with, and do not duplicate the efforts of, programs and laboratories within the Department and other relevant research agencies. In this case, ARPA-E and EERE's Vehicle Technologies Program (VTP) have close formal and informal working relationships.

TOTAL CLEAN ENERGY SPENDING

Question 30. Collectively—across all federal programs and all federal agencies—how much does the President's Fiscal Year 2013 budget propose to spend on clean energy?

Answer. The FY 2013 President's Budget requests $6.7 billion for clean energy research, development, demonstration, and deployment government-wide. Please see Section 22 (Special Topics, Research and Development, page 366) of the FY 2013 President's Budget Analytical Perspectives volume.

1603 GRANTS PROGRAM

Question 31. What is the total estimated cost of all projects that were—or could still be, based on various deadlines within the progrfam—funded by the Sec tion 1603 grants program?

Answer. This question is not within DOE's jurisdiction.

ARRA SPENDING

Question 32. According to the Department of Energy's website, roughly $13 billion in stimulus funding has not yet been spent. What has prevented those funds from being spent? When do you anticipate the Department will be able to report 100 percent spendout?

Answer. The Department of Energy has been deeply committed to ensuring that recipients are spending their Recovery Act funds in an efficient and responsible manner. As of November 25, 2012, the Department of Energy's approximately 5,000 Recovery Act recipients have outlaid $27.4 billion (80% of total stimulus funds obligated by the Department), to support over 15,000 clean energy projects across the country. These Recovery Act investments are putting Americans back to work, making our homes and businesses more energy efficient, increasing the use of clean and

renewable electricity, cutting our dependence on oil, and modernizing the electric grid.

Based on current spending, the Department of Energy expects that by the end of fiscal year 2013, over 90 percent of DOE granted stimulus funds will be spent by recipients. One hundred percent of Recovery Act funds will be spent by end of FY15 in accordance with law.

As was known from the inception of the Recovery Act, DOE's Office of Fossil Energy (FE) carbon capture, utilization, and storage (CCUS) and clean coal power initiatives will account for nearly half of the funds that will be spent in FY14 and FY15. The majority of FE's Recovery Act projects are large, capital intensive projects that involve long-lead times for siting, permitting, design and construction. While DOE's experience in prior negotiations allowed DOE to streamline the process for award negotiations and receive well-defined project management plans from recipients, these multi-million and billion dollar clean coal projects require an average of 2 years for completion of siting, permitting and design phases of the project before well-executed construction and retrofits can begin.

The remaining portion of Recovery Act funds to be spent after FY13 is primarily from:

- The Advanced Battery Manufacturing Program (68% of total ARRA funds spent as of November 25, 2012; 83% of total Recovery Act funds spent by end of FY13): DOE competitively-awarded funds for 30 projects to build domestic capacity for manufacturing advanced batteries and electric drive components—not only creating jobs but also helping to ensure the U.S. remains a leader in a fiercely competitive global automotive market. Industry is providing slightly more than 50 percent cost-share. Prior to the Recovery Act, domestic battery manufacturing was negligible; as of December 31, 2011, our Recovery Act projects created a total battery manufacturing capacity of 145,000 batteries/year.
- Smart Grid (79% of total ARRA funds spent as ofNovember 25, 2012; 92% spent by FY13): More than $4 billion in Recovery Act smart grid investments are helping to modernize our grid, critical to meeting today's increasingly complex electricity needs. These Recovery Act investments for smart grid projects went to 49 states and two territories to help build a more stable, secure electrical grid. The funds projected to be spent after FY13 are associated primarily with smart grid demonstration projects designed according to the original 5 year timeline set by the Recovery Act statute. These projects require additional time to complete due mainly to the scale of technologies and installations, often involving multiple states or regions; and longer field validation and data collection required for these first-of-a-kind technologies.

Question 33. The Department's IG and others have suggested that it may ultimately be appropriate to return at least some ARRA funding (e.g., from the Energy Efficiency and Conservation Block Grant program) to the Treasury. Do you agree? Please explain.

Answer. As part of the Recovery Act, the Department of Energy's 5,000 recipients have spent $23.1 billion (67% of total stimulus funds obligated by the Department), and averaged 91% of the monthly payment plan that it developed and submitted to OMB nearly two years ago. The Department of Energy has been deeply committed to ensuring that recipients are spending their Recovery Act funds in an efficient and responsible manner, and continues to diligently monitor its Recovery Act programs and projects to completion.

In those rare cases where projects have been unable to move forward for a variety of individual reasons the Department has established a system to efficiently terminate projects and return these funds to the US Treasury. While the DOE is proactive in its monitoring of funding recipients, and setting clear milestones to help recipients execute their projects, some recipients are ultimately unable to meet the agreed upon plan and have requested the contract be terminated. The Department's system also closely monitoring projects for any waste, fraud and abuse and retains the authority to terminate such contracts if in violation, or if a project fails to meet technical or performance milestones.

The Energy Efficiency and Conservation Block Grant (EECBG) Program made available $2.7 billion in formula grants and $454 million in competitive grants to US states, territories, local governments, and Indian tribesto improve energy efficiency and reduce energy use and fossil fuel emissions in communities. To improve oversight of EEBCG funds, DOE required cities and counties to develop energy-efficiency plans for the first time to receive funding. Many of these local governments had not previously participated in funding programs of this nature. As may be ex-

pected with participation in a new program, some EECBG grantees were slower to start moving forward than others.

To date, this program paid out over $2 billion (over 70% of total EECBG funds) and expects to be fully spent by the end of FY13.

The EECBG program has been among the largest job creators under the Recovery Act. The success of this program at the local level holds the potential to create a vibrant longterm market in energy efficiency throughout the country. It is helping local communities, homeowners and businesses to save money and energy and reduce our reliance on imported oil.

UNOBLIGATED BALANCES

Question 34. Please provide a full and detailed list of all unobligated balances for every program and account at the Department of Energy.

Answer. The Department's unobligated balances as of April 30, 2012 are as follows:

Base Financial Report PY Approp Unobligated, April 2012

CC Grouping	PY Approp Unobligated
DOE Total	**7,852,665**
NNSA Total	**61,482**
NNSA-WA Total	**20,159**
02-D-103 Project Engineering and Design, Various Locations	42
02-D-105 Engineering Technology Complex Upgrade (ETCU), LLNL	50
03-D-102 National Security Sciences Building, LANL	84
05-D-160 FIRP Project Engineering and Design, Various Locations	0
06-D-160 FIRP Project Engineering and Design, Various Locations	0
06-D-402 NTS Replace Fire Stations No. 1 and No. 2, NTS	4,101
06-D-601 Electrical Distribution System Upgrade, Pantex	0
06-D-603 Steam Plant Life Extension Project, Y-12	0
88-D-123 Security Enhancements, Pantex Plant	0
96-D-111 National Ignition Facility, LLNL	0
99-D-141-010 Pit Disassembly and Conversion Facility, SRS	0
Advanced Certification	96
Advanced Design and Production Technologies	134
Advanced Radiography	15
Advanced Simulation and Computing Campaign	222
Congressionally Directed Projects - Weapons Activities	32
Cyber Security	732
Defense Nuclear Security	1,190
Dynamic Materials Properties	138
Dynamic Plutonium Experiments	13
Energy Modernization and Investment	5
Enhanced Surety	2
Enhanced Surveillance	13
Environmental Projects and Operations	532
Facilities and Infrastructure Recapitalization Program	214
Facility Operations and Target Production	20
High Explosives and Weapon Operations	15
High-Energy Petawatt Laser Development	9
Ignition	45

Inertial Fusion Technology	18
Joint Program in High Energy Density Laboratory Plasmas	7
Life Extension Programs	372
Material Recycle and Recovery	350
NIF Demonstration Program	0
NIF Other Project Costs	0
National Security Analyses, Assessments, and Technologies	68
Nonnuclear Readiness	26
Nuclear Counterterrorism Incident Response	499
Operations of Facilities	53
Operations of Facilities - Institutional Site Support	2,578
Operations of Facilities - Kansas City Plant	1
Operations of Facilities - Lawrence Livermore National Laboratory	5
Operations of Facilities - Los Alamos National Laboratory	1,104
Operations of Facilities - Nevada Test Site	209
Operations of Facilities - Y-12 National Security Complex	197
Pit Manufacturing Capability	31
Primary Assessment Technologies	12
Program Readiness	12
Pulsed Power ICF	2
STA Operations and Equipment	912
STA Program Direction - Federal Support	2,318
Special Projects	20
Stockpile Readiness	13
Stockpile Services	1,348
Stockpile Systems	2,043
Support of Stockpile Program	1
Test Readiness	9
Tritium Readiness	50
University Grants/Other Support	2
W88 Pit Manufacturing	49
Warheads Dismantlement	116
Weapons Systems Engineering Assessment Technology	29
NNSA NN Total	33,578
00-D-192 Nonproliferation and International Security Center	6
99-D-141-010 PDCF, SRS	1,400
Accelerated Highly Enriched Uranium Disposition	3
Elimination of Weapons Grade Plutonium Production in Russia	2,059
Global Initiative for Proliferation Prevention	357
Global Threat Reduction Initiative	331
HEU Transparency Implementation	0
International Nuclear Materials Protection and Cooperation	20,871
International Nuclear Safety and Cooperation	47
Nonproliferation And Verification Research And Development	475
Nonproliferation and International Security	1,020
Russian Surplus Plutonium Disposition	0
Supporting Activities	0
U.S. Plutonium Disposition	7,001
U.S. Support and Oversight	10

NNSA-NR Total	4,125
05-N-900 Materials Development Facility Building, Schenectady, NY	9
06-D-901 Central Office Building 2, BAPL	27
08-D-901 Shipping and Receiving and Warehouse Complex	14
Naval Reactors Development	1,111
Naval Reactors Program Direction	2,964
NNSA-OA Total	2,794
Program Direction - National Nuclear Security Administration - Office of the Administrator	2,794
Spectrum Relocation Funds	1
NNSA-Other Total	826
01-D-701 Site-Wide Fire Alarm System Replacement, LANL	8
01-D-702 Emergency Operations Center Replacement and Relocation, LANL	0
01-D-705 Multi-Channel Communications Systems, LANL	44
97-D-102 Dual-Axis Radiographic Hydrotest Facility (DARHT), LANL	0
Emergency Preparedness	43
Emergency Response	0
Nuclear Security/Russian Production Reactor Shutdown Program	1
Physical Damage, Destruction Repair, and Risk Mitigation	274
Restoring Services	451
Resuming Laboratory Operations	5
Energy Total	3,112,965
EERE Total	116,987
Biofuels: Transportation	2
Biomass and Biorefinery Systems R&D	34
Biomass/Biofuels Energy Systems	2,840
Building Technologies	14,462
Congressionally Directed Projects - Energy Efficiency and Renewable Energy	9,160
Department Energy Management Program	2
Distributed Energy Resources	97
Energy Efficiency and Renewable Energy (EERE) Program Support	3,023
FEMP Program Direction	1
Federal Energy Management Program	1,386
Federal Facility Energy Efficiency	363
Fuel Cell Technologies	351
Gateway Deployment	1,217
Geothermal	1,479
Hydrogen Research R&D	7,195
Hydrogen and Fuel Cells Technologies	19
Hydropower	0
Industry Sector - Total	30,566
Intergovernmental Activities	311
NREL South Table Mountain Infrastructure	3
Other State Energy Activities	639
Policy And Management	48
Solar & Renewable Resources Technology Program Direction	6,850
Solar Energy	23,965
State Energy Program (Grants)	5,860
State Energy Programs	0
Training and Technical Assistance	69

Tribal Energy	307
Vehicle Technologies	973
Water Power Energy R&D	842
Weatherization Assistance	2,916
Weatherization Assistance Program	3
Weatherization Assistance Program (Grants)	168
Weatherization and Technical Assistance	32
Wind Energy Systems	1,805
OE Total	13,311
Clean Energy Transmission & Reliability	1,847
Cyber Security for Energy Delivery Systems	0
Cyber Security for Energy Delivery Systems R&D	565
Distributed Energy	151
Electric Distribution Transformation R&D	17
Electricity Restructuring	0
Energy Assurance and Security	7
Gridwise	44
High Temperature Superconductivity R&D	3
Infrastructure Security & Energy Restoration	269
Permitting, Siting and Analysis	115
Program Direction	8,523
Smart Grid Research & Development	1,617
Transmission Reliability R&D	95
Visualization & Control	57
FE Total	2,925,014
Advanced Metallurgical Processes	44
Advanced Research	215
Advanced Systems - Combustion Systems	96
Advanced Systems - Indirect Fired Cycle	193
Advanced Systems - Integrated Gasification Combined Cycle	1,970
Black Liquor Gasification Technologies	17
Clean Coal Power Initiative	61,566
Clean Coal Program Direction	149
Coal Utilization Science	158
Congressional Directed Projects - Advanced Research	370
Congressional Directed Projects - Fuel Cells	0
Congressional Directed Projects - Fuels	121
Congressional Directed Projects - Petroleum Reserves	0
Congressionally Directed Projects - Fossil Energy	260
Effective Environmental Protection	86
Emerging Processing Technology Applications	13
Expansion Activities	0
Exploration And Production	876
Field Program Direction - FE	4,611
Fossil Energy Environmental Restoration Fossil Energy Environmental Restoration	1,247
Fossil Energy Program Direction	6,549
Fuel Cell Systems	6
FutureGen	680
Gas Hydrates	112

General Plant Projects	217
Greenhouse Gas Control	672
Historically Black Colleges And Universities (Hbcus), Education And Training	171
Import/Export Authorization	539
Infrastructure	25
Innovations for Existing Plants	1,357
Innovative Clean Coal Technology	4,767
Innovative Concepts	117
Loan Guarantee Default Reserve	1
Materials And Components	69
NETL Coal R&D Direct Program Direction	1,044
Naval Petroleum and Oil Shale Reserve Program Direction	13
Petroleum Acquisition And Transportation	2,743,259
President's Hydrogen from Coal Research Fuels	510
Production & Operations	1,317
Program Management	6
Reservoir Life Extension/Management	451
Solid Fuels and Feedstocks	96
Special Recruitment Programs	161
Storage Facilities Development	88,682
Strategic Petroleum Reserve Management	363
Technology Crosscut	96
Transportation Fuels and Chemicals	546
Turbines	219
Ultra Clean Fuels	114
Ultra Deep Water and Unconventional National Gas and Other Petroleum Resources	806
Unconventional Fossil Energy Technologies	1
University Coal Research	53
Utah Center for Ultra Clean Coal Utilization	0
NE Total	24,369
Accelerator Transmutation Of Waste	0
Advanced Fuel Cycle Initiative (AFCI)	579
Advanced Radioisotope Power Systems	3
Advanced Reactor Concepts (ARC)	242
Advanced Reactor R&D	72
Breeder Reactor Technology	7
Civilian Radioactive Waste Management - Program Direction	7,100
Crosscutting Technology Development	1,161
FAC MODS FOR U233 DISPOSITION	0
Facilities	0
Generation IV Nuclear Energy Systems Initiative (Generation IV)	306
INL Operations and Infrastructure	62
Integrated Spent Fuel Cycle	384
International Nuclear Energy Cooperation	50
Light Water Reactor (LWR) Sustainability	204
Los Alamos Nuclear Infrastructure	1
MOX Other Project Costs	3
Next Generation Nuclear Plant (NGNP) Demonstration Project	1,356
Nuclear Energy Research Initiative	36

Nuclear Energy Technologies	411
Nuclear Hydrogen Initiative (NHI)	152
Nuclear Technology Research And Development	0
Plutonium Burning	0
Program Direction - Nuclear Energy	4,376
Research Reactor Infrastructure	87
Safeguards and Security - Nuclear Energy	8
Small Modular Reactors	83
Space and Defense Nuclear Power Systems Infrastructure Maintenance	150
State Dept. Funded International Nuclear Safety Activities	-3,492
University Reactor Fuel Assistance and Support	116
Waste Management System	10,910
EM Total	27,575
A-D Waste Treatment & Immobilization Plant - Subprojects A-D	67
Central Plateau Remediation	493
Defense ER&WM - Multi-Site Activities	8
Defense Environmental Cleanup - Closure Sites	2,387
Defense Environmental Cleanup - Program Support	749
Defense Environmental Cleanup - Safeguards and Security - Environmental Management	9
Defense Environmental Services - Federal Contribution to the Uranium Enrichment Decontamination and Decommissioning Fund	0
Defense Environmental Services - Non-Closure Environmental Activities	110
Defense Environmental Services - Program Direction	7,405
Defense Site Acceleration Completion - 2012 Accelerated Completions	84
Defense Site Acceleration Completion - Safeguards and Security -Environmental Management	0
Defense Site Acceleration Completion - Technology Development and Deployment	923
East Tennessee Technology Park	678
HQ-CDP-0100, Congressionally Directed Activities - Environmental Management	314
HQ-CDP-0100-N: Congressionally Directed Projects	7
Headquarters	58
Idaho Cleanup and Waste Disposition	235
NDEC - Small Sites	268
NNSA Sites and Nevada Off-Sites	609
Non-Defense Environmental Cleanup - Gaseous Diffusion Plants	26
Non-Defense Environmental Cleanup - West Valley Demonstration Project	450
OR-0011Z Downbend of U-233 in Building 3019	330
OR-0031 Soil and Water Remediation - Off-Sites	4
OR-0041 Nuclear Facility D&D - Y-12	17
OR-0100 Oak Ridge Reservation Community and Regulatory Support	2
ORP-0014 Radioactive Liquid Tank Waste Stabilization and Disposition	782
PED-08-01 Plutonium Vitrification Facility	3,925
Paducah Gaseous Diffusion Plant	27
Portsmouth Gaseous Diffusion Plant	1,520
Project Engineering and Design, Salt Waste Processing Facility Alternative, SR	4,800
Project Engineering and Design, Sodium Bearing Waste, Idaho	37
RL-0011 Nuclear Material Stabilization and Disposition - PFP	54
RL-0013C Solid Waste Stabilization and Disposition - 2035	37
RL-0030 Soil and Water Remediation - Groundwater/Vadose Zone	235
RL-0040 Nuclear Facility D&D - Remainder of Hanford	1,263
RL-0041 Nuclear Facility D&D - River Corridor Closure Project	604

