FINANCING CHALLENGES FACING THE RE&EE INDUSTRY:

As identified by the Finance subcommittee of the Renewable Energy and Energy Efficiency Advisory Committee

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Private sector investment in the U.S. renewable energy and energy efficiency (RE&EE) sector has grown considerably in recent years due to manufacturing and technology cost reductions, increasing demand for clean energy products and services, and federal and state tax policies. However, to further grow the industry and maintain a leadership role in the global clean energy economy, substantially higher levels of private sector investment is needed.

An effective policy framework is essential to ensure that the private sector investment needed to catalyze growth in the sector occurs. The challenge, in an era of fiscal restraint, is for U.S. Government policy-makers to design incentives that are both highly-efficient and effective; thereby limiting the cost for taxpayers, while simultaneously facilitating the rapid scale up of an industry that can provide economic opportunities for Americans across the country.

While sufficient private capital exists to support the accelerated deployment of renewable energy technologies and to finance the invention and innovation of new technologies in the sector, current policies are not efficiently mobilizing capital at scale. Put simply, federal policies must unlock new, lower-cost sources of capital and broaden the sector's investment base to meet the long-term needs of the industry.

To facilitate this effort, the Secretary of Commerce's Renewable Energy and Energy Efficiency Advisory Committee (RE&EEAC) has compiled the following report on the financing challenges hindering investment in the clean energy sector. The report describes the current barriers to project financing and within different periods of a company's growth, beginning with initial funding and ending with a revenue stream generated by exports, owning and operating projects, or selling assets. In particular, the report addresses the financing challenges facing companies in the following phases of project development and of a company's life-cycle:

- Start-up Capital
- Build-Out Capital
- Working Capital and Commercialization
- Construction, Project Finance
- Overseas Development & Construction Finance
- Asset Sales

Taken together, these financing phases move companies through the stages of innovation, entrepreneurship, commercialization, and ultimately global competitiveness. At each point in the process, companies must acquire capital to grow or sustain their business.

Each section of the paper details a company's needs at that particular stage of the business process, as well as the investment profile sought by financial firms interested in investing capital. As each investment vehicle – each investor – is different, understanding why an investor makes a decision is critical to identifying gaps and ultimately using the authority of the U.S. Government to catalyze investment in the sector, a priority for the Obama Administration and the Secretary of Commerce's RE&EE Advisory Committee.

Understanding the Risk Profile of the Renewable Energy Industry

As with other emerging and energy sector industries, investments in RE&EE companies and projects involve risk management. Policy-makers seeking to encourage private capital investment in the sector must grasp this concept, using the tools at their disposal to help manage and reduce project and investment risks. In general, risk – whether in the renewable energy sector or elsewhere – stems from uncertainty. In the renewable energy sector, uncertainty presents itself in a variety of ways, including new and rapidly changing technology, the high cost of research and development, competitive market conditions, market acceptance cycles, changing government certification requirements, and inconsistent domestic and international energy policies. In addition, it is often difficult to obtain project financing for development and early stage projects. These challenges can be difficult to account for and add costs for those seeking and providing financial investment.

First, the sector is defined by relatively new or emerging technologies and markets. Though the sector has existed for several decades and some segments are relatively mature, constant improvements in the technology and the breakthrough, disruptive nature of the industry (high-risk; high reward) makes investors wary of deploying capital too quickly or too cheaply. For companies seeking investment, this higher perceived risk profile can make obtaining low-cost financing difficult, particularly in an unstable economy.

Second, a company's growth in this sector requires several stages of investment, each one with a new set of financing challenges. For example, at the point of early-stage funding, which includes the search for an angel investor, companies have little to demonstrate other than a new idea or concept. Investors understand that even if the idea was viable, it would at best be years away from profitability. Furthermore, the firm could still fail for several different reasons (poor business acumen, changing consumer need, etc).

Once a company has a commercialized product – typically after several funding cycles – deploying it often involves a new set of technology and market risks that can make a project difficult to finance. Developers must often secure highly competitive power purchase agreements (PPAs) from utilities or fuel off-take agreements from fuel distributors for a project to obtain the proof of eventual profitability needed to attract investment. Without the ability to demonstrate the technology's competitiveness through these contracted revenue streams, a market for a company's technology and/or finished products often does not materialize.

