S. HRG. 110–573

CLEAN ENERGY TECHNOLOGIES

HEARING

BEFORE THE

COMMITTEE ON ENERGY AND NATURAL RESOURCES UNITED STATES SENATE

ONE HUNDRED TENTH CONGRESS

SECOND SESSION

TO

RECEIVE TESTIMONY REGARDING LEGISLATION TO IMPROVE THE AVAILABILITY OF FINANCING FOR DEPLOYMENT OF CLEAN ENERGY AND ENERGY EFFICIENCY TECHNOLOGIES AND TO EHNANCE UNITED STATES' COMPETITIVENESS IN THIS MARKET. SPECIFIC BILLS TO BE CONSIDERED ARE S. 3233, INTRODUCED BY SENATOR BINGAMAN AND S. 2730, INTRODUCED BY SENATOR DOMENICI

JULY 15, 2008

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CLEAN ENERGY TECHNOLOGIES

TUESDAY, JULY 15, 2008

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

The committee met, pursuant to notice, at 10:06 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, sorry for the delay in getting here. This is a hearing on various cup of financing bills; one that Senator Domenici introduced, one that I introduced.

Before we call our witnesses and make any opening statement, I'm informed that today is going to be the last day with the committee for Judy Pensabene. We wanted to recognize her great service to this committee during the last 11 years; particularly the last 5 years she has been the Chief Counsel for the Republicans.

I understand a resolution is being prepared to convey the high regard that the committee has for her and her good work, our gratitude for her service to the committee, and our best wishes in her future plans. I believe that will be presented to her at a later time. Let me just defer to Senator Domenici for any comment he wanted on that subject before we proceed to the hearing itself.

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

Yes, I do think this is sort of a bittersweet day for us. Judy is attending her last hearing as committee staff member. She's served the committee for more than 11 years including the last five as the first female Chief Counsel in this committee's history. I don't know what that says for this committee. But that just happens to be the facts.

Tomorrow is the first day of a well earned retirement. But today's a sad one for us. We'll all greatly miss her. While her forthright counsel and her tireless commitment to getting the work done she has had countless opposition lodged against our bills, seems like in new ways every year. She has found a way, one way or another to get them done. I think we all have to say a big thank you to her for getting that done.

Mr. Chairman, I will, later on we will have a resolution. I will just read the basic paragraph of it so everybody will know. "And it be it resolved that the members of the Committee on Energy and Natural Resources record the retirement and commend the service

of Judith K. Pensabene on this day, July 15, 2008. The members hereby offer their congratulations on this cordial occasion and extend their best wishes to Judy and her family in the years ahead."

Thank you, Judy. Thank you so much for years of service both to me, personally and to this committee and to the matter before us, we thank you, Mr. Chairman for holding this hearing. Before I proceed with the rest of my statement, I yield back to you.

The CHAIRMAN. Where's Judy? Let's give her a big round of applause here.

[Applause.]

The CHAIRMAN. Ok. Why don't we proceed with the more mundane part of today's hearing. I'll make a short statement and then Senator Domenici and then we'll call on our witnesses.

This is a hearing, as I indicated, related to two proposals to support the financing for deployment of new, clean energy technologies. We've had other hearings in the committee on the general subject. But now there are two bills that are pending related to this which better focuses our opinion or our discussion here.

I've heard many around here and elsewhere say that what we need is a new Apollo Project to solve our energy needs and to move to a clean energy economy. Others have said we need a new Manhattan Project. These are useful analogies, but I don't know that they, either one, capture the entire challenge that we have before us.

I believe Mr. Denniston's colleague, John Door, talked to us sometime ago about this challenge requiring not only speed, but scale. These bills are intended to deal with this problem of speed and scale both. It's like undertaking something more akin to nine or ten simultaneous Apollo Projects or essentially mobilized in the country in the way that we did for war in previous times, World War II, in particular.

I think it's going to take significant and sustained investment to bring the new technologies that we're all hoping are developed and useable to a point where they can be deployed on a scale necessary to meet our needs. These technologies relate to, not only meeting our energy needs, but dealing with the problem of climate change. Promising technologies exist that can address our oil security needs both in reducing the demand for fuel through efficient or electric drive vehicles and in replacing gasoline with sustainable biofuels.

The two bills that have been introduced that we'll be talking about today are an attempt to accelerate the time table for moving these technologies from the laboratory to the marketplace. Obviously there's urgency in trying to get this investment made. Our commitment needs to be, to deal with, not only greenhouse gas emissions, but the enormous drain on our economy from the continued dependence on imported fossil fuels.

So the need is great. If we fail to make the investments necessary to meet the challenge I think we run the very real risk that we are passing on a much diminished opportunity for our grandchildren and children in the future. So it's a great challenge. I think we're all well aware of that. I think these bills, at least, begin the discussion of how we can meet one part of that very substantial challenge.

Let me defer to Senator Domenici for his statement, then we'll hear from the witnesses.

STATEMENT OF HON. PETE V. DOMENICI, U.S. SENATOR FROM NEW MEXICO

Senator DOMENICI. Senator Bingaman, fellow members of this committee, and the witnesses, let me just say that these are unprecedented times, in my opinion. I have said this many times. Each time it's a little different setting. But I truly believe that our great United States is at peril. I believe it's economic peril.

I believe we're measuring this peril by the anger of the American people for the price at the pump. That's obviously what's happening and the people are feeling the impact.

But the truth of the matter is, there's a far greater problem than the pump price. It's that the U.S. economy is being drained dry. We will soon reach a point where we are exporting somewhere between 500 billion and 700 billion a year, sending it overseas to other countries for the single purpose of acquiring crude oil from them, which will be converted to diesel and gasoline fuels to move America.

The biggest problem is that most of it is used to move the automobile and related to mobility machines that we have chosen to love so much that we've almost come to the conclusion that we can't get along without them. So it came to me months ago that what we needed was to find a way to siphon far more capital into new projects, new technology. Somehow or another in talking with staff and people that are better informed and have more time to think about these things than some of us Senators, the idea came and was presented to me that we ought to be doing something like OPEC, something like the corporate structure that we use to finance overseas projects of trade.

That corporation has existed for a long time. It's self sufficient. It's run by a board of directors. It makes loans.

In my particular case, the bill I put before us had a very broad section of powers, loan guarantees and all kinds of instruments of equity, transfer and of moving money around to try to get more of it directed at energy technology. There are a number of ways we can talk about the difference between the two bills. But essentially I would say, there's not that big a difference.

There is a little bit of difference in the corporate structure, but you could fix that easily if you were interested in a bill on two or three other areas where there's some distance. That could be solved in one day.

But obviously the Senate is not working in a formal manner. It wouldn't have done Senator Bingaman much good, I don't think, had he taken that opportunity to work this bill 3 months ago because I don't think we're going to take up a free standing energy bill on the floor of the Senate in the condition that we're in now. I don't think the majority leader would let that happen for reasons unto him and unto the partisanship that exists between on energy matters. To bring up my bill or his bill 4 months ago would have been to open up the entire Senate to a debate on energy matters.

I wouldn't mind that at all. I would agree to a set of working conditions. But I'm not sure that could get done.

I just say to my friend, Senator Bingaman. It's too bad and in saying this I don't blame anybody. But it is too bad that we waited so long to come up with your bill which I would call a democratic bill that is matched up with mine.

But we took so long that I think we'll never get it done. But maybe you think to the contrary. It surely would make me feel good if you actually were to say that you were interested in getting this bill done this year. At least gotten out of the U.S. Senate because I think capital invested in new technology to produce clean energy is the most significant activity that we must deal with during the next 10 to 15 years if we're going to get out of this enormous, enormous bind that we're in which is second to none.

Thirty-six years into my tenure here in the Senate I have not witnessed an economic crisis of this magnitude. This is the worst I've seen. We are having more difficulty in getting out of the problem than any I've seen.

You pull out of one, you get another one. You solve one. You can't solve the other one. You solve something in energy it makes global warming worse. On we go.

So Senator, I would hope we would get moving. In any event, let's get this spread on the record today. I thank you for it. Look forward to working with you.

The CHAIRMAN. Thank you very much. Let's go ahead with our very distinguished panel of witnesses. Let me just introduce the entire panel. Then call on each of you to make whatever points you think are important for us to understand. Take a few minutes to do that. Then we will have questions.

The first witness would be Andy Karsner, who is the Assistant Secretary for Energy Efficiency and Renewable Energy. He's a very frequent testifier before this committee. We appreciate his good counsel and advice each time he testifies.

Next is John Denniston, who's a partner with Kleiner Perkins, also a frequent witness before our committee. We appreciate him coming all the way from California to testify.

Jeanine Hull, who is counsel with Dykema Gossett. Thank you very much for being here.

Dan Reicher, who used to be here in a different capacity, in a previous administration, he's now the Director of Climate Change and Energy Initiatives at Google.org, and we appreciate you being here very much.

Jeffrey Eckel, who is the President and CEO of Hannon Armstrong, we appreciate you being here.

Why don't we start and just go across the table. As I said if each of you take five or 6 minutes, make the main points you think we need to understand. Then we will have questions. Andy, thanks. Thanks for being here.

STATEMENT OF ALEXANDER KARSNER, ASSISTANT SECRETARY, ENERGY EFFICIENCY AND RENEWABLE ENERGY, DEPARTMENT OF ENERGY

Mr. KARSNER. Thank you, Senator and thank you for the opening words from you and the ranking member and the leadership you provide.

Mr. Chairman, Ranking Member Domenici, members of the committee, thank you for the opportunity to testify about how our Nation might best accelerate large scale capital formation and deployment of secure, clean energy technologies in the United States. Bills introduced by both Senators Bingaman and Domenici, the 21st Century Energy Deployment Corporation and the Clean Energy Investment Bank of the United States, respectively, boldly seek to address our challenges head on. I applaud your leadership, Mr. Chairman in calling this hearing to explore the various approaches to meeting these challenges.

While the Administration has not yet finished its review or determined a position on either bill, certain aspects of these new government entities and financing mechanisms proposed in the bills raise a number of issues and concerns that would need to be carefully considered and addressed in the interagency process as these bills move forward. Although no single technology solution exists to address our Nation's energy and environmental responsibilities, all elements of the solution share a common basis: the need for unprecedented levels of consistent, continuous capital formation to increase market penetration of clean, domestic energy sources and technologies.

As you will hear from the other experts on this esteemed panel, the private sector is, of course, the most efficient means of delivering the technological transformation to our marketplace that we have sought from recent landmark policies. But markets alone do not constitute a national strategy. Our government can play an indispensable and crucial facilitating role in accelerating the outcomes we, as a Nation, seek in a timeframe and at a scale that is consequential and commensurate with the magnitude of the economic, environmental and national security challenges that we face.

One such mechanism, as you well know, is the Title XVII Loan Guarantee Authority that emerged from the landmark, bipartisan Energy Policy Act of 2005, which supports early commercial use of domestic, advanced energy technologies that avoid, sequester or reduce greenhouse gas emissions. On June 30, the Department issued three new solicitations totaling $30.5 billion. These solicitations for renewable, energy efficiency, electricity transmission, nuclear power facilities, and for the front end of the nuclear cycle.

DOE anticipates issuing new solicitations later this summer for advanced, clean, fossil energy production worthy of $8 billion. Effectively, these two very complementary pieces of legislation seek to enhance the efficiency and efficacy and professional risk management capacities of our government to deliver on the Congressional intentions to catalyze commercialization and large scale financing of clean energy technology and energy infrastructure build out.

Together, Congress and this Administration have taken great strides, and on a bipartisan basis we can continue by integrating approaches and collaborating further with the urgency that the situation merits so that we move beyond problem identification and more robustly toward problem solving that will improve our energy security and diversify our national portfolio and reduce greenhouse gas emissions that contribute to climate change. For the past 30

years, DOE has helped to reduce the cost of clean energy technologies through research and development, demonstration, and deployment.

The historic core strength of the Department is in fact, science and technology, not facilitating commercialization or financing which is necessarily constrained by systemic limitations inherent in a conventional civil service institution. National energy goals now demand accelerated market penetration and significant capital formation and growth for higher risk technology investments. Meeting our ambitious goals will require tremendous investment in emerging technologies.

While the private sector can and will, in fact, continue to invest inclean energy technologies, the urgency of the energy and environmental challenges that you have addressed and that we face requires far, far greater capital formation to occur with immediacy in the private sector. The question before us, as a Nation, is how will that gap be bridged?

Before achieving any impact on our national energy goals, an advanced energy technology must evolve from a laboratory experiment to the bench scale to the pilot scale to a technology venture to a scaled infrastructure development project. The transition to commercial scale and production presents many economic, political and technological risk but to name a few. On the positive side secure and free access to abundant sun and wind and geothermal resources allows domestic renewable energy a fundamental economic advantage over conventional energy sources when building out a much needed national hedge in diversifying our portfolio.

While increasingly coming into economic parity and direct cost competitiveness, renewable energy assets currently cost more per unit of production of capital cost, front and installed cost, for their production capacity. The much larger profits realized by production costs and much lower operating and maintenance costs and zero exposure to fuel priced volatility ultimately justify their investments over the lifecycle consistently. On the security front, clean energy, including nuclear and clean coal with carbon capture and sequestration, like renewables, produced from domestic resources, ultimately impacts our geopolitical leverage and our surrounding strategic interest in energy commodities.

Additionally, large scale energy infrastructure, development, and deployment is amongst the world's most complex and capital intensive sectors of our economy. As you will hear from this panel, it requires sophisticated, professional risk management acumens in both legal and commercial structuring of project finance that demands long term, stable, predictable cash-flows and long term management stability. Evolving energy technology must, in fact, avail conventional financing in order to scale.

High risk technology equity investing that is today emerging in record numbers is insufficient in and of itself to scale our energy infrastructure needs. I applaud the bipartisan leadership and vision of the members of this committee for their earnest efforts to introduce disruptive models and overcome the systemic constraints that we presently face in the execution of our mission for national security environment stewardship and economic growth. The Congress and the Administration have enumerated numerous concrete

goals which require unprecedented levels of funding to achieve the policy vision at a scale and at a pace that is in fact meaningful.

This committee's leadership has been instrumental in the progress that we have made toward meeting them. When combined, the elements of both approaches call on us to go further and faster with greater facilities at our disposal. We intend to examine these bills thoroughly in the weeks ahead.

Mr. Chairman, this concludes my prepared statement, and I'd be happy to answer any questions the committee members may have.

[The prepared statement of Mr. Karsner follows:]

PREPARED STATEMENT OF ALEXANDER KARSNER, ASSISTANT SECRETARY FOR ENERGY EFFICIENCY AND RENEWABLE ENERGY, DEPARTMENT OF ENERGY

Mr. Chairman, Ranking Member Domenici, Members of the Committee—thank you for the opportunity to testify about how our nation can best accelerate the large scale capital formation and deployment of clean energy technologies in the United States. Bills introduced by Senators Bingaman and Domenici, the 21st Century Energy Technology Deployment Act and the Clean Energy Investment Bank Act of 2008, respectively, seek to address these challenges. I applaud your leadership, Mr. Chairman, in calling this hearing to investigate the pros and cons of various approaches to meeting this challenge. While the Administration has not finished its review of either bill, certain aspects of the new government entities and financing mechanisms proposed in the bills raise a number of issues concerning Federal credit policies, and financial risk and cost to the Federal government, along with certain constitutional concerns that the Justice Department has indicated would need to be carefully considered and addressed. We would have strong concerns about provisions that provide additional exposure of the Federal government to large liabilities.

Although no single technology solution exists to address our Nation's energy and environmental responsibilities, all elements of the solution share a common basis: increased market penetration of clean energy technologies. The private sector is the appropriate and most efficient means of delivering the solutions to the market at scale, but the government can play a facilitating role, where deemed appropriate such as it is currently doing by providing direct funding for research, development, and demonstration programs; by providing additional support such as risk insurance, loan guarantee programs including Title XVII, and production tax credits. We are continuing to review these bills and would like to discuss our ongoing energy programs.

One such mechanism as you well know, is DOE's Title XVII loan guarantee authority from the Energy Policy Act of 2005 and the 2007 Energy and Water Development Appropriations Act, which supports early commercial use of advanced energy technologies that avoid, reduce or sequester air pollutants or anthropogenic emissions of greenhouse gases. The program currently has $42.5 billion in loan volume authority that can be used to support a wide-range of innovative technologies including but not limited to advanced renewable, energy efficiency, electricity transmission, nuclear power, and advanced fossil energy. To date DOE has invited 16 projects to submit full applications under the first solicitation and has received application fees for the first four of these projects, meaning that DOE can begin their due diligence evaluation of projects. On June 30 DOE issued three new solicitations totaling $30.5 billion. These solicitations are for renewable, energy efficiency, electricity transmission, nuclear power facilities, and front end of the nuclear fuel cycle projects. DOE anticipates issuing a new solicitation later this summer for advanced fossil energy ($8 billion).

Together, Congress and this Administration have taken great strides to move beyond problem identification and toward problem solving that will enhance our energy security, diversify our energy systems, and reduce emissions that contribute to climate change. On December 19, 2007, the President signed the Energy Independence and Security Act of 2007 (EISA) into law. As you know, EISA includes increased Corporate Average Fuel Economy (CAFE) standards and an increased Renewable Fuel Standard. Specifically, the Act increases CAFE standards to 35 miles per gallon for all passenger automobiles, including light trucks, by 2020; and mandates the replacement of 36 billion gallons of gasoline with renewable fuel by 2022, including 21 billion gallons of advanced biofuels. The mandates included in EISA are aligned with Presidential initiatives to make the future of energy cleaner and more sustainable. These include the Advanced Energy Initiative (AEI), announced

in 2006 to confront our nation's addiction to oil and reduce greenhouse gas emissions by developing clean sources of electricity generation, as well as the "Twenty-in-Ten" initiative, announced in the 2007 State of the Union, to reduce gasoline consumption by 20% by 2017.