RL-0100 Richland Community and Regulatory Support	30
River Corridor and Other Cleanup Operati	0
SR-0014C Radioactive Liquid Tank Waste Stabilization and Disposition	1,182
SR-0101 Savannah River Community and Regulatory Support	0
Sales of Uranium	0
Salt Waste Processing Facility, SR	0
Savannah River Site - Site Risk Manageme	-2,176
Waste Isolation Pilot Plant	20
EM Total	5,709
Legacy Management Activities - Defense	1,518
Legacy Management Activities - Non-Defense	156
Program Direction	3,729
Worker and Community Transition Activities	305
Science Total	16,958
SC Total	16,958
Advanced Light Source (ALS), User Support Bldg (USB) - LBNL	3
Advanced Scientific Computing Research	1,168
Basic Energy Services	8,388
Biological And Environmental Research	1,701
Congressionally Directed Projects - Science	83
Converted Cumulative Balance	37
Fusion Energy Sciences	268
High Energy Physics	249
Infrastructure Support	36
Linac Coherent Light Source	26
Multiprogram Energy Laboratory	0
Nuclear Physics	624
Oak Ridge Landlord	4
Office of Science - Program Direction	3,414
PED Photon Ultrafast Laser Science & Engineering (PULSE) Big Renovation	0
PED, ALS, User Support Bldg	0
Research, Development And Operations	0
Safeguards and Security - Science	9
Science Laboratories Infrastructure	0
Small Business Innovation Research	584
Small Business Technology Transfer Pilot Research	41
Workforce Development for Teachers and Scientists	322
ARPA-E Total	157,286
ARPA-E Total	157,286
ARPA-E Projects	155,051
Program Direction	2,234
Loan Total	4,396,414
ATVM Total	4,396,288
Loan Guarantee Original Subsidy	4,224,341
Vehicle Manufacturing Loan Program	1,947
LGPO Total	126
Loan Guarantee Original Subsidy	170,000
Loan Guarantee Program	126
HQ Support Total	38,279
OSE Total	1,505

Office Of The Secretary - Program Direction	1,505
CIO Total	2,253
CHIEF INFORMATION OFFICER - INFORMATION MANAGEMENT	1,400
Corporate Management Information Program	89
Cyber Security Program	83
Energy Information Technology Services (EITS)	681
CFO Total	504
Office of the Chief Financial Officer - Program Direction	504
MA Total	4,414
Competitive Sourcing Initiative	71
Office of Management Program Direction	4,343
HC Total	36
Office of Human Capital Management Program Direction	36
HG Total	632
Office Of Hearings And Appeals	632
CI Total	2,758
Congressional & Intergovernmental Affairs - Program Direction	1
Congressional & Intergovernmental Affair	2,757
IE Total	1,465
Indian Energy Policy & Programs	340
Office of Indian Energy Policy & Program	1,125
PA Total	511
Public Affairs - Program Direction	511
GC Total	333
ES&H Program Direction - GC - Energy Supply	40
General Counsel - Program Direction	292
PI Total	528
Climate Change Technology Program	48
Emergency Planning	51
International Policy Studies	3
Office Of Environmental Analysis	102
Office of International Affairs - Program Direction	303
Policy, Planning And Analysis	21
ED Total	1,564
Economic & Impact Diversity - Program Direction	1,381
Minority Economic Impact Program	183
IG Total	10,986
Office of Inspector General - Program Direction	10,986
HSS Total	10,790
Counterintelligence	2
Defense Vulnerability and Threat	3
Employee Compensation Initiative	148
Energy Supply (Operating)	3
Energy and Proliferation	777
Environmental, Safety and Health Operating Expenses - HS - Other Defense	1,566
Intelligence	6
Nuclear Safeguards and Security	750
Operations And Support	0
Other Defense Activities (Operating)	74

Program Direction	4,996
Program Direction - ES&H	0
Program Direction - HSS	1,089
Program Direction - Office of Security	8
Program Direction - Office of Vulnerability and Threat	1
Security Investigations	322
Vulnerability and Threat Program Activity	1,045
EIA Total	750
EIA Total	750
National Energy Information System (Neis)	750
PMA Total	68,531
SEPA Total	364
Continuing Fund	50
Program Direction	314
SWPA Total	300
Continuing Fund	300
Program Direction	0
Spectrum Relocation	0
WAPA Total	67,867
Construction And Rehabilitation	9,244
Emergency Fund - Wapa	500
Falcon And Amistad Operation And Maintenance	213
Program Direction	6,343
Spectrum Relocation	47,555
System Operation And Maintenance	4,011

CC Grouping More detail is provided at the Congressional Control level.
PY Approp Unobligated All appropriated funds that have not been obligated from prior fiscal years (Source: FDS/STARS = PY Available minus Current Year Obligated Less PY Adjustment for prior year appropriated funds).
Blue Subtotal line Subtotal at the Under Secretary level.
Green Subtotal line Subtotal at the Organizational level.
Column/row with a 0 or -0 is money that is between 500 and -500.
Column/row with a blank space (no data) is truly a 0 amount.

WEATHERIZATION

Question 35. I know that looking at weatherization funding is complex given that the funding levels are still being affected by the large amount of money given to states, nearly $5 billion, in the economic stimulus bill in spring 2009. Still, given the benefits of weatherization as far as the amount of energy it saves, and given the Department's priorities to fund commercial energy efficiency programs, I am a bit confused by the budget that calls for weatherization funding of $195 million—still $36 million below 2011 and $135 million below the Department's former goal of trying to make about $325 million available for weatherization a year. My home State of Alaska, for example, is proposed to get $200,000 less than in FY 11, even though there are still tens of thousands of homes that would save more than $550 a year per household in energy costs from such energy efficiency efforts. Why did weatherization not rate a higher priority in the Administration's thinking?

Answer. The Weatherization Assistance Program (WAP) remains a priority for the Department of Energy. The $195 million funding request made by the Department in 2013 is a combination of three programs: Weatherization Assistance Program—$139 million; State Energy Program—$49 million; and Tribal Energy program—$7 million, which will help to reduce energy costs for families across the country.

Question 36. Please describe how your Department allocated FY2012 funding under the weatherization program to each state. If a State did not receive a FY2012 please describe the reasons for withholding funding.

Answer. The 2012 Consolidated Appropriations Act provided $65 million for allocation to Weatherization Assistance Program (WAP) grantees—a funding level that is less than one-third of the amount provided in the 2011 Appropriations for the Program. Congress also provided the Secretary of Energy with the authority to use an alternate methodology other than the formula established in regulation to distribute the available funding—taking into consideration unspent balances from the American Recovery and Reinvestment Act of 2009 (ARRA) and other DOE resources available to grantees in 2012. The Secretary exercised this authority and allocated program year (PY) 2012 funds to ensure two major outcomes: 1) grantees that spent their ARRA funds on time have adequate DOE funds to maintain their operations

at pre ARRA levels; and 2) all grantees have adequate funds to operate throughout PY 2012, given the fund balances that are already allocated but remain unspent. The allocations were based on the following criteria:

- Use of an appropriation amount of $210 million as the base "PY12 Target Allocation" for establishing funding for each grantee. This is the amount that would have been awarded to grantees through the funding formula as established in the regulations based on a $210 million Appropriation by Congress in 2010.
- Whether a significant portion of the "PY12 Target Allocation" was available in ARRA balances for at least half of the PY 2012. PY 2012 "Target Allocations" were adjusted downward for grantees with significant ARRA balances.
- Whether more than the adjusted "PY12 Target Allocation" is expected to be available at the start of the grantee's PY 2012. Grantees with a prior year balance totaling more than the adjusted "PY12 Target Allocation" did not receive FY 2012 funding.
- Allocation of PY 2012 funds was provided to those grantees requiring additional DOE funds to reach their adjusted "PY12 Target Allocation". This allocation was equal to 76.38 percent of the adjusted "Target Allocation".the proportional share of the $65 million Appropriation relative to the sum of the adjusted target allocations.

The only reason why a grantee would not have received funds in 2012 is that sufficient unspent ARRA and/or DOE Appropriated funds from previous years still remained available for use in 2012.

Question 37. Please briefly describe the reports that have been issued by the Office of the Inspector General at the Department of Energy that have found instances of waste, fraud and abuse under ARRA for the weatherization program. In addition, please describe actions that DOE will be taking with regard to each of the IG's recommendations stemming from these reports.

Answer. More than $5 billion of funding from American Recovery and Reinvestment Act of 2009 (ARRA) has been administered through 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. These audits were conducted by the DOE Office of Inspector General (OIG) and the Government Accountability Office (GAO). Of the 28 audits, 17 are complete and 11 are ongoing.

The majority of the completed audit reports (14 of 17) contained no significant findings. Of the remaining three reports, findings 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.

As part of DOE's regular monitoring and oversight responsibilities, the Department systematically identifies and responds to new or on-going compliance issues created as a result of the large increase in WAP activities under ARRA funding. All of the WAP grantees take part in regular phone call updates and have been visited on a routine basis, with a total of 121 Monitoring Site Visits conducted by program staff through December 2011. Any issues identified are tracked and addressed until corrected.

DOE monitoring efforts identified these issues prior to the OIG audits and actions have already been taken to address them. It is worth noting that some of these requirements, such as those related to the Davis-Bacon Act, were previously not applicable to the WAP but have now been integrated into the Program.

ENERGY STAR

Question 38. Please identify DOE's role in this program, and the amount of funds expected to be allocated to the Energy Star Program. In addition, please describe your coordination efforts with the EPA as it relates to Energy Star implementation.

Answer. DOE is the lead for the development of product test procedures and technical support of the verification testing program for the ENERGY STAR program. DOE remains committed to working with EPA and stakeholders in terms of creating and updating ENERGY STAR test procedures that are reflective of innovations in the market place and that address manufacturers concerns with test procedures. As an example, DOE and EPA are working closely with industry associations and major refrigerator manufacturers in the development of test procedures to support Smart Grid capability in ENERGY STAR refrigerators. In FY 2012, DOE's budget for ENERGY STAR was a total of $7 million. With those funds, DOE developed test procedures for the ENERGY STAR program that manufacturers must use when qualifying their products for the ENERGY STAR program and conducted a variety

of activities geared toward verifying the performance of ENERGY STAR labeled products through third-party laboratory testing. This information and data are provided to EPA on an ongoing basis, as they are responsible for managing the ENERGY STAR brand.

ADVANCED MANUFACTURING PROGRAM

Question 39. Last year your Department changed the name of the Industrial Technologies Program to the Advanced Manufacturing program. Within the FY 2013 budget you have requested a 150.9% increase above the appropriated FY 2012 levels. Please describe the changes that you anticipate with the new program, along with how you intend to allocate funding for each of the different components of the Advanced Manufacturing Program

Answer. The work of the Advanced Manufacturing Office (AMO) is focused around several major program activities: 1) The Innovative Manufacturing Initiative (IMI), 2) Manufacturing Demonstration Facilities (MDF), and 3) the Energy Innovation Hub for Critical Materials. Each of these is described further below.

1. The Innovative Manufacturing Initiative (IMI) will support competitively selected, industry-led cost-shared technology projects within broadly identified priority technology domains. Industry response to the IMI solicitation was widespread and diverse. AMO received 1,408 total Letters of Intent. Due to this strong industry response, awards will be highly competitive, but the eagerness of so many companies—78% of whom were small enterprises—to put significant sums of their own money toward these cost-shared projects speaks to the high level of demand for this type of public-private partnership.

The $51.2 million in support for projects selected through the IMI solicitation during FY2012 is split approximately equally between FY11 and FY12 funding.

2. The Manufacturing Demonstration Facilities (MDFs) are intended to create collaborative, shared infrastructure around targeted technical areas that will facilitate the development and utilization of energy efficient, rapid, flexible manufacturing technologies and to promote broad and rapid dissemination of manufacturing technologies. Two MDFs will be established around foundational keystone technologies that strongly affect techno-economic systems such as low-cost carbon fiber, out-of-the-autoclave composites, wide band gap semi-conductor materials, and other industry-identified priority areas.

The MDF's will serve a number of valuable functions. They will provide manufacturers and product developers access to physical and virtual tools from design to evaluation for rapidly prototyping new technologies and optimizing critical manufacturing processes. They will also guide and train users and maintain infrastructure with a staff of designers, manufacturing experts and product evaluators. In addition, the MDFs will act as a center for education and training, hosting interns and representatives from industry, academia and government.

3. The DOE Energy Innovation Hubs aim to foster innovation through a unique approach, where scientists and engineers from many disciplines work together to overcome the scientific barriers to cutting-edge energy technologies in specific topic areas. In this environment, the researchers can accomplish greater feats more quickly than they would separately. DOE's goal for the Hub is to create a coherent, full spectrum research team focused on conducting basic and applied research, development, and demonstration (RD&D) to reduce criticality for existing materials and prevent criticality of new materials that are essential to modern and emerging energy technologies. DOE has released a Funding Opportunity Announcement for the Critical Materials Hub and selection is expected by the end of 2012. In the 2013 budget request, AMO request $20M for this Hub. It is expected that AMO will request $25M annually for the Hub in FY 2014—2016.

Specific funding allocations for the various activities conducted through AMO will depend upon the availability of funds.

BUILDING TECHNOLOGIES PROGRAM

Question 40. The Building Technologies Initiative request is increased substantially, by 41.4% over the FY 2012 budget. Please describe how much you intend to allocate for each of the components within this Program. In addition, please describe how you intend to ensure that the Program's progress is coordinated with the other EERE programs, including: the Solar Technologies Program, the Weatherization and Intergovernmental Program, and the Federal Energy Management Program.

Answer. The allocation for each of the components within the Building Technologies Program is shown below:

	(Dollars in Thousands)		
	FY 2011 Current[a]	FY 2012 Enacted	FY 2013 Request
Building Technologies Program			
Commercial Buildings Integration	37,308	31,913	61,079
Emerging Technologies	75,694	84,765	108,344
Equipment and Buildings Standards	35,000	58,246	98,250
Residential Buildings Integration	37,308	31,282	35,872
Technology Validation and Market Introduction	22,000	8,500	0
SBIR/STTR	0	4,498	6,455
Total, Building Technologies Program	207,310	219,204	310,000

[a] SBIR/STTR funding transferred in FY 2011 $3,190,000.

The Building Technologies Program (BTP) is continually working on enhanced collaboration with other EERE organizations, including cross program "details" of staff, and jointly developed programs and results. Examples include:

- BTP is currently participating on a number of EERE crosscutting teams to coordinate activities including a team on advanced manufacturing for lighting, technology deployment and workforce.
- Building Integrated Photovoltaic (BIPV) in conjunction with the Solar Energy Program to explore the impact of roof-top PV systems on thermal management in buildings and develop solutions to mitigate additional cooling loads that might result from a BIPV system;
- Technology screening verification and technology demonstrations for the Federal and private sector with the Federal Energy Management Program;
- Development of energy audit tools, workforce standards and certification, residential retrofit strategies with the Weatherization and Intergovernmental Program; and
- Superior Energy Performance (SEP) and Global Superior Energy Performance (GSEP) Program with the Advanced Manufacturing Office. These are voluntary certification programs that provide commercial buildings and industrial facilities with a pathway for achieving continual improvement in energy efficiency and for documenting their achievements.

Question 41. Please describe how you intend to reduce building-related energy costs by reducing energy use by 50% by 2030. What are the projected incremental costs to the Department to fund these initiatives that could lead to a 50% reduction in building related energy use by 2030?

Answer. BTP will pursue several key activities to reduce energy use by fifty percent.

- The Equipment Standards and Analysis program will increase the scope and effectiveness of its energy conservation standards by accelerating the test procedures and standards rulemakings, allowing for the increased use of DOE's existing authorities to establish standards for additional products that have large energy savings potential. The program will also actively monitor and enforce all DOE energy conservation and water conservation standards through product testing and it will continue to initiate investigations into any detected noncompliance. DOE will also continue working with the Environmental Protection Agency to update and/or create test procedures for the ENERGY STAR program to use for those products that have the potential to save the most energy.
- The Emerging Technologies program will be focused on conducting additional new FOAs in the areas of HVAC; building envelope and windows; sensors and controls; and solid state lighting manufacturing. Additional research will include projects to improve building systems operations with innovative sensors for temperature, humidity, air flow, motion/occupancy, and light level.
- The Commercial Buildings Integration program will conduct demonstrations of commercial building retrofits critical to achieving BTP's goal of reducing building related energy use by 50 percent cost effectively, as well as increasing deployment of technical specifications and demonstration of cost effective retrofits. Commercial Buildings Integration will also work jointly on a competitive solicitation with Emerging Technologies with a focus on building envelope and windows, and one on sensors and controls with the intent to better align the technologies with market opportunities to improve ongoing building energy use.

- The Residential Buildings Integration program will greatly expand their research, including integrating new technologies into existing homes. It will continue to identify and develop the most cost effective measures and enable/demonstrate the cost effectiveness and reliability of systems required to meet the International Energy Conservation Code (IECC) 2012 code revision. In addition, the Building America Program will expand their research into achieving 50 percent energy efficiency savings in residential buildings over IECC 2009. These goals are targeted for completion for all climate zones by 2017.
- The Building Code program will build upon prior year activities to achieve the 50 percent upgrade of the IECC and ASHRAE 90.1 and provide significant technical assistance to States for code adoption and compliance.

DOE will continuously seek to identify opportunities and prioritize activities to meet the proposed 50 percent goal, and seek input from stakeholders throughout this process.

HOMESTAR INITIATIVE

Question 42. The budget continues to recommend the introduction and the enactment of the HOME STAR Efficiency Program. However, as of yet the President has not sent the Congress bill language.

What is your estimation on how much this program would cost? Will the Administration be sending Congress a legislative proposal on this initiative?

Answer. As proposed in 2010, HOMESTAR would establish a $6 billion rebate program, which would provide rebates to consumers to encourage immediate investment in energy-efficient appliances, building mechanical systems and insulation, and whole-home energy efficiency retrofits.

FEDERAL ENERGY MANAGEMENT PROGRAM (FEMP)

Question 43. Since 2006 you estimate that FEMP has saved Federal facilities over $5 billion in energy costs. Can you provide us a list of the projects. and their associated savings. that you used to arrive at the 55 billion in savings?

Answer. Between FY 2006 and FY 2012. 126 DOE ESPC delivery orders and task orders have been awarded with more than $1.7 billion having been invested in Federal energy efficiency and renewable energy improvements. These improvements have resulted in more than 210 trillion Btu life-cycle energy savings and more than 55.1 billion of cumulative energy cost savings.

	Project	Project Investment	Contract Price	Guaranteed Cost Savings	Annual Energy Savings (btu x 10^6)	Cumulative Energy Savings (btu x 10^6)
Total for FY 2006	22	$163,960,554	$404,786,831	$410,192,500	1,233,397	22,143,688
Total for FY 2007	15	$149,177,735	$366,600,406	$371,703,394	957,303	16,206,513
Total for FY 2008	21	$293,469,669	$734,130,687	$756,653,562	1,805,188	34,187,748
Total for FY 2009	23	$397,338,861	$1,331,589,161	$1,493,828,946	4,681,992	86,523,921
Total for FY 2010	37	$528,378,174	$1,143,420,524	$1,162,276,810	2,598,197	42,882,708
Total for FY 2011	7	$252,650,259	$916,119,421	$916,419,640	418,087	7,952,004
Total for FY 2012	1	$1,896,507	$9,336,022	$9,436,576	7,740	154,800
Grand Total	**126**	**$1,786,871,759**	**$4,905,983,052**	**$5,120,511,428**	**11,701,904**	**210,051,382**

Link to FEMP data: http://www1.eere.energy.gov/femp/financing/espcs_awardedcontracts.html

Question 44. Please describe how you intend to fully utilize your existing authorities to obtain additional energy savings at Federal facilities (EPSCs, USECs, PPAs, etc). In addition, please describe the specific authority, and projected cost of each project that you are likely to pursue to meet energy savings.

