Clean Energy and Bond Finance Initiative (CE+BFI): An Action Plan to Access Capital Markets

by

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Executive Summary

The prospect for sustained and growing federal financial support for clean energy is, to put it bluntly, bleak, especially without aggressive congressional action.

A new report concludes that, absent congressional action, "America's clean tech policy system will have been largely dismantled by the end of 2014, a casualty of the scheduled expiration of 70 percent of all federal clean tech policies."[2]

To exacerbate the decline in federal support, the great recession of 2008 has led to reduced bank lending in the clean energy sector, among both European and American banks. For example, many American banks have opted out of loans that exceed ten years, dealing a blow to infrastructure type investment in clean energy projects and resulting in higher lending costs and reduced capital availability.[3]

This all comes as hundreds of billions of dollars are needed to scale up renewable energy, energy efficiency, and manufacturing support.

What are alternatives to this sole reliance on federal funding?

Federal gridlock reminds us again that states have been the innovators in clean energy and economic and community development. Experts are looking to the states, regions and localities—a return to federalism—as an investment strategy; state funds have raised and leveraged over $12 billion in clean energy investment in the last decade.

Who else can provide clean energy finance?

To fill the gap, a large group of state and local finance partners has been overlooked—public authorities and other entities that do tax-exempt and taxable bond financing—a $3 trillion industry that has financed our nation's infrastructure and public improvements, from bridges to hospitals to university expansion. In the U.S., over 50,000 state and local agencies help finance economic and community development.

To date, these agencies have not been that active in clean energy, with the exception of a few projects; but they now want to aggressively move into clean energy financing.

As to the capital they can raise, municipal bond issuers in March 2012 alone brought 1,196 deals to market worth $34.50 billion. That makes $78.3 billion in 2,927 deals in only the first three months of 2012, the kind of financing scale needed for clean energy.

What kind of new financing partnerships are possible?

The Council of Development Finance Agencies (CDFA), has 300 state and local development members, and it works with over 5,000 entities representing nearly 20,000 development finance professionals nationwide.

CDFA wants to partner with Clean Energy Group (CEG) and its network of energy officials to create new clean energy finance instruments, and CEG/CDFA will work with other groups and private investors.

These new partnerships could begin to finance clean energy using traditional finance mechanisms like tax exempt bonds, including private activity bonds for exempt facilities and 501(c)(3) organizations.

Why are bonds a strong source of financing?

There is currently a great deal of misconception about the use of bond financing by state and local governments. The truth is that municipal bonds remain safe investments, a fact evident in the market's lack of reaction to high-profile, negative news. Further, CE+BFI will emphasize the issuance of revenue bonds, not general obligation bonds backed by a state or municipality.

The Clean Energy + Bond Finance Initiative (CE+BFI)

A new partnership between clean energy funders and development finance is needed at the national or regional level—*the Clean Energy and Bond Finance*

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Initiative has been created to fill that gap. The new partnership, with the support of a national Task Force representing all key finance and industry constituencies, will explore how to start that effort.

What are CE+BFI Operating Principles?

- Explore clean energy finance from a perspective focused on capital markets and bond issuance.
- Establish mutually useful working relationships between energy fund managers and development finance professionals at the state and local government levels throughout the country.
- Identify and mitigate barriers to capital markets.
- Establish public-private partnership (P3) models that finance clean energy.
- Provide educational and technical resources serving both energy and finance industry needs.
- Create a forum supporting practitioners seeking to increase clean energy development through established capital markets models.

What Is the CE+BFI Action Plan?

- 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, including renewable energy, energy efficiency, and supply chain manufacturing.
- Explore and demonstrate the role of state clean energy funds and other entities in providing credit enhancement and other measures for bond issuances.
- Evaluate institutional investors' requirements that need to be met to facilitate the purchase of clean energy and energy efficiency bonds, as well as the benefits and disadvantages of various public and private ownership models in accessing capital markets for clean energy projects.
- Analyze federal and state finance and policy initiatives that would increase capital to the sector, considering which are most viable in terms of political feasibility, financial efficacy, applicability to different technologies, and opportunity for collaborative federal and state partnerships
- Create and support pilot partnerships that finance projects in multiple sectors in 6-8 states.

What is the financial goal of CE+BFI?

The goal of the project is to increase bond financing for clean energy and efficiency by an additional $5 billion to $20 billion in private capital over the next five years. As bond proceeds often comprise only one of a number of sources of funds in a project's capital stack, including private capital, the total dollar amount of financed projects could easily be twice this dollar range, or between $10 billion and $40 billion during this period.

We think these numbers are ambitious but achievable; of course, we cannot control investment and the markets are unpredictable, but such a goal would be the prime mover behind the project.

To achieve these goals, the first priority of CE+BFI is to scale up the use of existing development finance tools for clean energy. This would not require changes in law, reliance on new policies, or creation of new institutions. It would be a matter of bringing the existing partners together to work on creating new opportunities and investments with existing bond tools.

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Background: Federal Funding Cliff + State Financing Tools

The prospect for sustained and growing federal financial support for clean energy is, to put it bluntly, bleak, especially without additional congressional action. Other options must be pursued, especially state, regional and local financing tools.

The continuation of federal tax credits, the primary tool for much clean energy finance, is at risk. In February 2012, Congress once again failed to extend the production tax credit for wind.[4] This failure, if not reversed, will dramatically impact US wind production. In addition to undermining investor confidence, these "on again – off again" tax equity programs have become less effective because the number of banks interested in tax equity schemes have declined. Tax equity financing available has dropped from $6.1 billion in 2007 to little more than $1.2 billion in 2009.[5,6] Also, the major federal investment tax credit program for solar is scheduled to end by 2016.

This tax credit drop is exacerbated by the end of the ARRA-related energy stimulus funding. ARRA has been the largest stimulus program for clean energy in American history, about $65.6 billion dollars from 2008-2012.[7] This includes the $3.2 billion energy efficiency block grant funding for municipalities.

An upcoming report concludes that, absent congressional action, "America's clean tech policy system will have been largely dismantled by the end of 2014, a casualty of the scheduled expiration of more than 70 percent of all federal clean tech policies."[8]

The end of funding comes amid enduring political paralysis over federal energy policy, and a massive debt overhang that makes any new funding extremely difficult to enact. Witness the failure of Congress to pass a popular bipartisan proposal for a federal infrastructure bank.[9] For clean energy, the country is facing a financing perfect storm at the federal level, a funding cliff of historic proportions. It is no understatement to call this situation a crisis for the industry.

Is there an alternative to this historical reliance on Washington? More clean energy experts are looking to the states, regions and localities—a return to federalism—as an investment strategy.[10] Federal gridlock reminds us again that states have been the clean energy innovators for the last decade. States hold out tremendous promise for the continued design and implementation of clean energy solutions, financing, and economic development.

