

# Clean Energy Finance Through the Bond Market: A New Option for Progress

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## Summary

State and local bond finance represents a powerful but underutilized tool for future clean energy investment.

For 100 years, the nation's state and local infrastructure finance agencies have issued trillions of dollars' worth of public finance bonds to fund the construction of the nation's roads, bridges, hospitals, and other infrastructure—and literally built America. Now, as clean energy subsidies from Washington dwindle, these agencies are increasingly willing to finance clean energy projects, if only the clean energy community will embrace them.

So far, these authorities are only experimenting. However, the bond finance community has accumulated significant experience in getting to scale and knows how to raise large amounts for important purposes by selling bonds to Wall Street. The challenge is therefore to create new models for clean energy bond finance in states and regions, and so to establish a new clean energy asset class that can easily be traded in capital markets. To that end, this brief argues that state and local bonding authorities and other partners should do the following:

- ▶ Establish mutually useful partnerships between development finance experts and clean energy officials at the state and local government levels
- ▶ Expand and scale up bond-financed clean energy projects using credit enhancement and other emerging tools to mitigate risk and through demonstration projects
- ▶ Improve availability of data and develop standardized documentation so that the risks and rewards of clean energy investments can be better understood
- ▶ Create a pipeline of rated and private placement deals, in effect a new clean energy asset class, to meet the demand by institutional investors for fixed-income clean energy securities

## I. Introduction

**T**he financing of renewable energy and energy efficiency projects to reduce carbon emissions and grow the American economy has not gotten easier.

The massive infusion of clean energy investments embedded in the American Recovery and Reinvestment Act (ARRA) of 2009 has almost entirely wound down.<sup>2</sup>

Additionally, commercial bank lending for clean energy projects is down, and many American banks have opted out of loans with long repayment schedules and for smaller renewable energy projects.<sup>3</sup>

The clean energy sector's ability to secure either equity or debt financing for projects has also ebbed following the Great Recession.<sup>4</sup>

“Bond finance holds tremendous potential for clean energy investment, at levels in the tens of billions of dollars in the next several years.”

As a result, the sector's growth has been tied to the vagaries of on again-off again federal incentives like the production tax credit and investment tax credit, as well as the market fortunes of a limited set of 15 to 20 tax equity investors, primarily financial institutions such as Bank of America, JPMorgan Chase, U.S. Bank, Wells Fargo and Citi.<sup>5</sup>

Richard Kauffman, former senior advisor to the U.S. energy secretary and now the energy and finance chairman for the state of New York, observes:

Projects in the [United States] rely upon an old fashioned and anachronistic form of financing that is different than how other parts of the U.S. economy are financed. Rather than use bond or stock markets, projects depend on non-capital market sources of so called tax equity, bank debt, and private equity where rates of return can approach typical private equity rates of return of 12-15 percent. [New strategies]... don't require going to the lab; they involve applying financing techniques that have already been invented and are used widely in other parts of the economy, but have not yet been applied to this sector."<sup>6</sup>

The implication: Either with or without federal support, different types of financing are going to be required to scale up the clean energy industry as it weathers a period of inconsistent policy support, insufficient tax equity approaches, and the challenges posed by low natural gas prices.

All of which raises the critical question: Given that billions of dollars are needed in clean energy investment, how will clean energy development across the nation be financed in a period of federal paralysis?

Fortunately, part of the answer may be hiding in plain sight—in the realm of the state and local agencies that have used conventional public finance for years to fund the nation's non-energy infrastructure.<sup>7</sup>

For more than a decade states and regions have been experimenting with a series of creative clean energy financing strategies.

State clean energy funds (CEFs), for example, have been a critical source of much-needed public capital driving market growth and leading to the creation of a vibrant clean energy sector in the country. Since 1998, state CEFs have invested over \$3.4 billion in state dollars to support renewable energy markets while leveraging another \$12.5 billion in federal and private sector investment. And now, some of these funds have begun to experiment with a smarter industry development focus as opposed to simple project development.<sup>8</sup>

Similarly, several states are working to create so-called "green" banks.<sup>9</sup> State green banks leverage limited public-sector funds with private-sector capital to provide low-cost and long-term loans to clean energy projects. First created in Connecticut, New York followed suit in 2013 with the launch of an ambitious \$1 billion green bank while a few other states like California, Maryland, and Washington are considering it.<sup>10</sup>

And now, the next step in this progression appears to be bond financing. Bond finance holds tremendous potential for future clean energy investment, perhaps at levels in the tens of billions of dollars in the next several years.<sup>11</sup> Bonds, as the bedrock of infrastructure finance, have long funded the nation's bridges, roads, airports, public libraries, hospitals, and university expansions. Using bonds in new ways, states and regions can lead the way in a new era of clean energy finance that reduces the cost of capital and financial risk.

Development finance agencies—encompassing over 50,000 state, county, and municipal agencies and authorities—will be key players. These entities have successfully leveraged private investment to deploy new technologies and public improvements for decades. They have helped support and finance economic development using a variety of tools including tax-exempt and taxable bonds, credit enhancement programs, and direct debt and equity investments. The \$3 trillion tax-exempt bond market has alone financed three-quarters of U.S. infrastructure, including 4 million miles of roadways, 500,000 bridges, 1,000 mass transit systems, 16,000 airports, 25,000 miles of intercoastal waterways, 70,000 dams, 900,000 miles of pipe in water systems, and 15,000 waste water treatment plants.<sup>12</sup>

Already, development finance through the issuance of bonds has started to bring new capital into the clean energy sector.<sup>13</sup> The New York State Energy Research and Development Authority (NYSERDA) has raised \$24.3 million in its first ever issuance of revenue bonds that will be used to finance loans to make energy efficiency improvements.<sup>14</sup>

For its part, Hawaii earlier this year enacted legislation allowing it to issue green infrastructure

bonds-backed in part by a utility surcharge—that will provide low-cost financing for clean energy generation projects like solar and for energy efficiency upgrades to buildings. The bond proceeds will be used to fund an on-bill program being developed by the Hawaii Public Utilities Commission.

And the so-called “Morris Model,” operating in Morris County, New Jersey since 2009, has been financing solar installations in public facilities through a unique combination of low-interest bonds and power purchase agreements (PPAs).<sup>15</sup>

Elsewhere entities in Delaware and Ohio have issued their own bonds for energy purposes.<sup>16</sup>

This growing number of state and regional finance innovations suggests that the financing of clean energy projects via capital raised through public markets (public capital) offers the potential to substantially increase the availability, and lower the cost, of investment that is critical to continued industry growth.