Answer. The Federal agencies have set targets for utilizing these private investment tools to support the December 2, 2011 Presidential Memorandum, which calls

on the Federal government to enter into $2 billion worth of energy efficiency performance-based contracts by December 2013. DOE has contracts, training, and technical resources in place to assist with this full utilization.

The specific authorities vary by contract type but include the following:

- ESPCs are authorized by 42 USC 8287 et seq. for all agencies to enter into these contracts.
- UESCs are authorized by 42 U.S.C. 8256, for all civilian agencies, to enter into these contracts. DoD has specific authority to enter into UESCs.
- PPAs are codified by 40 U.S.C. 501, for all civilian agencies, to enter into these types of agreements. PPA's are codified by 10 U.S.C. 2922 for DOD.

FEMP developed a 12-month timeline to guide agencies step-by-step, and monthbymonth towards achieving their targets and commitments using FEMPs multiaward ESPC. On average ESPC projects are about $15 million; however, the costs of these projects are likely to vary among agencies. Since these contracts are paid from savings, there is not an increased cost to government. FEMP is working with CEQ and OMB to track agencies progress in achieving the $2 billion target on a monthly basis.

Question 45. If a Federal agency pursues an energy savings initiative, are they required to consult with FEMP?

Answer. Federal agencies are not required to consult FEMP prior to pursuing energy savings initiatives, but highly encouraged to do so as FEMP has resources to assist with their energy savings initiatives, including services, tools, and expertise to help them achieve their Federal energy management goals and ESPC targets.

There are several statutory requirements for federal agencies to report on energy conservation measures and performance that is coordinated by FEMP. For instance, agencies are required to complete energy evaluations of their existing facilities, identify potential energy conservation measures and report those findings to FEMP annually, per §432 of the Energy Independence and Security Act (42 USC §8253(f)). Section 8253, Energy Management Requirements, requires 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.

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 certain energy management activities. Information and data collected from the agencies is then used to develop DOE's Annual Report to Congress on Federal Government Energy Management as well as the OMB Scorecards used to inform Congress and the public of federal energy management efforts.

Question 46. Please describe how you intend to reinvigorate the Federal Energy Efficiency kind. What types of projects do you envision being funded under this initiative?

Answer. Similar to DOD's Energy Conservation Investment Program, through the Federal Energy Efficiency Fund, in FY13 FEMP intends to provide direct funding and leveraged cost-sharing for Federal civilian agencies for capital projects and other initiatives to increase the energy efficiency, water conservation and renewable energy investments at agency facilities. Grants from the Fund would be awarded after a competitive assessment of the technical and economic effectiveness of each agency proposal. The types of projects that would be funded under this initiative include a broad range of energy efficiency, renewable and water technologies such as lighting upgrades, solar energy, geothermal heat pumps, metering, commissioning, and wind power.

Criteria for a project award under the Federal Energy Efficiency Fund include the amount of energy and cost savings anticipated to the Federal Government, amount of funding requested by the agency, and the extent that a proposal leverages financing from other non-Federal sources.

Question 47. FEMP is directed to assist agencies in meeting the goals set forth in the Presidential Memorandum on Performance Contracting (December 2, 2011). In the memo, Federal agencies are tasked to enter into a minimum of $2 billion in performance-based contracts in Federal building energy efficiency within 24 months. Please describe how you intend to meet this goal.

Answer. FEMP has a number of established tools and systems currently in place to assist Federal agencies which are ultimately responsible for executing projects in support of this goal. Those tools include an Indefinite Delivery, Indefinite Quantity multiple award (IDIQ)contract with 16 energy service companies (ESCOs) (with a $5 billion contract ceiling for each ESCO) that are fully qualified to do this work; a comprehensive set of contractual templates and documents, along with a stream-

lined process that allows agencies to move through a project efficiently in about 12 months; three Federal Financing Specialists assigned to different regions of the country who can assist and educate Federal agencies and build interest in performance based contracts; a team of Project Facilitators and National Laboratory experts who serve as the technical resource and assist Federal agencies as they move through project phases. Additional FEMP support includes on-line training, website resources, classroom training and other outreach activities to raise awareness across the Federal government.

FEMP also launched some new initiatives to assist agencies meet this goal. They include promoting "deep" energy retrofit projects (a whole-building analysis and construction process that uses integrated design to achieve much larger energy savings than conventional energy retrofits), a new small site initiative (ESPC ENABLE) for the purpose of bringing in small sites that are currently not being served by the DOE IDIQ ESPCs; partnering with Army on their Net Zero initiative that is expected to result in large, comprehensive projects. DOE headquarters is playing a lead role by piloting a data center ESPC with a goal of replicating similar initiatives throughout the Federal government. FEMP is also working with CEQ and OMB on agency sustainability planning and provided a project management tool to assist agencies with planning, tracking and monitoring implementation efforts.

ELECTRICITY

Question 48. With its budget request, the Administration proposes $20 million to establish a new Electricity Systems Hub that will focus on the "seam" between the transmission and distribution systems. Please elaborate on this proposal. Will FERC or NERC be invited to participate? What about electricity stakeholders? In last year's budget proposal, the Administration sought to create a Smart Grid Hub which I don't believe was ever established. Does DOE intend to include smart grid activities, including cyber security, within this new Electricity Systems Hub?

Answer. The Electricity Systems Hub will develop principles and functionalities around the substation of the future, redefining the critical seam between transmission and distribution. Innovation at this interface is necessary to enable the effective use of clean generation, electrification, and smart grid technologies. The Hub will convene diverse stakeholders including FERC, NERC, utilities, industry, system operators, regulators, commissioners, consumer advocates, national labs, and academia to solve the technical and institutional challenges at this interface. Hub activities will build upon existing smart grid projects, innovate, and embed a culture of cyber-physical security.

Question 49. The FY 2013 budget request proposes $143 million for the Office of Electricity Delivery and Energy Reliability, a 3% increase over the FY 2012 enacted level. DOE's budget materials note that "[t]hese efforts build upon the Recovery Act investments that will have successfully deployed more than 26 million smart meters and 1,000 phasor measurement units in FY 2013, laying the foundation for a modernized electricity grid." However, a January 2012 DOE Inspector General Report on the Department's management of the Smart Grid Investment Grant Program found that many of the grant recipients failed to include adequate cyber security measures. What steps is the Department taking to address these inadequacies?

Answer. DOE takes very seriously the responsibility of managing and overseeing the Smart Grid Investment Grant (SGIG) Program to protect taxpayer funds and ensure that projects are moving forward effectively to modernize our Nation's electricity grid. The security of our electrical grid is of the utmost importance, which is why the Department developed a comprehensive cybersecurity approach for all of SGIG projects. DOE required all recipients to develop cybersecurity plans that provided information about how they would identify cybersecurity risk, how those risks would be mitigated, and how the processes in place would ensure that a sufficient cybersecurity posture be maintained. Those cybersecurity plans were subject to a rigorous review by DOE cybersecurity experts, including iterations between DOE's cybersecurity and the recipient's cybersecurity experts prior to final approval. DOE approved cybersecurity plans for all 99 SGIG projects. DOE did not approve any SGIG cybersecurity plan that failed to meet DOE requirements.

The IG's opinion about what should have been included in the required cybersecurity plans differs from what DOE believes is necessary. The cybersecurity plans described a process that, when implemented correctly, would establish and maintain an adequate cybersecurity profile and, at the same time, retain flexibility so that specific cybersecurity protections could be addressed as the project requirements became better defined from the design phase to the deployment phase.

DOE will continue to ensure that the cybersecurity plans of the SGIG recipients are complete and are being implemented properly. The Department has conducted

a progress review of the recipients' cybersecurity implementations as an integral part of numerous site visits conducted over the past year. The interim assessments performed by cybersecurity experts during site visits help ensure that the recipients are implementing the cybersecurity actions and approaches outlined in their plans. DOE is in the process of reviewing information gathered from the on-site project reviews and, based on this review, will determine whether recipients are required to update their plans.

DOE will continue conducting on-site visits, sharing best practices, offering information-sharing sessions via workshops and webinars, and evaluating recipients' progress against their required cybersecurity plans.

RESPONSES OF THE FEDERAL ENERGY REGULATORY COMMISSION TO QUESTIONS FROM SENATOR MURKOWSKI

The DOE FY 2013 Congressional Budget Request Budget Highlights, (p. 84) proposes with respect to FERC:

> "1,480 FTEs . . . will support FERC in its reliability and critical infrastructure protection standards development and compliance processes; infrastructure siting and inspection responsibilities; enforcement efforts; and policy reforms related to competitive energy markets and regulatory policies, including removal of barriers to renewable resources and advanced technologies."

Question 50. Please provide the FTE breakdown for each of the referenced activities as follows, cross-referenced by Commission office:

- "reliability and critical infrastructure protection standards development and compliance processes;"
- "infrastructure siting and inspection responsibilities;"
- "enforcement efforts;"
- "policy reforms related to competitive energy markets and regulatory policies, including removal of barriers to renewable resources and advanced technologies."

Response:

FTE Breakdown by Activity	
Activity	**FTEs**
1. Reliability and critical infrastructure protection standards development and compliance processes *(Goal 2; Obj 3)*	**154**
	Direct Program: 126
	Support: 28
2. Infrastructure siting and inspection responsibilities *(Goal 2; Obj 1&2)*	**497**
	Direct Program: 407
	Support: 90
3. Enforcement efforts *(Goal 1; Obj 2)*	**214**
	Direct Program: 175
	Support: 39
4. Policy reforms related to competitive energy markets and regulatory policies including removal of barriers to renewable resources and advanced technologies Policy *(Goal 1; Obj 1)*	**615**
	Direct Program: 503
	Support: 112

Note: Support FTEs represent agency administration and other program office administrative support resources which perform initiatives that support all Commission goals and objectives and activities.

FTE Activity Breakdown by Commission Office				
Commission Office	1. Reliability/Critical Infrastructure Protection	2. Infrastructure Siting/Inspections	3. Enforcement	4. Energy Markets Policy Reforms/Regulatory Policies
Chairman/ Commissioners	3	9	4	11
Office of Administrative Law Judges	-	1	-	33
Office of the General Counsel	10	48	6	104
Office of Energy Projects	-	324	1	-
Office of Administrative Litigation	-	1	4	87
Office of Enforcement	11	1	144	14
Office of Electric Reliability	102	4	5	17
Office of Energy Market Regulation	-	7	11	204
Office of Energy Policy and Innovation	-	12	-	33
Total Direct Program FTEs	126	407	175	503
Total Support FTEs	28	90	39	112
Grand Total	154	497	214	615

Note: Support FTEs are comprised of FTEs from the Office of External Affairs, the Office of the Executive Director and the Office of the Secretary. In addition, support FTEs include other administrative support FTEs within the Commission program offices identified above.

Question 51. Also, do the activities highlighted represent all of the Commission's activities? And if not, how many FTEs are dedicated to other activities? Please specify.

Answer. The activities highlighted above represent all of the Commission's activities.

RESPONSES OF HON. STEVEN CHU TO QUESTIONS FROM SENATOR JOHNSON

Question 1. I appreciate the Department's intent to continue to support activities for minimal, sustaining operations at the Homestake mine in South Dakota. As you know, over the past year, operations have been moving forward through a combination of state, private, and federal resources. The project team has been updating the shafts to ensure they are safe and continuing to pump water from the mine and is supporting several early science experiments. Unfortunately, though, it is my understanding that the Department's request would reduce funds for "minimal, sustaining operations" by approximately a third below the FY 2012 level. This would very likely result in several operational changes, including layoffs of dozens of employees in the small town of Lead, SD. Additionally, this reduction would not instill confidence in our longstanding state, international, and private partners that have dedicated significant funding to this project. How does the Department plan to sustain this critical facility, continue to attract international interest, and keep dedicated private and state partners together given the current budget request?

Answer. The Department is exploring the impacts of the FY 2013 budget for "minimal, sustaining operations" at Homestake with the staff responsible for these

operations to ensure continued operations at the mine to support the current science program. Sustaining these operations will require continuing communication with and involvement of private and state partners. Other scientific activities that could utilize sites like the Homestake mine are in planning or pre-planning stages. Once the plans for these experiments are determined, it will be possible to engage in discussions with possible partners about

Question 2. I am pleased that the Administration seeks a 2.4 percent increase for the Office of Science. Additionally, I am pleased that the Administration is placing a heavy emphasis on the development of renewable energy. At the same time, I am also concerned about the proposed reductions to the Offices of High Energy Physics and Nuclear Physics. These offices have provided funding for operations of the Homestake Mine in South Dakota and the design of the Long-Baseline Neutrino Experiment, which has been recommended by the National Academies and numerous interagency committees. These scientific fields have become global in nature, but currently the U.S. role is participatory. As such, what are the Administration's plans to ensure the U.S. regains its leadership role in particle physics and to take advantage of unique assets like the Sanford Underground Research Facility in Lead, SD?

Answer. DOE is committed to maintaining U.S. leadership on the Intensity Frontier of particle physics. A suite of neutrino experiments is either already underway or under construction as part of the Department's intensity frontier program. A major workshop was held in December 2011 to help develop plans for this program. The program will involve the production of intense particle beams using the Fermilab accelerator complex and a series of experiments to explore neutrino interactions, rare decays, and other precision measurements of forefront interest to the international particle physics community. The unique facilities at Fermilab enable the U.S. to hold this leadership role on the Intensity Frontier. In addition, deep underground sites like the one at Homestake could house facilities for U.S. based dark matter direct detection and double beta decay experiments. Currently, Homestake hosts demonstration experiments in these areas.

RESPONSES OF HON. STEVEN CHU TO QUESTIONS FROM SENATOR BARRASSO

Question 1. The Department's 2008 Excess Uranium Inventory Management Plan states that the Department will not dispose of more than 3.8 million pounds of natural uranium equivalent during calendar year 2012. Will the Department abide by its own Management Plan to ensure that no more than 3.8 million pounds of excess uranium inventories enter the commercial market? If not, why not and how much uranium will enter the market?

Answer. On May 15, 2012, the Secretary of Energy issued a determination that specifically considered the following potential transfers:

1. Up to 9,082 metric tons uranium (MTU) of DUF6 to Energy Northwest (ENW) in CYs 2012 and 2013, which would be immediately followed by enrichment to LEU equivalent to 482 MTU, with ENW utilizing a portion of the LEU for fueling the nuclear power reactor it operates. The remaining LEU would be sold as LEU or, in its component parts, as NU and separative work units (SWU) to the Tennessee Valley Authority (TVA) as part of a commercial transaction to support future power generation and tritium production from 2013 through 2030, thereby serving national security purposes.

2. Up to 2,400 MTU per year of NU to DOE contractors as compensation for cleanup services at the GDP sites at Paducah, Kentucky, or Portsmouth, Ohio, in quarterly transfers of up to 600 MTU for the period 2012 through 2021.

3. Up to 400 MTU NU equivalent per year contained in LEU transferred to NNSA contractors for down-blending HEU to LEU for the period 2012 through 2020.

The Department's uranium transfers in 2012 are proceeding consistent with the May 2012 Determination.

Question 2. On January 13, 2012, the Department announced that it will assume $44 million in liability for depleted uranium from USEC. I am concerned about the impact that this decision will have on the commercial market for uranium and on jobs within the uranium mining industry. Will the transfer of liability result in any excess uranium inventories entering the commercial market beyond the amount specified in your answer to question one? If so, how much additional uranium will enter the market?

Answer. The Department signed a contract to procure approximately $44 million of separative work units (SWU) of enrichment services from USEC, and will compensate USEC for the SWU by accepting title to and disposal responsibility for a

portion of USEC's depleted uranium tails that present liabilities valued at approximately $44 million. The Department has taken title to, and eventual disposal responsibility for, the depleted uranium tails, and has provided natural uranium as feedstock to USEC in return for receiving low enriched uranium (LEU) in a quantity that is equal to the natural uranium feed provided and then enriched with the value of SWU the government is procuring. The LEU resulting from this procurement is now owned by DOE and held in its inventory. The LEU can be used to support tritium production. This transaction with USEC did not result in uranium entering the market.

Question 3. Will the Department take any other actions involving or related to USEC which will result in any excess uranium inventories entering the commercial market beyond the amount specified in your answer to question one? If so, what are those actions and how much additional uranium will enter the market?

Answer. At the time of this hearing, the Department does not anticipate taking any actions involving or related to USEC which will result in any excess uranium inventories entering the commercial market beyond the amount specified in the answer to question 1.

Question 4. It is my understanding that the Department is currently revising its 2008 Excess Uranium Inventory Management Plan. What steps are you taking to ensure that the revised plan will promote a strong and stable uranium mining industry within the United States?

Answer. The principles underlying the 2008 Excess Uranium Inventory Management Plan (Plan) are that the Department manages its inventory of excess uranium in a manner that is consistent with current law, maintains an adequate inventory for DOE mission needs, ensures transactions with non-Government entities are transparent and competitive, and supports the maintenance of a strong domestic industry. The Department remains committed to the maintenance of a strong domestic uranium industry, and the revised Plan will reflect adherence to policies and legal requirements that protect the interests of the domestic uranium industry in an effective and reasonable manner while providing the Department with the necessary flexibility to meet its programmatic needs and responsibilities.

Question 5. Can you tell me whether 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. The May 2012 Determination described in answer to question 1 effectively sets the Department's agenda for uranium transfers for the time span of the Excess Uranium Inventory Management Plan currently undergoing revision while keeping in mind the principles set out in the answer to question 4.

Question 6. The Department's FY 2013 budget request states that the Department "will begin implementing a disposition plan developed in FY 2012" for the Rocky Mountain Oilfield Testing Center and NPR-3. Has the Department completed its disposition plan for the property? If not, when will the Department complete the disposition plan?

Answer. The plan analyzing the options for disposing of Naval Petroleum Reserve No. 3 and the Rocky Mountain Oilfield Testing Center (RMOTC) is currently being prepared. It is expected that the disposition plan will be completed by the end of the year.

Question 7. It is my understanding that in 2009 the Department selected a number of projects to proceed to detailed due diligence and negotiation of terms and conditions necessary for a section 1703 loan guarantee. When do you anticipate that the Department will complete the review process for these projects?

