Submission to the Office of Science & Technology Policy
In Response to the RFI entitled "Strategy for American Innovation"
As described in the *Federal Register* on July 29, 2014
September 2014
National Venture Capital Association (NVCA)

Background

The RFI described above asked for responses on a number of topics, and NVCA's submission herein is meant to address the following questions in the RFI:

"Manufacturing and Entrepreneurship

"(15) What new or existing investment models should be explored to support entrepreneurship in new geographies, as well as in **technologies and sectors that are capital-intensive, relatively high-risk, and require sustained investment over long periods of time?**

"Angel and venture investment has tended to concentrate in a few regions and sectors, particularly sectors that are capital efficient and can provide "exits" for investors within 5-7 years. As a result, innovative technologies that do not meet these criteria may be better suited to different investment models.

"(16) For new technologies and products, how might "proof of manufacturability" be gauged sooner, and what entities would most appropriately provide the necessary resources and facilities? What sectors represent the most promising opportunities for the application of such models?

"Assessing the feasibility of **producing at scale remains a critical hurdle for manufacturing startups attempting to commercialize new or unproven technologies, but it is a challenge that firms do not face until relatively late in their evolution, after a great deal of early investment has already been committed. More effectively addressing this challenge at an early stage could yield more efficient allocation of investment capital**, and greater commercialization of important innovative technologies and products.

"(17) **What tools, business model innovations, financial innovations, or other developments hold promise for reducing the cost of starting and scaling a business in capital intensive sectors like the life sciences, advanced materials, and clean energy? What can the Federal Government do to accelerate these trends?"**

The NVCA understands that changes to the tax code require an act of Congress. But to the extent that the Administration seeks to shape tax reform – especially energy tax reform – in a manner that promotes innovation in the United States, we respectfully offer these thoughts and a proposal for your consideration.

Today's web of energy tax policies is in need of significant reform. Current policy is an amalgam of decades of regional priorities and inconsistent policies. No current policy supports the kind of innovation and adoption of new technology that ensures our long-term competitiveness in global energy markets.

NVCA is supportive of new policies that streamline and simplify the complex, technology-specific credits that exist across the energy sector. We believe that the tax code should create a level playing field for all technologies and establish the long-term certainty necessary to drive investment in the sector.

Continued innovation is critical. The United States needs to adopt a long-term energy tax policy that encourages corporations to invest in new technology, aligns with the needs of small emerging companies who are often the source of these innovations, and provides greater incentives to adopt new technologies. Regulations, standards, and incentives must balance support for existing technologies with the necessary incentives needed for continued innovation to meet our national priorities. They must also require that technologies can eventually compete on their own in the private market.

The approach discussed below would help create a more level playing-field for new energy technologies. Rather than support deployment of commercially-available products, the proposed energy innovation and manufacturing credit would target first-commercial projects to stimulate investment in innovative technologies. The proposed credit structure provides consistent, durable incentives for new technologies across the entire energy industry and ends the current practice of the government picking long-term technology winners. The proposed energy innovation and manufacturing tax credit structure would refocus federal support on early technology deployment where it is needed most and encourage private investment in innovation, which is one of the most critical components to unlocking new economic growth.

According to a report released by the Department of Commerce, "technological innovation is linked to three-quarters of the nation's post-WWII 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."[1] But historically, private investment in innovative technologies has been weaker within the energy sector than in almost every other industry. In 2010 the five largest oil companies spent just $3.6 billion on R&D which represents less than 2 percent of profits and less than 0.4 percent of total expenditures.[2] In the utility sector, the major utilities employ on average less than 5 people in R&D roles per 1000 employees. This

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

[2] Congressional Research Service. *Research and Development by Large Energy Production Companies.* August, 2011.

is the lowest level of any industry.[3] These numbers are a result of many industry dynamics, but also reflect how little incentive exists for energy companies to invest in new technology, even with R&D tax credits.