State governments led the nation's energy system transformation a decade ago. Since then, they have developed a broad array of clean energy development tools, ranging from financial support tools and net metering to incubators, cluster supports, and workforce training.[11] Over the last decade, state funds have invested over $2.7 billion in state dollars to support renewable energy markets while lever-aging another $9.7 billion in additional federal and private sector investment; more than $12 billion has supported over 72,000 renewable energy projects, from solar to wind to small hyrdo and biomass projects.

States have played an equally important role in financing energy efficiency through ratepayer-funded energy efficiency spending, which grew from $1.7 billion in 2004 to $4.4 billion in 2009. Further, twenty-nine states and D.C. have implemented renewable portfolio (RPS) laws that mandate new clean energy generation.[12] These programs have built the clean energy industry.

Despite this state progress, there is a large funding gap in the hundreds of billions of dollars.

In this search for ways to fill the gap, a large group of state finance partners has been overlooked – public authorities and other entities that do tax-exempt and taxable bond financing. This is a $3 trillion industry that has financed our nation's infrastructure and public improvements, from bridges to hospitals to university expansion. Development finance agencies are state, county, and municipal agencies and authorities that provide or support economic development financing programs, including tax-exempt and taxable bonds, credit enhancement programs, and direct debt and equity investments. Throughout the U.S., over 50,000 state and local agencies exist to help finance development. [13, 14]

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These public financing tools have leveraged private investment to deploy new technologies and major public improvements in American history. It is how we have built our nation's public libraries and schools and our water treatment and delivery systems, along with investments in affordable housing and the physical infrastructure of blighted urban and rural areas. Now, models like the Chicago Infrastructure Trust, and Mayor Emmanuel's March 2012 initiative to finance energy efficiency through bonds, are emerging as a new trend for infrastructure finance.[15]

What is needed to apply all these powerful funding tools at greater scale to the larger challenge of clean energy finance all across America?

To date, these development finance agencies have not been that active in clean energy, with the exception of a few projects. But they now have an appetite to aggressively move into clean energy financing. Other stakeholders such as housing finance authorities, state clean energy funds, clean energy policy makers, community development finance institutions (CDFIs), universities, and workforce development agencies—with the private sector—could partner with development finance agencies to finance clean energy.

With these new partnerships, they could begin to finance clean energy using their traditional finance mechanisms like taxable and tax exempt bonds (including private activity bonds), tax increment financing, infrastructure finance, clean renewable energy bonds, 501(c)(3) bonds, new market tax credits, low income housing tax credits and revolving loan funds. This new partnership could additionally leverage the financing capacity and capital and civic relationships of CDFIs to more fully integrate clean energy practices within their traditional community development portfolios.

But no partnership between clean energy funders and development finance agencies has been tried at the national or regional level. CE+BFI will fill that important financing gap. The objective is to develop a national action plan: *to define and implement a new role for development finance in clean energy federalism, a potential game changer for scaling up clean energy capital in the country.*

States as Innovators: The Emergence of a New Federalism

For clean energy in the last decade, states, regions and localities have been the innovators. From funding to policy-making to economic development and new finance models, states have shaped the direction of public policy, and helped create a new industry. Of course, the Obama Administration's financial support through a variety of stimulus related programs has helped tremendously in the last few years.

But with federal support in decline, along with the continuing national debt concerns and political paralysis, what kind of new federal and state financing actions are needed to move forward—and do states, regions and localities need to do even more?

Most experts believe the answer is yes—that decreasing federal support means states and localities must do more. The Brookings Institution recently proposed a broad "federalism" agenda for the next president after the 2012 election:

> *Remaking the economy, in essence, requires a remaking of federalism so that governments at all levels "collaborate to compete" and work closely with each other and the private and civic sectors to burnish American competitiveness in the new global economic order.*
>
> *The time for remaking federalism could not be more propitious. With Washington mired in partisan gridlock, the states and metropolitan areas are once again playing their traditional roles as "laboratories of democracy" and centers of economic and policy innovation. An enormous opportunity exists for the next president to mobilize these federalist partners in a focused campaign for national economic renewal.*

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Given global competition, the next president should adopt a vision of collaborative federalism in which:

- *the federal government leads where it must and sets a robust platform for productive and innovative growth via a few transformative investments and interventions;*

- *states and metropolitan areas innovate where they should to design and implement bottom-up economic strategies that fully align with their distinctive competitive assets and advantages; and*

- *a refreshed set of federalist institutions maximize results by accelerating the replication of innovations across the federal, state and metropolitan levels.*

In summary terms, the next economy should be fuelled by innovation, to spur growth not only through idea generation but the virtuous interplay of invention, commercialization and manufacturing. It should increasingly be powered by low-carbon energy, to position the United States at the vanguard of the next, innovation-led industrial revolution. ... And, it should be opportunity rich, so that working families can earn wages sufficient to attain a middle class life. [16]

Many clean energy experts agree. A recent ACORE paper concludes that "state-directed renewable energy policy will continue to be the principal means by which the industry grows in the United States for the foreseeable future."[17] Dan Carol, a special assistant to the Oregon governor, has proposed "flexible federalism" or "Federalism 2.0" for bottom-up economic development partnerships.[18] Clean Energy Group has called for "clean energy federalism."[19] (In the context of health care, conservative *New York Times* columnist David Brooks said to "remember there has always been a Hamiltonian alternative: centralize the goals, but decentralize the means people take to get there.")[20]

The first, most pressing, place to start on this federalism approach is finance—to figure out how to massively scale up the public and private capital to grow the clean energy sector

Expanding Partners for Clean Energy Finance

What players are at work at the state, regional, and local level on clean energy, energy efficiency, and community and economic development?

- The twenty or more *state clean energy funds* that finance clean energy projects and companies with billions of dedicated state funding. (Many work with Clean Energy States Alliance, managed by CEG; they are state "venture investors" who operate with strong, bipartisan support in state offices, authorities, nonprofit funds and other entities.) [21]

- The state energy agencies *who implement RPS laws* that have changed the utility generation landscape in America.

- The *economic development officials* who increasingly apply their traditional economic development tools, such as incubator support, supply chains, workforce training tools, to the new clean energy sector.

- The managers of *utility-run energy efficiency programs* who have implemented billions of dollars in efficiency improvements in all sectors of the economy.

- The municipalities *who have managed EE programs* and who are now facing a funding cliff with the end of the stimulus block grants.

- Managers of *new clean energy banks* that have bonding and other finance authority.

- The *private* sector investors who are looking for other finance partners.

- The many nonprofits, especially *community development finance institutions (CDFIs),* that have invested in urban and rural areas to create wealth and jobs.

The Financing Gap

While there is no single data point, there is consensus that the U.S. needs hundreds of billions of dollars of capital to scale up clean energy to address climate change, to create a sustainable industry, and to create opportunities for community development and economic growth. There are numerous proxies to measure the size of that funding gap. Some include:

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- Federal stimulus funds totaling about $65 billion will come to an end soon.