Answer. The Department seeks additional guidance and clarification on the "selected . . . number of projects" from 2009 that is cited and in order to answer the question responsively.

Question 8. It is my understanding that the Department of Energy, the Department of Treasury, and the Office of Management and Budget all participate in the review process of projects considered for section 1703 loan guarantees. Do any other agencies or offices within the Administration participate in the review process? If so, which agencies or offices?

Answer. Treasury and OMB are the only agencies or offices that have a statutory role in the review process for Section 1703 loan guarantees.

The statutory basis for Treasury's consultative role is found in Section 1702 (a) of Title XVII of the EPAct of 2005, which authorizes the Secretary of Energy "to make guarantees . . . for projects on such terms and conditions as the Secretary determines, after consultation with the Secretary of the Treasury." (Sec. 1702(a)).

OMB's authority is derived from Section 503 of the Federal Credit Reform Act (FCRA), which provides: "For the Executive Branch, the Director [of OMB] shall be responsible for coordinating the estimates required by this title." [".nder this author-

ity, the director of OMB delegates the authority to agencies to make estimates, while OMB reviews and must approve credit subsidy costs for all programs.". The Final Rule governing Section 1703 provides that OMB must review and approve DOE's calculation of the credit subsidy cost prior to issuance of a loan guarantee.

Question 9. Will you provide the Committee with a list of the projects currently under review for a section 1703 loan guarantee? Please also explain the current status of each project and the remaining steps that need to be taken to complete the review process for each project.

Answer. Disclosure of the status of loan guarantee applications may involve proprietary information that could adversely affect a company's financial position. Accordingly, we shall seek to accommodate the request for details about specific transactions through other means.

RESPONSES OF HON. STEVEN CHU TO QUESTIONS FROM SENATOR WYDEN

WATER POWER BUDGET CUTS

Question 1. For the third year in a row, DOE's budget cuts funding for water power technologies, like wave energy. The Europeans are committing hundreds of millions of dollars to wave energy technology, yet water power technologies were cut 66% to $20 million. The U.S. does not even have a test bed for full-scale wave energy devices, as the Europeans do, because you keep cutting the budget. Water power technologies have broad, bi-partisan support here in the Congress (as shown when this Committee adopted both of Sen. Murkowski's marine energy and hydroelectric bills last year) and at home. Cities want to install small hydro projects in their water systems. Irrigation districts want to install them in their irrigation canals. Why has the Department cut water power funding?

Answer. In FY 2012, the DOE Water Power program will continue and complete a number of important water power technology research and development projects. The FY13 request of $20 million will allow the Department's Water Power Program to continue its ongoing projects to advance water power technologies and accelerate their market adoption. At this funding level, DOE would be able to support a number of water power technologies for both conventional hydropower and emerging marine and hydrokinetic (MHK) energy technologies.

For hydropower specifically, DOE selected 16 new innovative hydropower technology development projects for funding in FY 2011, and that work will continue into FY 2012 and FY 2013. Additionally, DOE expects to continue its efforts to analytically quantify the benefits that conventional and pumped-storage hydropower provide to the electric grid, which can also support the integration of variable renewable resources like wind and solar. For MHK technologies, in FY 2013 activities are slated to focus on developing a suite of technologies that harness the energy from wave, tidal, and current resources. Specifically, MI-1K research is expected to focus on maintenance and development of advanced open water test infrastructure for MHK devices and research into the costs and performance of innovative, early-stage MHK systems and components. Finally, DOE anticipates conducting resource and technology assessments in FY 2012 and FY 2013 to accurately characterize all opportunities for water power development. DOE intends to use data from ongoing techno-economic MHK assessments to establish baseline costs, which DOE will use along with resource assessments to evaluate the need for further innovative water power R&D.

HYDROGEN AND FUEL CELLS BUDGET CUTS

Question 2. Hydrogen and fuel cell technology funding was cut more than 22% to $80 million. Here again is a technology with enormous potential and global competitors. A recent Pike Research white paper estimated the global market for fuel cells at $785 million for 2012. When this Committee was considering my alternative fuel vehicle bill last year, both of the major auto manufacturers groups recommended the bill place more emphasis on hydrogen, but DOE is recommending exactly the opposite. Why is the Department cutting hydrogen and fuel cell research?

Answer. The budget request for hydrogen and fuel cells has been reduced as part of rebalancing the Department's portfolio of advanced technologies. However, hydrogen and fuel cells remain an integral part of that portfolio and significant progress is being made. The budget request for fiscal year 2013 allows the Department to focus on hydrogen and fuel cell activities that will continue to yield technology advancements in key areas—including ongoing reductions in the cost and improvement in the durability of fuel cells, reductions in the cost of renewably produced hydrogen, and improvements in systems for storing hydrogen. Funding has been reduced for aspects of the program with less impact on R&D progress, such as tech-

nology validation, codes and standards, and market transformation. Rebalancing the portfolio will allow the Department to focus on nearer term transportation technologies while maintaining a strong effort in hydrogen and fuel cells.

Question 3. DOE also cut funding for grid-connected energy storage by 25% to 15 million in the Office of Electricity Delivery and Reliability. Energy storage technologies have application to a number of DOE programs and program offices—from energy efficiency, to integration of intermittent renewables, to electric grid management. At the hearing. Sen. Wyden requested that Secretary Chu provide the Department's technology roadmap or strategic plan for Department-wide research and development of energy storage technologies. Please provide this material.

Answer. DOE is pursuing a department-wide coordinated R&D strategy for energy storage. This strategy is articulated the following key documents:

- The Grid Storage Report to Congress (July 2010) describes the roles of each DOE Office, technical goals, and R&D portfolio overviews.
- The Energy Storage Program Planning Document (February 2011)[2] describes grid-scale energy storage technology challenges and needs, as well as near-and long-term DOE objectives in relevant R&D and demonstrations.
- The Vehicle Technologies Program Multi-Year Program Plan (201 1-2015)[3] describes DOE goals for vehicle energy storage R&D, related technical challenges and barriers. and cross-referenced specific research tasks.

In addition, the Quadrennial Technoloi. Review (September 2011)[4] establishes an overarching framework for DOE strategy in energy technologies, including energy storage. As it notes. the deployment of storage technologies faces harriers that include deficient market structures, limited understanding of system value, and limited large-scale demonstrations. Quantifying the benefits of storage under various operating conditions will be a priority so that industry and regulators alike can fully assess the value of deployed storage capacity. The Department will measure. validate, and disseminate performance intbrmation for grid-integrated storage technologies, and develop the analytic tools necessary to assess and predict value and service as a function of operation and location.

A key part of DOE's strategy in energy storage is the Batteries and Energy Storage Hub. The interdisciplinary research and development in the Hub is designed to advance next-generation electrochemical energy storage technologies to improve the reliability and the efficiency of the electrical grid, to better integrate clean, renewable energy technologies as part of the electrical system, and for use in electric and hybrid vehicles. The Hub will also serve as an interaction, information, and communication nucleus for the basic and applied battery and energy storage communities—encouraging the flow of people and information to ensure that the problems and issues being faced in today's technologies are understood and to ensure that Hub research will spur innovation and problem-solving broadly. The Hub is currently under review, and an award is anticipated later this year.

HYDRAULIC FRACTURING AND OTHER DRILLING TECHNOLOGIES

Question 4. Your budget has a $2 million increase in Fossil Energy for interagency research on hydraulic fracturing for natural gas. Those are the right ideas, both to increase funding on hydraulic fracturing and working with other agencies, but my sense is that the do.telopment of safer, more predictable hydraulic fracturing technologies is a bigger problem than a few million dollars can solve. Please describe the scope of work and roles and responsibilities and budget of each agency working on this interagency effort.

Answer. On April 13, 2012 DOE, the Environmental Protection Agency, and the Department of the Interior's U.S. Geological Survey signed a Memorandum of Agreement formalizing this Multi-Agency Collaboration on Unconventional Oil and Gas Research. Through this collaboration, a robust Federal R&D plan is being developed, taking into account the recommendations of the Secretary of Energy Advisory Board (SEAB) Natural Gas Subcommittee. DOE's role in this initiative will focus on priorities identified by the interagency collaboration in a research plan to be formed over the next nine months within its area of core research competencies, including wellbore integrity, flow and control; green technologies; and systems engineering, imaging and materials. The three agencies request to support this work with $45 million; of this amount, DOE is requesting $12 million.

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[2] See http://energy.gov/oe/technology-development/energy-storage .
[3] See http://www1eere.energy.gov/vehiclesandfuels/pdfs/program/vt__mypp__2011-2015.pdf
[4] See http://energy.gov/quadrennial-technology-review

Question 5. There are other energy-related technologies, like geothermal energy development, and carbon sequestration, that could benefit from advances in hydraulic fracturing technology and which have similar problems including seismic disturbance from hydraulic fracturing. To what extent are the Department's natural gas drilling and hydraulic fracturing research programs coordinated with the geothermal and sequestration programs?

Answer. These DOE programs are coordinated through various types of formal and informal technical exchanges including workshops, in-house technical meetings, and one-on-one discussions. Organizationally, the Office of Fossil Energy includes both the oil and gas program and the carbon storage program. These programs are coordinating efforts through periodic meetings to share and exchange program-related information.

There has been long-standing interaction between the oil/gas and geothermal programs. This includes the participation of Fossil Energy personnel in the review of project proposals for the DOE Geothermal Technologies Program and in the Interagency Geothermal Working Group led by the National Academies. Further, through a collaborative effort with the DOE Geothermal Technologies Program, the DOE Office of Fossil Energy's Rocky Mountain Oilfield Testing Center demonstrated a geothermal power generation unit using fluids from oil field wastewater streams.

ADVANCED NUCLEAR FUEL CYCLE R&D

Question 6. The Blue Ribbon Commission on America's Nuclear Future recently recommended that the Nation continue to pursue research, development and demonstration on a range of reactor and fuel cycle technologies. As the Commission noted, potential alternative fuel cycles must account for all elements of the fuel cycle including waste, safety, security, and non-proliferation concerns. There are advanced electro-processing technologies, especially uranium dioxide electrolysis, which appear to have significant benefits over more conventional reprocessing technologies. Please describe the technical viability, proliferation value, security, waste treatment, safety, and reactor design advantages and disadvantages of uranium dioxide electrolysis and other electro-processing technologies and the extent to which the Department is supporting research into these technologies.

Answer. The Fuel Cycle Research and Development (FCR&D) Program in the DOE Office of Nuclear Energy is researching sustainable nuclear fuel cycle technologies that improve resource utilization, reduce waste generation, enhance safety and limit proliferation risk. Electrochemical processing, also called pyroprocessing, is one of the technologies being researched by the FCR&D program.

Unlike conventional aqueous reprocessing technologies, pyroprocessing operates at elevated temperatures using molten salts as solvents. The use of molten salts in pyroprocessing may provide advantages over aqueous systems. Molten salts are not affected by temperature or radiation damage, so relatively short-cooled fuel can be processed. The technology can handle large quantities of fissile material needed for fast reactors, since a hydrogenous moderator is not present. The technologies are also potentially more compact. However, this technology is not sufficiently mature for commercial deployment and further research is required to fully develop its technical capabilities and better understand its costs, risks, and potential benefits. Specifically, the technologies for the recovery and accountability of transuranic elements (for either recycling or for material/waste management purposes) must be improved. Also, because this is a batch process, engineering studies would be needed (in conjunction with the resolution of the technology challenges) in order to evaluate the ability to "scale-up" this process and the associated economic feasibility.

Research activities supported by the FCR&D program have focused on understanding the fundamental principles that govern the efficiency of several separations processes, showing technical viability at laboratory scale where appropriate, evaluating waste management needs, and developing an understanding of the nonproliferation features of the processes. Questions about proliferation risks, environmental concerns, economics, technology, and other issues still exist. Current research efforts are focused on understanding the science and reducing the uncertainties.

MANUFACTURING AND MATERIALS RESEARCH

Question 7. The Department's FY2013 budget includes several initiatives to expand research and development of manufacturing and advanced materials. For example, the Industrial Technology Program within the Office of Energy Efficiency and Renewable Energy is being reorganized as the Advanced Manufacturing Office. The National Energy Technology Laboratory (NEIL), including its facility in Albany, Oregon, has unique expertise in materials and manufacturing technology although

it has historically supported the Office of Fossil Energy. To what extent, will the Department take advantage of the expertise of the Albany lab and other elements of NETL in its expanded manufacturing and materials research efforts?

Answer. The Advanced Manufacturing Office (AMO) has pending funding opportunity announcements that will seek to leverage existing manufacturing research and development resources including workforce, infrastructure and capabilities in areas all across the country to help advance important initiatives. The National Energy Technology Laboratory (NETL) facility in Albany, Oregon is an example of the type of facility that could potentially offer these resources. AMO encourages NEIL to apply when these competitive, merit-reviewed solicitations are issued.

RESPONSES OF HON. STEVEN CHU TO QUESTIONS FROM SENATOR CANTWELL

FUNDING FOR THE HANFORD WASTE TREATMENT PLANT

Mr. Secretary, while I am pleased to see DOE's continued commitment to cleaning up nuclear wastes on the Hanford Reservation, I have a few significant concerns. The Waste Treatment Plant is currently undergoing a re-baselining effort and DOE's FY 13 budget request for the Waste Treatment Plant is down $50 million from last year—about $110 million below the average costs of the past 3 years.

Question 1. Can you reassure my constituents in the Tri-Cities that this budget request and re-baselining effort will keep the Waste Treatment Plant on schedule to be completed and operational by 2019?

Answer. The Department is committed to working with the Congress, the Defense Nuclear Facilities Safety Board, and other key stakeholders to deliver a safe and efficient Waste Treatment Plant that addresses the major environmental risk at Hanford as close to the current cost and schedule baseline as possible.

At the requested funding level of $690M, the project will prioritize its FY2013 efforts on: 1) resolution of remaining technical issues, including the Defense Nuclear Facilities Safety Board Recommendation 2010-2 Implementation Plan commitments for Pulse Jet Mixing performance demonstration; 2) completion of the Low-Activity Waste Facility (LAW), Balance of Facilities (BOF), and the Analytical Lab; and 3) focus remaining resources first on the High-Level Waste Facility(HLW), and then on the Pretreatment Facility (PT). Until the Department develops its independent cost estimate, the rebaselining proposal is received from the contractor, and the independent reviews are concluded, cost and schedule implications cannot be defined.

Question 2. Is there any risk that Hanford clean-up funding at the President's FY13 budget request will prevent DOE from meeting the milestones of the Tri-Party Agreement?

Answer. The President's FY13 budget request positions DOE to meet all FY13 Tri-Party Agreement milestones.

Question 3. Is there any risk that Hanford clean-up funding at the President's FY13 budget request will increase the likelihood that radioactive materials will contaminate the Columbia River?

Answer. The Department has made significant progress in removing hazards from the Columbia River corridor. The risk posed by radioactive material contamination of the Columbia River in the short-term is extremely low based on groundwater modeling done in support of the Tank Closure and Waste Management Environmental Impact Statement. At the Tank Farms, all pumpable liquids have been transferred from the older single-shell tanks to the newer and more durable double-shell tanks. Barriers have been placed over some tank farms to reduce the risk of further contamination. The FY13 President's Budget request provides the resources to continue retrieval of the tougher sludge and saltcakes in single-shell tanks and transfer it to the double-shell tanks. No double shell tanks are believed to have ever leaked, and no single-shell tanks are currently leaking. The Department remains fully committed to completing this important mission of removing the threat posed by Hanford's tank waste.

Question 4. I'm also concerned about some recent reports, including concerns raised by whistleblowers, about the design of the Waste Treatment Plant. I understand this is a challenging project and that some of the Hanford waste treatment facilities and technologies are one-of-a-kind, but the plant must have the ability to operate reliably for decades once it comes online. When the waste treatment plant begins processing waste, high levels of radioactivity inside the facility will prohibit humans from entering it to make repairs. While we all want the plant to be completed in a timely and cost-efficient manner, we simply cannot allow any margin for error.

How exactly is the Department of Energy providing oversight to guarantee that the Waste Treatment Plant will be able to accomplish its unique mission, and have you looked into the design issues?

Answer. The Waste Treatment Plant (WTP) is the chosen method by which the majority of the tank waste will be stabilized for long-term disposal. As such, the Department, its regulators and contractors work closely together to ensure the plant is capable of safe and efficient operations. In this relationship, the Department oversees and is ultimately responsible for all aspects of the WTP nuclear safety, design, verification and validation, and construction and commissioning. Given the importance, scope and visibility of this project at Hanford, the Department routinely engages experts from government, industry and academia to provide additional independent reviews and assessments of the WTP project. The Department will continue to work closely with its contractors, stakeholders, technical oversight, regulators, Congress and others to ensure that the WTP will safely achieve its tank waste treatment mission at Hanford.

WASTE ISOLATION PILOT PLANT (WIPP) AND NUCLEAR DEFENSE WASTE FROM HANFORD

Mr. Secretary, waste retrieval and reversibility have historically been major limiting factors in the siting and cost of proposed waste disposal facilities. Yet the high level waste at the Hanford site is scheduled to be vitrified in the Waste Treatment Plant beginning in 2019, a process that will render materials in high level waste both stable and unrecoverable for future commercial or nuclear purposes. A permanent storage site will then be necessary for these vitrified wastes. Allowing Hanford to become the de facto repository for these wastes—which represent 90 percent of the nation's high-level radioactive defense waste—is unacceptable to me and my constituents.

Question 5. How do you propose that we resolve the long-term storage problem and move to establish a permanent repository for treated military wastes?

Answer. The Department's inventory of high-level waste and spent nuclear fuel resulting from historic defense-related operations is currently safely managed at four sites within the complex. The high-level waste and spent nuclear fuel can be safely stored on site for several decades pending the availability of a geologic disposal facility.

To ensure that nuclear power continues to be a safe, reliable resource for our nation's long-term energy supply and security, the United States must put in place a sustainable fuel cycle and used fuel management strategy. To advise the Administration, Secretary Chu convened the Blue Ribbon Commission on America's Nuclear Future (BRC). This expert panel completed their final report and recommendations in January of 2012. The Administration is giving full consideration to the BRC recommendations as we work to define a path forward. The Administration anticipates providing additional information later this year, and will work with Congress to implement a new strategy to manage our nation's used nuclear fuel and nuclear waste.

Question 6. At a hearing two weeks ago, former Energy Committee Chairman Domenici suggested that military waste should be prioritized and that the Waste Isolation Pilot Plant (WIPP) in New Mexico might be ideally situated for Hanford's waste.

Do you agree that WIPP is well-suited to accommodate the waste at Hanford?

Answer. The Department is currently evaluating the recommendations of the Blue Ribbon Commission regarding long-term waste disposal. The Department's experiences at WIPP will be considered as part of that assessment.

