

**CLEAN ENERGY DEPLOYMENT ADMINISTRATION**

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

TO

RECEIVE TESTIMONY ON THE PROPOSAL FOR A CLEAN ENERGY DE-  
PLOYMENT ADMINISTRATION, AS CONTAINED IN TITLE I, SUBTITLE A  
OF THE AMERICAN CLEAN ENERGY LEADERSHIP ACT OF 2009 (S. 1462  
OF THE 111TH CONGRESS)

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MAY 3, 2011



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## **CLEAN ENERGY DEPLOYMENT ADMINISTRATION**

**TUESDAY, MAY 3, 2011**

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

The committee met, pursuant to notice, at 10:04 a.m. in room SD-366, Dirksen Senate Office Building, Hon. Jeff Bingaman, chairman, presiding.

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

The CHAIRMAN. Why don't we get started. Thank you for coming today to participate in this hearing on the proposal to establish the Clean Energy Deployment Administration. This legislation has been in development for several years now. It's benefited greatly from input from many people in the private sector, including the ones who are here today.

The problems of bringing new energy technologies to the commercial marketplace have been documented for a long time. In many hearings over several years, we've heard about the challenging environment for securing investment in emerging clean energy technologies. The high capital requirements coupled with the unavailability of affordable financing have generally steered investments toward largely proven technologies while the real game-changing technologies have not been able to get the financing they need.

People have become accustomed to Moore's law in the information technology industry, which of course observes the trend that computing power roughly doubles every couple of years. This has resulted in rapid growth in that industry and high expectations for technological achievement and investment performance. But energy technologies have not followed that same path. Although research and development in the United States has been strong, leading to some very promising advances in renewable energy, highly fuel efficient and electric drive vehicles, smart grid technology, and ultra-efficient lighting and appliances, their transition to the commercial marketplace has been frustratingly slow.

The rest of the world is working hard to accelerate this deployment cycle. As we've heard in a hearing in March of this year, our global competitors are committing significant resources to making their countries attractive environments for clean energy technology deployment, including through financing support.

We've discussed the particulars of this bill before in the committee. I'll leave that issue to the witnesses. Mr. Silver has had an impressive set of results in recent months with the loan guarantee program. I'm interested in hearing what have been the lessons that he has brought from that experience that we should be aware of as we consider this legislation.

There are several features to the legislation, such as the emphasis on management of risks across a portfolio of investments and the targeting of a risk profile through a loan loss reserve, that should allow CEDA to function with the speed and flexibility that's needed. I hope we can hear testimony on those issues.

One thing I think has been made clear in the hearings so far on this topic is that we should not wait to make these investments. The budgeting conventions that we use here dictate that the funds set aside for CEDA within the Treasury are considered spent immediately, even though any actual losses may not happen for years and could be offset by fees collected. So we need to find a way to pay the amount that the bill is considered to cost when it comes to the full Senate.

While I'll acknowledge that the current environment makes this difficult, I look forward to working with colleagues to find a suitable offset, and we should not lose sight of the fundamental cost-effectiveness of this type of financing support. CEDA will generate significant private sector spending and will finance projects that have many times the value of the actual risks that will be taken.

So thanks again for your time and being here today, and let me call on Senator Murkowski for any comments she has before we hear from the witnesses.

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

Senator MURKOWSKI. Thank you, Mr. Chairman. I'd like to thank the witnesses here this morning as well.

Discussion about a Clean Energy Deployment Administration I think is certainly an important one, certainly timely. We had an opportunity to bring this up and move this out of this committee on a broad bipartisan basis last Congress. When you look to the purpose of CEDA, to address the persistent inability of clean energy projects to obtain financing, I think you will have folks say, well, why haven't we figured this one out earlier?

Back in 2005 with passage of the Energy Policy Act, we took a major step toward addressing the problem by creating the loan guarantee program there at DOE. But I think we would all agree that it has been less than perfect in terms of its implementation. We heard some continued frustration from clean tech developers who can secure support from the Federal Government for financing projects overseas, but not here in the United States.

So we set out to address this in a more robust way by the development of CEDA. Now, I want my colleagues to understand that great care was taken to balance the deployment of clean energy technologies with the requirement that CEDA be responsible and transparent in its operations.

I want to be equally clear that this proposal will require mandatory spending in the form of startup capital that was not offset in

the bill that we reported last Congress. CBO has assigned a \$9.6 billion score to CEDA. It's my view that we must find an acceptable offset for this entire amount and I'm prepared to work with every member of the Senate who's interested in doing so. An offset will not only help CEDA become a reality. It will also help us hold the line on new spending and assure that we do not make our deficit any worse.

But despite the high initial cost, I agree with you, Mr. Chairman; I believe that CEDA is a smarter way for the Federal Government to promote clean energy technologies. Perhaps to provide a little bit of context here, I would remind my colleagues that CEDA would be able to re-use its funding over time to back private lending for clean energy projects, and that's a more efficient way—or a more efficient use of taxpayer money than these one-time payments in form of grants or tax credits.

So when you look at how CEDA would operate, I believe that it would ensure that we get more bang for our buck than the more conventional forms of government support.

Finally, I think it's important to recognize that there's a legitimate role for the Federal Government to play in this area, even in difficult fiscal environments such as we're facing. As a matter of public policy, the United States is not going to stop supporting clean energy technologies altogether. So if you accept that premise, this debate can and should be about how we make better use of all of our resources, including the revenues that result from energy production.

It's my hope this morning that this hearing will serve as the beginning of a constructive conversation about these challenges, a conversation that accepts our limitations and focuses on the most efficient possible use of our resources so that we can support greater deployment of clean energy technologies made here in the United States.

Mr. Chairman, I look forward to the testimony this morning and again thank the witnesses.

The CHAIRMAN. Thank you very much.

Let me just introduce our panel of witnesses. First is Mr. Jonathan Silver, the Executive Director of the Loan Guarantee Program at the Department of Energy here in Washington. Next is Mr. Dan Reicher, who is a frequent witness before our committee and Executive Director of the Steyer-Taylor Center for Energy Policy and Finance at Stanford at this time; Ms. Kassia Yanosek, who is the Founding Principal of Tana Energy Capital LLC in New York; and Mr. Christopher Guith, who is the Vice President for Policy with the Institute for 21st Century Energy at the U.S. Chamber of Commerce.

So we appreciate all of you being here. Why don't we just have you give your testimony in that order, if you would, and each of you take 5 or 6 minutes to make the main points you think we need to understand and then we'll have some questions.

Mr. Silver, go right ahead.

**STATEMENT OF JONATHAN SILVER, EXECUTIVE DIRECTOR,  
LOAN PROGRAMS OFFICE, DEPARTMENT OF ENERGY**

Mr. SILVER. Thank you, Mr. Chairman, and good morning. Chairman Bingaman, Ranking Member Murkowski, and members of the committee: Thank you for the opportunity to testify today. My name is Jonathan Silver and I'm the Executive Director of the Loans Programs Office at the Department of Energy and by background a venture capital investor, hedge fund manager, and business executive involved in building high-growth companies.

I believe the loan programs provide critical support for the Nation's commercial deployment of clean energy and the jobs that go with it. I welcome the opportunity to discuss the programs with you and to highlight the significant impact the program has had to date.

The discussion about the right approach to energy finance is in some ways a discussion about our national commitment to global competitiveness in the 21st century. Clean energy will play an important role in our future and the extent and speed with which we successfully deploy new energy technologies will have enormous implications for our economic vitality.

So far, our track record is mixed. Although we have the highest GDP in the world, we rank ninth in clean energy investment as a percent of GDP and we have fallen to third and absolute dollars invested. A number of other countries have proportionally larger and more significant ongoing Federal-level programs to finance clean energy deployment.

Global competitiveness is not, of course, the only challenge. Our reliance on foreign oil is a constant threat to our national interests. Investment in domestic clean energy can help us regain control of our energy future and eventually achieve energy independence.

While investing in clean energy has long-term strategic benefits, it also plays a more immediate role in our economic recovery. Investments in power generation, manufacturing, and energy efficiency create new and good jobs and they create them today.

There are many ways for the Federal Government to support investment in clean energy. Tax incentives and manufacturing credits are effective, but must be put and left in place for an extended period. Uncertainty makes business planning challenging. Further, these credits do not finance construction and are only applicable after a project is built.

The loan guarantee programs have been among our most effective support mechanisms. Since March 2009 we've issued conditional commitments or closed on 27 projects, with more to follow. These investments are in a wide array of clean energy and auto technologies, including wind, solar, nuclear, advanced biofuels, geothermal, transmission, battery storage, and more. I'm pleased to report that we issued our first term sheet for an advanced fossil project just last week. The loan programs effectively support an "all of the above" energy strategy.

So far the loan programs have offered nearly \$30 billion in financing for these projects. With total projects costs of nearly \$47 billion, that's about \$17 billion of equity invested in these projects.

Project sponsors estimate that these projects will create or save more than 61,000 direct jobs. Cumulatively, they will generate

nearly 29 million megawatts of clean energy each year, enough to power over 2 million households, about the number of households in Kentucky and Wyoming combined. They will avoid over 60 million tons of CO<sub>2</sub> annually, more than the emissions produced by the 3 million vehicles registered in Alaska and Utah combined.

Loans have been made in 21 States representing almost every region of the country. Apparently, the wind blows and the sun shines in red and blue States.

The loan programs are necessary to overcome both cyclical and structural impediments to the rapid deployment of commercial energy technologies. First, the recent economic crisis reduced investment in clean energy. The tax equity market, one of the principal sources of equity for renewables projects, shrank dramatically.

Second, traditional lenders, never eager to invest in innovation, pared back further. There is a systemic shortage of traditional debt financing for clean energy, stemming basically from the relatively high completion risks associated with such projects. It's the old adage: Every bank wants to be the first bank to lend to your second project.

Third, many private sector lenders are unwilling to underwrite commercial-scale clean energy projects because they often require loans with unusually long tenors. The irony is that this valley of death between pilot and commercial deployment, where companies find it most difficult to source capital, is exactly the moment they begin to have a meaningful impact on jobs.

As you consider how the Federal Government can most successfully support clean energy deployment, it might be helpful to identify a few of the lessons learned from the loan programs. First, time-limited funds are not ideal in selecting highly innovative projects. Those projects need time to mature and deadlines require projects that can get done quickly.

Second, project finance is an excellent financing instrument for some, but not all, projects. At its most basic, project finance matches cash-flows to repayment schedules. A project without identifiable cash-flows for the duration of the loan is at a disadvantage. The private sector makes use of a wide range of financing tools, including venture, venture debt, mezzanine debt, letters of credit, insurance instruments, hedges, and more, to provide solutions tailored to project needs.

Finally, small companies have different financial needs and repayment capabilities than large companies do. Approaches which recognize this difference will make it easier to support important new technologies.

The loan programs have made an enormous contribution to the Nation's ability to compete in the energy sector already. That said, they represent only one of a variety of potential approaches. They were not designed to be a comprehensive Federal financing program and they do not operate that way. The CEDA legislation adopted by this committee would pursue a mission similar to the loan programs, but with additional flexibilities and financial tools.

Again, thank you for inviting me here today. I look forward to responding to your questions.

[The prepared statement of Mr. Silver follows:]

PREPARED STATEMENT OF JONATHAN SILVER, EXECUTIVE DIRECTOR, LOAN PROGRAMS  
OFFICE, DEPARTMENT OF ENERGY

INTRODUCTION

Chairman Bingaman, Ranking Member Murkowski, and members of the Committee, thank you for the opportunity to testify today. My name is Jonathan Silver, and I am the Executive Director of the Department of Energy's (DOE) Loan Programs Office (LPO). DOE's loan programs provide critical support for the nation's commercial deployment of clean energy, and the jobs and economic growth that come with it. I welcome the opportunity to discuss the programs with you and to highlight the significant accomplishments we have made to date.

GLOBAL AND DOMESTIC CONTEXT IN WHICH THE LOAN PROGRAMS OPERATE

*Clean Energy Opportunities*

Clean energy has an important role to play in America's future. The extent to which we can successfully deploy new, innovative clean energy technologies will have enormous implications for our future global competitiveness, energy security, economic recovery, and environment.

America's future prosperity may well depend on our ability to play a leading role in the global transition to a clean energy future. Yet, to date, the United States has not demonstrated the sustained commitment to clean energy investment that is needed to remain competitive.

Global competitiveness is not the only issue we face. The U.S. imports a significant portion of the petroleum it consumes from foreign sources, and this dependence on oil threatens our national security. Investments in domestic clean energy sources can help us regain control of our energy future and reduce oil consumption.

Clean energy not only has long-term, strategic benefits, it is also an important part of our ongoing national economic recovery. Investments in clean energy projects, including power generating plants, manufacturing facilities, and energy efficiency activities, create new and good jobs—and they create them now.

*Deployment: Importance, Obstacles, and Role for Government*

Much of the public discussion around clean energy focuses on research and development, which is crucial to reaching our long-term national energy goals. But near-term deployment of innovative, commercially-ready technologies is critical as well. Deploying energy technologies at scale immediately creates jobs, drives down unit costs, creates new supply chains, and incentivizes future research and development efforts. Innovation drives commercialization. But commercialization also drives innovation; it is a virtuous circle.

Unfortunately, there are both cyclical and structural impediments to the rapid deployment of innovative technologies in the United States. The recent economic crisis slowed the pace of investment in clean energy projects. Traditional lenders pared back their appetite for risk, resulting in reduced liquidity in the market. The market for equity investments in renewable energy projects based on tax credit incentives—one of the principal sources of equity for renewables projects—shrank, as well.

There also is an ongoing, systemic shortage of debt financing for certain types of innovative clean energy projects, stemming from the relatively high completion risks associated with such projects—principally technology risk and execution risk. Private sector lenders have limited capacity or appetite to underwrite such risks on their own, particularly because commercial-scale clean energy projects are capital-intensive and often require loans with unusually long tenors. Thus, there is a “valley-of-death” in the clean energy technology development cycle, between the pilot-facility stage and commercial maturity, where companies find it difficult to obtain the financing needed to deploy their technologies at commercial scale—the very point at which they begin to have a meaningful impact on job-creation and the environment.

The Department of Energy's loan programs were designed to address these impediments and fill this financing gap. Loan guarantees lower the cost of capital for projects utilizing innovative technologies, making them more competitive with conventional technologies, and thus more attractive to lenders and equity investors. Moreover, the programs leverage the Department's expertise in technical due diligence, which private sector lenders are often unwilling or unable to conduct themselves.

Achieving our nation's clean energy goals—including global competitiveness and domestic energy security—will require the deployment of innovative technologies at

a massive scale, and the DOE loan programs are an important element of federal policy to facilitate that deployment.

#### BACKGROUND ON THE LOAN PROGRAMS

As you know, the Loan Programs Office actually administers three separate programs: the Title XVII Section 1703 and Section 1705 loan guarantee programs, and the Advanced Technology Vehicles Manufacturing (ATVM) loan program.

The 1703 program, created as part of the Energy Policy Act of 2005, supports the deployment of innovative technologies that avoid, reduce, or sequester greenhouse gas emissions. As a result of the recently-passed 2011 Continuing Resolution (FY11 CR), the program currently has \$18.5 billion in loan guarantee authority for nuclear power projects, \$1.5 billion in authority for energy efficiency and renewable energy projects, \$8 billion for advanced fossil projects, \$4 billion for front-end nuclear projects, and \$2 billion in mixed authority. In addition, and for the first time, the 1703 program, historically a “self pay” credit subsidy program, now has \$170 million in appropriated credit subsidy, which will support a small number of loan guarantees for energy efficiency and renewable energy projects.

The Section 1705 program was created as part of the American Recovery and Reinvestment Act of 2009 (Recovery Act), to jump-start the country’s clean energy sector by supporting projects that had difficulty securing financing in a tight credit market. The 1705 program has different objectives than 1703 and somewhat different programmatic features. Most notably, under 1705, the credit subsidy costs associated with the loan guarantees are paid through funds appropriated by Congress (though applicants still must pay application and other administrative fees). Additionally, to qualify for 1705 funding, projects must begin construction no later than September 30, 2011. DOE’s authority to enter into loan guarantee agreements under 1705 expires on that date as well.

The ATVM program issues loans in support of the development of advanced vehicle technologies to help achieve higher fuel efficiency standards and reduce the nation’s dependence on oil. Congress funded this program with \$7.5 billion in credit subsidy appropriations to support a maximum of \$25 billion in loans.

#### SUCCESS OF THE LOAN PROGRAMS

The Loan Programs Office has made great strides since this Administration took office two years ago. Between 2005, when the program began, and 2009, DOE did not issue a single loan or loan guarantee. Since March 2009, the Department has issued conditional commitments for loans or loan guarantees to 27 projects, 16 of which have reached financial close—with more to follow soon.

DOE has provided (or conditionally committed to provide) nearly \$30 billion in financing to these 27 projects, which have total project costs of nearly \$47 billion. The projects are spread across the country, and reflect an array of clean energy and automotive technologies, such as wind, solar, advanced biofuels, geothermal, transmission, battery storage, and nuclear. These projects include the world’s largest wind-farm; two of the world’s largest concentrated solar power facilities; the first nuclear power plant to begin construction in the United States in the last three decades; the world’s first flywheel energy storage plant; and a biodiesel refinery that will triple the amount of biodiesel produced in the United States.

Project sponsors estimate these 27 projects will create or save over 61,000 jobs, including construction and operating jobs.<sup>1</sup> Cumulatively, they will generate nearly 29 million MWh of clean energy each year—enough to power over two million households, or approximately the same number of households in the states of Kentucky and Wyoming combined.<sup>2</sup> And they will avoid over 16 million tons of CO<sub>2</sub> annually—more than is produced by all of the approximately three million registered vehicles in Alaska and Utah.<sup>3</sup>

Under the Section 1703 program, DOE has offered conditional commitments for four projects so far, including one nuclear power, one front end nuclear, and two energy efficiency projects, which amount to just over \$10.6 billion in total government supported financing, including capitalized interest. Under 1705, DOE has issued conditional commitments to 18 projects representing approximately \$10.8 billion in

<sup>1</sup> Breakdown by program is as follows (based on Sponsor estimates): 1703: 5,210 construction, 1,340 permanent; 1705: 12,900 construction, 3,470 permanent; ATVM: 5,700 created, 33,000 saved.

<sup>2</sup> Sources: EIA 2005 Residential Energy Consumption Survey, Table US8; U.S. Census Bureau, American FactFinder, 2010.

<sup>3</sup> Sources: U.S. Environmental Protection Agency, Emission Facts: Greenhouse Gas Emissions from a Typical Passenger Vehicle; U.S. Department of Transportation, Federal Highway Administration, Highway Statistics 2008, Table MV-1 (December 2009).

financing, including capitalized interest. In addition, a significant number of projects are sufficiently far along in the due diligence process that we have issued a working draft term sheet and are in active negotiations with the applicants. LPO estimates that these projects, if they ultimately reach financial close, will utilize all of our remaining credit subsidy appropriations.

While there has been significant interest in the 1705 program, there has been little demand for renewables loan guarantees under the 1703 program. This may, in part, reflect the ability of certain renewable projects to qualify under both programs. But it may also reflect the fact that innovative clean energy companies—which tend to be smaller and have less capital—consider the 1703 program’s self-pay credit subsidy cost requirement to be prohibitive. The new credit subsidy provided by the 2011 CR will allow the 1703 program to invest in a limited number of projects that may not have had the means to pay a fee to cover the subsidy cost up front.

To date, DOE has committed and closed five ATVM loans, totaling over \$8.3 billion, which will support advanced vehicle projects in eight states. We anticipate making a number of significant additional ATVM loan commitments in the coming months.

#### VALUE OF DOE LOAN PROGRAMS

It is important to remember that the loan programs are not grant programs; LPO expects that the loans it provides or guarantees will be repaid. We review projects on a competitive basis, and we do not fund every eligible project. We ensure that the loans we support meet our statutory requirement of having a “reasonable prospect of repayment.” Every project that receives financing first goes through a rigorous financial, legal and technical review process—similar to, and in some ways more comprehensive than, what a private sector lender would conduct—before a single dollar of taxpayer money is put to work.

Not surprisingly, this type of sophisticated review requires thousands of man-hours, which is costly. However, administrative costs associated with the Title XII programs, including personnel expenses, are required by Title XVII to be covered by fees paid by applicants.

Moreover, the programs can efficiently and effectively leverage government resources to spur private-sector investment. A relatively small amount of appropriated credit subsidy can support a large amount of new private sector investment. Moreover, when a loan is fully repaid, the nation will have benefited from the incentivized private sector investment at relatively little cost to taxpayers.

The potential benefits are great. The projects supported by the loan programs promote economic growth and job creation. Clean energy and automotive technology projects can create construction and permanent operating jobs. In addition, these projects help lower the delivered cost of renewable energy and contribute to the build-out of the domestic supply chain and manufacturing base that we will need to “win” the clean energy future.