The President has also called for expanding domestic supply to increase our energy security. Just yesterday, the President lifted the executive ban on offshore drilling. He has also asked Congress to:

- lift the legislative ban and allow exploration and development of offshore oil resources;
- eliminate a provision, inserted into last year's omnibus spending bill, that blocks oil shale leasing on federal lands; and
- permit exploration in northern Alaska.

For the past 30 years, DOE has helped to reduce the cost of some clean energy technologies through research and development. The President's new national goal to stop the growth in U.S. greenhouse gas emissions by 2025 demands market penetration and significant capital formation and growth in a new and risky technology arena beyond the business-as-usual scenario. Meeting this ambitious goal will require tremendous investment in emerging technologies. The International Energy Agency estimates that North America will require over $1.5 trillion in cumulative energy investment by 2020,[1] although they did not disaggregate "clean tech" and conventional energy generation.

This study indicates a need for North American energy investment of over $100 billion per year between now and 2020. We expect that a significant portion of new energy investment would have to be from clean sources to meet the President's goal. In 2007, the U.S. saw $15.15 billion in clean energy asset investment according to New Energy Finance.[2] While the private sector can, and I believe will, continue to invest in clean energy technologies, the urgency of the energy and environmental challenges we face requires that greater capital formation occur in the private sector. The question before us, as a nation, is how will that gap be bridged?

CLEAN ENERGY INVESTMENT CHALLENGES AND OPPORTUNITIES

Before achieving any impact on our national energy goals, an advanced energy technology must evolve from a laboratory experiment, to a technology venture, to an infrastructure development project. The transition to commercial scale presents many economic, political, and technological risks.

Economic Risks Include:

- Chicken and egg problems—for example, which comes first: Flex-fuel vehicles or the E85 fuel itself? The availability of critical transmission infrastructure or increased generation capacity? Additionally,
- Historic volatility of energy commodity price signals;
- Unpredictable feedstock availability, pricing, and quality control;
- Limited off-take agreement length; and
- Unknown final design costs due to unforeseen engineering challenges or permitting delays.

Policy Risks Include:

- Changing environmental and economic regulations, including a lack of predictable, longterm tax policies;
- Balkanized regional and state energy policies; and
- Siting, permitting, interconnection, and transmission and transportation challenges.

Technological Risks Include:

- Complications in scaling from laboratory to commercial-scale production; and
- The development and deployment of cost-effective technology, as well as technological obsolescence.

On the positive side, however, free access to abundant sun, wind and geothermal heat allows clean renewable energy a fundamental economic advantage over traditional energy sources. While renewable energy assets currently cost more per unit of production capacity, the larger future profits realized by lower production costs and zero exposure to fuel price volatility can economically justify the investment.

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[1] IEA World Advanced Energy Outlook, 2003.

[2] Data from New Energy Finance desktop 3.0, "Asset Financings Investment Overview," www.newenergyfinance.com

On the security front, clean energy, including nuclear and clean coal with carbon sequestration, is generally produced from domestic resources which reduces geopolitical leverage surrounding strategic energy commodities.

Financial mechanisms are in place to accelerate research and development and project implementation for established technologies, but financing for commercialization of new technologies often falls short or is deemed too expensive. Additionally, large-scale energy infrastructure is a capital intensive business to begin with, requiring debt financing and stable or predictable cash flows.

It is essential that we work not only to accelerate R&D for new energy technologies, but also to address the accelerated adoption of technologies into commercial products that are widely available at reasonable cost to all Americans. We seek to help enable and accelerate market transformation toward the use of more efficient and cleaner technologies.

CONCLUSION

National security, environmental stewardship, and economic growth goals form the basis of robust U.S. energy policy. National security is enhanced through diversifying our energy mix and reducing dependence on petroleum. Environmental stewardship is maintained through the mitigation of greenhouse gas emissions and other negative environmental impacts. Achieving global economic competitiveness entails creating a more flexible, more reliable, and higher capacity national energy infrastructure, as well as improving the energy productivity of the U.S. economy and industry. The Congress and the Administration have enumerated concrete goals to achieve this policy vision, and this Committee's leadership has been instrumental in the progress that we have made toward meeting them. Mr. Chairman, this concludes my prepared statement and I would be happy to answer any questions the Committee Members may have.

The CHAIRMAN. Thank you very much. John, why don't you go right ahead?

STATEMENT OF JOHN DENNISTON, PARTNER, KLEINER PERKINS CAUFIELD & BYERS, MENLO PARK, CA

Mr. DENNISTON. Thank you. Thanks very much, Senator Bingaman. Good morning, Ranking Member Domenici, members of the committee.

I testified before this committee in March of last year. I'm honored to return today to share with you my views on how Federal policy might support the financing and development of clean energy sources.

Clean energy offers our best hope of confronting all three dimensions of our energy crisis: climate change, energy security and American competitiveness. But many breakthrough technologies can't get the loans they require primarily because the lenders today think they're too risky. You have two pieces of legislation before you this morning each of which aims to bolster domestic energy supplies by increasing private lending activity.

I know I join millions of other Americans in and outside the industry in applauding this basic tactic. But now let's look more closely at your options. I believe there are two key questions the committee needs to answer.

First, what kind of banking functions can most efficiently increase the supply of credit in the energy market? Credit meaning debt, loans. Second, what types of energy projects should the new bank target to support.

On the first question, the question of banking functions, I believe the two best available tools are credit enhancement in the form of loan guarantees and the creation of a vibrant secondary market for energy credits. I'll now briefly address each of those two topics.

S. 2730 provides for loan guarantees backed by the full faith and credit of the Federal Government, a tactic I heartedly support. Today a key impediment to more rapid commercialization of renewable energy is the scarcity of debt financing in the market. Expanded credit availability would help many emerging green technologies transition to large scale production.

I see this committee is also considering creating a vibrant secondary market for energy securities. By enabling this new bank to buy credit instruments relating to clean energy projects creating an active secondary market will energize investment and innovation in the clean energy sector.

In a novel feature, S. 3233 goes on to allow the aggregation of loans made by private sector lenders to residential and small business users of distributed generation technologies. I enthusiastically support this approach which would not only expand the pool of low cost capital that home owners and small business owners can tap for new clean energy solutions. But also give America's local banks a leadership role in the green tech revolution at a time when America's financial institutions desperately need new and profitable lines of business.

I realize the committee is also considering empowering the new bank to make direct debt and equity investments in clean energy projects. I just caution here that while doing so may be appropriate under certain circumstances. I think you'll make the most progress by focusing attention and resources on the loan guarantees and the creation of a secondary market.

This leads to the second question in front of this committee. What kinds of projects should the new bank target to support? I recommend the committee clearly direct the new bank to prioritize support for breakthrough technologies. Despite their financial risk these innovative technologies offer the greatest potential to help solve all three dimensions of our energy crisis.

Performance standards will be essential in evaluating new energy ventures. We should obviously favor those that can deliver the most bang for the buck in terms of all three aspects of our energy crisis: reducing greenhouse gas emissions, providing alternatives to imported oil and strengthening American competitiveness. The problem here however, is that under the existing DOE Loan Guarantee Program roughly 75 percent of the guarantees are directed right now to fossil and nuclear projects. I strongly recommend Congress take the approach specified in S. 3233 which aims 75 percent of the new support to breakthrough technologies, the ones that will address all three dimensions of our energy crisis.

This is clearly a superior allocation method to address our energy needs. Thus if the existing Loan Guarantee Program remains within DOE, I would also urge the committee to take advantage of this opportunity by amending the allocation between industries so it's more in line with S. 3233's approach.

In closing, I want to emphasize how heartened I am to witness this committee's resolve to confront our energy challenges. Particularly inspiring is your work in passing the CAFE legislation and the enhanced Renewable Fuel Standard. Even so, it's no secret we need to do much more to move ahead with a speed and scale commensurate with the scope of our energy crisis.

Once again I want to thank this committee for inviting me here today. I look forward to today's hearing and learning more about how we can work together to build a more secure country and world.

[The prepared statement of Mr. Denniston follows:]

PREPARED STATEMENT OF JOHN DENNISTON, PARTNER, KLEINER PERKINS CAUFIELD & BYERS, MENLO PARK, CA

INTRODUCTION

Good afternoon, Chairman Bingaman, Ranking Member Domenici and Members of the Committee. My name is John Denniston. I am a partner at the venture capital firm Kleiner Perkins Caufield & Byers. I testified before this Committee in March of last year, and am honored to return today to share my views about how federal policy might support the financing and development of clean energy technologies.

Together with most of the rest of America, venture capital and technology industry professionals—Democrats and Republicans alike—are deeply concerned about the risks posed by our energy crisis, encompassing climate change, the rising scarcity and cost of fossil fuels, and increasing threats to our global competitiveness. At the same time, our industry is in a unique position to recognize the opportunities these challenges present to build our economy, creating jobs and prosperity.

Founded in 1972, and based in California's Silicon Valley, Kleiner Perkins is one of America's oldest venture capital firms. We have funded more than 500 start-up companies, backing innovative entrepreneurs in the digital, life science and green technology industries. More than 170 of our companies have gone public, including Amazon.com, AOL, Compaq Computer, Electronic Arts, Genentech, Google, IDEC Pharmaceuticals, Intuit, Juniper Networks, Millenium Pharmaceuticals, Netscape, Sun Microsystems, Symantec, and VeriSign. Today, our portfolio companies collectively employ more than 275,000 workers, generate $90 billion in annual revenue, and contribute more than $400 billion of market capitalization to our public equity markets.

Kleiner Perkins is a member of the National Venture Capital Association and a founding member of TechNet, a network of 200 CEOs of the nation's leading technology companies. I serve on TechNet's Green Technologies Task Force. My testimony today reflects my own views.

You've asked me specifically to address the new energy legislation before you. But before I do, I want to offer an overview of how many of us in the venture capital industry perceive the energy challenges and opportunities facing our country today. I began my testimony last year in a somewhat similar fashion, but at the risk of a little repetition, I believe we must bear in mind the scope of our challenges as we move forward with strategies to address them.

THE ENERGY CRISIS

There's a fast-growing consensus among Americans today about the need to confront our three main energy challenges: the climate crisis, our dependence on foreign oil, and the risk of losing our global competitive edge by failing to champion new technologies that are becoming a huge new source of economic growth, jobs and prosperity.

Renewable energy sources—such as sun, wind, geothermal and biofuels—offer this country's best hope of addressing all three of these dimensions, and of helping us rebuild our domestic economy and regain our edge as an economic superpower.

Climate Change

Our leading climate scientists predict we have only a short period of time to make dramatic cuts in our greenhouse gas emissions or risk potentially catastrophic climate change. Global temperatures and sea levels are already rising and will continue to do so; the question now is whether we can slow down the projected rate of future increases. Global warming is not a partisan issue: President Bush and both Presidential candidates have publicly declared we must seriously confront our climate crisis. Yet perilously, we have so far failed to move with the requisite speed and determination.

Energy Security

As for our energy security dilemma, this Committee is well aware that America continues to import approximately 70% of our oil needs. Rapid growth in worldwide

energy demand has stretched supplies, causing energy prices across the board—oil, natural gas, coal, and even uranium—to skyrocket. As world population and energy demand increase, there's every reason to believe supply and price pressures will persist.

Global Competitiveness

Finally, our future prosperity is at risk, and here I speak from very personal experience. As I've traveled on business to China and Europe, I've witnessed how the rest of the world is striving, and often succeeding, to emulate in the renewable energy sector, the technology innovation that has been a hallmark of the U.S. economy and perhaps the single most important driver of our enviable standard of living. Increasingly, entrepreneurs overseas enjoy advantages in the form of determined government policies, including financial incentives and large investments in research and education.

Credible economic studies suggest our technology industries are responsible for roughly one-half of American GDP growth. Our country would look quite a bit different today had we not, several decades ago, become a global leader in biotechnology, computing, the Internet, medical devices, semiconductors, software and telecommunications. And now we find ourselves with a vast new economic opportunity—to grow green energy technologies that seem destined to become the economic engine of the 21st Century. But will America again lead the way?

RENEWABLES: THE OPPORTUNITIES

Moore's Law & The Pace of Technological Progress

In Silicon Valley, we often refer to a principle known as Moore's Law: a prediction, credited to Intel co-founder Gordon Moore back in the 1960s, that semiconductor performance would double every 24 months. Moore's law underpins the information technology revolution of the past three decades. Better, faster, and cheaper silicon chips led the way, over just the past quarter of a century, from an era of big and expensive mainframe computers to affordable handheld cell phones that connect us to the Internet and to each other.

At Kleiner Perkins, we believe we're already seeing a Moore's Law dynamic operating in the energy sector, giving us confidence the rate of greentech performance improvement and cost reduction will lead to energy solutions we can't even imagine right now.

Alternative energy is becoming increasingly cost-competitive, as the price of conventional power skyrockets and costs for clean energy such as wind and solar power come down. World-class talent is racing into the greentech sector. And a growing sense of urgency regarding our energy crisis is boosting demand. We're seeing breakthroughs today in a host of scientific disciplines relating to the energy sectors, including material science, physics, electrical engineering, synthetic chemistry, and even biotechnology.

These improvements have occurred over a period of time in which there was relatively little government policy or entrepreneurial focus on these sectors. Solar manufacturers are innovating their way around silicon shortages, with next-generation materials including pioneering thin-film technologies. The agriculture industry is now beginning to produce transportation fuels from non-edible plants. And nanotechnology breakthroughs are creating the promise of new ways to store energy, which will catalyze an electric transportation revolution. Imagine what American ingenuity might accomplish in the future as more and more of our best and brightest devote their efforts to the greentech field!

RENEWABLES: THE CHALLENGES

Our opportunities are truly breathtaking. Yet unfortunately, we're moving much too slowly to take advantage of them. Three major obstacles currently impede faster commercialization of renewable energy.

Scarce Research Funding

American innovators woefully lack necessary funding for basic, translational and applied research in renewable energy. Our leading research institutions are begging for federal funding, and faculty interest has never been keener. Yet at roughly $1 billion annually—most of which is ear-marked—DOE funding is microscopic relative to the problem at hand.

Credit Scarcity

Many promising new technologies are being delayed or thwarted by the unavailability of commercial loans. In many cases, these new technologies are unproven at

scale, and the credit markets are unwilling or unable to assume the risk to help them grow.

Competitive Market Disadvantage

The high cost of renewable energy sources, relative to the incumbent competition, is the third main barrier to greater capital investment and more rapid adoption of clean power. Why does green power cost more? Primarily because it's so new, meaning it is produced in such low volumes that the industry has yet to benefit from economies of scale, and has only just begun a continuous cost reduction process.

And older power sources have another comparative advantage. Most coal-fired and natural-gas plants were constructed many years ago, and are now fully amortized. That means those facilities' owners no longer need to charge rate-payers for initial construction costs. Clean-power companies, in contrast, still need to include construction financing costs in their customer pricing, putting them at a major disadvantage.

On top of this, government policy to date has provided powerful advantages to fossil fuels and nuclear energy. In some cases, the federal government itself has paid directly for electrical generation facilities and transmission and distribution infrastructure.

Beyond government subsidies, the fossil fuel industry has long benefited by escaping responsibility for the costs of the environmental consequences of its emissions—instead, society has paid the price. Clearly, traditional power sources would become much more expensive, and alternative sources of energy more cost-competitive, if plant owners had to take on the true costs of these emissions.

In the special case of nuclear power, the federal government has for many decades assumed enormous costs for research and development, plant operations, insurance and waste disposal—all of which, if borne by nuclear plant operators, would make this power source a much less viable option.

THE PENDING LEGISLATION

Overview

With anxiety growing throughout America about our energy crisis, Congress today has a unique opportunity to tackle the obstacles standing in the way of renewable energy development. I'm gratified to see some of the steps you are considering in this session may do just that.

You have before you two pieces of legislation: the 21st Century Energy Technology Deployment Act (S. 3233), and the Clean Energy Investment Bank Act of 2008 (S. 2730). Each, in its way, aims to bolster domestic energy supplies by increasing private lending activity for energy technologies. I know I join millions of other Americans in and outside of industry in applauding this basic strategy. But now let's look more closely at the options before you.

Goals

"Goals are dreams with deadlines," writes the author Diana Scharf Hunt. Frankly, the magnitude of our energy problems means we all need to start dreaming some very big dreams. Clearly stating our goals at the outset is the first step toward fulfilling them.]

At the heart of the 21st Century Energy Technology Deployment Act is the goal of promoting domestic development of clean, advanced energy technologies. I believe this indeed must be our explicit target. Only by means of a massive deployment of renewable energy can we hope to address all three dimensions of our energy crisis, protecting our environment and enhancing our national security, while at the same time advancing our economy.

For that reason, I advise you to include a succinct preamble in whatever law you approve that defines both this mission and the intended approach. It might read something like this: "The purpose of this Act is to address our three-dimensional energy crisis, encompassing climate change, energy security and American competitiveness, by accelerating private loans supporting the rapid adoption of clean energy solutions."

While there are many details to consider in the legislation, I believe there are two key questions the Committee needs to answer:

- What banking functions should Congress charter the new bank to perform in order to execute on the mission to expand credit availability?
- Which types of energy projects should the new bank target to support?

Banking Functions

Both pieces of legislation before you would create an entity with banking functions to facilitate new energy technology funding. In my view, the best tools available to you are credit enhancement in the form of loan guarantees; the creation of secondary markets; the direct provision of debt-financing; and, in appropriate circumstances, insurance coverage.

Credit Enhancement

S. 2730 provides for loan guarantees backed by the full faith and credit of the Federal government, a tactic I heartily support. Loan guarantees have tremendous potential to help level out the playing field for new energy technologies. In order for the loan guarantee program to be effective, it is critical the guarantees be supported by the full faith and credit of the Federal government.