For a project investor, the risks associated with a project are thus four-fold: 1) that the technology will not meet performance expectations or will not be cost-competitive at scale;

2) that even if the technology works perfectly, it could be crowded out by other, more competitive products; 3) that the variable resource may not allow for the project to be as profitable as was anticipated over time; and 4) that even if the project does perform as designed, the market will not be fully developed or stable enough to return the projected profits. In developing or emerging markets, the latter is often viewed as the most risky part of an investment. In short, cascading costs throughout a project make it less attractive for investors.

A long term power purchase agreement and commercially available project finance are typically predicated on proof of a commercially scalable operating project. This requirement means that the company and its investors may not only have to fund the R&D and overhead associated with the development of the underlying technology, but that they also have to be prepared to fund the proof of concept project and even the first commercial plant; the cost of which can easily exceed the investment required to develop the technology. As project finance investors will look to be paid back from the project they finance, the company and its investors may require the construction of multiple successful projects before they receive a return on their investment.

Understanding the Role of Government

Over the past five years, with the support of existing policy incentives, the renewable energy industry has accounted for more than 35% of all new power capacity installed domestically. The result has been more than $300 billion in private sector investment in the U.S. clean energy market since 2004, which has helped to create thousands of American jobs across the industry's robust supply chain.

Yet more must be done. For new technologies to become viable and allow companies to move from the research and development phase to the commercialization of their product or service, long-term governmental policy is essential. When policies supporting the sector are robust, long-term, and consistent, investment – whether in the United States or elsewhere – has followed. Conversely, when policies are inconsistent or short-term, significant potential investors look to other markets or other sectors for more attractive returns, limiting growth in the United States. This is in stark contrast to the conventional energy sector, which in the United States has enjoyed a relatively stable, long-term – if not permanent, policy framework for nearly a century.

Given the risks associated with making capital investments in a sector driven by policy, it is not surprising that most RE&EE investors are firms with large pools of capital that can spread risks across several investment entities. These firms often enjoy a direct understanding or association with the clean energy market. Consequently, non-traditional investors and smaller investment firms have largely backed away from the market during periods of policy uncertainty.

And like any opportunity with few investors, those willing to deploy capital can require a high rate of return for their investment, adding costs for the sector and making the deployment of new, renewable energy technologies slower and more costly. Addressing this situation by catalyzing investment in the sector from those firms or organizations not

traditionally involved in clean energy would likely facilitate significant growth and spread the benefits of clean energy deployment broadly.

Start-up Capital (Invention and Innovation)

- Venture capital
- Government Support
- Grants

The first financing phase, finding start-up capital, could arguably be the most difficult phase of a company's financial life-cycle (it is the farthest from the revenue stream). Early design and development financing (on the order of up to $5 million) often relies on the investment of friends and family, angel investors, and/or successfully winning state and federal awards for research and development (R&D).

Since the 2008 economic crisis, the availability of venture capital (VC), long the life-blood of innovation in the sector, has been highly limited. Many VC funds – especially in capital intensive areas like manufacturing and power generation – have exited the market. The current VC model prefers easily scalable online businesses, such as Instagram or Tumblr, since these industries are seen as having less intense competition and do not require capital-intensive proof of concept or commercial operating plants. They are thus viewed as somewhat safer investments.

For new or emerging renewable energy technologies, long development cycles with uncertain pathways to success can make it difficult to predict revenues, profitability and the potential opportunities for exit. Developing and commercializing a new water-based renewable electricity generation system, for instance, is a 10-15 year process requiring successfully completing multiple generations of technology design, development, demonstration, and commercialization processes.

Moreover, new and emerging technologies must compete in the energy market with large, well-funded, and deeply entrenched traditional companies. Many investors are reluctant to bet significant amounts of capital on the widespread replacement of these established incumbents, resulting in the limited availability of capital for innovative new products or companies. Financing is thus often dependent on the identification of potential niche opportunities in the existing market where new products could be priced competitively.