However, significant challenges remain. States and municipalities need catalytic programs and policies to accelerate the use of bonds for clean energy finance and make them an accepted form of infrastructure finance in capital markets.

What follows in this paper is an exploration of the barriers to scaling up widespread bond use in renewable energy and clean energy development and some suggestions of approaches to ameliorating them.

## II. The Challenge

**F**or all of the promise of bonding for clean energy development, significant financial and policy hurdles currently impede its broad use in the sector.

Four major finance and policy problems currently preclude clean energy finance from becoming a regular part of the portfolio of development finance agencies. The four problems are as follows:

- ▶ **Weak cooperation between development finance agencies and clean energy offices inhibits large-scale bond use in the clean energy sector.** A first impediment to the scale-up of bond use in the clean energy space is a lack of partnership. The long-term expansion of bond finance for clean energy developments will require close coordination between state and local development finance agencies and energy offices. Such collaborations will be necessary so that the finance professionals can better understand the unique context of clean energy development and clean energy professionals for their part can better understand the requirements of the capital markets. Unfortunately, even in states with CEFs and key public officials working on clean energy finance, there has usually been little sustained interaction between these two groups.

This is not surprising given the history of clean energy development at the state and local level. Much of the growth of the clean energy industry up to now has relied on the provision of grants, rebates, and incentives from state and utility clean energy public-benefit funds. Bond agencies, for their part, have focused on conventional infrastructure projects and have not been active in clean energy, with the exception of a few projects. For bond agencies, the clean energy sector can seem volatile, complex, and full of uncertain regulatory and financial risks that these agencies have not previously encountered.

Further impeding cooperation between development finance agencies and clean energy agencies is the uncertainty caused by the current lack of information that exists about recent clean energy deals, including about their structure, the risk sharing they entail, and the deals’ interaction with state law and institutions. The understandable conservatism of many public bond agencies is exacerbated by an information shortage which can inhibit innovation and make bonding agencies reluctant to partner with clean energy offices without first seeing proven success.

- ▶ **The lack of a large market for clean energy bonds precludes scale up of clean energy bond financing.** At the same time, the small size of the current pool of clean energy bond issuances has exacerbated the cooperation and related information shortfall. In most cases the new innovations in clean energy bond finance are few and far between, and no more than a year or two old.

In this regard, states’ and regions’ limited experience with bond finance tools in clean energy

has created something of a self-fulfilling prophecy: Given their limited experience, very few states are committed to replicating the emerging examples of clean energy bonds. The few examples that have emerged, outlined more fully in this report, are typically in a few states that already have a history of clean energy innovation. For clean energy bond finance to scale up, many more states and regions will need to deploy bond finance tools to support a range of clean energy technologies, from energy efficiency, solar installations, to new resilient power applications that would reduce the risk of power outages in extreme weather events.

A significant barrier to the emergence of a large market for clean energy bonds is the limited use of conventional credit enhancement tools to reduce the financial risks of new clean energy bonds.<sup>17</sup> By mitigating risks for private investors, credit enhancement can effectively raise more capital at lower costs for multiple clean energy projects. These can take the form of loan loss and debt service reserves, loan guarantees, and subordinated debt. Each of these credit support programs are familiar to development agencies and have been used by them to enhance the financial quality of various infrastructure deals. This stands in contrast to the clean energy sector where there have been few easily adoptable credit enhancement models.

For clean energy bond finance to scale up, then, two problems will need to be addressed. First, the level of innovation and experimentation in applying bond financing to clean energy has to increase so that many states across the country are working on bond and clean energy demonstrations in multiple technology sectors. And second, successful clean energy bond finance models—relying on credit enhancement tools, used in multiple financing packages for financing many different technologies—need to be scaled nationally.

- ▶ **Spotty performance data and the lack of standardized documentation inhibit widespread adoption and scale of bond finance models.** The absence of compelling performance data on clean energy projects—including loan performance, underwriting criteria, and project attributes—and standardized documentation makes bond finance agencies even more unwilling to assume new risks that they may not fully understand. This further limits private-sector capital flows into otherwise attractive clean energy projects.

Securitization—pooling loans to create consolidated securities that investors can purchase—through the asset-backed market will be crucial to scaling up clean energy bond financing. As is true with other loan products, clean energy securitization benefits from high transaction volumes, standardized documents, and compelling performance data. However the lack of quality historical and publicly available data on clean energy projects has inhibited investor confidence in renewable energy and energy efficiency loans as an asset class, further complicating the ability of bond finance agencies to use new bond tools in clean energy.

For instance, potential investors in bonds backed by Property Assessed Clean Energy (PACE) loans and rating agencies have expressed concerns about the lack of historical performance data regarding default and foreclosure rates on these loans.<sup>18</sup> A similar data challenge was faced by NYSERDA in its efforts to securitize a \$26 million energy efficiency loan portfolio.<sup>19</sup> When NYSERDA approached a national rating agency to provide a rating on a proposed bond issue that would be repaid from its portfolio of residential energy efficiency loans, it was told that there was not enough data on its previous residential loans to receive a rating. Even historical data from a similar Pennsylvania energy efficiency loan program did not satisfy normal rating agency requirements for an investment grade security. NYSERDA's experience clearly demonstrates the need for a national repository of standardized loan performance and energy savings data that can be used by rating agencies, investors, and other stakeholders.

Similarly, the field lacks standardized methods. The clean energy sector has yet to widely adopt standardized terms and documentation that could be easily adapted to many states and many different types of projects. This is in sharp contrast to bond finance practice in traditional infrastructure areas like transportation and water where decades of bond deals have created standardized documentation that can be modified for deals with unusual features.

That there is a lack of standardization in clean energy is not at all surprising given that there are few accepted and standard documents in more mundane clean energy policies and programs where many states field different rebate and grant programs. Navigating the clean energy project documentation process can be time-consuming and costly, with high transaction fees, especially

when done project by project. This greatly increases financial transaction structuring costs and the due diligence requirements for each investment. Standardization of the many contracts, forms, and permits required during the project development cycle could reduce the innumerable contract variants currently applied in the market, significantly mitigating the due diligence requirements of potential investors as well as reducing total costs for developers.

- ▶ **Institutional investor demand for clean energy bond offerings as a new asset class of securities remains limited.** Finally, the lack of demonstrated performance information, standardized data and documentation, and a scalable pipeline of clean energy bond projects depress investor demand. Large institutional investors such as insurance companies, pension funds, and university endowments drive the capital markets. These firms deploy their trillions of dollars of assets to buy and sell investment grade marketable securities. Demand by these investors for clean energy bonds is critical to make this a new asset class that can raise the capital needed to finance a significant clean energy transition.<sup>20</sup> And yet institutional investor allocations to clean energy projects remain limited for a variety of reasons.