#### CONCLUSION

In just two years, the Department’s loan programs have begun to meet the expectations Congress had in creating and funding them. We are making a meaningful contribution to our national clean energy goals, and we look forward to continuing our progress.

That said, it is important to recognize that programs such as ours represent only one of a variety of potential approaches to providing federal support for clean energy. While useful for certain types of projects, loan and loan guarantees are not appropriate for all types of clean energy projects.

Moving forward, we must think about clean energy investment in a comprehensive manner, ensuring that limited resources are deployed in the most effective and efficient manner possible. Only then will we be able to create an environment where the private sector will invest in clean energy technologies at the scale needed to remain globally competitive, help secure our energy independence, and protect our environment.

Thank you again for inviting me here today. I look forward to responding to your questions.

The CHAIRMAN. Thank you very much.  
Mr. Reicher, please go ahead.

**STATEMENT OF DAN W. REICHER, EXECUTIVE DIRECTOR,  
STEYER-TAYLOR CENTER FOR ENERGY POLICY AND FI-  
NANCE, STANFORD UNIVERSITY, PALO ALTO, CA**

Mr. REICHER. Mr. Chairman, Ranking Member Murkowski, and members of the committee: Thank you for the opportunity to testify. My name is Dan Reicher. I recently became Director of Stanford University's Steyer-Taylor Center for Energy Policy and Finance and a faculty member of the Stanford Law School and the Graduate School of Business. Prior to my role at Stanford, I was Director of Climate Change and Energy Initiatives at Google, held senior executive posts with a venture-backed renewable energy company and a private equity firm, and served as Assistant Secretary of Energy for Efficiency and Renewables in the Clinton Administration.

The legislation you are advancing today would, in simple terms, create a financing entity with the resources, tools, and independence to help American clean energy technologies cross the colorfully but accurately named valley of death that sits between the early stages in the development of an energy technology and its full commercial deployment. By helping to reduce the risks in crossing the valley of death, the Clean Energy Deployment Administration would substantially increase private sector investment in energy technology development and deployment and create a more successful and competitive U.S. clean energy industry.

Let me personalize the CEDA story a bit. For about 2 decades I have walked the ups and downs of the energy research, development, demonstration, and deployment pathway. I started my journey at DOE, where we spent billions on R and D to advance the full range of energy technologies from fossil to renewables and efficiency to nuclear power. R and D was and is a high-risk enterprise, where the only certainty is that it almost always takes longer and costs more to get a technology to a point where the private sector will take a serious look at commercialization.

After 8 years, I left DOE and joined a venture capital-backed renewable energy company. Our mandate was to take high-risk venture capital and use it to turn energy R and D into products that had enough of a shot at commercialization that we could sell our firm or take it public. It was tough sledding at this company, in part because the route to successful commercialization of energy technologies is so very challenging.

Proceeding down the energy technology pathway, I helped form and lead a private equity firm to invest in clean energy projects. We worked with banks, engineers, and construction firms to get real energy projects built and financed. It was at this firm that I reached the scariest point along the energy pathway. Day after day, we received investment proposals for energy project with profiles that simply exceeded the risk threshold of our capital. Had the underlying technologies been prone in the lab? Generally, yes. Had they operated in a pilot plant? Sometimes. Had they operated at commercial scale? Rarely. There were relatively few proposals that fit our investment profile. In the end, the biggest chunk of our capital was used to finance corn ethanol plants, a technology well proven at large commercial scale for decades.

It was at this firm that I peered into the valley of death, seeing there the remains of hundreds of abandoned energy projects, projects based on exciting technologies supported by DOE or venture capital firms, that worked well in pilot plants, but died trying to get to commercial scale, from wind, solar, biomass, and geothermal to advanced coal and natural gas, transmission and distribution, nuclear power, and beyond.

We and most other private equity firms simply could not shoulder the risk in the commercial scale-up of an energy technology, where a single project, a single project, can cost hundreds of millions or billions of dollars.

It was interesting landing next at Google, where engineers spend months writing computer code for a new product, test it, and then 1 day, in my simple terms, push a button and it's deployed. There are certainly tough engineering challenges and software products that fail. It's just that with software products generally succeed and fail faster and more cheaply than in the energy world.

In the energy technology world, months turn into years and years into decades and billions can be spent on a single technology before even one commercial plant or factory is operating.

The Department of Energy loan guarantee program, to its credit, has been working hard to address the investment challenges of the valley of death, backing loans for innovative projects as well as providing financial help to conventional projects. Those of us watching from the outside have been impressed with recent progress and professional skills of the DOE team, but continue to be concerned about the multi-agency review process and the uncertainty of the yearly budgeting cycle.

I and many others across the energy technology spectrum, from fossil to renewables to nuclear power, believe that as long as the loan guarantee program remains as currently structured inside DOE, it will continue to be subject to these challenges. I and many other observers of the global clean energy race believe that our country would be better served by taking a new approach to the critically important task of energy technology commercialization.

We support significant fiscal year 2012 funding for the DOE loan guarantee program led by Mr. Silver to continue its important work in the near term. However, over the longer term supporting the financing of capital-intensive energy projects with serious scale-up risks in close collaboration with the private sector is not a good match for the current structure, oversight, risk tolerance, and financial tools of the Department of Energy.

Commercializing energy technology requires a new, more effective approach, and that approach is CEDA. Mr. Chairman and Ranking Member Murkowski, we have a limited window of opportunity to develop and execute a clear U.S. strategy for global leadership in the clean energy sector. We unfortunately find ourselves caught flatfooted in the energy technology race while clean energy investment in Europe and Asia charges on.

We need look no further than China to see the clean energy technology industry, largely invented and once dominated by the U.S., slipping away reactor by reactor, turbine by turbine, panel by panel. As we have dithered in our country in setting national energy and climate policy and addressing financing needs, China has

been working aggressively to become the world's clean energy powerhouse, surpassing the U.S. on a number of clean energy commercialization fronts, for example recently becoming the world's largest producer of wind turbines and solar panels.

In 2010, China attracted \$54 billion of new clean energy private capital, with Germany attracting \$41 billion and the U.S. \$34 billion. These numbers do not reflect the major additional investment made by the Chinese government or the China Development Bank.

CEDA, in strong partnership with the private sector, could more effectively support the scale-up of clean energy technologies and U.S. clean energy competitiveness than the current approach. CEDA would have an array of tools, such as loan guarantees, insurance products and bonds, to accelerate private sector investment. Initially funded with an appropriation of \$10 billion, CEDA would become a self-sustaining entity, that is no additional appropriations, based on mechanisms in the bill that would allow it to take a financial stake in projects.

Also, while CEDA would be established as an agency within DOE, it would have an administrator and board of directors and enjoy an important degree of independence, like the Federal Energy Regulatory Commission, an independent arm of the DOE.

Finally, CEDA would be a highly complementary mechanism to a national clean energy standard that this committee is currently considering and the Obama Administration supports.

Mr. Chairman and Senator Murkowski, Congress needs to enact CEDA this year. Prioritizing the scale-up of innovative technologies will help us reduce the cost of energy for all Americans, enhance our national security, and combat climate change. It will also position to U.S. to capture a massive global market that is growing by the day and create large numbers of good-paying jobs in the process.

Thank you for the opportunity to testify.

[The prepared statement of Mr. Reicher follows:]

PREPARED STATEMENT OF DAN W. REICHER, EXECUTIVE DIRECTOR STEYER-TAYLOR CENTER FOR ENERGY POLICY AND FINANCE, STANFORD UNIVERSITY, PALO ALTO, CA

Mr. Chairman, Ranking Member Murkowski, and members of the committee, my name is Dan Reicher and I am pleased to share my perspective on the proposal for a Clean Energy Deployment Administration contained in Title I, Subtitle A of the American Clean Energy Leadership Act of 2009. I am Director of Stanford University's Steyer-Taylor Center for Energy Policy and Finance and a faculty member of the Stanford Law School and the Graduate School of Business. I also chair the board of directors of the American Council on Renewable Energy and serve on the Board on Energy and Environmental Systems of the National Academy of Sciences and the board of directors of the American Council for an Energy Efficient Economy.

Prior to my role at Stanford, I was Director of Climate Change and Energy Initiatives at Google. I also served on President Obama's transition team where I helped develop the stimulus package for clean energy. 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 this position, I was Executive Vice President of Northern Power Systems, a venture capital-backed renewable energy company.

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.

## OVERVIEW

Mr. Chairman and Ranking Member Murkowski, the legislation you are advancing would, in simple terms, create a financing entity with the resources, tools and independence to help American clean energy technologies—from energy efficiency and renewable energy to fossil energy to nuclear power—cross the colorfully but accurately named “Valley of Death” that sits between the invention of an energy technology and its full commercial deployment. By helping to reduce the risk in crossing the Valley of Death, CEDA would substantially increase private sector investment in energy technology development and deployment and create a more successful and competitive U.S. clean energy industry, with all the attendant economic, environmental and security benefits.

If you’ll indulge me for a moment, let me personalize the CEDA story a bit. For about two decades I have walked the ups and downs of the energy research, development, demonstration and deployment (RDD&D) pathway. I started my journey at DOE under President Clinton where we spent billions on research and development to advance the full range of energy technologies. R&D was—and is—a high-risk enterprise where the only certainty is that it almost always takes longer and costs more to get a technology to a point where the private sector will take a serious look at commercialization.

I left DOE and joined a renewable energy company that had recently received significant venture capital investment. Our mandate was to take this high-risk capital and use it to turn energy R&D into products that had enough of a shot at commercialization that a bigger company would want to buy our firm or we could take it public. It was tough sledding at this company for several reasons, but in part because the route to successful commercialization of energy technologies is so challenging.

Proceeding down the RDD&D pathway, I helped form a private equity firm, with capital from a large public pension fund and a venture capital firm to invest in clean energy projects. We were the equity in these projects and we worked with banks and other debt providers—as well as engineering and construction firms—to get real energy projects built and operating. It was in this firm that I reached the scariest point along the energy RDD&D pathway.

Day after day our firm received investment proposals for energy projects based on technologies with profiles that simply exceeded the risk threshold of our capital. Had the underlying technologies been proven in a lab? Generally yes. Had they operated in a pilot plant? Sometimes. Had they operated at commercial scale for a decent period of time? Rarely. We received so many project proposals but there were so few where we could actually make an investment. So what were we left with? Well, the not so little secret is that the biggest chunk of our capital was used to finance corn ethanol plants—a technology well proven at large commercial scale, for decades.

It was in my role at this firm—traveling down the RDD&D pathway—that I first peered into the Valley of Death. Littering the valley floor are the remains of hundreds—perhaps thousands—of abandoned energy projects. Projects based on exciting technologies backed by DOE or venture capital firms. Technologies that worked well in pilot or demonstration plants but died trying to get to commercial scale. And we saw advanced technologies of all sorts, from wind, solar, biomass and geothermal, to breakthrough coal and natural gas, to nuclear power and beyond. We and most other private equity firms simply couldn’t shoulder the risk inherent in the initial commercial scale-up of an energy technology, where a project—a single project—can cost hundreds of millions or even billions of dollars.

It was interesting landing next at Google, primarily a software company where engineers spend months writing computer code for a new software product, test it internally, and then one day determine it’s ready for initial commercial testing and deployment. In my simple terms, they push a button and it’s deployed. If the product needs improvements then Google engineers make them and a new version is launched. There are certainly very tough engineering challenges and products that fail. It’s just that with software my perception is that a product generally succeeds—and fails—faster and more cheaply than in the energy technology world.

In the energy technology world, months turn into years, and years into decades, and billions can be spent on a single technology before even one commercial scale plant is operating. And this of course is where CEDA comes in. The book might be titled: “CEDA: A Bridge over the Valley of Death.”

The Department of Energy, to its credit, has been working hard to address the investment challenges of the Valley of Death. The DOE Loan Guarantee Program has been backing loans for innovative projects across a broad spectrum of energy technologies under authority it gained in the 2005 Energy Policy Act. And additional

funding, resulting from the American Recovery and Reinvestment Act, has given DOE the means to provide loan guarantees for renewable energy, biofuels and transmission projects that commence construction before September 30, 2011. DOE has improved its performance in guaranteeing loans for large-scale projects across a range of technologies under both of these programs. Those of us watching the program from the outside have been impressed with the recent progress and the professional skills of the DOE team, but continue to be concerned about the multi-agency review process and the uncertainty of the yearly budgeting cycle. As long as the loan guarantee program remains as currently structured inside DOE, it will continue to be subject to these challenges. We and many other observers of the global clean energy race believe that the country would be better served by taking a new approach to the critically important task of energy technology commercialization.

We support significant FY 2012 funding for the DOE Loan Guarantee Program to continue its important work in the near term. However, over the longer term, supporting the financing of capital-intensive energy projects with serious scale-up risks—with leadership from and in close collaboration with the private sector—is not a good match for the current structure, oversight, risk tolerance, and financial tools of the Department of Energy. If the U.S. is to regain its competitiveness in the global clean energy technology race, commercializing energy technology innovations requires a new more effective approach—and that approach is CEDA. I would also note that political support for—and the ultimate success of—a national Clean Energy Standard, that this committee is currently considering and the Obama Administration supports, will be greatly enhanced if a complementary and comprehensive financing mechanism, like CEDA, is also adopted.

We have a window of opportunity to develop and execute a clear U.S. strategy for global leadership in the clean energy sector, but that window won't be open indefinitely. In this nascent yet global market, we unfortunately find ourselves caught flat-footed in the energy technology race, hamstrung by a lack of focused policies, while clean energy investment in Europe and Asia charges on. As I detail below, China in particular has surpassed the U.S. in the last few years on a number of energy commercialization fronts, for example recently becoming the world's largest producer of wind turbines and solar panels and also quickly accelerating public and private energy R&D. In 2010 China attracted \$54B of new clean energy private capital, with Germany attracting \$41B and the U.S. \$34B. These numbers do not reflect the major additional investment made by the Chinese government or the significant additional support provided by the China Development Bank to enter key markets such as Brazil and India.

CEDA—with some independence from DOE and in strong partnership with the private sector—would more nimbly and efficiently support the scale-up of clean energy technologies, and U.S. clean energy competitiveness, than the current approach. As developed in the American Clean Energy Leadership Act, CEDA would administer various types of credit instruments, such as loan guarantees, insurance products, and clean energy backed-bonds to accelerate private sector investment in the commercial deployment of new energy technologies. Initially funded with an appropriation of \$10 billion, CEDA could become a self-sustaining entity based on “profit participation” mechanisms that would allow it take a financial stake in the projects it backs. Also, while CEDA would be established as an agency within DOE it would be under the direction of an administrator, a board of directors, and technical advisory council and would enjoy an important degree of independence including, for example, from line reporting and the Secretary's reorganization authority. The best analogy is the Federal Energy Regulatory Commission (FERC), an independent arm of the DOE.

Congress needs to enact CEDA this year. Prioritizing the scale-up of innovative technologies will help reduce the cost of energy for all Americans, enhance our national security, and address climate change. It will also position the U.S. to capture a massive global export market that is growing by the day—and create large numbers of good paying jobs in the process.

#### THE CASE FOR CEDA

As I have testified before in this committee, there is an established pathway for investment in clean energy:

- It 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.

CEDA is focused 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, energy security, economic competitiveness, and job creation. However, CEDA, as developed in the American Clean Energy Leadership Act has an even more particular and critical focus: the point at which an energy technology is ready for scale-up from a pilot project to a full-scale plant. This problematic moment is often when many promising energy technologies falter and a significant number die. In the clean energy technology industry it is known as the “Valley of Death”.

The Valley of Death looms large. Addressing it will be a particular challenge for scale-up of promising technologies including, for example, Carbon Capture and Storage (CCS), Enhanced Geothermal Systems (EGS), advanced nuclear reactors, various on-shore and off-shore wind technologies, Concentrating Solar Power (CSP), advanced batteries, biomass power and fuels, and an array of efficiency devices. Failing to bridge the Valley of Death has already cost us serious progress on many clean energy technologies from renewables, nuclear and energy efficiency to coal, natural gas and oil—technologies that have been developed with U.S. government and private sector investment and that could address our many energy-related challenges. In an increasing number of cases investors from other countries have stepped into the breach and the technology has advanced but we have lost the employment and tax benefits of a company based in the U.S.

We need look no further than China to see the clean energy technology industry—largely invented and once dominated by the U.S.—slipping away: reactor by reactor, turbine by turbine, panel by panel. As we have dithered in our country in recent years in setting national energy and climate policy, China has been working aggressively to become the world’s clean energy powerhouse. The Chinese have:

- Set standards for power companies to produce more clean electricity;
- Shut down more than 50,000 megawatts of old coal-fired power plants and a substantial amount of outdated heavy manufacturing capacity;
- Established a program to improve the efficiency of its top 1,000 most energy-consuming enterprises;
- Invested heavily in R&D;
- Provided incentives for homeowners to install solar panels and water heaters;
- Made major investments in the electricity grid;
- Set a target to reduce carbon intensity 40-45% below 2005 levels by 2020;
- And most relevant to this hearing, provided low cost financing for clean energy generating and manufacturing projects.

With this attention to innovation, policy and investment the Chinese are quickly becoming the dominant world player in clean energy technology. Consider:

- The Chinese are now the world’s largest manufacturer of wind turbines, having vaulted past several EU nations and the US in this fast-growing clean energy technology business;
- The Chinese also recently leapfrogged the West as the world’s largest manufacturer of solar panels, with six of the top ten global solar photovoltaic manufacturers now in China;
- The Chinese have 13 nuclear power plants operating today and 27 more under construction with the intention to raise the percentage of nuclear-generated electricity from 1% to 6% by 2020, and make dramatic increases beyond that point. Importantly, China is also becoming increasingly self-sufficient in reactor design and construction;
- The Chinese have plans for 140,000 megawatts of new hydropower capacity by 2015;
- China has approved the construction of GreenGen, an integrated gasification combined cycle coal plant capable of capturing and storing carbon dioxide and anticipated to be in operation before the U.S. equivalent, FutureGen.
- Major US companies have set up not only new clean energy technology manufacturing facilities in China, but increasingly are locating significant R&D facilities there. Thus the Applied Materials Corporation, based in Silicon Valley and the world’s largest supplier of equipment for making semiconductors, flat-panel displays, and solar panels recently decided to build its newest and largest research lab in China.
- And overall, while in 2004 the U.S. was the focus of approximately 20% of total global clean energy investment and China accounted for just 3%, in 2010, the U.S. saw 19% of global clean energy investment, while China surged past our nation with 20% of that investment.

Beyond China, other countries including Germany, Japan, South Korea, and Denmark are forging ahead with ambitious clean energy economic strategies and becoming top competitors in the vast emerging global marketplace for clean energy technology. Significantly, all of them are taking aggressive approaches to policy and investment. The work of these countries is critical in mitigating climate change, but their top motivation has often been their own economic self-interest through the creation of vibrant new industries, significant new jobs, and growing international markets in clean energy technologies and projects. In contrast, the U.S. has largely stayed on the sidelines, endlessly debating the need for and approach to a successful clean energy economic strategy.

That's the bad news from a US competitiveness, security, and environmental perspective. But the good news is that we can regain our leadership in clean energy. As the President said in his 2010 State of the Union address, we should "not accept a future where the jobs and industries of tomorrow take root beyond our borders..." Aggressive federal policy can drive private sector investment—measured literally in the trillions of dollars—that will be required to move the nation toward a more sustainable energy future. Among the solutions:

- Adopt a national clean energy standard, following the lead of many states that have set renewable energy and energy efficiency standards. Political support for—and the ultimate success of—a national Clean Energy Standard, being considered by this Committee and supported by the Obama Administration, will be greatly enhanced if a complementary and comprehensive financing mechanism, like CEDA, is also adopted.
- Increase our investment in energy R&D significantly. The President's proposed 2012 budget is a good start with a one-third increase in overall investment in clean energy technologies compared to 2010;
- Extend federal tax credits that have been so vital in encouraging private sector financing of clean energy projects;
- Improve energy project permitting and siting processes;
- Reject the proposal to withdraw EPA authority to regulate carbon emissions under the Clean Air Act. The Supreme Court upheld this authority in 2007 and there is a significant and increasing portion of the business community that seeks greater certainty and reliability regarding carbon controls, and supports a well-designed regulatory approach;
- And most relevant to this hearing, replace the DOE loan guarantee program with CEDA.

CEDA, as established under the American Clean Energy Leadership Act, would increase the capital available for clean energy projects, thereby helping to mature the underlying technologies and move them to scale.

Chairman Bingaman and Ranking Member Murkowski, we welcome your bill and its innovative and attractive approach to improving clean energy finance through the creation of CEDA. Below we describe what we see as CEDA's key elements addressing the Valley of Death and provide a few thoughts about how your bill might be strengthened.

