Union of Concerned Scientists
Citizens and Scientists for Environmental Solutions

April 15, 2013

The Honorable Kevin Brady
Chair
Energy Working Group
Committee on Ways and Means
US House of Representatives
Washington, DC 20515

The Honorable Mike Thompson
Vice Chair
Energy Working Group
Committee on Ways and Means
US House of Representatives
Washington, DC 20515

Dear Reps Brady and Thompson:

The Union of Concerned Scientists appreciates the opportunity to submit comments to the Energy Tax Reform Working Group. These comments examine new financial approaches that would lower the cost of renewable energy and help enable renewables to more fairly compete in the marketplace. Our comments are based on research conducted by Meister Consultants Group, whose staff has considerable expertise in renewable energy finance, markets, and policy at the local, state, national, and international levels.

This letter presents several approaches to diversify renewable energy financing by adapting practices and experience from other industries to renewable energy, including a thorough review of the following:

- Declining Costs and the Production Tax Credit;
- Reducing the Costs of Financing for Renewable Energy ;
- Master limited partnerships (MLPs) and real estate investment trusts (REITs);
- Green Banks;
- Tax-credit bonds; and
- Securitization.

We believe that a combination of complementary policies may best support the expanded deployment of renewable energy toward the vision outlined last year by the National Renewable Energy Laboratory (NREL) of supplying 80% of our electricity from renewable sources by 2050. Renewable energy investment can move America toward a cleaner, healthier future by creating a range of economic and environmental opportunities, including fostering new jobs and industries, decreasing US dependence on coal and imported fossil fuels, diversifying our power supply, reducing air pollution, and cutting global warming emissions. (Nogee et al., 1999; Union of Concerned Scientists, 2009).

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Declining Costs of Renewable Energy

The market for renewable energy technologies has grown dramatically, with wind and solar experiencing double digit expansion during the last ten years. The primary driver of this growth has been the combination of state renewable electricity standards working in tandem with the federal production tax credit (PTC), which has helped drive down the cost of renewable energy. This growth will need to be sustained and accelerated if the US is to ensure its energy security, grow our economy, reduce the public health burden of our energy use, and respond to the climate crisis. A key strategy for supporting market expansion will be to supplement and extend existing federal tax credits and state renewable standards with financial innovations that lower the cost of renewable energy and help level the playing field with non-renewable power plants.

The most effective near-term strategy for supporting this market expansion would be to extend the current PTC for wind and other renewables now set to expire at the end of 2013.

Renewable energy has historically been thought of as being more expensive than conventional generation such as coal and nuclear power, in large part because market prices do not capture the hidden health and environmental costs of conventional sources. For example, according to a 2013 peer-reviewed study, the average public health cost of coal, including illnesses, premature mortality, workdays lost and direct costs to the health care system was $0.32 per kilowatt-hour (Machol 2013). This is more than three times the average retail price for electricity in the U.S. in 2012, according to EIA data.

The economic argument for renewable energy has improved in recent years, however. The average price of wind energy has declined by more than one-third since 2009, and is now less expensive than new coal and nuclear plants in most parts of the country and competitive with new natural gas plants at high quality wind sites (Bolinger 2013; Wiser et al., 2012). The installed cost of solar photovoltaic (PV) systems decreased by 35 percent between 2009 and 2011, and declined by an additional 27 percent in 2012 (SEIA, 2013; Barbose et al., 2012). As a result of these declines, some utility scale solar systems are approaching parity with conventional generators when federal tax benefits are included. For example, several recent utility scale solar PV projects proposed or approved in the Southwestern U.S. have prices in the $58-$100/MWh range (Goosens and Martin 2013; Marks, 2012)

The improved competitive position of renewable energy is evident in Figure 1 below from a 2011 UCS report (Freese 2011), with prices for wind and solar PV moving toward the lower end of the range over the past two years. The Energy Information Administration's (EIA) most recent levelized cost estimates for different technologies in 2018 also fall within these ranges, including a new natural gas combined cycle plant at $65.6/MWh (EIA 2013).[1]

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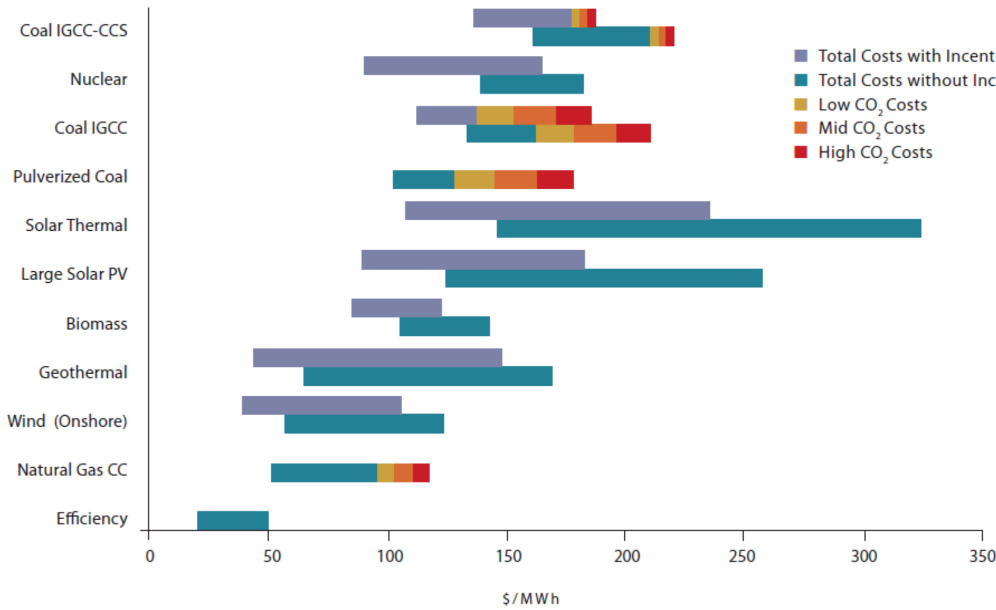
[1] **Figure 1. Levelized Cost of Electricity for Various Technologies.** Levelized costs represents the present value of the total cost of building and operating a generating plant over an assumed financial life and duty cycle, converted to equal annual payments and expressed in terms of real dollars to remove the impact of inflation. The range of costs reflects uncertainty in capital and fuel costs, as well as regional variations in costs and resource quality. The assumptions are



For a variety of economic reasons – including the advanced age and inefficiency of many coal plants and competition from natural gas and renewable energy – there is already a market trend away from coal-fired generation toward cleaner sources. From 2008 to 2012, the U.S. Energy Information Administration reports that the share of coal power in our electricity mix has declined from more than 50 percent to 37 percent. At the same time, natural gas and renewable energy sources are growing at a rapid pace, In 2012, natural gas generation accounted for 30 percent of the U.S. power supply (up from 18 percent in 2008), and new renewable energy capacity additions—led by wind and solar development—exceeded new capacity additions in fossil fuels for the first time. This significant change in our electricity generation mix provides an opportunity to clean up and modernize our power plant fleet while diversifying our energy portfolio.