In other sectors the procedures and standards for buying and selling securities are well established. Companies like Standard and Poor's "rate" various government and corporate bonds at levels from AAA on down depending on their credit quality. In turn, many institutional investors have established portfolio requirements that they can only purchase "rated" securities at a certain level, usually above A or AA. Or, in some cases, these investors can purchase "unrated" securities in "private placements" where credit concerns are addressed in more individual ways.

Because of the immature state of the sector, rating agencies have difficulty rating clean energy bonds due to their lack of a sufficient history. Therefore, most institutional investors may be unable to purchase them under their investment guidelines. And there is too little experience to know if private placement unrated bonds can be made acceptable to institutional investors.

In short, institutional investor demand for clean energy bonds remains insufficient to make clean energy bonds a large and viable asset class. Conversely, many investors would purchase investment grade clean energy bonds if there were a robust market for these securities.

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While the opportunity exists to raise hundreds of billions of dollars for clean energy investment using proven mechanisms, a number of state-policy and market hurdles are impeding the application of those mechanisms. The need of the hour, therefore, is to first understand and then address the challenges that currently hinder their use.

### III. Toward a New Infrastructure Finance Approach

**G**iven the challenges described, there could not be a better time to employ successful public finance tools to step up investment in clean energy, and U.S. state and regional actors are well placed to lead on their use.

States and regions have led clean energy policymaking in the United States.<sup>21</sup> From innovative financing mechanisms to policymaking to economic development, they have played an essential role in creating the nascent clean energy industry. States have pioneered the use of renewable portfolio laws and the use of utility surcharges for greater energy efficiency and renewable investment.<sup>22</sup> They have deployed state clean energy funds to support a broad range of clean energy-related economic development activities within their states, including cleantech innovation support through research and development funding, financial support for early-stage clean-tech companies and emerging technologies, and various other industry development efforts.<sup>23</sup> And now they are moving towards a greater use of private-sector and public finance tools through the state green bank movement.

Given this history, states and regions should once again lead from the front to scale up the use of existing development finance tools for clean energy. For the most part, the existing development finance toolbox provides plenty of options for accelerating the use of public financing for clean energy development. In some cases, such as the new bond effort in Hawaii, new state laws that create

## Financing Municipal Clean Energy Projects with Low-Interest Bonds: The Morris Model

Morris County, NJ is the birthplace of an innovative financing mechanism for renewable energy projects that combines power purchase agreements (PPAs) with government-issued bonds. Popularly known as the Morris Model, the mechanism got its start in 2010 when the Morris County Improvement Agency (MCIA) issued bonds for a 3.2 MW solar energy project that put solar panels on 19 schools and county buildings. Since then, the Morris Model—with its combination of PPA and bond financing—has attracted attention as a promising approach to deploy solar projects in public buildings that can satisfy municipal and state renewable energy goals.

Under this model, the MCIA issues pooled bonds to finance the development costs of renewable energy improvements on public buildings throughout the county. MCIA issues a request for proposal seeking a private developer to own, operate, and maintain solar panels on public buildings. MCIA then enters into a lease-purchase agreement with the winning bidder which transfers ownership of the solar installations to the developer and also requires the developer to make payments to the county that are in turn used to pay principal and interest on the bonds. MCIA also enters into a PPA with the developer to buy the electricity from the system at a lower rate than it would pay a utility.

The bonds are backed by both project revenues—arising from the PPA—and a county guarantee which decreases the interest rate and significantly lowers the cost of capital for projects. In addition to the low-cost bond financing, the developer also benefits from state incentives available through the sale of solar renewable energy certificates (SRECs) as well as federal income tax incentives which are not available to MCIA as a public entity, offsetting significant portions of the project costs.

Morris County has benefitted from electricity prices approximately 35 to 60 percent less than that from a local utility. The Morris Model has been successfully adopted by several other counties in New Jersey.

*Source: NREL, "Financing Solar PV at Government Sites with PPAs and Public Debt," (Golden, CO: National Renewable Energy Laboratory, 2011).*

dedicated credit enhancement mechanisms could accelerate use of bonds in clean energy. In other cases, state laws that encourage or mandate the recommendations in this report could advance the use of these finance mechanisms. Federal law changes, noted below and unlikely to be achieved in this Congress, also could be helpful.

Along these lines, states and regions can choose from among a variety of bond instruments as they work on different classes of clean energy projects. Bond markets are not monolithic and different bond financing approaches would fit different clean energy projects.

For instance, capital projects of clean energy supply chain manufacturers can be financed with small-issue tax-exempt bonds, such as Industrial Development Bonds (IDBs). IDBs are a type of qualified small-issue private activity bond (PAB) that provide tax-exempt interest rates to private borrowers who meet certain public benefit requirements.<sup>24</sup>

Taxable bonds can also be used by public bond agencies to finance clean energy public-private partnerships. The Morris Model is a great example of a hybrid taxable municipal bond-PPA model that has been used to support clean energy projects (mainly solar PV) on public buildings. This taxable bond model combines the tax monetization benefits of third-party ownership with low cost capital in the form of public debt.

Finally, large securitizations of distributed solar generation loan portfolios can be financed with corporate bonds providing much needed liquidity for strong solar developers. In November 2013 SolarCity sold \$54.4 million in bonds with a 4.8 percent interest rate and with that became the first U.S. company to sell bonds backed by rooftop solar panels.<sup>25</sup>

The challenge is to capture the investment opportunities for clean energy using many types of bond instruments.<sup>26</sup> In virtually all of the cases, credit enhancement now and in the future will continue to play a significant role in accessing public capital markets, as will supportive public policy as the markets gain more experience with the performance of clean energy bond instruments.

- To fulfill this promise, states, regions, and localities should consider pursuing four main agendas:
- ▶ Establish mutually useful partnerships between development finance experts and clean energy officials at the state and local government levels

- ▶ Expand and scale up bond-financed clean energy projects using credit enhancement and other emerging tools to mitigate risk and through demonstration projects
- ▶ Improve the availability of data and develop standardized documentation so that the risks and rewards of clean energy investments can be better understood
- ▶ Create a pipeline of rated and private placement deals, in effect a new clean energy asset class, to meet the demand by institutional investors for fixed-income clean energy securities

Along these lines state and regional clean energy leaders should:

**Establish mutually useful partnerships between development finance experts and clean energy officials at the state and local government levels.** Many state and local clean energy leaders are keen to locate new sources of financing for compelling projects. At the same time, development finance agencies are eager to make significant investments in clean energy using bond finance instruments. They know how to raise hundreds of billions of dollars for infrastructure investment and can bring the same skill to the clean energy sector, provided efficient partnerships can be forged with state and local clean energy stakeholders to create mutually beneficial financial instruments.