Question 7. What advantages and disadvantages do you see in using WIPP to dispose of Hanford waste in terms of cost, safety, and timing?

Answer. The Department is currently evaluating the Blue Ribbon Commission recommendations for disposal of high-level waste and spent nuclear fuel. At this stage it is premature to assess the impact on cost, safety, and timing.

Question 8. Do you see any technical barrier to disposal of additional volumes of vitrified high-level waste, spent nuclear fuel, and other wastes from Hanford at the WIPP facility? Could the facility potentially accommodate higher levels of both contact-handled and remote-handled wastes?

Answer. At present, WIPP's mission is limited by statute to the disposal of defense transuranic waste. Therefore, WIPP's design and regulatory approvals currently support only transuranic waste disposal. Additional evaluation is necessary to determine whether any technical barriers exist to disposal of high-level waste and spent nuclear fuel at WIPP. Based on early studies and ongoing international efforts, disposal of these wastes in a salt repository appears to be technically feasible.

The WIPP Land Withdrawal Act of 1992, as amended, limits the repository disposal volume to 175,675 m^3 of defense-related transuranic waste. In addition, WIPP

is limited to a total curie level for remote-handled transuranic waste which is not to exceed 5.1 million curies and a volume requirement not to exceed 7,080 m^3.

There are no technical barriers to WIPP accepting additional volumes of contact-handled and remote-handled transuranic wastes.

Question 9. Considering that WIPP has now been operated successfully for over a decade now, what barriers prevent the facility from being expanded beyond its current maximum of 175,500 cubic meters of defense-generated transuranic (TRU) waste.

Answer. The Waste Isolation Pilot Plant (WIPP) Land Withdrawal Act of 1992 (WIPP Land Withdrawal Act), as amended, limits the repository disposal volume to 175,675m^3 of defense-related transuranic (TRU) waste. The WIPP Land Withdrawal Act and the Environmental Protection Agency certification impose a limit on total curie level for remote-handled TRU of 5.1 million curies. Additionally, the Consultation and Cooperation Agreement with New Mexico limits the total volume of remote-handled TRU to 7,080 cubic meters. While there are no apparent technical barriers to WIPP being expanded to receive additional TRU waste volumes beyond the statutory limit, there are significant legal barriers.

With respect to additional TRU waste, it would be necessary to revise the statutory limits in the WIPP Land Withdrawal Act and the Consultation and Cooperation Agreement with New Mexico, and to obtain the appropriate regulatory approvals from EPA and the State of New Mexico.

Question 10. Under the Land Withdrawal Act, does the Department of Energy have the authority to transfer larger quantities of defense wastes, including spent nuclear fuel and vitrified high level wastes, from Hanford to WIPP within the current limits of WIPP's license? If not, what authority would be necessary?

Answer. Under the Waste Isolation Pilot Plant (WIPP) Land Withdrawal Act of 1992, as amended, DOE does not have the authority to dispose of spent nuclear fuel or high-level radioactive waste at WIPP. Section 12 of the Act specifically states, "The Secretary shall not transport high-level radioactive waste or spent nuclear fuel to WIPP or emplace or dispose of such waste or fuel at WIPP."

PENDING LAND TRANSFER AT HANFORD SITE

Mr. Secretary, DOE completed its Comprehensive Land Use Plan (CLUP) in 1999 that identified nearly 10% of the Hanford Site that could be used for industrial development in the future. The remaining 90% of the Hanford Site was identified for preservation or conservation. That CLUP met all requirements under the National Environmental Policy Act (NEPA) and the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) at the time, and a Record of Decision was made following the release of the final CLUP.

Question 11. To what extent can the current process and review rely on existing data, particularly from the CLUP, to expedite finding new productive uses for Hanford land?

Answer. DOE is taking steps required prior to any potential transfer including review under NEPA. DOE will complete an Environmental Assessment (EA) for any proposed land transfer action and will engage interested members of the public in the NEPA process. Any land transfer EA will review/consider existing documents and studies that are pertinent to the land transfer action, including the CLUP, which was updated in a supplement analysis in 2008.

Question 12. Knowing that the CLUP had extensive public involvement in support of industrial development, why doesn't this satisfy certain NEPA/CERCLA requirements? What is the NEPA/CERCLA legal structure governing this current review and process, and the requirements for any public comment?

Answer. The CLUP provides broad NEPA coverage for land-use designations such as "industrial" but does not satisfy NEPA requirements for site-specific activities, such as the transfer of Federal lands. DOE recognizes that in accordance with NEPA, public input is an important component of its evaluation, and that input received from the CLUP will be considered in the preparation of the EA.

The CERCLA process to ensure that cleanup activities are sufficient to meet the anticipated land use has not been completed for the lands being considered for transfer. Upon completion of the work required to meet CERCLA remedy requirements, DOE will request Environmental Protection Agency concurrence on a Clean Parcel Determination pursuant to section 120(h)(4) of CERCLA.

Question 13. What are the baseline studies that DOE envisions that will take 18 or more months to complete before the 1,641 acres requested are transferred to the Tri-Cities community? How can this process be streamlined and expedited?

Answer. As part of the NEPA process to prepare the Environmental Assessment (EA), DOE will need to conduct cultural and natural resource surveys for portions

of the lands where such surveys have not been completed to date. In addition, DOE will take advantage of existing surveys where they are available and will complete necessary further data-gathering activities as efficiently as possible. We hope to arrive at a consensus as to reasonable alternatives and the scoping process for the EA involving the public and interested stakeholders.

U.S. FOSSIL FUEL EXPORTS

Mr. Secretary, I was troubled by your recent comments in Houston which seemed to suggest that you may have pre-determined that exporting natural gas was in the public interest, or that it was okay if natural gas exports led to moderately higher natural gas prices for American consumers and businesses.

Question 14. Do you think that fossil fuel prices would increase domestically as a result of expanding our exports of fossil fuels? If so, how do you weigh the likely impact of those price increases on the economy? Please provide individual responses to these questions for oil and petroleum exports, natural gas exports, and coal exports taking into account the different market dynamics for each fuel.

Answer. DOE has not conclusively studied the domestic price impact on fossil fuels as a result of an increased export of fossil fuels.

Oil and Petroleum Exports: Crude oil from the United States (U.S.) cannot be exported without a special clearance from Congress, and as a result, crude oil is rarely exported—the one exception being some crude oil exports from Alaska in the 1990's when the U.S. West Coast had excess supplies of oil. Refined oil products can be exported however. In theory, assuming both crude or refined products could be exported, it appears that increasing exports of U.S. oil (if U.S. production remained the same) might have little, or no, effect on oil prices since these prices are determined in international markets. Thus, if U.S. exports increased the U.S. would have to increase imports to balance out its domestic needs—i.e., basically this would appear to be a net balancing of oil supplies with no price effects. However, if the U.S. increased domestic oil production, either for export or domestic use, this might, depending on the size of the increase relative to the size of the global market, put downwards pressure on international oil prices because it would increase the overall supply of oil in international markets.

Natural gas: In January 2012, the Energy Information Administration (EIA) released a study that found domestic natural gas prices could increase as a result of domestic natural gas exports, in addition to a number of other findings. This report is available on the EIA website at: http://www.eia.gov/analysis/requests/fe/

Coal: The U.S. has traditionally been a net exporter of coal. The EIA shows the U.S. currently exports about 5% of the approximately 1.1 billion tons of coal it now produces annually. Thus, the effects, if any, of these levels or exports have already been factored into the prices paid for coal in the U.S. The effects of increasing coal exports beyond these levels would depend on how readily, and at what price, the U.S. coal could increase its production.

Question 15. Does it make sense for the United States to export more raw energy commodities—and the resulting environmental impacts—across the Pacific just to have finished goods such as solar panels be imported back to the U.S.?

Answer. In general, free international trade of goods and services could benefit all parties with each party exporting the products it can produce most efficiently, and importing the products it cannot produce as efficiently as others.

Question 16. Do you think exporting natural gas and coal would make them behave more like oil—a world market commodity, governed by higher, more volatile day-to-day prices?

Answer. It is more likely that exporting natural gas or coal into international markets would not cause them to act like international oil markets. International oil markets are fully integrated and buy and sell oil in an international market where virtually all transactions are valued according to the dynamics of that international market with price adjustments for quality and location. The international markets for natural gas and coal, to the extent that these markets exist, are much more regional and local in operation. Thus, these markets do not set an international price for natural gas or coal. The prices and transactions that do take place in these markets are much more likely to reflect local or regional market conditions and often are point-to-point transactions with long term contracts. These contracts tend to reduce price volatility.

RELATIONSHIP BETWEEN GASOLINE PRICES TO SUPPLY AND DEMAND FUNDAMENTALS

Mr. Secretary, there are few economic drivers more significant than prices at the pump. Even small gas price increases can significantly impact every family budget and the bottom lines of virtually every American business. Higher gas prices hurt

consumer confidence and can also be a serious threat to economic recovery. Many industry analysts think we are just a few months away from $4 per gallon of gas, which tends to be the point at which the price of gas starts to undermine economic growth. And we'll shoot right past that if Iran reacts to additional economic sanctions by restricting its production or even attempting to close the Strait of Hormuz.

While these geopolitical considerations have an understandable impact on prices at the pump, every year the oil markets seem to be getting further and further divorced from the laws of supply and demand. During a Finance Committee hearing last year, I asked Exxon-Mobil CEO Rex Tillerson what he thought the price of oil should be if it were based on supply and demand fundamentals. His answer was $60 to $70 a barrel, rather than the $100—$115 we see today. I've studied this issue closely for many years now, and I think the evidence is clear that excessive speculation in the oil futures market drives disruptive behavior in the price of oil.

Question 17. What do you think is responsible for our new era of volatile and elevated oil and gasoline prices?

Answer. Volatility in the oil market and periodic high gasoline prices have been concerns during the last four decades. Continuing unrest in many oil-supplying nations of the Middle East and North Africa has contributed to price volatility in the oil market by adding uncertainty about the availability of supply. Additionally, the global demand for oil has increased, particularly with the rapid industrial growth and development in countries like China, India and Brazil. For instance, in 2010 alone, China added roughly 13 million cars on its roads. As standards of living rise throughout the world, there will be more demand for oil, and that will affect prices of petroleum and petroleum products worldwide.

Question 18. Do Americans simply have to live with high prices and high volatility until better alternatives allow us to run our cars and trucks on something other than oil, or make them all run on less oil?

Answer. Without changing their fuel or vehicles, Americans do have options for reducing oil consumption by making choices about vehicle maintenance and operation. FuelEconomy.gov, one of DOE's most heavily trafficked websites, offers its many visitors information on those options. Americans can choose when and how to make trips both locally and long-distance. The Administration has called for transportation policies that offer Americans more choices among available modes of transportation to make those trips. These are some of the options available to Americans who wish to control their energy costs without replacing their existing vehicles or changing fuels.

Question 19. It was just a decade ago that Saudi Arabia was trying to keep world prices in the range of $22 to $28 dollars per barrel to discourage the development of alternatives, why isn't $100 per barrel helping spur alternatives to gasoline?

Answer. High oil prices have, and will continue to, spur the development of alternatives to gasoline. Higher prices at the pump impact consumer preferences for vehicles with greater fuel economy, helping spur innovation in the design and production of those vehicles. Driven by these innovations and by the Administration's historic new fuel economy standards, the fuel economy of America's light duty vehicle fleet has achieved an all-time high over the last year. U.S. Department of Energy (DOE) programs have also seen an unprecedented response from entrepreneurs and applicants with innovative technologies that could reduce oil consumption. Specifically, these programs have cut the cost and improved the performance of promising electric vehicle, biofuels and fuel-efficient technologies. To achieve full commercialization of alternative fuels, we must continue to invest in innovations that make alternatives competitive with fossil fuels on both price and cost.

Question 20. What is necessary to break oil's monopoly on our transportation system, and what will bring alternative fuels online on a scale to compete with fossil fuels?

Answer. Developing alternative fuels and advanced vehicles through investments in innovation is essential to diversifying the energy used in the U.S. transportation sector. The recent introduction of more electric vehicles into the light duty fleet is a major step toward that objective. In the long-haul heavy duty truck fleet, greater use of natural gas has the potential to be a complementary approach to addressing the dependence on oil. 'In addition to pursuing advances in technology and infrastructure for electric and natural gas vehicles, DOE is also investing in the development of biofuels that can be produced at a commercial scale and sold at a cost that is competitive with fossil fuels. The DOE Biomass Program is taking specific steps such as developing fuels that can be directly dropped into existing infrastructure for gasoline, diesel, jet fuel, and a host of other useful products. Sustained investment in these innovation paths is necessary to fully develop and deploy the technology solutions that can address oil dependence in the transportation sector.

Question 21. The President announced a significant amount of new oil and gas drilling in his State of the Union speech. Yet based on the testimony from experts we have heard in the Energy Committee, drilling or bringing in more oil from Canada is not going to make a bit of difference in the world price of oil, especially in the short run. The same would hold true even if we opened up drilling off every coastline in the United States. The Energy Information Administration states that even the most comprehensive domestic drilling proposals would only decrease gasoline prices by 3 to 5 cents—and not until 2030.

In your opinion, will any amount of additional drilling lead to substantially lower prices at the pump today, tomorrow, or any time in the next 20 years?

Answer. Oil prices are set on a global market and fluctuate depending on global the market conditions. Even if the United States were a net oil exporter, U.S. gasoline prices would be set based on global oil prices as they are today. Given the complexity and uncertainty of predicting the future global oil market it would be difficult to determine whether additional domestic drilling would substantially lower prices.

BUDGET CUTS TO WATER POWER R&D

Mr. Secretary, as you know hydropower is the largest source of clean, renewable energy in the United States. And Washington State produces almost a third of the nation's total. This affordable, emissions-free, and renewable power source has helped attract new business investments to the Pacific Northwest and there is great potential remaining, as was recognized by the 2011 Hydropower Improvement Act, bipartisan legislation led by Senator Murkowski. A recent study has shown that with the right policies, hydropower could create over 1.4 million cumulative direct, indirect, and induced jobs by 2025. Given this potential, I have some concerns about the FY 2013 request for water power programs, which take a disproportionate reduction from FY 2012 level—a two-thirds reduction, in fact—whereas virtually all other EERE research program areas get increases of the same magnitude or more.

Question 22. Why is there such a dramatic decrease in your funding request for this particularly promising area of clean energy generation?

Answer. The Department believes that the $20 million requested for water power research in FY 2013 will allow its Water Power Program to continue its ongoing projects to advance water power technologies and accelerate their market adoption. At this funding level, a number of water power technologies can be developed for both conventional hydropower and emerging marine and hydrokinetic energy technologies.

For hydropower specifically, DOE selected 16 new innovative hydropower technology development projects for funding in FY 2011, and that work will continue into FY 2012 and FY 2013. Additionally, DOE expects to continue its efforts to analytically quantify the benefits that conventional and pumped-storage hydropower provide to the electric grid, which can also support the integration of variable renewable resources like wind and solar. For marine and hydrokinetic (MHK) technologies, in FY 2013 activities are slated to focus on developing a suite of technologies that harness the energy from wave, tidal, and current resources. Specifically, MHK research is expected to focus on maintenance and development of advanced open water test infrastructure for MHK devices and research into the costs and performance of innovative, early-stage MHK systems and components. Finally, DOE anticipates conducting resource and technology assessments in FY 2012 and FY 2013 to accurately characterize all opportunities for new water power development across the country. As data from these assessments become available and results from ongoing research and technology development projects are produced, DOE will evaluate the need for further innovative hydropower R&D.

Question 23. Isn't a strong hydropower R&D program important to achieving the ambitious clean energy goals that the Department of Energy has identified?

Answer. Yes, a strong hydropower R&D program is critical to meet the President's clean energy goals, including the goal of producing 80% of U.S. electricity from clean energy sources by 2035. Hydropower has a major role in the renewable portfolio. On average 6% of the nation's electricity and 70% of the renewable electricity has come from hydropower over the last decade, and it will continue to have a strong role in the renewable energy portfolio for the foreseeable future. Hydropower is clean, low-cost energy source with a well-developed industry that not only has a significant role in the renewable energy portfolio, but is also a critical part in the electricity operation and electrical power grid. Hydropower's quick response time has been critical to ensuring power grid reliability and security. Pumped-storage hydropower is the only reliable and cost-effective utility-scale energy storage available today.

In FY 2012, the Department will continue and complete a number of important water power technology research and development projects initiated in FY 2010 and FY 2011. The $20 million requested in FY 2013 allows the Department's Water Power Program to continue its ongoing efforts to advance water power technologies and accelerate their market adoption.

Question 24. Do you believe that no further innovation or technological advance is possible for hydropower?

Answer. The Department believes that further innovation and advancement of hydropower technologies are both possible and necessary to improve the efficiency and sustainability of existing assets that provide a substantial amount of energy and services for the nation, and to encourage the development of new sustainable hydropower generation. In FY 2012 and FY 2013, the Department will continue and complete a number of research projects that will develop and test new hydropower generation technologies and water utilization tools, demonstrate a state-of-the-art fish friendly turbine, develop standardized assessment guidelines for upgrading existing hydropower facilities, and quantify the benefits that conventional and pumped-storage hydropower provide to the electric grid (which can also support the integration of variable renewable resources like wind and solar). Finally, DOE anticipates conducting resource and technology assessments in FY 2012 and FY 2013 to accurately characterize all opportunities for water power development. The FY 2013 request would allow for the completion of these activities, after which the Department will have more information to evaluate the need for additional innovative water power R&D.

Question 25. Please provide a summary of DOE's spending on hydropower R&D over the last two decades and measureable outcomes from the taxpayer investment.

Answer. DOE has made hydropower R&D investments since 1991, but funds for such initiatives and programs were relatively limited compared to investments in recent years. Since Congress re-established the Water Power Program in 2008, DOE has spent a total of $58.5 million on conventional hydropower R&D through annual Water Power Appropriations and an additional $30.6 million for hydropower upgrades as part of the American Recovery and Reinvestment Act. Over the last five years, new opportunities in small hydropower have emerged as well as opportunities for upgrades of existing hydropower which results in increased generation. DOE's R&D has also included detailed laboratory tests of efficiency and fish survival rates of a fish-friendly turbine, which potentially provides a more sustainable option for producing electricity at an estimated 1,000 environmentally sensitive hydropower facilities and thousands of new potential developments.

Another leading role that DOE has played is in conducting credible resource assessments, which developers, states, and other federal agencies can use to inform decisions about infrastructure investments. For example, DOE recently completed a study that finds that there are 50,000 non-powered dams in the United States with the potential to add over 12 GW of capacity. The majority of these dams are operated by the U.S. Army Corps of Engineers, and power stations can likely be added to many of these dams without impacting critical habitats, parks, or wilderness areas while powering millions of households and avoiding millions of metric tons of carbon dioxide emissions each year.