#### CEDA: KEY ELEMENTS ADDRESSING THE VALLEY OF DEATH

There are typically two elements of energy project finance: equity and debt. Federal tax credits have stimulated equity investment in wind, solar, geothermal 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. A common refrain from the bankers goes something like this: "We'd be delighted to finance your third or fourth project. Come see us after you've built the first couple of full-size plants and you've got solid operating data proving that your technology works at scale."

Bank financing plays a critical role because a commercial-scale energy project can often cost hundreds of millions or billions of dollars, generally beyond the capacity of venture capital investors who have often advanced the technology through pilot scale. The projects also generally have rates of returns well below what the venture community expects. There are other sources of private equity beyond venture capital but these players generally require the lower cost debt provided by the banks to be part of the project finance deal in order to meet their return thresholds.

Let me provide a bit of perspective on the scale of energy project transactions and expected rates of return. Between 2005 and 2009 venture capital investment in wind, solar, biofuels, biomass, geothermal, small hydro and marine energy companies was roughly \$12 billion worldwide. In contrast investment in projects deploying

these technologies was more than twenty times this at about \$275 billion. And in very rough terms, venture investors expect average returns on a per transaction basis to be 35-40% in a basket of deals ranging from “home runs” to total losses. In contrast, returns for equity investors on individual energy projects are roughly in the 8-12% range and 6-8% for the banks providing debt, with the expectation that most energy projects will perform as promised—and none will be outright failures.

The key point is that the Valley of Death projects sit precariously between the venture capital and project finance worlds. They are generally too big in terms of required capital and too small in terms of returns for the venture capital community. And they are often too risky for the project finance players, especially for the banks that typically provide the great majority of a project investment. This is where CEDA comes in.

CEDA would have a number of important characteristics that make it particularly attractive to projects confronting the Valley of Death:

- First, it would focus on the central element of the Valley of Death problem, i.e. “breakthrough technology” with significant potential to advance critical national energy goals but that “has generally not been considered a commercially ready technology as a result of high perceived technology risk or other similar factors.” It is this breakthrough technology, with its significant risk profile, that faces difficulties raising capital for the first few commercial-scale plants—both innovative energy generation projects and manufacturing facilities.
- Second, CEDA would provide a broad array of tools to accelerate deployment of clean energy technology including direct loans, loan guarantees, letters of credit, and other credit enhancements. It would also have the authority to issue bonds, notes, debentures or other obligations or securities. These tools go well beyond the current loan guarantee program that DOE is administering.
- Third, upon transfer of current DOE loan guarantee functions to CEDA, the new agency would be capitalized with \$10 billion. \$10B is not a small sum, particularly in these budget-constrained times, but it could leverage private capital many times more and, as I explain next, with this initial appropriation CEDA may well become self-sustaining, i.e. require no further federal appropriations.
- Fourth, CEDA, would have the authority to use “alternative fee arrangements” such as “profit participation” and “contingent fees.” This is important to the success of the program because it allows CEDA to be compensated for risk it takes through a financial stake in successful energy projects and companies. This will help meet the critical goal of making the Clean Energy Investment Fund, which undergirds CEDA, self-sustaining and more able to accommodate truly innovative technologies. Other government entities like the U.S. Overseas Private Investment Corporation (OPIC) currently have such authority to be compensated in providing loans, guarantees, insurance etc to U.S. private companies. In order to allow CEDA to more completely address commercialization challenges at the early stages of the Valley of Death, the Committee may want to consider augmenting this important authority by more explicitly allowing the agency to take equity positions through purchase of warrants in the technology companies underlying its project investments. CEDA would then benefit from the rising value of companies that successfully commercialized their products with CEDA support. CEDA could do this either directly or through a fund in partnership with private investors. This might also take the form of rights to invest in additional future projects on favorable terms.
- Fifth, CEDA would be established as an agency within DOE under the direction of an administrator, a board of directors and technical advisory council. It would, however, enjoy an important degree of independence, including from Departmental line reporting as well as the Secretary’s reorganization authority. The best analogy is the Federal Energy Regulatory Commission (FERC), an arm of the DOE with significant independence.
- Sixth, CEDA would use a portfolio investment approach to mitigate risk and diversify investments across technologies. Its board of directors, as well as the technical advisory council, will have the background and skills to help ensure that the financial and technical risks of the agency’s clean energy project investments are adequately considered. The current DOE loan guarantee program is limited in taking such a portfolio approach, with each deal having to stand on its own. CEDA, in contrast, could balance a lower risk but innovative energy efficiency aggregation investment with an investment in a higher risk first time scale-up of a new manufacturing facility or generating project. The Committee may want to consider an additional way to broaden the portfolio and mitigate risk, that is for CEDA to bring together current clean energy investment programs not only at the Department of Energy but also at other agencies as well,

including a biofuels program at the Department of Agriculture, a major transmission fund at the Western Area Power Administration, and several funds at the Small Business Administration.

- Finally, CEDA would have the authority to set its loan loss reserve, which is the percentage of capital the agency should keep as a buffer against potential losses. This is important authority because the lower the loan loss reserve the more loans CEDA can make for the same amount of appropriation. For example, the current figures of \$10 billion in appropriations with a 10% reserve would provide about \$100 billion in loans. If the reserve percentage was reduced to 5% then about \$200 billion in loans could be provided for the same \$10 billion. The loan loss reserve depends on a number of factors including the quality of the deals selected and the structuring of the transactions. The smarter the approach CEDA takes to these and other tasks, under the direction of its Administrator and with input from its board and advisory council, the easier it will be to set a reasonable loan loss reserve. I would also note that OMB oversight of CEDA investments, under the Senate bill, would be narrowed to a review of the loan loss reserve, compared with OMB's broader current oversight of the DOE Loan Guarantee Program.

These and other core elements of CEDA, as developed in the Senate bill, will create a financing entity with the resources, tools and independence to successfully bridge the Valley of Death for critical clean energy technologies—from efficiency and renewables to fossil energy to nuclear power—with significant resulting economic, security and environmental benefits.

#### CONCLUSION

Mr. Chairman and Senator Murkowski, the legislation you are jointly advancing obviously comes in the midst of significant national economic and federal budget problems. 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 your legislation is so important. This is especially the case for projects involving innovative technologies, from efficiency and renewables to fossil energy to nuclear power, with higher associated risk—the very technologies that may well hold the keys to addressing the climate problem, our oil dependence, a deteriorating electric grid, and also provide a major stimulus to the faltering economy and U.S. competitiveness. And when the economy improves, these Valley of Death projects will continue to need the critical financial support that this bill provides. Finally, I truly believe that the nation that successfully bridges the Valley of Death will lead the energy technology race of the 21st century, with extraordinary resulting benefits.

The CHAIRMAN. Thank you very much.

Ms. Yanosek, go right ahead.

#### **STATEMENT OF KASSIA YANOSEK, FOUNDING PRINCIPAL, TANA ENERGY CAPITAL LLC, NEW YORK, NY**

Ms. YANOSEK. Thank you, Chairman Bingaman, Senator Murkowski, and other members of the committee, for the opportunity to testify today. It is an honor to speak to you on CEDA.

My name is Kassia Yanosek and I am a Founding Principal of Tana Energy Capital, an energy investment and advisory firm. At Tana I evaluate and execute investments in energy companies. Prior to founding Tana, I was a senior investment professional at a private equity firm called Hudson Clean Energy Partners and have worked at Bechtel and BP investing in both traditional and renewable energy.

As an investor, I see firsthand the need for funding clean energy technologies at scale. Significant capital is needed for moving technologies from pilots to deployment, capital that does not fit the risk-return profiles of traditional investors. These technologies are stuck in the commercialization gap. As an investor, I find that term to be slightly more palatable than “the valley of death.”

The bill being discussed today, CEDA, would be an important solution to this funding need. Today I will highlight the following 5 key points:

No. 1, the flow of clean energy investment of recent has weakened toward western markets;

No. 2, transitioning to a cleaner energy economy in a volatile funding environment requires investing today in tomorrow's winners;

No. 3, a key impediment for the private sector is funding across the commercialization gap;

No. 4, CEDA would help bridge the commercialization gap;

No. 5, in a tight budget environment getting taxpayer bang for the buck is critical. CEDA and its one-time capitalization would deliver this.

No. 1, the flow of clean tech investment has weakened toward western markets. Clean energy of recent has seen tremendous growth. However, when you unpack the data a new investment pattern is emerging. Much of the growth has shifted to China. Furthermore, government stimulus, which provided 20 percent of clean energy investment last year, has masked the true flow of capital. As these programs phaseout and budgetary realities sink in, investors are faced with uncertainty and the aftermath of a subsidy-driven cycle which has propped up the industry.

No. 2, transitioning to a cleaner energy economy requires investing today in tomorrow's winners. Only one-eighth of all clean energy investment worldwide has gone to innovation. While we need investment across the entire technology development cycle, we have failed to prioritize funding the commercialization of innovations that have a much better chance of reaching cost parity with conventional energy.

No. 3, a key challenge is funding the commercialization gap. I recently evaluated a first commercial biomass technology in Europe, which will help utilities supplement their coal use. This project and many other first commercial projects I evaluate requires significant dollars to prove out their first facility. In this particular case, \$100 million was already put into this technology, much from a European government. This type of capital just doesn't exist without government support.

Coal-based utilities exposed to upcoming EPA regulations are concerned about future generation mix and how innovations will fit into their investment choices. My experience in working with these utilities is that they too would benefit from policies like CEDA.

No. 4, CEDA will help to bridge the commercialization gap. By lowering financial risk to private investors, CEDA will unlock hundreds of billions of capital off the sidelines. An important aspect of CEDA is its broad array of financial tools. Various debt products and the ability for CEDA to participate as a member of an investor syndicate is important. These tools expand DOE's ability to provide solutions for a range of investments because, believe me, every investment is unique. Structured as a separate administration within the DOE, CEDA's substantial independence will provide a nimbleness which has eluded DOE's loan guarantee programs.

Finally and importantly, CEDA is designed to become self-sustaining. Profit participation is one mechanism which will allow

CEDA to be compensated for risk with up side in successful investments. This and other fee-generating revenues will reduce CEDA's dependence on budgetary outlays so it is only needing a one-time capitalization. This in my view is fiscally responsible and as a taxpayer I like to see this.

In closing with point No. 5, policies which give taxpayer bang for the buck are critical. CEDA will put smarter, more efficient government dollars to work in partnership with the private sector. This evergreen program will provide taxpayers a deal, particularly when compared to other programs which deploy grants with no return. The section 1603 grant program, for example, will approximately cost \$10 billion through the end of 2011, which is about equal to CEDA's one-time capitalization.

CEDA presents an opportunity for Congress to act with fiscal awareness and put the higher priority on innovating today with an eye toward competitiveness, energy security, and less-polluting energy for tomorrow. In this tight budgetary environment, it's an opportunity we shouldn't miss.

Thank you.

[The prepared statement of Ms. Yanosek follows:]

PREPARED STATEMENT OF KASSIA YANOSEK, FOUNDING PRINCIPAL, TANA ENERGY CAPITAL LLC, NEW YORK, NY

#### INTRODUCTION

Thank you Chairman Bingaman, Senator Murkowski, and other members of the Committee for the opportunity to testify today. It is an honor to speak to you on CEDA and the importance of this legislation to the clean energy investment community.

I am Kassia Yanosek, a Founding Principal of Tana Energy Capital, an energy investment and advisory firm. As a principal of Tana, I evaluate and execute investments in energy technologies. Much of my work has been focused on investments in technologies of interest to the electrical utility sector. I work with utilities around the country to understand their perspective on innovative energy technologies and how they expect to diversify their generation portfolios, and improve their transmission systems. Prior to founding Tana Energy Capital, I was a senior investment professional at Hudson Clean Energy Partners, a billion dollar private equity firm focusing on renewable energy. I have also worked at Bechtel and at BP, making investments in both renewable and traditional energy.

#### THE NEED FOR PROGRAMS LIKE CEDA TO ADVANCE U.S. CLEAN ENERGY INNOVATION LEADERSHIP

As an investor and advisor to companies seeking capital for deployments of clean energy technologies, I see firsthand the critical need for funding to deploy clean energy technologies at scale. Significant capital is often needed to move technologies from pilot testing to deployment—capital that does not fit the risk/return profiles of venture, private equity, or debt financing. As such, these technologies and projects are stuck in the "Commercialization Gap". The bill being discussed today—the Clean Energy Deployment Administration (CEDA)—would be an important solution to this funding need which I will describe in further detail.

In my testimony today, I would like to offer my observations on capital flows for clean energy, the funding needs of the Commercialization Gap, and my view on how CEDA would help to solve this challenge and increase U.S. competitiveness. CEDA has a focused purpose to promote affordable financing for clean energy technologies and projects which would not get financing otherwise. CEDA will help to improve U.S. competitiveness in clean energy and reduce the cost of new energy technologies. Support for breakthrough technologies developed and deployed domestically could strengthen U.S. clean technology leadership and lay the groundwork for a competitive U.S. export market.

In this time of fiscal austerity, I see CEDA as a win-win for the American people, legislators, and energy companies alike.

Today I will highlight the following key points:

- The flow of investment in the clean energy sector has strengthened towards emerging markets such as China, and weakened towards Western markets, where flow is slowed by policy uncertainties and low natural gas prices. Recent data for Q1 2010 demonstrate this shift.
- Accelerating our transformation to a cleaner energy economy—and enabling the U.S. to compete abroad—requires the adoption and scale-up of new technologies that have the potential to compete dollar-for-dollar with conventional technologies over the long haul.
- A key impediment for the private sector is funding innovative companies and projects that fall into the “Commercialization Gap”: investments which are too capital-intensive for venture capital, but too risky for private equity, project or corporate debt financing.
- As currently designed, CEDA would provide various types of credit supports to stimulate private sector investment and help bridge the commercialization gap.
- In today’s state of fiscal austerity and budgetary concerns, getting taxpayer “bang for the buck” is critical. CEDA’s focus and structure would enable the program to be capitalized only once, yet provide long-lasting benefit.

*The current state of clean energy investment globally and in the U.S.*

The global clean energy industry has seen tremendous growth in recent years. According to Bloomberg New Energy Finance, 2010 was a record year for invest investments worldwide, topping \$243 billion. In the past five years, growth rates have topped 25 percent. However, when you unpack the data, it is clear that a new investment pattern is emerging. Much of the recent investment growth has shifted from Western economies to growth economies such as China. Last year, investment in China was up 39% to \$51.1bn, larger than any one country.<sup>1</sup> Furthermore, 2010 investment was kept strong by temporary government stimulus programs, which made up one-fifth of investment in clean energy worldwide.<sup>2</sup> As these programs phase out and budgetary realities sink in, investors are faced with uncertainty which in turn limits investment in both innovative clean energy technologies—such as energy storage—as well as conventional clean energy projects such as wind farms and nuclear plants. Early data showing investment trends in the first quarter of 2011 demonstrate how policy uncertainty impacts investment. Q1 2011 saw much weaker investments (\$31bn) which is down 30% from Q4 2010.<sup>3</sup> Much of this decline in growth can be attributed to policy uncertainties in Europe, as well as low natural gas prices which have impacted U.S. investments. For example, in 2010, the number of new wind turbine installations in the U.S. fell by almost half.

*Accelerating our transformation to a cleaner energy economy requires the adoption and scale-up of new technologies*

Whether the fiscal realities will strengthen or weaken the clean energy industry will depend on how policymakers prepare for it. In my view, a root cause of today’s investment uncertainty is a boom-bust cycle of short term policies that have encouraged investment in conventional clean energy projects. Nearly seven-eighths of all clean energy investment worldwide has gone to deploying mature clean energy technologies such as wind power. Only a tiny share focuses on innovation. While we need both types of investment, more attention should be placed on accelerating the adoption of innovative technologies that stand a better chance of competing with conventional energy over the long haul.

Accelerating the transfer of energy technology from the lab to commercial deployment is critical for the United States, now more than ever. Impending clean air regulations will require utilities to retrofit or replace a significant number of coal-fired power plants with cleaner options. Energy storage innovations are needed to support intermittent energy sources such as wind and solar power, which only produce power when the wind is blowing or the sun is shining. And grid modernization is critical as “smart-grid” technologies come online and nascent markets such as electric vehicles and customer-driven demand-side management provide new challenges for managing the electrical grid.

*A key impediment for the private sector is funding for innovative companies and projects that fall into the “Commercialization Gap”*

It is vital that we find a solution to accelerate the commercialization of new technologies and the requisite financing needed for their full-scale deployment. Many commercialization investments are stuck in a so-called “Commercialization Gap”

<sup>1</sup> Bloomberg New Energy Finance; Morgan Stanley.

<sup>2</sup> Bloomberg New Energy Finance.

<sup>3</sup> Ibid.

(Figure 1). They are plagued by a lack of financing, technology adoption risks, and poor coordination among product manufacturers, financial investors, and the utilities that would deploy these technologies. Significant capital is often needed to move technologies from pilot testing to deployment—capital that most utilities and financial institutions are unable or unwilling to put at risk. Furthermore, technology adoption risks—driven, for example, by uncertainty around technical standards—have held back deployment capital, particularly for investments in grid modernization technologies.

In my day-to-day work as an investor and advisor to energy firms, I see these challenges first hand. For example, I have recently evaluated a second-generation biomass technology in Europe which, if commercialized at scale, has the potential to help utilities supplement their use of coal with a product that is renewable, will significantly reduce their “carbon” footprint, and do so with a pricing structure for the product that is not too dissimilar to coal’s pricing today. This project and many other technologies I evaluate require significant capital expenditures to prove out a first generation facility—capital that is difficult to access without government support prior to proof of commercial viability.

I also see the challenges that utilities face regarding the commercialization gap. In contrast to venture or private equity, utilities enjoy a low cost of capital. However, it is difficult for them to justify risky commercialization investments to their shareholders or ratepayers. For utilities with significant coal portfolios subject to upcoming EPA regulations, there is a concern about the future generation mix and how technological innovation will fit into their investment choices. My experience in working with these firms is that they also would benefit from policy moving towards technological innovation instead of away from it. Some of these utilities have announced plans to pursue clean coal projects with their Chinese counterparts. These partnerships signal China’s intent to develop its capability and competitiveness in clean energy innovation.

[Note: “Figure 1: Definition of the Commercialization Gap” has been retained in committee files.]

*CEDA would provide various types of credit supports to stimulate private sector investment and help bridge the commercialization gap*

To help close the commercialization gap, the U.S. government can lower the financial risks the private sector faces in investing in the deployment of breakthrough technologies. CEDA’s credit support products will do just this, improving the risk/return profile for these risky yet capital intensive technologies and enable private sector capital to move off the sidelines. Loan guarantees have already proven essential to promising large-scale solar projects and to firms that test new technologies to burn coal more cleanly. CEDA, as drafted, would incorporate the existing loan guarantee program and improve upon it. Important aspects of CEDA include the following:

- **Emphasis on breakthrough technologies.**—This emphasis addresses the Commercialization Gap funding challenge and serves to move private capital off the sidelines by improving the risk/return profile of commercialization-stage technologies. CEDA’s portfolio approach will pool risk and diversify investments. This allows for losses on some investments to be offset by gains on others.
- **A broad array of tools to accelerate the deployment of clean energy technologies.**—Credit support includes loans, loan guarantees, insurance products, and debt instruments that allow CEDA to participate as a co-lender or member of an investor syndicate. CEDA may also provide indirect market support to develop securitized products. These tools enhance and expand the ability for the DOE to provide tools for a range of technologies and projects.
- **A separate administration within the Department of Energy, similar to FERC.**—CEDA’s separate Administrator and Board of Directors would provide CEDA substantial independence within DOE, much like FERC. This independence will likely help to reduce lengthy review processes which have challenged the loan guarantee programs.
- **Funding mechanisms which permit CEDA to become self-sustaining.**—Profit participation, as defined in the CEDA legislation, will allow CEDA to be compensated for risk with upside in successful companies and/or projects. This is one mechanism by which CEDA could self-fund over time, similar to a mechanism employed by the Overseas Private Investment Corporation (OPIC) Fund Program. OPIC provides loan guarantees to private sector funds in return for a preferred government return. Achieving self-funding status is a significant goal as it would permit CEDA autonomy from the appropriations process.

For my detailed analysis of CEDA in the American Clean Energy & Leadership Act, passed by the Senate Energy Committee 6/29/2009, Please see APPENDIX A,\* “The Clean Energy Deployment Administration (CEDA): A comparison of the Senate, House and Green Bank Proposals, April 10, 2010.”

In the current state of fiscal austerity and budgetary concerns, getting taxpayer “bang for the buck” is critical. CEDA’s focus and structure would enable the program to be capitalized only once, yet provide long-lasting benefit.