Even with these positive trends, renewable energy will require smart policy solutions and technology innovation in order to overcome existing market barriers, further reduce costs and become broadly competitive. There is currently a focus on achieving cost reductions through research and development and the deployment of technological advances. A new generation of higher capacity factor wind turbines, for example, has significantly lowered the cost of energy production during the past several years (Wiser et al., 2012). There is also a national focus on reducing the "soft costs" associated with renewable energy project development (e.g. permitting and customer acquisition costs), through programs like the US Department of

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based on project specific data, where available, and recent estimates from power plant construction and engineering firms, financial institutions, utilities, and state and federal agencies. Incentives include federal tax credits for all technologies and loan guarantees for new nuclear plants. The range of future CO_2 prices assumes $13/ton in the low case, $26/ton in the mid case, and $43/ton in the high case. Transmission and integration costs are not included, Source: Freese et. al. 2011.

Energy's SunShot Initiative(Seel et al., 2012; US Department of Energy, 2010a). Clearly, much more can also be done to enhance the competitiveness of renewable energy sources that are widely available and being deployed across the U.S. today.

Reducing the Costs of Financing for Renewable Energy

Another area for potential cost reduction is in the cost of financing. Renewable energy generators are capital intensive, meaning that the majority of project costs occur upfront. This is in contrast to conventional generators who tend to have lower upfront costs, but incur significant fuel costs over time. In order to cover their upfront costs, most large-scale renewable energy projects require external investors to provide the capital for development and construction. The rate of return that these investors require can make the difference between whether a project is economically viable or not. A high interest rate, for example, can make an otherwise competitive project infeasible. The rate of return required by investors can also determine broadly whether the renewable energy industry can compete with conventional generation. The identification and deployment of strategies that can reduce the cost of capital for renewable energy financing should be a high priority for policymakers and sustainable energy advocates

The competitiveness of renewable energy is highly sensitive to the cost of both debt and equity. As can be seen in the Table 1 below, decreases in the cost of capital can have a significant impact on the levelized cost of energy of renewable energy. A 4% decrease in the cost of equity in the example of the wind plant in the example below, for example, reduces the levelized cost of producing energy by 1.2 cents/kWh, or approximately 14%.

Table 1. The Effect of Return on Equity on a Hypothetical Wind Project's Levelized Cost of Electricity[2]

Return on Equity	Levelized Cost of Energy
16%	9.75
14%	9.15
12%	8.55

The precise impact of a reduction in the cost of capital will depend on the financing structure of the project (e.g. mix of debt and equity) and the capital cost of the system.

The cost of capital is heavily influenced by the risk of the project to be financed, as perceived by potential investors. There are a broad range of potential risks to renewable energy development, which have been characterized in a series of recent publications – but which will not be revisited in detail here (de Jager & Rathmann, 2008; Justice, 2009).

[2] This analysis was completed using the base assumptions in the NREL Cost of Renewable Energy Spreadsheet (CREST) model. The debt to equity ratio was adjusted to 30/70. *See* https://financere.nrel.gov/finance/content/crest-cost-energy-models

Globally, there has also been an increasing focus on "de-risking" renewable energy investments by transferring the perceived risk away from investors (e.g. through guarantees and insurance) or by removing the barriers that create the risks in the first place (DB Climate Change Advisors & UNDP, 2011; Glemarec et al., 2012). Recent attempts to reduce risk in the US include federal policies such as the Section 1703 and 1705 loan guarantee programs authorized under the Energy Policy Act of 2005.

Beyond risk, however, another important driver for the cost of capital is the supply of available capital. If only a few investors compete to provide capital to a certain market, the cost of capital will be higher than if several thousand investors competed to supply capital to the same market. The number of capital providers that currently finance renewable energy projects in the US remains fairly limited, primarily as a result of the structure of US renewable energy tax incentives.

The federal government currently offers production tax credits and investment tax credits to renewable energy generators. Combined with state policies, such as renewable electricity standards, these federal tax incentives have driven a significant proportion of renewable energy growth in the US during the past decade. In order to fully utilize these incentives, however, project owners must have sufficient tax liabilities, or "tax appetite" to absorb the tax credits. Most utility scale renewable energy projects in the U.S. are structured to include equity investors that can use the tax credits (i.e. so-called "tax equity investors") (Bolinger, 2009; Harper et al., 2007).

This reliance on tax equity has created challenges. The number of tax equity investors that participate in renewable energy projects, for example, has been limited to between 20 and 30 large firms at the height of the market. This pool of potential investors can be difficult for all but the most established firms to access. The small number of investors participating also makes the pool of capital vulnerable to broader economic trends. During the recent financial crisis, for example, the number of firms actively making tax equity investments decreased from 20 to 6 (Schwabe et al., 2009). The decrease in active firms significantly increased the cost of tax equity, and therefore increased the LCOE of renewable energy generators.

Bloomberg New Energy Finance recently reported that an "optimistic estimate of US tax equity availability" in 2012 was $3.6 billion, whereas demand for tax equity from renewable energy projects was $7.5-$9 billion (Sharif et al., 2011). This lack of supply has caused the cost of tax equity to increase. The vacuum left by the expiration of the cash grant -- and the subsequent increase in demand for tax equity -- has been estimated to raise the cost of capital for PV by 2% - 4%. (Mendelsohn et al., 2012).

The recent experience with tax equity supply highlights the need to identify new structures that can enable a broader range of potential capital providers to participate in renewable energy investments -- both in the near term when tax equity markets are constrained and in the longer-term when it is likely that tax credits will decrease or sunset. There are different strategies that could be pursued to expand the amount and type of capital available to renewable energy projects. A variety of investment mechanisms and structures used in other industries could be adapted to support renewable energy. These include:

- **Master limited partnerships (MLPs) and real estate investment trusts (REITs).** MLPs and REITs are corporate structures that can raise capital by issuing shares of ownership in the stock market, but at the same time enjoy tax benefits not available to normal corporations. MLPs have been used extensively by the oil and gas industries to build and own infrastructure (e.g. natural gas pipelines), whereas REITs are used to invest in real estate assets as the name implies. In 2012, the REITs had attracted over $603 billion in investment, whereas energy-focused MLPs attracted $241 billion (Linder & Di Capua, 2012).