As I mentioned earlier, a key impediment to more rapid commercialization of renewable energy is the scarcity of debt financing. More available credit would help many emerging green technologies transition to large-scale production. Yet lenders have been hesitant to finance these projects, mostly due to the novelty of the technologies and their lack of a track record. This leaves green entrepreneurs who want to grow fast with the sole option of financing that growth through equity investments. Thus, they start out at a major disadvantage compared to most conventional energy sources, which have historically had easy access to the credit markets.

Loan guarantees would not only eliminate that disadvantage but also help renewable energy projects get more affordable financing terms. That, in turn, would help reduce their production costs, addressing another handicap relative to incumbent energy sources.

Timely government support—be it loan guarantees or even direct grants—can make a crucial difference for emerging energy technologies, as seen in the recent case of cellulosic biofuels. These, as you know, are fuels made from wood chips, switchgrass, and other non-food sources. Last year, in a special appropriation, Congress enabled DOE grants to innovative companies in this field that would have otherwise struggled to obtain debt financing for these new production plants.

Under the existing DOE loan guarantee program, roughly 75% of the guarantees are directed to fossil and nuclear projects. It's not clear to me whether S. 2730 intends to have the newly created bank carry this type of allocation forward. In contrast, S. 3233 sets aside 75% of the new support for breakthrough technologies. S. 3233 introduces an indisputably superior allocation methodology because it optimizes the impact of the legislation across all three dimensions of our energy crisis. If the existing loan guarantee program remains within DOE, I would urge the Committee to take advantage of this opportunity to amend the allocation between industries so it is more in line with S. 3233's method.

Secondary Markets

I see this Committee is also considering creating a secondary market for energy securities, by enabling a new government entity to buy credit instruments relating to clean energy projects. Until now, there has been no secondary market for renewable energy credits. Creating one could help energize investment and innovation.

In a novel feature, S. 3233 goes on to enable the aggregation of loans made by privately-owned lending institutions to residential and small commercial users of distributed generation energy sources (Section 6(e)). I enthusiastically endorse this concept, which gives America's local banks a leadership role in the greentech revolution, while also expanding the pool of low-cost capital that homeowners and small business owners can tap for new clean energy solutions.

Debt Financing

One of the pieces of legislation before you creates a bank that can make direct loans to worthy clean energy projects. While I support giving the bank this capability, I believe you'll make the most progress by focusing attention and resources on the first two tools I've mentioned— catalyzing the primary credit markets through loan guarantees, and creating a secondary market for clean energy credits.

Insurance

One of the bills before you considers offering insurance to energy facilities. I believe there may be instances in the future where insurance could be a useful tool to address our energy crisis, such as insuring feedstock supplies for cellulosic biofuels producers. However, the legislation is vague on which sectors would be eligible for insurance coverage. I would advise this Committee to be clear in the legislation that Congress does not intend to expand the nuclear industry's already generous federal insurance subsidy under the Price-Anderson Act.

Equity Financing

Another tool before this Committee is to enable the new energy bank to make direct equity investments in projects that have not been able to attract private capital. This strategy may be appropriate in some cases, but if used widely could be inefficient. I'd frankly much rather see the government save its scarce dollars for more pressing needs, such as funding basic research and facilitating credit, and allow the equity markets to serve as a litmus test that alerts the bank to credit-worthy projects.

Prioritization of Energy Projects

This leads to the question of what kinds of energy projects should be first in line for this new government support. I recommend the Committee clearly direct the new bank to prioritize support for the "breakthrough" energy projects that, despite their risk, offer the greatest potential improvement to our energy crisis.

Impact on Energy Crisis

Performance standards will be essential for project selection, and the bank should obviously favor projects that can deliver the most bang for the buck in terms of all three aspects of our energy crisis: greenhouse gas emissions reduction, providing alternatives to imported oil, and strengthening American competitiveness.

S. 3233 defines the "breakthrough" technologies it prioritizes for support as those having been highly rated by the Advisory Council yet lacking in private investment due to their perceived high technical risk. I heartily support this approach. And I would also strongly encourage you to consider including advanced battery technology and cellulosic and advanced biofuels projects on the list of prioritized projects. Following this agenda, in my view, would help the new law achieve maximum impact.

Development Stage

I know I speak for a great many Americans when I also urge you to prioritize the cleanest and most advanced new technologies, many of which are still in their infancy. It would be a serious mistake to limit new government support to technologies already in wide commercial use. As I've mentioned above, traditional fossil fuel and nuclear power sources have long enjoyed heavy government subsidies. We need now to level the playing field for the most innovative technologies to unleash power from the sun, wind, geothermal, biofuels, and other renewable sources.

Risk

At issue before you is also the level of risk entailed in projects eligible for government support. Especially in our current economy, it's hard to imagine creating a banking entity that would continuously lose money by supporting only the riskiest projects. On the other hand, if such a bank is set up from day one to generate a profit on all the projects it supports, it will only fund the safest ventures, losing opportunities to back truly breakthrough technologies that will have the greatest impact on the three dimensions of our energy crisis.

My advice here is to steer a middle ground: create a bank with the primary purpose of accelerating the market adoption of breakthrough technologies, which would therefore be expected to lose money on some fraction of those projects. However, the bank could counteract losses by reaping profits through fees, and by issuing some of its guarantees for more proven technologies. It could then use those revenues to cover its losses on some of the more speculative projects.

CONCLUSION: WHAT MORE CAN WE DO?

In closing, I want to emphasize how heartened I am to witness this Committee's resolve to confront our energy challenges. Particularly inspiring is your work on H.R. 6, the Renewable Fuels Standard, and the recent enhancement of CAFE standards.

Even so, it's no secret we need to do much more so we can move ahead with a speed and scale commensurate with the scope of our energy crisis. In that spirit, I would like to offer five recommendations outside of the scope of this hearing:

1. We simply must put a price on carbon. And I would urge you, even as Congress deliberates carbon cap-and-trade legislation, to consider the additional potential merit of a carbon tax, as a straightforward signal to the markets.
2. It is also imperative that we substantially increase Federal funding of renewable energy research and development in American research institutions.
3. We need to stop the waste in the American energy system. This is one of the specified goals in S. 3233, but it cannot be overemphasized. Energy efficiency is America's hidden powerhouse, with recent estimates that up to 50 bil-

lion barrels of oil could be saved between now and the year 2030 with sustained attention to investments in new technologies and simple retrofitting of buildings.

4. Let's also move forward with other overdue policy changes, such as creating a national renewable portfolio standard and extending federal tax credits—ITC and PTC—for clean energy.

5. More broadly, we must resolve to give our clean energy campaign an appropriate level of attention and resources. You've heard talk of a program the size of the Apollo and Manhattan projects. Frankly, we need something much larger. And because this kind of commitment won't be free of cost or sacrifice, I suggest we also find more effective ways to communicate about our energy challenges and opportunities with the American public.

I'd like to suggest one such strategy: a DOE dashboard to monitor our national energy transition. The dashboard would measure greenhouse gas emissions, the share of U.S. energy consumption powered by imported fuel, U.S. market share of the global renewable energy industry, and Federal funding for renewable energy research. Updated monthly and widely disseminated, this tool would remind Americans of the government's resolve to make progress in this vital area, while encouraging public participation.

Once again, I want to thank the Committee for inviting me to share my views with you. I look forward to today's hearing and to learning more about how we can work together to build a more secure future for America and the world.

The CHAIRMAN. Thank you very much.

Ms. Hull, go right ahead.

STATEMENT OF JEANINE HULL, COUNSEL, DYKEMA GOSSETT PLLC

Ms. HULL. Thank you, Mr. Chairman, Ranking Member Domenici and members of the committee. It is an honor to testify before you today in support of S. 3233 and S. 2730. I am currently of counsel at Dykema Gossett, a law firm, where I advise clients on energy infrastructure and project finance issues. My testimony today, however, reflects exclusively my personal opinions. I come to this issue with more than 30 years in the energy infrastructure and finance sector.

The introduction of these two bills demonstrates that we are finally well passed the point of debating whether this country must undertake a massive energy infrastructure improvement effort. The relationship between energy and security has been well discussed today and is recognized now as a national priority. I have integrated into my work what I call the four securities. These are energy security, economic security, national security and environmental security. I believe the first three are familiar to all and the fourth environmental security refers to the avoidance of the climate change and other pollution scenarios.

The four securities are symbiotically intertwined. One can not be achieved fully without the other three. Both bills recognize the need for immediate action to solve the challenge of the four securities recognizing that the earlier these actions are undertaken the greater and more immediate the payoff will be.

In fact, the amount of agreement between the bills is quite encouraging. Both bills create a funding entity which can become self supporting to support clean, domestic energy technologies. Both bills acknowledge that private investment can and ultimately will meet the demand for financing domestic clean energy projects.

But that action is required now to accelerate the ability of the private financial markets to rapidly deploy these technologies. Both

bills acknowledge that the expertise to operate the proposed financing facility is not common in the civil service. The civil service incentives are unlikely to attract the expertise required.

However, the bills are silent on exactly how the financing entity will relate to existing capital markets. It has been my experience that the existing markets are attracted to financing large projects. Projects that have limited risk.

The technologies that suffer from a lack of attention are not only the projects with technology risk. Which has been discussed today. But also the unglamorous projects of residential and solar and commercial solar and efficiency improvements which are too small to interest investment banks and equity funds because they cannot bear the burden of significant transaction costs.

Thus there is a huge opportunity space for the funding entity to participate in which will not overlap with existing private capital markets. To give you an idea of the scale of energy savings opportunities that I'm talking about each ton of solar cooling installed using existing technology avoids the production of 2.3 tons of carbon equivalent per year. At ten cents a kilowatt hour and $12 a dekatherm, each 50,000 tons of solar cooling systems will shift ten million dollars per year from foreign fossil fuel purchases to domestic renewable energy systems that provide good local jobs.

Over the 20 year useful life of the equipment, each ton of solar cooling will reduce fossil fuel purchases by nearly $46,000 on an investment of $10,000. That is a huge payoff. The technology to achieve this is currently available.

The only thing lacking is access to affordable financing which could be provided by the proposed funding entity. By enacting legislation creating a new energy funding entity, energy security will be enhanced by the development of domestic, affordable, reliable and sustainable sources of energy to meet the demand for fuels and electricity. Such a system is also less vulnerable to intentional disruption.

Economic security will be enhanced through increased ability to insulate ourselves from the inflationary pressures of a petroleum based economy and by slowing the imbalance of payments to oil and gas producing nations. Keeping the petro-dollars at home and focusing them on a greener economy, the United States can maintain its manufacturing and intellectual competitiveness.

National security will be enhanced by reducing our need to protect foreign oil and gas infrastructure while allowing the reduction of troop presence in sensitive areas.

Environmental security will be enhanced by reducing the volume of emissions which contribute to climate change and otherwise pollute the air, water and ground.

Mr. Chairman, thank you and the committee today for the opportunity to testify in support of legislation that is so vital to our country. I urge the committee to act quickly on these bills and to move legislation to the floor as soon as possible. Time is truly of the essence on this issue.

This concludes my prepared remarks. I look forward to your questions.

[The prepared statement of Ms. Hull follows:]

PREPARED STATEMENT OF JEANINE HULL, COUNSEL, DYKEMA GOSSETT PLLC

Mr. Chairman, Ranking Member Domenici, and Members of the Committee, it is a distinct honor as well as a pleasure to testify before you today in support of S. 3233, the 21st Century Energy Technology Deployment Act, and S. 2730, the Clean Energy Investment Bank Act of 2008. I am currently of counsel at Dykema Gossett, PLLC, where I advise clients on energy infrastructure and project finance issues. My testimony today, however, reflects exclusively my personal opinions. I come to this issue with more than 30 years in the energy sector, and in particular, industry structure and finance.

These bills address the critical challenge of our generation, which is, as the author Thomas Friedman states, to resolve the energy-climate problems that will define the stability of the 21st century. Our success or failure will determine the living conditions of this planet's inhabitants in the near as well as distant future. This challenge is critical to each of us personally, it is urgent and it is huge. We are now beyond the moral equivalent of war. This is a real war, with immediate security impacts. This is a matter of economic, physicall, and environmental survival.

A specific experience of mine is relevant to this testimony. In 1998, I became a partner in Cantor Fitzgerald LP, with an office on the 105th floor of the North World Trade Tower. Cantor was and still is the leading secondary market for US Treasuries. It achieved this distinction by providing a marketplace for bond trading that is open, transparent, rules-based and heavily monitored. US Treasuries became the benchmark against which all other financial actions could be indexed because of the safe, trusted and credit worthy market Cantor created. Howard Lutnick, Cantor's chief executive officer, believed the same kind of market could be created for electricity and natural gas. Cantor hired me to help bring the discipline of the financial trading markets to the energy markets. I was working toward that goal on September 11, 2001. I am here to talk about it because I was working here in Washington on that day of the terrorist attack that destroyed the World Trade Towers. Almost everyone I worked with and almost everything I had done for five years were vaporized.

We are well past the point of debating whether this country must undertake a massive energy infrastructure improvement effort. The relationship between energy and security which became part of my personal mission is now recognized as well as a national priority. I have integrated into my work what I now refer to as the Four Securities. These are: energy security, economic security, national security and environmental security. I believe the first three are familiar to all. The fourth, environmental security, refers to avoidance of the more dire climate change scenarios. The Four Securities are symbiotically intertwined, as each of the bills recognize, and none can be achieved without success in each of the others. The legislation overtly recognizes the need for new financing capacity to address the energy and environmental security challenges; but it is important not to lose sight of the economic and national security benefits as well.

Both bills recognize the need for immediate action to solve the challenge of the Four Securities, recognizing that the earlier these actions are undertaken, the greater and more immediate the payoff will be.

Both bills create a funding entity which can become self-supporting. S. 3233 creates the 21st Century Energy Deployment Corporation, while S. 2730 creates the Clean Energy Investment Bank of the United States. For simplicity, I will refer to the 'financing entity' created by the bills. Furthermore, the bills also acknowledge that federal resources may not be adequate to directly fund the effort at the level necessary through annual appropriations.

Both bills appear to acknowledge that private investment can, and ultimately will, meet the demand for financing domestic, reliable, clean energy development projects, but that action is required now to provide the foundation for that investment by bearing the immediate risks of technology development.

Both bills would leverage the unique position of the US Government to accelerate the ability of the private financial markets to rapidly deploy technologies which have the potential to radically reduce reliance upon carbon-based combustion for transportation and generation, and to more efficiently use the energy that is produced, including more efficient and intelligent delivery systems and markets.

Both bills acknowledge that the expertise to operate the proposed financing facility is not common in the Civil Service and Civil Service incentives are highly unlikely to attract the expertise required.

Both bills are technology neutral, are clearly non-partisan and do not pit consuming regions against producing regions, the notorious bane of energy legislation. Instead these bills benefit innovators and developers who are currently constrained by lack of access to the financial markets.

I turn now to what I believe are the specific strengths of each bill.

S. 3233 recognizes the vast breadth of technologies that are needed to meet the Four Security challenges. Its defined term, 'Clean Energy Technology,' covers any technology 'related to the production, use, transmission, control or conservation of energy' that will improve the efficiency of use or transmission of energy, diversify the sources of environmentally sustainable energy, or stabilize greenhouse gas ("GHG") emissions.

I urge the Committee to retain this definition and to specifically recognize the need to update our power delivery system, most of which was built after World War II, and which is in desperate need of modernization, including the deployment of advanced control and smart grid enabling technologies. Our nation's power delivery system is generally under tremendous strain, at both distribution and transmission voltage levels.

Adequate transmission is necessary for power markets to function properly and to attract sufficient liquidity. Many regional markets today are limited by the perception that the delivery system is stacked in favor of the transmission owners to the detriment of non-transmission owning market participants. Although this is not the forum to address that market structure issue, it is important to note that adequate physical delivery infrastructure is necessary to properly address the structure issue. The words 'congestion pricing' will continue to depress and distort power markets until congestion is eliminated.

Expansion of delivery capacity is not just a ploy to benefit speculators and arbitrageurs. Neither the energy generated at remote or dispersed renewable energy installations nor that generated from existing facilities can be used or priced efficiently without an assured delivery system. Increased interconnectivity will also balance renewables' intermittency with non-intermittent resources, increasing its usefulness. Buildout of new generation and new transmission must be coordinated to prevent the costs of achieving energy security being far greater than would otherwise be necessary.

S. 2730 provides the financing entity with a broad selection of financing tools and flexibility in selecting which tool to use. None of these tools is unique to energy infrastructure and all are used, in varying combinations, by other government sponsored programs. Each tool has a different specific purpose, cost and risk profile, and no one tool can perform all tasks. With this wide array of tools, the financing entity can more finely tune the project's need with the funding available.

One tool that S. 2730 does not explicitly include is the one tool that S. 3233 provides. Securitizing a portfolio of loans for remarketing is critical to adding depth to the private financial markets, as it was for home mortgages and farm credit. This tool should definitely be available to the financing entity and should be specifically stated in the legislation.

If the goal is to make the financing entity self-supporting, then allowing for limited equity investment, perhaps through preferred stock, may not only be helpful, but may also be the most cost-effective way for the financing entity to support a particular project. The dividends would also provide a non-appropriated budgetary source of funding. In other cases, the financing entity could issue letters of credit ("LOC") or other credit enhancements, short of loan guarantees, to meet the project's need. The transactional costs in time and dollars charged to the developer for a LOC would be significantly reduced compared to the transactional costs of a loan guarantee. Similarly, allowing the financing entity to provide insurance to transfer an investor's technology risk on a specific project might be the only support necessary for a breakthrough technology to succeed. In addition, for new technologies the issue is usually less the interest rate than it is of finding an investor willing to incur the technology, credit and/or development risks.

I am mindful of the old adage that warns, if one only has a hammer, everything looks like a nail. I urge the Committee to provide the financing entity with multiple specialized tools which will enable it to deploy and leverage its resources in the most cost-effective way possible and support the broadest range of development projects.

