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Before the
House Committee on Science, Space & Technology
Subcommittees on Energy and Oversight

Evaluation of the DOE Loan Guarantee Programs

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Thank you for the opportunity to speak with you today on this important issue.

I have had the opportunity to invest in 40 US energy companies and to serve on the boards of a dozen firms, two of which have applied for the DOE loan program guarantees. Based on this experience I can attest that the DOE application process is lengthy and rigorous. US firms and projects first seek private financing. But if the projects involve new technology, new scale or other innovation, private sector funding may be difficult or impossible to secure until the technology or project scale has been built and demonstrated. The DOE loan program allows this to happen, and then private capital steps in. DOE loan program technologies and projects are chosen by the private sector, and not by DOE.

In five years as the Director of Financing for Energy Efficiency and Renewable Energy at U.S. Department of Energy and more recently as member of a National Academy of Sciences committee developing policy recommendations to strengthen US innovation and competitiveness, it remains concerning that while the US leads in advanced energy innovation, too often countries like China and Germany reap the benefits by building the commercial plants. This happens in large part because our competitors provide large grants and subsidized loans, etc. to allow these new technologies to be built and proven in their country at a commercial scale. The US DOE loan program allows the US to retain or regain global leadership in key clean energy technology areas including solar PV and electric vehicles. These industries matter because solar and wind already provide half the new electricity capacity in Europe and US, and because the countries that dominate the race to supply clean power plants and clean vehicles will have many millions of well paid workers in these global industries.

Brief biography of Gregory Kats:

- Managing Director of ARENA Investments LLC, a US energy investor
- President of Capital E (cap-e.com), a national clean energy advisory firm
- Former Managing Director of Good Energies, a multibillion dollar global clean energy investor
- Invested \$1.5 billion in 40 advanced US energy firms
- Served on the boards of a dozen advanced U.S. energy firms
- Served as the Director of Financing for Energy Efficiency and Renewable Energy at U.S. Department of Energy (1995-2001)
- Founding Chairman of IPMVP, the international energy efficiency design and measurement standard used in \$50 billion in energy efficiency projects, enabling off balance sheet financing
- Partnered with JP Morgan and Citi to develop financial strategies to scale US funding for energy efficiency from \$20 billion a year to \$150 billion a year
- Chairs the congressionally established advisory board guiding the energy upgrading of 430,000 federal buildings
- Member, National Academy of Sciences Committee on Comparative National Innovation Policies: Best Practices for the 21st Century”. Published as “Rising to the Challenge: US Innovation Policy for the Global Economy”, National Research Council, 2011-2012
- Author of Greening Our Built World: Costs, Benefits and Strategies (2010), and 50 book chapters and articles on energy, finance and economics
- Regularly testifies on energy and finance issues in US and in Europe
- Education: BA, UNC (Morehead Scholar); MBA from Stanford University, MPA from Princeton University, Q level security clearance (inactive), Certified Energy Manager

This hearing addresses several questions, including:

- What role DOE loan and loan guarantee programs play in commercializing and deploying new clean energy technologies, and is this a role that the private sector would otherwise fill?
- What is the overall record of DOE's loan portfolio?
- What is the level of rigor of the review process that the DOE loan program carries out?
- What role does the DOE loan program have on US competitiveness and employment?

What role does DOE loan and loan guarantee programs play in commercializing and deploying new clean energy technologies, and is this a role that the private sector would likely fill for these projects?

The DOE loan program outlines broad categories of energy such as renewable energy or nuclear, and private sector firms decide which technologies and projects and whether they apply or not. DOE loan program technologies and projects are chosen and submitted by the private sector, and not by DOE. The loan program therefore does not distort the market. The application process is expensive and rigorous, so companies that apply do not undertake the process lightly. The requirements include having 3rd party engineering and other firms undertake independent reviews, and these are determinative for DOE loan decisions.

The DOE loan guarantee process requires extensive and expensive due diligence – largely paid for by the applying companies. The rigor of the loan review program makes it demanding. I have served on the boards of two US energy firms that applied for DOE loan guarantees, and I can attest that the DOE application process is detailed and rigorous. In both cases, the DOE's loan review process involved very detailed and extensive documentation, submission of 3rd party validation and testing and performance data, and payment of up-front fees. Fees paid by applicants typically include application fees, facility fees, maintenance fees and sometime additional fees beyond that.