The analysis did not consider the economic feasibility of developing each unpowered facility.

As part of the Recovery Act, DOE awarded $30.6 million to create jobs and help modernize infrastructure, increase generating efficiency, and reduce environmental impacts at seven hydropower facilities. For example, the Abiquiu Hydroelectric Facility boosted output from 13.8 MW to 16.8 MW, increasing renewable energy generation capacity by 22%, and will produce enough energy to power 1,100 homes annually. Construction is in progress for several more of these modernization projects.

Over the last decade, hydropower has provided on average 6% of the nation's electricity and 70% of renewable electricity output annually. DOE has sponsored new innovative hydropower R&D at more than a dozen universities across the country.

RENEWABLE ENERGY PRICE PARITY WITH FOSSIL FUELS

Mr. Secretary, we clearly have to make some difficult choices with regard to the allocation of funding across energy R&D and other technology specific incentive programs. While there have been major improvements in many of these technologies in recent years, they still have some way to go before they can compete on an equal footing with fossil fuels and seize the expanding world market for clean energy.

Question 26. What is your sense of the future with respect to the competitiveness of renewable energy technologies? When might we expect them to be competitive in the marketplace on their own?

Answer. Renewables, such as wind and solar, are competing today in some electricity markets where the highest quality resources (wind speed and solar irradiation) can be tapped. Although there are currently policies in place (production and investment tax credits, accelerated depreciation schedules, State Renewable Portfolio Standards, Renewable Energy Credits, etc.) that help incentivize the emerging renewable energy market, DOE's goal is to enable all renewable energy technologies to compete with fossil fuels on an unsubsidized basis. This means that the true installed cost of renewable electricity, without subsidies, needs to be approximately $0.06 per kilowatt-hour. Currently, land-based wind power at approximately $0.08 per kW-hr is within striking distance of this goal. In some wholesale electricity markets accessible to high class winds and transmission, it is already competitive. In some areas of the country that have real-time pricing, high peak retail electricity rates and good solar irradiance, rooftop photovoltaics (PV) energy is becoming competitive.

DOE has been committed to promoting R&D in high potential renewable technologies that have specific goals to become cost competitive over time. For example, off-shore wind technology is currently not cost competitive, however, through the development of deepwater wind technology, DOE has an interim goal of $0.10 per kW-hr by 2020 for off-shore wind systems to be more competitive and an ultimate goal of price parity with fossil fuels by 2030.

DOE's Sunshot Initiative puts us on track to enable photovoltaics to meet this $0.06 per kilowatt-hour goal by the end of the decade. Concentrated solar power technologies will require lower cost and higher performance materials before they are competitive on an unsubsidized basis.

Naturally-occurring steam or hydrothermal geothermal systems can be cost competitive if the resource is well characterized. The Department is now developing better exploration tools to facilitate resource characterization. Enhanced geothermal systems are still in the early stages of development but have an advantage over hydrothermal systems in that they could be deployed almost anywhere in U.S., not just where natural occurring geothermal exists (which is primarily in western U.S.). DOE's goal is to prove EGS feasibility by 2020 and cost parity with fossil fuels by 2030.

In addition, the Department sees hydropower playing a critical role in continuing to produce renewable generation while integrating higher penetrations of variable solar and wind power into the grid. For instance, a common current practice is to curtail wind power in times of lower demand. Instead of curtailing the wind generation, it can be used to pump water to a higher altitude reservoir and then to use that potential energy when wind generation is low. Small hydropower and marine and hydrokinetic devices (current, tidal, wave, etc.) require more research and development but have the potential to be cost effective in the future.

Finally, renewable energy generation has nearly doubled over the last 3 years. Continued investment in research and development can help create domestic manufacturing jobs and make the U.S. more competitive in this global competition for alternative energy sources.

Question 27. Do you agree with the many energy experts who argue that a predictable price on carbon designed in a way that minimizes price volatility is the most economically efficient and technology neutral way to realize greater energy efficiency and diversity?

Answer. The Administration supports a Clean Energy Standard (CES) as the centerpiece of a strategy for creating clean energy markets in the power generation sector. A CES will provide the signal investors need to move billions of dollars of capital off of the sidelines and into the clean energy economy, creating jobs across the country and reducing air pollution and greenhouse gas emissions. By setting an annual target for electricity from clean energy sources, while allowing businesses and entrepreneurs to figure out the best way to meet it, the CES is a flexible, market-based approach that taps American ingenuity and innovation—and channels it toward a clean energy future.

Question 28. In your view, what are the most economically efficient policies to increase U.S. energy diversity without the need for government to pick technology or special interest winners or losers?

Answer. The Administration supports a Clean Energy Standard (CES) as the centerpiece of a strategy for creating clean energy markets in the power generation sector. A CES will provide the signal investors need to move billions of dollars of capital off of the sidelines and into the clean energy economy, creating jobs across the country and reducing air pollution and greenhouse gas emissions. By setting an annual target for electricity from clean energy sources, while allowing businesses and entrepreneurs to figure out the best way to meet it, the CES is a flexible, market-

based approach that taps American ingenuity and innovation—and channels it toward a clean energy future.

INVESTMENTS IN GRID MODERNIZATION R&D

Mr. Secretary, you have called attention, for example in your FY 2011 budget request, to the nation's chronic underinvestment in R&D supporting the modernization of the electric power grid. I am referring specifically to grid-scale energy storage technologies and control technologies that will enable the integration of larger shares of renewable energy and give operators better tools to manage the grid in real time and make it more reliable and efficient. I am concerned with the substantial cuts to the Office of Electricity Delivery and Energy Reliability's R&D budgets in your budget request. For example, the Smart Grid R&D budget request for FY 2013 is 40 percent lower than the FY 2012 budget, and the request for energy storage R&D is 24 percent lower than last year. I realize that this year's budget request includes $20 million for an Electricity Systems Innovation Hub, but I am concerned that funding for the new Hub comes at the expense of other programmatic priorities.

Question 29. Could you explain your strategy for the Office of Energy Delivery, as it is reflected in the budget request?

Answer. The FY 2013 budget request of $143 million for the Office of Electricity Delivery and Energy Energy Reliability (OE) supports the President's commitment to an "all-of-theabove" energy strategy that includes critical investments in innovative technologies, tools and techniques that will enhance the capabilities of a modern power grid. As such, strategic decisions were made to prioritize activities providing a balanced portfolio of projects and activities that increase electricity reliability and security nationwide by taking a systems-level approach to grid modernization, developing the computational capabilities to improve system planning and operations, and emphasizing cybersecurity. FY 2013 also reflects our ongoing efforts to continue to leverage funding throughout the Department, with other Federal agencies and the industry to maximize cost effectiveness.

Question 30. Does it make sense to take funds from other R&D programs within OE to pay for the Energy Systems Hub?

Answer. Strategic priorities and tradeoffs were made to maximize resources and results while at the same time minimizing programmatic impacts. Investing in the Electricity Systems Hub will allow us to focus on the seam between transmission and distribution—a pinch point of grid modernization where power flows, information flows, policies and markets intersect—to tackle the critical issues and barriers associated with integrating, coordinating, and facilitating the numerous changes that are happening system-wide. The Hub activities will accelerate adoption of new technologies within a policy and regulatory framework that allows efficient utilization of assets and capital investment, including minimizing consumer costs for grid modernization.

Question 31. Can you share how you envision this innovation hub providing leadership in shaping our national pursuit of a transformed power system for the 21st century?

Answer. The Hub will serve as a platform to test and evaluate new technologies and concepts developed by the Hub, DOE, or industry. Key stakeholders will convene at the Hub to observe, discuss, and understand the market, regulatory, and institutional implications of these advancements. It will serve as a center of excellence for sharing information and best practices and be a training ground for future engineers needed in a transformed power system.

INTERMITTENT RESOURCE INTEGRATION IN THE PACIFIC NORTHWEST

Mr. Secretary, with the growth of intermittent generation throughout the West—and especially the Northwest—there is a legitimate desire to find ways to integrate wind economically. To that end, I have concerns with the potential results of blindly relying on "markets" to meet consumer needs in an affordable fashion. My constituents suffered the consequences of the Enron-induced West Coast energy crisis, and I believe that any new proposal, which claims to address legitimate issues through the market, needs to be evaluated carefully. My concern is that we not presume that organized and centralized markets are the only or best solution without the due diligence to support that claim.

Question 32. Do you agree that utilities and generators in the west, including the power marketing agencies under your supervision, should look at all options to integrate intermittent resources and focus on the solution with the least cost to consumers?

Answer. The decisions made by utilities, including the Power Marketing Administrations (PMAs), should always be made with the consumer in mind and the impact those decisions will have on consumers' bills. The electric sector is facing unprecedented changes as our nation moves towards cleaner energy sources. These changes must be done cost-effectively to ensure electricity rates remain affordable.

As the United States. becomes fueled more and more by clean energy, we will need to improve our ability to integrate variable resources. All options are on the table, but the country cannot wait indefinitely; we must transition from studying to decision making sooner rather than later.

Question 33. How does the proposed Energy Imbalance Market (EIM) compare to operational measures within and between so-called balancing authorities? What approach to integrating intermittent resources do you think would be the most effective while impacting the consumers the least?

Answer. Some utilities have developed a range of operational measures within and between balancing authorities (BAs) over the last few years. These include new wind forecasting techniques, intra-hour scheduling, reserve sharing, and a new electronic bulletin board for intra-hour transactions. These operational measures, which have been developed at low cost among groups of interested utilities, have been designed to work with the existing market structure. They help utilities maintain reliability and provide balancing reserves at reasonably low cost to consumers.

While these operational measures have provided benefits, they may face limitations as the amount of renewable resources increases over time. Currently, the balancing of load and renewable generation occurs within each individual BA without taking advntage of the natural diversity of variable generation and load fluctuations between different BAs. Spreading the variability of generation over a wider footprint and sharing diversity among a broader group of BAs could result in reductions in total balancing reserve requirements, potentially reducing costs to consumers and reducing wear and tear on existing balancing resources.

In an EIM, balancing requirements are consolidated amongst all participating BAs. An independent market operator conducts a continuous least-cost dispatch of available resources to maintain the balance of loads and resources across the footprint of the participating BAs. The netting of system variability over the entire EIM footprint reduces the amount of balancing reserves that must be set aside in anticipation of such movement (though the benefits of this netting can be constrained by transmission access to the offered flexibility). These measures may be more economically efficient than current practices and have the potential to lower the cost of integration. The operation of the EIM could also provide price signals that would facilitate the development of controllable loads (e.g., the smart grid) and incentivize optimal location of new resources. Finally, the wide area visibility and resource responsiveness facilitated by an EIM could improve system reliability.

Some of the diversity benefits of an EIM may be achievable through operational measures. These include the sharing of variable energy resource diversity between BAs and enhanced dynamic transfer capabilities. To further the evaluation of benefits that maybe gained from an EIM, DOE has partnered with utilities to evaluate the costs, benefits, and design requirements of a number of enhanced balancing market options, including an EIM. The Department expects to receive regular updates on the status of this work and is also monitoring other work streams on the topic underway in the West.

STANDBY POWER PROVISIONS OF THE ENERGY INDEPENDENCE AND SECURITY ACT OF 2007

Mr. Secretary, I authored Section 524 of the Energy Independence and Security Act of 2007 (EISA 2007) which directs federal agencies to procure appliances and other equipment that use no more than 1 watt of electricity in standby power mode, if such products are available, and to procure products with the lowest standby power consumption otherwise. The requirement is stated in 42 USC 8259b(e) in the Federal Acquisition Regulation, under Subpart 23.2—Energy and Water Efficiency and Renewable Energy, which states that, in their procurements, agencies must purchase items listed on FEMP's Low Standby Power Devices product listing.

Question 34. To what extent are new products and appliances that meet FEMP standby power requirements available for off-the-shelf purchase?

Answer. In product categories where FEMP has had a long-standing low standby power program we have seen migration of the market towards production of low standby power products. New products are becoming available that meet the low standby power requirement.

In addition, new product categories frequently appear on the market. FEMP currently requires standby power of 1W or less for three product categories: cordless

phones; desktop computers, workstations, and docking stations; and fax/printer machines. FEMP monitors market changes in order to identify opportunities for significant energy savings through new low standby power requirements. FEMP also coordinates with the DOE EERE Building Technologies Program, which establishes test procedures and standards for energy-consuming product categories.

Question 35. What progress have federal agencies made to comply with these procurement guidelines?

Answer. DOE's Federal Energy Management Program (FEMP) has assembled lists of qualified products and made them available to agencies. FEMP has worked with the Federal supply sources (DLA and GSA) to indicate compliant products within those systems. FEMP has also worked to incorporate the low standby requirements into other market transformation programs, such as the Electronic Product Environmental Assessment Tool (EPEAT) and ENERGY STAR. Data from the Federal Electronics Challenge suggests that over 90% of Federal purchases covered by EPEAT are of EPEAT-qualified models. The success of EPEAT and ENERGY STAR combined with the notable increase in models that meet the low standby power requirements suggest that agencies are purchasing an increasing number of low standby power products. FEMP's low standby power program helps make it easier for Federal agencies to find and comply with requirements.

Question 36. Specifically, what does the Department of Energy need to do, if anything, to meet these guidelines?

Answer. DOE ensures sustainable procurement mandates are followed internally through continuous review and updates to the Department's contract writing system. All contracts are required to contain clauses and provisions to ensure offerors and contractors meet the Federal government's sustainable acquisition goals and initiatives.

The Department also ensures that all personnel involved in the procurement process are made fully aware of DOE's current policies and objectives through training courses and involvement in working groups.

DOE's official policies and progress for meeting sustainable acquisition mandates and goals are included in its annual Strategic Sustainability Performance Plan (SSPP).

Question 37. To date what have been the energy and financial savings resulting from FEMP's standby power requirement and what savings to you anticipate in the future?

Answer. While Federal market penetration data regarding devices with stand-by power is difficult to acquire, FEMP estimates savings on the order of—19,000MWh or—2MW, approximately $1.5 million annually in avoided Federal energy costs. This is based on preliminary analyses for a report being prepared by FEMP on Federal Energy Savings Potential, which will estimate savings potential by product category. FEMP is currently researching Federal sales volumes in order to better estimate Federal energy savings potential associated with FEMP-designated efficiency requirements and standby power requirements. FEMP has observed an increase in the national availability of low standby power products that is likely attributable to Federal leadership in this area.

Question 38. Please provide a summary of other DOE efforts to minimize standby power losses and the benefit they could provide American consumers.

Answer. The Department is making great strides towards amending test procedures and energy conservation standards to account for energy consumption in standby mode and off mode to help consumers of these products save money. Per Section 310 of EISA 2007, all final rules establishing or revising a standard for a covered consumer product, adopted after July 1, 2010, shall incorporate standby mode and off mode energy use. To date,. DOE issued standards that consider standby and off mode for clothes dryers, room air conditioners, furnaces, central air conditioners, residential refrigerators, and fluorescent lamp ballasts and has revised test procedures for clothes dryers, room air conditioners, furnaces, boilers, battery chargers, and external power supplies. DOE is currently engaged in a rulemaking to amend standards for Class A external power supplies and establish standards for non-Class A external power supplies and battery chargers. This rulemaking considers the energy consumed in standby and off mode, as required by EISA 2007. In the Notice of Proposed Rulemaking, DOE's proposal estimates that standards for battery chargers and external power supplies (in all modes of operation) could save an estimated 2.35 quads of energy cumulatively over the years 2013-2042. The benefit to the nation for this rulemaking, represented as the cumulative net present value of total consumer costs and savings from the standards is estimated to be $6.83 billion over the years 2013-2042 (7% discount rate, in 2010$). Until this proposal is finalized, these energy savings estimates are subject to change.

SUPPORTING DOMESTIC REGIONAL FUEL STOCKS DEMONSTRATIONS

Mr. Secretary, although the lack of qualified cellulosic biofuels has made it more difficult to meet the requirements of the Renewable Fuel Standard (RFS), I am encouraged that the DOE is coordinating with the U.S. Navy and the U.S. Department of Agriculture (USDA) to promote the development of cellulosic biofuels.

Question 39. Can you tell me more about this partnership, and how it is developing regional strategies for cellulosic biofuels?

Answer. DOE has a robust and growing partnership with the U.S. Navy and USDA to promote the development of biofuel technology for future military and civilian use. The collaboration is creating a better understanding of the biofuels needs of the military and the potential of the technology. In June 2011, Secretary Chu signed a Memorandum of Understanding (MOU) with Secretaries Vilsack and Mabus to request that funds be transferred through the Defense Production Act or other appropriate authority to DOD to jointly develop biorefineries that will produce military specification fuels. DOE also works closely with USDA on feedstock issues such as the Feedstock Regional Partnership and the Biomass Research and Development Initiative. Finally, DOE is continuing to work with USDA to better understand the regional needs and sustainability issues required for wide spread commercialization of advanced biofuels.

Question 40. What level of support for RDD&D programs is necessary to reach the targets set in the RFS? Does the current budget request meet this need?

Answer. The RFS has set aggressive volumetric goals for biofuels, such as ethanol. In FY12 the Biomass Program will have developed, demonstrated, and validated multiple integrated systems for the conversion of biomass to ethanol and other industrial alcohols cost competitively. This will conclude the program's R&D effort in this area and the data will be available to industry and others looking to commercialize these technology pathways. In addition, four commercial scale biorefineries based on cellulosic ethanol technologies have already broken ground and anticipate operations by FY 13. Leveraging this knowledge and investment to date on ethanol, including feedstock logistics and intermediates production such as sugar, the program is shifting efforts to producing drop-in fuels and bio-products in future years to displace the entire barrel of oil, and DOE believes the FY13 request is adequate to support the necessary RD&D needed to advance this effort.

Question 41. What can the DOE do to alleviate the current market reality that there are not enough qualified products, and how can the DOE support the qualification of renewable fuels, such as oil derived from woody biomass for process heat, to qualify under the RFS?

Answer. Within the President's budget request, DOE is supporting the necessary research, development and demonstration (RD&D) of technologies that can help meet the requirements of the RFS. Support of the collaborative demonstration project with the Navy and USDA will allow the private market to make more informed investment decisions regarding renewable fuels. In fact, four commercial scale biorefineries supported by DOE have already initiated construction and will have the capacity to produce more than 80 million gallons of cellulosic ethanol by 2013. In support of the qualification of additional renewable fuels for the RFS, DOE conducts research and analysis and provides data and expertise related to qualifying cellulosic renewable fuels. As an example, for ethanol, DOE conducted the engine testing of ethanol blends at its national laboratories and supported pioneer cellulosic ethanol demonstration and commercialization efforts through the Biomass Program.