I want to emphasize a point that the bills have in common. Both bills recognize that the civil service workforce and rules are not conducive to acquiring the sophisticated financial expertise that the financing entity requires. This is not a small issue, and I believe it is vital that this facility not be restrained by rules and processes that make sense in other contexts, but that have not designed to enable the agencies to get the most benefit from the expertise created in the private markets. It is not a lack of will on the part of the agencies, they are as frustrated as anyone. The people involved in building this new financing facility will need the ability to move in support of the broader private financial markets, exiting one area when private markets are capable, and entering others where the market is not yet developed.

The two bills are silent on exactly how the financing entity will relate to existing capital markets. It has been my experience that the existing markets are attracted to financing very large projects, such as hundred or thousand megawatt generating facilities or large transmission projects, and projects that have limited risks. The technologies that suffer from a lack of attention by the financial markets are the 'low hanging fruit' of residential and commercial solar and efficiency improvements, which are too small to interest investment banks and equity funds. Other projects which have difficulty accessing capital have one or more disqualifying risk, such as credit, technology, regulatory, market or development risk.

Smaller projects, intended for residential and commercial sectors are generally not large enough, individually, to benefit from competitive interest rates and cannot bear the burden of significant transaction costs. Lack of financing has been an impediment to achieving meaningful market penetration of effective, existing technologies. Savings that could be accomplished by retrofitting solar thermal for heating and cooling in terms of reduced electrical and gas loads are greater than any one or ten plants standing alone, but since they are so dispersed, they are also difficult to finance and achieve.

To give you an idea of the type of savings I am talking about, according to Solarsa, a solar developer located in Florida: each ton of solar cooling installed using existing technology avoids the production of 2.27 tons of carbon equivalent per year. At 10 cents/kwh and $12/Dth, each 50,000 tons of solar cooling systems will shift $10 million per year from fossil fuel purchases to renewable energy systems providing good local jobs. Over the 20 year useful life of the equipment, each ton of solar cooling will reduce fossil fuel purchases by $45,890 on an investment of $10,000. That is a huge payoff and the technology to achieve this is currently available. (Solarsa is not a client of Dykema's.) I understand the European Union expects to meet one fourth of its target GHG reductions by 2020 by aggregating a large number of these solar thermal and biomass projects.

This is one area that I can see the financing entity being most effective while simultaneously not competing with the private capital markets. However, it is important that the new entity be structured to focus its efforts on the gaps in the markets, and to exit that specific area once the private markets are adequate, so as to enhance funding for energy infrastructure and not compete with the private sector.

To conclude, I believe the financing entity will address each of the Four Security challenges as follows:

> Energy Security will be enhanced by the development of domestic, affordable, reliable and sustainable sources of energy to meet the demand for fuels and electricity, and by using energy as the valuable resource it is.
>
> Economic Security will be enhanced through the increased ability of the United States to insulate itself from the inflationary pressures of dependence on a petroleum-based economy, as well as slow the balance of payments to oil and gas producing nations. By retaining petrodollars at home and refocusing them on a "green" economy, the United States can maintain its manufacturing and intellectual competitiveness, create and maintain good jobs and support thriving new technologies.
>
> National Security will be enhanced by reducing our need to protect foreign infrastructure which produces and transports oil and gas while allowing the reduction of troop presence in sensitive areas.
>
> Environmental Security will be enhanced by reducing the volume of emissions which contribute to climate change and otherwise pollute the air, water and ground.

Mr. Chairman, thank you for the opportunity to testify today in support of legislation that is so vital to our country. I urge this Committee to act on these bills and to move legislation to the floor as quickly as possible. Time is truly of the essence. this concludes my prepared remarks. I look forward to your questions.

The CHAIRMAN. Thank you very much. Dan, go right ahead.

STATEMENT OF DAN W. REICHER, DIRECTOR, CLIMATE CHANGE AND ENERGY INITIATIVES, GOOGLE.ORG, MOUNTAIN VIEW, CA

Mr. REICHER. Mr. Chairman, Ranking Member Domenici, members of the committee, my name is Dan Reicher. I'm very pleased to share my perspective today on legislation to advance the deployment of clean energy technology. I'm Director of Climate Change

and Energy Initiatives for Google.org, a unit of Google which has been capitalized with more than $1 billion of Google stock to make investments and advance policy in the areas of climate change, energy, poverty and health.

At Google we have been working to lower the cost and increase the deployment of renewable energy through our Renewable Electricity Cheaper than Coal Initiative and also to accelerate the deployment of plug in vehicles through our Recharge It Initiative.

Prior to my position with Google, I was president and co-founder of New Energy Capital, a private equity firm funded by the California State Teachers Retirement System and Vantage Point Venture Partners to invest in clean energy projects.

Prior to my roles in the private sector, I served in the Clinton Administration as Assistant Secretary of Energy for Energy Efficiency and Renewable Energy.

Mr. Chairman, the good news is that there is an array of clean energy technologies that have been developed with government and private sector investment that could address many of our energy related challenges. The not so good news is that investment in the actual deployment of these technologies "steel in the ground" as we say in the project investment world is inadequate.

Sometimes the risk profile of the technology is too high. Sometimes the return profile is too low. Sometimes the technology is too costly in comparison with competing technologies.

The most important point I will make today is that aggressive Federal policy can drive private sector investment measured in the trillions of dollars that will be required to move the Nation and the globe toward a more sustainable energy future. Among these policy measures, the Federal Government must provide financial support to the private sector to help move immature, higher risk technologies to the market and from there commercial scale. This role is well illustrated by the bill you have recently introduced, S. 3233.

The bill, if enacted, would increase the capital available for clean energy projects. Thereby helping to mature the underlying technologies and move them to scale. There are typically two elements of energy project finance, equity and debt.

Federal tax credits, when they are available, have stimulated equity investment in wind, solar and other clean energy projects. Securing loans for projects has been more problematic, especially for higher risk projects. Bankers are generally reluctant to provide a loan for a project involving a technology that has not been proven at commercial scale.

The bankers are critical however, because a commercial scale energy project can often cause hundreds of millions or billions of dollars, generally beyond the capacity or interest of venture capital investors. This problematic moment moving a technology from a small pilot project to a full commercial scale plant is often the point at which many promising energy technologies falter. In the clean energy technology industry we call it the "Valley of Death."

Mr. Chairman, the "Valley of Death" looms large. Failing to bridge it has cost a serious progress on many clean energy technologies. In some cases investors from other countries have stepped into the breach and the technology has advanced. But we have lost

the tax and employment benefits of a company based in the United States.

S. 3233 would begin to address this problem. It would increase the willingness of banks to make loans for clean energy projects by providing a secondary market for their loans through the 21st century Energy Deployment Corporation. Implemented well, this secondary market should increase the capital available for the scale up of clean energy technologies with lower risk profiles.

The critical question is whether the corporation, in its operation, would also purchase loans from higher risk, "Valley of Death" projects. One of the primary purposes of S. 3233 is promote access to affordable debt financing for accelerated deployment of advanced clean energy technologies and first of a kind commercial deployments. I am concerned, Mr. Chairman, that the bill will fail to address precisely this kind of higher risk, "Valley of Death" project as part of a larger portfolio projects.

Mr. Chairman, the legislation you have introduced obviously comes at a challenging time with a downturn in the economy, tumult in the credit markets and problems at Fannie Mae and Freddy Mac. But it is precisely at this moment when clean energy projects so vital to our economy, environment and security are facing increasing difficulty getting financed that the mechanism you propose is so important. This is especially the case for projects involving innovative technologies with higher associated risk, the very technologies that may well hold the keys to addressing the climate crisis, our oil dependence, a deteriorating electric grid and also provide a major stimulus to the faltering economy. These higher risk projects should be part of a broader, risk balanced portfolio of loans that enter the secondary market created by the corporation you propose in the bill.

In addition to a secondary market for project loans this committee has been focused on various credit enhancement tools for some time, including enacting a Loan Guarantee Program in the 2005 Energy Bill, potentially refining that program in Senator Domenici's pending bill and considering various tools during the development of S. 3233. These tools include loan guarantees, letter of credits, direct loans and related mechanisms. They could directly address these higher risk projects.

Unfortunately S. 3233 as currently written does not provide these tools to the corporation. Given the scale of the challenge, I suggest you revisit this decision. In sum, S. 3233 as drafted may not result in loans for high risk projects finding a home in the secondary market and will not provide credit support such as loan guarantees for these high risk projects.

In March, Senator Domenici introduced S. 2730 which creates the Clean Energy Investment Bank. The bank has authority to make investments in eligible clean energy projects using a variety of tools including loans, loan guarantees and purchase of equity shares. The bank however, is restricted to investments in deploying a commercial technology. That is, a technology in general use in the commercial marketplace. This, combined with the requirements that investments be made on a "self sustaining basis" seems to limit the scope of the activities to technologies that have already navigated the "Valley of Death."

So, Mr. Chairman, we have an important dilemma. Your bill, S. 3233 has a critical focus on high risk, "Valley of Death" projects. But as written it does not authorize the corporation to use the most effective credit support tools for advancing these critical plants.

Senator Domenici's bill, S. 2730 includes these important credit support tools, such as loan guarantees, but does not allow the new bank to invest in higher risk, "Valley of Death" projects.

I urge the committee to explore the integration of these two important bills to ensure that the critical need for capital for these projects can be addressed through both mechanisms, a secondary market for energy project loans and credit support, including direct loans and loan guarantees.

In conclusion, I strongly support the efforts of this committee to greatly increase the debt capital available for clean energy projects, especially for high risk ventures that might not otherwise cross the "Valley of Death." Mr. Chairman, I urge you and Senator Domenici to integrate the best aspects of your two bills and thereby provide important mechanisms that will stimulate the massive private sector investment required to take clean energy technologies to scale. We stand ready at Google to help both of you in your important legislative efforts.

Thank you for the opportunity to testify.

[The prepared statement of Mr. Reicher follows:]

PREPARED STATEMENT OF DAN W. REICHER, DIRECTOR, CLIMATE CHANGE AND ENERGY INITIATIVES, GOOGLE.ORG , MOUNTAIN VIEW, CA

Mr. Chairman and members of the Committee, my name is Dan Reicher and I am pleased to share my perspective on legislation to advance the deployment of clean energy technology. I serve as Director of Climate Change and Energy Initiatives for Google.org, a unit of Google which has been capitalized with more than $1 billion of Google stock to make investments and advance policy in the areas of climate change and energy, global poverty and global health. At Google we have been working to lower the cost and increase the deployment of renewable energy through our Renewable Electricity Cheaper than Coal (RE<C) Initiative and also to accelerate the deployment of plug-in vehicles through our RechargeIT Initiative. We have also been working to increase our use of clean power and energy efficiency at Google data centers and offices in the US and other countries.

Prior to my position with Google, I was President and Co-Founder of New Energy Capital, a private equity firm funded by the California State Teachers Retirement System and Vantage Point Venture Partners to invest in clean energy projects. New Energy Capital has made equity investments and secured debt financing for ethanol and biodiesel projects, cogeneration facilities, and a biomass power plant. Prior to this position, I was Executive Vice President of Northern Power Systems, one of the nation's oldest renewable energy companies. Northern Power has built almost one thousand energy projects around the world and also developed path-breaking energy technology.

Prior to my roles in the private sector, I served in the Clinton Administration as Assistant Secretary of Energy for Energy Efficiency and Renewable Energy, the Acting Assistant Secretary of Energy for Policy, and Department of Energy Chief of Staff and Deputy Chief of Staff.

There is an established pathway for investment in clean energy:

- It often starts with government investment in early stage high risk technology research
- It moves to corporate and venture capital funding of technology development
- It then proceeds to actual deployment of technologies through project finance and other mechanisms.

Your bill is focused primarily on the final stage of this continuum—the deployment of clean energy technologies at a scale significant enough to actually address our energy-related challenges like climate change, national security, economic competitiveness, and poverty alleviation.

The good news is that there is an array of clean energy technologies that have been developed with government and private sector investment that could address our many energy-related challenges.

The not so good news is that investment in the actual deployment of these technologies—"steel in the ground" as we say in the project investment world—is inadequate.

- Sometimes the risk profile of the technology is too high.
- Sometimes the return profile of the technology is too low.
- Sometimes the technology is too costly in comparison with competing technologies.

The most important point I will make today is that aggressive federal policy can drive private sector investment—measured in the trillions of dollars—that will be required to move the nation and the globe toward a more sustainable energy future. There are several critical steps the federal government must take:

- First, the federal government must put a price on greenhouse gas emissions in order to internalize the costs of climate change and move energy investments toward lower carbon and more efficient technologies.
- Second, we must remove barriers to cleaner and more efficient technologies and establish rigorous standards to move these technologies to market.
- Third, we must significantly increase public funding of research and development of advanced energy technologies.
- And fourth, the federal government must provide financial support to the private sector to help move immature and often higher risk technologies to the market—and from there to commercial scale.

The fourth role is well illustrated by the current debate over the reauthorization of tax credits for renewable energy. There is no better example of the role of federal policy in stimulating—and retarding—investment in clean energy projects than the on-again, off-again investment in US wind projects because of the on-again off-again nature of the wind production tax credits. For more than a decade these credits have been here for a year or two and then gone for months or years. Investors simply will not back a US wind project if it looks like the tax credit authorization will expire prior to completion of the project. This has caused a damaging boom and bust cycle in the industry.

This fourth role is also illustrated by the bill you have recently introduced, S. 3233, the 21st Century Energy Technology Act. The bill, if enacted, would increase the capital available for clean energy projects, thereby helping to mature the underlying technologies and move them to scale. I welcome your bill and in this testimony provide my thoughts on how it might be improved including integration with a related bill Senator Domenici introduced in March.

There are typically two elements of energy project finance: equity and debt. Federal tax credits—when they are available—have stimulated equity investment in wind, solar and other clean energy projects. Securing loans for projects has been more problematic, especially for higher risk projects. Bankers are generally reluctant to provide a loan for a project involving a technology that has not been proven at commercial scale. The bankers are critical, however, because a commercial-scale energy project can often cost hundreds of millions or billions of dollars, generally beyond the capacity or interest of venture capital investors who have often advanced the technology through pilot scale. This problematic moment—moving a technology from a small pilot project to a full commercial-scale plant—is often the point at which many promising energy technologies falter. In the clean energy technology industry we call it the "Valley of Death". It is a major focus of our RE<C (Renewable Electricity Cheaper than Coal) Initiative.

The Valley of Death looms large. Failing to bridge it has cost us serious progress on many clean energy technologies from wind, solar, and geothermal, to biofuels and efficiency. In some cases investors from other countries have stepped into the breach and the technology has advanced but we have lost the tax and employment benefits of a company based in the U.S.

S. 3233 would begin to address this problem. It would increase the willingness of banks to make loans for clean energy projects by providing a secondary market for their loans through the 21st Century Energy Deployment Corporation (Corporation). Implemented well this secondary market should increase the capital available for the scale-up of clean energy technologies with lower risk profiles. The question is whether the Corporation in its operation would also purchase loans from higher risk "Valley of Death" projects. One of the primary purposes of S. 3233 is "to promote access to affordable debt financing for accelerated deployment of advanced clean energy technologies and first-of-a-kind commercial deployments." The bill di-

rects the Corporation to establish criteria that will enable banks to determine the eligibility of loans for resale at the time of initial lending. A key issue in the development of these criteria will be the level of project risk that the Corporation is willing to assume as it develops a portfolio of loans for the secondary market. I am concerned that the bill will fail to address precisely the kind of higher risk Valley of Death projects—as part of a larger portfolio of projects—that most need a smart push from the government.

Mr. Chairman, the legislation you have introduced obviously comes at a challenging time with the downturn in the economy and tumult in the credit markets. But it is precisely at this moment—when clean energy projects so vital to our economy, environment and security are facing increasing difficulty getting financed—that the mechanism you propose is so important. This is especially the case for projects involving innovative technologies with higher associated risk—the very technologies that may well hold the keys to addressing the climate crisis, our oil dependence, a deteriorating electric grid and also provide a major stimulus to the faltering economy. These higher risk projects should be part of a broader, risk-balanced portfolio of loans that enter the secondary market created by the Corporation you propose in S. 3233.

In addition to a secondary market for energy project loans, this Committee has been focused on various credit enhancement tools for some time, including enacting a loan guarantee program in the 2005 energy bill, potentially refining and expanding that program in Senator Domenici's pending bill, and considering various tools during development of S. 3233. These tools, including loan guarantees, letters of credit, direct loans and related mechanisms, could directly address these higher risk projects. Loan guarantees, for example, help borrowers obtain access to credit with more favorable terms than they might otherwise obtain in private lending markets because the federal government guarantees to pay lenders if the borrowers default. By doing so we could help leverage the vast amounts of private sector capital that is so critical to taking clean energy technologies to scale. Unfortunately, S. 3233 as currently written does not provide these tools to the Corporation. Given the scale of the challenge, I suggest you revisit this decision.

In summary, S. 3233 as drafted may not result in loans for high-risk projects finding a home in the secondary market and will not provide credit support, such as loan guarantees, for these high risk projects.

In March, Senator Domenici introduced S. 2730, the Clean Energy Investment Bank Act of 2008. The bill has goals similar to S. 3233 and the two bills are complementary in certain respects in their approach. S. 2730 creates the Clean Energy Investment Bank of the United States which has authority to make investments in eligible clean energy projects using a variety of tools including loans, loan guarantees, purchase of equity shares, and participation in royalties, earnings and profits. The bank, however, is restricted to investments in projects deploying a "commercial technology", i.e. "a technology in general use in the commercial marketplace." This, combined with the requirement that investments be made "on a self-sustaining basis" seems to limit the scope of the activities to technologies that have already navigated the Valley of Death.

