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Before the Senate Committee on Energy and Natural Resources

Hearing on Clean Energy Finance

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Thank you Chairman Wyden, Ranking Member Murkowski, and distinguished members of the Committee. I appreciate the opportunity to be here today. It is an honor and a privilege to speak with you on issues that are so critical to our nation.

I am Will Coleman. I am the founder of OnRamp Capitalwhich partners with corporations to invest in early stage innovations.

As someone focused on investing in and building companies at the earliest stages of the innovation process, and doing so in collaboration with larger corporate partners, I am constantly confronted with the challenge of taking products from early research to full commercialization in the energy industry. I am here today to talk about how innovation in energy continues to be critical to the strength of our economy and to share some perspective on how the overlap between economics and public policy is causing persistent and growing barriers to the kind of innovation that we need to remain competitive. I will also share a few thoughts on where I think the federal government can and should play a role.

America Thrives on a Diversity of Energy Options

America's economic strength over the last century has been fueled in large part by access to affordable and abundant domestic energy resources. Investments in oil, hydro, nuclear, and more recently natural gas have unlocked innovations that have ensured America's relative wealth of resources. We are all well aware of how recent advances in drilling and fracking have unlocked tremendous reserves of natural gas and helped address what has been a worrisome four-decade trend towards dependence on foreign resources.

However, energy is a global commodity, and the unprecedented growth in global demand, a situation that is still in its infancy, has driven continued increases in prices. Thus even as we begin to import less, we are paying more. Even with the boom in gas production and slowing global economies the average price of oil increased to $112/barrel in 2012 and the U.S. spent $434 billion on oil imports from foreign countries.[1] That's up from $337 billion in 2010. In

[1] http://www.eia.gov/dnav/pet/pet_move_impcus_a2_nus_ep00_im0_mbbl_a.htm

other words, we continue to transfer increasing amounts of America's wealth overseas – dollars that could be reinvested here at home.

Many people argue that with low natural gas prices and a growing abundance of apparent reserves, we don't need alternatives any time soon. However, that ignores the reality of global growth in demand and the complexity of harnessing these resources. It is clear that natural gas will be an important and growing piece of the energy mix going forward, but it does not negate the need for other alternatives. We will continue to rely on coal and oil as well for decades to come, but we need to continue to develop and use these resources with increasing efficiency.

Innovation will be needed to harness all of these resources efficiently, effectively, and safely. The federal government plays an important role in this effort. It's important to remember that the technology that has enabled the shale gas boom actually came from a legacy of federally funded research done in the national labs on horizontal drilling over the last 30 years.[2] Similarly government research through the DOE, NASA, and DOD over the last 40+ years provided the technological foundation for dramatic improvements in cost and performance in solar, wind, biomass and other technologies.

These technologies would not exist if not for this research funding. At the same time, they would not be commercial without private capital investment. The high cost of gas and oil in the early 2000's and the presumption that governments would need to begin to regulate carbon emissions drove significant new investment in shale gas development and other alternatives. In both cases the investments in commercializing these technologies and then scaling them has led to impressive reductions in cost. Natural gas has dropped from a high of $7.97/thousand feet[3] in 2008 to $2.66/thousand feet[3] in 2012 and production has grown 16% over that time frame[3]. Wind, solar, biomass and other renewables are also playing increasing roles. Wind deployments grew over 500% from 2007-2012[4] and solar grew over 1000% over the same time period. The cost of solar modules has dropped over 60% in the last two years alone.[5] In comparison, most conventional resources which are impacted by global demand have increased in cost. Coal prices have climbed over 200% since 2003[6] and imported crude oil prices have climbed 350% over the same time period.[7]

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[2] http://thebreakthrough.org/archive/shale_gas_fracking_history_and
[3] http://www.eia.gov/dnav/ng/ng_sum_lsum_dcu_nus_a.htm
[4] http://www.awea.org/learnabout/industry_stats/index.cfm
[5] http://www.seia.org/research-resources/solar-industry-data -
[6] http://www.eia.gov/totalenergy/data/annual/pdf/sec7_21.pdf
[7] http://www.eia.gov/forecasts/steo/realprices/[8]
http://www.windpoweringamerica.gov/pdfs/wind_maps/poster_2010.pdf

Despite the growth of alternatives, many of these technologies are still in their infancy. Wind provides only 2.9% of our electricity and solar just 0.4% as compared to 42% from coal and 25% from natural gas. The reason is not a lack of resource. The U.S. has some of the largest wind, solar, and biomass resources in the world. The US possesses over 231,000 GW[8] of annual capacity from untapped wind and solar resources alone. This is over 222 times our current total electricity capacity. [9] Unfortunately, every day that these American resources are not captured they are lost.