One DOE loan guarantee application I was involved in was for Sage Electrochromic Glass, a Minnesota based, very high performance window development and manufacturing firm. Sage is a company we invested in and for which I served on the board, and we pursued a DOE loan guarantee to finance construction of a six-acre manufacturing facility in Minnesota that would employ several hundred people. Sage Electrochromic Glass spent two years and several million dollars in application costs, paying for third party engineering, market, and legal reviews by firms qualified by DOE and selected by DOE. DOE ultimately turned down the loan guarantee application largely because of concerns about market demand for this new product class. Without the DOE loan guarantee, Sage could not secure US financing it needed to build its commercial manufacturing plant. As a result, a large French multinational acquired Sage. While the first scale manufacturing plant was built in Minnesota, the additional manufacturing plants will likely be built in Europe.

This case illustrates the fact that the DOE loan guarantee application process is demanding - and is perhaps too demanding. I serve on the board of a carbon sequestration firm called Blue Planet that applied for a DOE loan guarantee to build carbon sequestration facilities at natural gas, coal and cement plants to sequester carbon dioxide by converting it to aggregate by mineralization for use in building materials like concrete. Over the last few years the loan application process appears to have become even more rigorous - and somewhat more streamlined.

The objective of a loan guarantee program is to finance projects that cannot otherwise get commercial financing. If energy projects were very low risk (investment grade) they would have access to commercial funding, and a DOE loan guarantee would be an unattractive option. The rigorous nature, difficulty and cost of these applications means that a DOE loan guarantee is pursued by US firms only when they cannot get competitive private sector financing.

As noted above, there are substantial costs associated with 3rd party review, documentation and the like, and there is a onetime fee to cover credit risk equal to up to 5% to 10% of loan amount. Added together these costs mean that the effective cost for a DOE loan guarantee is about the same as private sector financing. But because of the DOE credit risk fee is front loaded, and the application process typically in some ways more demanding than that of conventional bank financing, it is a less attractive funding. Put differently, because the DOE loan program is arduous and imposes costs sufficient to make it largely self-funding on a standalone basis, it is an option that US companies take when they are not able to secure private financing.

Like other bank and government commercial lending programs, the DOE loan guarantee program assumes a default rate as normal and expected. DOE loan guarantee default rates have proven to be far lower than projected by OMB and Congress. In establishing the 1705 loan guarantee program, for example, the Office of Management and Budget predicted, and Congress budgeted for, \$2.47 billion to cover expected project defaults or partial defaults, but defaults proved to be one third of this.¹

In 2010-2011, the DOE Loan guarantee program provided guarantees to the first 5 utility scale solar projects (over 100 MW). This scale of solar was viewed as important but new and risky by banks, and therefore required DOE loan program support for this large expansion in US clean energy development. Since these 5 DOE loan program supported utility scale solar projects, the private sector has funded 28 utility scale solar projects totaling some 7 GW. This represents several tens of billions of dollars in private capital and tens of thousands of good and widely distributed US jobs. This is clearly a great success for the DOE loan guarantee program and for the US – and deserves to be recognized and celebrated. The DOE loan program clearly increases the availability and accessibility of private capital for large scale advanced clean energy projects.

As of September 2014, \$3.5 billion in loan principal had been repaid on DOE loan guarantees along with \$810 million in interest payments. Loan losses of as of September 2014, including for Solyndra, were only \$780 million, under 3% of the program loans – far lower than projected and budgeted for by the OMB. As of October 2015 the DOE loan guarantee program metrics had further strengthened, with principal repayment exceeding \$5 billion, interest earned by the US government exceeding \$1.2 billion, and actual and expected losses still at about \$780 million. This reflects a very low default and loss rate. Almost any experienced investor in portfolios of projects – or for that matter almost anyone with knowledge of investing – would recognize this as a very successful track record.

Some critics appear to anticipate additional defaults in the existing portfolio. But defaults tend to occur early in the loan cycle, so additional defaults in the existing loan portfolio are actually unlikely. With some \$32 billion in loans and loan guarantees issued, interest repayment back to the US government will exceed \$5 billion. Additional federal tax revenue from the jobs created should be included in any full accounting. A full accounting includes the tax impact of additional federal taxes from the jobs created. Assuming 50,000 jobs created² and at an average wage of \$50,000 per year indicates \$2.5 billion in taxable wages, plus additional corporate taxable income, generating over \$500 million in Federal revenue annually. Overall the net federal tax revenue (revenue minus costs) from the DOE loan programs over 20 years will be on the

¹ <http://www.whitehouse.gov/omb/budget/Supplemental>

² http://energy.gov/sites/prod/files/2015/12/f27/DOE-LPO_Report_Financing-Innovation-Climate-Change.pdf

order of \$10 billion, making the DOE loan guarantee program very profitable for the federal (and state and local) governments.