- Clean energy investment was $55 billion in 2011, triggered by federal support.[22]

- Funding needed to comply with state RPS through 2025 could total at least $8 billion a year, probably well over $100 billion over this period.[23]

- Energy efficiency investment opportunities are over $289 billion in next ten years.[24]

- Global investment in renewable energy was about $311 billion in 2010.[25]

- Germany plans to spend $263 billion on offshore wind projects in the next decade.[26]

Whatever the actual size of the gap, it cannot be filled with existing financing tools by existing players.

Concurrent with the dramatic decline in federal support, the great recession of 2008 and its aftermath have led to reduced bank financing in the clean energy sector, among both European and American banks. It is unrealistic to expect the banking industry to meet the project financing needs for clean energy. Commercial banks typically lend for an eight- to ten-year term, often with an interest rate swap embedded, requiring the borrower to refinance at the end of the initial term and subjecting the borrower to interest rate risk and swap risk.

The shorter financing term from commercial banks exposes borrowers to higher debt service payments and refinancing risk when loan balloon payments come due. Bond financing, on the other hand, can commit capital for longer amortizations than commercial banks, typically up to the lesser of the asset life or the length of the power purchase agreement. The shorter financing term from commercial banks exposes borrowers to higher debt service payments and refinancing risk at the time the loan balloon payment is due, whereas bond investors lend at a fixed rate for up to 20 years with no interest rate risk for the borrower.

Furthermore, commercial bank loan documents often allow the bank to call or re-price the loan under certain circumstances. Bond documents do not include these types of provisions and borrowers are not at risk for regulatory changes that are outside of their control.[27]

Fortunately, outside the current clean energy finance players are the thousands of development finance agencies that want to help solve the clean energy finance crisis. Who are they and what can they do to help fill the gap?

What is Development Finance?

Development finance is the effort of local communities to support, encourage and catalyze economic growth. It is a tool to help make a project or deal successful, and in turn, to create a benefit for the long-term health of a community. This benefit is the economic growth that can take place through public and private investment in infrastructure, business, and industry.

Development finance offers a potential solution to the challenges of the local economic, business, and industrial environment. The finance tools used come in a variety of forms. These tools include loans, equity, tax abatements and tax credits. They also include the offer of a guarantee, collateral or some other form of credit enhancement within the context of a complex financing package. Development finance may include gap financing, which often makes the difference between a project that is contemplated, and one that reaches fruition.

Hundreds of development finance programs exist at the federal, state, and local level. These programs have been created over the past two centuries to address the financing needs of business, industry, real estate, housing, environmental and community development entities.

Does Bond Funding Raise Much Capital?

To give an example of the kind of funding amounts raised through bond offerings, consider that municipal bond issuers in March 2012 alone brought 1,196 deals to market worth $34.5 billion. This was up significantly as compared to this time last year, in a more difficult economic climate, when 849 deals were done that only totaled $18.91 billion.[28]

There is currently a great deal of misconception about bond financing by state and local governments. The

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truth is that municipal bonds remain safe investments, a fact evident in the market's lack of reaction to high-profile, negative news. The revenue-backed private activity bonds emphasized by CE+BFI do not contribute to state or municipality debt, as with general obligation bonds backed by full faith and credit.

So for 2012 alone, year-to-date capital raised through bond volume stands at $78.3 billion in 2,927 deals. This is compared to $47.9 billion in 1,937 issues for the same period in 2011, when volume contracted sharply due to the expiration of the Build America Bond program and other factors.
The market has emerged significantly from a large sell-off in December 2010 and January 2011, sparked in part by predictions that the market would see a wave of municipal defaults that did not occur.

Transportation and public facilities saw the largest jumps among sectors, March 2012 over March 2011. Transportation deals soared 207.5%, while public facilities leapt 164.4%.

Bond Finance Tools to Support Clean Energy

Bonds are the bedrock of public development finance. They have been used to help build roads, bridges, sewers, dams, city halls, prisons, schools, hospitals, libraries and thousands of other public and private projects. In its simplest form, a bond is a debt or a loan incurred by a governmental entity. The bonds are issued and sold to the investing public, and the proceeds are typically made available to finance the costs of a capital project. If the bonds are being issued for the benefit of a non-governmental borrower, the proceeds are often loaned to such borrower, and the borrower then makes loan payments to match when principal and interest are due on the bonds.

There are two types of bonds: Governmental Bonds and Private Activity Bonds (PABs). The interest that accrues on Governmental Bonds and "Qualified PABs" is exempt from federal taxation. Unlike Qualified PABs, Governmental Bonds may be used for many public purposes (e.g., highways, schools, bridges, sewers, jails, parks, government equipment and buildings, etc.). Private entities may not significantly use, operate, control or own the facilities that are being financed. Governmental Bonds benefit the general public, while PABs benefit private entities. Governmental Bonds are intended to address an "essential government function" such as building a highway or a school.

A bond issuer's objective is to raise capital at the lowest cost. Tax-exempt treatment of Governmental Bonds makes them the lowest cost option. However, various "private activity tests" serve to limit the amount of private sector involvement with facilities that are financed with Governmental Bonds. On the other hand, qualified PABs permit a larger degree of private sector involvement, but they do so at a higher interest rate. In the economic development industry, Qualified PABs are the development finance mechanisms that drive projects involving both the public and private sector.

PABs may be used to address numerous economic development finance needs. They are issued for the benefit of private entities. The Internal Revenue Code (IRC) permits the financing of several types of facilities using qualified PABs, although they may be used partially or entirely for private purposes:

Small Issue Industrial Development Bonds

Bonds in this category include Industrial Development Bonds (IDBs), which are often referred to as Small Issue Manufacturing Bonds. These bonds are the single most actively used bond tool for financing the manufacturing industry.

501(c)(3) Bonds for Not-For-Profits

This category of bond is used to finance projects owned and used by not-for-profit corporations that are exempt under Section 501(c)(3) of the IRC. Organizations using Qualified 501(c)(3) bonds may include: religious or charitable groups, scientific organizations, literary or educational groups. 501(c)(3) bonds are not subject to state volume cap requirements.

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Exempt Facility Bonds

This category of bonds may be used to finance a wide variety of projects, including airports, docks, and wharves, mass-commuting facilities (such as high-speed rail) and water and sewage facilities. Exempt Facility Bonds may also be used to help finance solid waste disposal facilities, qualified residential rental projects, facilities for the furnishing of electric energy or gas and facilities for local district heating and cooling.

Qualified Redevelopment Bonds

Infrastructure projects the financing for which does not meet the IRC requirements for Governmental Bonds may qualify for tax exempt financing if they meet several tests for "qualified redevelopment bonds." For instance, in many cases, the proceeds must be used for redevelopment in designated areas of blight.

Qualified Energy Conservation Bonds (QECBs)

QECBs are another form of tax credit bond where the bondholder receives payments in the form of tax credits from the federal government. The tax credits permit an issuer of a QECB potentially to borrow for "qualified conservation purposes" at much lower interest rates. "Qualified conservation purposes" may include a wide variety of opportunities, from capital expenditures for renewable energy source development, energy consumption reduction and green program development, to facility and research grants. The wide variety of financing opportunities with QECBs makes the program very flexible and popular and should be explored by communities working to develop green and renewable energy initiatives.