- **Green Banks**. Green banks are publicly chartered finance entities which serve as market intermediaries, supporting the development of clean energy projects. Green banks have been used successfully to support renewable energy markets in a number of countries, with the most successful example being KfW, the German infrastructure bank. Several states have either established or in the process of creating investment authorities dedicated to the development of clean energy projects using the green bank model.
- **Tax-credit bonds**. Tax credit bonds are federally authorized debt instruments that provide an interest rate subsidy to bond investors. Typically issued by state or local governments, tax credit bonds have been used to support a range of project types, from infrastructure and school improvements to clean energy and energy efficiency. Qualified zone academy bonds (QZABs) were created in 1997, for example, to allow schools to borrow money for establishing special programs in partnership with the private sector. There has been $500 million available annually for QZABs, and this amount was increased to $1.4 billion under the 2009 Recovery Act. The federal government has also created two clean energy tax credit bond programs --the Clean Renewable Energy Bonds (CREBs) and the Qualified Energy Conservation Bonds (QECBs).
- **Securitization**. Securitization refers to the process of pooling of loans or other receivables in a trust which issues debt against the pool of assets. Securitization has been used successfully to scale-up capital provision and lower the cost of capital in many different markets: housing, equipment, auto and student loans along with credit card receivables. As of the end of the third quarter 2012 there was about $1.7 trillion dollars outstanding in the asset-backed securities (SIFMA 2012).

Real Estate Investment Trust (REIT) and Master Limited Partnership (MLP Corporate Structures)

Corporations in the United States are taxed on the income they earn, and corporate shareholders are then taxed on the income they receive from company dividends. As a result, corporate income in the United States is effectively taxed twice. Corporations also enjoy certain advantages – such as the ability to have their ownership interests publicly traded in the financial markets. Publicly-held companies can raise capital by issuing stock to gain funding from a broad range of different types of investors – such as “retail” investors (e.g. individual citizens), pension funds, foreign governments, etc.

REITs and MLPs are two types of corporate structures that are allowed to raise capital by issuing stock, but whose income is taxed at the level of the company owners and not at the corporate level. In other words, REITs and MLPs are only taxed once, instead of being subject to the “double taxation” of standard corporations. Both REITs and MLPs, however, are defined in a way that constrains the type of investments that can be made through the structures and the types of assets they can own.

Real Estate Investment Trusts (REITs). REITs were first established by Congress in 1960 in order to enable smaller-scale capital providers to have opportunities to invest in real estate investments. Real estate is an income-generating asset that tends to keep pace with inflation and often serves to diversify the risk of an investment portfolio dominated by stocks and bonds. REITs currently own a broad range of different types of real estate assets, including shopping centers, office buildings, health care establishments, apartments, and hotels, among others (National Association of Real Estate Investment Trusts, 2011). In order to retain their status, REITs must distribute 90 percent of their taxable income to their investors each year. REITs must also pass an asset test and income tests. First, 75 percent of a REITs *asset* must be real property. Second, 95 percent of a REITs *income* must derive from approved passive income sources such as rents or interest from mortgages (Feldman et al., 2012).

Master limited partnerships (MLPs). MLPs were first established by Congress in 1980, and Congress has subsequently amended MLP related legislation several times. In order to be considered an MLP, 90 percent of the partnership's gross income must be from passive income, such as royalties, interest, and rents from real property – rather than income from business operations (Martin, 2006). An exception is made, however, for income from production, processing, and transportation of minerals and natural resources. Under this exception, a significant amount of investment has been channeled through MLPs to conventional energy infrastructure such as natural gas pipelines (Sherlock & Keightley, 2011). Income from geothermal energy is eligible under MLPs, and the Emergency Economic Stabilization Act of 2008 expanded MLP-eligible income sources to include transportation of ethanol and biodiesel (Freed & Stevens, 2011). Income from wind, solar, and hydropower, however, is explicitly ineligible for MLPs under the law. The market capitalization of energy MLPs has grown from $2 billion in 1994, to $220 billion in 2010, and $241 billion in 2012 (Linder & Di Capua, 2012).

How REITs and MLPs could change Renewable Energy Markets

With few exceptions, REITs and MLPs cannot currently serve as investment vehicles for renewable energy projects. If renewable energy investments became eligible for inclusion in REITs and MLPs, renewable energy projects would benefit from:

- The elimination of federal tax on income from renewable energy business operations;
- A significant increase in the number of potential investors, which could substantially decrease the cost of capital available to renewable energy projects.

The benefits from these changes could be significant. A recent report from Bloomberg New Energy Finance (BNEF) analyzed the impact of investing in a $198 million, 100 MW wind farm through an MLP structure. BNEF found that the use of the MLP would increase equity internal rates of return (IRR) by 1.5 percent and increase project net present value for investors by $4.3 million (i.e. from $11.5 to $15.8 million). BNEF also concludes that vehicles such as REITs and MLPs that make "project investments a more liquid option and that allow…projects to tap a broader pool of investors through capital markets" will be a significant driver in unlocking lower costs of capital in the future. BNEF projects that the cost of capital for financing the commercial operation of renewable energy systems could decrease from a 14 percent cost of levered equity to cost of 8-12 percent.[3] Such a decrease in the cost of capital would translate into a significant decrease in the LCOE of renewable energy.

Although a range of studies have emphasized the need to expand REITs and MLPs to renewable energy, there have been few estimates on how REITs and MLPs might impact the renewable energy markets and more quantitative analysis needs to be done. One exception to this is a study by Southern Methodist University, which estimates that opening MLPs to renewables could result in an additional $3.2 to $5.6 billion capital inflow into the industry by 2021.[4] This estimated amount of capital, which has been described as "conservative," is in the range of the estimated gap in currently available tax equity.

Benefits and Challenges of Renewable Energy REITs and MLPs

Neither REITs nor MLPs can currently be used as investment vehicles to support renewable energy projects. The pathway to achieving renewable energy eligibility differs for each structure, as do the pros and cons of pursuing each model.