At this stage, government grants and support by federal laboratories are vitally important, and have proven to be a tremendous national asset in developing new, competitive technologies. The DOE, USDA, and SBIR grants have all been successfully used to support this sector.

Build-Out Capital (Entrepreneurship and Phase 2 Start-up Expenses)

- Venture capital
- Grants

Once a company receives enough initial stage investment to begin the process of creating a company with a commercialized product, it must transition its initial concept or prototype into a sellable technology. This process, sometimes called the "technology design process," often includes the development of an initial design, the scale-model testing of that first design, and construction of a prototype for development and testing. This phase of the business cycle may also include iterative prototype development, unit and multiple unit array demonstration and testing, and multiple generation system improvement design and testing.

As new companies achieve initial demonstration successes, funding requirements can increase from approximately $3-5M to $10-25M for next generation designs and demonstrations. Successful completion of this development phase often requires accessing additional local, state and federal government R&D funding where available, or attracting additional capital from an angel, institutional investor, or a committed strategic industry investor or fund.

At this phase, institutional investors are rare because the financial payback period is still beyond their typical investment horizon (as many as 5-7 years), and their investment perspective requires more predictability.

Once a technology has proven successful at a test/design level, companies must begin the construction of a "pilot project" to demonstrate how their technology works to new investors looking to take a product to market for the first time. While a company is developing its technology, most firms are concurrently pursuing a demonstration site permit and an environmental impact permit. Once permits are received and the technology appears ready, construction can begin on a pilot project. This provides an important platform to obtain independent certification to test the new technology for performance and other issues, and serves as a basis for future project financing.

For the renewable fuels industry, this is the period in which firms build an integrated demonstration facility to prove their technology at scale. This ensures that a company's first commercial project will qualify for debt financing.

Working Capital and Commercialization

- Venture capital
- Private equity

If the pilot project is successful, a company can then begin preparations for implementing its build-out and operations plan. The plan may include initiating an international business agenda, planning staff expansions, accessing renewable energy incentives, further scaling of the technology, and hopefully achieving cost competitiveness. The commercialization financing requirement can be $25-50 million depending on the project (from $25-$400 million and up for renewable fuels projects), and the availability of incentives either locally or internationally.

During this phase, companies simultaneously seek to develop a full-scale system demonstration; independent technology and project certification for warranty, insurance, and project financing; and the scaling of manufacturing capacity. For companies interested in projects, additional work must be undertaken in project siting, permitting, and licensing. In addition, potential PPA off-takers or project investors may require the company to build and begin to operate its first commercial plant utilizing its own capital (at a potential cost of up to several hundred million dollars) before agreeing to provide financing for that plant and future projects.

Though varying widely, total funding required to successfully complete the commercialization of new renewable energy generation technologies should be expected to amount to approximately $30-200 million over 10-12 years. Additional equity capital is often needed to fund this expansion. A this point, some later stage venture capital firms may seek to invest in a company, and private equity investors – buoyed by a successful demonstration of a firm's technology – may also seek to make investments. For many companies, especially those started by scientists or engineers, this can be a difficult transitional period – as "running a business" becomes the modus operandi for the company rather than the continual development of a technology. Outside management teams are often brought in to remake the company as hiring begins to escalate.

In seeking funds for both the initial commercial project and full-scale system demonstration phases, U.S. companies are frequently solicited by international investors that would have the company move or base its U.S. manufacturing facilities overseas as a condition of financing. The United Kingdom (U.K.), for example, currently offers economic incentives for commercializing new renewable energy technology systems there, which provides a compelling reason to consider choosing the U.K. over the United States for locating a manufacturing facility.

To date, U.S. Government support for renewable energy companies in this phase of the business cycle has been reliant on loan guarantees from the Department of Energy. The 1703 and 1705 Loan Guarantee Programs provide loan guarantees for 80% of a renewable energy project's cost for the greater of 30 years or 90% of a project's useful live. As of May 2013, under the 1705 program, DOE had closed on 26 loans totaling $15.6 billion, leveraging billions more in private-sector investment.