Technology transitions have always been good for economic growth, driving both investment and jobs. Even though solar still represents just a small sliver of the energy mix, the solar industry already employs more people in the U.S. (119,000)[10] than the coal mining industry (87,000)[11]. Solar employment has more than doubled in the last 4 years alone.

The U.S. must continue to leverage its energy assets effectively to embrace the growth potential and to remain economically competitive. Conventional technologies represent the vast majority of today's production; however, we cannot afford to ignore the growing opportunity that other alternatives represent.

Innovation Drives Long Term Cost Reductions

Shale gas, wind, solar and other alternatives have achieved remarkable reductions in cost over the last decade, but continued innovation is absolutely critical. The cost reductions are the result of a fundamental premise of technology development which is that each technology reduces its costs over time through a combination of technical innovation and scaling the volume of production. The result is that each technology undergoes a "learning curve" that drives costs down.

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http://www.nrel.gov/docs/fy10osti/45889.pdf http://votesolar.org/wp-content/uploads/2011/02/NREL_Solar_Tools.pdf

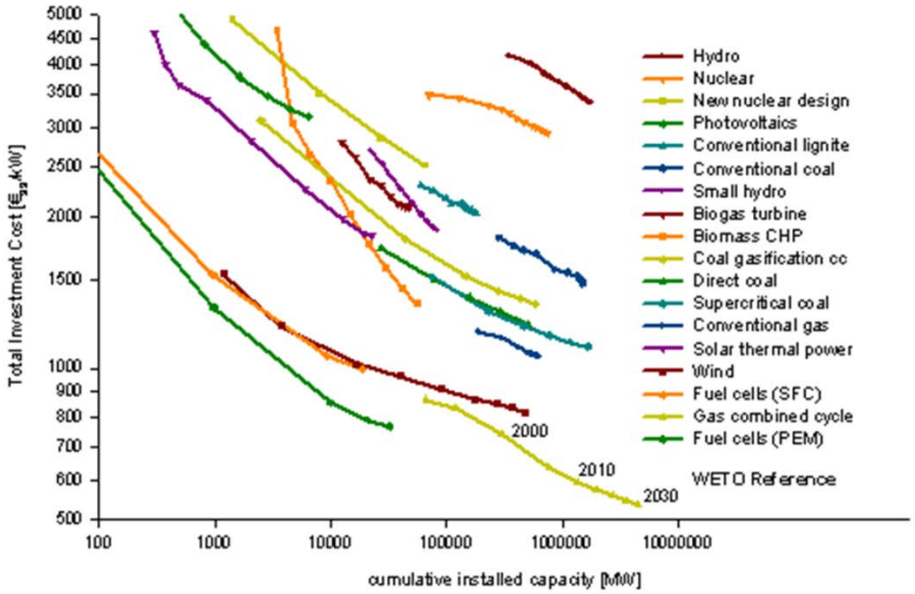
[8] http://www.windpoweringamerica.gov/pdfs/wind_maps/poster_2010.pdf http://www.nrel.gov/docs/fy10osti/45889.pdf http://votesolar.org/wp-content/uploads/2011/02/NREL_Solar_Tools.pdf www.nrel.gov/gis/docs/resource_maps_200905.ppt

[9] http://www.eia.gov/electricity/annual/pdf/tables1.pdf

[10] http://thesolarfoundation.org/sites/thesolarfoundation.org/files/2012%20Census%20Press%20Release%20FINAL.pdf

[11] http://www.bls.gov/oes/current/naics4_212100.htm

Historical Learning Curves by Technology (over volume)



Source: European Commission. *World Energy, Technology and Climate Policy Outlook 2030*. 2003. P.71

Different technology solutions – even within the same type of technology – can have different learning curves and development trajectories. For instance, in solar learning curves are specific to individual technology platforms such as Si panels (SunPower, Suntech, etc…) or CdTe panels (First Solar), and even specific to different approaches within these material systems, rather than to solar technology as a whole. Thus the dramatic cost reductions that we have seen over the last decade are really the aggregate result of several different unique platforms reaching commercial scale and driving the whole industry cost curve down.