FUTURE ELECTRICITY GENERATION FROM COAL

Mr. Secretary, in an investment analysis published in November 2010, Deutsche Bank concluded that coal use for electricity production in the United States is likely to decline significantly in coming decades—from 47 percent in 2009 to 22 percent in 2030. Several factors contribute to coal's decline, including capital cost increases relative to gas, retirement of aging plants, increasingly stringent regulation of criteria pollutants, rising ash disposal costs, and financial barriers due to the regulatory uncertainty associated with greenhouse gas emissions. In contrast, EIA's Annual Energy Outlook 2012 Early Release projects that U.S. aggregate coal use will continue to rise and that coal will still account for 39 percent of U.S. electricity production in 2035.

Question 42. Which forecast do you think is more likely?

Answer. The two cited energy outlooks by Deutsche Bank and EIA are based on different assumptions in areas important to the future domestic energy outlook where there is considerable uncertainty, including: legislation to achieve major greenhouse (GHG) emission reductions, future natural gas costs, electricity demand

assumptions, the competitiveness of gas and coal power plants with carbon capture and storage (CCS), and the impacts of new regulations impacting power plants.

The Deutsche Bank analysis is driven by a policy-oriented initiative, specifically, the identification of a low cost solution for achieving a 17-percent reduction in overall U.S. greenhouse gas (GHG) emissions by 2020 and an 83-percent reduction by 2050 relative to the 2005 level. Those specific policy goals were not represented in the Annual Energy Outlook 2012 (AEO2012) Early Release. If they were, the coal share of 2035 electricity would likely be lower.

FUTURE ELECTRICITY GENERATION FROM COAL

Question 43. Do you concur with the broad consensus that anticipated plant retirements, increasing regulatory obligations, and higher hurdles to capital finance for new coal plants.will have a profound impact on U.S. coal consumption?

Answer. EIA is providing the answer to this question. EIA is currently studying U.S. coal consumption in its Annual Energy Outlook for 2012 (AEO2012) and its findings will help to inform the Department's analysis. There are numerous factors including relatively slow electricity demand growth, low natural gas prices, high coal prices and upcoming environmental rules that will lead to some coal retirements and impact future coal use for power generation over time. However, DOE does not project as large an impact as is seen in the 2010 Deutsche Bank analysis. Deutsche Bank provides an analysis driven by an assumed policy-oriented initiative, where the primary goal of the study was to find a low cost solution for achieving the Administration's proposed 17-percent reduction in overall U.S. greenhouse gas (GHG) emissions by 2020 and an 83-percent reduction by 2050 relative to the 2005 level.

In addition, it appears that some of the assumptions used for Deutsche Bank's analysis may vary substantially from those used by EIA for the AEO2012 Early Release Reference case. For example, in their analyses Deutsche Bank indicates that natural gas prices will remain in a range of $4.00 to $8.00 per million Btu in nominal dollars, with perhaps $6.00 being their primary forecasting assumption. In the AEO2012 Early Release Reference case, the nominal price of natural gas at Henry Hub increases from $4.39 per million Btu in 2010 to $8.98 per million Btu in 2030 and to $11.48 per million Btu in 2035. Another important difference between Deutsche Bank's analysis and EIA's AEO2012 Early Release Reference case is the outlook for electricity demand, with Deutsche Bank projecting average electricity demand to increase by 0.5 percent per year between 2009 and 2030 and EIA projecting more rapid growth of 1.0 percent per year for this same time period.

In the area of coal-fired generating capacity retirements, Deutsche bank projects 152 gigawatts of capacity retirements (most likely nameplate) by 2030, which is considerably higher than the 33 gigawatts of net summer coal-fired capacity retirements projected in the AEO2012 Early Release during the years 2011 through 2030. In the Deutsche Bank report, the authors indicate that the costs of some environmental rules not represented in EIA's AEO2012 Early Release, such as the EPA's recently finalized Mercury and Air Toxics Standards (MATS) and forthcoming EPA rules on cooling water intake and ash disposal were represented in their analyses. EIA plans to represent the new MATS rule in the updated AEO2012 Reference case scheduled for publication later this year.

Question 44. In 2011 the Environmental Protection Agency (EPA) issued a number of new rules. As these policies go into effect, the price of coal-fired generation is expected to rise. The National Research Council's 2010 report "The Hidden Costs of Energy" showed that the average additional cost of coal generation due to emissions of SO_2, NO_X, and particulate matter was 3.2 cents per kilowatt-hour in 2005 and will decrease to roughly 1.7 cents per kilowatt-hour by 2030.

How do the costs of reducing these emissions from recent regulations compare?

If the additional cost of coal generation estimated by the NRC were included in EIA's modeling, how would that change the estimate for future coal consumption and the price through 2035? How do the costs of reducing these emissions from recent regulations compare?

If the additional cost of coal generation estimated by the NRC were included in EIA's modeling, how would that change the estimate for future coal consumption and the price through 2035?

Answer. EIA is providing the answer to this question. EIA has not performed an analysis of the potential impacts of the non-market externalities referred to in the NRC report. If externality cost were incorporated into pricing, coal plant operators would have an incentive to abate emissions in order to reduce impacts on generation costs and prices. However, there would likely be some increase in coal generation

costs, some reduction in coal generation and increase in other generation sources, and some increase in electricity prices.

Question 45. The Congressional Research Service documented in a 2007 study that significant bottlenecks in rail transport caused billions of dollars in losses in previous years, and that many billions of dollars of improvements would be required to avoid such problems in the future. How much would this increase the true cost of coal? What must be invested to ensure the national reliability of inputs to coal-fired power plants considering that that EIA also projects coal mining to become more geographically constrained?

Answer. EIA is providing the answer to this question. The report cited is CRS No. RL34186, Rail Transportation of Coal to Power Plants: Reliability Issues, September 26, 2007. The report found (pp. 38 and 39) that:

> "just as there are no public metrics that directly measure current rail system capacity, there are also no firm estimates of future capacity needs or costs.... In summary, rigorous national-level assessments of rail system capacity needs and expansion costs do not appear to exist."

In general, the limited availability of rail infrastructure costs and capacity data make their specific impacts on rail costs difficult to assess in the National Energy Modeling System used to produce the Energy Information Administration's Annual Energy Outlook. But, because projected changes in coal volumes are relatively small (0.4% growth per year in U.S. coal production) , significant capacity constraints and related impacts on projected transportation rates are not anticipated.

COAL RESERVES

Mr. Secretary, the U.S. Geological Survey (USGS) has been updating data on U.S. coal reserves in the last few years. The AEO 2012 updated, and reduced, previous estimates for technically recoverable reserves of shale gas based on new data from USGS. The AEO 2012 does not mention its reference for coal reserves.

Question 46. Why do you think the Energy Information Administration (EIA) has not updated its estimates of coal reserves? Do you find the latest USGS data for coal reserves to be reliable?

Answer. EIA is providing the answer to this question. EIA frequently reviews options for updating coal reserve estimates, but has not under taken such an effort at this time because the known resource base appears large enough to meet current and expected demands. While the United States Geological Survey (USGS) does not maintain a centralized one-stop source of coal data for some key coal basins, data exists at state geological surveys, mining companies, and in localized USGS studies. Additionally, EIA has documented declining productivity in the Appalachian Basin (the main eastern U.S. coal producing region).

Question 47. In 2009 USGS published an analysis that included evaluations on how to calculate economic recoverability, estimating that 6% of the Demonstrated Reserve Base (DRB) was 'economically recoverable' without a rise in price per ton that is well beyond current EIA projections. How should EIA integrate the USGS analysis on economic recoverability of coal reserves into its analysis? If USGS estimates on economic recoverability were included in the AEO, how would the projected prices, exports, and production for all energy types be affected?

Answer. EIA is providing the answer to this question. In the USGS report, the 6 percent relates to original resources, not to the Demonstrated Reserve Base (DRB). For clarification purposes, DRB represents a portion of original resources.

The differences in the assumptions and methodology used in the USGS and EIA analysis should be acknowledged. For example, EIA reports Estimated Recoverable Reserves (ERR) of Wyoming surface-mined coal at 15.3 billion short tons (bst) comparable to the "economically recoverable" estimate of 18.5 bst made by the USGS. The discounted cash flow analysis done by USGS assumes that future mining is done with today's technology so it also is an approximation of coal availability. (Note: the USGS assessed the Gillette field, which while it is the major part of all the coal in Wyoming, leaves out some coal included in the EIA estimate of ERR for all of Wyoming. However, this difference is not large and does not alter the comparisons.)

EIA has considered projected coal prices, recovered coal quantities, and available coal reserves in its latest long-term assessment of U.S. energy markets published in the Annual Energy Outlook 2012 (AEO2012) Early Release Reference case in January 2012. For the time horizon represented in the AEO2012 Early Release Reference case Wyoming coal reserves are felt to be sufficiently abundant to meet the projected levels of coal demand. For Wyoming's Powder River Basin, coal prices increase from $12 per short ton in 2010 to approximately $25 per short ton in 2035

(constant 2010 dollars). Based on the USGS assessment, the amount of recoverable coal in Wyoming's Gillette coalfield at $25 per short ton would be about 40 bst. The AEO2012 Early Release Reference case shows cumulative coal production of 12 bst for the Wyoming's Powder River Basin during the years 2010 through 2035. The USGS estimates of economically recoverable coal exceed the cumulative AEO coal production forecasts by a wide margin.

RESPONSES OF HON. STEVEN CHU TO QUESTIONS FROM SENATOR COONS

ARPA–E

I am pleased to see a continuing commitment to the ARPA-E program. The budget request for S325 million indicates the administration's commitment for breakthrough, transformational research. ARPA-E's focus on exclusively high-risk, high-payoff concepts—technologies promising genuine, high-impact innovation in the ways we generate, store and utilize energy has been essential. While the Department has invested heavily in conventional energy research. ARPA-E has augmented that original mission and acquired support from many different stakeholder interests.

Question 1. With the Department's FY 2013 budget request. do you plan to continue solicitations in the portfolios already in place, establish new opportunities around potentially transformational ideas. or open one or more opportunities to a more general set of ideas that might evolve from public input?

Answer. In FY 2013. ARPA-E plans to continue investing in some technology areas that are already represented within its research portfolio while also seeking out and identifying new high-impact areas of focus. For example. ARPA-E's Electrofuels program has successfully supported several technologies on the lab-scale that allow microorganisms to combine chemical or electrical energy with carbon to create liquid transportation fuels. Through the recently issued Electrofuels II Request for Information (RFI)[5] ARPA-E is seeking input from industry, academia, and other interested stakeholders on the steps and challenges necessary to scale-up and apply these and related technologies in a commercial-scale facility.

ARPA-E issued an Open Funding Opportunity Announcement (FOA) on March 2, 2012 to support transformational and disruptive high-impact energy R&D projects for energy-related technologies that enhance our nation's energy and economic security. These projects are expected to include: renewable power, bioenergy, transportation, the electrical grid, and building efficiency, among other technology areas. The release of the Open FOA followed a three-week RFI, which produced public comments that were utilized in finalizing this FOA. Since ARPA-E issued an Open FOA in FY 2012, it does not plan to issue one in FY 2013, holding to a pattern of issuing an Open FOA every two to three years.

ARPA-E's prides itself on constant innovation and its organizational model reflects that by allowing a timeline from conception to execution that is greatly accelerated—typically only six to eight months. This allows ARPA-E to respond rapidly to newly emerging technological discoveries in its creation of new programs.

QUADRENNIAL ENERGY REVIEW

Over the years, there have been calls for a national approach to formulate an integrated, forward-looking energy policy. Energy policy touches many different federal agencies. The Quadrennial Technology Review done by the Department of energy is broader than many review before it, but still does. not consider Administration-wide priorities. The intent of developing a government-wide Quadrennial Energy Review (QER) is to bring greater coherence and interagency cooperation to Administration-wide energy projects, as well as point for effective dialogue with Congress on a coordinated legislative agenda. However, that very interagency cooperation will be required to make the QER possible, which makes this undertaking more complicated than its predecessors.

Question 2. How will the DOE, as the agency in charge of coordinated the QER process, deal with this complexity, ensure that the final product is useful, and engage with the many different entities across the Administration?

Answer. Pursuing the QER as a fully integrative effort from the outset with comprehensive recommendations later in the process is a critically important, but complex challenge. Discussions are underway about taking a "moving spotlight" approach in which attention would be focused sequentially on each of the six strategies

[5] DE-FOA-0000671: Request for Information (RFI) on Funding Opportunity Announcement (FOA) DE-FOA-0000671 for Chemo/electro-autotrophic Synthesis of Liquid Fuels at Scale. available at: https://arpa-e-foa.energy.gov/

defined in the QTR, which would allow DOE and its interagency partners to develop recommendations more quickly. The series of spotlight QERs would let the agencies tackle the overall complexity in manageable pieces.

To ensure that the fmal QER product is useful and to engage with stakeholders inside and outside the Administration, DOE will actively pursue stakeholder engagement, including engagement across the Federal government, as taken during development of the QTR. The DOE-QTR demonstrated a successful approach for substantive consultation that involved public comment on a framing document and a series of focus groups, topical workshops and a capstone workshop. I anticipate each spotlight QER will adopt a similar approach.

Question 3. What preparation has been done already within DOE to prepare to execute the QER process? Are there impediments to implementing a QER, and if so, what are they?

Answer. Discussions are underway currently, and DOE will fully brief Congress on our plans as soon as we are ready to announce them.

BIOFUELS—REPLACING THE WHOLE BARREL

I applaud DOE's newfound focus on utilizing biomass to replace the "whole barrel" of products from crude oil—not only gasoline, but also diesel, jet fuel, and petrochemical products. Today, a variety of companies are seeking to scale technologies to produce drop-in and direct replacement fuels that can be seamlessly integrated into existing refineries, transported in existing pipelines, dispensed from existing tanks and pumps, and used to fuel any engine used today—as well as chemicals that can replace petroleum derived products used in plastics, packaging, clothing, and other fibers.

Question 4. How is DOE utilizing programs across the department (in the Office of Science, EERE, and ARPA-E) to address biomass conversion to drop-in and direct replacement fuels?

Answer. DOE's Undersecretary level technology team, which brings together the Office of Science, ARPA-E, and EERE's Biomass Program, coordinates efforts to conduct research, development, demonstration and deployment (RDD&D) activities to overcome barriers to commercializing advanced biofuels. Office of Science is focused on basic or fundamental R&D that increases knowledge and the suite of tools available to the research community. The Bioenergy Research Centers, supported through the Biological and Environmental Research program (BER) of the Office of Science, are pursuing the basic research underlying a range of high-risk, high-return biological solutions for bioenergy applications. Advances resulting from the BRCs will provide the knowledge needed to develop new biobased products, methods, and tools that the emerging biofuel industry can use. Also supported by BER, the Joint Genome Institute sequenced the genomes of key industrial organisms that produce novel enzymes for the degradation of biomass to sugar, providing the applied programs with the necessary information to make industrial grade improvements. One of ARPA-E's goals is to accelerate technology development from basic science to applied science through high risk high reward research that is not mature enough for the applied research programs. For example, ARPA-E's Electrofuels program looks for solutions with non-photosynthetic biofuel production, and ARPA-E's PETRO (Plants Engineered to Replace Oil) program looks to find new paradigms in feed stocks and bioengineering techniques. EERE focuses on the applied research, development, demonstration and deployment (RD&D) activities, working in partnership with the industry that is commercializing the technologies to reduce costs, ensure reliability and help fund the first-of-a-kind technology. The Department's efforts support the goal to produce renewable gasoline, diesel, or jet fuel at $3/gal by 2017.

Question 5. How are these efforts coordinated across various programs to accelerate technology development toward commercialization?

Answer. The Department of Energy has established a team at the Undersecretary level that meets monthly to discuss key issues such as technical, economic, and market barriers to fostering the development of the U.S. biomass industry. This technical team focuses on setting goals that drive all three programs (Office of Science, ARPA-E, and EERE's Biomass Program) in a coordinated fashion. Additionally, staff from the three programs meet quarterly to discuss progress, new opportunities, and strategic direction. In December, 2012, EERE's Biomass program sponsored a "roadmapping" workshop, inviting industry as well as academics and national laboratories to present on the scientific barriers that have already been overcome, what new or remaining barriers exist and the best solutions for overcoming these through research and development from fundamental science through to demonstration.

Question 6. Has there been any attempt to try and coordinate these various programs across agencies as well?

Answer. The primary coordination mechanism for bioenergy activities across agencies is under the Biomass R&D Act of 2000 (as amended). The Act directs three primary efforts: an annual Initiative solicitation administered by the Department of Energy (DOE) and the Department of Agriculture (USDA); the Biomass Research & Development Board (Board); and the Biomass Research and Development Technical Advisory Committee.

The Board is an interagency collaboration chaired by DOE and USDA and composed of senior officials from federal agencies and the White House. The Board meets quarterly and currently includes members or representatives from the DOE, USDA, Environmental Protection Agency (EPA), National Science Foundation (NSF), Department of Interior (DOI), Department of Defense (DOD), and the White House of Office of Science and Technology Policy (OSTP). In their 2008 National Biofuels Action Plan (NBAP), the Board directed the formation of several Interagency Working Groups to facilitate the coordination of efforts across agencies related to feedstock production and logistics, conversion, and distribution infrastructure and end use.

In addition to formal coordination efforts that take place through the Board, DOE and USDA coordinate on a regular basis through other mechanisms and collaborate on projects such as the Regional Biomass Energy Feedstock Partnership under the Sun Grant Initiative. DOE is also working closely with DOD and USDA to advance the MOU that was signed by three Secretaries last year to assist the development and support of a sustainable industry for drop-in hydrocarbon biofuels in military applications.

BIOFUELS—MILITARY BIOFUELS MOU & DOE FUNDING

In the summer of 2011, President Obama announced a $510 million Memorandum of Understanding (MOU) between the Secretaries of Energy, Agriculture, and the Navy to assist the development and support of a sustainable industry for drop-in hydrocarbon biofuels to power the Department of Defense and private sector transportation. The FY12 Energy and Water Development appropriations bill proposed by the Senate included language that would have given DOE the authority to transfer up to $170 million from EERE into the Defense Production Act (DPA) for this initiative. Unfortunately, that language was not included in the final appropriations act. The FY13 budget request asks for authority to shift up to $40 million in DOE biomass funding to DPA to support pilot-scale demonstrations, rather than the commercial production envisioned by the MOU.

Question 7. Has the DOE's role in this program shifted since release of the MOU, and if so, how?