Policy Recommendations

For tax policy to effectively drive domestic innovation, it will need to address the scaling challenges and accommodate the financial constraints of smaller emerging companies in the energy sector. These companies play a major role in driving energy innovation, along with some larger companies, that are in fact committed to continuous innovation. And if they receive the private investment they will need to reach commercial scale, these companies will create thousands of new jobs -- just as entrepreneurial companies have done in the information technology and life sciences sectors over the past four decades.

Moreover, policy should be structured in a manner that encourages emerging, high-growth companies to develop a wide range of energy technologies (from renewables to fossil to nuclear), allows the private market to determine winners and losers among these technologies, and creates robust opportunities for new and improved technologies to access the market and compete on a level playing field.

A new approach is in fact possible. Creating a new, non-refundable credit would support technologies as they develop and begin to enter the market -- before they have fully reached economic scale. The structure would be focused on driving technologies down their respective cost curves and then automatically roll off tax credit support as these technologies reach maturity and can compete on their own in the market. America has the most robust private capital markets in the world, but long-term, reliable incentives that create a level playing field are required to unlock this capital. Such a framework would provide certainty to investors across all stages of investment – seed, early, growth, and debt financing for commercialization -- and help to attract the capital required to fill development gaps throughout the commercialization process.

[3] 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 Energy Innovation & Manufacturing Credit

NVCA, in coordination with industry partners and investors across the capital spectrum, has developed the following proposal for an "Energy Innovation & Manufacturing Credit":

Objective

Streamline the energy tax code toward a singular long-term policy that provides consistent, durable incentives for new technology across the entire energy industry; move away from the current practice of the government's picking long-term technology winners; refocus federal support on early technology deployment where it is needed most; and encourage private investment in innovation.

Credit Structure

Eligibility: The credit seeks to achieve technology neutrality and applies to 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 energy efficiency. Companies eligible to receive the credit must be operating qualifying facilities in the United States that manufacture or produce an eligible technology.

How is a technology deemed "innovative"? Qualifying technologies must be determined to meet a threshold as "new and significantly improved" relative to commercially available alternatives. This means that a technology must be only recently developed, discovered, or learned and there must be proven improvements to production processes – the technology must involve or constitute new or improved function, performance, reliability, or quality, 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 value. If the claimed innovation has been in use by three or more facilities for the five-year period preceding the claim of the credit, the technology will be deemed "in commercial use" and thus not a qualifying innovation.

Permanence & Commercial Scale Roll-Off: The credit structure will be permanent in the tax code (until repealed by statute, so not requiring periodic and uncertain "extensions" by Congress), but will not be available to individual companies forever. As a company grows and reaches commercial scale, the credit will reduce to zero once the company reaches a "roll-off trigger" -- a cap on "qualifying capital expenditures," calculated as the aggregate capital expenditures by an individual company associated with the implementation of new or improved technology elements of the system. Once the company has received tax credits equaling 50% of its capital expenditures associated with the innovation, the credit is no longer available to the company.

Claiming the Credit: Claiming the credit does not require any pre-approval by any government agency. If the company's board of directors is satisfied by the opinions of its legal counsel and

auditing firm that the company qualifies for the credit under the statute, the company simply claims the credit on its annual tax return. That return is subject to audit, of course, and companies will follow the guidance that the IRS shall provide for the credit after the credit in enacted in the Internal Revenue Code.

Transferability: The credit will be transferable upstream and downstream in a company's supply chain of business relationships to allow pre-revenue and emerging growth technology companies to obtain its full value. This transferability feature will also encourage larger companies in the energy manufacturing industry to become strategic partners with smaller companies that develop the innovations that earn the credit.

CASE STUDY 1: Innovative Wind Turbine

The tax credit is available to manufacturers of innovative electricity-generating equipment who invest in manufacturing facilities that produce innovative technologies or that use innovative production methods. The credit is only available up to a 50% of the capital invested in the specific manufacturing equipment needed to enable the innovation.