Qualified Zone Academy Bonds (QZABs)

The Qualified Zone Academy Bond is another federal tax credit bond program. QZABs may be used for most school renovation and rehabilitation projects as well as equipment and up-to-date technology. New construction does not qualify.

Taxable Bond Financing

Taxable bond financing works much like tax-exempt bond financing, but lacks federal tax-exemption benefits and federal tax credit benefits. Despite the lack of federal tax-exemption, these bonds remain attractive options because many are exempt from state income taxes. Many finance agencies use taxable bonds, called "taxable tails", to complete projects that do not generate enough tax-exempt financing capacity. Taxable tails are often used as a gap-financing source to complete projects requiring additional financing support.

Why is Development Finance Important?

Development finance is critical to economic development because it has the potential to make or break a project. Development finance can help businesses generate working capital and invest in their ideas. It can help developers achieve an acceptable return on investment in a project. It can help communities to develop infrastructure and jobs. It can also act as a catalyst for development led by the private sector. Development finance may offer financing that is less expensive than conventional financing.

Development Finance + Clean Energy

Within the development finance industry, renewable energy development is the most pressing public financing challenges facing communities. CDFA members have put clean energy financing at the top of their priorities for additional financing activity.

While CDFA works daily with over 20,000 development finance professionals, the scope of the clean energy industry is not being fully addressed. CDFA has worked with CEG for the past year to develop a partnership between the two groups. CEG represents the renewable energy state leaders while CDFA represents the public and development finance leadership. These two areas rarely interact, even at the state level.

Now, CDFA members want to do more. The recommendations and partnership proposals in this paper are a result of that year long study and collaboration. CDFA sees the need for a partnership between energy leaders and development finance leaders as critical to long-term expansion of clean energy development at the state and local level.

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Case Studies for Bonds + Clean Energy Finance

Attached to this paper are several project-specific case studies that show how development finance already has begun to bring new capital into the clean energy space. These case studies highlight project models that could be significantly scaled up and replicated to bring more capital to the industry.

Morris Model for Solar Bond Financing **–** How bond financing is being used to scale up solar installations though traditional public authority activity, a model that could be replicated across the country.

Chicago Infrastructure Investment in Energy **–** How new infrastructure bond finance is planned for energy efficiency and other public improvements in a new multi-billion plan for the city of Chicago.

Washington Bonds for Energy Efficiency and Renewables in Multifamily Housing **–** How bonds are used to raise capital for multi-family energy efficiency improvements, another model that could scale up financing across the country.

Bond Financing for Clean Energy Development in New Jersey **–** How the New Jersey Economic Development Authority is becoming a major player to support clean energy supply chains and manufacturing in the state.

Illinois Finance Authority Using Moral Obligation Bonds for Wind Project **–** How the state of Illinois has enacted legislation to use bonding authority to provide financing for wind projects across the state.

Ohio Third Frontier Bond Program Invests in New Energy Technologies **–** How voters consistently approve a state-wide bonding referendum to generate funds to invest in new technologies, including advanced energy.

These case studies suggest an emerging trend to use development finance to bring capital to clean energy– in solar, wind, clean energy manufacturing, energy efficiency, and supply chain development.

With these emerging trends, two questions remain:

- What can be done under existing law to scale up these efforts in the clean energy space?
- What changes in law are needed to bring even greater development capital into the space?

Scale-Up under Existing Laws

The first priority of CE+BFI is to scale up the use of existing development finance tools for clean energy. This would not require changes in law, reliance on new policies, or creation of new institutions. It would be a matter of bringing the existing partners together to work on creating new opportunities with existing bonding tools.

Most importantly, there is an opportunity in the near term to take advantage of today's historically low interest rates to use taxable bond financing for clean energy. Taxable bond financing is the most flexible, least restrictive means of accessing capital markets. It is likely to be the major source of bond financing for clean energy in the next few years. In addition, there is a chronic underutilization of Qualified Energy Conservation Bonds (QECB) and New Clean Renewable Energy Bonds (New CREB) The existing development finance toolbox provides dozens of resources for state and local leaders to use when addressing traditional development. Many of these tools (i.e., loan funds, bond finance, seed/venture capital) can and are already being used to finance renewable energy. But these existing development finance tools could be utilized more broadly to quickly accelerate the use of public financing for clean energy development.

There are several preliminary examples of what more can be done under existing law.

Solar Deals

Many more Morris Model solar bonding deals can be done throughout the country, with the right kind of education and partnerships and state laws. NREL has analyzed several states where replication is possible, depending on laws governing long-term contracting,

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bond approvals, and public procurement. The attorney who structured the early deals says that the key factors underlying the deals could well be done in other jurisdictions, if similar conditions were found, including favorable bond, public contracting, procurement and clean energy laws.

Energy Efficiency

Current bonding authority to use proceeds to finance energy efficiency programs can be vastly expanded under current law, assuming the political will and strategic plan. One state that has issued non-private activity revenue bonds for energy efficiency is California. Here, two bond issues totaling $66.7 million securitized the proceeds of an existing portfolio of loans supporting energy efficiency measures in state buildings. These bonds received an investment grade AA3 rating from Moody's due to the high quality of the underlying payment history on the energy efficiency loans. Other states could also replicate this model of bond financing for energy efficiency loans.[29]

Manufacturing

Bonds could be used to support manufacturing support and supply chain funding; if there is a dedicated state policy to use proceeds for that purpose, Industrial Development Bonds (IDBs) in particular could be used to help finance onsite energy facilities thus strengthening American manufacturing.

Universities

Universities as credit worthy institutions can float bonds to finance clean energy projects, an initiative that can be widely expanded throughout the country. For example, a new wood-chip and oil-fired cogeneration plant was just constructed by the Middlebury College community in Vermont. The $11 million plant will provide the campus with 20 percent of its annual electricity demand and 50 percent of its annual heating demand. Financing the plant was fairly straightforward. The college issued a 40-year, tax-exempt bond with a fixed interest rate of five percent.[30]

Credit Enhancement of Bonds with Clean Energy Funding Support

In all these cases, there is a catalyzing role that state clean energy funds can play with development finance agencies to attract much more capital to clean energy projects. Adding to the current practice of subsidizing individual projects with rebates, grants or other incentives, state funds also could provide credit enhancement to a bond pool issued by a development finance agency that would fund multiple projects. By mitigating risk for investors, credit enhancement would raise more capital more efficiently at lower cost to multiple energy projects. There are various forms that this credit enhancement might take:

- *Loan loss and debt service reserves.* States could fund loan loss reserves that would be available to protect investors from losses arising from individual non-performing projects within a bond pool. Similarly, states could fund the required debt service reserves, freeing up bond proceeds for other purposes or reducing the size of the issuance and debt service burden.