Continued innovation on variations and wholly new platforms will unlock step-changes in cost reductions even after existing technologies in a category have reached commercial scale.

The main question for any technology investor is not “what is the cost today?”, but “can the cost of a technology ultimately get below existing alternatives?” Technology development is one piece of the equation, but scale is critical. Further cost reductions are possible, but only if both research and deployment capital are available.

Again, we can look at solar cost curves to see how this works. Over the past thirty years, solar engineers have reduced cost with every generation of new technology, but it took scaling the volume of production to close the gap with conventional technologies. For example, First

Solar's panel production costs have dropped from over $3.00/watt in 2004 to under $0.66/watt in 2013, due in large part to a 2,500% increase in production capacity from 2004-2008[12].

Solar is not alone. Almost every technology-driven industry evolves this way, whether it is energy, semiconductors, or steel production. The U.S. has benefitted from leading the innovation cycles in many of these industries, but it always requires significant investments from private capital sources which in turn requires the right market conditions, a robust pipeline of technology, and constructive public policy. Unfortunately, when it comes to energy, the U.S. is faltering in all three of these categories.

The Innovation Gap

We are fortunate to have a strong, diverse natural resource base. However, much of our competitive advantage over the last two centuries has come from our ability to innovate – to develop new, lower-cost or advantaged technologies such as oil, nuclear and now renewables, ahead of our global competitors. According to a report released by the Department of Commerce, "Technological innovation is linked to 75% of the Nation's post-WW II growth rate. Two innovation-linked factors – capital investment and increased efficiency – represent 2.5 percentage points of the 3.4% average annual growth rate achieved since the 1940's."[13]

Unfortunately, the energy industry is extremely slow to adopt new technology. In 2010 the five largest oil companies spent less than 2 percent of profits and less than 0.4 percent of total expenditures on R&D.[14] In the utility sector, the major U.S. utilities employ on average less than 5 people in R&D roles per 1000 employees. This is the lowest level of **any** industry.[15]

Many companies recognize the value of innovation, but are understandably driven by optimizing and protecting existing business lines. This is particularly true when the majority of all federal energy incentives focus on bolstering supply of conventional resources, irrespective of the efficiency or efficacy of the technologies used to access those resources.

The net result is an industry that does not natively produce an enormous amount of innovation or adopt novel technologies except in times of acute disruption. This would be fine if energy was not such a strategic imperative for our nation's competitiveness. But given the length of

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[12] http://www.greentechmedia.com/articles/read/First-Solar-Surprises-With-Big-2013-Guidance-40-Cents-Per-Watt-Cost-by-201

[13] U.S. Department of Commerce, *Patent Reform: Unleashing Innovation, Promoting Economic Growth & Producing High-Paying Jobs.* 2010

[14] Congressional Research Service. *Research and Development by Large Energy Production Companies.* August, 2011. Calculations are based on total R&D spending of $3.6bn in 2010.

[15] National Science Foundation, Research and Development in Industry: 2006-07 (Arlington, VA: National Science Foundation, 2011), 130-131. Table 31 and 261. http://www.nsf.gov/statistics/nsf11301/pdf/nsf11301.pdf