So we have an interesting dilemma: S. 3233 has an important focus on high-risk Valley of Death projects but as written it does not authorize the Corporation to use the most effective tools for advancing these critical plants. Senator Domenici's bill includes these important credit support tools, such as loan guarantees, but does not allow the new bank to invest in higher risk Valley of Death projects. I urge the Committee to explore the integration of these two important bills to ensure that the critical need for capital for these projects can be addressed through two important mechanisms: a secondary market for energy project loans and credit support including direct loans and loan guarantees.

As you further explore credit support, one risk mitigation measure you might analyze is whether it would make sense to require that a loan or loan guarantee for a high risk early stage project be provided to the underlying technology company rather than the typical special purpose limited liability project company. In this way if the project fails there may still be revenues, assets etc. in the underlying company that can reduce the government's financial liability. This approach might also reduce the level of technical due diligence required by the government-sponsored bank or corporation.

It is important to note that the existing DOE loan guarantee authority could, in principle, address the Valley of Death problem and, more generally, help with scaling important technologies. But DOE's loan guarantee program (LGP) faces a number of challenges that have in part motivated the legislation this Committee is considering. In a report issued last week the Government Accountability Office reviewed the LGP for the Energy and Water Development Subcommittees of the

House and Senate Appropriations Committees. GAO concluded that the LGP program has been slow in implementation; as of this month DOE had not approved any loan guarantees. GAO also concluded that DOE is not well positioned to manage the LGP effectively and maintain accountability. Additionally, GAO found that it will be difficult for DOE to estimate the "subsidy costs" of the LGP, i.e. the estimated long-term net cost of loan guarantees including, for example, government payments of defaults and delinquencies. GAO suggested limiting the amount of DOE loan guarantee commitments until DOE had addressed these and other problems.

Before I conclude let me highlight two other aspects of S. 3233. First, I strongly agree with the direction in the legislation to develop deployment goals and numerical performance targets in order "to guide and measure the performance of the Corporation toward supporting the deployment of clean energy technologies . . . " While some details may need to be considered further, these kinds of goals and measures are an important element of a successful deployment program.

Second, I also support your effort in the bill to develop debt instruments that aggregate smaller clean energy technology deployment projects. This could be particularly helpful to an array of energy efficiency projects which tend to be smaller but often share enough characteristics to be aggregated into larger financeable packages.

In conclusion, I strongly support the efforts of this Committee to greatly increase the debt capital available for clean energy projects, especially for higher risk ventures that might not otherwise cross the Valley of Death. Mr. Chairman, I would urge you and Ranking Member Domenici to integrate the best aspects of your two bills and thereby provide important mechanisms that will stimulate the massive private sector investment required to take clean energy technologies to scale. We stand ready at Google to help you in your important legislative efforts.

Thank you for the opportunity to testify today.

The CHAIRMAN. Thank you very much.

Mr. Eckel, you're our final witness here. Go right ahead.

STATEMENT OF JEFFREY ECKEL, PRESIDENT AND CEO, HANNON ARMSTRONG, ANNAPOLIS, MD

Mr. ECKEL. Thank you Senators Bingaman, Domenici and members on the committee. I appreciate the opportunity to speak to you today on these two bills. I last appeared before this committee in 1988. I appreciate you keeping my resume on file. I hope to come back sooner next time.

I'm going to provide the perspective of a lender in the energy finance business. Hannon Armstrong has pioneered multi-billion dollar securitization facility for clean energy investments. We also make direct equity investments.

We would perhaps be able to describe ourselves as a clean energy investment bank with those two activities. The focus of the firm is increasing energy productivity. A note, I no longer say energy efficiency or conservation. We call it energy productivity. A domestic supply of energy while reducing greenhouse gas impact.

Three reference projects that I think will establish some credibility. One and a half billion dollar U.S. Transcarbon Project in Louisiana basically takes domestic petroleum coke, gasifies it and turns it into a synthetic gas to replace all together too expensive natural gas in the U.S. fertilizer business. Among the very interesting things about this project is that it has a 100 percent carbon sequestration strategy through enhance oil recovery.

Hannon Armstrong has financed one and a half billion, actually more than that, in energy efficiency investments under the Energy Savings Performance Contract Program and Utility Energy Service Savings Contract Program, UESC Program. Programs that have been dramatically re-energized by Assistant Secretary Andy Karsner. Thank you, Mr. Karsner.

We also commenced the first large scale geothermal drilling program in 20 years in the salt and sea area in California. It is the single best geothermal resource in the United States. It will result in $1 billion of new geothermal power production in the next 5 years. We're very excited about what we've done, very proud of our activities and know that it's just a drop in the bucket. Much more must be done on a much grander scale.

I believe both the 21st century concept and the clean energy bank concept have terrific elements in them that I would agree with the panelists probably need to be combined. These are bold ideas coming at a critical juncture with an extraordinary opportunity to create change. Of course the enemy of the great is merely the "pretty good."

I respectfully suggest that we avoid the "pretty good." Because we've got a pretty good problem ahead of us. I would say the biggest issue will be the ordinary investments that are far short of the extraordinary investments that we need.

I'm going to highlight three concerns I have with essentially both concepts and not really single them out. Determining which investment actually fills a market void or instead crowd out private investment is fundamentally crucial to a government corporation that's in the finance business. It wouldn't be the first government program to have an unintended consequence of reducing private sector development or investment of risk taking.

Particularly the concept of in the 21st century Corporation, to develop a stable secondary market and promote access to affordable debt financing. That's what Hannon Armstrong and a number of other firms do. We do it pretty well.

I think there's a notion that small transactions don't get done because of financing. I think our activity on the ESPC program and UESC program puts that to the test. The issue is really an engineering and procurement and insulation project. We don't have enough engineers in this country to do energy efficiency on the scale necessary to do it. It's not really a finance problem.

We don't need lower interest rates. In fact the history of the last 10 years in credit markets is credit is priced too cheaply. Fannie and Freddie are extremely relevant examples of that. The problem is there's no debt for most of these transactions at any price. They're the larger transactions, the unproven transactions that Dan spoke about in the "Valley of Death."

The second point is that we really go after extraordinary projects. I'm also trying to catch the panel up on time here. The 21st Century concept has a very interesting list of technologies. I think a lot of good thinking went into it.

It does however, leave the latitude to pursue some fairly ordinary transaction which I fear it would lead to. I would humbly suggest that only projects that satisfy two goals be considered for either of these concepts. One is that it improves the Nation's energy security. Two, it reduces greenhouse gases simultaneously.

The World Resources Institute has done remarkable work in making this an incredibly approachable subject of which technologies actually achieve both. But we have two huge problems. We better be going after both of them at the same time.

The final point is, again, if we're going after grand scale projects, and I believe the Clean Energy Investment Bank says we need 30 percent private investment. It sounds good on the surface. We should have some risk sharing by the private sector.

But the really big projects are still not going to attract private capital initially. I would point out the Niagara and St. Lawrence hydro projects in the 1940s, interstate highway system in the 1950s and even the overused space program analogy. Grand scale projects, not private sector financed on the front end.

Private sector financed on the back end, I think the U.S. Government could make a lot of money with this corporation by underwriting the very grand projects. Then once they're proven, built and operational, sell down to the private sector. I think that would be a very terrific use of the incredible power in the U.S. Government in these programs.

That's the sum of our comments. Thank you very much.

[The prepared statement of Mr. Eckel follows:]

PREPARED STATEMENT OF JEFFREY ECKEL, PRESIDENT AND CEO, HANNON ARMSTRONG, ANNAPOLIS, MD

Senators Bingaman, Domenici and the members of the Committee on Energy and Natural Resources, I appreciate the opportunity to speak to you today regarding Senate Bill 3233 for the establishment of the 21st Century Energy Deployment Corporation and Senate Bill 2730 for the establishment of Clean Energy Investment Bank. I will provide the perspective of Hannon Armstrong, a firm that has pioneered the aggregation of small, clean energy investments into a multi-billion dollar securitization program. Hannon Armstrong is also a firm that I would describe as a Clean Energy Investment Bank; we are a 28 year old investment bank focused on financing the projects that advance the US energy system by increasing energy productivity and the domestic supply of energy, while reducing the impact of greenhouse gas emissions. Recent examples of our activity include:

- The $1.5 billion US Transcarbon project in Louisiana that gasifies domestic petroleum coke into a synthetic gas to be used in place of expensive natural gas in the nation's fertilizer industry. Among the notable aspects of this project is its 100% carbon sequestration in enhanced oil recovery wells.
- $1.5 billion in energy efficiency investments under the Federal Energy Savings Performance Contracts ("ESPC") and Utility Energy Savings Contracts ("UESC") programs, programs that have been dramatically re-energized by the leadership of Asst. Secretary Andy Karsner.
- Commencement of the the first large scale geothermal drilling program in the Salton Sea area of California in over 20 years that will result in over $1 billion of new geothermal power production in the next 5 years.

I am very proud of our activities in the clean energy area and yet am fully aware that so much more must be done, on a scale much grander than can be addressed by conventional project finance. I believe both the 21st Century concept and the Clean Energy Bank concept can fill an absolutely critical role in achieving the scale necessary to make a difference.

This is a bold idea, coming at a critical juncture, with an extraordinary opportunity to create change. Of course the enemy of the great is merely the "pretty good" and I respectfully suggest that every effort must be made to ensure either concept does not succumb to the temptations of the politically popular, but ultimately ordinary, investments. Among the concerns I have include:

- The determination of which investments actually fill a market void or instead crowd out private investment is fundamental. This would not be the first government program that had the unintended consequence of reducing private sector investment, despite a mission to expand it. I am particularly concerned by the stated goals of the 21st Century Corporation to 1) "develop a stable secondary market for clean energy technology loans" and 2) "promote access to affordable debt financing". I would describe those two activities as areas the private sector, my firm included, actually do quite well. More importantly, these two notions are very far from the critical market void I believe this legislation

aspires to fill. In my opinion, I do not think the key focus should be on "lowering interest rates", a theme that runs though S 3233. Too high of an interest rate is not the problem in today's clean energy finance—it is the lack of debt at any price for the most ambitious efforts we need to accelerate.

- It is absolutely critical to define the type of projects any government corporation would pursue in order to achieve the extraordinary. While the 21st Century concept proposes a very specific and useful list of technologies, it provides latitude to pursue a very broad range of projects. And while the Clean Energy Investment Bank includes a definition of "Eligible Projects", an essential concept in my opinion, I would suggest the definition be revised to include only those projects that achieve two goals simultaneously: improve the nation's energy security AND reduce green house gas emissions. As written, this institution would have the latitude to do projects that achieve only one of those objectives, a rather low bar for the opportunity at hand.
- The concept of requiring at least 30% private investment in the Clean Energy Investment Bank seems sound and appropriate on the surface, ensuring that the Bank is not the only institution at risk. But I would suggest that some of the great investments in this country that have made real change have been initially 100% government investments. Think of the Niagara and St. Lawrence hydroelectric projects in the 40's, the Interstate Highway system in the 50's, and even the space program in the 60's. There are grand scale projects that will need to be done in the areas of carbon sequestration, hot rocks geothermal technology, national transmission lines, the development of a national electric vehicle recharging system among many others, where, if done correctly and on a grand enough scale, will still be too ambitious for private sector capital. Once these grand projects are constructed, operational and proved successful, the investment can be sold down to private investors. As such, I would propose that the 30% private investment target be considered over the life of the project, not soley for the initial capitalization.

I thank the committee for this opportunity to comment on the concept of the 21st Century Energy Technology Deployment Act and the Clean Energy Investment Bank.

The CHAIRMAN. Thank you very much. Thank you all for that good testimony. Let me start and ask some questions here. I just advise folks that we're scheduled, at least the last word I got, was that there's supposed to be a vote at 12:15—11:15, excuse me. So I'll try to stick by the 5-minutes.

Let me ask first, a lot of the testimony seems to be that a failure of both bills is that we don't really insure a new source of financing for the higher risk projects. I think that was sort of one of the themes that I heard. At least both from Dan and from John and maybe Andy alluded to that.

I guess a concern I've got is we've sort of got two ends of the spectrum here. One is the loan program that we've already put in place in the Department of Energy where I believe the criteria that they're using or the general rule of thumb is they don't want to take on any risky projects. They want every project that they provide a loan guarantee for to be a successful project; none of them should fail.

I believe that's the position that they are very open about. I don't think I'm misstating that. Now we're saying ok, what we want to do is to set up an entity that will take a very different view. Perhaps sort of, have a target or a focus of looking for some of these risky projects and providing assistance there.

Obviously with all of the turmoil we're seeing in financial markets today, I'm sure there are a lot of people who would say, wait a minute. That's all the government needs is to find, some more risky things to invest in. So Andy, what's your take on that?

I guess neither bill really contemplates substantial focus on these riskier projects the way I read the two bills. But I think I under-

stood Dan to be saying and maybe John as well that that's a piece that needs to be addressed.

Mr. KARSNER. Senator, the word risk is the operative word there. That's a very relative term and very broad bandwidth. It can be a scary word.

I'm reminded of people who say well, you know, that mother won't let their kid even cross the street. It's too big of a risk. From my own experience as a power generation developer, the institutional barriers and impediments that we're talking about are not risky if you understand the technology.

I can tell you a tale of two turbines. The V47 Vestas turbine which at one time was the world leading, most installed turbine and the V52 which evolved from it, which simply turned the blades a little bit, turned the nacelle a little bit so it could optimize that turbine's capacity performance. I wanted to use that later turbine on a project, but I couldn't find anybody to finance it because it wasn't already in the marketplace.

Now it dominates the marketplace. That turbine optimization technology called variable wind speed was developed by NREL. There was nobody in government that would do anything less than certify that that was available, that it worked. That it was tested. That it should be deployed. That it was operational. But you could not find the debt, as Jeff says, at any price, to go for something that would be considered new technology.

So we're distorted. We're forcing our energy industry to be what it is, the most conservative, technology-avoiding, risk averse industry because of the lack of financing available for what we call risk. We're in government, our shop is in the business of developing that risk, moving it down the cost curve, certifying it, asserting it. Then you all have given us the additional mission through the Loan Guarantee Program and other mechanisms, grants, Clean Cities etc, to deploy it.

So overcoming that risk "Valley of Death" that Dan's talking about. Sometimes isn't jumping the Grand Canyon. It's merely understanding managed risk and moving it forward because the financial markets are too conservative to act.

The CHAIRMAN. Dan, did you have a perspective on this you want to elaborate on here? I guess what I'm hearing from you Andy is you're saying that even though it is classified today by most as high risk, in fact if you know something about the technology, it's not. There may be examples like that.

But there are other examples, I would assume, that are classified as high risk because they are high risk. I think John and Dan were saying that we ought to invest in those too. We ought to provide credit for those too even though they may fail and we may wind up having guaranteed a loan that nobody is going to pay back.

Mr. REICHER. Yes, Mr. Chairman, let me say when I was in the private equity world when we were investing in clean energy projects, we would be regularly approached by project developers with a higher risk project. Our standard line was, come back after you've built the first project. We'd love to finance them.

There's lot of people standing in line ready to finance the second project. It is indeed the first project that is often the real challenge. That's where this comes into play.

Andy is right. Sometimes this is risk perception. Sometimes you just need to push this into the market. People need to see it working. Sometimes, as you indicate, the first projects do indeed fail. That's precisely the point at which I think the Federal Government can step in, in those higher risk areas, and move them through that early stage.

It's not the 50th wind project. It's the first with a new technology. There is more exposure. But if we want to make progress in these technologies, this is an appropriate role for the government.

The government has taken on risk in the space program, building the interstate highways system, building the hydroelectric dams. You know, across a whole area of technologies, in the early stages of the nuclear program. It's the appropriate role for government. Taking people through this "Valley of Death" we will more quickly get to a point where the regular commercial credit markets can take over.

Having said that what you propose, I think, can be put in a portfolio approach. There can be a mixture of higher and lower risk kinds of loans that are in fact packaged for the secondary market. So these are not only high risk. I stress that in the testimony. A risk adjusted balanced portfolio.

But unless we really do support these early stage, high risk "Valley of Death" projects, we won't be adding very much to the current situation.

The CHAIRMAN. Thank you.

Senator Domenici.

Senator DOMENICI. Mr. Chairman, let me just say to the witnesses. I introduced the bill after a lot of staff work, it's a pretty good document. A lot of work went into it.

I would think you would consider that here's a Senator, full of enthusiasm, trying to find some way to get some real money into what's obvious. That is this whole business of investing in energy projects that need money to move us ahead. I was probably wet behind the ears and enthusiastic as could be.

Now I've experienced the 6-months of the U.S. Government trying to get loan guarantees, just plain old loan guarantees, nothing, no reinvention of anything, no new technology. Loan guarantees for nuclear power plants, which aren't new things. They're old dinosaurs.

We've been building them for 40 years. We got some that are 40 years old. We can't even get loan guarantees approved and ready to go by the government of the United States. You know that makes me think that it's all a waste of time, a waste of time thinking about this corporation which would do exotic things.

How can you get this through the Federal Government? There's more bureaucrats around at different levels that want to kill anything that involves something unique and different. It's no different now than it was at any time during the last 36 years that I've been here. When you've got something new and different, you just don't have a shot at it.

But I tell you. We probably won't get this one done because we waited too long in the calendar to get it done. But the United States of America is not going to be able to make it in terms of en-

ergy projects that are required with the Loan Guarantee Portfolio and the ideas that we have right now of loan guarantees for the nuclear industry and eight billion or so for the coal industry and whatever the number is for the wind industry.

That's not going to work. That's not going to get much done. But I think we've got to get that done, nonetheless to show we can do something.

I don't know how you people in government, including you, Andy. I don't see how you can put up with it. How much longer do you think it's going to take to get the loan guarantees where we can say we're going to do them?

I'm just fishing around here to get something that would be a precursor to this bill. Plain and simple, loan guarantees. We've got how many billion of them there? We've got 20 billion, 20, 21 billion? We haven't used a nickel.

