

**Statement of Dan W. Reicher
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to the
Senate Committee on Energy and Natural Resources
Hearing on the Proposal to Create a
Clean Energy Deployment Administration
under the
American Clean Energy Leadership Act
May 3, 2011**

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.

1. 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.

2. 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.

3. 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.

4. 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.