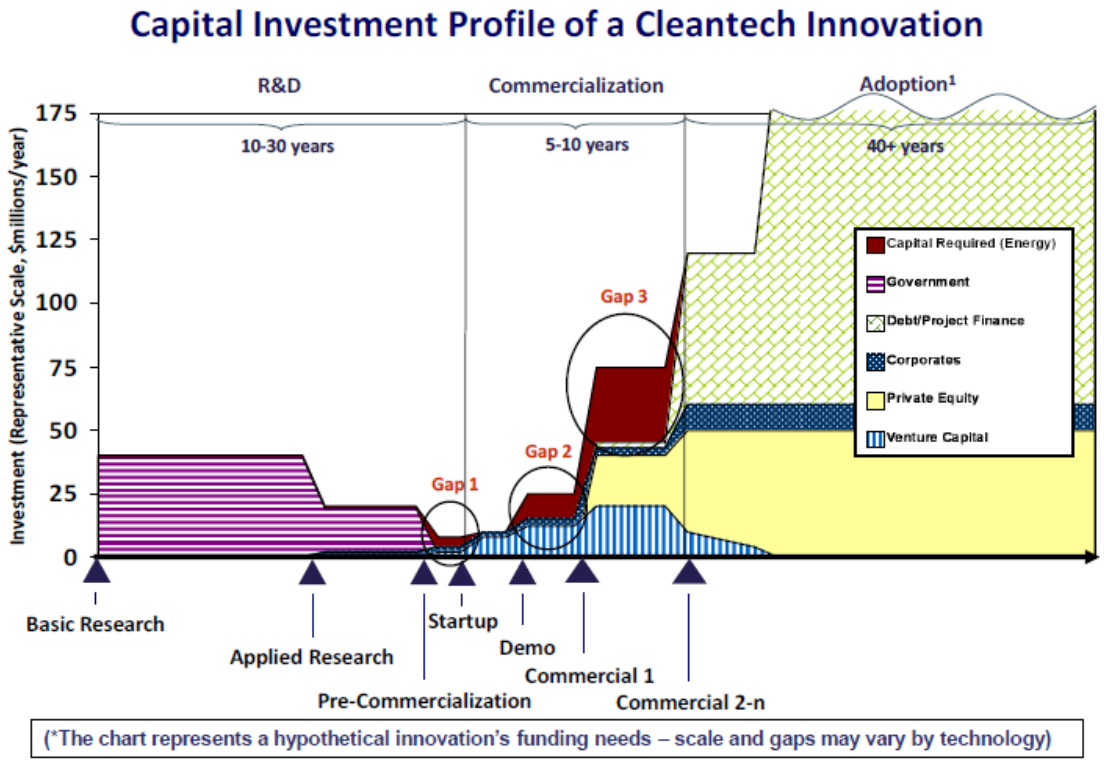
the innovation cycle, we cannot afford to wait until the next disruption or allow other nations to take over the lead on new technology. An opportunity exists and many forward looking companies are looking for ways to get ahead of this trend in the sector, but the bulk of investors in new energy technologies are struggling to overcome these industry dynamics.

State of New Energy Financing

Over the last 10 years, market conditions, technology advancements, and public policy expectations led venture capitalists to deploy $25.1 billion into energy related technologies[16]. Investors relied on the supposition that conditions would persist and other types of investors would participate in the scaling and deployment of the most effective technologies. This investment drove a boom in new technologies and attracted a growing pool of talent to the industry. However, scaling these technologies has proven to be a major stumbling block. Commercializing most energy technologies demands a magnitude of capital and level of collaboration with incumbents that goes beyond the capacity of the venture capital industry.

The challenge for most startups is that without operating track records or large balance sheets, they are unable to secure lower-cost debt capital to get to scale. This means that they typically need to raise higher-cost equity or some combination of equity, mezzanine financing (if available), or higher-cost debt (which often isn't available) to build early commercial plants. More expensive forms of financing impact the profitability of producing any technology and make it harder for investors at each level to realize competitive returns. The result has been a series of financing gaps that exist for scaling larger industrial technologies that need to reach a minimum efficient scale to be competitive.

[16] Source: PricewaterhouseCoopers/National Venture Capital Association MoneyTree™ Report, Data: Thomson Reuters