Now we've already got a GAO report that says they don't work. Of course it was done—GAO was asked to do it by somebody who's anti nuclear so you know it would come out. Everybody thinks GAO is objective. It came out just what the person that asked wanted that the program is no good.

Let's wait about 6 months and Senator Bingaman and I will ask them to do one. It will come out the other way. That's how great GAO is.

Now let me ask you what about it? Can we get loan guarantees through before we worry too much about this bill?

Mr. KARSNER. Senator, we have to. Of course I can't speak for an Administration position on the two bills and how they relate to that. But what I can say is we have an obligation in the Energy Policy Act to put that up.

I don't think I've had a hearing with you or this committee where this subject matter hasn't come up. So let me speak to it in the terms that you're speaking to it. What is the time, value, and the opportunity cost of not moving forward?

I think what you all are discussing today, and I've had a good fortune to discuss with all the leaders in this room privately, is what are appropriate means of organizing ourselves to act expediently and with agility with something we know we must do? We're hemorrhaging $700 billion a year. The Northwest Passage is open for the first time in human recorded history.

We inevitably will take these risks to deploy technologies that the taxpayer has invested in and matured and are available and are in our interest. The question is will we do it at the point of paying or reactively, or will we do it proactively with foresight and vision? I know that's what you all are striving to do.

I would urge you to consolidate and integrate approaches in the way that these panelists with more than 100 accumulated years of energy experience, infrastructure build-out experience, are advocating, and continue to work with the Administration to craft a disruptive organizational approach. Because that's the only way we're going to see this erupting technology.

Senator DOMENICI. We don't even know if the Administration concurs with this bill, right? Based on your testimony——

Mr. KARSNER. The Administration is still evaluating the bills.

Senator DOMENICI. Have you had enough time?

[Laughter.]

Mr. KARSNER. We're doing a very thorough job, sir of evaluating the——

[Laughter.]

Senator DOMENICI. The point I'm making, it isn't brand new. I mean my bill has been around. We asked them to do it.

It's been around how many months? You know, unless you're against it and don't want to open the blinds, letting sunlight in. You could already have this done.

So I've noticed how you very carefully phrased it when you told us. I thought you were saying, my God, I've got to say this but it certainly is foolish.

Mr. KARSNER. That's part of my present job description, sir, is being very careful.

Senator DOMENICI. No, it isn't. You have to state things that are foolish. You have to state them anyway.

The CHAIRMAN. Careful, Andy.

[Laughter.]

Senator DOMENICI. Excuse me, Senator. I have questions about the make up difference of the two corporations, but look to your two high paid people to ask those questions. So I'm just going to not ask any.

You know I think we can put something like this together. Senator Bingaman wants to do it. We'll do it and be bipartisan and it will be something very different.

But I don't believe we've got any imagination around. The problem is not sufficiently bad for us to be looking for things like this. I mean we're down here in the weeds still trying to find a way out of this bill that's five years old that provided all these things. We didn't even do them.

You know many of these things are provided in the bill that we did, Senator Bingaman. Administration never looked at them. They're just sitting there, this 4-year-old, 5-year-old law. You know that.

For me, I've gone all the way from the top of the mountain to way down in the valley in terms of what we're going to get done. I think this one terrible crisis for the great people of this country. I don't think we've ever had anything like it. It can't be solved by people running around saying let's do a Manhattan Project.

He's closer to any. He said you don't want one, you need eight or ten Manhattan Projects. They're all so different. You can't solve all the energy crisis with a Manhattan Project. What is the project trying to do?

So anyway, too much talk by me and I'm going to shut up and close my binder up and when I do that you can conclude from that whatever you'd like.

The CHAIRMAN. I'll conclude it's time for Senator Salazar to ask questions.

Senator SALAZAR. Thank you very much, Chairman Bingaman. Let me first at the outset say thank you to Judy Pensabene for all her hard work on the matters that we've dealt with on this committee for the last three and a half years. She's been a trooper and a great example for this committee.

To Andy Karsner, also to you as Assistant Secretary, your great work at Enrail. Sometimes it seems that Republicans and Democrats can't get along very well in this town. I think your work at the National Renewable Energy Lab has shown that in fact we can move forward as we try to develop this new energy frontier for our world.

I agree with the panelists in terms of the energy futures. John, the three dimensions that you talked about which I think are imperatives for us in our country. I would look forward, frankly, to working with you, Chairman Bingaman and Senator Domenici to see whether we might be able to take the advice of the panel and integrate the approaches and try to come up with a package that we might even be able to move forward with if we can get another energy bill.

It seems to me that the people of America want us to do that. I always say about this energy world that we are in we know a lot about what we can do. It's just a matter of how we get that technology, to play it out and make it commercialized.

You know, Colorado, just a quick example with the National Renewable Energy Lab leading we formed a collaboratory with the University of Colorado School of Minds and with the Colorado State University to deploy these new technologies out into the private sector. We're doing that with Conoco Philips and a whole host of other organizations that are taking these technologies and trying to deploy them out. So I appreciate what we are doing out there.

I want to ask just a couple questions and ask maybe each of you to take 20, 30 seconds to respond to it. With respect to these financing mechanisms that have been proposed in these two legislations, how would those financing mechanisms help us with two specific technologies that we've been working on? Some of which we've made progress on and some of which we are very frustrated with. But that is IGCC. We take coal and do what we have to do, including carbon sequestration.

Two, cellulosic ethanol because we know we have limits on corn. We have a RFS here that we have passed. So how would these financing mechanisms here help us advance those technologies? Andy, why don't we start with you and just come across the board. If you take 30 seconds each.

Mr. KARSNER. I'll just talk on the basic principle and let the pros talk to specific characteristics. But the basic principle is all of these technologies have higher up front installed capital costs. That they pay for themselves through the benefit of how they operate through time.

So if that's biofuels, the obvious benefits of security in emissions and oil dependency and pricing. I mean, we're now almost at cost parity for gasoline today on cellulosic. So giving a long term project financing framework enables us to lower that cost on the project as opposed to all equity up front.

Think of buying your home, all cash up front, verses financing it over 30 years. You can do that today with our commoditized conventional based economy. You cannot do it with something we know we can do, such as the 12 to 17 experimental cellulosic biorefineries we're putting in motion.

When project No. 2 of each of those becomes replicable process integration——

Senator SALAZAR. So these financing mechanisms will help us with those projects along?

Mr. KARSNER. Should help us scale them. Right now we're perfecting process integration.

Senator SALAZAR. Ok.

Mr. KARSNER. Through the government experiments.

Senator SALAZAR. Mr. Denniston, let me, I want to get everybody. Since I have like 5 minutes and you guys got a minute and a half here left.

John.

Mr. DENNISTON. Yes, thanks, Senator Salazar. It's a great question. I think you chose two terrific examples.

I think that cellulosic and advanced biofuels are the poster child for what this legislation can do because one of the properties of those advanced technologies is that entrepreneurs are now at a point where they are working at small scale. What they want to do is to introduce them into the market at large scale. That's not been done before.

Lenders are not signing up to debt finance those projects. This is exactly what this new corporation can do with the loan guarantee lenders will step up, finance them, some will work, some will not. We have to worry about and think about a portfolio balance for the new corporation. But it is the case in point from my perspective of what this corporation can do.

In terms of the second, do you have a question?

Senator SALAZAR. No, I only got 20 seconds to go through the rest of the panel.

Mr. DENNISTON. On capture and sequestration I actually think that's more of an R and D phase at the point where we have capture and sequestration technology, the corporation then can give guarantees to put it in the market.

Senator SALAZAR. Ok.

Ms. Hull.

Ms. HULL. Yes, sir. The risks on both IGCC and cellulosic are technology risks on our scale of risks as everyone said. There's many other risks. But those are the fundamental risks.

Loan guarantees address that risk. Insurance addresses that risk. The ability to bundle and remarket securities can help with that so——

Senator SALAZAR. So are these two financing mechanisms then help address those risks?

Ms. HULL. Absolutely.

Senator SALAZAR. Ok.

Dan.

Mr. REICHER. Very quickly, Senator. Patent number five million with all those zeros was issued in the early 1990s for cellulosic ethanol. When it was issued we had great hopes that we were going to see commercial scale plants by the end of the last decade. We still haven't seen commercial scale plants. It goes as my colleagues have said to the issue of risk in building plant number one and number two, perfect mechanism for addressing this.

The whole point about debt financing, as we call it, debt tends to be cheaper than equity. If you have to equity finance a project like that, it's very expensive. The venture capital world is not prepared to put hundreds of millions or billions into a single project. That's where the debt markets come into play.

That's why these debt oriented mechanisms, the secondary market and the credit support mechanisms are absolutely critical. We're not going to do this on the back of equity ownership projects. We're going to have to use the classic mix of equity and debt to move these projects forward.

Senator SALAZAR. Ok.

Jeff. Thirty seconds.

Mr. ECKEL. The market void that would be filled by this bank on cellulosic ethanol would be to fund the second project. The market void that would be filled by this bank on IGCC is to fund the first project. Excellent opportunities for this institution.

Senator SALAZAR. Thank you for your excellent testimony. Chairman Bingaman you have put your finger on, I think, one of the most important issues that we can work on as an Energy Committee. Thank you so much.

The CHAIRMAN. Thank you so much. Senator Craig.

Senator CRAIG. Wile our government is suffering from risk aversion, we are suffering from political aversion at the moment. We're probably hand tied for at least 10 to 12 months. I hope it's different than that. But I think the reality is that.

So let me give the panelists an example because when we passed the Energy Policy Act and we established a loan guarantee program, we hoped it would do a variety of things that it has not yet done and in many instances you're saying may not be able to do. Phase one of the loan guarantee program was solicitation, was issued in August 2006 after the passage in 2005. So still no loan guarantees were issued after 2 years.

DOE received 143 applications in response to this solicitation. Still no new projects started. DOE finalized a loan guarantee regulations in October 2007, 2 years after it was authorized.

Phase two solicitations were just announced on June 30 to cover renewables and nuclear projects. The phase two loan guarantees, probably based on simply the reality of who we are, a change of Administration, the politics of all of that, establishing a new Administration. My guess it's November 2009 and more likely November 2010 before we see this happen.

So there's a phenomenal level of frustration here that the bureaucracy grinds not only slowly, but sometimes chooses not to do anything. Jeanine, I think you used some nice finessing words saying civil servants could not? There was a phrase in your testimony that was a window of opportunity for me to say, were you talking about the inability of DOE to get its act together in a timely fashion?

Ms. HULL. I was talking about the general lack in governmental agencies of the type of sophisticated financial expertise that is necessary.

Senator CRAIG. Ah ha. I thought that's what you were saying. You phrased it differently than I. So tell me how this is different. These two bills do it differently and how long it takes.

It should take from legislation to policy to law that creates it. I mean, we put the money up, everything is there. But DOE drags along. Industry out there is now watching it and departing.

Let me suggest on the cellulosic issue. I work very closely with Iogen Corporation, one of those new technologies. They finally walked away from DOE because of timeliness.

Another reason, a lot of money out there in the marketplace right now that wants to invest in energy. Along came a company that had been helping them and said, forget the time lag. We want to lead in cellulosic. Here's a check. Go built the plant. So they're going ahead. That's good news. Government didn't have to finance it.

The bad news is government had an opportunity to do a lot of things that it didn't do. The timeline was several years late. What's different about this?

Ms. HULL. Um, sir. I——

Senator CRAIG. Of these two bills, Jeanine?

Ms. HULL. It's Jeanine. Thank you.

Senator CRAIG. Oh, I'm sorry, Jeanine.

Ms. HULL. Quite alright.

Senator CRAIG. My apologies.

Ms. HULL. Both bills are significantly different from the existing loan guarantee program which is, as you noted, housed within the Department of Energy and is run by career professionals.

Senator CRAIG. It's ok. Go ahead.

Ms. HULL. They are limited by an awful lot of rules and regulations that are there and appropriate in other circumstances, but are not geared to getting the financial programs like this off the ground quickly. So this——

Senator CRAIG. So maybe our mistake——

Ms. HULL. But neither one of these bills, sir, as I understand them. I haven't really had a chance to seriously analyze the bill that was just, most recently, introduced. But both bills, as I understand it, would separate the entity being created from the civil service structure and would allow the entity to acquire the necessary expertise to be able to make this entity capable of responding closer to the timeframe we're talking about.

Senator CRAIG. So in the context of the current circumstances we're in, in the mortgage market, having created a quasi governmental marketplace entities that are in trouble today. Jeff, how should we do it differently? So we can convince not only our colleagues that these are good ideas, but we can convince the marketplace that this is something that long term, down the road when we've got hundreds of billions racked up, doesn't come tumbling down?

Mr. ECKEL. There's no way to guarantee there won't be mistakes in the future. There better be mistakes in the future.

Senator CRAIG. I was going to say I hope there are a few.

Mr. ECKEL. We're not taking enough risk if there aren't mistakes. But simply the very act of making it a private corporation. We've done projects where we've borrowed money from OPEC, from IFC, from Finish and Dutch Export Credit Agencies. It's not super fast, but it's way faster than borrowing money from the U.S. Government.

It's got to be out of the civil service. I think both bills achieve that.

Senator CRAIG. Thank you. My time's up. Thank you, Mr. Chairman.

The CHAIRMAN. Senator Murkowski.

Senator MURKOWSKI. Thank you, Mr. Chairman. I too, want to echo the comments from Senator Salazar that you and Senator Domenici have really identified, the crux where we are with our energy crisis now. We're talking about a lot of policy and we're talking about technologies as if we are utilizing all of this in our backyard today.

The fact of the matter is, is we're not. I think the public is also thinking we must be doing it somewhere. Maybe not in my State or your State, but we're doing it somewhere because we keep talking about carbon capture and sequestration. We keep talking about IGCC.

We keep throwing these around. Then they're not seeing any lowering in the prices of their energy, whether it's at the pump or what they're paying at home. They don't understand that the problem to a certain extent is back here as we put up road blocks, if you will, to provide for the financing to get these projects off the drawing board and into everybody's backyard so we can really be utilizing it.

I appreciate the frustrations that you have raised, Senator Domenici and Senator Craig about the loan guarantees. You know we put them in place. We expect them to work and then we don't see those outcomes.

I would like to think with the approach that both energy leaders here at this Dias are presenting. That it's more than just putting something on paper. That we actually have a process that works. That does allow for facilitation of the concepts into the market to truly make a difference.

Secretary Karsner, when we had an opportunity to talk about Senator Domenici's legislation some months ago you were mentioning the fact that in your former life you were in an international wind project developer. We had an opportunity to talk about other programs that are available if you're outside the borders of the United States. Did you ever utilize the United States funded export/import bank or the Overseas Private Investment Corporation for projects overseas?

We talked about them being models for what we could do here. Senator Domenici's legislation somewhat crafted around similar concepts. But are those ideas that we can meld into these two particular pieces of legislation that we have before us now?

Mr. KARSNER. Again, not taking an Administration position on the specific bills. But as we talked about on that occasion, absolutely it was my experience. It is probably my greatest single frustration that coming back to my own country with the technologies I now preside over in this portfolio. I could use the taxpayer funded mechanisms at the Export-Import Bank for 100 percent credit, if I wanted debt, without ever going to Congress or having legislation any day of the week.

If I wanted to finance a project I could use OPIC for help and equity arrangement. I could use the Trade Development Agency for

walking around money, for anemometry, for site development, for permitting, only if it was outside the United States. If all the villages that I know you are so concerned about in Alaska are hit hardest by these energy situations.

Whatever has hit it home has hit multiples harder in Alaska; where we have geothermal resource, where we have bio-gas, gassifiers ready to go. They could easily be economically justified over their life cycle. But all I can offer them from here in Washington is small, annualized increments of potential grants from a tribal program rather than a guaranteed outcome that would pay for itself.

So instead of doing the right thing today, we force ourselves to do it over time. If Alaska were a foreign country, I could walk into any of those institutions that the taxpayers already on the book for and fund those things tomorrow, based on those technologies that are already in my portfolio.

So you can imagine the irony and the challenge it is for me, mentally, to think that I can deploy these things faster abroad than I can deploy them at home.

Senator MURKOWSKI. It's incredibly, incredibly frustrating. Let me ask just generally, I think most of you, Mr. Reicher and Mr. Eckel, certainly, indicated that the best way forward is an integration of the two concepts that we have from Senator Domenici and the chairman. Is it possible to do it the way that both gentlemen are approaching it?

Senator Domenici's perspective is perhaps a little more conservative in respect to which projects receive the funding as opposed to Senator Bingaman that looks more toward the breakthrough concepts. Is it doable to integrate, do you believe? Everyone's in concurrence.

Mr. Denniston.

Mr. DENNISTON. No, I do. I agree with Mr. Reicher. I think that we have a lot to admire in Senator Domenici's bill and a lot to admire in Senator Bingaman's bill. I think there's a very happy marriage between the two.

I think the key question that's left is which projects, which energy projects, does the new corporation aim to support? What's the prioritization?

Senator MURKOWSKI. But you could, in fact, have this portfolio mix, as some have suggested as well?

Mr. DENNISTON. Undoubtedly. The question is what's the mix? I think that's where the detail has to——

Senator MURKOWSKI. Mr. Reicher.

Mr. REICHER. Senator Murkowski, I think we could do this. I think this is one of those situations where Republicans and Democrats, environmentalists and folks from industry, you know, the left and the right. I think there's an awful lot of agreement here. Unlike so many other issues, I think this could happen.

I don't think it would be a huge amount of work to sit down, integrate these bills and get some broad agreement. Then get down to details about how you put this entity together. I think it's really critical that we do it.

Now, I do have to emphasize the government can fulfill this role. I have to say when I was in the private equity world we got in-

volved in a bio diesel project. We went to the U.S. Department of Agriculture and we got a loan guarantee. That enabled a local bank in Delaware to get a loan for a bio diesel project.