- *Letters of credit.* State funds could support bank letters of credit that protect investors from losses. Letters of credit are a common form of credit enhancement for private bond placements, and would be effective in raising bond financing for energy projects.

- *Guarantees.* A state fund or agency could provide a guaranty ensuring repayment to investors if the project is unable to do so.

- *Subordinated debt.* State funds could purchase a portion of a bond issuance, subordinated to the payment of the other bondholders.

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Changes to Improve Development Finance for Clean Energy

There are other ways to improve development finance through legal changes or clarifications to existing law, which would expand the use of bond finance for clean energy. These changes could be part of an advocacy agenda going forward but are note key to short-term success.

Bond Finance Policies

Several bond financing policy modifications would have a significant positive effect on the ability to raise development finance for clean energy. There are over a dozen different federally authorized bond finance mechanisms. Each has their own advantages and disadvantages. Currently, bond financing is suffering from a lack of capacity as the twenty year old rules are outdated and do not match the new clean energy industry definitions and allowances (CDFA made these recommendations in a meeting of the White House Jobs Council in mid-March, 2012): [31]

Modernize Industrial Bonds to Cover Clean Energy

Industrial Development Bonds (IDBs) are the primary public financing tool for small to medium-sized manufactures but have seen a decline in issuance over the past decade due to outdated definitions of manufacturing, limited project size caps ($10 million per project) and arcane regulations set in place in the 1980s. With simple changes to the IRC allowing IDBs to be more flexible and with higher caps, the manufacturing sector could quickly develop and build thousands of onsite renewable energy facilities The demand for this type of financing would likely increase three fold given some modest IRS changes.

QECB Clarification from IRS

Qualified Energy Conservation Bonds may be issued by state, local, and tribal governments to finance clean energy projects. ARRA allocated $3.2 billion for these bonds, but they have been dramatically underutilized, with $2.7 billion in bonding authority remaining because the legislation was unclear. This problem that can be solved if the IRS issues temporary regulations or a Revenue Procedure to allow issuers to raise private capital via the purchase of these bonds by mutual funds and other investors to fund clean energy projects.

Create New Renewable Energy Facilities Qualifying Purpose for Private Activity Bonds

There could significantly more use of tax exempt Private Activity Bonds (PABs) for renewable energy project finance if the regulations were expanded to allow for new "renewable energy facilities" of PABs. Right now, even lower cost, tax exempt financing cannot be used to finance Morris Model type projects (as successful as they could be using taxable bonds) because of the private ownership of the projects. The National Association of State Treasurers has supported legislation to "amend the Internal Revenue Service Code to add additional categories of tax-exempt private activity bonds for renewable energy, energy efficiency, demand-side management, energy storage, electric transmission, smart grid, water conservation, zero emission vehicle projects and manufacturing facilities."[32] Advocacy to make this change happen could bring more private capital to invest in clean energy projects.

Private Equity and Bonds

One question is how to marry private equity with infrastructure finance. The public private partnership (P3) model of finance is slowly emerging in the U.S. This model, that uses public financing mechanisms backed by long-term private management and capital improvement investments, is an efficient and effective method for supporting infrastructure development. This model has been used extensively in Europe for projects like bridges, tunnels and now renewable energy. Despite these early successes, P3 financing continues to struggle for a lack of awareness and critical development of this market in the U.S. In fact, it wasn't until early 2012 that the first formal rating of a P3 project was successfully achieved when S&P rated the construction of a tunnel under the Elizabeth River between Norfolk, VA and Portsmouth. In addition to bond financing in that deal, the private partners agreed to $1.235 billion in financing, $318 million in equity, $495 billion in bank loans, and a $422 million in other loans—a strong marriage of public finance and private equity capital. [33] Renewable energy development would benefit greatly from the advancement of a P3 model and the successful development of a secondary market for P3 transactions. This model would also bring an estimated $2 billion in private investment

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through pension funds and large investment firms lacking secure, long-term infrastructure investment options. To assist in this effort, the federal government should set up a working federal guarantee program for public-private partnership (P3) financing projects that assist with the early stage financing structure.

State Energy Policy Collaboration

States like NJ and NY make sophisticated use of their development capital to finance clean energy supply chains, manufacturing and other forms of industry support. There are excellent models for other states to follow; in other cases such as offshore wind development or energy efficiency, more coordinated, state by state collaboration on these issues could greatly accelerated industry growth.

New Federal/State Energy Finance Model

There is also a federal program model in development finance that should be considered for use in clean energy. In 2010, Congress initiative a program called the State Small Business Credit Initiative (SSBCI) aimed at distributing federal funds through a state to local delivery method.[34] The SSCBCI program allocated $1.5 billion to the states with each state receiving a minimum of $13 million for establishing programs that provide access to capital for small to medium sized businesses. The program is designed to leverage at least 10 times that amount, an expected $15 billion in small business support, including from the private sector.[35]

If created, a State Clean Energy Capital Access Program could allow states to build their own clean energy financing models to support this type of development. It would be a much simpler, state driven program that would not depend on a top down, program run by the federal government, but recognize the states' leadership in economic and community development finance. Programs could include loan guarantees, bond fund credit enhancement, bond insurance, loan funds, collateral support programs and venture capital.

Note: These are only preliminary observations. More work needs to be done to confirm, expand and then improve upon these ideas; this can be done through real world partnerships and through further research and demonstration as proposed in the action plan at the end of this paper.

Connecting Bond Finance to Clean Energy Capital

We have a unique financing situation for clean energy. The federal funding cliff for clean energy is dire, and there is no alternative but to look to the states, regions, and local communities as public investment partners for the future.

At the state level, we have a new group of financial players who know how to raise hundreds of billions of dollars for infrastructure investment. They have begun to make small moves into the clean energy space, with a handful of investments. They are interested in becoming major players. Few know of their interest. And no one has partnered with them on a serious level to create new ways to scale up the work that they do now on clean energy.

We have an opportunity to change the clean energy financial picture, to begin to fill the funding gap with new sources of private and public capital through bond offerings.

An action plan to create a partnership between existing state and federal clean energy policy makers and the development finance entities could begin to address the following *strategic questions*:

- If the country is to take advantage of the economic benefits of clean energy in this global economy, how will clean energy be financed in a period of federal paralysis?

- How can we rapidly implement a more decentralized finance strategy that recognizes the key role of states and the value proposition of a state/federal/private investor partnership to deploy such a strategy?

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- How can such a strategy be implemented most effectively through outreach, assistance, partnerships, pilot projects, a network, and "SWAT" teams across the states?

Some *tactical questions* underlying this effort are:

- What would it take to move this financial sector into clean energy under current law?
- How much could these new tools and players contribute to the financial cliff?
- How could these tools be used for energy efficiency, renewables and manufacturing support?
- What could existing state funders do to partner with bonding authorities; could they underwrite risks through credit enhancements and other means, to encourage bond financiers to move into clean energy?
- What kind of other partnerships are needed to work with these players?
- What other nonprofit efforts are relevant to this challenge?
- What is the role of private tax equity investors such as corporations (Google, Buffett and others)?
- What state and federal policy changes are needed to expand the source of bond capital?
- What new federal and state institutions could be established to accelerate progress?
- Finally, what sort of non-profit partnership would be most beneficial?