So the two communities should get together. In most cases state clean energy funds and bond authorities can form new partnerships to explore clean energy finance from a perspective focused on capital markets and bond issuance. Clean energy officials would learn about public finance from the bond authorities while the latter would learn about clean energy. To productively launch their new partnerships state and local clean energy policymakers and the development finance entities should:

- ▶ Identify opportunities and barriers facing private and public participants to access capital markets for energy efficiency, renewable generation project finance, and manufacturing and economic development that integrates clean energy
- ▶ Analyze specific bond finance instruments to determine how each available bond finance tool could be used in present or modified form to match the need for clean energy finance in a range of energy sectors
- ▶ Identify if any state and federal policy changes are needed to expand the source of bond capital keeping in mind political feasibility, financial efficacy, and applicability to different clean energy technologies<sup>27</sup>
- ▶ Work with relevant federal agencies like the U.S. Department of Energy (DOE) and Environmental Protection Agency (EPA) to explore partnerships to analyze finance gaps and look to expand use of federally supportive tools like the Clean Water Act revolving loan funds
- ▶ Establish state peer to peer learning networks regarding infrastructure finance for clean energy in order to accelerate change

In other words, these partnerships should bring together the best of finance in the bond market with the best of the clean energy sector to create a financing mechanism and best practices to move clean energy forward.

It bears noting, meanwhile, that the establishment of state green banks in a few states has opened new opportunities to develop bond finance. Both Connecticut's Clean Energy Finance and Investment Authority (CEFIA) and New York's Green Bank (housed within NYSERDA) possess the authority to carry out bond finance and as such have the potential to expand their operations beyond standardizing the finance of consumer loans to engage in bonding activities for larger infrastructure projects. The establishment of more green banks would require more entities to either develop bonding authority or partner with existing public bond agencies in their states.

**Expand and scale up bond financed clean energy projects using credit enhancement and other emerging tools to mitigate risks and through demonstration projects.** As partnerships cohere scale-up will become possible. In this regard, for clean energy bond finance to take off, the industry needs to move from one-off projects to a more systematic use of bond finance tools across multiple states and regions. Coordinated action in many states can create pools of projects that can in turn be sold into capital markets.

Credit enhancement—used in virtually every other sector to raise capital to scale—can help create a new asset class that would enable the clean energy sector to access low-cost capital and increase its scale. To that end, state CEFs can deploy funds as credit enhancement tools, such as by pledging of utility system benefit charges to provide credit-enhanced bond financing, to reduce the financial risk in clean energy deals. These funds' investment total about \$500 million a year, holding tremendous

## Financing Clean Energy Infrastructure with a Combination of Bonds and Ratepayer Repayment: The Hawaii Approach

A unique combination of bond financing and repayment via electric utility surcharges is poised to accelerate Hawaii's deployment of renewable projects, especially solar photovoltaic systems. One of the biggest challenges for Hawaii residents, as elsewhere in the country, who want to install solar water heaters or rooftop photovoltaic systems is the upfront cost. Hawaii's innovative financing model addresses this challenge by combining a bond-financed loan program for solar with an on-bill repayment program in a first of its kind in the nation.

In May 2013 Hawaii's legislature passed Senate Bill 1087 allowing the state to create and issue a "green infrastructure bond." Under this law, the Department of Business, Economic Development, and Tourism (DBEDT) would issue revenue bonds at very competitive rates and then pass these savings on to the consumers in the form of lower borrowing costs. The bonds would be backed by an existing public benefits fee that consumers pay on their electricity bills. Proceeds from the sales of green infrastructure bonds to private investors such as pension funds would go into a special fund controlled by a new green infrastructure authority that would make loans to consumers. Consumers would repay the loans from the energy savings on their electricity bills. Hawaii plans to initially capitalize the loan fund with \$100 million in bonds.

Hawaii's innovative financing structure will make solar and energy efficiency improvements affordable for residents and business owners who cannot afford the upfront costs of these improvements. The program will go into effect in 2014 and early indications reveal that the green infrastructure bonds will be well-received in the capital markets, enabling the state to borrow at interest rates below those that are paid on other revenue bonds.

*Source: Robert Sanders and others, "Reduce Risk, Increase Clean Energy" (Montpelier, VT: Clean Energy Group and Columbus, OH: Council of Development Finance Agencies, 2013).*

opportunity for funding clean energy growth through bond financing.<sup>28</sup>

Traditionally, though, these funds have been used for one-off project development or to incentivize a company. States should consider expanding the scope of these funds to use them as credit enhancement, such as debt reserves, for clean energy bond issuances. Hawaii is already doing this by using its utility system benefit charge as a credit enhancement to support bond finance for clean energy. Other states with utility system benefit charges for energy efficiency or clean energy can consider a Hawaii-type model.

States should also examine the few examples of clean energy bond finance being developed and executed in places like Hawaii, New York, and Morris County, NJ, among others, and identify ways to adapt and replicate those models in their jurisdictions. Scaling up these emerging demonstration projects could deploy billions of dollars of mainstream bond finance for clean energy projects.

There are several ways for states to dramatically increase the number of demonstration projects using credit enhancement tools. State bond finance agencies and clean energy officials should:

- ▶ Consider developing joint investment plans dedicating a certain amount of bond capital to clean energy projects over a fixed amount of years
- ▶ Support the creation of pooled bond funds for clean energy
- ▶ Participate in prepaid bond financings in which future PPA energy payments are funded with upfront cash provided by low-cost tax-exempt bonds
- ▶ Commit to procure clean energy using state public financing tools, such as the State Clean Water Act revolving loan funds approach used by NYSERDA and New York State Environmental Facilities Corporation
- ▶ Explore utility regulation or new laws to use some small portion of existing utility-based surcharges in a securitization strategy to leverage those committed sources of capital into larger capital pools, such as has been pioneered in Hawaii
- ▶ Support targeted demonstration projects in critical public infrastructure facilities to avoid the damaging effects of power outages as occurred during Superstorm Sandy
- ▶ Work together to finance bond projects affecting multiple states, such as offshore wind development on the East Coast, which requires large amounts of capital but also will provide economic benefits to many states

## Reducing Risk in Clean Energy Deals: Credit Enhancement Strategies

Credit enhancement is a financial risk reduction technique that reduces lender or investor risk by providing a level of protection against losses in case of borrower default. Credit enhancements have been used widely in the infrastructure sector to raise capital to scale and get projects to capital markets. Now these conventional credit enhancement tools are beginning to be used in the clean energy sector to reduce the financial risk in clean energy deals.