Yet the structure of the two loan guarantee programs provides significant limitations, potentially reducing their impact. Under the programs, the only financial product available to DOE to address the market failure known as the "valley of death" between pilot scale phase of a technology and full commercialization is a loan guarantee. As such, DOE is not able to utilize equity or quasi-equity investments, sell letters of credit, or charge revenue generating fees. This lack of flexibility can hamper DOE's ability to provide support to many promising renewable energy technologies and makes the programs entirely reliant on unpredictable government appropriations.

Construction, Project, and Customer Finance

- Private equity

- Infrastructure funds

With a proven technology and a commercially scalable operating plant, the financing challenges for renewable energy sector shift to the challenges associated with the development of projects, as companies that have survived the demonstration phase and found investors now look for buyers of their technology.

Current governmental incentives are often provided through tax policy. Thus project finance in the sector relies heavily on tax equity investors that can monetize available tax incentives. The result has been a fairly complicated investment environment that involves several barriers to entry for new, smaller investors. Renewable energy tax credits allow a developer to write off a certain percentage of the total project costs from its taxes. These credits (the Production Tax Credit, Investment Tax Credit, and previously the Section 1603 Treasury Cash Grant Program) have played an important role mobilizing private capital and investment in the sector and continue to be important drivers of private capital investment in the sector.

Improvements to the tax credits could, however, make them even more effective. In many cases, project developers do not have enough profits to take advantage of the credits; that is, the amount they would have been allowed to write off is far larger than the amount of taxes they have to pay. The industry must therefore often rely on financing structures so that the project's investor (typically a large firm with significant tax liabilities) can assume the role of tax equity partner who provides capital to the project in exchange for the tax incentives and deductions.

Unfortunately, the supply of capital from tax equity investors is highly limited by this arrangement, as many traditional financial institutions that understand the tax equity product are carrying forward losses or otherwise do not need tax sheltered investments. Many more potential corporate investors with a tax appetite are uninterested learning the complex deal structures required to receive value from these transactions.

As a consequence of the limited participation in the tax equity market, financial intermediaries often charge a premium (or add a friction cost) to the use their tax equity. Consequently, tax equity is often a more expensive form of financing. Some financiers estimate that the present value of the tax benefits that ultimately reach project developers through tax equity financing is approximately 70%of the actual value of the tax benefits. In contrast, renewable energy projects financed with project debt and cash-based incentives are generally cheaper and easier to finance.

Any financing vehicle will benefit from long-term consistency in government policy. However, the current debate over policy and regulatory changes to the Renewable Fuels Standard has raised the specter of change in policy, chilling the market and impacting RIN values. The blender's tax credit for biodiesel and ethanol, which was created initially to assist producers on plant costs, has been extended for one year terms, creating uncertainty in the market and impacting the value of both biodiesel and ethanol facility assets and profits.

The use of feed-in tariffs, where the incentive is incorporated in the revenue stream, could facilitate the more efficient allocation of resources and thus make renewable energy investments more attractive.

Alternatively, in the case of transportation fuels, RE&EE projects could be financed using the cash reserves of large oil or chemical companies or through enhanced debt financing, perhaps through a green bonds program. Industry experts believe the U.S. transportation fuels industry will require roughly $200 - $300 billion of debt financing, and over $1 trillion worldwide. To the extent that U.S. Government programs can be developed to help RE&EE investors more readily access the worldwide $90 trillion bond market, the more likely additional investment will flow into the sector.

Customer Finance

For commercially viable technologies with relatively low prices, continued industry growth may depend more on customer financing than on financing for manufacturers. The best example of this phenomenon has been the advent of residential solar equipment leasing. Rather than buying a solar power system, which may cost $25,000 with a payback period of 5-7 years, a customer can now lease that same system, avoiding a significant capital investment, for 20 years, lowering the overall cost – and risk – for residential consumers.

Residential systems are typically sized to provide most, but not all, of the customer's power requirements. The monthly lease rental payment is, on average, less than the cost of the purchased power it replaces. As a result, the customer often saves money on his/her electric bill from the first month the system is operating, without any out-of-pocket cost.