The challenge is to create a series of programs, partnerships and policy strategies to create a new class of clean energy finance, using traditional bond mechanisms for this new industry.

The Principles + Action Plan

The partnership has defined a set of principles and an action plan to guide its operations.

CE + BFI Operating Principles

- Explore clean energy finance from a perspective focused on capital markets and bond issuance.
- Establish mutually useful working relationships between energy fund managers and development finance professionals at the state and local government levels throughout the country.
- Identify and mitigate barriers to capital markets.
- Establish public-private partnership (P3) models that finance clean energy.
- Provide educational and technical resources serving both energy and finance industry needs.
- Create a forum supporting practitioners seeking to increase clean energy development through established capital markets models

CE + BFI Action Plan

- Identify opportunities and barriers facing private and public participants to accessing 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, including renewable, energy efficiency, and supply chain manufacturing.
- Explore and demonstrate the role of state clean energy funds and other entities in providing credit enhancement for bond issuances.
- Evaluate institutional investors' requirements that need to be met to facilitate the purchase of clean energy and energy efficiency bonds, as well as the benefits and disadvantages of various public and private ownership models in accessing capital markets for clean energy projects.

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- Analyze federal and state finance and policy initiatives that would increase capital to the sector, considering which are most viable in terms of political feasibility, financial efficacy, applicability to different technologies, and opportunity for collaborative federal and state partnerships
- Create and support pilot partnerships that finance projects in multiple sectors in 6-8 states.
- Increase bond financing for clean energy and efficiency by an additional $5 billion to $20 billion in private capital over the next five years.

CE+BFI Bottom Line

A unique financing situation for clean energy, including declining federal support, is encouraging the industry to seek reliable and scalable sources of financing. Development finance agencies are capital markets participants who know how to raise hundreds of billions of dollars for infrastructure investment, and are now interested in making significant investments in clean energy using bond finance instruments to close the funding gap.

- The partners engaged in the CE+BFI, with the support of CEG and CDFA, are eager to make a significant contribution to this extremely important national issue of clean energy finance.

Conclusion

It is rare for an entire class of new investors to appear, somewhat unexpectedly, and offer to help solve a pressing social problem. But that is the case with development finance entities and clean energy.

The current and future pressures on the federal budget now create both a crisis and an opportunity. It is time to explore a more decentralized, and potentially more durable, model to finance clean energy outside of Washington, one that has enjoyed enormous success, bipartisan support and strong institutional loyalty at the state, regional and local levels. It will not solve all the funding problems but it could go a long way to solve some or many of them.

The premise of this paper is not that alternative funding is needed for permanent, long-term subsidies for clean energy. As these technologies become cost competitive, it is fair that their subsidies decline, and could be phased out, as long as fossil fuel subsidies that are a century old also are ended, to create a fair playing field. But until then, support will be needed to scale up this industry for some time to come.

In any case, the opportunity is to create new partnerships with these development finance players and state clean energy players and private policy makers and the federal government—to create mutually beneficial financial instruments.

If we are successful, a greater reliance on existing institutions like public bonding authorities will pave a new way to finance clean energy.

This is the infrastructure challenge for the new economy.

The time to meet that challenge is now.

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APPENDIX. Case Studies: Clean Energy Development Finance

Case Study #1

The Morris Model for Solar Bond Financing: Ready for Scale[36]

Historically, state and local governmental agencies have employed one of two models to deploy solar photovoltaic (PV) projects: (1) self-ownership (financed through a variety of means), or (2) third-party ownership through a power purchase agreement (PPA). Morris County, New Jersey, recently pioneered a new way using public bond financing.

Under this "Morris Model" the Morris County Improvement Authority (Authority) contributed low-cost project capital through a debt issuance. Under this model, the authority issued a government bond at a low interest rate and transferred that low-cost capital to a developer in exchange for a lower power purchase price to install solar on public buildings.

Under the arrangement, the authority issued a request for proposals (RFP) seeking a solar developer to build, operate, and own a solar project or portfolio of projects on public buildings (local hosts). The administrator then sold bonds to finance the development costs of the PV installation, and it entered into both a lease-purchase agreement with the winning bidder and a power purchase agreement or PPA (on behalf of the local hosts) to buy the electricity from the PV system. The total for one project was about $22 million in bonds.

The private developer owns the system, not the government. In fact, the arrangement between the administrator and developer is structured as a capital lease, not a loan. For the purposes of state law, the authority is considered the project owner/ lessor, and the developer is the lessee. However, the terms of the lease-purchase agreement are such that all of the benefits and burdens of ownership are transferred to the developer.

The result is that the public entities saved up to 60% off their utility rates. In some cases, schools are paying 4 to 7 cents a kWh as compared to utility rates of 14 cents/kWh. These depend on incentives, which if not present, would affect ultimate terms.

Because the private developer is the owner, federal law requires here that the bonds issued for private use must be taxable because here the private develop owned the project. Although the bonds were taxable investments, the good credit rating of the administrator made its borrowing rate less than that of the solar developer, thus saving money.

The bottom line: Solar costs are reduced by low cost public debt issued through bonds.

These projects can be replicated, and have been.

As of September, 2011, five deals that have been completed in New Jersey, resulting in almost $45 million in cost savings.[37] In January, 2012, Morris County issued another round of $33.1 in green bonds to finance more projects, with Wells Fargo as its underwriter.[38] But many more could be done, according to the attorney who structured the deal if there are: government entities with strong credit ratings; conduit issuers of debt like authorities willing to do the deals; supportive state energy law; a streamlined process for bond issuing; provisions for multi-year contracting; contracting laws that do not depend solely on price but on multiple factors like benefits.[39]

Bond financing could be a significant source of new capital to greatly scale up solar and other clean energy installations across the country. This handful of projects could ramp up in the thousands, if not millions, if the right strategies were put in place to scale up bond financing strategies.

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Case Study #2

Chicago Infrastructure Investment in Energy Efficiency

On March 1, 2012, Chicago Mayor Rahm Emanuel announced the formation of the Chicago Infrastructure Trust, an innovative way to finance public improvement through tax and taxable debt issued through a new municipal infrastructure authority. Energy efficiency work, through a new program called Retrofit Chicago, will be the first series of investments made by the Trust, pending approval by the City Council. By aggregating energy efficiency projects across the City and its sister agencies and tapping into private investment, the Trust will accelerate retrofit projects that would otherwise not have been possible. (This local work is an alternative to the federal infrastructure bank proposal, and is endorsed by former President Clinton.)

As the first project of the Trust, the City will work with debt and equity investors to finance $200-$225 million in an effort to reduce energy consumption of participating City assets by 20 percent. The City currently spends $170 million annually on energy consumption. This project will reduce energy costs by more than $20 million annually, create nearly 2,000 construction jobs, and remove CO2 emissions—the equivalent of taking more than 30,000 cars off the road.