In closing, CEDA is a much-needed policy mechanism to provide smarter, more efficient government dollars to work in partnership with the private sector for technologies which have a chance to become cost-competitive with conventional energy. The one-time \$10 billion capitalization needed for this evergreen program provides taxpayers a “bang for their buck”, particularly when compared to other government programs which have deployed capital for clean energy in the form of grants with no return. According to PREF, the Section 1603 Treasury Grant program is expected to cost approximately \$10 billion through the end of 2011, equal to the one-time capitalization needed by CEDA.

CEDA presents an opportunity for the U.S. government to enact a fiscally responsible, sustainable policy that puts a higher priority on innovating today with an eye towards competitiveness, energy security, and less polluting energy for tomorrow. In this tight budgetary environment, this is an opportunity Congress should not miss.

The CHAIRMAN. Thank you very much.  
Mr. Guith, why don’t you go right ahead.

**STATEMENT OF CHRISTOPHER GUTH, VICE PRESIDENT FOR  
POLICY, INSTITUTE FOR 21ST CENTURY ENERGY, CHAMBER  
OF COMMERCE**

Mr. GUTH. Thank you. Chairman Bingaman, Ranking Member Murkowski, members of the committee: I am Christopher Guith, the Vice President for Policy at the Institute for 21st Century Energy, an affiliate of the United States Chamber of Commerce. The U.S. Chamber is the world’s largest business federation, representing the interests of more than 3 million businesses, organizations of every size, sector, and region.

In 2008 the Energy Institute issued its foundational policy document, the Blueprint for Securing America’s Energy Future, where we laid out the structure of a truly comprehensive energy policy ranging from increasing the efficient production and use of energy to expanding access to America’s energy resources, like oil, natural gas, and coal, to ensuring that we are producing the necessary engineers, scientists, and skilled workers, not only to design and to build the infrastructure of tomorrow, but also to maintain our existing infrastructure now. We made nearly 90 actionable and substantive recommendations that, if adopted, would secure our energy future.

One of the central themes of our blueprint is technology deployment. Irrespective of regulatory regimes we decide to impose in the future, it is clear that the development and, more importantly, deployment of newer, more efficient and cleaner energy technologies will be needed to secure our energy future.

We often hear calls for Manhattan or Apollo Projects to answer our energy prayers, but I would respectfully argue that these proposals miss the mark because they fail to recognize existing technology developed and do not address the structural issues that hamper the deployment of any new technology.

The U.S. does not want for energy technology development. As has been mentioned already, nearly every technology in use or,

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\*Document has been retained in committee files.

frankly, even discussed today owes its invention, discovery, or improvement to America's industry, national laboratories and academic institutions. While we absolutely need to maintain a commitment to robust R and D and encourage novel approaches like ARPA-E, it is the initial deployment of new technologies that is the biggest barrier to their commercialization.

Unconstrained, markets operate in a risk-reward paradigm—the higher the potential risk, the higher the potential reward—and generally fall on the risk-averse side when considering the development of new technologies, especially in the energy industry.

Clean energy technologies face multiple structural inefficiencies in financial markets, inefficiencies that limit their ability to deliver their desired benefits of energy security, environmental quality, and economic development. These inefficiencies include financing bottlenecks along the technology development pipeline, the inability of the market to fully account for societal costs and benefits, and the current infrastructure optimized for traditional energy sources.

Over the past 6 or 7 years, the Federal Government has authorized an array of policy tools to overcome these structural inefficiencies and accelerate clean energy deployment. But the slow pace and sometimes intransigence of the Federal bureaucracy limits to impacts of those existing policies.

An entity like CEDA as included in ACELA in the last Congress could provide the flexible financial risk management tools currently employed to advance other long-term goals, for example exports at the Export-Import Bank and emerging market investment at OPIC, or the Overseas Private Investment Corporation, and could add these to our capital-intensive clean energy goals. This is why we supported CEDA in 2009 and continue to support it today.

I realize that there have been various versions of clean or green energy bank proposals considered. Often they are intended to help any or all clean technologies or sometimes just a select few. Mr. Chairman, this committee's version of CEDA is eloquently tailored to address the primary problem of commercializing technologies because of their newness and inherent technological risk, while doing it in a technology-neutral fashion.

I must be clear. The label "clean energy" is not reserved solely for renewables, but must be accurately applied to any and all new technologies and processes that reduce environmental impact, whether it be clean coal, advanced biofuels, natural gas vehicles, or natural gas as a transportation fuel, advanced nuclear or energy storage, just to name a few.

It is also important to point out that much has changed since this committee reported ACELA last Congress. The country's debt and deficit have grown to damaging and unsustainable levels. We would encourage a broader discussion of how to capitalize CEDA reflecting our fiscal realities. Perhaps a quicker infusion of private capital through Federal bond offerings could reduce budgetary impacts.

Additionally, CEDA must be structured to operate revenue-neutral and could be required to pay any initial capital infusion from taxpayers to the U.S. Treasury through successful operation.

In summary, clean energy can provide many societal benefits not easily captured by normal market forces. Independent agencies have furthered national priorities in the past and successfully carried out important roles that traditional Federal agencies are not designed to fulfill. The urgency and scale of energy security, environmental quality and job creation requires greater access to the full Federal policy portfolio to accelerate the clean energy investment necessary to meet our national energy goals. CEDA combines a domestic energy mission with sophisticated financial risk management skills to bring emerging clean energy technologies to the market significantly faster than would occur under current market conditions.

Thank you.

[The prepared statement of Mr. Guith follows:]

PREPARED STATEMENT OF CHRISTOPHER GUTH, VICE PRESIDENT FOR POLICY,  
INSTITUTE FOR 21ST CENTURY ENERGY, CHAMBER OF COMMERCE

Thank you, Chairman Bingaman, Ranking Member Murkowski, and members of the Committee. I am Christopher Guith, vice president for policy of the Institute for 21st Century Energy (Institute), an affiliate of the U.S. Chamber of Commerce. The U.S. Chamber of Commerce is the world's largest business federation, representing the interests of more than three million businesses and organizations of every size, sector and region.

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

THE DEPLOYMENT HURDLE

In 2008, the Energy Institute issued its foundational policy document, Blueprint for Securing America's Energy Future, where we laid out the structure of a truly comprehensive energy policy, from increasing the efficient production and use of energy to expanding access to the America's energy resources like oil, natural gas, and coal, to ensuring we are producing the necessary engineers, scientists, and skilled workers not only to design and to build the infrastructure of tomorrow, but also to maintain our existing energy infrastructure. We made nearly 90 actionable and substantive recommendations that if adopted, would secure our energy future.

One of the central themes of our Blueprint is technology deployment. Irrespective of regulatory regimes we decide to impose in the future, it is clear that the development and deployment of newer, more efficient, and cleaner energy technologies will be needed to secure our energy future. We often hear calls for a "Manhattan" or an "Apollo" project to answer our energy prayers, but I would respectfully argue that these proposals miss the mark because they do not address the structural issues that hamper the deployment of any new energy technology.

The United States does not want for energy technology development. Nearly every technology in use, or even discussed, today owes its invention, discovery, or improvement to America's industry, National Laboratories, and academic institutions. While we absolutely need to maintain a commitment to robust research and development and encourage novel approaches like Advanced Research Project Agency—Energy (ARPA-E), it is the initial deployment of new technologies that is the biggest barrier to their commercialization.

Unconstrained, markets operate in a risk-reward paradigm—the higher the potential risk, the higher the potential reward—and generally fall on the risk averse side when considering the deployment of new technologies, especially in the energy industry. Clean energy technologies face multiple structural inefficiencies in financial markets, inefficiencies that limit their ability to deliver the desired benefits of energy security, environmental quality, and economic development.

These inefficiencies include: financing bottlenecks along the technology development pipeline; the inability of the market to fully account for societal costs, and benefits; and a current infrastructure optimized for traditional energy sources. Over the past six years, the federal government has authorized an array of policy tools to overcome these structural inefficiencies and accelerate clean energy deployment, but

the slow pace, and sometimes intransigence, of the federal bureaucracy limits the impact of those existing policies.

A quasi-governmental agency like the Clean Energy Development Administration (CEDA), as included in the American Clean Energy and Leadership Act of 2009 (ACELA), could provide the flexible financial risk management tools currently employed to advance other long-term goals (e.g. exports at the Export-Import Bank and emerging market investment at the Overseas Private Investment Corporation) to our capital-intensive clean energy goals. This is why we supported CEDA in 2009 and continue to support it today.

I realize that there have been various versions of clean or green energy bank proposals considered. Often, they are intended to help any and all “clean” technologies, or sometimes just a select few. Mr. Chairman, this Committee’s version of CEDA from ACELA is elegantly tailored to address the primary problem of commercializing technologies because of their newness and inherent technological risk, while doing it in a technology-neutral fashion. I must be clear, the label “clean energy” is not reserved solely for renewables, but must be accurately applied to any and all new technologies and processes that reduce environmental impact, whether it be clean coal, advanced biofuels, natural gas vehicles, advanced nuclear, or energy storage to name a few.

The ability to acquire financing is not the only hurdle to clean energy deployment. Our existing siting process has proven to be an absolute obstacle for dozens of clean energy projects. Without substantive reform to the current National Environmental Policy Act (NEPA) process, clean energy deployment will not reach its potential. The same applies to the siting of necessary infrastructure to support greater deployment (and cost reduction) of clean energy, such as interstate transmission siting.

It is also important to point out that much has changed since ACELA was reported out of this committee. The country’s debt and deficit have grown to damaging and unsustainable levels. We would encourage a broader discussion of how to capitalize CEDA reflecting our fiscal realities. A quicker infusion of private capital through federal bond offerings could reduce budgetary impacts. Additionally, CEDA must be structured to operate revenue-neutral and could be required to repay any initial capital infusion from tax-payers to the U.S. Treasury through successful operation.

#### FINANCING BOTTLENECKS

Limited access to capital is the primary impediment to the timely market penetration of clean energy infrastructure. While the price of clean energy has significantly declined over the past 30 years due to research and development investments, meeting national energy goals implies accelerated market penetration and greater capital investments in the raw materials of the concrete and steel necessary to build the infrastructure needed to generate power, produce alternative fuels, or manufacture batteries.

Before advancing national energy goals, an energy technology must evolve from a discovery, to a laboratory experiment, to a technology venture, and to an infrastructure development project. The private sector often struggles to overcome the unique challenges of transitioning between each stage. Incremental research and development funding improves the quantity and quality of technologies coming off the lab bench, but does not address the unique risks between a technology venture and a large-scale infrastructure project.

Project finance investors, who manage access to large volumes of low-cost capital, are riskaverse as they seek to protect and grow their investments. In general, investors will give small amounts of capital to risky projects in hopes of high returns, but offer large volumes of capital to lower risk opportunities in expectation of secure, predictable returns.

Multi-billion dollar energy projects face multiple risks, including engineering risks, construction risks, commodity risks, execution risks, resource risks, technology risks, permitting risks, and policy risks. While clean energy projects can mitigate a majority of these risks using normal project development processes, overcoming the technology hurdle will take years if left to business-as-usual market processes. Mitigating technology risk traditionally takes years of waiting for the empirical results of a pilot project, a demonstration facility, a semi-scale facility and then a full commercial scale project. This lengthy process has resulted in multiple technologies demonstrating promising laboratory results but failing to meet national energy goals because they never reached full commercial scale.

Before the recent financial crisis reversed the upward trajectory of clean energy investment, the market began to respond to the need for clean energy capital investment, with worldwide investment more than doubling in recent years. The baseline,

however, is quite small, and unprecedented growth is required. CEDA could offer tools aimed at catalyzing private market investment, and thereby accelerate the maturity and large scale delivery of clean energy.

#### UNDERVALUED BENEFITS

Clean energy possesses to various degrees and in various ways three societal benefits the free market has difficulty pricing: energy security, environmental quality, and economic development. Competitive markets efficiently deliver optimized results for the costs and benefits directly assumed by the buyer and seller. Competitive forces will yield optimized societal results if all of the costs and benefits of the transaction are solely assumed by the buyer and seller. If costs or benefits are imposed on or enjoyed by parties other than the buyer and seller, competitive forces will depart from the optimal societal outcome, as is the case in clean energy.

**Energy Security.**—Oil is not traded in a free market. The members of the Organization of Petroleum Exporting Countries (OPEC) control 67% of proven oil reserves and 40% of current production. The United States is 95% reliant on oil for transportation and consumes approximately 25% of the global oil supply on an annual basis. While the U.S. is the world's third largest oil producer, our domestic production only covers approximately 40-50% of our demand. The remaining 60% we import largely from countries in the western hemisphere. But since petroleum from any country can be refined into gasoline, the price we pay is set by the world market's supply and demand balance.

Everything else being equal, the proliferation of free trade and oil market globalization has lowered the average price of petroleum and decreased the magnitude of volatility caused by domestic disruptions (e.g. Hurricane Katrina or Alaskan pipeline maintenance) but has increased the frequency of volatility as international disruptions now affect our markets. While these disruptions may be the result of natural causes, this inter-linkage exposes our energy, national, and economic security to terrorist acts on foreign oil assets and the intentional manipulation of the oil market by OPEC.

OPEC, a self-proclaimed international cartel, benefits from both the highs and lows of oil markets. They capture large profits during periods of high prices and capture market share during times of low prices as higher-cost producers leave the market (e.g. like we have seen recently in the U.S. biofuels industry). Anti-trust laws in the United States restrict anti-competitive collusion to protect free market forces, but national jurisdictional boundaries limit the tools available to counteract international collusion.

Recent developments in the oil and natural gas exploration and production provide a fitting example to how quickly and profoundly technology can change the landscape and improve our energy security. Commercial utilization of advanced seismology, hydraulic fracturing, and horizontal drilling have enabled the country to increase domestically produced oil for the first time in years. The potential for further increasing domestic production is tremendous as these new technologies are utilized at larger scales. One of the only limiting factors to this positive trend is access limitations.

Mitigating exposure to oil market volatility requires energy resource diversification and the availability of ready oil substitutes. While such mitigation presents strong benefits to society at large, the downside risk of low prices impacts alternative energy producers. Alternative energy reduces oil dependence and price volatility by harnessing domestic resources such as natural gas, electricity, advanced biofuels, and coal.

**Environmental Quality.**—While reliable and affordable energy raises society's standard of living, methods of energy production often incur environmental costs not naturally priced by the free market, and these costs are not always integrated into the cost of energy production. The environmental costs of clean energy technologies are in many cases lower than those of conventional energy sources.

**Economic Development.**—Free market economics encourage producers to seek the lowest cost of production. Multi-national corporations often benefit from the cost savings of more favorable regulatory environments and lower cost labor in developing nations, but corporate accounting does not allow them to capture the indirect benefits of the economic development in their home nation caused by local job creation. The global goals for clean energy require substantial job creation in industries currently on the margins of the economy. Creating a more favorable regulatory environment and utilizing American labor will create domestic economic development by displacing imported products and creating new export industries.

## OVERCOMING INCUMBENT INFRASTRUCTURE

Clean energy also faces an incumbent infrastructure specifically designed to maximize efficient production, delivery, and consumption of traditional energy. Historical U.S. energy policy primarily focused on delivering low-cost, reliable energy. To advance those goals we have built an infrastructure of pipelines, pumps, transmission lines, refineries and generating stations. Today, each new unit of fossil energy production and delivery is made dramatically cheaper by the trillions of dollars of infrastructure investment made decades ago.

While clean energy can leverage some of the existing infrastructure, most of the assets are geographically optimized to connect rich fossil regions and centralized generation stations with demand centers. Clean energy's distributed, intermittent, and often remote resource profile requires a different infrastructure design. While economically feasible in some markets, clean energy's infrastructure build out is slowed by the lengthy permitting processes. The stable flow of capital to clean energy projects, enabled by CEDA, would encourage infrastructure developers to enter the lengthy permitting process by providing the expectation that clean energy projects will be financed and built.

## RESTRICTIVE FEDERAL AGENCY MANAGEMENT

The magnitude and complexity of the challenges associated with emerging energy technologies demands professional and dedicated financial risk management. While investment in clean energy technologies is wholly consistent with the mission of the Department of Energy (DOE), the cumbersome rules, leisurely pace, and bureaucratic intransigence of traditional federal agencies, especially the Office of Management and Budget, restrict the management flexibility and acquisition of skills necessary to manage financial risk intelligently and in a consequential timeframe. An independent, quasi-governmental agency, such as CEDA, would be able to more effectively administer energy financial services and would avoid the improbable task of reforming an existing Federal entity, such as DOE.

Existing quasi-governmental agencies possess sophisticated capital risk management expertise, and have established a strong track record of furthering national goals. Existing entities, however, would need substantial changes to their charters to accommodate the task of domestic energy investment and lack deep energy domain expertise. A new quasi-governmental agency modeled after successful examples, such as the Export-Import Bank and the Overseas Private Investment Corporation, could combine a domestic energy focus with the necessary management flexibility.

Given the potential energy security, environmental quality and economic development benefits potentially generated by clean energy, the government can play a unique role by supporting first-of-a-kind commercial scale facilities that mitigate technology risk for future project developments by providing an empirical reference case. Such support, though, must be done responsibly through intelligent, flexible and swift mechanisms absent in traditional federal agencies. CEDA could advance national energy goals by filling financing gaps with the professional risk management of financial products designed to support the scaling of clean energy projects.

## CONCLUSION

Clean energy possesses the societal benefits of energy security, environmental quality and economic development not easily captured by normal market forces. Independent, quasigovernmental agencies have furthered national priorities in the past and successfully carried out important roles that traditional federal agencies are not designed to fulfill. The urgency and scale of energy security, environmental quality, and job creation requires greater access to the federal policy portfolio to accelerate the clean energy investment necessary to meet our national energy goals. CEDA combines a domestic energy mission with sophisticated financial risk management skills to bring emerging clean energy technologies to the market significantly faster than would occur under current market conditions.

The CHAIRMAN. Thank you very much. Thank you all for your excellent testimony.

Let me start with a few questions. Mr. Silver, first let me ask you. You talked about some of the lessons that have been learned with the current loan guarantee program and what you've achieved there. You also I think talked about how CEDA would provide additional flexibility and tools to achieve some of the results that

we're all agreed upon are important. Could you elaborate a little bit on that as to what are the lessons particularly that this new flexibility or these new tools would help to respond to?

Mr. SILVER. Sure. Thank you for the question, Senator. The 3 or 4 topics I made reference to with respect to early lessons learned were around timeframes, the limited utility of project finance as the sole financing vehicle, the unique requirements that small businesses face as well.

I might add a couple of other lessons learned to that. One is that obviously ensuring that we have the capability of hiring folks with deep expertise in the analysis and negotiation and structuring of these transactions is essential and speaks to a certain extent to special hiring authorities, as well as a revisit of the procurement process by which we bring consultants in.

I would only note, not specifically vis a vis CEDA, which as you know the administration does not have a formal position on, but I would note that in the private sector folks working on transactions in this space frequently are able to make use of other risk mitigants which they have at their disposal. Among them and in no particular order of importance would be various kinds of hedging strategies, leveraged leasing structures, insurance wrappers, warrant structures, which play a kind of de-risking role as well.

So there are certainly other tools in the arsenal that are potentially available and would lead to the most appropriate and most tailored results for any individual project.

The CHAIRMAN. Mr. Reicher, you also talked about how, as you see it, CEDA would allow for the use of some—I think you referred to insurance products, bonds, some other tools. Did you want to elaborate on any of that as to what you think is not being done now that could be done effectively in this area?

Mr. REICHER. Mr. Chairman, loan guarantees, as I said, as Mr. Silver said, is one of a number of tools that we need in the arsenal to get these projects through the valley of death. Sometimes in my experience, having financed projects, a loan guarantee won't get the job done and an insurance product, which are increasingly being developed for these kinds of things, could in fact be a good substitute. Bond offerings to back these projects.

I think the ability of this new entity actually to engage in what's known under the legislation as profits participation, pay itself back, continue to fund the operation of the entity, I think that's a very attractive element of this. The simple answer, Mr. Chairman, is that the current loan guarantee program is a good but limited tool, and it's pretty straightforward if you talk to folks in the finance industry that if you could add to the arsenal of tools and provide this entity with a variety of flexibilities we could be doing a lot more, a lot faster, and arguably at less cost and with less risk, and finally again, and this is very important in these fiscally challenged times, not have to come back to Capitol Hill for an additional appropriation.

The CHAIRMAN. Let me ask one other question here. You've done a comparison of the Senate and the House and the green bank proposals. I think that's part of your testimony. Ms. Yanosek, maybe you could just summarize what you concluded with regard to the

merits of this CEDA proposal the way we have it here before the committee?

Ms. YANOSEK. Thank you, Mr. Chairman. The chairman is referring to a paper, a white paper that I wrote for the ACELA legislation from last year which compared the proposals from last year. The conclusion that I made in this comparison was that the Senate CEDA—and this is my personal view—is very well developed and is very well articulated to, frankly, give the opportunity to have the biggest bang for the buck.