Any technology must meet the following four criteria in order to qualify:

Qualification Criteria	
The end product is used to generate electricity	√
The end product or production process is "innovative"	√
Capital is invested in the manufacture of the end product	√
The capital is invested in US manufacturing facilities	√
The end product is manufactured and sold	√

A company is deciding whether to invest in commercializing a new 5 MW turbine design. The new turbine has shown promise in its initial pilot deployment, but has never been commercially produced. As the company works out the financing terms for a commercial manufacturing facility, they want to make sure the technology is eligible for the tax credit and they make the following four determinations.

- ✓ **The turbine will be used to generate electricity.**
  The new turbine design has the largest capacity of any onshore turbine in the world. Project developers plan to deploy the turbine in massive new wind farms and sell electricity onto the commercial grid. The credit is received when the company sells the manufactured turbines to the project developer.

- ✓ **The turbine is an innovative technology.**
  The credit is only available if the company is able to certify that the turbine is a true innovation. The turbine provides a functional or performance enhancement over existing technology in its improved energy conversion rate and significantly reduced maintenance

requirements.

A third-party audit must confirm that the new turbine is produced in no more than three existing facilities, and that none of those facilities have been in existence for more than five years.

- ✓ **Capital is invested in manufacturing the turbine.**
  The credit only supports capital investment in elements of manufacturing facilities that are necessary to enable the production of the innovative turbine. Qualifying costs are limited to equipment, engineering, construction, or other specified costs.

- ✓ **The turbine is manufactured in the United States.**
  The credit is only available for manufacturing activity located in the United States.

- ✓ **The turbine is manufactured and sold.**
  The credit only becomes available to the company after the electricity-generating equipment has been both manufactured and sold.

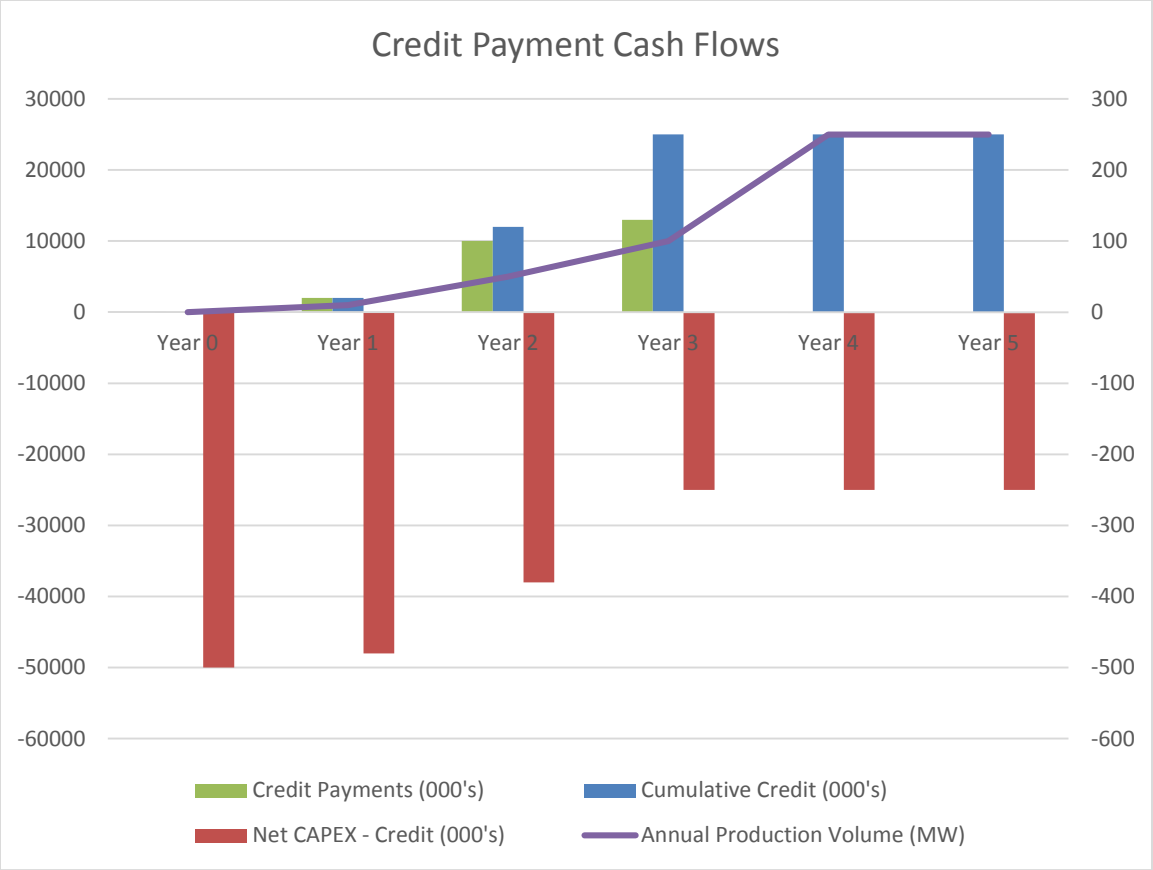
After the determination has been made that the turbine is eligible to receive the credit, the company will subsequently seek to understand how much the credit will be worth. It is essential for the company to be able to forecast this value while negotiating its terms of financing for the facility. To cross the commercialization "valley of death," the company must build in revenue projections associated with the tax credit to make the project more enticing for investors and bring down the facility's cost of financing.