The Chicago Infrastructure Trust will provide advantaged financing, enabling each project to customize a financing structure using taxable or tax-exempt debt, equity investments and other forms of support. Each project will be coordinated with the City and its sister agencies' long-term plan for transformational infrastructure investments. Five financing organizations–Citibank, N.A., Citi Infrastructure Investors, Macquarie Infrastructure and Real Assets Inc., J.P. Morgan Asset Management Infrastructure Investment Group and Ullico–have each agreed to consider the projects that the Trust is undertaking and evaluate them for investment. These investors represent some of the most highly regarded infrastructure investors in the world.

Collectively, they have indicated an initial investment capacity in excess of $1 billion, depending on the specific terms of individual projects. The Trust will leverage private sector resources alongside initial capitalization, bond financings, and grants. Individual projects will repay both the Trust and the private sector investors, depending on how each project is structured.[40]

On March 29, 2012, the Mayor announced a much larger, $ 7 billion infrastructure investment in roads, sewers and other public improvements using similar taxable and tax-exempt mechanisms.[41]

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Case Study #3

Washington Bonds for Energy Efficiency and Renewables in Nonprofit/ Multifamily Housing

The Washington State Housing Finance Commission launched a program to offer tax-exempt bond private placement financing of energy efficiency/ renewable energy projects for nonprofit and multi-family housing borrowers. [42]Marketed in cooperation with a local energy service company, the financing program can support up to $10 million in project loans. The minimum loan size is $250,000, and a 10- to 15-year fixed-rate financing in the range of 4%–5.5% is anticipated, subject to borrower credit review.

State ARRA funds of $1 million have been allotted for credit enhancement and program implementation support. The Commission has arranged for a single bond purchaser to approve the credit of borrowers case by case, and streamlined bond documentation has been developed to manage transaction costs. These programs came about because the state legislature in 2010 encouraged state-chartered bond authorities to finance energy efficiency projects, authorizing them to accept and administer portions of the state's federal energy efficiency funding for designing energy efficiency finance loan products and for developing and operating efficiency financing programs. As a result, the Washington State Housing Finance Commission may issue bonds for the purposes of financing loans for energy efficiency and renewable energy improvement projects for low-income and other recipients.

Since 1983, the commission has issued over $8 billion in bonds issued bringing investment dollars and work to Washington State. The commission is a self-funding state entity that works with the lending community to bring below-market financing to the state.

Its energy efficiency program, funded through bond financing, the project offers:

- Zero Upfront Capital Costs. Upfront capital costs of the energy efficiency improvements are amortized and repaid through the energy savings. Typical finance periods are between 5 to 7 years with 10+ year options available (depending on qualifications), if the life expectancy of improvements is in excess of the loan term.

- Energy Savings Equal Positive Cash Flow. The energy savings realized from the improvements will fully repay the debt of the energy efficiency improvements and potentially provide positive cash flow to the organization based on the energy savings.

- Lower Operating Costs. The energy savings realized from the improvements will lower long term operating costs for your facility. [43]

The Commission program is another example of the creative use of state bonding authority to leverage scarce federal and state resources.

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Case Study #4

Bond Financing for Clean Energy Economic Development in New Jersey

The New Jersey Economic Development Authority is the state's leading bonding and economic development entity. [44]It can help companies by providing access to capital, including tax-exempt and taxable bond financing, loans, loan guarantees, and business and tax incentives. It also manages the Edison Innovation Fund. The Fund, among other things, authorizes investment from bond revenue to support clean energy companies and manufacturing facilities in the state.

As the state describes the effort, the Edison Innovation Fund seeks to develop, sustain, and grow technology and life sciences businesses that will lead to well-paying job opportunities for New Jersey residents. Financing is provided[45] for several programs.

Edison Innovation Green Growth Fund

Technology companies with Class I renewable energy or energy efficiency products or systems that have achieved "proof of concept" and successful independent beta results may be eligible for subordinated convertible debt financing up to $1 million to advance technologies in becoming competitive with traditional sources of electric generation. There is a 1:1 match funding requirement that must be received by time of loan closing.

Edison Innovation Angel Growth Fund

Angel supported technology companies with minimum trailing 12 month commercial revenues of $500,000 may be eligible for up to $250,000 in subordinated convertible debt financing. Growth capital through the Edison Innovation Angel Growth Fund can be used for key hires, product rollout, product enhancement, and marketing/sales. There is a 2:1 angel match funding requirement that must be received within 90 days prior to application.

Edison Innovation VC Growth Fund

Venture capital (VC) supported technology companies with minimum trailing 12 month commercial revenues of $500,000 may be eligible for up to $500,000 in subordinated convertible debt financing. Growth capital through the Edison Innovation VC Growth Fund can be used for key hires, product rollout, product enhancement, and marketing/sales. There is a 1:1 VC match funding requirement that must be received within 90 days prior to application.

Edison Innovation Growth Stars Fund

Angel and/or VC supported technology companies with minimum trailing 12 month commercial revenues of $2,000,000 may be eligible for up to $500,000 in subordinated convertible debt financing. Growth capital through the Edison Innovation Growth Stars Fund can be use for key hires, product rollout, product enhancement, and marketing/sales. There is a 1:1 match funding requirement that must be received within 90 days prior to application.

Edison Innovation Clean Energy Manufacturing Fund

Two separate program components offer up to $3.3 million as a grant and loan for New Jersey manufacturers of Class I renewable energy and energy efficiency technologies. Up to $300,000 is available as a grant to assist with the manufacturing site identification and procurement, design, and permits. Up to $3 million is available as a loan to support site improvements, equipment purchases, and facility construction and completion. One-third of the loan may convert to a performance grant if certain business and technology-based milestones are met.

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Case Study #5

Illinois Finance Authority Using Moral Obligation Bonds for Wind Project

The Illinois Finance Authority has authority to provide up to $3 billion in “Additional Security” (moral obligation) loan guarantees or bonds to help facilitate the development of renewable and other energy projects in Illinois. The IFA has rules that allow the use of bonds to underwrite wind projects that are required by the state’s renewable portfolio law. [46]

This project finance can contain long-term tenors to fully repay the project debt, thereby eliminating the risk of refinancing. The loan guarantees will be secured by the state's moral obligation. While moral obligation is not a full faith and credit guarantee, it is a model that has been used extensively in the municipal finance markets, and it's used often in Illinois. As of September 2009, the State has outstanding debt (unrelated to this renewable energy finance initiative) of over $100 million using this model. Eight state agencies have the ability to issue moral obligation-supported debt totaling around $1.5 billion for local governments and economic development purposes.

Under the first of three IFA funding models, a developer can work with its traditional project finance lenders and add the IFA as a partner, providing a "loan guarantee" to private sector lenders. The private sector lender would also have the support of Illinois' moral obligation pledge.