Program administrators have the option to choose from a variety of credit enhancement tools depending on the target market and program design. Among the most common mechanisms are:

- ▶ Loan loss reserves that typically make available a pool of funds from which the lender/investor can recover a portion of their losses in case of borrower default
- ▶ Debt service reserve funds in which cash is placed in a dedicated account that is available to pay interest and principal payments on a loan in the event the borrower fails to make scheduled payments
- ▶ Loan guarantees that enable the lender to recover potential losses in the event of a borrower default.
- ▶ Subordinated debt where the loan holds a lower priority position compared to privately funded senior capital. In this structure the subordinated capital absorbs first losses in the event of a default and acts as credit enhancement for the senior capital

Credit enhancements can be used to meet different objectives in delivering an attractive clean energy financial product. They can be offered to obtain lower interest rates and longer terms for customers from the lender or investor. By mitigating credit risks identified through traditional underwriting, credit enhancement can also expand the range of customers who have access to capital markets. And yet in other circumstances they can be used to encourage lender/investor participation in clean energy programs offering novel financing products.

*Source: Department of Energy's State and Local Energy Efficiency Action Network, "Credit Enhancement Overview Guide," (January 2014); Sanders, Milford, and Rittner, "Reduce Risk, Increase Clean Energy," (2013).*

In the end, more projects will come about if the states and localities learn how to better integrate their energy policy process with their public finance process. States should consider a specific policy to create an official working group of state energy and public finance officials to develop a joint clean energy infrastructure financing plan. This would include targets, budgets and commitments to certain levels of investment over the long term.

**Improve the availability of data and standardization of documentation so that the risks of clean energy investments can be better understood and mitigated.** To facilitate scale-up the availability of quality data and standard documentation tailored to the specifics of each clean energy segment will be critical. After all, if clean energy bonds are to be established as a new asset class for institutional investors wishing to invest in clean energy, then they require a credit risk/return profile equivalent to any other similarly rated asset.

Along these lines, clean energy projects are going to require better and more available data to enable improved evaluation of the risks associated with each technology and the ways to mitigate them, reducing the cost of capital. In some states, existing institutions like NYSERDA and Connecticut's CEFIA serve as hubs of information sharing and data gathering on these new finance issues. In most states, however, there is no such focus.

In addition, it will be critical to develop standardized investment documentation in order to build the foundation for a securitized clean energy market. The investment framework for each clean energy project is unique and requires new details for financing and development to be formulated and negotiated; that framework must be agreeable to all parties involved. One way to overcome this challenge is to develop a set of standard finance and project documents—while still allowing for local variations in laws and markets—for each clean energy segment that can be readily used in states without the need to recreate the wheel on clean energy bond finance state by state.

Standardized documentation can significantly help reduce the transaction costs and risks, increase profitability, and eliminate costly delays in project implementation. From the investor's point of view, standardized documentation makes the risk profile of a project easy to decipher and compare across other projects in its class. And from a financial point of view, standardization can clarify the project

evaluation process for financiers and facilitate their investment. Standardized contracts also make bank underwriting simpler and cheaper.

Some efforts are already underway to address this challenge. The National Renewable Energy Laboratory (NREL), for instance, recently assembled the Solar Access to Public Capital (SAPC) working group with the goal of enabling securitization of solar PV assets.<sup>29</sup> The group's primary effort focuses on developing standardized power purchase agreements, leases, and other documents relevant to residential and commercial deployment. Similarly, in energy efficiency, the Environmental Defense Fund's (EDF) Investor Confidence Project is developing protocols and aggregating disparate standards currently being used with the goal of ultimately building a securitized energy efficiency market. The project is also collecting and analyzing data from energy efficiency loans on the residential side, including loan performance, underwriting criteria, energy savings, and project attributes.<sup>30</sup>

In this vein, states contemplating use of bond finance in clean energy should coordinate with other states and the national coordinating efforts to standardize key aspects of project development and data collection. They should focus on developing standardized origination and other contracts, system performance and customer credit metrics, and rating agency criteria and evaluation.

To address the data and standardized documentation gaps, states can:

- ▶ Establish working groups to assemble information, organize analysis, and focus strategic thinking on how to leverage clean energy financing through infrastructure finance
- ▶ Analyze how bond financing could fit the state's specific clean energy sector, whether through energy efficiency loan pools, solar financing, public "resilience" infrastructure or large-scale projects like offshore wind
- ▶ Improve ongoing project and loan performance data collection—including data on equipment performance, operation and maintenance costs, as well as customer payment and default data—so that investors can understand investment risks; and share this data across states
- ▶ Work with national laboratories such as NREL and Sandia and other organizations like EDF to develop relevant project and performance data for bond finance, and create standardized documentation to accelerate adoption across the country
- ▶ Work with rating agencies to understand the current ratings for clean energy investments and difficulties faced by rating agencies in issuing a rating
- ▶ Work cooperatively with other states to develop standardized documentation of deal structures to accelerate use in multiple jurisdictions

These investments in collecting data, establishing metrics, and standardizing documents will make it easier to de-risk clean energy projects and assign them a credit rating that major investors can accept with a reduced due diligence burden. This will ultimately reduce the cost of capital and enable the scale up of these projects.

**Create a pipeline of rated and private placement deals, in effect a new clean energy asset class, to meet the demand by institutional investors for fixed-income clean energy securities.**

Finally, states and municipalities need to achieve scale in capital markets, and to do that need to develop bonds, together with related credit enhancement tools, that can be readily bought and sold in those markets. Clean energy bonds to finance distributed solar PV systems, for example, need to be as liquid as car loans and mortgages so that they can become an asset class available for investment by large institutional investors.

In view of the barriers noted earlier, it is crucial that clean energy bonds become rated and available for significant private placement opportunities in order to increase institutional investor demand. The good news is that these barriers are starting to come down.