Customer financing is also an important component of the energy efficiency market, especially in the commercial sector. Through energy service agreements, building owners can contract with energy service providers to make building systems improvements and arrange financing. The providers usually guarantee that utility cost reductions will cover retrofit financing debt service.

Municipalities can also act as financing intermediaries for commercial and residential retrofit projects under the Property Assessed Clean Energy (PACE) program. Long-term bond financing for multiple projects is arranged on the municipal issuer's credit. The municipality then disburses the bond proceeds to participating property owners and collects debt service through an additional line item on their property tax bills. A similar mechanism, On Bill Repayment (OBR), uses utility bills to collect privately arranged energy retrofit financings under a program launching in California this year. Supporting and facilitating these types of leasing arrangements through federal policy could encourage the expanded use of renewable energy and energy efficiency technologies at a very limited cost.

Overseas Development & Construction Finance

- Global banks

- Government support

Although several of the same technology and policy risks associated with domestic projects also exist, developers seeking to build renewable energy projects in foreign markets face additional challenges. Since these developers are the purchasers of American-made technologies, they are a critical piece for the promotion of exports. If developers are unable to build American-supplied projects, there simply would not be a market for U.S. renewable energy exporters to sell into.

Developers often base their decision to construct renewable energy projects in foreign markets on the same expectations as projects in the United States – expectation of profitability and effective management of project risks. As in the United States, the policy framework plays an important role on the viability of successful investment. Examples of policies that have been attractive to investors and therefore have also facilitated project development include:

- Reasonable levels of local and national government funding to commercialize a range of new technologies;
- Funding requirements for government matching of less than 50-50,
- Significant incentives for major industry leaders to participate in new technology development and commercialization;
- Incentives or financial structures for institutional and private investors to participate in new technology investments with longer term (5-10 year) payback periods;
- Access to public financing through public financing mechanisms (e.g., early technology and/or project IPOs); and
- Local incentives (e.g., feed-in tariffs) for commercial projects

Project Development in Foreign Markets

In many emerging or developing markets, local financial institutions are unwilling to invest large amounts of capital in the renewable energy industry. This is partly because of the perceived technology risk associated with the sector, and often due to the substantially lower credit profile of the government and the utility company. As a result, most renewable energy projects in these markets are financed by export credit agencies, like the U.S. Export-Import Bank (ExIm), national development finance institutions, such as the U.S. Overseas Private Investment Corporation (OPIC), or by multilateral institutions, including the World Bank (the Bank) and other regional multilateral development banks (MDBs).

Each of these organizations has a unique mandate and set of expectations for renewable energy investments. The overall mandate of the World Bank Group, which includes the International Finance Corporation (IFC) and the multilateral development banks, is to reduce poverty and support economic development. Since 2007, the Bank has embarked on a comprehensive strategy to also address climate change, resolutely incorporating clean energy development into its lending practices. OPIC's mission is to support economic development by promoting U.S. private investment in developing countries. Since 2009, OPIC has had an institutional focus on renewable energy investment and has steadily

increased its investments in the sector. ExIm's mission is to support U.S. exports by providing export financing that the private sector is either unwilling or unable to provide or that counters the financing support that foreign governments offer their exporters. ExIm support for renewable energy and environmentally beneficial exports is mandated by Congress, and the Bank has steadily grown its portfolio of renewable energy transactions.

However, modifications at each of these institutions could support additional investment in the sector, reduce risks for investors, and remove barriers to trade that add costs unnecessarily. For example, to the detriment of U.S. manufacturing, the World Bank and its affiliates continue to make investments in renewable energy projects that benefit from local content requirements, which direct project procurement managers to source a percentage of their supplies from the country in which the project is being built, and which in some cases is illegal under international trade law. As developers must often pay more for products, this adds costs and also reduces or eliminates the potential opportunity provided to U.S.-based suppliers of similar technologies.

Additionally, most international financial institutions (IFIs) do not provide enough support in local currencies and therefore add a currency risk to each project. The International Finance Corporation (IFC) offers local currency lending, but it is usually only available if paired with debt offered by the IFC, which can be costly. Other institutions such as the Export-Import Bank, OPIC, and the Inter-American Development Bank do not currently offer lending in local currencies.