But the value of the DOE loan program goes well beyond being a large job creator and substantial net source of revenue for the federal government. The DOE loan guarantee for Tesla Motors allowed Tesla to build its Fremont California manufacturing plant that now employs about 3000 people. The DOE program enabled Tesla to survive and thrive, building what is widely viewed as the worlds most advanced electric vehicles, vaulting the US ahead in the race with Germany, China and other countries for the very fast growing global market for electric vehicles. The Tesla DOE loan was repaid early - with interest - using money that Tesla, with US DOE loan in hand, was able to raise through stock and debt raises. This illustrates the fact that US firms rely on the DOE loan program when they cannot raise funds in the private sector, and demonstrates that the DOE loan program successfully plays the role intended.

The DOE loan program has enabled the US to regain some global leadership in the critical areas of advanced transportation and power generation at a time when it was falling behind its international competition in these fundamentally critical industries. It is difficult to place a dollar value on this, but clearly the value to US economy and competitiveness is large. The fact that the DOE loan program does so with loan losses in the 2% range – far below projected and budgeted - and in a way that will generate about \$10 billion in profit to the federal government – largely through expanded tax revenues that also benefits state and local governments - deserves wider recognition.

For parties interested in US competitiveness, this has proven to be a highly successful and significant program. By any reasonable measure this is a notably cost-effective and successful program and has played a large role in allowing US to regain or retain some global leadership in clean and advanced energy.

On the basis of its record, the DOE loan guarantee program can be viewed as one of the most cost-effective, pro-competitive American programs on record.

Department of Energy loan program is a very cost-effective way to maintain US competitiveness in the face of large domestic subsidies by other countries

The DOE loan guarantee program is essential to maintaining US global leadership in the fast-growing clean advanced energy and transportation industries.

I served as a member of the Steering Committee of the National Academy of Sciences study on “Comparative national innovation policies: Best Practices for the 21st Century”. The findings were published as 570-page book entitled “Rising to the Challenge: US Innovation Policy for the Global Economy”.³ Our work focused on US global competitiveness, how it erodes and how it can be strengthened. The work identified polices that are necessary to support and strengthen US global competitiveness in a time of increasing international competition. Key findings include the critical importance of sustaining US leadership and innovation in clean energy to maintaining US global competitiveness. The report found that “the United States needs to make greater efforts to capture the output of US investments in innovation, that is, to provide an environment that encourages retention and growth of high tech businesses and the high quality jobs they bring”. The DOE loan program achieves exactly these objectives.

The modern wind and the solar technologies were largely developed and refined here in the United States, including during the 5-year period I served as the Director of Financing for Energy Efficiency and Renewable Energy at U.S. Department of Energy

³ Rising to the Challenge: U.S. Innovation Policy for the Global Economy. Washington, D.C.: National Academies Press, 2012. <http://www.nap.edu/catalog/13386>.

But our major competitors, including China and Germany, through sustained domestic subsidies and purchases, have rapidly expanded their domestic advanced energy corporations. Today, of the top 20 global wind turbine and PV manufacturers three quarters are located outside of the US. This reflects sustained financial investment by foreign countries into their clean energy companies and projects. The DOE loan guarantee program – which is largely self-financing - provides an effective response to help offset the subsidies provided by other countries.

The European Union funds renewable energy projects through loans by the European Investment Bank, which provides billions of euros to support renewable energy in the EU. In addition, individual European countries provide financial support directly to their own national renewable and clean energy companies. For example, KfW (the German government owned development bank)⁴ Renewable Energy Program provides low-interest loans with a fixed interest period of 10 years including a repayment-free start-up period for investments in electricity generation facilities.

Similarly, the Chinese Government offers low-interest loans and large credit lines through the China Development Bank (CDB).⁵ In 2010, for example, the CDB lent a total of 232 billion yuan (US\$36.8 billion) for energy-saving and pollution control projects and provided China's major solar panel manufacturers with a combined total of 203 billion yuan (US\$32.2 billion) in very low cost loans to increase production capacity and expand overseas operations. Chinese wind and PV firms have been given land for construction, long term contracts that foreign firms effectively cannot bid on, and a range of other subsidies.

As documented by Bloomberg New Energy Finance, Asia increasingly dominates global investment in clean energy, with Asian countries now investing more than three times as much as the US in these critical industries. Limiting the DOE loan program would damage long term US competitiveness. The DOE loan program is a central part of how US can and must maintain its advanced clean energy global leadership. The DOE loan guarantee program does so in way that strengthens US industry and US financial institutions.