REITs. Renewable energy systems can already be integrated onto buildings that are owned and operated under REIT structures. The key question, however, is whether REITs can own renewable energy assets only on a "pure play" basis. The key consideration for whether REITs can be extended to renewable energy systems is whether or not renewable energy can be considered "real property" and therefore eligible for inclusion as a REIT asset. Recent analyses from NREL and others suggest that there is a reasonable argument for PV in particular being considered real property (Feldman et al., 2012; Sturtevant, 2011). However, there has been no formal clarity on the topic from the Internal Revenue Service. There are several pathways to secure this clarity:

- Individual projects can secure private letter rulings from the IRS. As of March 2013, there is at least one PV project that has done this. However, these private letter rulings apply only to the specific projects in question and cannot be used as a precedent for other projects.
- The IRS could also issue a broad revenue ruling, which would be applied to all of a specific project types (Mormann & Reicher, 2012). There a several pathways to requesting a revenue ruling, including requests from a Congressional Committee or from industry associations.
- If a revenue ruling could not be secured or if the ruling was unfavorable, Congress could pass a law that creates a "safe harbor" for renewable energy in REITs, similar to the safe harbors that have been created for the healthcare and hotel industries in REITs.

[3] BNEF estimates that the cost of equity would decrease to ~6% (unlevered). Assuming that leverage adds 200-500 basis points to the cost of capital, this would equate to an 8%-11% levered cost of equity. *See* Mintz Levin and GTM Research (2012).
[4] The study uses three different renewable energy growth scenarios and assumes that 80% of the renewable energy assets would be placed in MLPs. The study then calculates the tax benefits that would derive from the MLP structure and uses them as an approximation of the additional capital that would flow into the sector. *See* Bullock et al. (2012)

Although there is a pathway forward for including renewable energy in REITs, there are several concerns that would be raised by this transition:

- REITs do not have a tax appetite sufficient to monetize renewable energy tax credits, since REITs must distribute 90 percent of their income to shareholders (Deloitte, 2010).
- Under a revenue ruling from the IRS, it is reasonable that solar PV could qualify as real property because it relies on passive processes to generate electricity. Since wind and other renewable energy generators rely on mechanical energy to generate electricity, however, they might not meet the passivity test for real property and may therefore be ineligible for REITs unless special legislation is passed (Feldman et al., 2012).

MLPs. MLPs are currently defined in law to exclude most renewable energy sources. In order for MLPs to be opened to renewable energy, Congress would need to pass new legislation. The bipartisan Master Limited Partnerships Parity Act (S. 3275) and its companion bill in the House (H.R. 6437) introduced in the 112th Congress would amend the definition of MLPs to enable renewable energy to participate. There have been concerns raised in the past about the risk that MLPs would reduce the corporate tax base (Sorice, 2012). However, it is unlikely that renewables will achieve a scale under MLPs in the near- to mid-term that would pose a significant threat to US tax revenues. Despite these challenges, REITs and MLPs could each serve as new avenues for renewable energy finance. Opening REITs and MLPs to renewable energy would create the conditions to lower the cost of capital for renewable energy. As described above, different legislative and regulatory strategies will be required to enable renewable energy to participate in REITs and MLPs. However, there is value in pursuing both mechanisms in parallel in order to provide the renewable energy industry with an array of flexible financing and ownership options in the future.

Green Financing Entities

A number of federal and state-level governments have established clean energy financing programs that are intended to improve access to capital and lower financing costs for renewable energy projects. The following section describes the organizational structure and products offered by three such entities: the German KfW bank, the U.K.'s Green Investment Bank (GIB) and Connecticut's Clean Energy Finance and Investment Authority (CEFIA).

The German KfW Development Bank

Several countries have developed federal institutions to facilitate the financing of renewable energy and energy efficiency projects. One of the most successful and prominent examples of this strategy are the clean energy lending programs of the German Kreditanstalt fur Wiederaufbau (or KfW), a federally chartered bank established under the Marshall Plan to redevelop the country after the Second World War (KfW, 2009). As part of its continuing mission to development the German economy, KfW now plays a significant role in providing financing for renewable energy and energy efficiency projects (KfW, 2013). In 2011, KfW deployed EUR 8.7 billion (USD 11.3 billion) in financing assistance, supporting 36 percent of all renewable installations in Germany in 2011 (KfW, 2012).[5] Lending from the federally charted financing institution is also a critical component to the current government's plans to fully decommission all German nuclear generating stations by 2022. In support of this initiative, KfW recently announced the availability of EUR 100 billion (USD 130 billion) of financing over the next five years for clean energy project development. The KfW provides a suite of banking products tailored for the renewable energy and energy efficiency markets including:

- Lending products for home energy retrofits up to EUR 50,000;
- Renewable energy investment loans for individuals, farmers and other corporations up to EUR 25 million;
- Debt financing for offshore wind projects up to EUR 700 million;
- Resource risk insurance for geothermal energy projects.

Loan origination and credit underwriting for many of KfW's lending products is coordinated with German commercial banks, allowing KfW to leverage the existing relationships, marketing assets and experience of private lenders in support of its mission. Several KfW renewable energy project finance products also require project sponsors to find privately sourced matching funds in order to access bank loans. This private financing matching requirement ensures that the federally-chartered bank shares risk with other lenders and encourages the private sector to make investments in the renewable energy market.

The U.K. Green Energy Investment Bank

[5] For reference, the total clean energy market financing in the United States in 2011 was estimated at $56 billion. *See* US Partnership for Renewable Energy Finance (2011b) .

Observing the success of the German renewable energy industry, in 2010 the U.K. government established its own clean energy finance bank institution, the Green Energy Investment Bank (GIB). Designed to support public-private financing partnerships that will rapidly scale U.K. renewable energy markets, the GIB was created in an effort to further the country's goals of supplying 15 percent of its energy from renewable sources by 2020 (DBIS, 2011).

The GIB is currently in its program design and start-up phase and is awaiting further funding from the U.K. government. Current plans envision the GIB will participate in renewable energy project financing by developing products and services that are focused on several key strategies including:

- **Risk mitigation:** Provision of first-loss debt to renewable energy projects in order to facilitate private project lending;
- **Innovative financing mechanisms:** Development of permanent post-construction financing for large renewable energy projects such as offshore wind facilities, and;
- **Capital provision:** Project equity and senior debt investments for projects that are unable to raise sufficient capital from private markets;
- **Information provision:** Educating traditional capital markets about the potential benefits of investing in renewable energy projects.

Initially funded through budget appropriations, the GIB will develop its own borrowing powers in 2015 if certain national debt thresholds are met. Critics have noted that, under its current rules and funding plan, the GIB will have limited impact on U.K. renewable energy markets and have advocated for the institution to have immediate borrowing authority (Lucas, 2012).