The credit provides $200 per kilowatt (KW) of nameplate generating capacity of the turbines, up to the equivalent of 50% of qualifying capital investment. The company would earn the $200/KW credit per turbine produced and sold in a taxable year.

The cap on the credit is 50% of the total qualifying capital investment made by the company in the manufacturing facility. Qualifying capital investment is limited to the capital investment required to enable the innovation, and does not include capital investment that would have been made in a similar facility without the qualifying innovation.

For example, if the company invested $500 million in its new turbine manufacturing facility and $50 million of that investment was determined to be necessary to enable the innovative turbine, then the credit limit would be 50% of that $50 million (for a total credit value of $25 million).

The following chart depicts the annual impact of the credit relative to capital expenditures over the manufacturing facility's first five years of operation. The turbine facility would begin receive the credit as production volume increases (beginning in Year 1), up to the 50% capital expenditures cap, which in this case is reached in Year 3. At that point, no further outlays are expended.



<u>CASE STUDY 2</u>: 3rd Generation Biobutanol

The tax credit is available to producers of innovative transportation, heating, or electricity generation fuel who invest in production facilities that produce innovative technologies or that use innovative production methods. The credit is only available up to a 50% of the capital invested in the specific production equipment needed to enable the innovation.

Any technology must meet the following four criteria in order to qualify:

Qualification Criteria	
1) The end product fuel meets ASTM standards for use as a fuel for transportation, heating, or electricity generation	√
2) The end product fuel or production process is "innovative"	√
3) Capital is invested in the manufacture of the end product fuel	√
4) The capital is invested in US production facilities	√
5) The end product fuel is produced and sold	√

A company is deciding whether to invest in commercializing a new process to produce biobutanol. The molecular structure of the fuel molecule and sustainable feedstock pathway have shown promise to be cost effective, but have never been commercially produced. As the

company works out the financing terms for a commercial biorefinery, they want to make sure the technology is eligible for the tax credit and they make the following fiver determinations.

- ✓ **The biobutanol meets ASTM standards for use as a fuel for transportation, heating, or electricity generation.**
  The new biobutanol molecule has proven to match all of the characteristics of traditional butanol at lab and pilot scale development. In particular, airline carriers are interested in the company's cellulosic sugar-to-jet fuel pathway. The biobutanol is submitted to ASTM for testing and demonstration to meet the updated jet fuel standards. ASTM either certifies the fuel, or the fuel is demonstrated to meet ASTM standards by an independent third party, for use as a fuel for aviation transportation.