Answer. There has been no revision of DOE's role in the MOU. The MOU states an objective of supporting domestic commercial or pre-commercial scale advanced drop-in biofuel plants and refineries. DOE is planning on requesting an intended $170M over multiple years to fulfill its commitment. This commitment will primarily come in two forms. First, we have requested $40M in FY 13 funds, along with the authority to transfer these funds to the DPA, to support a competitive solicitation with DOD and USDA for a commercial scale biorefinery that produces drop-in military jet and diesel biofuels. In addition, DOE has requested $20M in FY13 to competitively solicit innovative pilot scale demonstrations for producing military specification fuels. In FY12, we are also committing $20M for innovative pilot demonstrations.

Question 8. How did the DOE determine the request for "up to $40 million" for FY13?

Answer. The DOE fully supports the MOU between the DOD, USDA, and DOE. DOE is planning on a total of $170M to support the initiative. The $40M funding request was determined based on the total cost of each biorefinery being at least 50% cost-shared by the private sector and the recognition that the multi-year project does not need all of the money the first year. Furthermore, DOE's experience in funding commercial and pre-commercial scale facilities suggests that the first year of funding includes critical go/no go decision points including NEPA compliance, and securing of private cost share that will determine when they can move into the more expensive construction phase. In addition to this $40M, $20M is requested in FY2013 along with $20M in FY 12 for innovative pilots that will demonstrate initial scale up of technologies and provide essential data to produce military grade fuels.

Question 9. Does the DOE still intend to contribute funding on the scale of $170 million for this initiative?

Answer. DOE continues to fully support the joint DOD/USDA/DOE MOU. DOE's intended commitment of $170M will be requested over multiple years. We plan to invest $60M in FY 2013 with $40M going to the DPA procurement for a commercial scale biorefinery and $20M for innovative pilot scale facility to demonstrate initial scale up of technologies and provide essential data to produce military grade fuels.

Question 10. Does the DOE still support use of the DPA to fund commercial scale advanced drop-in biofuels plants?

Answer. Yes, DOE is fully supportive of the DPA initiative to fund commercial or pre-commercial scale biorefineries and is requesting $40M under the President's FY 13 budget request. In addition to the DPA effort, another $20M in FY 13 is requested for innovative pilots that would produce advanced "drop-in" fuels for military applications. Our intended total commitment is $170M and is subject to appropriations.

BIOFUELS—ADVANCED BIOFUELS HURDLES TO COMMERCIALIZATION

Today, many companies seeking to produce advanced drop-in and replace fuels are on the verge of commercialization. These companies have proven their technologies at the pilot and demonstration scales, but nonetheless face significant hurdles in building bio refineries at a scale whereby the product volumes are large enough to be cost-competitive with existing refineries. The capital required to deploy a commercial scale bio-refinery is an order of magnitude higher than the cost of development or demonstration, and typically beyond the limits of venture capital. Moreover, private lenders generally will not offer low-cost debt to finance a first-of-its kind plant or technology. I believe there is a role for the Federal government to play in addressing this Valley of Death—which in turn will help meet our nation's energy, economic, and security goals.

Question 11. How does the DOE plan to help companies and investors address these hurdles, either through existing programs or new policy?

Answer. DOE is addressing the hurdles associated with biofuel commercialization by funding a robust portfolio of projects that address the research, development, and deployment needs of the biofuels industry. Continued RD&D is critical to driving the cost of production down so that the industry can attract private sector capital and stand on its own without government incentives or subsidies. In addition to R&D activities, DOE is funding 21 integrated biorefineries ranging from pilot to commercial demonstration scales. The Department is also working with the Department of Defense (DoD) and US Department of Agriculture (USDA) toward the funding of commercial scale facilities via the Defense Production Act advanced biofuels initiative. DoD is an appropriate first user for advanced biofuels since they are the largest purchaser of fuel within the Federal Government system. The combination of these initiatives and continued price volatility in the oil markets could create the conditions necessary for the industry to overcome the challenges associated with biofuel commercialization.

Question 12. Will the DOE be convening events and seeking input from potential investors to address the unique financial and commodity risks facing biofuels companies?

Answer. DOE's Biomass Program continually seeks input from private sector investors and the biofuel fmancing community by participating in multiple, recurring forums including its annual Biomass Conference. The Biomass 2012 Conference will have an opening plenary session on Advanced Biorefineries that have obtained financing and broken ground as well as a break-out session on innovative financing strategies. The conference is scheduled for July 10-11, 2012 at the Washington Convention Center and is open to the public. There are several other investor events in which DOE participates, including the Annual Cellulosic Ethanol Financing Summit. Additionally, DoD, USDA, and DOE jointly sponsored an industry information exchange on March 30, 2012. This information exchange took place at USDA and the objective was to bring feedstock suppliers, biofuels conversion companies, and end users together to discuss process integration issues. Additional exchanges of this type are being planned.

BIOFUELS—NATIONAL ADVANCED BIOFUELS CONSORTIUM

The DOE's National Advanced Biofuels Consortium (NABC) has had great success in developing technologies to convert lingo-cellulosic biomass feed stocks to biofuels that are compatible with the existing transportation infrastructure. Originally funded with $35 million in American Recovery and Reinvestment Act funds, the NABC has successfully leveraged $14.5 million of partner funds and recently announced two promising technology pathways would move forward.

Question 13. How have the R&D successes of the NABC addressed technical risks of converting cellulosic material to drop-in fuels?

Answer. The NABC was competitively awarded to bring together a multidisciplinary team of experts from academia, national labs and industry to assist the program in accelerating the development of biomass processing technologies for advanced biofuel production to industry-ready status. In Stage I of the NABC, six processing strategies were evaluated for their potential to successfully launch a pilot-scale biorefining facility by 2014. This process resulted in two strategies that convert lignocellulosic sugars to hydrocarbon fuels to be selected to move forward to Stage II. One strategy utilizes catalytic conversion of corn stover and loblolly pine and the other uses a proprietary yeast strain and hydrocracking to produce a diesel and jet fuel blendstock.

Additionally, the NABC identified two technology pathways which demonstrated considerable promise for achieving drop-in biofuels but were missing key data to fully complete the feasibility study. These pathways—hydrothermal liquefaction and hydropyrolysis—use thermochemical processing regimes to convert biomass to bio-oils, which can be subsequently upgraded to hydrocarbon fuels. These two technologies are on a track solely focused on addressing the primary technical and economic barriers that were identified in Stage I. This is the best mix of routes and allows the consortium to focus resources where they will have the greatest probability of providing the best benefits.

Question 14. How will the FY13 budget request support the ongoing activities of the NABC?

Answer. Since the NABC was funded through ARRA, all money has been obligated, and the FY13 request will not directly support ongoing activities in the NABC. The NABC is focused on developing two pilot ready routes to producing hydrocarbon fuels, but there are numerous other routes that show long term potential. The FY13 request supports a wide array of research, development, and demonstration that focuses on routes to hydrocarbon fuels through biomass-derived oil and carbohydrate intermediates. Additionally, the Biomass Program will continue to fund a FY12 solicitation that targets the construction of pilot scale biofuel production facilities that use terrestrial and algal biomass in FY13. The Biomass Program's diverse portfolio of research aims to enable many pathways by reducing the technology cost of producing cost effective lignocellulosic intermediate streams and final hydrocarbon fuels or blendstocks.

BIOFUELS-QUADRENNIAL TECHNOLOGY REVIEW AND DIESEL AND JET FUELS

The DOE's Quadrennial Technology Review (QTR) notes that in FY 2011, energy technologies addressing the transportation sector have been underfunded as compared to stationary energy by a ratio of 3:1. Within transportation, the QTR notes that "advanced hydrocarbons" especially for diesel trucks and jet aircraft should be a priority.

Question 15. Do you believe there should be a different balance between transport and stationary energy within the DOE portfolio?

Answer. Consistent with the DOE-QTR findings, the FY2013 budget emphasizes increased funding to technologies supporting the transportation sector.

Question 16. How does the FY2013 budget address the QTR findings that energy for the transport sector, and specifically biofuels (13% of funding) has been underfunded compared to clean electricity (51% of funding)?

Answer. The Department provided a concerted effort to prioritize technologies related to the transportation sector across the Office of Science, ARPA-E, and EERE, resulting in increased funding in technologies such as biofuels and advanced batteries.

Question 17. How does the FY 2013 budget request address the QTR findings that alternative hydrocarbon fuels, particular to replace diesel and jet fuel, should be an area of emphasis for DOE?

Answer. The EERE Biomass program builds on success in converting cellulosic material to ethanol by increasing the focus on converting non-food cellulosic feedstocks to hydrocarbons that can be directly substituted for gasoline, diesel and jet fuel at competitive prices. ARPA-E continues to explore other innovative solutions that use biological processes to harness solar, chemical, or electrical energy directly, converting CO_2 into hydrocarbon fuels. The Office of Science-led Fuels from Sunlight Energy Innovation Hub (known as the Joint Center for Artificial Photosynthesis) is researching advanced non-biological materials that can mimic photosynthesis and produce chemical fuels directly from sunlight. In addition, the 3 Office of Science-led Bioenergy Research Centers are investigating the basic biological processes that

underlie biofuels production, to improve our scientific understanding of these mechanisms.

In FY13, DOE has requested $40 million to transfer to the Defense Production Act in order to support a competitive solicitation with the Department of Defense and the Department of Agriculture for a commercial scale biorefinery that produces military jet and diesel fuels. DOE has also requested $20 million in FY13 to competitively solicit innovative pilot scale demonstrations for producing military specification fuels.

OFFSHORE WIND

The DOE's budget request for the offshore wind is $95 million for FY 2013, and your program is beginning to shift from onshore to next-generation offshore technology applications. The DOE has indicated that it will be releasing a funding opportunity award soon. I worked with my colleagues to make it possible for this to happen in the FY 2012 in the Consolidated Appropriations Act of 2012 (P.L. 112-74). Offshore wind has struggled to get the first major large-scale projects in place, but initiating demonstration-scale projects is an important step.

Question 18. What advancements does the DOE believe will be made in terms of cost reductions, technological improvements, and other advancements through this upcoming solicitation?

Answer. Much of DOE's FY 2013 $95 million request for the Wind Energy Program is crosscutting and is intended to lead to technology advances that will benefit both the,landbased and offshore wind industries.

On March 1, 2012, DOE announced its $180M multi-year demonstration program via a competitive solicitation. An initial $20 million will be available in FY 2012 as the first step in supporting the preliminary phases of up to six initial R&D projects resulting, after a later down-selection process, in up to four innovative offshore wind energy installations in United States waters. These offshore wind projects are expected to accelerate the deployment of breakthrough wind power technologies that will help diversify our Nation's energy portfolio, promote economic development and launch a new industry here in America.

While the specific technical improvements that will be proposed by applicants to this new funding opportunity are difficult to predict, DOE expects to support projects with improvements and innovations in area such as turbine and drivetrain architecture, blade and rotor design, support structures, foundation designs, electrical systems and other balance of system items that result in levelized cost of energy (LCOE) reductions. These improvements and innovations may reduce the LCOE by reducing initial capital, operational and maintenance, and lifetime costs. LCOE may also be reduced with technologies that allow improved access to higher wind speed environments and reduced plant losses. In addition, data collected by these demonstration projects will be disseminated to industry with the expectation that they will contribute to further technological advancements and LCOE reductions from future R&D.

DOE believes that this program is important because more cost-effective technology is needed to harvest the Nation's vast off-shore wind resources.

Question 19. Is there an advantage to encouraging multi-vendor turbine technology proposals so that multiple designs can be tested and so that costs can be spread across the program and more partners can be included in the program?

Answer. The current $180M multiyear solicitation is set up to initially evaluate multiple designs and then to down-select the best designs before more expensive construction phases. In addition, DOE is encouraging researchers and companies throughout the entire supplier chain to provide greater cost share leveraging and to decrease overall technical risks. Testing multiple turbines from one or more turbine manufacturers on a common foundation or multiple foundations at a given site may provide enhanced project benefits in the form of increased R&D results and engagement of additional partners for the same amount of DOE investment. For this reason, the Advanced Technology Demonstration Projects funding opportunity included language to encourage multiple turbines and multiple turbine vendors as follows: "Examples of potential candidate projects include, but are not limited to, a stand-alone single turbine, multiple turbines from one or more turbine manufacturers, or turbines that are a first phase of a planned larger commercial project."

WEATHERIZATION ASSISTANCE PROGRAM

I am concerned about the DOE's funding request for the Weatherization Assistance Program (WAP). WAP has turned in a solid success after a slow start on recovery act implementation. By early December 2011, the production goal for March 31, 2012 was reached. Secretary Chu announced local partners had weatherized more

than the target number of homes-or more than 617,000. In 2011 alone, more than 200,000 homes were weatherized and more than 14,000 full-time jobs were filled by this program. However, DOE's budget request for FY 2013 significantly reduces the WAP below previous years' enacted funding levels. The budget request for $139 million would be the lowest since 1996. In real dollars, it would be one of the lowest levels in the program's 30-year history.

Question 20. Would there not be significant cuts to DOE's state and tribal partners based on a normal formula distribution?

Answer. The Weatherization Assistance Program (WAP) experienced a $5 billion investment over three years under the American Recovery and Reinvestment Act of 2009 (ARRA) in addition to receiving base funds in each fiscal year. Additionally, many states received extensions to continue weatherization work using ARRA funds. These funds have successfully enabled and accelerated weatherization work for hundreds of thousands of families, thereby bringing significant savings on home energy costs. Under the current fiscal situation, the $139 million request for WAP ensures that, if fully funded, important weatherization work will continue to progress in FY13.

Question 21. Would the reduced funding request, if enacted, have an impact on the workforce that is in place now to support the program?

Answer. The $5 billion American Recovery and Reinvestment Act of 2009 (ARRA) investment for the Weatherization Assistance Program (WAP) expanded employment to more than 24,000 workers at peak production, compared to 7,500 to 8,000 nationwide at the state, local and contractor levels prior to the Recovery Act period. Additionally, during this time period, DOE received appropriations ranging from $200 million to $250 million each year and leveraged funds from other federal and private sources (LIHEAP; utilities, state funds, etc.).

The 2013 funding request of $139 million will continue important WAP activities, but cannot replace the infusion of more than $1.66 billion that was available each of the three years the WAP network had to use the ARRA funds.

Response of Hon. Steven Chu to Question From Senator Shaheen

Recently, your agency proposed updated national energy efficiency standards for electric distribution transformers. Better transformers will reduce electricity losses in the distribution grid and lower electric bills.

However, the DOE proposal calls for only a very modest increase in the standards. DOE estimates that the proposed standard will save consumers about $3.7 billion over 30 years. But a higher standard, which was recommended by the largest companies that make the transformers, would save almost four times as much electricity. In my own state, Warner Power makes transformers that will provide 40 percent savings compared with current technology while also creating good jobs.

Question 1. Are you confident that these proposed standards are at the maximum achievable level as the law requires? Will you take another look at this before you issue the final standard?

Answer. As required by statute, DOE must set standards that are technologically feasible and economically justified. DOE's analysis for the proposed rule recognized that many technologically feasible transformer types and designs are more efficient than the levels proposed in the notice of proposed rulemaking (NOPR). Indeed, as required by law, DOE thoroughly assessed the technical and economic merits of these designs.

While standards more stringent than those DOE proposed would likely save more energy, the Department weighed these benefits within the context of several critical economic considerations, including: the financial impact on manufacturers, the ability of manufacturers to ramp up currently low-volume designs to meet the needs of the market, the availability of essential high quality steels, and the impact on competition in the steel supply and transformer markets. For the proposed rule, DOE tentatively concluded that these and other potential impacts of the more stringent energy efficiency levels would outweigh the projected benefits. In the recent public meeting on DOE's proposal for these products, companies that manufacture transformers supported the standard levels proposed by the Department, likely due to their concerns over these same issues.

As stated in the NOPR, DOE will reevaluate the costs and benefits of various standard levels based on consideration of the public comments DOE receives in response to this notice and related information collected and analyzed during the course of this rulemaking effort. DOE may ultimately adopt standards that are either higher or lower than the proposed standards, or some combination of energy efficiency level(s) that incorporate the proposed standards.

RESPONSES OF HON. STEVEN CHU TO QUESTIONS FROM SENATOR UDALL

Question 1. With regards to the proposed Critical Materials Hub, what do you see as some of the milestones that you would like to lay forward for the next four years—in particular the research milestones that would define success? Where do you envision this research taking place—within DOE labs or at Universities or within industry?

Answer. DOE's goal for the Hub is to create a coherent, full spectrum research team focused on conducting basic and applied research, development, and demonstration (RD&D) to reduce criticality for existing materials and prevent criticality of new materials that are essential to modem and emerging energy technologies. The Hub applicants were asked to direct R&D across the entire lifecycle including materials discovery and design, feedstock supply, processing, manufacture, use, recycling, and re-use. Success metrics would include: efficiency demonstrations in recovery from secondary sources; reduction in critical material use for a given application(s); and effective substitution of critical materials in a given application(s).

The specific milestones for the Critical Materials Hub will be determined once the applicant has been selected and will be based upon the specific research program proposed. Once awarded, the Department will develop goals and milestones that will be clear, precise, and measurable. These goals and their associated milestones will be continually reviewed by DOE, and the Hub will be subject annually to rigorous review of the RD&D program along with its management structure, policies, and practices.

There are multiple locations at which the research can take place. The Hub Funding Opportunity Announcement will be open to DOE laboratories, universities, industry, and other entities. In fact, the Hub model encourages consortia teams spanning multiple disciplines and institutions. For these consortia, industry participation is highly encouraged to transition technologies quickly to manufacturing and commercialization. DOE will select all research locations based upon merit.

Question 2. What do you see are some of the criteria that must be met in the research activities for the Hub to be considered for funding beyond 2016?

Answer. Funding of the Critical Materials Hub beyond five years will be based upon a number of factors including the extent to which the critical material needs persist, the extent to which there is a plausible approach for addressing those needs, the extent to which the Department determines the Hub model is best-suited to addressing these challenges, and the success or promise of the Hub's efforts funded over the course of the first five years.

RESPONSE OF HON. STEVEN CHU TO QUESTION FROM SENATOR RISCH

IDAHO CLEANUP VISION

Question 1. Can you please provide details of what the Department of Energy will be funding at the Idaho Cleanup Project, as it relates to Environmental Management's plan to accelerate the cleanup at Idaho by nine years to 2015? Is the 2015 vision still on track? Under this funding scenario what are the impacts to the cleanup scope and staffing?

Answer. The FY 13 request for Idaho supports all the activities necessary to achieve the regulatory milestones, including:

1) Sodium Bearing Waste treatment and tank closures by 12/31/2012.

2) Submittal of the Calcine RCRA Part B Permit Modification to the State of Idaho by 12/01/2012.

3) Processing of EM Transuranic waste to complete all campaigns by 12/31/2018.

4) Continue wet-to-dry EBR-II used fuel transfers to complete by 2023 regulatory milestone date.

5) Continue exhumations of targeted waste at the Accelerated Retrieval Project.

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