Connecticut Clean Energy Finance and Investment Authority

In addition to examples from the U.K. and Germany, the state of Connecticut has also recently established a clean energy financing authority. The Connecticut Clean Energy Finance and Investment Authority (CEFIA), is a quasi-state corporation charged with facilitating private-sector financing of renewable energy installations. As with the United Kingdom, the CEFIA is in the early stages of its program development. Initial capitalization of CEFIA was achieved by consolidating funds from several existing state funding streams including revenue from the sale of Regional Greenhouse Gas Initiative (RGGI) allowances and the state's utility system benefit charge (Berlin et al., 2012).[6] CEFIA has also received authorization from the legislature to issue up to $50 million in bonds to support its activities and also was granted an allocation of the state's tax-preferred federal private activity bond allocation (Hansen & McCarthy, 2012). Near term CEFIA program offerings include (CEFIA, 2012):

[6] System Benefit Charges have been used by a number of states to support renewable energy markets. For instance, total state funding for renewable energy for Clean Energy States Alliance member states was estimated at $477.4 million in 2011. *See* Clean Energy States Alliance and Peregrine Energy Group (2012)

- A residential clean energy financing program intended to provide long-tenor, low-interest rate loans to homeowners;
- A commercial Property Assessed Clean Energy (PACE) lending initiative that will support both renewable energy and energy efficiency technologies;
- A solar thermal financing initiative.

Prior to the creation on CEFIA, Connecticut administered a series of programs that provided cash subsidies for many of the clean energy technologies that will be supported through CEFIA financing initiatives. One of CEFIA's primary goals was to transition these existing subsidy initiatives away from high-cost rebate- and grant-based programs towards more sustainable financing-based initiatives. With the federal Production Tax Credit (PTC) for wind and other renewable energy technologies recently extended for projects that are under construction before the end of 2013, and the federal Investment Tax Credit (ITC) for solar expiring at the end of 2016, the CEFIA model may provide roadmap for the federal government's eventual transition away from these tax-credit-based incentives. Other states are also exploring the green bank model. In January of 2013, New York Governor Andrew Cuomo announced the creation of a $1 billion state green bank. Details on the structure of this new financing entity have not been finalized (Tweed, 2013).

How a Federal Clean Energy Investment Authority could change Renewable Energy Markets

Clean energy financing institutions are a proven model for expanding renewable energy markets. Each of the entities discussed above have a taken similar approach to meeting the goals of increasing capital availability and lowering financing costs for renewable energy technologies. The fundamental mission of each of these organizations is to mitigate barriers to private-sector investment in clean projects while limiting taxpayer risk exposure. A similar federally chartered U.S. clean energy finance institution could have a substantial impact on the development of national renewable energy markets by mitigating existing financing barriers to renewable energy development.

Several renewable energy industry groups have noted that access to low-cost debt financing is one of the major hurdles to further expansion of American wind and solar markets. A recent analysis by the Coalition for Green Capital compared the levelized costs of wind power financed through traditional private debt against financing provided through a government sponsored financing authority. The analysis estimated that government sponsored financing could lower wind power prices by up to 20 percent (Berlin et al., 2012). Other stakeholders active in renewable energy finance have pointed to a commercialization gap in current private sector financing entities where venture capital is relatively abundant for early stage technology companies and traditional commercial debt products are accessible to well established technologies, but limited resources are available for installation of renewable energy technologies with relatively small but growing markets (US PREF, 2011a).

Programs implemented by a federal clean energy financing authority could lower average project capital costs by both increasing project debt-to-equity ratios and by lowering the cost of debt within a project finance transaction. A federal clean energy finance authority would also likely be able to supply longer-tenor debt for renewable energy projects than would typically be available through private capital markets. Extending project finance debt tenors for solar and wind projects would improve project cash flow and allow more renewable energy installations to be completed.

A federal clean energy finance authority could provide a range of targeted products to help facilitate capital flow into the renewable energy markets. A recent report by ACORE's Partnership for Renewable Energy Finance listed several potential products a federal clean energy investment authority could support, including (US PREF, 2011a):

- Loan guarantees for project debt;
- Letters of credit to support long-term power purchase agreements;
- Interest rate hedge instruments to allow project sponsors to fix interests rates prior to project completion, and;
- Subordinated loans to fill project financing gaps not supported by traditional debt or equity providers.

Depending on the structure of a financing authority, a federally charted clean energy financing authority could also attract new debt providers into the renewable energy finance markets. Currently, large institutional investors such as pension and insurance funds have limited exposure to renewable energy project investments despite high interest in entering this market. This investment gap is attributable, in part, to the low transaction volumes in existing renewable energy markets and the non-standard nature of most renewable energy project finance deals. Large institutional investors have been reported to have limited interest in relatively small transactions, while the unique nature of existing renewable energy finance contracts makes pooling project debt into securitized instruments challenging.

A federal financing authority could address these market barriers by creating standardized financing structures that can be adopted throughout the U.S. renewable energy industry. Creating uniform financing structures, project contracts and underwriting criteria will facilitate the pooling of project debt allowing for the development of renewable energy securities that could be attractive to institutional investors. The federally chartered mortgage finance entities Fannie Mae and Freddie Mac played a similar market standardization role in the development of secondary markets for mortgage backed securities during the 1980s, substantially increasing the pool of capital available to home buyers in the United States.

Benefits and Challenges of a Federal Clean Energy Investment Authority

A federal clean energy finance authority would present both challenges and benefit for the growth of the U.S. renewable energy markets. Several of the pros and cons of this strategy are presented in Table 2 below.

Table 2. Benefits and challenges of a federal clean energy investment authority

Increase capital availability for renewable energy projects and sends clear market signal of long-term federal commitment to renewable energy	Requires legislative creation of a new federal corporation and may require other federal and state renewable energy policies to scale markets
Increases capital market familiarity with near-market clean energy technologies, resulting in better alignment of actual and perceived project risks	Requires federal investment authority to assume project financing risk that are not currently attractive to private capital markets
Can be structured to be revenue-neutral	May require significant initial capitalization
Streamlines market transactions by standardizing renewable energy deal structures, contracts and other documentation	Federal requirements may create administrative barriers to financing

As the table notes, while the intent of the clean energy investment authority would be do focus on energy project financing, direct federal support for clean energy finance continues to be highly controversial. Additionally, while a federally chartered clean energy financing authority could be structured and operated as a revenue neutral not-for-profit federal corporation, initial capitalization would require a multi-billion dollar government appropriation or grant of bonding authority. One way to address these concerns might be to structure the federal clean energy finance institutions to focus on project finance of near-market technologies instead of more risky investments in manufacturing firms. The authority could also be required to invest in a broad portfolio of project types that are likely to lower portfolio risk and increase revenue generating opportunities.