In a second financing model, the IFA would issue bonds secured by both project revenues and the state's moral obligation support. The IFA would then loan the bond proceeds to the project developer to pay for project construction. Again, the first repayment source for the debt service on the bonds is project revenues. Illinois will be called upon by the Bond Trustee to fund any debt service deficiency on a moral obligation basis. In this instance, the tenor of the bonds could be set to correspond to a final term that will be near the PPA maturity, fully amortizing the project debt. The bond investors will assume the project risk. However, investors will also benefit from the security of the guarantee of the State of Illinois on a moral obligation basis. This additional security will reduce the project's interest rate.

These two models can be combined with the private sector providing a loan for a shorter-term piece and bonds issued for a longer-term piece of the debt financing. For example, the IFA can provide a loan guarantee to private sector lenders on their shorter-term financing (also known as "Series A") and the IFA can be the lender, on a pari-passu basis (in other words, without partiality) for a "Series B" financing that will represent the debt's longer-term portion. The combination of the proceeds from the Series A and Series B financings will provide the total debt funding for the project, thereby reducing total debt service costs and eliminating the re-finance risk of traditional private sector funding. [47]

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Case Study #6

Ohio Third Frontier Bond Program Invests in New Energy Technologies

The Ohio Third Frontier program invests in technology research, development, commercialization and entrepreneurship in five industries. It is funded by a series of multi-billion dollar bond initiatives that have been approved by voters over the last decade. It is managed by the state's economic development agency.

By one independent analysis, the project created an economic impact of $6.6 billion, 41,300 jobs and a return on the state's investment of 10-to-1 in its first seven years. A recent analysis led by business people who sit on the Third Frontier's commission and advisory board concluded the project likely would pay back taxpayers by 2014 — with just sales and payroll taxes generated by businesses and industries it helped. [48]

The programs work to accelerate the development and growth of some of the state's most promising green technologies. The grants benefit both the industry and its supply chain by providing direct financial support to organizations seeking to investtigate near-term specific commercial objectives; commercialize new products; commercialize manufacturing processes/ technologies, or adapt or modify existing components that can reduce the cost and improve the efficiency of fuel cell systems and other advanced energy technologies; address technical and commercialization barriers; or demonstrate market readiness.

Ohio's Third Frontier Program has already invested over $100 million in advanced energy technology research and development since 2002, and is projected to provide $24 million in additional grants to advanced energy projects in the coming years. [49]

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Author Bios

Lewis Milford

Lewis Milford is President and founder of Clean Energy Group and the Clean Energy States Alliance, two nonprofit organizations that work with state, federal and international organizations to promote clean energy technology, policy, finance and innovation. Mr. Milford is also a non-resident Senior Fellow at the Brookings Institution. He also works with many public agencies and private investors in the United States and Europe that finance clean energy. Mr. Milford is frequently asked to appear as an expert panelist at energy conferences throughout the United States and Europe. His articles on clean energy have appeared in the *New York Times*, *Boston Globe*, *Electricity Journal,* and *Solar Today*.

Prior to founding CEG in 1998, Mr. Milford was a vice president of the Conservation Law Foundation, where he conducted litigation and advocacy relating to a variety of energy and environmental issues and testified before numerous legislative and regulatory agencies. Previously, Mr. Milford was a New York Assistant Attorney General representing the State of New York in the Love Canal hazardous waste case, and a law professor and director of the public interest law clinic at American University in Washington, D.C., where he represented Vietnam War veterans, in federal court and before Congress, who were harmed by Agent Orange.

Mr. Milford is the co-author of Wages of War, a social history of American war veterans, published by Simon and Schuster. He has a J.D. from Georgetown University Law Center.

Toby Rittner

Mr. Rittner runs the day-to-day operations of the Council of Development Finance Agencies (CDFA), which includes management of a 32 member Board of Directors, and the organization's various educational, advocacy and research initiatives. Rittner is a frequent speaker at local, state and national conferences and events focused on economic development finance. He has been featured extensively in The Bond Buyer and other national media publications concerning the advancement of development finance tools. He is the author if CDFA's highly acclaimed Practitioner's Guide to Economic Development Finance and is a Certified Economic Development Finance Professional (EDFP) through the National Development Council (NDC). Rittner has also advised state and federal government leaders, including President Obama's Administration Transition Team, on economic development finance policy and focus.

Prior to joining CDFA, Mr. Rittner was the Director of Legislative Affairs and former Director of Training for the International Economic Development Council (IEDC). Mr. Rittner has also worked for the Franklin County, Ohio Board of Commissioners, Community and Economic Development Department as a Senior Program Coordinator for Economic Development and as an Associate Planner for the City of Gahanna, Ohio.

In 2010, Mr. Rittner was appointed to the U.S. Environmental Protection Agency's Environmental Financial Advisory Board. He is a member of the Advisory Board for the National Community Fund I, LLC and is also a member of the Advisory Board for Heritage Ohio. Mr. Rittner holds a Bachelor of Arts in Political Science and a Master's of City and Regional Planning degree from the Ohio State University.

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Robert G. Sanders

With over twenty-five years of experience in community development and energy-related commercial finance, Rob Sanders provides consulting services in the areas of sustainable development, clean energy and community development. Mr. Sanders was formerly the Managing Director of Energy Finance for The Reinvestment Fund, a leading innovator in the financing of neighborhood and economic revitalization with $700 million dollars under management from 800 investors. In this capacity, he served as Fund Manager for the Sustainable Development Fund, a $32 million fund created by the Pennsylvania PUC to promote renewable energy and energy efficiency, as well as TRF Fund Manager for the Pennsylvania Green Energy Loan Fund and the Philadelphia metropolitan area EnergyWorks Loan Fund – representing $80 million of new public and private resources for building-related clean energy projects. As lead for all energy investing, Mr. Sanders made loans, leases, equity investments and performance-based grant incentives and positioned TRF as a leader in energy finance among community development financial institutions (CDFIs).

He served two terms on the Board of the Pennsylvania Energy Development Authority and was a director and officer of the Clean Energy States Alliance, a national organization comprised of members from 19 publicly-funded clean energy funds and state agencies. He represented U.S. clean energy fund managers and presented at meetings of the UN Sustainable Energy Finance Initiative in Bonn, Amsterdam and Paris.

Mr. Sanders has provided testimony at a U.S. Congressional briefing on the respective roles that federal and state funding should play to accelerate clean energy market development. He holds an MCP from the University of California at Berkeley and a BA from Stanford University.

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Endnotes

[1] Note that the CE+BFI Task Force has not endorsed this paper or its recommendations, as it was just recently established; the paper, at this time, reflects the opinions of CEG and CDFA.
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[39] https://financere.nrel.gov/finance/content/solar-ppa-v20-hybrid-morris-model-saves-public-facilities-money

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[40] This information is paraphrased from information in a press release from the Mayor's office. See http://www.cityofchicago.org/city/en/depts/mayor/press_room/press_releases/2012/march_2012/mayor_emanuel_announceschicagoinfrastructuretrusttoinvestintrans.html

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