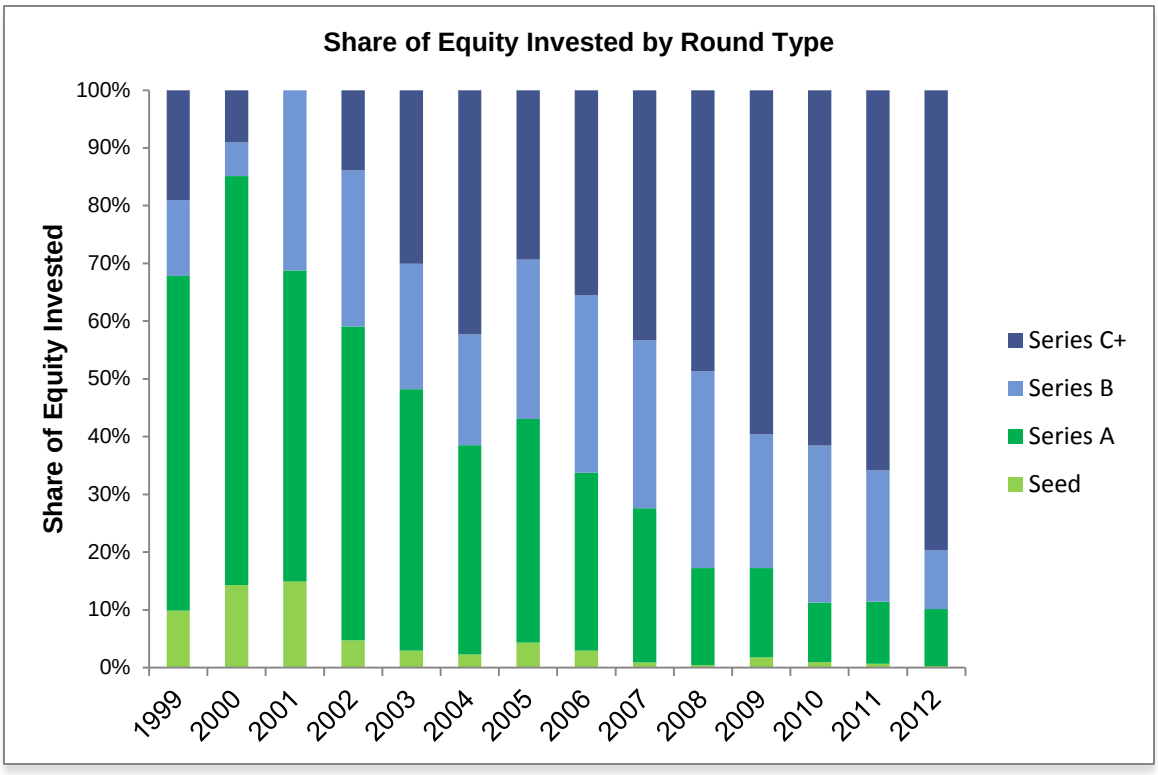


Source: Mohr Davidow Ventures.

[1] The capital investment associated with adoption is depicted to indicate that it may well exceed $175 million/ year.

Venture capital has historically been able to bridge financing gaps in many sectors. Where it works, the results have been transformative. While under 0.2% of GDP is invested in venture capital each year, over 21% of GDP is generated by companies that were originally venture-backed, and 11% of all private sector Americans are employed by these companies. But in energy, the magnitude of capital requires many other investment partners.

Even in the best market conditions, with robust financing options, many promising energy technologies are not able to overcome these gaps. Over the last few years changes in market conditions, instability in financing, and wavering policy commitment have eroded investor confidence in energy technologies. As a result, the financing gaps have grown and venture capital has begun to pull back from investing in new innovations in heavy industrial applications, including energy. Venture investors continue to support existing investments, and family offices and corporate investors have increased investments in the sector. However, we have seen a marked decline in early stage investments in energy technologies. This decline is concerning for the future of energy innovation.



Source: OnRamp Capital analysis (aggregate data from i3, venture source, NVCA)

A healthy innovation process, particularly in energy, depends on a stable ecosystem of funding partners including venture capital, private equity, corporates, project finance, and other debt providers. If we as early stage investors don't believe that low-cost capital will be available to scale these technologies, then there is no way we will invest in the early technology development in the first place. Thus, financing gaps at any stage have a rapid domino effect on the rest of the financing ecosystem, and innovation funding begins to dry up at all stages.

As I mentioned, large strategic corporate investors have begun to increase their investments in the sector over the last couple years. Strategics now account for 10.4% of venture type investment in energy technologies.[17] Strategic investment is a critical piece of the equation. However, most strategic investors have historically relied on venture capital for the earliest stages of investment and face legal and structural challenges investing in the earliest stages of the innovation process. OnRamp Capital and other models are emerging to help address this constraint, but the bottom line is that fewer entities are actively investing in the kind of core energy innovation that is needed to continue progressing the industry. If investments decline so too will the interest from entrepreneurs and scientists. We risk losing the accumulated

[17] Source: PricewaterhouseCoopers/National Venture Capital Association MoneyTree™ Report, Data: Thomson Reuters

knowledge and talent we have developed over the last decade, and it will take a long time to rebuild these innovation ecosystems.