Language authorizing a federal clean energy financing authority would need to be carefully crafted to ensure that only clean energy technologies would be eligible for financial support.
Several countries have used clean energy finance entities to support the growth of domestic renewable energy markets. Several U.S. states are currently pursuing the development of clean energy banks and federal legislation has been introduced in Congress. A federal clean energy investment authority that provides project finance support could bridge a number of gaps in the existing marketplace, leading to the development of a more robust U.S. renewable energy market. State-based initiatives may also be a useful complement to a national initiative.

Tax Credit Bonds

Tax credit bonds are a financing vehicle that provides bond holders with a federal subsidy in lieu of a traditional interest payment. The Qualified Zone Academy Bond (QAZB) program -- the first federal tax credit bond initiative -- was introduced in 1997 to support infrastructure projects at underperforming schools (Maguire, 2009). Since then, congress has created number of other similar programs to support investment in other priority national policy areas. Several of these tax credit bonding initiatives, including the Clean

Renewable Energy Bond (CREB and New CREB) and the Qualified Energy Conservation Bond (QECB) programs have been designed to support local and state renewable energy and energy efficiency development. Others, such as the Build America Bonds (BABs) program have been used by some government entities to support clean energy development despite being more generally applicable to many non-energy project types. Regardless of the program, tax credit bonds can provide the low-cost, long-term debt that can be critical to developing viable renewable energy projects.

Federal qualified tax credit bond programs are managed by the Treasury Department under authority granted in Section 54A of the Internal Revenue Code (Internal Revenue Service, 2010). These programs provide qualifying entities with the right to issue federally subsidized debt for specific, legislatively authorized purposes. While the mechanics of each tax credit bond type differ, these bond types generally provide either a federal tax credit subsidy to bond holders in lieu of an interest payment or a direct interest subsidy from the federal government to the bond issuer. In the case of New CREBs and QECBs, this federal subsidy lowers the borrowing costs for renewable energy or energy efficiency projects, allowing projects that may have otherwise been un-economic to move forward. Unlike traditional tax-exempt municipal financing, interest payments on tax credit bonds are taxable. Economists have argued that the taxable nature of the tax-credit bond subsidy is economically more efficient than traditional tax-exempt financing and results in less overall reduction in federal revenue (Sherlock & Maguire, 2011). The following section reviews these congressionally-authorized debt instruments and discusses their potential to support large-scale clean energy market growth.

CREBS and New CREBS

First authorized under the 2005 Energy Tax Incentives Act, Clean Renewable Energy Bonds allow authorized issuers to offer bond debt for qualifying renewable energy projects. In response to challenges with issuing CREBs under their original structure, Congress passed legislation authorizing the creation of New CREBS as part of the 2008 Energy Improvement and Extension. While similar to the original CREBs program, New CREBs allowed for more flexible debt structures, greatly improving their applicability for state and local governments. Along with these structural changes the 2008 Energy Act also authorized an $800 million national bond cap for the program. This bond cap authority was expanded to $2.4 billion in 2009 as part of the Recovery Act.

Projects eligible to take advantage of New CREBS financing include electricity generating wind, solar, biomass, small hydro, biogas, marine hydrokinetic and trash combustion projects (Internal Revenue Service, 2010). Administered by the IRS, New CREBS program rules require awardees to issue debt within three years of receiving their allocations or surrender their allocations back to the federal government (US Department of Energy, 2010b).

The combined $2.4 billion bond allocation authorized under the 2008 Energy Act and the 2009 Recovery Act required the bond cap to be evenly divided amongst government bodies,[7] public power providers and electric cooperatives. The Treasury Department awarded an initial round of bond cap allocations in October of 2009 (McGuireWoods, 2009). This initial funding round drew significant interest from eligible applicants with total requested allocation pool of more than $5 billion. Both the government body and public power sub-allocation were significantly oversubscribed while the electric cooperative allocation received requests for more than $600 million of the $800 million limit. In total, more than 800 clean energy projects were awarded bond cap allocations (Internal Revenue Service, 2009). Smaller projects were given preference during this round of awards, with the IRS ranking qualifying projects by total requested allocation and awarding the lowest cost projects first until the total bonding authority limit was reached. A second round of cap allocation was completed in 2011 to award the remainder of available electric cooperative allocation. Figure 2 below shows the per capita CREBs allocation for both the 2009 New CREBs issuance and for CREBs issued under the old 2007 program. As the figure shows, on a per-capita basis, Alaska was the leading recipient of CREBs bond authority with more than $200 per capita. Amongst the lower 48 states, Washington ranked first with $77 per capita and Iowa second with $52 per capita.

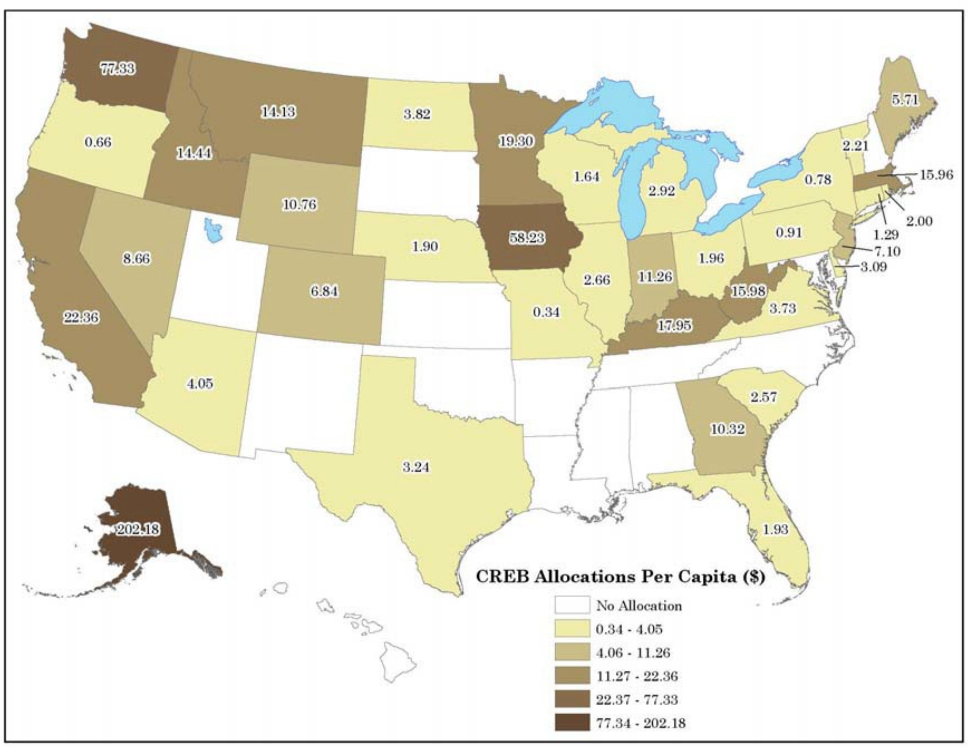

Figure 2. CREBs allocations per capita for 2007 and 2009 program allocations

[7] Government bodies include state and local governments, school districts and public colleges and universities.