I do believe that having an arm's-length relationship from the DOE is important. I also believe that the opportunity to have a range of financial products that CEDA would be able to administer is important. As I mention in my testimony, we have—every investment is different and so having that ability is really critical, and I believe that having the ability to have profit-generating mechanisms is important so that CEDA may continue to be able to self-fund itself.

Thank you very much.

The CHAIRMAN. Thank you very much.

My time is up. Senator Murkowski.

Senator MURKOWSKI. Thank you, Mr. Chairman.

Based on what all four of you have said and just repeated again here in response to the chairman, Mr. Silver, Mr. Reicher, I conclude that you view CEDA as yet one more tool, that it is not necessarily something that replaces loan guarantees or replaces tax credits or the other financing mechanisms or opportunities out there, but that it is yet another way that we can offer a process. Is that a somewhat correct summation?

Mr. REICHER. Senator Murkowski, I would say that the way you've wisely written the bill, it would in fact incorporate the loan guarantee program as one of its several tools, and in fact those authorities, the funding would be transferred over to CEDA upon its creation as I understand the setup of the new organization. That I think is very smart.

Then added to that is this independence. But I would also echo something you mentioned as well. There is a separate array of tools that we need outside of CEDA, for example the tax credits. Those have been very effective, both investment tax credits and production tax credits, for driving investment in these technologies. They do need to be reauthorized when they come up in 2012 and 2016.

But CEDA as you've designed it, incorporating the loan guarantees and adding to that loan guarantee authority a whole host of additional tools, is really what we need to get these technologies from nuclear to coal to gas to renewables to efficiency through this valley of death.

Mr. GUITH. Senator Murkowski, if I might.

The CHAIRMAN. Mr. Guith.

Mr. GUITH. I think this partially goes back to Chairman Bingham's first question on the difference between House and Senate versions of CEDA, in that the version reported out of this committee, the scope is much more limited. The version out of the House committee—I'm sorry. The version that was passed in Waxman-Markey was applicable to virtually, as I noted in my testimony, any technology that meets the definition, including mature

technologies, whereas the version that you passed last Congress was neatly tailored to address, as was mentioned in various forms, the valley of death, the nascent technologies.

So to your question, I would say that the loan guarantee program in Title 17 at DOE right now fits that same valley of death model. So it very easily should be incorporated, not impacting existing guarantees. But the other tools that are out there should be debated on their own merits, because they generally apply and are, frankly, used by mature technologies and mature technologies only, and I would argue that CEDA should not be open, should not be used, should not be allowed to crowd out those nascent technologies by mature technologies.

Senator MURKOWSKI. Mr. Silver.

Mr. SILVER. Senator, first I'd like to just make clear that my comments were really simply an observation that there were tools available in the private sector. It didn't address directly the question of CEDA one way or the other.

But I would make—I would add to that litany one other general observation about private sector investment and investment strategies. That is the use of a portfolio strategy, a portfolio approach. As currently structured, the loan guarantee program addresses each individual application, each individual transaction, on a standalone basis. As I think my colleagues here on the panel will describe to you based on their private sector investment experience, that is not traditionally the way that is handled, and it does have implications for the risk profile and therefore by extension the speed and nature of the projects that one finances.

Senator MURKOWSKI. Let me ask the question, because I think when we look at tax credits—and I know several of you have mentioned that there's uncertainty with those because you never know what we here in Congress are going to do. Are they going to continue or are they not? Can you bank on them?

But, having said that, when you think about the tax credits, you think about the grants, it's easier to assign a value to them than you might be able to with a loan guarantee or other financial instruments. Can you quantify the benefit of a loan guarantee program in CEDA as we're discussing here, or at least discuss kind of in a broader sense how much these higher installed cost figures—how they could possibly be lowered with Federal involvement in borrowing for the projects?

When people look at this CEDA, looking at it and saying, well, this is a good approach, but \$10 billion? How we get around that? I appreciate your comments, Mr. Guith, about perhaps some suggestions there as to how we might deal with the financing of this, a Federal bond offering. But is there something that can be done with regards to the loan guarantee or with CEDA just as we talk about the numbers, the dollars that are involved?

Mr. SILVER. Senator, with respect specifically to the loan guarantee program, which is really all I'm qualified to discuss, I think that it's important first to step back and look at what the objectives of the loan guarantee program are, which are essentially to drive innovative technologies to scale and to bring them to market in ways that attract private capital in. I think the 27 projects we've

been able to do, to invest in or support across the 3 programs that we administer, lends support to that observation.

In some respects, the intent is to demonstrate that the technologies, innovative technologies at scale, work and change the risk-reward profile that one of my colleagues here made reference to in such a way that it continues to entice and bring private capital to bear.

As part of the mechanism by which we operate, it seems to me our responsibility is to leave those sectors once private capital has been sufficiently incentivized and to move on to other technologies, new and innovative technologies which need to be brought to scale.

The second part of that answer is that the levelized cost of energy which in a sense you're referring to is made up of a variety of different components, if you will, and many of these technologies address independent parts of them. A recent solar project we supported changed the mechanics by which you install solar paneling. Another provides a unique set of features related to the aperture and the management of the apertures, and on and on.

So we're trying to bring a series of these new elements to bear because at scale—and this is the point I'm trying to drive to—at scale, that drives down the cost of these. The reason to focus so explicitly, it seems to me, on commercial deployment is because at scale commercial deployment drives down unit costs. As unit costs are driven down, we more successfully build out our supply chains, and the more aggressively we build out our supply chains the more aggressively and successfully we can compete at cost around the world.

Mr. REICHER. Senator Murkowski—

Senator MURKOWSKI. I'm way over my time, but, Mr. Reicher, if you want to.

Mr. REICHER. Very, very quickly, I just wanted to add, reflecting another aspect of your question, that we've talked today about a \$10 billion capitalization of CEDA and I think you were asking what could that drive in terms of investment. The numbers are quite extraordinary, depending upon how you set the so-called loan-loss reserve. If you set it at 10 percent, you'd be driving on the order of \$100 billion worth of investment. You set it at 5 percent, on the order of \$200 billion worth of investment.

So you get huge, huge leverage out of this. Compared to lots of other tools that we use today—grants, as much as I'm a big fan of them in certain circumstances, you don't get much leverage at all. This would be the biggest source of leverage we could find as far as the Federal Government getting money deployed for these innovative technologies.

Mr. SILVER. May I add just one other comment, Senator? I think what Mr. Reicher said is deeply important. It's important also to remember that the loan programs as structured and potentially as envisioned going forward are in fact self-sustaining. That is to say that we charge administrative fees, both application fees and monitoring fees, which cover our operating costs.

Perhaps most importantly, it's important to remember that these are not grants; they're loans, and as structured we expect them to be repaid, and we work to ensure on a monitoring basis going forward that they are in fact repaid. So they are among the most

leverageable of imaginable programs, provided we do our work correctly.

Senator MURKOWSKI. Thank you all.

The CHAIRMAN. Senator Manchin.

Senator MANCHIN. Thank you all. I thank all 4 of you for your presentations.

If I may, Mr. Silver, ask you. On the past experience as far as CEDA, percentwise what part of your loans are given to the so-called renewables versus the mature, such as fossils?

Mr. SILVER. Senator, the number of applications is driven in part by the number of applications we receive and in part by the funding available for the projects. Actually, advanced fossil projects fall into a different bucket, financing bucket, if you will, than the renewables do.

To give you an overview, we have whatever \$2.4 billion of credit subsidy will generate in the 1705 program, which is targeted to renewables and particularly to commercializable renewables. There is an \$8 billion bucket of funding available for fossil projects, and in addition—and not to get too deep into the weeds—\$2 billion of what's called mixed no-use money, which is also available for that, for fossil.

Senator MANCHIN. It just seems to me that, with the dependency that we have on fossil—in West Virginia we do a little bit of everything. We have the largest wind farms. We do an awful lot of wind. Solar has not been that great as far as development in our State. But of course, you know, coal and of course Marcellus shale, natural gas.

Also, from the DOE we noticed that funding was cut back on the deep shale fracking. In a time when we're looking to be more—less dependent on foreign oil, it seems like that was an unwise move. Do you have any input on that at all or are you stepping in to fill the void?

Mr. SILVER. No, Senator. The loan programs focus specifically on the financing structures to support emerging clean technologies, and so I can't speak for the other decisions or discussions around financing elsewhere in the Department.

What I would say is that we do have an active pipeline of projects in the advanced fossil space, both in terms of various kinds of gasification efforts as well as carbon capture and sequestration. As I indicated in my testimony, we just actually this past week issued our first term sheet for a very significant project, a very, very large fossil-related project.

Senator MANCHIN. If I could ask any of the 3 of you to chime in on this one. Tax credits. I know you've been talking back and forth on the credit systems that we have, offsets and credits. I know you know there's a large debate going on about that with the oil credits. Do any of you believe that there should be a trigger mechanism on credits, to where they basically at a certain price level, take oil at \$25 a barrel or \$50 a barrel, that basically the credits go off and come back on, to basically—and still there would be a large amount of investment made when prices fall, market prices fall, whether it be traditional coal, gas, and oil?

It seems one size fits all and when prices are \$100 a barrel or \$75 a ton of coal or \$14 an mcf, the credits just keep marching

right on. Do you think there could be another way of rearranging that?

Mr. GUTH. I certainly do, but let's be careful what we call credits. What the Finance Committee has proposed or is about to propose includes very direct excise taxes, and yet it's called elimination of tax treatment. Raising taxes is raising taxes, and that's frankly what folks on both sides of the Hill are considering right now.

I would also—

Senator MANCHIN. It's not raising taxes. I think we're talking about putting fairness to the system, as it needed it, at certain prices. Do you think the credits or the taxes are still needed when markets hit certain prices?

Mr. GUTH. Certainly we've discussed the potential of perhaps phasing out the blender's credit for biofuels once it is economically competitive with gasoline, exactly as you're discussing. But I would note that that leaves on the table technologies or projects that are, frankly, never competitive and never reach their threshold. The question is should they be in existence in perpetuity because they never reach a point of competition?

Senator MANCHIN. I can tell you that credits on thin seam coal or the credits on tight sands for drilling basically when it goes to \$12 and \$14 an mcf might not still be needed. But if it's around \$2, \$3, \$4 an mcf, you've got to continue to stimulate that market so they'll continue to explore.

If you would, please?

Ms. YANOSEK. I'll just take it to a higher level, which is essentially a tax or a cap or something of that nature isn't a very efficient mechanism. The question is what is the goal that you're going after? Is it energy security, is it lower carbon? It really depends on the goal.

I think there's a distinction that needs to be made between, as my colleague said, the difference between technologies that are actually going to be, have the potential to be cost competitive, and those that will not, that just won't get there. I think that what we've seen with the ITC and the PTC and some of these mechanisms is that, frankly, we've gotten that industry to a quite developed stance and where the real need is is for us to actually focus on what we're talking about today, which is the commercialization gap.

Actually, when Senator Bingaman asked me the difference between the 2 proposals, the green bank and the CEDA one, the biggest one—and it's kind of an oversight because I just focus on the commercialization gap and I kind of forget that CEDA could potentially focus on some of these technologies that are already mature—is that that's a big difference.

Now, certainly the credit subsidy cost is lower for these more conventional technologies like wind, like solar. So you could argue that CEDA could leverage more private sector dollars. But I don't think that's solving the problem that we have today, which is actually thinking more long-term about persistent financing challenges for the part of the energy technology development cycle where no private capital is going to go.

Senator MANCHIN. It's not going to go because of the return on investment. Basically, if the market's not there and the price is so high, we're going to keep plowing money in for something that's never going to be competitive.

Ms. YANOSEK. To the point where the risk-return profile doesn't make sense. So I will tell you that—

Senator MANCHIN. So we've got to continue to give it tax-supported money to make them viable?

Ms. YANOSEK. For wind and solar, a good percent of that return on investment is coming from a government subsidy.

Senator MANCHIN. Absolutely. Thank you.

Mr. SILVER. Could I just quickly add? No. 1, on your initial question about the relative proportion of funding across renewables, fossil, and the like in the loan guarantee program, one of the beauties of CEDA is in fact, as you've heard, it could take a portfolio approach. It would not be—it would not be subject to these narrow categories, you should spend X on this and Y on that. So it could look out and say, what are the needs in this energy innovation area, and act accordingly, just like a smart investment manager would. That's No. 1.

No. 2, with respect to how to help energy technologies move forward, I do think the production tax credit and the investment tax credit continue to have a role in helping current technologies come down the cost curve—wind, solar, geothermal, biomass, a whole host of traditional technologies as well.

But, having said that, like my colleagues here, I think we do need to look very hard upstream of that, earlier at this innovation stage, and ask what else is coming that we really need to back if it's going to ever see initial deployment.

So I think we need to look carefully at the whole set of incentives that are out there and, depending upon where we are in research, development, demonstration, and deployment, adjust the dial accordingly.

Senator MANCHIN. Thank you.

The CHAIRMAN. Senator Hoeven, we were just getting to you.

Senator HOEVEN. Sorry, I've got to go.

The CHAIRMAN. You've got other plans.

Senator PORTMAN.

Senator PORTMAN. Thank you, Mr. Chairman, and I thank the witnesses this morning. I've got so many questions and I'm going to try to stick to my time in deference to my colleagues.

First, Mr. Reicher, thank you for being here today. Mr. Hoeven had to leave. He'll try to come back. But he's a graduate of your college, year 1979, as you and I are. So what a coincidence 3 of us ended up here together.

Mr. REICHER. Mr. Portman, I will not tell any stories.

Senator PORTMAN. Thank you. I appreciate that. You're under oath probably, so that makes it particularly problematic for me.

[Laughter.]

Senator PORTMAN. Listen, thank you for helping us on the energy efficiency bill. As you know, we're working on this bill with Senator Sheehan. She's not here today, but we appreciate your working with us on helping to deploy energy efficiency technologies across all sectors of our economy. We think we've got some good common-

sense stuff in there. A lot of it comes out of the work that Senator Bingaman and Senator Murkowski have done over the years, and I think that this is something that hopefully on a bipartisan basis we can move forward on.

One of the stated energy technology development goals with CEDA I saw is the transformation of building stock of the United States to zero net energy consumption. What does this mean? Would CEDA be able to help facilitate this transformation on the efficiency side, too? Would these loans go directly to consumers or would they go to developing energy efficiency technology?

Mr. REICHER. Let me take a stab at that. First of all, CEDA as I read it and I think as the committee intends it would in fact apply to energy efficiency, innovative approaches to energy efficiency. So that's No. 1 and I think that's important.

It would allow, for example, something that we really need in the efficiency world and that is how do you take lots and lots of small efficiency opportunities, say across a company with many, many different manufacturing plants, aggregate those, bring in an innovative new technology to address those efficiency problems, and get it financed. I think that's a very attractive element of CEDA, being able to aggregate what often, as you know, in the efficiency world are small opportunities, but taken together and financed in a smart way could really drive energy efficiency forward.

The beauty of energy efficiency is, we say that the low-hanging fruit actually grows back. We're continuing to develop new approaches to energy efficiency, but those, just like supply side technologies, need to be proven in the market, and CEDA would help us do it and I think help U.S. manufacturing and help U.S. commercial and residential buildings.

Senator PORTMAN. I think that's an important point that wasn't raised earlier and I look forward to continuing to work with you and others on the efficiency side, CEDA or no CEDA.

Mr. Silver, I appreciate your working with me on the loan guarantee program issues. You and I have had this conversation before, but, as you know, I'm very concerned about where we are with the American Centrifuge Project. There are 2 others in Ohio, as you know, the CODA project, and now there's a new one in Mansfield, Ohio, Calley Solar, all of whom have applied for loan guarantees. If these loan guarantees don't come through, it means the loss of thousands of jobs in Ohio. If they do come through, it means the addition of even more thousands of jobs. So it's a big deal for us in Ohio and incredibly important for our energy security going forward with regard to the uranium enrichment capacity at the Piketon plant. So thank you for working with us on that.

My question to you today has to do with OMB. It might sound funny coming from me, but one of my big concerns is that tradeoff from your office to OMB. I understand with regard to the American Centrifuge Project there has now been a handoff and I appreciate that. But can you talk to us a little about that handoff to OMB, how that relationship works, and then specifically how a new Clean Energy Deployment Administration proposal might improve or change that DOE-OMB relationship?

Mr. SILVER. Yes, Senator, absolutely. Although I didn't go to college with you, I'm from Ohio, so I'll be happy to address the question.

Senator PORTMAN. Welcome. We have another Buckeye on the panel.

[Laughter.]

Mr. SILVER. You are correct that the project in question has been transferred. Perhaps to provide some background to the process, we issue a solicitation, essentially a request for proposals, and applications come in. We screen them for eligibility and completeness and, assuming they meet that initial screen, we then bring them in house for due diligence.

As we undertake our due diligence on a sort of a parallel track, we begin to negotiate the terms of a potential agreement. Assuming that we can reach terms with an applicant, we prepare the project to move into the review and approval process.

The first thing that happens is that an application is reviewed internally at the Department of Energy by something called, a group called the credit committee, made up of finance professionals and others within the Department, who look at the underlying credit instrument. At the same time, we release it for review through an inter-agency process. A number of different agencies are involved in reviewing it to ensure that it meets our obligations to fully protect taxpayer funds and as the natural course of events ask us a series of questions about these projects. We answer and there's a good healthy back and forth.

Once that project—that process has concluded, it comes back inside the Department of Energy to what's called the credit review board, made up of the most senior officials in the Department, who review it once again.

We have worked assiduously with our related agencies to ensure that the process is as streamlined as it can be. We're now trying to work on—we are now working on an expedited schedule, which I'm hopeful will have positive benefits in that regard. So we are all I think quite clear-eyed about the need to make this work as efficiently as possible.

Senator PORTMAN. Thank you. If you could maybe in writing, because my time has expired, give me some sense of how CEDA might change that process in relationship particularly to the credit subsidy issue and the relation to DOE and OMB.

Thank you, Mr. Chairman.

[The information referred to follows:]

Under the Federal Credit Reform Act (FCRA), the subsidy cost reflects the best estimate of the long-term cost to Government of the loan or loan guarantee, excluding administrative costs. As with all other federal credit programs, OMB's responsibility for determining the credit subsidy cost associated with DOE's loan guarantees is found in Section 503 of FCRA, which states that the Director of OMB is responsible for credit subsidy cost estimates. Under the oversight authority in Section 503, OMB delegates the modeling of credit subsidy costs to agencies, and issues implementing guidance to ensure consistent and accurate estimates of cost. For new programs or programs where actual experience is not available, such as the Title XVII program, OMB works closely with agencies to create or revise credit subsidy models. DOE has worked with OMB to develop the credit subsidy estimation methodology used for the Loan Programs, and OMB approved DOE's credit subsidy cost model in 2008. Title XVII loan guarantees generally support diverse investments in a wide variety of underlying projects, each of which has unique risks and contract

terms. Because the specific projects and contract terms vary substantially, these loan guarantees, to date, have been scored on a loan-by-loan basis.

The CHAIRMAN. Senator Franken.

Senator FRANKEN. Thank you, Mr. Chairman.

Thank you all for being here, and I'd like to thank the chair and the ranking member for making the issue of energy finance a priority.

Since joining this committee, I've traveled all across Minnesota to meet with our clean energy leaders and innovators. Last week I was at a roundtable with researchers at the University of Minnesota, who are doing all kinds of cutting edge work on a range of energy issues. The one thing I heard over and over again is the need for financing to bridge this valley of death problem that we've been talking about, and with China and other countries moving ahead, financing is a critical piece of our clean energy future that we have to get right.

Senator Portman was talking about energy efficiency in buildings and, Mr. Silver, I want to thank you. The Department of Energy helped with a loan to Sage Electrochromics, which makes these incredibly energy efficient windows. One issue that came up was whether they were renewable or efficiency, and since buildings consume about 40 percent of our energy—again, they lead the world in this cutting edge technology of blocking out the sun during the summer and letting it all in, all the UV in, in the winter.

One of the issues that came up was credit subsidy fees. As I've learned from that experience, that fee can potentially prevent innovative technologies from benefiting from loan guarantees.

So, Mr. Silver, in your experience are we doing a good job of determining the appropriate level of credit subsidy to offset risk for the government when issuing loan guarantees? Can that—can we be modulating that rate that these companies pay in order to promote the innovation that we want to do?

Mr. SILVER. Senator, that issue comes up in the context of the fact that there are 2 programs currently that provide loan guarantees to renewables projects: one the 1703 program, which has as its focus innovative energy technologies; and one the 1705 program, which, as you know, came into being through the Recovery Act of 2009.