Indeed, in international markets, it is clear that there is a growing institutional investor demand for "green" bonds issued by multilateral development banks to finance a host of clean energy and environmental projects.<sup>31</sup> And in the corporate bond market, including the recent sale of SolarCity solar bonds, the demand for clean energy bonds has been oversubscribed.<sup>32</sup>

So the demand is there by institutional investors for the right clean energy bond. The sale of the credit enhanced NYSEDA/EFC bond to Wall Street specifically demonstrates that a properly structured clean energy bond can meet investor demand.<sup>33</sup>

The challenge is to continually expand the pipeline of credit-enhanced clean energy bond offerings that can be aggregated for sale to these investors. A better understanding of and response to

## Using State Revolving Funds to Support Energy Efficiency Bonds: The NYSERDA Approach

In August 2013, New York raised \$24.3 million in the bond market to finance energy efficiency projects as part of its Green Jobs-Green New York program, a statewide initiative to promote energy efficiency and renewable energy projects. The new bonds, issued through the New York State Energy Research and Development Authority (NYSERDA), are the first of their kind in the country and have significant implications for financing clean energy projects in an era of declining subsidies.

The revenue bonds issued by NYSERDA have been rated AAA/Aaa by S&P and Moody's and are backed by a guarantee from the New York State Environmental Facilities Corporation (EFC) through its Clean Water State Revolving Fund (SRF) program, the largest SRF program in the country. EFC provides AAA-rated financing to local governments and public entities for clean water and drinking water projects. Working in close collaboration with EFC, NYSERDA was able to prove that energy efficiency programs can reduce fossil fuel consumption and air pollutant deposition in water bodies and are, therefore, eligible for assistance under the SRF program.

The bonds were sold as taxable Qualified Energy Conservation Bonds (QECB), which provide a partial interest subsidy from the U.S. Treasury, at an average interest rate of approximately 3.21 percent for an average term of approximately 6.8 years. The QECB interest subsidies coupled with the EFC guarantee have resulted in a net interest cost on the bonds well below 1 percent—thereby facilitating low-interest rate energy efficiency loans.

This is the first time that a state has used a SRF—previously restricted to use for water and wastewater bonds—to support revenue bonds to finance residential energy efficiency improvements throughout the state. This innovative approach represents an important step in scaling up clean energy bond financing that other states can model.

*Source: New York State Energy Research and Development Authority (NYSERDA) website; Clean Energy + Bond Finance Initiative.*

institutional investor demand will accelerate the building of a responsive pipeline of projects and increase the supply of clean energy bonds across the United States for investors.

The strategy for overcoming those barriers will emerge over time, but should begin now with some obvious first steps. States should come together to:

- ▶ Explore a new partnership with national and regional institutional investors to explore the needs of each group to create a product that can be made acceptable to those investors
- ▶ Create bond products in different clean energy market segments, focusing on how to get these bonds rated and how private placement bond securities can be structured to meet investors' needs
- ▶ Educate institutional investors about the risk and return profile of clean energy projects allowing them to consider these opportunities more broadly

The goal of this exercise would be to create a standardized national set of bond products in clean energy that states can sell into capital markets. Much if not all of this can be done without changes to state or federal laws or regulations. However, some changes at federal level could be helpful to rapidly expand this market.

At the federal level, some policy changes would be helpful that:

- ▶ Level the playing field and expand the definition of tax-exempt financing through PABs to include clean energy projects
- ▶ Increase the funding amounts for IDBs from \$10 million to at least \$30 million per facility so they can be used to finance clean energy projects on industrial property
- ▶ Create a state-level capital-access program at Treasury to leverage more state infrastructure finance, similar to the existing SSBCI program. This would be along the lines proposed by the Clean Energy Group (CEG) and Council of Development Finance Agencies (CDFA) in the State Clean Energy Finance Initiative (SCEFI)<sup>34</sup>
- ▶ Create a securitization loan guarantee program like the SBA Section 7a program for clean energy
- ▶ Reconsider proposed approaches that would reduce the effectiveness of tax-exempt financing through any tax code overhaul. Those would harm the overall ability of public finance agencies to invest in necessary infrastructure, including clean energy

Finally, if Congress is unable to agree on any new appropriations for a federal credit enhancement

program like SCEFI, DOE and other federal agencies should seriously consider repurposing existing federal funds to create credit enhancement funds for states to encourage more financial innovation in this public finance realm.

Modest federal policy changes along these lines would aid and abet the emergence of the dynamic clean energy bond market that is well within sight even without such changes.

#### IV. Conclusion

**N**ot often does a whole new category of actor emerge as a possible linchpin to the solution of a major market problem. But that is the case with development finance entities and clean energy.

The time has come to explore a more decentralized, and potentially more durable, model for financing clean energy development—one that would operate outside of Washington and utilize the enormous experience of state and local development finance agencies to apply well-established bond-finance tools to clean energy.

Bond finance is a widespread, effective finance tool that begs for much more testing in the clean energy sector. The nation's development finance agencies, after all, know how to achieve financial scale in other infrastructure finance sectors and know how to sell financial instruments to Wall Street. The clean energy community should therefore link up with the development finance community and apply bond finance tools to a new national challenge.

The result could be catalytic: Clean energy projects stand to gain access to low-cost, long-term capital markets and investors would gain access to new flows of investment grade securities that meet their financial requirements—benefitting both and so launching a new era of clean energy finance.

#### Selected References

Berlin, Ken, and others. 2012. "State Clean Energy Finance Banks: New Investment Facilities for Clean Energy Deployment." Washington: Brookings Institution.

Jenkins, Jesse, and others. 2012. "Beyond Boom and Bust: Putting Clean Tech on a Path to Subsidy Independence." Oakland: Breakthrough Institute, Washington: Brookings Institution and World Resources Institute.

Milford, Lewis, and others. 2012. "Leveraging State Clean Energy Funds for Economic Development." Washington: Brookings Institution.

Milford, Lewis, Robert Sanders, and Toby Rittner. 2012. "Clean Energy and Bond Finance Initiative (CE+BFI): An Action Plan to Access Capital Markets." Montpelier, VT: Clean Energy Group and Columbus, OH: Council of Development Finance Agencies.

Muro, Mark, Jonathan Rothwell, and Devashree Saha. 2011. "Sizing the Clean Economy: A National and Regional Green Jobs Assessment." Washington: Brookings Institution.

Nelson, David, and Brendan Peirpont. 2013. "The Challenge of Institutional Investment in Renewable Energy." San Francisco: Climate Policy Initiative.

Sanders, Robert, Lewis Milford, and Toby Rittner. 2013. "Reduce Risk, Increase Clean Energy: How States and Cities are Using Old Finance Tools to Scale up a New Industry." Montpelier, VT: Clean Energy Group and Columbus, OH: Council of Development Finance Agencies.