Source: Sherlock and Maguire (2011)

To date, limited data is available from the IRS about New CREBs bond issuances by projects receiving bonding authority in 2009. IRS records indicate that seventeen 2009 awardees had issued debt during 2010 with a total value of $371 million (Internal Revenue Service, 2011). Several high-profile projects awarded allocations in 2009 have not moved forward including a $200 million wind project in Washington State that received more than a quarter of the total public power allocation (Miller, 2011). The expiration date of most of the New CREBs allocations issued in 2009 was October 2012. Some industry analysts expect that between $400 and $500 million in bonding authority may be available for reallocation by the IRS during the first quarter of 2013 for local government projects (Skiver, 2013). Given the complexity of renewable energy projects, a low project completion rate for New CREBs bond cap awardees is not unusual. Other renewable energy incentive programs, for example, have reported project failure rates in excess of 50 percent (Kreycik et al., 2011).

Qualified Energy Conservation Bonds (QECBs)

Qualified Energy Conservation Bonds were first authorized by congress under the 2008 Energy Improvement and Extension Act. This legislation defined the parameters of the program and allocated an $800 million national bond volume cap. As part of the 2009 Recovery Act, Congress expanded the national volume cap to $3.2 billion (US Department of Energy, 2010b). Unlike New CREBs, each state is awarded a population-based percentage of the national bond cap. States are then required to make a portion of their total allocation available to each local government with a population greater than 100,000 in the state.

The QECB authorizing legislation defines a broad range of project types that can be funded using this type of tax credit bond. These include both renewable energy projects as well as energy efficiency programs and clean energy research facilities. The authorizing legislation specifically allows QECBs to be used to fund:

- Projects that reduce energy consumption by a minimum of 20 percent in public buildings,
- Implementation of green community programs,
- Rural development projects that include renewable energy,
- Renewable energy research facilities,
- Mass commuting facilities that reduce greenhouse gas pollution ,
- Technology demonstration projects,
- Public education campaigns designed to promote energy efficiency.

While many communities have chosen to fund energy conservation projects with their QECB allocations, a number of state and local governments have issued QECBs to fund the development of community-scale renewable energy projects. For example, notable QECB-funded renewable energy projects include an $8.7 million expansion of a small hydro facility in Lawrence, KS and more than $130 million issued by the Los

Angeles Department of Water and Power for several large wind and solar projects (Friedman & Fazeli, 2012).

The National Association of State Energy Offices (NASEO) has been actively engaged in tracking the progress of the QECB program and has compiled a database of projects funding through QECBs. While some states and local governments have aggressively pursued the use of QECBs for both public and private sector projects, many have not used their allocations as of this writing. To date, NASEO reports that 120 government bodies had issued QECBs with more than $729 million in total issuances. Leading states include Kansas, which has issued the entirety of its federal allocation, and Kentucky, which has issued more than 90 percent of its bonding authority (Energy Programs Consortium, 2012).

Like the New CREBs program, the QECB program has seen slow issuance of bonds over the course of the last several years. NASEO has developed a series of recommendations to improve the QECB program and increase utilization rates (Lin & Otto, 2012). These include:

- Bundling QECB issuances with other bonds to improve scale for communities with small QECB allocations,
- Pooling issuances amongst local governments to leverage resources and reduce transaction costs,
- For communities that are averse to taking on new debt, allowing a portion of their allocation be used for private activities,
- For local governments, coordinating issuances with state agencies that may have in-house expertise that can reduce transaction cost barriers.

Additionally, NASEO notes that that during the summer of 2012, the IRS issued a series of clarifications regarding the QECB program that were intended to reduce uncertainty around the appropriate use of funds. These clarifications may improve QECB utilization rates by state and local governments going forward.

How Tax Credit Bonds could better support renewable energy markets

If properly structured, tax credit bond programs have the potential to significantly lower the cost of capital for renewable energy projects. Debt issued under these federal authorization have the added benefit of having debt tenors that can exceed 20 years, effectively stretching the bond repayment period well into the life of most renewable energy systems and significantly improving project economics. Both the QECB and New CREBs programs provide a potentially promising model for federal efforts to lower the costs of renewable energy project capital. While these programs have met with limited success to date, improvements to the existing programs could significantly increase bond cap utilization rates.
Another potentially transformational benefit of more robust tax credit bond initiatives would be to introduce new classes of investors to renewable energy project finance. To date, renewable energy projects in the United States have largely been financed by a limited number of tax equity investors and a handful of commercial banks (Mintz Levin & GTM Research, 2012). Increasing the number of potential renewable

energy project investors to include traditional municipal bond investors would substantially increase the depth of available financing for renewable energy projects.[8]

Benefits and Challenges of Tax Credit Bonds

Improving current tax credit bond programs and increasing federal bond cap authority for these programs would present both benefits and challenges for U.S. renewable energy markets. Table 3 below lists some of these potential issues.

Table 3. Benefits and challenges of tax credit bond programs

Potential to offer low cost capital	Requires continued congressional appropriation to scale the market
Substantial potential benefit for state and local governments from direct development of renewable energy projects	Market may be limited to class of investors and other financing markets may be better suited to renewable energy finance
Proven model in the United States – structures already authorized	Cost of issuance could present a problem for smaller communities
Could attract traditional muni bond investors into RE market increasing the pool of potential investors	Development of government sponsored renewable energy projects can be complicated by issues such as procurement and government authorization

As noted in the table, scaling the tax credit bonds to meet the needs of the growing U.S. renewable energy market is challenging. State and local governments may not be best positioned to develop renewable energy projects and government entities typically face a number of added challenges in completing projects when compared to private sector developers. That said, more robust tax credit bond programs for renewable energy development could provide substantial amounts of low-cost, long-tenor debt capital that could result in near-term renewable energy market growth.

Securitization

The securitization markets are rooted in efforts by the US government to increase capital available for home mortgages that go back to the 1930's. Over time, and through a series of government sponsored entities (GSEs), capital was channeled to the housing market by creating a mortgage-backed security (MBS) market in which bankers could sell mortgages into a secondary market and reinvest the proceeds into more loans.

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[8] The SEC reports that there are currently more than $3.7 trillion in outstanding municipal bonds in the United States. *See* SEC (2012).