- ✓ **The biobutanol is an innovative technology.**
  The credit is only available if the company is able to certify that the biobutanol molecule is a true innovation. The biobutanol fuel provides a performance enhancement over existing technology in its improved energy input/output ratio while maintaining functional performance characteristics.

  A third-party audit must confirm that the new biobutanol is produced in no more than three existing facilities, and that none of those facilities have been in existence for more than five years.

- ✓ **Capital is invested in producing the biobutanol.**
  The credit only supports capital investment in elements of production facilities that are necessary to enable the production of the biobutanol. Qualifying costs are limited to equipment, engineering, construction, or other specified costs.

- ✓ **The biobutanol is produced in the United States.**
  The credit is only available for manufacturing activity located in the United States.

- ✓ **The biobutanol is produced and sold.**
  The credit only becomes available to the company after the fuel has been both produced and sold.

After the determination has been made that the biobutanol is eligible to receive the credit, the company will subsequently seek to understand how much the credit will be worth. It is essential for the company to be able to forecast this value while negotiating its terms of financing for the facility. To cross the commercialization "valley of death," the company must build in revenue projections associated with the tax credit to make the project more enticing for investors and bring down the facility's cost of financing.

The credit provides $0.50 per gasoline gallon equivalent (GGE) of the biobutanol, up to the equivalent of 50% of qualifying capital investment. The company would earn the $0.50/GGE credit per gallon produced and sold in a taxable year.

The cap on the credit is 50% of the total qualifying capital investment made by the company in the biorefinery. Qualifying capital investment is limited to the capital investment required to enable the innovation, and does not include capital investment that would have been made in a similar facility without the qualifying innovation.

For example, if the company invested $300 million in its new biobutanol refining facility and $50 million of that investment was determined to be necessary to enable the innovative molecule, then the credit limit would be 50% of that $50 million (for a total credit value of $25 million).

The following chart depicts the annual impact of the credit relative to capital expenditures over the biobutanol refinery's first five years of operation. The biorefinery would begin receive the credit as production volume increases (beginning in Year 1), up to the 50% capital expenditures cap, which in this case is reached in Year 3. At that point, no further outlays are expended.

Venture Capital Plays a Key Role in Innovation

According to a 2011 IHS Global Insight report, companies that were founded as small start-ups with venture capital accounted for 12 million jobs and $3.2 trillion in revenues in the United States. These figures equate to 11 percent of private U.S. employment and 21 percent of our country's GDP.

Venture-backed companies are responsible for the creation of entire industry sectors here in the United States including semiconductors, biotechnology, Internet content and software. Today, we are creating the companies that will serve as cornerstones for cloud-based computing, internet security, healthcare, social media and new energy. Many companies founded with venture capital are household names today, including Apple, Genentech, Starbucks, Facebook, Home Depot and FedEx.

Over the past 10 years, venture capitalists have invested over $25.0 billion in 762 energy and cleantech companies. With this burgeoning growth of venture capital investment in energy companies over the last ten years, the next generation of successful companies innovating in energy is poised to follow in their footsteps.

The chart below highlights the considerable increase in venture capital investment in energy and cleantech over the past ten years. The data is from the MoneyTree Report by PricewaterhouseCoopers LLP and the NVCA, based on data from Thomson Reuters.

Investments by Year	$M Invested
2003	228.97
2004	431.08
2005	630.94
2006	1,800.84
2007	3,123.66
2008	4,279.31
2009	2,519.23
2010	4,091.53
2011	4,615.18
2012	3,325.42
TOTAL	25,046.16

Conclusion

NVCA encourages the Administration to focus on innovation as it considers a long-term approach to tax reform. The Energy Innovation & Manufacturing Credit we propose would ensure a productive, focused role for the federal government in helping energy technology innovation reach commercial scale – but not beyond that point. Furthermore, the Energy Innovation & Manufacturing Credit would help increase participation of private-sector investors who will ultimately drive economic growth and ensure U.S. leadership in the global energy economy.