Positive Employment Impact

Expansion of US manufacturing of clean energy technologies and projects supported by the DOE loan guarantees enables private sector funding and jobs. Virtually all of these are located in the United States.

The Council of Economic Advisors, the National Bureau of Economic Research, and the US Congressional Budget Office share a view that programs like the DOE loan guarantee programs have large, positive employment benefits. A February 2016 report by the US Council of Economic Advisors, for example, estimates that American Recovery and Reinvestment Act clean energy-related programs created roughly 900,000 job-years in innovative clean energy fields between 2009 and 2015.⁶

The Advanced Technology Vehicles Manufacturing DOE loan program has supported more than \$8 billion in US advanced automotive production, creating over 35,000 jobs in eight states. The guarantees supported 4 million fuel efficient cars, in turn reducing oil consumption and driving down fuel costs nationally while strengthening the US economy, employment and balance of trade.

Major banks such as Citi and JP Morgan also believe that that investments in clean advanced energy produces a lot of well-paying US jobs. A Deutsche Bank report entitled “Repowering America: Creating Jobs” forecasted energy supply and energy employment through 2030 based on projections of sustained US investment and growth in the areas of energy efficiency and clean energy. Deutsche Bank determined that such a strategy would result in 7.9 million cumulative net job-years of direct and indirect US energy

⁴ <https://www.kfw.de/inlandsfoerderung/Unternehmen/Energie-Umwelt/index-2.html>

⁵ <https://china.lbl.gov/sites/all/files/lbl-5579e-green-finance-wiresjune-2012.pdf>

⁶ https://www.whitehouse.gov/sites/default/files/page/files/20160225_cea_final_clean_energy_report.pdf

employment, of which 6.35 million jobs (80%) would come from energy efficiency or renewable energy sectors (e.g. geothermal, solar PV, solar thermal and wind).⁷ Dialing back the DOE loan guarantee program would hurt US ability to match the support other countries give to their clean energy firms, and would adversely impact US employment.

Long bipartisan history, rationale for public–private investing, including for the DOE loan guarantee program

There is a long bipartisan history of U.S. government support for clean and advanced energy, as exemplified by the DOE Loan program. The first part of the DOE loan programs, Section 1703, authorized DOE to provide loan guarantees to enable commercialization of clean energy technologies and projects. This program was part of the bipartisan Energy Policy Act of 2005 and was signed into existence by President George W Bush. The second part of the DOE Loan program addresses advanced technology vehicles manufacturing (ATVM) and was established in the bipartisan Energy Independence and Security Act (2007) and signed into law by President George W Bush.

The DOE loan guarantee program now supports expanded investment of US companies and projects in clean energy, including solar, wind, energy efficiency, transmission and energy storage as well as advanced nuclear, fossil fuel plants and efficient transportation. Like loan guarantee programs in general, these are projects that are viewed as unlikely to receive commercial funding because the companies or projects are early stage, somewhat risky and/or not yet fully commercial proven.

Bipartisan support for the DOE loan guarantee program has been based on a common understanding that the DOE loan program strengthens the US economy and security and US competitiveness, and builds US jobs by expanding US investment in clean energy such as solar PV and wind. As Republican Governor of Iowa, Terry Branstad, observed in the Wall Street Journal “The wind power industry is an American success story that is helping us build our manufacturing base, create jobs, lower energy costs and strengthen our energy security.”⁸

Positive Security Impact

The DOE loan program strengthens US security, as defined by the US military.

One of the objectives of the DOE loan guarantee program is to expand US clean energy manufacturing and generation capacity as a way to strengthen US security. Secretary of the Navy Ray Mabus⁹ asked: “Why the interest in alternative energy? The answer is pretty straightforward: We buy too much fossil fuel from potentially or actually volatile places on earth. We buy our energy from people who may not be our friends. We would never let the countries that we buy energy from build our ships or our aircraft or our ground vehicles, but we give them a say on whether those ships sail, whether those aircraft fly, whether those ground vehicles operate because we buy their energy. There are great strategic reasons for moving away from fossil fuels. It’s costly... But it’s costly in more ways than just money. For every 50 convoys of gasoline we bring in, we lose a Marine. We lose a Marine, killed or wounded. That is too high a price to pay for fuel.”