The reason I bring this up is because the 1703 program until recently did not in fact have credit subsidies appropriated to enable us to support the more innovative projects that would struggle with that issue. It is a self-pay program. By contrast, 1705 has \$2.4 billion of credit subsidy available.

I don't know that the issue is as much what the credit subsidy is as to whether or not it is feasible or possible for an applicant to pay it. It comes as no surprise, I think, to anybody that we have been challenged to make the 1703 renewables program work in the absence of credit subsidy for innovative technologies, in part because if you want to substitute a phrase for "innovative technologies" you might substitute the phrase "early to mid-stage, relatively thinly capitalized," often venture-backed companies, as opposed to more robust applications introduced by larger sponsors with more robust balance sheets.

That also ties into my earlier observations about the various kinds of financing tools and what works and what doesn't work. With only project finance, which as I indicated requires us to be able to identify cash-flows to match repayment schedules, we are challenged to make that work.

The good news in all of this is that the CR which you have approved through the end of this fiscal year provides for the very first time credit subsidy, appropriated credit subsidy, in 1703 and would be available for projects like the one you refer to.

Senator FRANKEN. So it's sort of a trigger, not a sliding scale rate? It's either one or the other; it's either you get it or you don't, as opposed to determining what the level of the credit subsidy would be depending on the need, the determined need?

Mr. SILVER. To be more specific, we do in fact identify specific credit subsidy scores for particular projects and those do in fact—those are—

Senator FRANKEN. OK.

Mr. SILVER. They're based on the specifics of the particular transaction. The riskier they are, not surprisingly, the higher credit subsidy. What I was referring to was whether or not credit subsidy funds were actually available to support, to pay for that credit subsidy, irrespective of what it was.

Senator FRANKEN. I have run out of time. Can I ask? No?

The CHAIRMAN. Sure, go right ahead. But Senator Portman was very meticulous about not taking additional time.

Senator FRANKEN. He was. He was. You know what? I'm going to submit to—

The CHAIRMAN. Why don't you go ahead with your question. Then we'll call on Senator Portman to finish his line of questioning, and then anybody else.

Senator FRANKEN. Mr. Reicher, in your testimony you outlined 6 other policy areas. Now I'm looking at this and it might have a long answer, so why don't I submit it for the record in writing.

The CHAIRMAN. That's fine. If that's your preference, we'll be glad to do that.

Senator FRANKEN. It isn't really.

The CHAIRMAN. Then, go ahead and ask the question.

[Laughter.]

The CHAIRMAN. We don't want any resentful members of this committee.

Senator FRANKEN. I know, and that's a problem of mine.

OK. Mr. Reicher, in your testimony you outline 6 other policy areas that are important for clean energy commercialization. We can't think of a single energy policy in a vacuum. Among them are a national clean energy standard, investments in R and D, protecting EPA authority to regulate greenhouse gases, and extending Federal tax incentives for clean energy technologies.

Which of these are most critical to have in addition to CEDA to make this green bank most effective, and how effective would CEDA be if none of these other policies were to be enacted? Is that a really long question?

Mr. REICHER. No. We need to look at this as an entire spectrum, research, development, demonstration, and deployment, if we're really going to compete internationally. So the care and feeding of

R and D at the Federal level is very important. We need to do what many other countries are doing, which is to put serious money into energy R and D.

I do think in some fashion at some point, sooner rather than later, we've got to put a price on carbon emissions. There is no doubt about that, Senator Franken. I don't think that's likely to happen in this session, but we need to get to that.

I do think—and I will stress this—to the extent this committee and the Senate moves down the road toward a clean energy standard, it would be far, far more effective if it was complemented by a financing mechanism like we're talking about today. If you want to make that an affordable clean energy standard, we really need to drive these innovative technologies into greater use, drive costs down.

I think the politics of that will be better. People will see this as cheaper to comply with a clean energy standard. That's why I am, to be honest, frustrated with the Obama administration not stepping up in support of CEDA as a complement to the clean energy standard which it is strongly supporting and advocating.

Mr. SILVER. Let me just add one thing to that, Senator, if I may. There is a tendency, I think, to view investments in one or the other as both binary and linear, whereas I think of them as a virtuous circle. An investment in innovation leads to commercialization, but commercialization in turn leads to future innovation. One without the other is incomplete.

Senator FRANKEN. Thank you.

Thank you for your indulgence.

The CHAIRMAN. Sure. Thank you.

Senator Portman indicated he does not have a need to go ahead with additional questions. Let me call on Senator Coons for his questions.

Senator COONS. Thank you, chairman, and thank you for holding this hearing today. It's a fascinating topic and I agree well deserving of our attention.

Mr. Silver, I just wanted to ask, if I could, first with you. Given your experience and tenure as the head of the Loan Guarantee Office, you witnessed some of the significant challenges in moving projects along, and you've mentioned a few lessons learned from the loan guarantee program in your testimony, if you were designing this program again from the ground up, which I know we're not, but if you were, what would it need to accomplish, and can you give us some more examples of the lessons learned? If it was established, did CEDA respond to them, and what suggestions do you have for how we might apply those lessons learned in moving forward with CEDA?

Mr. SILVER. That's not a short answer.

Senator COONS. In 3 minutes or less.

[Laughter.]

Mr. SILVER. I think the loan guarantee efforts have been substantial and quite successful under the circumstances under which we work. Because I don't have the luxury of starting from scratch, we work with what we have.

I think, as I outlined a little bit in my testimony and in other conversations, I think there are 3 or 4 basic elements to a success-

ful loan guarantee program. The first, of course, is the ability to attract and retain highly competent, highly experienced professionals with deep energy-specific project finance experience. Again, our work is only project finance. Obviously, to the extent we had other tools available to us we would have other expertise as well. But clearly a deep expertise is necessary in several different areas—origination, which is really the review and negotiation of the transaction; credit and credit analysis, which gets to the issues in the underlying credit instrument; obviously technology because we are funding innovative technologies. We certainly have benefited from our relationship with the DOE lab system and others, and more.

We have, in the loan program we have a very strong legal team with deep background in corporate transactional work. We have a NEPA team that looks at those issues as well.

So the ability to bring on those folks and retain them gets to the issue of how you hire them. It gets to procurement and a whole set of issues, part 1.

Part 2: I think the greatest amount of clarity we can provide in the solicitation process is very, very important. In some respects, I'd describe it as the difference between a broadcast and a cable vision of the world, and I think increasingly as we have experienced, gone through this process, more narrow and targeted approaches are I think highly desirable because the amount of work is so significant on each project.

Which leads me to my third observation, which is that there is an important distinction between small projects and large projects, a corollary to that, between well-funded and less well-funded projects, between projects with existing technologies in a field for which there is data and those which are simply emerging, and each of those buckets needs to be handled somewhat differently.

So those are 3 of the most basic ways I think one would think about structuring.

Senator COONS. Thank you. One of my concerns, for anyone on the panel who wants to answer, one of my real concerns is the sort of mishmash of incentives and signals that we're sending to a rapidly growing marketplace. So I have supported extension of the R and D tax credits, the 48 [c] manufacturing credits, the 1603 Treasury grants program. I have wondered whether offering another signal, longer-term power purchase agreements, might be another constructive way.

How important is it, in your view, for us to have longer term rather than routinely and briefly extended tax credit or Treasury grant or other market signals, and how will CEDA fit into that as a potential solution? Any member of the panel who wishes to address it.

Ms. YANOSEK. I can take that. I think that it's critical that we have longer term policies. As an investor, I'm very challenged by the fact that I can't see into the future about 2 years from now whether or not Congress is going to extend something. That impacts investment dramatically.

We just saw the Q1 figures come out for global investment and they're down 30 percent from fourth quarter of last year. That's mostly due to government subsidies cutting back. It's also due to

the fact that, with the 1603 grant program, folks were rushing in to get that grant because they didn't know if there was going to be an extension or not.

I find this boom-bust cycle to be unsustainable. As a taxpayer, it bothers me. As an investor, I don't want to be a part of investments that have that political and regulatory risk associated, or policy risk associated with it.

My view is actually to some of the clean energy community somewhat provocative. My view is that if we're not focusing on the breakthrough technologies I think we should just go home, frankly. I believe that something like 30 to 50 percent of returns that are going to wind and solar projects are made up of government subsidies, and in my view CEDA must focus on the breakthrough technologies.

I do believe that a portfolio approach is important because you can leverage more outside dollars. I believe that CBO came up with a number that if you include nuclear projects that fund their own credit subsidy costs you can add another additional \$100 billion to the leverage that you would get out of CEDA.

So I do think that a portfolio approach is important, but the end goal has to be about funding this gap where the private sector won't go, and that's really, really critical in my view.

Thank you.

Mr. REICHER. Senator, if I could just add one quick example. Do you have a moment? When I was at Google before moving over to Stanford, we made an early stage investment along with Marubeni and Good Energies in a project to build a high voltage DC transmission line from the New York-New Jersey border down to the Carolinas under water off the Atlantic coast to hook up what will hopefully be large amounts of offshore wind.

Senator COONS. Hopefully go just off the coast of Delaware.

Mr. REICHER. Yes, your very State. You know the project well.

That project is moving forward. Permitting is moving forward, discussions with the Federal Energy Regulatory Commission, with the State public utility commissions. But it is indeed an innovative project, and it is hard to know, looking out 1 year, 2 years, 3 years, what kind of Federal tools will in fact be there at that moment when the big money, literally measured in billions of dollars, needs to be put together to build that very innovative project.

So we have a real serious problem in this country today, which are signals that we send that are very unreliable to the investment community at whatever stage, from venture all the way down to the big banks on Wall Street.

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

The CHAIRMAN. Thank you.

Senator Murkowski, did you have additional questions?

Senator MURKOWSKI. I don't have additional questions. I'm just pondering what Ms. Yanosek said about the importance—you don't call it the valley of death. You call it your commercialization gap, I guess. You know, our problem around here is once we get something started we can't pull it back. We can't, whether it's an investment—well, we have the investment credits and they're good for a couple years. But once we seem to get something in place, then you develop that reliance, and how we then wean those who have taken

advantage of these opportunities, how we get them off it then, is another part of our problem that needs to be addressed here.

So hopefully something like a CEDA would allow us to just focus on these new developing technologies, give them that kick-start that they need, and then they're on their own, theoretically.

Ms. YANOSEK. I definitely agree with you wholeheartedly. I think that the difference between this proposal and some of the others that were out there, like the green bank proposal last year, really was focusing on the amount of capital that could be leveraged off the sidelines from the private sector. But at the end of the day, if you're just addressing a short-term financing challenge, which was the argument for investing in these conventional energy technologies, that credit gap has moved on. We've moved on past that short-term financing need, and this is a persistent financing need that the government needs to step in and play a role in.

Thank you.

Mr. SILVER. Senator, I'd like to put in a word for what I would call innovative but nonetheless commercial projects, because I think the issue of scale is critically important. In the loan programs to date, we have provided financing support for the world's largest wind farm, the world's 2 largest solar thermal plants, the first nuclear power plant to be built in quite a long time. We've really changed the face of concentrated solar power by doubling it.

Projects at scale are almost definitionally commercially based, but there are innovative features to each. As I said earlier, I believe the significance of driving down unit costs and building out supply chains should not be underestimated in terms of its ongoing importance.

Mr. GUTH. If I may, I think your point is well taken. If you look at—I think it was mentioned already. If you look at what has happened in Germany in the last year, when they had to, because of austerity conditions, trim their feed-in tariff, the solar industry has been decimated globally, because they had become so dependent upon that handout. Frankly, investors will make money anywhere they can, whether it's off of a central government in Europe or whether it's off a trading market.

It's clear in that instance that not only has it become overly dependent, but that it stifled innovation, from the standpoint that manufacturers will only do what they need to do in order to qualify for the feed-in tariff. There's no incentive to move beyond that.

Where CEDA fits in—and a plug for my written testimony. I put a graph in here that I stole from DOE, that we created when I was there, that shows the deployment process. CEDA fits in that very unique gap that is not here right now. All the other tools we're talking about are much further down the line. I think they need to be discussed. To your original point and I think your ultimate point about offsets, that should be discussed and, frankly, has to be discussed as part of this overall concept.

But it's vitally important to realize that what the CEDA that this committee reported is talking about is solely getting those nascent technologies, the first, second, third, whatever it might be, fifth, basically following the loan guarantee concept and helping those get to that next stage where private investment will come in. It's not, rightfully so—and I commend the committee for this—it's not try-

ing to get the 50th and 500th of a kind technology out there. Frankly, even from a scaling perspective, I think there are other tools for that, but CEDA is probably not the best one for it.

Mr. REICHER. I would only add, Senator Murkowski, that you make a logical argument, but I would caution you on 2 aspects. One, we do have to look from a competitiveness standpoint at what other countries are doing in this clean energy race. Many of them are in fact providing an array of support beyond this innovation stage.

The innovation stage is absolutely critical. It is where everything else flows from, and CEDA is a great answer to that. But we are in fact in a very heated race and other countries are providing a lot of support downstream of that, No. 1.

No. 2, if we were to pull back with these downstream sort of incentives post-CEDA in a sense, I think we'd need to be fair about how we did it across the entire range of energy technologies, including conventional ones. To pull back from renewables, for example, and leave other incentives in place for more traditional supplies I think would further torque this market in an unfortunate way.

Senator MURKOWSKI. Thank you all.

The CHAIRMAN. Senator Coons, did you have additional questions?

Senator COONS. If I could, Mr. Chairman, just one last question.

You raised to me a fascinating point about competitiveness and the tools that our global competitors are using. How would CEDA compare? Are there comparable structures? I mean, I'm relatively new to the whole concept of how our competitors are financing their investments in either emerging or breakthrough technologies in this space. How would CEDA compare? In your view, since I think there's broad agreement on the desirability of the challenges it's funding, how important is this to making America competitive in the next decade?

Anyone who seeks to leap in?

Ms. YANOSEK. This is an area that I have spent a long time trying to find the answer to. I think it's a big enigma what's going on in China. But I would say that, unlike the process by which we go through here to assign credit subsidies to certain investments and the long process we go through with the DOE and OMB, I think that essentially China doesn't have to manage the democracy that we have in this country. So therefore the investments are going by direct loans from the banks and the banking community in China. Free real estate and buildings for a lot of these facilities.

There is obviously a much more nuanced relationship between government and business, and therefore China is able to put capital, low-cost capital that's coming from the government in many forms, into these investments. They range from the breakthrough technologies to the wind farms.

Now, China also has other problems, so certainly we saw \$50 billion worth of investment going into China last year. If you go there you'll see that about 50 percent of the wind turbines are not connected to the grid. So there has been this huge movement of capital into the country for jobs, job creation, for developing of the manu-

facturing businesses, but I also think that we're not going to necessarily see the sustainable growth there either.

So I do think that our approach here to think very carefully about the right mechanisms is critical. But in terms of specific other programs that we can look at like CEDA, there are other green banks that are being put together or thought about in Europe. In my view, I think CEDA is a much better mechanism because it is focused on breakthrough technologies and solving a real problem. I don't necessarily see that happening with the U.K. green bank, for example.

Mr. REICHER. The only thing I would add to that answer is that we do have a number of companies struggling in this country to build project No. 1 as a result of this lack of CEDA. As much as the loan guarantee program is helping, it can't fill the entire bill and it doesn't have all the tools. China is the No. 1 option for many of them. There is in fact, as Kassia said, an array of low-cost financing. There is a willingness to take on some risk in getting this first plant built.

So we have to be very mindful that that's a very likely place where plant No. 1 of a particular technology gets scaled up and we lose a lot of benefits as a result.

Senator COONS. I'm very concerned about that loss of early market leadership and intellectual property that seems to be going on whole-scale across whole families of technologies.

Mr. REICHER. Including, I would say, in offshore wind. Lots of development there and we still haven't seen project No. 1 built.

Ms. YANOSEK. Also, one more thing on China actually, just very quickly, which is that what we're also seeing is that utilities here in the United States are desperate for seeing technology scaleable in their own country. They're having a lot of trouble doing that here with the loan guarantee program and otherwise, so they're actually partnering with firms in China, particularly around coal gasification. If you talk to the CEOs of these utilities, they will tell you: We're looking to bring back that technology into the United States.

So it's something we need to be very conscious of moving forward.

Senator COONS. Thank you.

Thank you very much, Mr. Chairman.

The CHAIRMAN. Thank you all very much. I think it's been a useful hearing and we appreciate your excellent testimony.

[Whereupon, at 11:36 a.m., the hearing was adjourned.]

[The following statements were received for the record.]

U.S. DEPARTMENT OF AGRICULTURE,  
OFFICE OF THE SECRETARY,  
Washington, DC, May 24, 2011.

Hon. JEFF BINGAMAN,  
*Chairman, Energy and Natural Resources Committee, U.S. Senate, 304 Dirksen Senate Office Building, Washington, DC.*

DEAR MR. CHAIRMAN:

I take this opportunity to inform you of the U.S. Department of Agriculture's (USDA) contributions to renewable energy as you continue your discussions on the proposal for a Clean Energy Deployment Administration as contained in Title I, Subtitle A of the American Clean Energy Leadership Act of 2009 as offered by S. 1462 of the 111th Congress.

USDA's support for renewable energy is an important part of a much broader commitment to a cleaner and greener future, an energy policy that reduces our dependence on imported oil, and a strategy that promotes jobs and economic growth in the United States. USDA's commitment has included investment in energy efficiency, clean energy production through biofuels, biomass, wind, solar, geothermal, and hydroelectric power, as well as basic scientific research into second and third generation biofuels.

USDA has many programs to assist farmers, forest owners, rural businesses, rural residents, and the Nation respond to energy-related issues and opportunities. These programs range from basic scientific research to the development and commercialization of new technologies. Specifically, we have focused on outreach and education, technical assistance programs, financial support for infrastructure, and the adoption of energy-saving products by USDA itself.

For example, USDA supports the modernization of the rural electric grid and the deployment of smart grid technologies in order to modernize rural electricity and facilitate the use of clean energy into the grid. From more efficient farming techniques, wind farms, and ethanol plants to biochemical and genomics research, USDA is deeply involved in and committed to the Nation's quest for clean energy and energy security. In fiscal year (FY) 2010 alone, USDA invested over \$1 billion in clean energy. USDA has a number of clean energy investments, activities, and programs that are listed on the enclosure.

The Administration recently put forth a Blueprint for a Secure Energy Future, focusing on the development of domestic clean energy supplies to help harness America's clean energy potential. Recognizing the promise of commercial development of cellulosic and advanced biofuels, their potential contribution towards reducing our oil dependence, and the current challenges to bringing those technologies to scale, the President has set a goal of breaking ground on at least four commercial-scale cellulosic or advanced biorefineries over the next 2 years. In addition, the President has challenged USDA, the Department of Energy, and the Department of the Navy to investigate how to speed the development of drop-in biofuel substitutes for diesel and jet fuel.

President Obama has set an ambitious goal of reducing oil imports by one-third from 2008 levels by 2025. Increasing both biofuel production and the use of biofuels are important parts of achieving that goal. The Administration is working on an integrated research strategy to overcome barriers to increased use of today's biofuels and to accelerate the development and commercial deployment of next-generation biofuels. This strategy includes targeted investment in biofuels distribution infrastructure, support for research, development and early-stage deployment of promising next-generation biofuels technologies, and implementation of the Renewable Fuels Standard and other key components of the regulatory framework.

USDA's commitment to renewable energy is longstanding. While there are urban and suburban sources of renewable energy, renewable energy is largely rural energy. Biofuels and bio-based products rely primarily on farm and forest feedstocks. Due to siting challenges, large-scale wind and solar farms, as well as geothermal plants, may be located in rural areas. In addition to its environmental, energy security, and national security implications, renewable energy is an important source of jobs, economic growth, and tax revenue in rural communities across the country, while biofuels and biomass offer exciting new opportunities specifically for American agricultural producers. Our Nation's future depends on out-innovating, out-investing, out-educating, and out-building our competitors in an ever-more integrated world economy. Renewable energy is clearly one of the sectors in which we must win the future. Furthermore, the President has set a clean energy goal of 80 percent of the Nation's electricity coming from clean energy resources by 2035.

USDA has entered into Memoranda of Understanding related to renewable energy with the Department of the Navy and with the Federal Aviation Administration (FAA), and we work closely with many partners in academia and the private sector as well. The aviation industry is a prime example of a sector that is pressing forward to transition to renewable jet biofuels.

The accelerated deployment of renewable energy is a high priority for the Obama Administration, as it has been for Congress as well, on a bipartisan basis, for many years. We are partners in this effort, and welcome this opportunity to inform the Committee of USDA's role in helping to build a cleaner, more secure, more sustainable, and domestically-produced energy sector for future generations. A similar letter is being sent to Senator Murkowski.