The Role of Government

Our premise and our requirement as investors has always been that we invest in technologies and companies that, regardless of political regulation or subsidy, will be able to stand on their own two feet and compete on a level playing field within the lifespan of our investment.

At the same time, we recognize that even in markets that are considered free and open there are often market failures or financing gaps that can prevent new viable technologies from getting to market. In energy, incumbents benefit from decades of investment in infrastructure, legacy government support, fully depreciated plants, economies of scale, and operating track records that make it difficult for any new technology to compete without assistance.

To create a level playing field that encourages continued innovation we must acknowledge past investments that have created the current systems. According to a report from DBL Investors, the average annual inflation adjusted federal spending on oil over the first 15 years of its deployment in the U.S. was 5 times greater than what we have spent on renewables. Spending on nuclear was 10 times greater.[18]

I am not suggesting that the federal government needs to spend enormous sums on any specific new technology, but it is important to recognize that the government has played a role in cementing the current energy landscape. If we can agree that continued innovation in energy is critical to our competitiveness as a nation, then the federal government can and should play a role in helping to unlock that innovation.

The Need for Certainty

The primary challenge for Congress is to identify ways to support continued technology development while working with private capital to close the funding gaps around commercializing new technologies. For federal policy to unlock continued innovation, it will need to consider these scaling challenges, work to accommodate the financial constraints of smaller emerging companies, and provide enough certainty to draw private capital into the market.

As investors we are seeking stable, open markets that reward better solutions over a long period of time. Any significant innovation takes years and sometimes decades to develop,

[18] Nancy Pfund & Ben Healey. *What Would Jefferson Do? The Historical Role of Federal Subsidies in Shaping America's Energy Future*. DBL Investors, Sept. 2011.

deploy, and mature. Even in some of the faster moving industries that venture capital invests in the average time from initial funding to liquidity is 4-8 years. In energy, where large commercial facilities often take years to construct and cannot be financed until a technology has been fully de-risked, investors require piloting, demonstration, and operating track records. Even if a company can secure the financing for a first-of-a-kind commercial facility, they will then need to operate that facility for up to five years before they can secure conventional debt financing for future plants. That means the timeline can be 15+ years from early R&D to initial commercialization for some of these technologies. The timeline is even longer if we consider the need to attract researchers and other talent into the sector to invest their own time and energy well before the commercial development cycle even begins.

For early stage investors, we can only take risks on a new technology if we believe the talent is available to develop it and that other investors and acquirers will be there to invest in the technology along the way. Other investors will only be there if the market need is persistent over a long period of time. Therefore, any solutions that the government provides need to have the same persistence and stability. Many of the conventional energy credits have been made permanent over the last several decades, which enables these industries to plan and invest with certainty. In contrast, almost all of the credits for alternative technologies have been temporary and continually threatened, which in turn creates a dual impediment to financing these new technologies. Short-term extensions of demand-side credits such as the PTC and ITC do not provide the long-term certainty necessary to incentivize early investment in innovation.

The government could make these credits permanent, which would provide certainty, but would also create a permanent dependence. As a technology investor, I don't believe we should prop up any technology indefinitely, but rather support technologies to scale and then require that they compete on a level playing field. Federal structures already exist, such as the 30D advanced vehicle tax credits, which provide certainty without dependence. There are ways to replicate such credits in more technology-neutral approaches that will provide the certainty necessary to draw capital into the innovation cycle even at the earliest stages, and do not require significant government expenditures.

Just as over the last few years we have seen the costs of alternatives drop significantly, we expect scale and continued innovation to drive costs lower. Eventually any given technology should not need support. If we as a nation want to reap the benefits of continued cycles of innovation then our focus should be on getting new and improved technologies down their respective cost curves and to a point of maturity where they can compete on their own two feet.

Ideally, government would merely provide the conditions for private capital to work effectively. In the case of energy, improved, safer, cleaner solutions are well within our capability to develop and deploy. But the private market is not confident in the direction and stability of our policies. In this case, the government is both failing to address persistent market failures and compounding them with inconsistent policies.