In order to facilitate the aggregation of the loans, individual loan features and associated contracts were standardized. Prior to the establishment of the MBS market, banks and S&Ls typically held the mortgages they originated until maturity, making it very difficult to manage the concentrated risks in their portfolios. The establishment of the secondary market satisfied both the needs of the bankers to diversify risk and the appetite of investors seeking a means to capture investment returns from the real estate market.

In the 1980's bankers looked to the MBS market as a model for other assets they held on their balance sheets, including auto loans (and, later, leases), student loans and credit card receivables. By the early 1990s the asset-backed securities (ABS) market was in full swing. While details differ depending upon the asset type, in each case the assets are codified by standard and transparent rules and pooled into a trust (or similar) vehicle. Standardization of asset features and documentation in the pool enables the aggregation of small assets into a larger pool. An ABS *deal* is created from the pools of assets and *securitized debt* (a series of bonds) is issued based on the cash flows of the assets in the pool. By redirecting the amount and priority of the cash flow, bonds with different risk levels and features (coupon, average life and credit enhancement) are sold to investors with various risk appetites. The due diligence process is largely replaced by submitting the deals for rating by at least two of the three ratings agencies (S&P, Moody's or Fitch).

How Securitization Could Change Renewable Energy Markets

Securitization for renewable energy could significantly lower the cost or capital for projects by dramatically broadening the investor base and eliminating the existing funding gap. Nearly $200 billion in ABS deals were underwritten in 2012, representing about 22% of US debt underwritings for the year, down from a peak of $754 billion (27% of US debt underwritings) before the financial crisis (simfa, 2013). Because the value of the energy created through renewable energy would increase in times of increased oil or natural gas prices, bond investors would likely find the inherent inflation hedge to be a significant risk mitigation tool compared to most other bonds.

While securitization of renewable energy assets is untested at present, the financial technology of securitization is well established. The potential to decrease the cost of capital, with concomitant flow-through to lower cost of energy, could fundamentally and beneficially alter the renewable energy financing landscape. The aggregation results in larger deal-size, which opens the doors to large institutional investors eager to invest in renewables but unwilling or unable to entertain the relatively small deal size in the current environment. Further, the aggregation process itself requires transparency and greater consistency among underlying assets and related contracts, which would help investors in analyzing and pricing the value of the securities. Finally, debt ratings by recognized credit ratings agencies (CRAs) dramatically reduce the cost of due diligence on deals, further expanding the pool of potential investors.

In the current market environment, unsecured intermediate-term investment grade corporate bonds yield approximately 1.95% and non-investment grade unsecured bonds of similar term yield about 6%.[9] ABS securities tend to trade at lower rates ("tighter spreads") than corporate bonds by virtue of the backing of the underlying asset pool. A reasonable proxy for the cost of capital for initial renewable energy ABS deals, incorporating the yield premium associated with newly-introduced asset types, might be priced mid-way between investment grade and non-investment grade corporate bonds, or about 4%. While this is only a very rough estimate of the cost of capital, it indicates that securitization could potentially vastly enlarge the potential pool of investors and lower the cost of capital without any government tax credit support. As the market matures we would expect the spreads to compress to levels below unsecured debt of similar rating.

Benefits and Challenges of Securitization

Securitization of renewable energy project assets could potentially dramatically increase the number and type of investors and change the capital provision dynamics from a niche, tax-equity driven market with few players to one of a wider, institutionally-led set of capital investors who do not require tax-incentives. If renewable energy asset backed securities (REABS) did not depend on tax credits, many of the political issues and structural uncertainties risks could be eliminated. Reduced risk (or risk perception) always has the effect of decreasing the cost of capital in financial markets.

Securitization markets have been main-stream investment markets for over twenty years, and were included in the Lehman Aggregate Bond Index in January of 1992 (Barclays Capital, 2008). The securitization model efficiently aggregates relatively small deals into larger pools, attracting more institutional investor interest. By providing banks or other capital providers with a secondary market, capital can be replenished and reinvested, increasing the amount of capital available for renewable energy projects. The process of asset aggregation requires greater consistency of underlying asset types and legal structures or contracts. The increased consistency reduces the complexity of due diligence analysis. Since many institutional investors have guidelines that require assets to be rated by a CRS, the credit rating process would open the door to investors who might be interested in renewable assets but are prohibited from investing in non-rated issues. The ABS market has incorporated new asset-types quickly and efficiently, including manufactured housing, auto loans and leases, auto floor-plan finance, equipment and student loans, to name a few. A substantial field of stakeholders would be likely to advocate for such a market, most notably the American Securitization Forum, which represents investors, bankers, CRS and the legal community. The Committee may want to explore the establishment and scale-up of the REABS market as a means of efficiently providing lower cost capital for renewable energy projects.

Asset securitization has been used to massively scale capital provision while reducing the cost of capital for small deals with common features. There is precedent for using this approach to push federal policy

[9] Barrons January 26, 2013, Current Yield

objectives (housing and student loans) without offering any tax incentives which may eliminate some political obstacles. There is significant movement in Europe toward home-renewables aggregation (Green Covered Bonds) that bears watching and could provide a good indication of the viability of such an approach.

CONCLUSION

Over the past decade, policy makers and clean energy advocates have focused significant attention on developing and implementing direct tax incentive programs, renewable electricity standards, and other policies to support the development of renewable energy markets. These initiatives have largely been effective and have stimulated substantial expansion of wind and solar markets. Despite this growth, the broader finance community has yet to fully embrace investment in renewable energy technologies. Continued market scaling will require broadening the number of potential renewable energy project debt providers and equity investors.

Policy driven financing mechanisms such as green banks and tax credit bonds have been successfully used to lower capital costs for clean energy projects in a number of contexts. Germany's KfW development bank has been an integral part of the renewable energy market growth in that nation and tax credit bonds have been successfully used to support local and state government sponsored clean energy projects in the United States. Similarly, Master Limited Partnerships and Real Estate Investment Trusts are existing financing structures that are already popular amongst investors and these structures present a potentially promising means of increasing the pool of capital available to finance renewable energy projects. Finally, in order to fully scale, future renewable energy projects will need to access funding from traditional bond markets. Renewable energy project securitization will be critical to accessing these multi-billion dollar markets and the low-cost capital available from traditional bond investors could substantially lower the delivered costs of renewable power.

Each of these renewable energy financing models are based on existing strategies that have been successful either in other countries on in other contexts. Policy makers and renewable energy advocates should look to these and other similar mechanism as renewable energy markets continue to scale and as installed costs of clean energy technologies continue to decline.

The Union of Concerned Scientists looks forward to working with you to craft effective and common sense changes to the federal tax code that would encourage the deployment of clean energy.

Sincerely,

Marchant Wentworth
Legislative Director

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