Sincerely,

THOMAS J. VILSACK,  
*Secretary.*

## ENCLOSURE.—CLEAN ENERGY INVESTMENTS, ACTIVITIES, AND PROGRAMS

*Research in Renewable Energy*

- USDA's Office of Energy Policy and New Uses recently released a seminal report titled, *Renewable Power Opportunities for Rural Communities*, on the potential for renewable energy in rural America.
- SDA completed a Biofuels Roadmap identifying barriers to and proposed plans of action to meet Congressionally-mandated Renewable Fuel Standard (RFS2) goals for national biofuels production and use, with detailed information by region. ([http://www.usda.gov/documents/USDA\\_Biofuels\\_Report\\_6232010.pdf](http://www.usda.gov/documents/USDA_Biofuels_Report_6232010.pdf))
- USDA has established five regional research centers (led by the Agricultural Research Service and the Forest Service) working on the scientific research necessary to ensure reliable and profitable biofuels can be produced from a diverse range of feedstocks across the nation. The latest genetic methods and natural resource management tools are being used to find the most sustainable ways to produce the feedstocks needed for the next generation of biofuels.
- In 2010, the National Institute of Food and Agriculture (NIFA) Agriculture and Food Research Initiative Sustainable Bioenergy Challenge awarded approximately 50 grants totaling \$40 million. The grants fund research, education, and outreach supporting the development of regional systems for the sustainable production of biofuels, biopower, and biobased products. These grants are implemented through regional Coordinated Agricultural Projects (CAPs) that focus on five dedicated energy crops aimed at producing advanced non-ethanol fuels and biobased products. The CAPs also provide innovative education programs for bioenergy workforce development; and sustainable bioenergy research projects targeting biofuel conversion co-products, carbon sequestration, and feedstock crop protection.
- From 2008 to 2010, approximately 30 grants totaling about \$30 million were jointly awarded by NIFA and the Department of Energy (DOE) to accelerate fundamental genomic research of cellulosic bioenergy feedstock crops, such as fast-growing trees, shrubs, and grasses.
- NIFA has also funded research through the joint USDA/DOE Biomass Research and Development Initiative. In 2009, USDA funded nine projects worth approximately \$18 million, and, using 2010 dollars, is about to award approximately \$35 million to 7 awardees, along with DOE's awarding a \$6 million grant. These funds focus on near-term research and development of technologies and methods to produce biofuels, bioenergy, and high-value biobased products. Projects must address the environmental, economic, and social impacts of the technologies as they are developed. Advanced biofuels produced through 2010 funding are expected to reduce greenhouse gas emissions by at least 50 percent as compared to fossil fuels. Earlier this month, USDA and DOE announced grants of \$42 million that funded eight research and development projects to support the production of biofuels, bioenergy, and high-value biobased products from a variety of biomass sources.
- The National Agricultural Statistics Service (NASS) collects valuable information on agricultural practices and production, which are further analyzed by the Economic Research Service (ERS) to assess the economic implications of biofuel production on commodity prices, use and conservation of land, environmental outcomes, greenhouse gas emissions, and markets for biofuel by-products.
- In February 2011, NASS also released the "On-Farm Renewable Energy Production Report" which provides on-farm bioenergy production data for wind, solar, and methane digesters

*Investments in Renewable Energy Production*

- We are investing in advanced biofuels and biomass energy projects in each of the five regions of the country identified by our Biofuels Roadmap, funding construction and updates to production facilities as well as feasibility studies in 27 States and the Western Pacific.
- The Bioenergy Program for Advanced Biofuels made payments worth nearly \$30 million to more than 120 recipients in 34 States.

We are supporting potential biorefineries for advanced biofuels in Michigan, Florida, Georgia, Mississippi, and New Mexico, an investment totaling over \$302 million through loan guarantees.

- In 2 years, the Forest Service' Woody Biomass Utilization Grant Program invested \$11.5 million and \$19 million in leveraged dollars to fund 41 projects, saving or creating more than a hundred jobs and using hundreds of thousands of green tons of woody biomass from forest restoration activities for renewable energy generation and use at bioenergy facilities.

- In April 2011, USDA announced a clarification of one of our most popular energy programs, the Rural Energy for America Program (REAP), so that it was clear to our stakeholders that flex fuel pumps for biofuel dispensing were eligible for funding.
- We have made investments in more than 270 wind energy projects over the last 2 years under REAP.
- USDA has invested \$152 million in smart grid over the last year and is preparing to do more in the coming year.
- Since 2003, through USDA Rural Development's energy, business, and utility programs, have invested in clean energy and have created or saved 15,064 jobs, reduced greenhouse gases by over 19 million metric tons of CO<sub>2</sub>, and generated/saved over 15 billion kWh in energy, according to USDA's Rural Business-Cooperative Service' "FY 10 Energy Report."

*Support for Growers and Producers of Renewable Energy Feedstocks*

- Under the Biomass Crop Assistance Program (BCAP), USDA provides up to 75 percent of the cost to establish new energy crops, annual payments as the crops mature, and matching payments to transport the crops to bioenergy facilities.
- BCAP will reduce the financial risk for producers who support emerging biofuels markets by growing and producing renewable energy crops such as switchgrass, miscanthus, fast-growing woody poplar, jatropha, algae, energy cane, and pongamia.
- Biomass must be collected and harvested only with an approved conservation, forest stewardship, or similar plan to protect soil and water quality and preserve land productivity into the future. Further, biomass harvest cannot occur on native sod, and all crop collection, harvesting, and transportation must be in accordance with invasive plant species protections.
- BCAP will also kick-start liquid cellulosic biofuels to meet Renewable Fuel Standard targets by providing bonus incentives for the cultivation of cellulosic biofuels that have 60-percent lower lifecycle greenhouse gas emissions.

*Support for Energy Efficiency and On-Farm Energy Generation*

- From 2009-2010, under REAP, USDA helped nearly 4,000 rural small businesses, farmers, and ranchers save energy and improve their bottom line by installing renewable energy systems and energy efficiency solutions that will save a projected 4.3 billion in kWh—enough energy to power 390,000 American homes for a year.
- Working with the Innovation Center for U.S. Dairy, USDA is implementing key strategies from an MOU signed in December 2009 to cut greenhouse emissions from U.S. dairy operations by 25 percent by 2020 through increased use of anaerobic digesters. See below:

USDA Assistance Awarded to Anaerobic Digester Systems in FY2010

Program	Awards to Digesters	Awards to Dairy Digesters
9007 Rural Energy for America Program (REAP)	18	10
9007 REAP Feasibility Study Grants	22	14
Value-Added Producer Grants (VAPG)	4	2
Rural Business Enterprise Grants (RBEG)	1	1
Environmental Quality Incentives Program (EQIP)	6	5
Total	51	32

STATEMENT OF RAY ROTHROCK, GENERAL PARTNER OF VENROCK AND BOARD MEMBER OF THE NVCA

My name is Ray Rothrock. I am a 23 year General Partner of Venrock—one of the oldest venture capital firms in the United States. I am also a member of the Board of Directors of the National Venture Capital Association (NVCA), on whose behalf I am pleased to submit this testimony today. Attached to this testimony is

a related letter sent to the President of the United States on June 29, 2010 by many of my colleagues at the NVCA and other significant business and financial leaders.\*

During the last decade, the venture capital industry has committed a tremendous amount of time and resources to identifying the most promising innovations in the renewable energy sector and bringing those technologies to market. In just the last five years, U.S. venture capitalists have invested more than \$14 billion in an estimated 1,000 American companies in the clean technology industry. I can testify first hand to the promise of this emerging economy in terms of innovation, revenue growth and job creation.

My colleagues and I on the board of the NVCA can certainly understand how reasonable people can disagree on elements of U.S. energy policy. The importance of U.S. clean energy technology leadership in a global marketplace, however, should not be one of them.

America must lead the world in the development of low-carbon and renewable energy technologies if it intends to maintain its global economic primacy. Trillions of dollars and millions of U.S. jobs depend on it—not to mention our national security and the health of our planet.

Sadly, political paralysis on Capitol Hill is risking U.S. leadership in the race to shape the world's energy future. The data are coming in to illustrate this slippage in real time. For example, Bloomberg financial data shows that as early as 2009, the US slipped behind China for the first time ever in terms of overall clean energy finance and investment. And the accounting firm Ernst & Young reported in September of 2010 that China beat the US for the first time in the firm's annual rankings of 27 countries in terms of their attractiveness for renewable energy investment. The report cited in particular US failure to enact supportive national clean energy policy. It is not too late to change this course of events.

That's why Congress must act now to pass an energy bill that directly addresses the primary challenge in successfully developing and deploying innovative energy technologies: financing promising ideas from inception all the way to the marketplace.

This can prove exceptionally difficult for clean-energy technology innovations because they can require hundreds of millions or even billions of dollars to scale up to large-scale commercial facilities from small pilot projects which are often funded by venture capital investment or government grants. During this process, months can turn into years and years into decades. The time frame alone can kill even the most fragile and promising startup company. A single technology can consume billions of dollars before even one commercial-scale plant goes online. The risks to private investors to undergo this financing challenge so far is too great.

It's no wonder that so many promising energy innovations die on the vine, so to speak, during this scale-up process. This period or phase in development of these promising companies has been dubbed "the valley of death." The investments require too much capital for venture capital funds, and the scale-up process involves too much risk for traditional players like commercial banks and private equity firms. So the floor of the valley of death is littered with energy technology carcasses ranging from renewable energy to cleaner fossil fuel technologies to nuclear.

Fortunately, the Senate Energy Committee in 2009—on a bipartisan basis—devised a way for the federal government to help bridge this critical financing gap, bridging the "valley of death"—the Clean Energy Deployment Administration (CEDA). CEDA, while organized within the Department of Energy, would enjoy a healthy degree of independence. Most importantly, it would create an attractive investment environment for the full-scale deployment of new clean energy technologies. At this time, such a vehicle is essential to regain U.S. leadership in energy deployment.

CEDA would do so by managing an initial \$10 billion fund to provide loans, loan guarantees, and other credit enhancements to private investors, as well as provide secondary-market support to develop products such as clean energy-backed bonds that would allow less expensive lending in the private sector. In terms of cost, CEDA has been designed to pay for itself through a blend of returns on its loans and investments, royalties from patents and technology transfers, and fees for other services it will offer.

To some critics, CEDA may look like just another expansion of government, or an attempt by bureaucrats to pick winners and losers. It's not. In fact, CEDA aims to get billions of private-sector dollars flowing toward the most promising clean energy companies as identified by private investors. In effect, CEDA would help U.S. companies with proven technologies to get their first few large-scale plants up and running and then get out of the way—letting the private sector finance the rest of those

\*Signatures have been retained in committee files.

companies' growth. CEDA would follow the private sector, not lead it, in picking promising management teams and technology.

Perhaps most importantly, the billions in private investment that CEDA aims to unleash would help spur the creation of millions of jobs immediately. The job creation generated from venture-backed companies is well documented. According to a 2011 reporter by HIS Global Insight, companies that received venture capital in their formative years today account for 12 million jobs or 11 percent of U.S. private sector employment. Armed with the confidence that CEDA will be there to help bridge the "valley of death" for their portfolio companies, enactment of CEDA legislation would by itself prompt venture capital and private equity firms to start investing right now in breakthrough clean-energy technology companies. The establishment of CEDA, the provision of CEDA's initial funding and then self-sustaining financial engine, and the implementation of its professional and independent management structure would provide exactly the kind of stable, long-term, dependable policy mechanism that investors and businesses need to grow in the United States.

The alternative course of action—failure to enact CEDA—could cripple the competitive global economic posture of the United States in energy. Other countries, from China to Germany to Japan, have already put an array of measures in place to help their nascent clean technology industries grow into global leaders. A September 9, 2010 New York Times article highlighted the myriad ways that China has done this, including providing debt financing at critical junctures in the growth cycle of these companies. The United States has a strong research and development system and a highly entrepreneurial culture, but unless new American clean energy companies can find the capital they need to bridge the "valley of death" here in the U.S., they will have to go where the money is which is abroad.

I cannot emphasize this point enough. Given the willingness and ability of other countries to provide financing to new clean-technology companies, U.S. companies (and their investors and investment bankers) must do a very sober assessment of the pros and cons of locating their next facility in those foreign countries. In fact, it is becoming increasingly common for potential investors and investment bankers to ask companies not about WHETHER they might consider locating operations in China, but rather about what their current plan IS to locate operations in China. Recent anecdotal evidence bears this out. Within just two hours of receiving an email sent to NVCA clean energy firms inquiring whether they knew of U.S. innovative companies that had moved facilities to China for financing for their commercial facilities, those members named and told the stories of 15 companies that had done precisely that.

It is not realistic to suppose that the United States will appropriate government dollars to deploy clean energy facilities and plants in amounts sufficient to match the expenditures of a country like China. Bloomberg News reported on July 20, 2010 that China is planning to invest \$738 billion over the next 10 years. The hope for the U.S. to compete with these vast expenditures is to spur comparable private-sector investment in the deployment in clean technology facilities in the U.S. And CEDA is the public policy mechanism to accomplish that objective and to realize that hope.

In the alternative, if the U.S. fails to enact CEDA and regain the lead in clean energy technology deployment, we will likely see U.S. innovators take their promising technologies abroad, at the expense of developing and commercializing them here at home to say nothing of the loss of domestic job opportunity. If that happens, we will have made a mistake of historic proportions at a critical point in America's economic history. We will—by inaction—have consciously ceded to other nations, economic growth, millions of high-paying new jobs, and global leadership that goes hand-in-hand with one of the most important industrial sectors of the 21st century.

Thank you for accepting this testimony in conjunction with the hearing on May 3, 2011 of the United States Senate Energy and Resources Committee.

ATTACHMENT

*June 29, 2010.*

The PRESIDENT,  
*The White House, Washington, DC.*

DEAR MR. PRESIDENT: When we first wrote you on January 21 of this year, we were 13 entrepreneurs, investors, and industry stakeholders active in the transition to a low-carbon energy economy, urging you to work with Congressional leaders to craft a jobs package that includes the immediate creation of a Clean Energy Deployment Administration (CEDA). We have now been joined by many others in this letter to reiterate our strong belief that CEDA's swift enactment will both spur the

creation of jobs in 2010, and position the U.S. as the global leader in the development and deployment of clean energy technologies for years to come.

The need to enact CEDA is now all the more urgent as part of the comprehensive clean energy bill you have called for. The tragic oil spill in the Gulf of Mexico highlights the critical need for investment in the deployment of breakthrough clean energy technology—the core focus of CEDA—to better position the U.S. to reduce its oil dependence.

In our first letter, we explained that the Senate Energy and Natural Resources Committee had adopted bipartisan legislation to create CEDA, and how the Senate's version of CEDA would create a financing entity with the skill, flexibility, and independence to effectively provide the necessary credit support for the development and deployment of clean energy technologies throughout the economy. Most importantly, we highlighted the focus of the Senate's CEDA bill on innovative technologies and how it will help America's emerging clean energy technology companies cross the so-called "valley of death" between the invention of a technology and its full commercial deployment. We argued that this focus would substantially accelerate and increase the private sector investment necessary to position the U.S. as the global clean energy leader.

It has become apparent that to create high-paying jobs now, we need to enact the Senate's version of CEDA now. Venture capital funds and other private investors are ready to invest in clean energy entrepreneurial companies today if they know that the government is poised to help finance the scale-up of these companies' technologies when they are ready to build their first commercial facilities tomorrow. These investments—and the jobs that they will create—need not wait until CEDA is actually up and operating. The swift enactment of CEDA will significantly increase confidence necessary to spur these investments right now. By expeditiously enacting the Senate's CEDA into law we will not only accelerate the flow of investment into technologies that will reduce our dependence on foreign oil, but we will also contribute to significant job creation here in the U.S.

In conclusion, this now larger group of entrepreneurs, investors, and industry stakeholders once again extends an offer to discuss this matter in more detail with Administration officials. Thank you again for your consideration and your leadership in the emerging clean energy economy.

## APPENDIX

### RESPONSES TO ADDITIONAL QUESTIONS

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#### RESPONSES OF KASSIA YANOSEK TO QUESTIONS FROM SENATOR BINGAMAN

*Question 1.* Critics would say that other technologies have traversed the Commercialization Gap you mentioned in your testimony without government intervention. From your perspective as a market participant, what is different about energy that requires government intervention? Is it just the competitive pressure of other governments that are providing support, or is there something fundamentally different about energy?

Answer. Significant capital is often needed to move technologies from pilot testing to deployment—capital that does not fit the risk/return profiles of venture, private equity, or debt financing. As such, these technologies and projects are stuck in the “Commercialization Gap”. Traversing this gap is critical for accelerating new technologies from first-commercial demonstration to widespread adoption and deployment by the private sector.<sup>1</sup>

- What is unique about energy is that the private sector is often unable to realize enough of the available economic benefit to warrant the costs of traversing the Commercialization Gap. Unlike “capital-light” sectors such as information technology, the energy sector often requires high capital expenditures for first commercial projects. Furthermore, these high upfront investments coupled with venture capital-like risks, warranting high internal rates of return for private sector investors. Such returns can be elusive in the energy sector—particularly for electric power innovations—due to the limited returns electricity can provide its end seller, often a regulated utility limited by the price it can charge for innovative power.

Utility-scale concentrated solar power generation provides a case study for the role for government intervention—a role that CEDA could play in helping such a technology traverse the Commercialization Gap. First-commercial, utility-scale solar power projects, often requiring billions in initial capital investments, are plagued by a persistent financing challenge as the risk/return profile of such projects are undesirable for private investors. Unlike innovations in industries such as consumer electronic products which can be rewarded by high price points driven by consumer demand, such incentives do not exist for the electric utility sector. Price points (e.g. prices set by power purchase agreements) are driven by conventional fossil fuel alternatives and/or are capped by regulators.

Figure 1\* shows the value chain for the solar energy production—from the mining of the silicon to the sale of electricity to a consumer—of utility scale solar power. Each link in this value chain requires an enterprise to produce a product and take a margin on the sale from the next link in the value chain. At the end of the chain, when the utility sells the generated electricity to the consumer, the utility will have to charge a high enough rate that it recovers—at a minimum—the sum of the margins charged across the value chain. For many new technologies, this allowed rate is not high enough to cover the cost of the value chain—and the margins necessary to justify the risks, compared with other alternatives. (Note that a combined cycle gas plant can be built for \$1,000 per kilowatt of installed capacity, while a solar plant requires \$3,000 per kilowatt). The most challenging piece of the value chain from a financing perspective is that of the project developer, who must arrange for billions of dollars of capital to develop and construct such a facility. For a project which has not yet

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<sup>1</sup>See Appendix A for a description of the risk/return profiles of the staages of energy technology innovation. [Note: Appendix A has been retained in committee files.]

\*Figure 1 has been retained in committee files.

been proven commercially at scale, government intervention is necessary to either underwrite the risk or underwrite the return of this asset in order to successfully bring private sector equity and debt providers to invest in the project's development and construction.

- Persistent funding support for clean energy innovation by other governments—and inconsistent funding support by the U.S.—will ultimately result in a reduction in U.S. technological innovation and competitiveness. While it is difficult to parse out how other governments are funding clean energy technologies in the Commercialization Gap, it is clear that much of the overall clean energy investment growth has shifted from Western economies to growth economies such as China, as demonstrated by 2010 investment data. Last year, investment in China was up 39% to \$54bn, larger than any one country.<sup>2</sup> This investment has in part gone to growing China's manufacturing capabilities as a supplier of clean energy technologies, particularly in wind and solar. Starting in 2008, Chinese solar module suppliers have consistently acquired market share from U.S. and European manufacturers. Historically, such manufacturers aimed for 30-40% gross margins on modules; Chinese suppliers as of recent have been willing to sell for 20-30% margins.<sup>3</sup> While margin erosion brings down the overall cost of installing solar (and is a good thing for consumers), U.S. suppliers will continue to see their market share erode without innovations or cost reductions that allow them to compete with their Chinese competitors. Chinese supplier market share has grown from 5-15% in 2008 to 56% as of Q4 2010. Figure 2\* illustrates suppliers of solar PV modules to the California market from 2007-2010:

*Question 2.* You've spent some time looking at what other countries have done to provide financing for clean energy projects. Can you compare the scale of those programs with what we're contemplating here with CEDA? Do we need to match their investments?

*Answer.* Comparing CEDA—which would prioritize financing the scale up of breakthrough technologies—to other like-minded government programs is difficult. Much of the government-backed clean energy financing activity in the U.S., Europe, China and elsewhere has been dedicated to project financings of conventional renewable technologies such as wind farms and solar parks, rather than first-commercial projects. In 2010, the China Development Bank made \$35bn available in credit facilities for six domestic wind and solar companies. In contrast, the U.S. government Federal Financing Bank provided \$2bn in financing to the clean energy sector.<sup>4</sup>

U.S.-China partnerships are an indication that U.S. firms see the potential for developing first-commercial technologies first in China. In January 2011, a number of U.S. firms announced partnerships with Chinese firms to pursue technology developments in areas such as coal gasification. General Electric and China Huadian Corporation confirmed a joint venture on gas turbines for China. GE also announced a deal with Shenhua to develop coal gasification technology in China. Alcoa and China Power Investment Corp. announced a project for aluminum and clean energy projects in China. Duke Energy and AEP respectively announced MOUs with Chinese energy firms for joint demonstrations of clean coal technologies.