Solutions: Accelerating the Adoption of Clean Energy Technology

The good news for America is that for now our scientists and entrepreneurs are still churning out innovative energy technology ideas and companies. We still have a robust national lab system and we have some of the best university research labs in the world. We also still have a robust private capital ecosystem that has deployed significant investments in energy and clean technology over the last decade. In the first quarter of 2013, the venture capital industry has already invested more than $369 million dollars into clean technology companies.[19] If the history of venture capital is any guide, then those dollars can generate ten times the investment downstream. The challenge is how to draw the necessary investors into the segments that represent heavier capital lifts and riskier market entry.

Fortunately, there are several ways in which the U.S can unleash private-sector investment and promote innovation at the same time. Government can do this without "picking winners" and without huge costs to the taxpayer.

1) Support the innovation pipeline

We need to make sure we continue to replenish the innovation pipeline. We cannot starve the research budgets that not only breed the next generation of innovation, but keep the talent here in the U.S. We have the talent, but we need the promise of commercialization to continue to keep that talent here. That's why it is critical that Congress continue to support basic R&D at universities and labs, and fund the Advanced Research Projects Agency for Energy (ARPA-E).

ARPA-E was designed to spur exactly the type of early commercial research and development that our innovators and venture investors look for. ARPA-E is a small but critical program that has developed into a model program for how government should tackle these challenges. We should double down on the support for ARPA-E and also programs that provide follow on support for ARPA-E projects. These follow on programs help ensure that we continue to mature new innovations and support an ecosystem of researchers and entrepreneurs. We cannot afford for the sector to go dormant and expect that at some point we will be able to turn the lights back on. These communities take decades to build.

[19] Source: PricewaterhouseCoopers/National Venture Capital Association MoneyTree™ Report, Data: Thomson Reuters

2) Fill the financing gaps

For those segments that have high strategic value to our nation, but do not attract private investment, we need a set of tools to help fill the financing gaps and draw private capital in. These tools should prioritize innovative technologies, and they need to be flexible, efficient, and technology neutral. Above all else, they must be predictable. Investors need to know that if they invest in a company that unlocks meaningful innovations they will be able to finance the company to scale.

The primary financing gap typically occurs where a company must scale up to a demonstration facility and then first commercial plant. We've seen this in solar manufacturing facilities, biofuel plants, battery production lines and a host of other technologies. The capital requirements tend to outstrip the capacity of most equity investors that are willing to tolerate technology risk. Without an operating track record, capital is difficult to secure.

We have already seen a mix of government solutions, ranging from grants to loans that target this gap. These are helpful but not sufficient. We need a solution that draws private capital in to fill these gaps, whether it is venture capital, debt financing, or corporate capital.

In the past the venture industry has supported efforts by the Chairman and Ranking Member to create a Clean Energy Deployment Administration. On behalf of the venture industry I would also like to call for reform of the current energy tax code with a focus on leveling the playing field for new alternative technologies.

The current process underway in the senate to re-evaluate the current tax code from the bottom up is a great opportunity to look at new approaches to energy. In particular, we support the creation of a new energy innovation tax credit that could replace many existing credits. This credit would provide incentives to companies as they scale an innovation and automatically sunset once a company hits a specified volume of production. The credit would be technology-neutral and accessible to all companies that invest in scaling innovative technologies across the entire energy industry. A one page overview of the proposal put forth by the National Venture Capital Association (NVCA) to streamline the energy tax code in this fashion is attached as Appendix A.

The establishment of a tax credit that is permanent in the tax code – though only available to individual companies up to pre-determined, commercial-scale thresholds – would create the long-term certainty necessary to drive private capital into the commercialization gaps discussed above. The capacity-based volume threshold and a secondary cap on qualifying capital expenditures would prevent companies from claiming the credit beyond what is necessary to level the playing field and allow companies investing in innovation here in the U.S. to compete on their own two feet.

The bottom line is that if we are serious about filling these gaps in sectors that have high strategic value to our nation, then government needs to create more enduring structures that can evolve with the market over time.

Conclusion

Let me conclude on a note of urgency. The global energy landscape is changing. New technologies are emerging, and the economic strength of our economy over the next several decades will depend not just on how effectively we use existing resources, but on how we choose to cultivate newer sources of energy.