In many cases, project sponsors need to combine debt from more than one IFI. To facilitate this process, IFIs could develop a standard inter-creditor arrangement that covers most of the key items associated with their products. This would reduce time and complexity, and introduce uniformity – similar to the way the multilateral development banks look to the World Bank and IFC's environmental standards as models for their own policies. Importantly, the financing process for most MDBs takes a very long time, which can run afoul of requirements of most markets where renewable energy is growing at a very fast pace.

Finally, the sector would benefit from the ability to receive a financial product on a blended, combined basis with one agency or arranger as the front. For instance, a program that would allow a developer to work simultaneously with ExIm Bank and other government financial organizations, such as Germany's KFW or the Japanese export-import bank, to secure financing, debt, or another arrangement would streamline the financing process and help deploy technology faster.

Asset Sales

- Pension funds (Canadian FAIT)
- Utilities
- REITs
- Public Corporations

The final phase of the financial cycle for the renewable energy sector involves the selling of assets to institutional investors. In many ways, a low cost of capital for RE&EE companies is dependent on the existence of a secondary market for investments in late-stage or already constructed projects. Without a strong secondary market for projects, developers are often unwilling to invest in projects.

Creating liquidity in the renewable energy market through the creation of a secondary market enables large institutional investors to more easily invest in the sector, without relegating such investments to special situations, esoteric, or alternative asset desks. In fact, since the credit crisis of 2008, most investors in renewable energy projects must demonstrate some secondary market for investments in order to attract capital. Examples of additional sources of liquidity include:

- Sale to other similar investor;
- IPO with secondary market trading;
- Strategic acquisition

Investors in these assets must have sufficient competence in the U.S. rules that oversee investment companies (e.g. the SEC 40 Act), independent power producers (e.g. FERC), the taxation of different types of businesses, and the ability or non-ability to pass through tax benefits (Internal Revenue Code), as well as any issues surrounding the types of investors in an investment vehicle, such as pension plans (ERISA) or foreign investors (FIRPTA). These rules require expert analysis before forming an investment vehicle for the purpose of investing in renewable energy, which can create a barrier to entry for some who might be interested in investing in this sector, and raise the cost of capital for those committed to making such investments.

One concept that would provide access to a large, liquid, and relatively low cost investor market is to allow tax-efficient vehicles to own renewable generation assets. Publicly traded dividend paying companies such as master limited partnerships (MLPs), real estate investment trusts (REITs), and business development companies (BDCs) have targeted dividend payout rates between 6 – 12% and would add a substantial amount of new investment potential to the sector.

For example, a relatively small, newly formed $200 million RE&EE investment company that targeted a 10% payout rate, could invest in established operating company assets with an unlevered cost of capital below 10% while still investing 5% of its assets, or $10 million in early stage technology companies with an expected return of 0%, and still meet its investment objectives. In this example, if a RE&EE company grew to $1 billion in assets, it would have $50 million available for early stage RE&EE investing. Such a requirement would create demand and competition for the very best early stage investments, while providing an efficient funding platform and source of takeout capital for companies that successfully cross the chasm and become stable cash flowing businesses.

Conclusion

A healthy RE&EE industry must include robust access to capital along the development chain from R&D funding for new technologies, to demonstration projects, early stage project development, and ultimately for long term ownership of operating businesses and projects. Identifying the gaps in the availability of financing should be a priority for U.S. Government policy-makers interested in expanding the competitiveness of the sector, and is thus a priority for the Renewable Energy and Energy Efficiency Advisory Committee of the U.S. Department of Commerce.

Based on the analysis presented in this summary of the financing challenges faced by the renewable energy sector, the Committee will develop actionable recommendations for the U.S. Government. While not all problems or challenges have been identified in this report, every effort has been made to capture the most relevant features of the current investment climate. As the sector changes, the Committee will take into account the latest information it has when developing recommendations, and will update past recommendations when conditions make them unnecessary or duplicative.