According to the DoD, this matters because of “a \$21 billion annual energy bill and because the fragility of the grid “leaves DoD vulnerable to service disruptions and places continuity of critical missions at serious

⁷ http://www.dbcca.com/dbcca/EN/_media/DB_Repowering_America_Creating_Jobs.pdf

⁸ <http://www.wsj.com/articles/SB10001424052702304070304577398493215885010>

⁹ National Clean Energy Summit 4.0 Las Vegas, NV August 30, 2011

and growing risk,^{10,11} the US military has set ambitious targets to reduce energy use and develop renewable energy sources. The Army and Navy both have net zero programs, aimed at reducing energy use on bases, with the Navy targeting 50 percent of its bases to have net zero energy consumption by 2020. Energy is, in the words of Admiral Mullen, about “not just defense but security, not just survival but prosperity.”¹² Our national defense infrastructure and systems hold the potential to “help to stem the tide of strategic security issues related to climate change”¹³ while simultaneously improving operational effectiveness.¹⁴

Limiting the DOE loan program that supports clean energy technologies that the US military needs would ultimately force our military to import the technologies it needs to achieve its mission of shifting to clean energy and so would weaken US security. The US military commitment to expanding US strength and investment in advanced and clean energy as a critical security objective is clear. The DOE loan program strengthens US security.

Conclusion

Given the clear success of the loan guarantee program to date based on measures of financial performance and impact on security, employment and US competitiveness, the DOE should not slow or limit the loan program. In the real world where US companies are investing to build jobs and strengthen America’s competitive position in global markets, the DOE loan program is a big success. The DOE loan program enables innovation and enables expanded venture capital and private equity investment in these industries. The DOE loan guarantee program is critical to scaling of first time and innovative clean energy companies and projects that the private sector is otherwise unwilling to finance.

The DOE loan program provides critical and very cost effective financial support to scale clean energy and bring new technologies to commercial scale. By any reasonable measure this is a notably cost-effective and successful program and has played a large role in allowing the US to maintain a global leadership position in clean and advanced energy.

For US citizens and businesses, whether the US wins or loses in the clean energy race matters a great deal because the outcome will shape future US employment, economic strength, and the linked threats of security and climate change.

Thank you

¹⁰ Speech by Dorothy Robyn, Deputy Under Secretary of Defense for Installations and Environment Washington DC, ICF international office, 19 April 2012

¹¹ “Department of Defense Annual Energy Management Report Fiscal Year 2010” July 2011

¹² Energy Security Forum Speech as Delivered by Admiral Mike Mullen, chairman of the Joint Chiefs of Staff, Washington, D.C. Wednesday, October 13, 2010 <http://www.jcs.mil/speech.aspx?id=1472>

¹³ Energy Security Forum Speech as Delivered by Admiral Mike Mullen, chairman of the Joint Chiefs of Staff, Washington, D.C. Wednesday, October 13, 2010 <http://www.jcs.mil/speech.aspx?id=1472>

¹⁴ Energy Security Forum Speech as Delivered by Admiral Mike Mullen, chairman of the Joint Chiefs of Staff, Washington, D.C. Wednesday, October 13, 2010 <http://www.jcs.mil/speech.aspx?id=1472>

Gregory H Kats



Greg has played substantial roles in developing the clean energy and green building industries, and is a long-time thought leader and investor in the transition to a low carbon economy. He is Managing Director at ARENA Investments LLC - a clean energy impact investment firm, and President of [Capital E](#) - which works with cities, corporations and financial institutions to design, scale and implement clean energy and low carbon strategies.

Greg previously served as Managing Director of Good Energies, a multi-billion dollar global clean energy PE/VC fund, where he led investments in smart grid, energy efficiency, green materials and green buildings. Over the past decade he has invested \$1.5 billion in 50 US clean energy firms. Greg served for 5 years as the Director of Financing for Energy Efficiency and Renewable Energy at the US Department of Energy. Greg was the Founding Chairman of [IPMVP](#) and built it into the international energy and water efficiency design and verification standard for >\$50 billion in building efficiency upgrades. He was the Principal Advisor guiding the development of Green Communities, the comprehensive green design standard for over 50,000 units of green affordable housing. He recently helped design the World Bank's large new green building financing program. Greg is a founder of both the American Council on Renewable Energy (ACORE) and the country's first green bank. In 2011 he was the first recipient of the US Green Building Council's Lifetime Achievement Award.

Greg Chairs the congressionally established board guiding the greening of 430,000 federal buildings, serves on the Mayor's Green Ribbon Committee guiding the greening of the District of Columbia, and served on a National Academy of Sciences board on strengthening US global competitiveness. He earned an MBA from Stanford University and (concurrently) an MPA from Princeton, a BA from UNC as a Morehead Scholar and is a Certified Energy Manager. Greg is the author of [Greening Our Built World; Costs Benefits and Strategies](#) and 50 technical papers, reports and book chapters on energy and financial issues. He serves on several clean energy corporate boards, and a solar PV system powers his DC family home and an electric car.