The U.S. may not need to match China's investments dollar for dollar. China's macroeconomic policies to maintain GDP growth have led to inefficient uses of investment capital, demonstrated by the fact that 50% of wind farms remain unconnected to the grid. However, China's capital and labor cost advantages will continue to pressure export markets and the U.S.' ability to compete, unless the U.S. shifts its policy priorities to providing intervention where it is needed most—financing the scale up of more innovative technologies.

CEDA is designed to put efficient government dollars to work in partnership with the private sector, for financing technologies which have a chance over time to become cost-competitive with conventional energy. The one-time \$10 billion capitalization needed for this evergreen program provides taxpayers a “bang for their buck”, particularly when compared to other government programs which have deployed capital for clean energy in the form of grants with no return. As a comparison, the Section 1603 Treasury Grant program is expected to cost approximately \$10 billion through the end of 2011, equal to the one-time capitalization needed by CEDA.

<sup>2</sup>Bloomberg New Energy Finance

<sup>3</sup>Bloomberg New Energy Finance 3 Power advocate, <http://marketing.poweradvocate.com/webfm—send/476>

\* Figure 2 has been retained in committee files.

<sup>4</sup>Bloomberg New Energy Finance.

*Question 3.* Fundamentally, CEDA is taking on risks that private banks are not interested in taking. An economist might say this means the market is telling us the investments are not worth making. How do you react to this criticism? Is there some type of market failure here that is keeping these investments from happening?

Answer. The economist would only be right if he or she is solely considering conventional clean energy technologies, and ignores the “breakthrough” technologies that have yet to be commercialized. The market failure is the “Commercialization Gap” characterized by a persistent financing challenge that the private sector cannot address alone. The benefits of commercializing new clean breakthrough energy technologies that can compete in an open market with fossil-based fuels are well documented; there is limited disagreement on this vision in developed economies around the world. Government intervention is worthy of intervention in this regard. The rationale is less justifiable for intervening on behalf of technologies that will perpetually require subsidies to be competitive in an open marketplace.

To help close the Commercialization Gap, the U.S. government can lower the financial risks the private sector faces in investing in the deployment of breakthrough technologies. CEDA’s credit support products will do just this, improving the risk/return profile for these risky yet capital intensive technologies and enabling private sector capital to participate. Loan guarantees have already proven essential to promising large-scale solar projects and to firms that test new technologies to burn coal more cleanly. CEDA, as drafted, would incorporate the existing loan guarantee program and improve upon it. Important aspects of CEDA include the following:

- Emphasis on breakthrough technologies. CEDA addresses the Commercialization Gap funding challenge and serves to move private capital off the sidelines by improving the risk/return profile of commercializationstage technologies. CEDA’s portfolio approach will pool risk and diversify investments, allowing for losses on some investments to be offset by gains on others.
- A broad array of tools to accelerate the deployment of clean energy technologies. Credit support includes loans, loan guarantees, insurance products, and debt instruments that allow CEDA to participate as a co-lender or member of an investor syndicate. CEDA may also provide indirect market support to develop securitized products. These tools enhance and expand the ability for the DOE to provide funding solutions for a range of technologies and projects.<sup>5</sup>
- A separate administration within the Department of Energy, similar to FERC. CEDA’s separate Administrator and Board of Directors would provide CEDA substantial independence within DOE, much like FERC enjoys. This independence will likely help to reduce lengthy review processes which have challenged DOE’s loan guarantee programs.
- Funding mechanisms which permit CEDA to become self-sustaining. Profit participation, as defined in the CEDA legislation, will allow CEDA to be compensated for risk with upside in successful companies and/or projects. This is one mechanism by which CEDA could self-fund over time, similar to a mechanism employed by the Overseas Private Investment Corporation (OPIC) Fund Program. OPIC provides loan guarantees to private sector funds in return for a preferred government return. Achieving self-funding status is a significant goal as it would permit CEDA autonomy from the appropriations process.

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RESPONSES OF CHRISTOPHER GUTH TO QUESTIONS FROM SENATOR BINGAMAN

*Question 1.* The thrust of your testimony is that CEDA can greatly accelerate the development of new technologies and bring them to the commercial market faster. I agree that the goals of energy security, environmental quality, and job creation are urgent. I think you’d also agree that this is a growing global market. Can you speak to how urgent this accelerated development is to maintain international competitiveness as well?

Answer. Technology development and deployment are one of the keys to maintaining and improving America’s competitiveness in the global market. This is true in medicine, information technology, biotechnology, and defense to name a few, and it is no less so regarding energy technology. While there is most certainly a value in developing and marketing new applications or devices at home and around the world, the primary economic benefit energy technology development delivers is by providing a stable, reliable, and affordable supply of energy.

The last decade has made this point abundantly clear in the petrochemical industry, where a self-imposed supply shortage in the U.S. drove natural gas prices to

<sup>5</sup> See Appendix B for a description of potential CEDA financial products. [Note: Appendix B has been retained in committee files.]

historic levels very quickly. Between 2000 and 2008 prices increased 460%. The petrochemical industry is very dependent upon natural gas, not only as a source of processing energy but also as a hydro-carbon feedstock to produce everything from pharmaceuticals to plastics. The staggering price increases quickly made it unprofitable to operate in the U.S., contributing to the industry shedding more than 120,000 jobs, many of them relocated to countries with much less restrictive natural gas production laws and thus, more stable and affordable prices.

However, technology development and deployment has now enabled us to gain access to one of the largest proven natural gas reserves in the world. The combination of decades-old hydraulic fracturing technology with the newer horizontal drilling technology made access to and production from formations rich with natural gas not only possible but profitable. Prices have receded to levels not seen in nearly a decade, and the petrochemical industry is cautiously optimistic that it can grow again in the U.S. if this trend continues.

The ability to develop and deploy technologies that will ensure stable and affordable energy prices is directly tied to economic health and competitiveness. The creation of a tool like the Clean Energy Deployment Administration (CEDA) would be a positive step towards bringing new technologies to market and achieving this important goal.

*Question 2.* Do you have any data on investments by international competitors in this sector, or any other measurements of market potential that could help us get a sense of if the scale of CEDA is sufficient to the task?

Answer. We are currently measuring and gathering quantitative data on the energy investments of other nations. While we are not finished with this activity, it is clear that other countries, while investing heavily in traditional sources of energy, are also investing heavily in advanced energy technologies. It is also clear that nations with the greatest economic growth are not limiting investment into any one technology, but rather are investing in any and every technology that meets the goal of supporting economic growth and bringing reliable and affordable energy to millions who currently lack such basic resources.

We do not think CEDA should be seen as the only tool to promote energy technology deployment. Fundamental certainty of regulatory and fiscal policy has historically had the greatest impact on energy technology deployment investments. Similarly, looking at the tremendous siting and permitting barriers that have evolved under the National Environmental Policy Act since its inception 40 years ago, removing regulatory hurdles must be at least as high a priority as financing new technologies, if not greater. Policy tools like CEDA will help to draw capital to technologies with prohibitively high technological and economic risk, but if siting and permitting a project remains an unpredictable gamble, CEDA will not—indeed, cannot—be as effective as it could be.

#### RESPONSES OF CHRISTOPHER GUTH TO QUESTIONS FROM SENATOR SANDERS

*Question 1.* Does the U.S. Chamber of Commerce believe that CEDA should be a “permanent financing platform” for nuclear power as is advocated by the Nuclear Energy Institute?

Answer. The U.S. Chamber of Commerce supports CEDA’s limited scope, as embodied in the version reported out of the Energy & Natural Resources Committee in 5. 1462, the American Clean Energy Leadership Act, in the 111th Congress. The goal of CEDA—and the reason the U.S. Chamber supports its creation—is to address the structural financial barriers that inhibit new energy technology deployment. These barriers are prohibitively high technological and economic risk. As drafted, CEDA is not designed to scale any technology, whether it be nuclear or wind. But some versions of these technologies certainly fit within CEDA’s scope (e.g. off-shore wind or advanced nuclear), but not indefinitely. Once a particular technology or application has reached a certain threshold, it should no longer qualify for CEDA consideration.

*Question 2.* Does the U.S. Chamber of Commerce believe that there should be a limit on the total amount of credit support CEDA can provide to ensure it does not over-extend itself and leave taxpayers on the hook?

Answer. The U.S. Chamber of Commerce feels that a diversified portfolio of technologies is crucial to achieving its public policy goals and to mitigate risk to taxpayers. CEDA’s compliance with the Federal Credit Reform Act coupled with its proposed structure and focus on diversification will protect tax-payers.

Moreover, requiring recipient projects to pay operational costs through fees as well as any credit subsidy costs will further mitigate risk. Additionally, an expeditious issuance of public bonds and requiring CEDA to ultimately repay the initial federal capitalization should be considered.

*Question 3.* Does the U.S. Chamber of Commerce believe mature technologies such as conventional coal plants and nuclear plants should be excluded from CEDA financing since CEDA is focused expressly on helping breakthrough technologies scale up and make it past the “valley of death”?

Answer. The U.S. Chamber supports CEDA because it does focus on new or breakthrough technologies. As drafted, CEDA is not designed to scale technologies. This is true for existing nuclear and conventional coal technologies, as well as traditional wind and photovoltaic technology. CEDA is crafted to overcome technological risk barriers, which is not evident in any of these technologies. However, clean coal (e.g. supercritical, IGCC, and CCS) and advanced nuclear (e.g. generation 3+ and Small Modular Reactors) clearly fit within CEDA’s defined scope today, as would concentrated solar thermal and offshore wind. If and when a technology is deployed to the point where technological risk has been mitigated, it should no longer be eligible for CEDA consideration.

*Question 4.* Does the U.S. Chamber of Commerce recognize and accept the scientific finding, as stated by the U.S. Global Change Research Program which includes the Departments of Commerce, Defense, Energy, Interior, State, Transportation, Health and Human Services, Agriculture, as well as EPA, NASA, The National Science Foundation, and the Smithsonian Institution, that “global warming is unequivocal and primarily human-induced”?

Answer. As noted in my written testimony: “Irrespective of regulatory regimes we decide to impose in the future, it is clear that the development and deployment of newer, more efficient, and cleaner energy technologies will be needed to secure our energy future.”

One of the primary reasons we support CEDA is that it is simultaneously focused on improving the country’s energy security and reducing environmental impact of energy production, transmission, and use.

*Question 5.* If the answer to question number 4 is yes, does the U.S. Chamber of Commerce support action by this Committee to add clearly defined metrics to ensure that CEDA only finances projects that lower carbon pollution relative to conventional technology?

Answer. The U.S. Chamber supports CEDA’s definition of clean energy technology. The creation of the Department of Energy’s Title 17 loan guarantee program demonstrates that allowing agency flexibility in such endeavors is preferable to prescriptive statutory language. CEDA itself should be able to produce the rules that establishes metrics by which technologies are evaluated, whether it be for financial risk or meeting the statutory definition of “clean energy technology” through the regulatory rule-making process.

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RESPONSES OF JONATHAN SILVER TO QUESTIONS FROM SENATOR BINGAMAN

*Question 1.* CEDA is intended to provide a flexible platform, with a number of financial tools to address the problems associated with commercialization of advanced clean energy technologies. In other words, the objective is to provide aid in bridging the “Valley of Death” several people have referred to in this hearing. This naturally implies taking on some risk that the private sector has been unable to shoulder and providing for novel financing arrangements in areas, such as building efficiency, that have been largely neglected.

A primary criticism of the loan guarantee programs has been that the inter-agency review process and the multiple layers of review have led to support for larger, lower-risk projects, at the expense of some of the more innovative or entrepreneurial endeavors that will be very important in the coming decades. CEDA seeks to address this both by creating a mechanism for portfolio investing and by giving flexibility in how the agency can recover costs through fees.

Understanding that the Administration has not taken a position on the legislation, can you provide a technical review of the language we’re considering today with an eye towards ensuring it achieves the results we envision? Without changing the fundamental structure of the Federal Credit Reform Act, is there a way to make sure the reviews from the Office of Management and budget are focused on the administration of the fund and the process by which support is provided rather than project-by-project review?

Answer. Under the Federal Credit Reform Act (FCRA), the subsidy cost reflects the best estimate of the long-term cost to Government of the loan or loan guarantee, excluding administrative costs. As with all other federal credit programs, OMB’s responsibility for determining the credit subsidy cost associated with DOE’s loan guarantees is found in Section 503 of FCRA, which states that the Director of OMB is responsible for credit subsidy cost estimates. Under the oversight authority in Sec-

tion 503, OMB delegates the modeling of credit subsidy costs to agencies, and issues implementing guidance to ensure consistent and accurate estimates of cost. For new programs or programs where actual experience is not available, such as the Title XVII program, OMB works closely with agencies to create or revise credit subsidy models. DOE has worked with OMB to develop the credit subsidy estimation methodology used for the Loan Programs, and OMB approved DOE's credit subsidy cost model in 2008.

Title XVII loan guarantees generally support diverse investments in a wide variety of underlying projects, each of which has unique risks and contract terms. Because the specific projects and contract terms vary substantially, these loan guarantees, to date, have been scored on a loan-by-loan basis.

*Question 2.* It seems that certain technologies such as advanced biofuels, smaller scale projects, and manufacturing have been a challenge for the loan guarantee program. Are there issues with the structure of the loan guarantee program that naturally lead to this? Do you have any thoughts on the how CEDA may be able to treat these type of projects differently?

Answer. As I discussed in my testimony, loan guarantees are appropriate for some, but not all types of projects. At its most basic, project finance is about matching future cash flows to repayment schedules. This works well for projects that have predictable future cash flows, such as those stemming from defined offtake arrangements like power purchase agreements. However, advanced biofuels and manufacturing projects sell products and, thus, do not have clearly defined and predictable revenue streams, which makes it more difficult to ensure any loan guarantee they received would have, as the statute governing Title XVII requires, a "reasonable prospect of repayment."

DOE is committed to supporting advanced biofuels and manufacturing projects through the loan programs. We have already issued several conditional commitments for loan guarantees for such projects, and we expect to issue more in the near future.

*Question 3.* The 1705 loan guarantee program will end in October of this year and I understand you will be informing applicants about their status within that program and if they are likely to be able to reach completion by that time. There will certainly be a group of applicants that may be worthy of a loan guarantee but, for various reasons, cannot reach the end of the process before the end date. Those projects can be transferred into the original 1703 program and Congress has recently appropriated \$170 million for subsidy costs for those projects. Can you estimate how much of those projects could go forward using that \$170 million and how much additional subsidy cost funding might need to be provided to allow the remaining projects to go forward after the September 30th date arrives?

Answer. The \$170 million in credit subsidy currently appropriated to the 1703 program would support an estimated \$1.1 to \$1.7 billion in loan guarantees. As you note, DOE recently informed a number of the 1705-eligible applicants that their applications were being placed on hold because of the pending sunset of that program. The applications placed on hold are seeking over \$17 billion in loan guarantees, though as in the private sector, it is likely that not all of these projects would ultimately reach financial close.

#### RESPONSES OF JONATHAN SILVER TO QUESTIONS FROM SENATOR SANDERS

*Question 1.* Does the Department of Energy support Congress passing the Clean Energy Deployment Administration legislation as contained in S. 1462 from the 111th Congress, and if not why not?

Answer. The Administration has not established a position on S. 1462 introduced in the prior term of Congress. However, loan programs, properly structured, can be an important element of federal policy to accelerate the deployment of innovative clean energy technologies at commercial scope or scale, which in turn creates jobs, drives down unit costs, creates new supply chains, and incentivizes future research and development efforts. The 2012 Budget proposes \$200 million in credit subsidy to support an estimated \$1 to \$2 billion in loan guarantees for innovative energy efficiency and renewable energy projects and up to \$36 billion in loan guarantees to support construction of nuclear power facilities under the Title 17 Innovative Technology Loan Guarantee Program.

*Question 2.* Should the Committee put a limit on the total amount of credit support CEDA can provide, in order to ensure it does not simply become a "permanent financing platform" for new nuclear plants, as has been advocated by the Nuclear Energy Institute?

Answer. The Department of Energy does not support authorizing unlimited credit authority for any institution.

*Question 3.* Should the Committee prohibit the financing of conventional coal and nuclear plants under CEDA, which are clearly not emerging or breakthrough technologies but rather mature technologies, since the express purpose of CEDA is to support breakthrough technologies and help technologies get to scale while avoiding the “valley of death”?

Answer. If the Committee seeks to support breakthrough technologies and help technologies reach commercial markets, then the terms of eligibility enacted by Congress in the EPA Act 2005 Section 1703 loan guarantee program may be a useful point of reference.

*Question 4.* Does CEDA need stronger, more detailed metrics, for what constitutes a “clean energy” project, to ensure that CEDA only finances projects that reduce carbon pollution relative to conventional technology, and if so what metrics do you suggest?

Answer. The Administration has not established a position on S. 1462, including analyzing what metrics might be used to determine what constitutes a “clean energy project.”

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RESPONSES OF DAN W. REICHER TO QUESTIONS FROM SENATOR BINGAMAN

*Question 1.* There are those that would say that as long as the market incentives, such as tax credits or standards such as a CES or an RFS, are sufficient to allow deployment, the market will take care of financing. Your experience seems to be that even in those cases, financing of innovative technologies doesn’t happen. Can you expand on why you think this is the case?

Answer. The problem is that mechanisms to drive deployment, like tax credits or standards, are largely focused on technologies that have already been proven at commercial scale. They do little to help technologies that have yet to cross the often vast “Valley of Death” that sits between an energy technology demonstrated at pilot scale—often with government and venture capital funding—and its deployment at full commercial, often with traditional energy project finance. CEDA is designed to address this challenge in a way that tax credits and standards simply cannot.

*Question 2.* You’ve spent some time looking at what other countries have done to provide financing for clean energy projects. Can you compare the scale of those programs with what we’re contemplating here with CEDA? Do we need to match their investments?

Answer. I worry that we are increasingly getting beaten in the energy technology race by the European Union and Asia, in particular China. Thus while in 2004 the U.S. was the focus of approximately 20% of total global clean energy investment and China accounted for just 3%, in 2010, China saw 20% of that investment and the U.S. 19%—and this investment gap is widening rapidly.

And the stakes are very large. The International Energy Agency (IEA) forecasts that over \$5.7 trillion will be invested in renewable energy globally over the next two decades. 2010 alone saw over \$127 billion invested globally in renewable energy project financing. Unfortunately it is looking less and less likely that investment will be here in the U.S. As Will Coleman, a venture capital investor in clean energy companies, said in a recent Senate Energy and Natural Resources Committee hearing: “We are not only seeing companies start here in the U.S. and then move overseas, but we are increasingly seeing companies start overseas and stay overseas.”

RESPONSES OF DAN W. REICHER TO QUESTIONS FROM SENATOR SANDERS

*Question 1.* As currently drafted in S. 1462 from the 111th Congress, what assurances are there that a Clean Energy Deployment Administration will not become a “permanent financing platform” for new nuclear plants as the Nuclear Energy Institute has advocated?

Answer. I am comfortable that CEDA, as currently drafted, would take a portfolio approach to its investments. The new agency, under a Senate-confirmed director, would need to take a broad technology approach to the application of its many financial tools, from innovative approaches to bundling small efficiency projects into larger financeable packages to new ways to back advanced renewable energy projects to financing support for early next generation nuclear power plants. Without a broad portfolio approach CEDA risks taking unsuccessful financial stakes in a narrow range of technologies and therefore not being at least partially self-sustaining, as contemplated by Congress.

*Question 2.* Should the Committee put a limit on the total amount of credit support it can provide, in order to ensure it does not simply become a “permanent financing platform” for new nuclear plants?

Answer. The Committee should not put specific limits on credit support for specific technologies.

*Question 3.* Should the Committee prohibit the financing of conventional coal and nuclear plants under CEDA, which are clearly not emerging or breakthrough technologies but rather mature technologies, since the express purpose of CEDA is to support breakthrough technologies and help technologies get to scale while avoiding the “valley of death”?

Answer. I think it will be clear from its statutory mandate that CEDA’s focus is on innovative technologies. The Committee report language on the bill could stress this.

*Question 4.* Does CEDA need stronger, more detailed metrics, for what constitutes a “clean energy” project, to ensure that CEDA only finances projects that reduce carbon pollution relative to conventional technology, and if so what metrics do you suggest?

Answer. I don’t think the bill as written needs more detail about what constitutes a clean energy project. Report language on the bill could provide some qualitative guidance on this subject.

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