So there are programs, well established track records. But something of this magnitude, with this sort of risk profiles that we're talking about, the time dimensions that are so critical. I do think that moving this outside of government into some sort of bank or corporation with the government oversight, with some government involvement as both bills require. I think that makes a lot of sense.

What I really want to emphasize, I really think we could bring all the right players together to get this done.

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

The CHAIRMAN. Thank you. The vote has started. Why don't we go to Senator Sessions? You'll be the last questioner. Then we'll dismiss everyone and go vote.

Senator SESSIONS. Thank you, Mr. Chairman.

Senator DOMENICI. Senator, as you close up would you just permit me to make an observation before you do that?

Senator SESSIONS. I'd be delighted. Thank you, Chairman Bingaman for your cool head and leadership consistency on this issue and Senator Domenici for your long term leadership on this issue.

We're going to have some fusses soon, I think over energy. I do not believe we need to go home as a Congress until we've taken some steps that will deal with the reality that the average family, since last year, is paying $100 more per month for the same amount of gasoline as they paid the year before. This is an incredible hit to their budget which it ripples through the economy.

We've got chemical companies and others that are outsourcing to get cheaper natural gas, feed stocks for their progress. It's just $700 billion a year wealth transfer.

So Mr. Karsner, Congress gets it. I think, is beginning to get it. The American people want something done.

And on this loan matter, I remain baffled, has there not been a single loan granted under the program that——

Mr. KARSNER. Not as of yet.

Senator SESSIONS [continuing]. Senator Domenici put through?

Mr. KARSNER. No, sir, there hasn't.

Senator SESSIONS. This is most troubling to me. Is there some problem with the legislation? I mean is there something? Have you asked us to fix some gap in the legislation so this could go forward? Because I mean this is the way I see it.

I'm just simple minded about it. If we could accelerate, for example, cellulosic ethanol and accelerate it through government intervention, which I don't loathe to do, a free market person, but if we could accelerate that and prove its commercial viability earlier, could have already have done that. We may find that that's a substantial new source of clean energy. Is there some problem here that's keeping this from happening?

Mr. KARSNER. Sir, first of all let me say my experience with you is you are anything but simple minded. So as you know, nobody's doing more than Auburn University and Dr. Bransby to bring down that price of cellulosic ethanol. As you've heard here what you need to do to integrate the process being developed there and build it out, physically build it out.

But when you talk about the impediments, a lot of times it's not as complex as just, at the big level, the bureaucracy stopping us. I mean, consider the fact that Dan's job before, my job now, is a transient management position. Typical average on this job might not exceed 24 to 30 months. But it takes me 17 months to hire one person.

The likelihood that that person is going to be an MBA or have the acumen necessary for this level of risk management for $42.5 billion in guaranteed capacity when the whole budget of DOE is $25 billion is a mismatch in expectations. I had an employee at my former company who was recruited in 3 weeks by Korn/Ferry to be part of the Millennium Challenge Corporation. He now dispenses money as grants for the U.S. Government. He's got 25 years of energy experience. But I couldn't possibly hire him at DOE.

Ok, so we have to deal with the realities, the lack of agilities in our institutional infrastructure and posture ourselves, not for the cold war, but for the speed of the challenge to alleviate the price pressure you're talking about.

Senator SESSIONS. This question, do you think that this whole concept is doable? I think there've been some government sport for range fuels, a biofuel, cellulosic fuel plant on the Georgia/Alabama line. I know of three others in the State that have gotten no financial assistance.

They've been delayed as a result of that. Actually one of the little projects is running below the radar screen and creating from wood product natural gas and less price than the commercial natural gas prices. So that's cellulosic without any real subsidy.

But I guess what I'm saying is that our goal is to accelerate the production of these items or could we—can you help us? Does your program help or do we need to start over like Senator Bingaman and Senator Domenici are proposing?

Mr. KARSNER. Our program today, the core strength of it is applied science technology, research development, and demonstration. So we can do that in the increments that we are given by Congress, this year 1.7 billion. So that's almost two-thirds of a coal-fired power facility.

We can do that at those increments over time. I think we're postured as an organization to do that well. But the challenge is a cost benefit versus $700 billion that needs to be displaced, and growing. The challenge is to raise the $15 billion that's in the private markets today to a clip that gets us to our goals in multi-years. That's more like $80 billion or $100 billion of investment per year.

So we've got to help accelerate that going to market. The current institutional framework of the Department of Energy is about science and technology, not commercialization and scale deployment.

Senator SESSIONS. Thank you.

The CHAIRMAN. Senator Domenici, you had a comment?

Senator DOMENICI. I wanted to just comment to you, Mr. Chairman. I've kind of indicated in my own way how I was so enthusiastic about this as a method of getting some real money into the marketplace. How I felt like all our work was probably in vain.

But I want to take all of that back. Say that I leave today, if you're willing and I'm willing, let's see if we can put a bill together. See if we can do it.

It's not the solution to all the problems surrounding the energy crisis. But it's obviously a vacuum that if we could get it done and modeled after either the two that do foreign financing. Get it out of Congress and to a President who will sign it. I think it could fill a gap.

I would be willing to spend some time, if you are and want to make sure the record reflects that. These wonderful people given all their time know that I generally love to get things done. It's nothing more thrilling than to do it together as bipartisan.

I don't know anymore whether or not you, but whether the hierarchy around here wants things done. So that's what I was alluding to a while ago. I don't know.

If we had something real good to do, I don't know whether there is a message out there that even though we have 49, you have 51. I don't know whether our 49 can say shall we try something or are we just wasting time? I don't and you maybe don't know either.

But at least you know from me that I'm willing to try.

The CHAIRMAN. Thank you very much. Obviously we want to work on this and see if we can bring these two bills together and fill in any of the gaps that have been identified here by the witnesses.

Let me thank all the witnesses for your excellent testimony. We will conclude the hearing.

[Whereupon, at 11:39 a.m. the hearing was adjourned.]

APPENDIX

RESPONSES TO ADDITIONAL QUESTIONS

RESPONSES OF JEFFREY ECKEL TO QUESTIONS FROM SENATOR BINGAMAN

Question 1. You observe that the primary problem for projects is not necessarily the expense of debt financing but rather its unavailability. Could a more robust secondary market, make lenders more likely to issue debt or do you believe a more direct intervention is required?

Answer. The main reason debt is scarce is not supply (present credit crunch notwithstanding) is that the projects are not well enough structured to "deserve" debt. The existing Federal loan guarantee programs fill some of that need and should be fully utilized. That said, a secondary market will increase debt supply.

Question 2. You mention the need to substantially increase the scale of the investments in these technologies. What specific mechanisms do you see as the most effective for the federal government?

Answer. First, getting the price signals right: a price on carbon is essential to increasing investment. Second, changing the way the renewable energy tax credits work would be very effective. Moving to a national Renewable Portfolio Standard and eliminating tax credits would be a way to accelerate private sector investment. Third, this entity should focus on the grand infrastructure projects and enabling technologies that change the way energy is used. For example a massive transmission project in the west to get wind energy from the plains to the load centers, or hydrogen refueling infrastructure or the carbon sequestration projects, such as FutureGen.

RESPONSES OF JEFFREY ECKEL TO QUESTIONS FROM SENATOR DOMENICI

Question 3. Can you elaborate on the role that you see a more comprehensive menu of 'financial tools' playing in the Bank's investments and provide examples as to why different projects may require different tools?

Answer. No comment.

Question 4. S. 2730 and S. 3233 take different approaches on maximum contingent liability. One bill sets that amount at $100 billion, while the other allows the volume of lending activities to be determined by the Corporation itself. Could you provide your views on the merits or risks of each approach?

Answer. No comment.

Question 5. On the issue of whether or not common stock for the financial entity created in either S. 2730 or S. 3233 should be issued, I am concerned about the impact that doing so would have on the advancement of game-changing technologies that have a higher level of default risk. How do you believe that such a process might change the posture of the financial entity in terms of its willingness (or ability) to take risks versus a likely preference for profit-driven operations when shareholders have a role?

Answer. By definition, if one can sell stock in the entity on commercial terms, then it is effectively crowding out private equity capital. Having the entity make the large investments, that transform technologies and industries will probably not be the kind of investment the private sector would make, or it would be doing it now.

RESPONSES OF JEFFREY ECKEL TO QUESTIONS FROM SENATOR MARTINEZ

Question 6a. I would like to get the panelists perspective on a provision included in S.3233 that allows a government created and sponsored clean energy corporation to issue stock to shareholders. In light of the current financial problems facing Fannie Mae and Freddie Mac and their historic governance problems, is it a wise idea to give a federally-backed lending institution two seemingly contradictory roles?

Answer. I agree that it is a contradiction. However, the government should get equity, if it can, in the enterprises it creates, similar to the warrants received under the TARP program.

Question 6b. Could the drive to maximize shareholder profit compromise the public mission of a government-backed institution using tax-payer dollars to finance clean energy projects?

Answer. I think that is a very real risk.

DYKEMA GOSSETT PLLC,
Washington, DC, September 12, 2008.

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

DEAR CHAIRMAN BINGAMAN: Attached, please find my answers to your follow-up questions to my testimony at the July 15, 2008, hearing of the Senate Energy and Natural Resources Committee on S. 3233 and S. 2730. These bills would create a federal funding entity (referred to as the "FFE" in my response) whose purpose is to invest in energy technology which will create a diversified domestic energy industry capable of meeting a significant portion of the nation's energy requirements and minimize the nation's emission contribution to climate change from the energy production or use sectors. This attachment also includes my answers to questions from Senators Domenici and Martinez.

The Committee's questions, and my responses, essentially focus on three questions:

1. What projects should qualify for funding?
2. What funding mechanisms should be available to the funding entity? And
3. What risk management measures should be included in the statutory language?

Although I elaborate on the responses in the attached, my short answers are:

1. Any energy project that can make a meaningful contribution to our energy, environmental, economic or physical security which cannot access private sources of funding due to uncertainties regarding commercial performance, aggregation-related credit issues or certain regulatory risks, should be eligible for funding.
2. The complete suite of financial and funding mechanisms identified in both bills should be available to the funding entity.
3. An absolute cap on the lending, guarantee and investment authority of the funding entity should be included specifically in the legislative language. However, the cap should be high enough to reflect the scale of funding required (in the order of approximately one trillion dollars over the life of the FFE), and the purpose of encouraging new technology will be undermined with a requirement for the entity to be self-sustaining, especially in the early years.

The FFE needs broad authority to fund energy supply solutions that meet the goals of energy and environmental security, from new technologies under development to the large pool of technologies that are here today but not are not being properly exploited, such as energy efficiency and solar thermal installation. It needs the flexibility to invest in potentially high-return solutions that currently are a gleam in their inventor's eye, as well as moderate-return investments that are available today and which provide immediate benefits in job creation and energy security of technologies.

As the front pages of our newspapers tell us, even the best intentioned and drafted legislation can cause enormous pain if it is not appropriately regulated and audited. It is imperative that any FFE created by this Committee not be left to judge its own behavior, but be submitted to adequate regular financial and managerial audits by disinterested third parties, such as the Office of the Comptroller of the Currency or the Federal Reserve Bank Board. Regulation is not the bane of free markets. Regulatory failure, not regulation, created the savings and loan crisis of the 1980's, the failure of Long Term Capital Markets in the 1990's, the implosion of the electrical markets in 2001 and the recent subprime mortgage market collapse, with its attendant disruption of the commercial banking sector. Appropriate regulation keeps markets free, open and operating with integrity and competence.

I elaborate on these and other issues in the Questions and Answers attachment.

Thank you for the opportunity to participate in promoting these important legislative initiatives.

ATTACHMENT

RESPONSES OF JEANINE HULL TO QUESTIONS FROM SENATOR BINGAMAN

Question 1. I agree with your comments on the opportunities in aggregating smaller loans to the residential and commercial sectors. We've tried to address that area in Section 6(e) of my bill. Do you have any recommendations for how we can go further to strengthen or expand this program?

Answer. Section 6(e) is an important recognition of the need to enhance the investment profile of residential and commercial scale energy efficiency and solar thermal applications by encouraging the aggregation of such projects for resale to a government-sponsored secondary market. In addition, the definitions in Section 3 of "clean energy technology" and "novel technology" recognize the diversity of solutions that should be supported. However, the requirement of Section 4(d) that 70 percent of the funding portfolio be invested in "breakthrough" technology may limit the ability of the financing entity to support solutions that face non-technical barriers to financing.

As a country, we currently have available many technologies which are underutilized and do not meet the definition of 'novel' or 'breakthrough.' However, they have, if broadly deployed, the potential to significantly and immediately reduce the percent of energy wasted in the U.S. today, reduce the per capita use of electricity and natural gas, reduce the production of greenhouse gases (GHG), reduce the amount of diesel fuels needed to transport coal and other feedstocks and relieve over-burdened electrical transmission infrastructure.

There is no bigger "bang for the buck" for a federal dollar than loan guarantees, energy-efficient mortgages, and secondary market support for energy efficiency, solar thermal applications and other similar technologies. It is the cost of aggregations, credit risk and low returns that limit the widespread deployment of these deserving, but 'unsexy' programs. This is exactly the kind of investment that a federal funding entity (FFE) should look to make.

As government investment makes energy efficiency and other programs capable of harvesting 'low-hanging-fruit' available and widely deployed, the private sector will step up to participate. Private sector funding is highly unlikely to happen without direct government intervention in the market through the tools provided in the bills.

Question 2. Can you expand further on your comments regarding some of the constraints that you see as impeding government programs such as the DOE loan guarantee program? What kind of form do you estimate would be most successful?

Answer. The biggest constraint to the success of current government financing programs is that the government system is not structured to reward the skill sets that are necessary to make efficient judgments about financial risk. People making financial risk decisions must be experienced in the market sector. They must understand market fluctuations and how risks are valued. Learning how to evaluate and manage risk effectively is a skill learned primarily through experience, and the government has to be ready to pay for that. Using consultants to provide these services is an expensive way around the civil service structure which fails to provide an in-house capability and diffuses decision making responsibility. From my years as a consultant, educating senior management and Boards of Directors on the management of energy traders, I can say that FFE managers will need to thoroughly understand these risk in order to properly manage this program.

Therefore, I recommend that a provision similar to Section 4(e)2 of S. 2370, exempting employees of the funding entity from the civil service laws and regulations be included the Committee's merged bills.

This is not to say that there is no role for input from qualified civil service employees, including the national labs. The Department has exceptionally qualified and talented engineers and scientists who are experts in research and development of alternate technologies. Basic R&D in these fields is a role that must be performed by government, if it is to be performed at all, given the exceptional lead-time for commercialization of these technologies. It also provides a ready and trained talent pool to assist the financial entity in evaluating technologies for investment. The FFE can and should reimburse the government for the consulting services of these individuals.

As critical as it is that the FFE get into markets in a timely manner, it is equally critical that the government get out of the market when it is no longer needed. The FFE should be sunsetted in the organic statute. It would be difficult to set up, operate and then disband a 'permanent' bureaucracy within the existing civil service structure.

Attracting young, bright, well educated (if not highly experienced) employees should not be a problem for an entity that can be a jumping-off place for the lucrative equity finance private sector. In this regard, a preventive conflict-of-interest policy should be in place early on.

With respect to the organizational structure of the FFE: I do not believe a perfect template exists for an FFE, although similar functions can be found in the Highway Trust Fund, Federal National Mortgage Association (FANNIE MAE), the Small Business Administration Loan and Loan Guarantee Programs, the various development and commercialization programs conducted by the Department of Energy and Agriculture, the Overseas Private Investment Corporation and the Export-Import Bank of the US, among many others.

The Department of Energy has studies which analyze various templates for the FFE which the Committee is presumably studying to determine exactly what structure is most appropriate and the powers and authorities needed by such an entity. I do not think you will find the template for this entity "on the shelf."

The structure, however, will not determine the success or failure of this program. That will be determined by the quality of people hired to set up the FFE and retained over time to operate it, together with policies and procedures that ensure transparency and accountability, demand professionalism and avoid to the maximum extent possible conflicts of interest, partisanship, politization and other self-defeating betrayals of the public trust.

The structure must allow for, indeed encourage, risk-taking within the pre-determined bounds of technological potential or commercial operability, or rapid deployment of energy-saving methods among lower-income families who may not be able to pay back the investment, or perhaps who should not even be asked to do so.

These are not normal commercial risks and the entity's progress can only be measured accurately over time, in years not in quarters, on a total portfolio and societal benefit basis. The FFE's ability to pay back all capital or to be self-supporting within a specific time frame are not the kind of 'success' that is required from this effort. Yes, there must be a risk/reward equation which balances, but those who bear the risk will not in all cases be the same as those who are rewarded. Some benefits, such as unrepaid direct investment in weatherproofing low income homes or in energy-efficient transportation systems, should be considered valid and appropriate investments and should be encouraged. In those cases, all Americans benefit when less energy is imported, wasted or exhausted into the atmosphere.

Question 3. Assuming we were to merge the bills before us today and develop an entity that could provide the most important services of each entity, that would entail some risk to the taxpayers of businesses failing. Beyond this risk of project failure, I'm also concerned that safeguards be in place to give us some assurance that the risks undertaken by the new entity be prudent and targeted towards providing real societal benefits. Can you recommend any additional safeguards or standards for a combined bill that might give us such assurance?

Answer. The manner in which the FFE approaches risk management is a key issue that must be addressed in legislation, merging and supporting the various approaches identified in S. 2730 and S. 3233.

The issue is not whether individual projects will fail, since some failure is inevitable. A normal private equity sector success ratio is that one out of ten projects pay off. There is no reason to think that the government will do better. The issue is the overall success of risk management, so that gains from successes protect taxpayers (as opposed to the financing entity) from bearing the cost of unnecessary failures. Note that taxpayers can also lose as a result of inaction in the face of opportunity, by not underwriting "necessary risks." If 100 breakthrough technologies that change the U.S. energy security profile are financed as a result of 1,000 investments, the risk will have equaled the reward, although, of course, quantification is required.