## Endnotes

1. Lewis Milford is president of Clean Energy Group and a nonresident senior fellow at the Metropolitan Policy Program at Brookings. Devashree Saha is a senior policy analyst and associate fellow at the Brookings Metropolitan Policy Program. Mark Muro is a senior fellow and the director of policy for the Metropolitan Policy Program at Brookings. Robert Sanders is a senior finance advisor with Clean Energy Group. Toby Rittner is the president and CEO of the Council of Development Finance Agencies.
2. In fact, the clean energy sector is in the midst of the mass extinction of federal funding support with nearly 70 percent of the 2009 level of federal clean energy policy support set to expire by 2014. See Jesse Jenkins and others, "Beyond Boom & Bust: Putting Clean Tech on a Path to Subsidy Independence" (Oakland: Breakthrough Institute, April 2012).
3. In the aftermath of the Great Recession, commercial banks are faced with greater credit oversight and have, therefore, tightened their credit standards. In addition, concerns regarding the adequacy of collateral, borrowers' debt capacity and the need for debt service and loan loss reserves now make it difficult for many clean energy projects to obtain commercial loans. See CE+BFI, "Clean Energy Bond Finance Policy Proposal" (Montpelier, VT: Clean Energy Group and Columbus, OH: Council of Development Finance Agencies, 2013). See also statement of Richard Kauffman on "Clean Energy Financing" before the Senate Energy and Natural Resource Committee, July 18, 2013.
4. For more information see Mintz Levin and GTM Research, "Renewable Energy Project Finance in the U.S.: 2010-2013 Overview and Future Outlook" (Boston: Mintz Levin and GTM Research, January 2012).
5. U.S. Partnership for Renewable Energy Finance, "Prospective 2011- 2012 Tax Equity Market Observations," (Washington: U.S. PREF, July 2011). Available at [www.uspref.org/wp-content/uploads/2011/07/US-PREF-Tax-Equity-Market-Observations-v2.2.pdf](http://www.uspref.org/wp-content/uploads/2011/07/US-PREF-Tax-Equity-Market-Observations-v2.2.pdf). See also Bloomberg New Energy Finance, "The Return—and Returns—of Tax Equity for US Renewable Projects," (Washington: BNEF, November 2011).
6. Comments of Richard Kaufman, special adviser to U.S. Department of Energy Secretary Chu (July 25, 2012) in a public note to colleagues in the field. In simpler terms, this means that our current, some would say old-fashioned, way to finance clean energy is neither easy nor cheap. It requires complex tax maneuvers to find the banks are willing to buy the tax equity in a deal, and those banks now number no more than a dozen. It requires armies of lawyers and accountants and tax experts, with high transaction costs. And the one-off nature of these deals makes them uniquely unsuitable for scale. The individualized, deal-by-deal structures mean they cannot be readily bundled and sold into capital markets like mortgages or car loans, to enable companies to then go and raise more capital for the next deal. Because of that lack of liquidity, clean energy is mired in small-scale capital markets, unable to tap the trillion dollar Wall Street pockets that propel our auto and housing markets. See also statement of Richard Kauffman on "Clean Energy Financing" before the Senate Energy and Natural Resource Committee, July 18, 2013.
7. Despite the ongoing federal policy paralysis, the federal government has tens of billions in annual financing capacity that can be deployed for clean energy. State and local policy leaders, while continuing to experiment with innovative financing mechanisms that leverage scarce public dollars with private capital, should actively seek to incorporate federal financing capacity into their own efforts.
8. For discussion of how some states are repurposing their clean energy funds from a project finance model to building a statewide clean energy industry see Lewis Milford and others, "Leveraging State Clean Energy Funds for Economic Development" (Washington: Brookings Institution, 2012).
9. For a discussion of state "green" banks and possible models for states see Ken Berlin and others, "State Clean Energy Finance Banks: New Investment Facilities for Clean Energy Deployment" (Washington: Brookings Institution, 2012). The Department of Energy (DOE) is also working with various states to advance "Energy Investment Partnerships," which are public-private lending entities with the authority to raise capital through various means—including bonds, sale of equity, legislative appropriations, dedication of utility regulatory funds, or foundation grants—for the purpose of supporting, through loans and credit enhancements, energy efficiency and renewable energy projects. This includes state green banks.
10. For details on the Connecticut "green" bank, the Clean Energy Finance and Investment Authority, and its programs see [www.ctcleanenergy.com/](http://www.ctcleanenergy.com/). New York proposed the creation of a \$1 billion New York State green bank in

January 2013. An initial \$210 million of funding has been allocated to capitalize the bank. Open for business, the NY Green Bank has issued a solicitation for \$200 million in clean energy projects. For more information see <http://greenbank.ny.gov/RFP1.aspx>.