The energy industry as a whole must continue to innovate and adopt new technologies to provide the strong economic base that the U.S. needs to remain competitive. To do so requires a new way of thinking about energy policy, particularly tax policy, that can be applied consistently across the entire energy industry and provides the long-term certainty that investors and corporations require to make rational decisions.

This committee has held many hearings on the deteriorating competitive position of the United States in new energy markets *vis a vis* China, Japan, Korea, and Germany, so I will not recount those details here. As the U.S. emerges from recession it is critical that resources should be targeted at the most effective ways to strengthen the American economy. We need to remember that our legacy of innovation is uniquely American and a huge reason for our success over the last century, but it can't be taken for granted. Federal policy plays a critical role in whether we continue to build new American energy solutions that will keep us competitive. We have begun to see some of the limitations of our innovation process. It could not be more urgent to reduce the uncertainty of our current tax credits for alternative energy technologies and explore the creation of innovative, performance-based tax credits that are permanent and provide certainty, but do not create dependence.

In this 113th Congress, the tax code is clearly front and center. I believe we have a rare opportunity to streamline the tax code to make it more efficiently support the development of the next generation of technologies. The focus must shift to accelerating the rate of innovation, continuing to reduce the costs to taxpayers, and reducing the long-term dependence on government support. Such a transformation need not be complicated. The tools and approaches already exist. But we must work to rationalize these structures to better support the innovative companies that fuel our economy. We have the talent, the capital markets, and the capacity to lead in energy technology. I look forward to the opportunity to work with this committee on addressing these challenges moving forward.

Appendix A: Energy Innovation Tax Credit Overview

Objective

Streamline the energy tax code; create a long-term policy that provides consistent, durable incentives for new technology across the entire energy industry; move away from the current practice of government picking winners through technology definitions; refocus federal support on early deployment and scaling of production where it is needed most; eliminate permanent dependencies on subsidies; and leverage private investment in innovation.

Credit Structure

Eligibility: The credit provides technology neutrality by supporting any innovative technology used for the production of fuels, energy generation property, or any technology that can be paired with energy generation property to improve the performance or efficiency. Companies eligible to receive the credit must be operating qualifying facilities in the United States that manufacture or produce an eligible technology. The credit is only received for actual production of fuels or energy generation property.

How is a technology deemed "innovative"? Qualifying technologies must be determined to meet a threshold as "new and improved" relative to commercially available alternatives. This means that a technology must be only recently developed and not yet commercialized and provide improvements to production processes or end products – i.e. the technology must involve or constitute new or improved performance, reliability, or efficiency in comparison to commercial technologies. Such requirements include as eligible the adoption of existing or previously proven commercial technologies at a different scale and/or for a wholly separate function in the market relative to their initially intended commercial application. Like other tax structures the burden is on the filer to maintain records to justify these qualifications such that they can be audited and verified.

Permanence & Commercial Scale Roll-Off: The credit structure will be permanent in the tax code (until repealed by statute), but will not be permanently available to any given company. The structure uses two distinct "roll-off triggers" that reduce a company's ability to take the credit over time for any given innovation. Since the credit is awarded per unit of production (measured in KW or gasoline gallon equivalent), the first trigger is a volume-based threshold which sets a cap on the total cumulative production volume that a company can receive the credit for from any given innovation. The second trigger is a cap on "qualifying capital expenditures," calculated as the aggregate capital expenditures by an individual company associated with the implementation of the new or improved technology elements of the system. A company can receive the credit for additional innovations based on the capital expenditures associated with additional innovations.

The volume-based thresholds sufficient for an individual producer to have reached commercial scale will be determined for each qualifying technology by the Department of Energy (DOE) Secretary in consultation with the Secretary of Treasury. These thresholds will be subject to revision based on market conditions every five (5) years following enactment of this legislation and will be adjusted only in the case that technology development capabilities and market conditions have shifted significantly such that the volume at which commercial scale can be achieved is determined to have changed significantly. The Internal Revenue Service (IRS) in consultation with DOE will have authority to regulate the threshold on qualifying capital expenditures.

Transferability: The credit will be transferable up and downstream in a company's supply chain via business relationships to allow pre-revenue and emerging growth technology companies to obtain its full value.