Under an optimized merged bill, the FFE would support a number of different technologies with widely differing risk profiles. These different categories are already defined in the two bills: "breakthrough technology," "novel technology," and "commercial technology."[1] (See S. 3233 Sections 3(3), 3(7), and S. 2730 Section 2(4) and (5), respectively.) Each definition would represent a separate funding silo with different evaluation criteria, funding mechanisms and risk-reward characteristics.

The proposed FFE would create a portfolio divided into the three silos. Specific investment goals and risk models should be tailored for each silo. This is both an additional safeguard that allows more effective risk evaluation, and an additional

[1] I recommend against inclusion of the provision of S. 2730 that requires all 'eligible projects' to use commercial technology, and the funding allocation of S. 3233, which is heavily biased toward breakthrough technology.

way to ensure that the entity will meet its statutory goals. The proportion of funding allocated to the three silos should be determined by market and opportunity analysis under the leadership of the FFE Board rather than legislated, should be flexible, and should be an ongoing evaluation task.

Certain technologies, such as new transmission communications and control equipment, which are commercially available today but are more expensive than conventional equipment, are subject to prudence reviews, multi-state approvals and diversified ratemaking scenarios which expose developers to greater regulatory risks. The FFE needs explicit authority to backstop these types of risks as well as market-based risks. In addition, expansion of the transmission grid to resource rich, but currently undeveloped regions, such as the areas with wind resources in Wyoming and North Dakota, are subject to a chicken and egg guessing game. Lenders are unwilling to lend to wind developers due to the lack of transmission service to the areas, and transmission developers are unwilling to risk line extensions to an undeveloped resource area. The FFE is in the best position to work with the regional grid planning entities to ensure that both the supply and transmission service projects are developed in a timely manner.

Oversight would be provided by properly structured boards, the Secretary of Energy and either the OCC or Federal Reserve Board. Regular and attentive Congressional oversight will have a substantial impact on risk management and goal achievement. I will reiterate, however, how important it is that the FFE take the risks to be enumerated in the legislation, which should include, at a minimum technology risk, scale-up risk, certain regulatory risk, operational risk for novel technologies and aggregated credit risk.

From highest risk to lowest risk, the primary tools which should be available to the FFE are: equity investments, loans, loan guarantees, letters of credit, and insurance. The provision and operation of the secondary market is a critical element to support the funding authority. Each of these can be found in either S. 2370 or S. 3233.

The FFE legislation should address the future role of the DOE Loan Guarantee Program Office (LGPO), which could continue to provide a service in energy financing, or could be rolled into the FFE. In either case, the role and limitations of the LGPO should be clearly recognized. The LGPO supports technology already demonstrated at pilot scale where the primary risk is scaling up. However, due to the statutory interpretation that the LGPO be self-sustaining, the transaction requirements and costs of LGPO loans may be limited LGPO customers to projects of about $20 million or greater, and may result in more money being available for loan guarantees than there are applicants for the support.

It is crucial that risk methodology enable the financing entity to value the societal benefit of alternatives, and to aggregate these benefits when appropriate and necessary to create an efficient investment package. One technology may have widespread benefits where each application's benefits are small. Nuclear technology risk should be limited by the Price-Anderson Nuclear Industries Indemnity Act. Direct investments of the entity in nuclear projects should be subject to provisions of the Price-Anderson Act covering DOE facilities.

Responses of Jeanine Hull to Questions From Senator Domenici

Question 4. Can you elaborate on the role that you see a more comprehensive menu of 'financial tools' playing in the Bank's investments, and then provide examples as to why different projects may require different tools?

Answer. This is one case where that old saw "one size fits all" definitely does not apply. The projects eligible for financial support under a combined bill should be (1) breakthrough, (2) novel and (3) commercial technologies, as discussed in the response to Question 3. That means that projects will be in early-stage, mid-stage and late stage development when they approach the FFE for funding. Just as venture capitalists (VCs) have different criteria than commercial bankers and different vehicles and mechanisms available for funding, the FFE will need to have the tools appropriate for angel, VC, mezzanine and quasi-commercial investing. One of the most effective risk management tools the funding entity can have is a full set of tools specially tailored to various types of risk. The ability to use the tool that imposes the least risk on the FFE, while achieving its intended function, is a key factor in the entity's ability to successfully meet its goal and purpose. Having the appropriate tools will also allow the FFE to assist more projects if each project uses just the amount of funding or credit capacity it actually needs and no more.

Technologies in the breakthrough silo are dominated by the risk they will not work as intended. These technologies will need greater support, perhaps for a longer period of time, than a project that has been demonstrated at pilot scale where the

risk is limited to scale-up, or a "novel" technology. In the first example, a direct loan or loan guaranty may be required to be in place for a period of five or more years. In the second example, insurance may be sufficient to encourage private lenders to take the funding risk. 'Scale-up' insurance may only be required for 1 to 3 years, until the commercial-size facility is operational. The cost of providing, and receiving, these two types of financial support will likely vary greatly. Both are necessary, but not for all projects. "Angel" investing should be limited, but where justified, is likely to take the form of a direct equity investment.

Question 5. S. 2730 and S. 3233 take different approaches on maximum contingent liability. One bill sets that amount at $100 billion, while the other allows the volume of lending activities to be determined by the Corporation itself. Could you provide your views on the merits or risks of each approach?

Answer. I believe in managing to budget limits. Therefore, I would encourage the Committee to set an explicit limit on maximum direct investment, direct lending and contingent liability as a first line risk management tool. Such a limit would serve as a baseline for audits, would help force management accountability, and would force better decision-making on tough issues. I also believe that Congress should revisit the cap on a regular basis to evaluate the overall performance of the FFE.

However, the total amount available to the FFE should be more like $500 billion over the life of the program. I would also suggest attention to a gradual scaling up of the financial authority of the FFE over time. The first year authority will be spent primarily on hiring personnel and developing investment policies and screening mechanisms. For these reasons, the FFE will not likely be able to provide funding until its second year of operation. Depending upon the financing mechanism (direct appropriations, a Highway-Trust fund fee approach or sales of government Clean Energy Bonds or a combination of these and other methods), the total commitment (direct debt and equity) and contingent liability caps should be adjusted yearly to make available adequate funds and capacity to ensure wise investment decisions, but not too much as to encourage unnecessary risk taking.

Responses of Jeanine Hull to Questions From Senators Domenici and Martinez

Question 6. On the issue of whether or not common stock for the financial entity created in either S. 2730 or S. 3233 should be issued, I am concerned about the impact that doing so would have on the advancement of game-changing technologies that have a higher level of default risk. How do you believe that such a process might change the posture of the financial entity, in terms of its willingness (or ability) to take risks versus a likely preference for profit-driven operations when shareholders have a role? I would like to get the panelists perspective on a provision included in S.3233 that allows a government created and sponsored clean energy corporation to issue stock to shareholders. In light of the current financial problems facing Fannie Mae and Freddie Mac and their historic governance problems, is it a wise idea to give a federally-backed lending institution two seemingly contradictory roles?

Could the drive to maximize shareholder profit compromise the public mission of a government-backed institution using tax-payer dollars to finance clean energy projects?

Answer. I share your concern that offering shares to the public would drastically curtail the ability and willingness of the entity's officers and Board of Directors to take the type of risks that must be taken for the facility to meet the goal of domestic energy security.

I am flatly opposed to allowing a government sponsored clean energy bank to issue shares of its stock to the public. I would, however, have no problem with the sale of government-backed clean energy bonds to the public as a means to ensure adequate capitalization of the funding entity, but only after the first five years of operation.

In addition, and I can speak from personal experience on this issue, allowing the entity to sell stock to the public would impose a significant distraction on management to ensure compliance with state and federal securities laws and regulations and would lead to a never-ending debate over the laws from which the entity should be exempted (such as environmental, Freedom of Information, Federal Advisory Committee Act and on and on . . .).

It is key that the funding powers and life expectancy of this entity be limited in explicit statutory language. When private capital markets are ready and willing to venture into a field cultivated by the FFE, the FFE must decamp to another underserved field or roll back operations. It will not be easy to determine when there is

adequate participation by private markets, but there must be specific indicators identified and monitored. It is not the role of this entity to compete with private capital markets, but to develop them into robust funders of a robust domestic energy industry and a rules-based secondary market for its debt.

If, after 5-10 years of operation, there is no greater incursion by private markets into energy infrastructure development, then I believe the FFE will have failed at one part of its 3-part mission. I believe, however, that within the expected 20 years lifespan of the FFE, the FFE can jumpstart the creation of a diversified domestic energy industry capable of meeting a significant portion of the nation's energy requirements and minimize the nation's emission contribution to climate change from the energy production or use sectors. It should then remove itself from the market completely, allowing private capital markets to take over from there.

[Responses to the following questions were not received at the time the hearing went to press:]

QUESTIONS FOR ALEXANDER KARSNER FROM SENATOR BINGAMAN

Question 1. Given the significant investments you mention that will be needed to achieve market transformation in clean energy technologies, in your personal opinion is there an opportunity for the federal government to play a constructive role in financing beyond the currently authorized programs?

Question 2. In addition to the loan guarantee program authorized in the 2005 bill, the 2007 energy bill authorized a sizable new direct loan program for automotive manufacturing to help push forward domestic production of fuel efficient vehicles; is it likely that such a program would be implemented on a schedule like we've seen with the loan guarantee program? Are there advantages inherent in placing such a program within or without the Executive Branch?

Question 3. Based on your experiences in the private sector and in government, can you give us your personal perspective on the strengths and limitations of financial market interventions in each of the bills we are discussing today?

Question 4. Assuming we were to merge the bills before us today and develop an entity that could provide the most important services of each entity, that would entail some risk to the taxpayers of businesses failing. Beyond this risk of project failure, I'm also concerned that safeguards be in place to give us some assurance that the risks undertaken by the new entity be prudent and targeted towards providing real societal benefits. Can you recommend any additional safeguards or standards for a combined bill that might give us such assurance?

QUESTIONS FOR ALEXANDER KARSNER FROM SENATOR MENENDEZ

Question 5. If S. 3233 were enacted, you would serve on the Clean Energy Development Corporation's board of directors, and your Department would be responsible for developing the technology roadmap which would guide Corporation. You would be responsible for balancing riskier investments with less risky ones. How large of a role do you see for solar panels in this theoretical portfolio?

Question 6. I am concerned that small investment projects might not receive sufficient attention from either the CEIBUS Bank or the Century Energy Development Corporation. Many of our country's best opportunities for energy efficiency and renewable energy are widely distributed. In addition, it can be even more costly to assess the risk associated with many small projects. What could be done to improve the ability of the proposed Energy Development Corporation to improve its ability to finance small, distributed projects?

Question 7. One of the philosophical differences between S. 2730 and S. 3233 is that the former only invests in "commercial technology" which is "in general use". It also requires that its investments be made on a self-sustaining basis. I am concerned that this might preclude a number of technologies which we need in order to solve our energy crisis. Could CEIBUS support investments in photovoltaic solar power? What about plug-in hybrids? Can you give me an estimate of how much Federal incentives are already available for the established technologies which it could support, either through direct support, tax incentives, or through programs like the DOE Loan Guarantee Program?

QUESTIONS FOR ALEXANDER KARSNER FROM SENATOR DOMENICI

Question 8. As an Assistant Secretary, I would like your opinion on how these bills differ in their approach to filling positions on the Board of Directors. One pro-

vides for Presidential nominations with the Senate's advice and consent, while the other relies upon Presidential appointments. One requires balanced representation of the political parties, while the other does not.

Question 9. Having faced Senate confirmation, can you discuss the advantages and disadvantages of using that process to find the quality of individuals that we would seek to run an entity like those contemplated by S. 2730 and S. 3233? How important do you believe it is to have bipartisan representation on the Board of Directors?

Question 10. S. 2730 and S. 3233 take different approaches on maximum contingent liability. One bill sets that amount at $100 billion, while the other allows the volume of lending activities to be determined by the Corporation itself. Could you provide your views on the merits or risks of each approach?

Question 11. On the issue of whether or not common stock for the financial entity created in either S. 2730 or S. 3233 should be issued, I am concerned about the impact that doing so would have on the advancement of game-changing technologies that have a higher level of default risk. How do you believe that such a process might change the posture of the financial entity, in terms of its willingness (or ability) to take risks versus a likely preference for profit-driven operations when shareholders have a role?

QUESTIONS FOR ALEXANDER KARSNER FROM SENATOR MARTINEZ

Question 12. I would like to get the panelists perspective on a provision included in S. 3233 that allows a government created and sponsored clean energy corporation to issue stock to shareholders. In light of the current financial problems facing Fannie Mae and Freddie Mac and their historic governance problems, is it a wise idea to give a federally-backed lending institution two seemingly contradictory roles?

Question 13. Could the drive to maximize shareholder profit compromise the public mission of a government-backed institution using tax-payer dollars to finance clean energy projects?

QUESTIONS FOR JOHN DENNISTON FROM SENATOR BINGAMAN

Question 1. Mr. Eckel indicated in his testimony that he doesn't see a great need for a secondary market in energy project development loans, but you seem to disagree. What needs do you see as still going unaddressed in this area by the marketplace?

Question 2. You talked a bit about risk and charting a middle course by balancing risk with fees generated through supporting more proven technologies. At the same time, one criticism of the DOE loan guarantee program is that in attempting to make the program self-sufficient, they may not be reducing costs sufficiently for the riskier technologies. How do you see striking this balance, and over what time period would you think a new entity should strive to be self-sustaining? Or should it be self-sustaining at all-should it leave the marketplace at some point?

Question 3. Assuming we were to merge the bills before us today and develop an entity that could provide the most important services of each entity, that would entail some risk to the taxpayers of businesses failing. Beyond this risk of project failure, I'm also concerned that safeguards be in place to give us some assurance that the risks undertaken by the new entity be prudent and targeted towards providing real societal benefits. Can you recommend any additional safeguards or standards for a combined bill that might give us such assurance?

QUESTIONS FOR JOHN DENNISTON FROM SENATOR DOMENICI

Question 4. One of the most constant refrains that we hear from witnesses before the Committee is that we must refrain from choosing technological winners and losers as we formulate a sound national energy policy. And yet, your testimony advocated the exact opposite approach-specifying which technologies should get financial assistance (batteries and biofuels, in your opinion) and which ones should not (nuclear and fossil fuels, again, in your opinion). I have trouble squaring your assertion that breakthrough technologies should be a top priority with your attempt to cross certain technologies off the list from the outset. Is it also your opinion that there are no breakthroughs left to be had in the nuclear and fossil sectors-would fission and affordable CCS for coal not constitute major breakthroughs?

Question 5. Your discussion of a three-dimensional energy crisis does not include any mention of the need to keep energy affordable for Americans. I believe this is done, at least in part, by ensuring a healthy supply of energy that is capable of meeting demand for it. Do you agree with that assertion?

Question 6. At the hearing and in your testimony, you discussed some concerns with the eligibility criteria in S. 2730, which is modeled after Title XVII of the Energy Policy Act of 2005, and I would like to better understand those concerns. What technologies, exactly, do you believe would not be eligible under S. 2730?

Question 7. S. 2730 and S. 3233 take different approaches on maximum contingent liability. One bill sets that amount at $100 billion, while the other allows the volume of lending activities to be determined by the Corporation itself. Could you provide your views on the merits or risks of each approach?

Question 8. On the issue of whether or not common stock for the financial entity created in either S. 2730 or S. 3233 should be issued, I am concerned about the impact that doing so would have on the advancement of game-changing technologies that have a higher level of default risk. How do you believe that such a process might change the posture of the financial entity, in terms of its willingness (or ability) to take risks versus a likely preference for profit-driven operations when shareholders have a role?

Question 9. In your testimony, you note that you have witnessed efforts in other nations, such as China and those in Europe, to dramatically accelerate the use of renewable energy. You state that, "Increasingly, entrepreneurs overseas enjoy advantages in the form of determined government policies, including financial incentives and large investments in research and education."

Congress has taken significant steps in recent years-particularly in the Energy Policy Act of 2005, the America COMPETES Act, and the Energy Independence and Security Act of 2007-to improve the United States' offerings in those areas. It is my hope that Congress will renew the Production Tax Credits for solar and renewable energy projects before they expire, and substantial revenues are being invested in clean energy in the United States. In Ernst & Young's most recent Country Attractiveness Indices for Renewable Energy, our nation remained atop the "All Renewables Index."

Can you provide additional details as to why you believe the U.S. is falling behind other nations with regard to renewable energy? Could you provide specific examples of advantages available in other nations that are not being offered by the United States, and provide your thoughts on how we can close whatever gaps continue to exist?

Question 10. I was very interested in your comments on the Loan Guarantee Program-in particular, your suggestions for the current allocation of funding among the various low-carbon and carbon-free energy sectors. The structure of this program is the result of two years' worth of bipartisan negotiations with our colleagues in the House of Representatives, and I believe its allocations are both realistic and appropriate. According to my staff, a total of $42.5 billion has been made available for loan guarantees. Approximately $4 billion has been solicited to date, and will be allocated between 13 renewable projects and 3 coal projects. Of the funds that remain, more than 80 percent will be distributed to nuclear and renewable projects-even though those technologies currently account for just 21 percent of our nation's electricity.

Given the need to keep energy affordable, can you explain in greater detail how the theoretical allocations that would be established by S. 3233 are an improvement over our current process?

QUESTIONS FOR JOHN DENNISTON FROM SENATOR MARTINEZ

Question 11a. I would like to get the panelists perspective on a provision included in S.3233 that allows a government created and sponsored clean energy corporation to issue stock to shareholders. In light of the current financial problems facing Fannie Mae and Freddie Mac and their historic governance problems, is it a wise idea to give a federally-backed lending institution two seemingly contradictory roles?

Question 11b. Could the drive to maximize shareholder profit compromise the public mission of a government-backed institution using tax-payer dollars to finance clean energy projects?

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