11. See Lewis Milford, Robert Sanders, and Toby Rittner, "Clean Energy and Bond Finance Initiative (CE+BFI): An Action Plan to Access Capital Markets" (Montpelier, VT: Clean Energy Group and Columbus, OH: Council of Development Finance Agencies, 2012).
12. Toby Rittner, Erin Tehan, and Jason Rittenberg, "Built by Bonds," (Columbus, OH: Council of Development Finance Agencies, 2011).
13. For a useful review of how states and localities are using well-established public finance tools like bond financing to reduce financial risk in clean energy and creating a new path to access capital markets see Robert Sanders, Lewis Milford, and Toby Rittner, "Reduce Risk, Increase Clean Energy: How States and Cities are Using Old Finance Tools to Scale up a New Industry" (Montpelier, VT: Clean Energy Group and Columbus, OH: Council of Development Finance Agencies, 2013).
14. See Press Release, "NYSERDA Announces Residential Energy Efficiency Financing Bonds through Green Jobs-Green New York," August 13, 2013. Available at [www.nyserda.ny.gov/About/Newsroom/2013-Announcements/2013-08-13-Residential-Energy-Efficiency-Financing-Bonds-through-GJGNY.aspx](http://www.nyserda.ny.gov/About/Newsroom/2013-Announcements/2013-08-13-Residential-Energy-Efficiency-Financing-Bonds-through-GJGNY.aspx)
15. For more information on how the Morris Model is financially structured see CE+BFI, "Morris Model," (Montpelier, VT: Clean Energy Group and Columbus, OH: Council of Development Finance Agencies, 2013).
16. The Delaware Sustainable Energy Utility issued \$70.2 million in tax-exempt bonds to finance energy efficiency improvements in state public buildings. See Gayathri Vaidyanathan, "Del. Creates Utility Fund for Public Building Retrofits," *Greenwire*, October 20, 2011. Meanwhile, in 2012, the Toledo-Lucas County Port Authority issued two bond deals for \$5.3 million and \$6.4 million respectively to finance Property Assessed Clean Energy (PACE) projects. The first bond issuance was a cooperative effort of the Port Authority, the Port Authority's BetterBuildings Northwest Ohio Program, and the City of Toledo and aimed at improving energy efficiency and environmental performance of City of Toledo municipal buildings. Ohio's second PACE bond issue funded 11 projects including energy efficiency upgrades in nine buildings and installation of two large solar arrays for a mix of government, nonprofit, and commercial properties. See Port Authority News Release, "Port Authority Issues \$6 Million Bond to Support BetterBuildings Northwest Ohio Programs," October 24, 2012.
17. Sanders, Milford, and Rittner, "Reduce Risk, Increase Clean Energy."
18. See Paul Schwabe and others, "Mobilizing Public Markets to Finance Renewable Energy Projects: Insights from Expert Stakeholders," (Golden, CO: National Renewable Energy Laboratory, 2012).
19. See Sanders, Milford, and Rittner, "Reduce Risk, Increase Clean Energy."
20. A new report from Bloomberg New Energy Finance discusses ways to increase institutional investor demand for clean energy investment in Europe, including the use of bonds, which hold important lessons for the U.S. as well. Their recommendations include securitization of assets into bonds that can fit the funds' fixed interest portfolios, increased use of credit enhancement tools, and aggregating projects into larger pools to make them more attractive to large institutional investors. See Bloomberg New Energy Finance, "How to Attract New Sources of Capital to EU Renewables," (Washington: BNEF, December 2013).
21. For discussion on state and regional leadership on clean energy policies see Lewis Milford and others, "Leveraging State Clean Energy Funds for Economic Development;" Ken Berlin and others, "State Clean Energy Finance Banks: New Investment Facilities for Clean Energy Deployment;" Sanders, Milford, and Rittner, "Reduce Risk, Increase Clean Energy;" Charles Kubert and Mark Sinclair, "State Support for Clean Energy Deployment: Lessons Learned for Potential Future Policy," (Montpelier, VT: Clean Energy States Alliance, 2011); and Mark Muro, Jonathan Rothwell, and Devashree Saha, "Sizing the Clean Economy: A National and Regional Green Jobs Assessment," (Washington: Brookings Institution, 2011).
22. See Warren Leon, "The State of State Renewable Portfolio Standards," (Montpelier, VT: Clean Energy States Alliance, 2013), and David Hurlbut, "State Clean Energy Practices: Renewable Portfolio Standards," (Golden, CO: National Renewable Energy Laboratory, 2008).
23. Lewis Milford and others, "Leveraging State Clean Energy Funds for Economic Development."

24. For more information on Industrial Development Bonds (IDBs) see CE+BFI, "Clean Energy Bond Finance Model: Industrial Development Bonds," (Montpelier, VT: Clean Energy Group and Columbus, OH: Council of Development Finance Agencies, 2013).
25. Justin Doom, "SolarCity Advances on First Solar-Bond Sale, Upgrade," *Bloomberg News*, November 14, 2013.
26. It could be questioned whether additional capital for clean energy through bond financing is needed. This is the argument that the market alone, without future public support, declining technology costs and new businesses alone will generate the funding need to build out the clean energy market. The answer depends largely on the purpose of the investment. If the purpose of clean energy investment is to scale up clean energy to generate no carbon emissions in time to address climate change, the consensus view is that hundreds of billions, if not trillions of dollars of new investment capital are needed in the next few decades to bring about sufficient emissions reductions from the power sector. There is no scenario in the public domain that suggests the current trajectory of cost reductions and related activities alone will bring about the capital accumulation needed for that task. Many forms of new investment, including bonds, will be needed to meet the challenge.
27. Some state policy changes will be required to fully take advantage of bond financing for clean energy projects. For instance, for the Morris Model to be widely replicated in other places, states and localities will need to make sure that regulations surrounding third party PPAs are amenable to third-party developers to own a host's solar PV system and that laws governing public contracts are for longer duration (15 year contracts or longer) for financing third-party PPAs. In a similar vein enabling legislation and related regulation will be required to dedicate states' existing clean energy systems benefit charge mechanism as credit enhancement to bond issuance.
28. Lewis Milford and others, "Leveraging State Clean Energy Funds for Economic Development."
29. For more information see NREL, "Solar Securitization and Public Capital Finance," available at [www.financere.nrel.gov/finance/solar\\_securitization\\_public\\_capital\\_finance](http://www.financere.nrel.gov/finance/solar_securitization_public_capital_finance). The SAPC working group represents over 100 project developers, banks and financial institutions and law firms. The working group is focusing efforts on three fronts: The standardization of power purchase and lease contracts used by solar developers and installers; the collection of performance and credit data to facilitate investor and ratings agency evaluation of solar assets; and the submission of a solar securitization 'mock filing' to several rating agencies to find out how they will assess the risks of the solar asset class. So far the working group has developed standardized contract templates for residential leases and commercial power purchase agreements.
30. For more information see Investor Confidence Project (ICP) at [www.eepformance.org/](http://www.eepformance.org/). The ICP has developed commercial energy efficiency protocols that can serve as the base minimum requirements for an investment quality analysis on how to maintain and validate lower energy use. It is also working on other market barriers that exist in the energy efficiency market. On the data project, ICP will work with rating agencies, investors, and utilities to figure out how best to leverage the public data.
31. Mark Nicholls, "Painting the Bond Markets Green", yourSRI, June 2013. Available at [www.yoursri.com/responsible-investing/newsletter/Topic%20of%20the%20month%20June%202013](http://www.yoursri.com/responsible-investing/newsletter/Topic%20of%20the%20month%20June%202013)
32. Justin Doom, "SolarCity Next Bond Offering May Reach \$200 Million: CFO", *Bloomberg News*, Nov. 21, 2013.
33. Barbara Vergetis Lundin, "NYSERDA Recognized for Innovative Energy Financing," December 11, 2013. [www.fierceenergy.com](http://www.fierceenergy.com)
34. CE+BFI, "State Clean Energy Finance Initiative," (Montpelier, VT: Clean Energy Group and Columbus, OH: Council of Development Finance Agencies, 2013).

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## Acknowledgements

The Metropolitan Policy Program at Brookings would like to thank the Rockefeller Foundation for its support. We would also like to thank the Nathan Cummings Foundation for their generous support of the program's clean economy research.

For their substantive contributions to this policy brief and invaluable local insights, meanwhile, we wish to thank Kenneth Alston, Colin Bishopp, Peter Davidson, Richard Kauffman, Jeff Pitkin, and Jeffrey Schub. And finally, within the Metropolitan Policy Program, the authors would like to thank Robert Puentes and Patrick Sabol for their substantive assistance and David Jackson for his editorial help.

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