

Pennsylvania Energy Investment Partnership Report

Prepared by the Coalition for Green Capital

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Prepared for The Nature Conservancy



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About the Coalition for Green Capital

The Coalition for Green Capital (CGC), a 501(c)(3) nonprofit, is the nation's leading, advocate, expert and consultant on the topic of Green Banks, dedicated finance entities that use public-purpose dollars to drive greater private investment in clean energy deployment. CGC works directly with state governments and other partners to identify ways for public capital to stimulate private investment in mature clean energy technologies and accelerate the growth of clean energy markets. CGC often works with government to help create the institution, assessing various legal options to institutional creation and financial options for green bank capitalization. CGC also works with states to implement innovative clean energy finance and market development mechanisms through existing public institutions.

About The Nature Conservancy

Founded in 1951, The Nature Conservancy is a nonprofit, science-based organization that has grown from a pioneering U.S. land trust to a global organization whose work to conserve lands and waters for nature and people reaches all 50 states and 72 countries around the world. The Conservancy and its nearly one million members have protected more than 119 million acres of land and 5,000 miles of river around the world. In support of its mission in Pennsylvania and across the world, the Conservancy advances market-based strategies to promote the sustainable and efficient use of energy and the deployment of appropriately-sited clean energy resources.

About this Report

The Nature Conservancy has partnered with the Coalition for Green Capital to explore the potential need for greater clean energy finance capacity in Pennsylvania. The first part of this project was a comprehensive report on the state's clean energy program and policy landscape and the market potential for various clean energy technologies, paying particular attention to the role of financing programs. This second report provides specific recommendations for financing structures, institutions, products, and activities in Pennsylvania that could help fill market gaps and spur more clean energy deployment.



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Executive Summary

There is tremendous clean energy market potential in Pennsylvania, yet much of it is untapped.ⁱ There are approximately \$7 billion to \$9 billion in economically viable distributed clean energy projects in Pennsylvania. If a greater portion of these projects are implemented, collateral benefits to Pennsylvania's economy can also be achieved, such as adding to the state's 72,417 existing jobs in the clean energy generation, energy efficiency, storage, and microgrid fields.¹ At present, however, there is currently very little consumer or private investment participation in these projects.ⁱⁱ The formation of an Energy Investment Partnership (EIP) is a potentially effective means of accessing this distributed clean energy market potential and encouraging private investment. An EIP could offer various clean energy financing products and market development activities that would help eliminate barriers to clean energy market growth. An EIP could make affordable financing available at terms tailored to the clean energy technologies being financed. And, in addition to sourcing and deploying its own lending capital, an EIP could leverage private investment in clean energy. Beyond financing, an EIP could help eliminate information gaps and transaction costs that are currently hampering market growth.

An EIP would provide a platform for a more focused, market-oriented approach to clean energy investment in Pennsylvania. An EIP in Pennsylvania could take many forms and engage multiple partners with a goal of improving market conditions. Initial products offered by an EIP in Pennsylvania could include both residential and commercial solar financing products that supplement the existing CFA Solar Energy Program. Additional products could be developed after the initial products are launched, including an efficiency financing product for county and municipal governments involving unused Qualified Energy Conservation Bonds (QECBs) and a small commercial efficiency financing product. The EIP could also create a website that serves as a central clearinghouse for all clean energy information and resources in the state, and future market development efforts could also include the statewide administration of a Property-Assessed Clean Energy (PACE) program.

The following report outlines some of the key market gaps in Pennsylvania, the core concept and model behind the EIP, as well as case studies of EIPs in other states, and finally a list of recommendations for establishing an EIP in Pennsylvania.

ⁱ For the entirety of this report, *footnotes* are denoted in roman numerals and are used for providing additional information, and *endnotes* are denoted in European digits and are used for citations.

ⁱⁱ The term "clean energy" is used in this report to refer to any zero-carbon or low-carbon renewable energy generation technology, energy-saving or energy efficiency technology, and fuel-switching activities. The term "clean energy" is distinct from the term "alternative energy," which is frequently used in Pennsylvania and includes several fossil-fuel based technologies. Clean energy explicitly excludes all fossil fuels except for the purposes of fuel switching from fuel oil to natural gas heating.



Pennsylvania Clean Energy Market Financing Gaps and Needs

This study follows the *Pennsylvania Clean Energy Market Report* that was published on February 28th, 2017. In preparing that report, extensive program and policy research was undertaken, as well as numerous conversations with market stakeholders to identify any financing gaps and needs in Pennsylvania's clean energy market. Interviews were conducted with project developers, contractors, program managers, investors, policymakers, NGOs, and regulators. The analysis focused on understanding the current energy landscape, and the process for identifying, financing and developing clean energy projects. Discussions also centered on identifying gaps, opportunities and underserved market segments. As identified in the *Pennsylvania Clean Energy Market Report*, the economically viable market potential for clean energy projects in Pennsylvania is large, and market penetration is well below its potential.ⁱⁱⁱ

Table 1: Clean Energy Investment Potentials by Technology: High Priority for EIP

Technologies	Savings, Capacity & Project Potentials	Investment Potential (\$M)
Solar (Distributed)	970 MW	\$2,910
Efficiency (Electric)	6,748 - 61,000 GWh	\$889 - \$2,233
Efficiency (Thermal)	218,800 BBTU	\$577
Fuel Switching	429,930 households	\$2,107
Micro Hydro	200 MW	\$528
Bioenergy Electric Generation	80 - 348 projects	\$16 - \$1,000
TOTAL	-	\$7,027 - \$9,355

Table 2: Clean Energy Investment Potentials by Technology: Low Priority for EIP

Technologies	Savings, Capacity & Project Potentials	Investment Potential (\$M)
Solar (Utility-Scale)	6,261 MW	\$9,078
Wind (80m) ^{iv}	69 – 1,100 MW	\$117 - \$1,876
TOTAL	-	\$9,195 - \$10,954

ⁱⁱⁱ This study is not exhaustive—there may be additional clean energy technologies that have attractive and untapped market potential.

^{iv} As stated in the *Pennsylvania Clean Energy Market Report*, economically viable wind potential estimates for turbines at 110m were excluded from the study because the estimates were so large (more than \$70 billion) that they dwarfed all other investment potential estimates.

Of particular interest are distributed clean energy projects such as distributed solar projects and building efficiency, as they are more heterogeneous and rely on mostly local deployment. Stakeholder interviews focused on these markets in particular, in an effort to understand why investment levels are below their potential, and what market gaps and failures might be preventing growth. Discussions focused on real and perceived market risks, investment priorities for homes and businesses, and the existing landscape for Pennsylvanians looking to save money from clean energy upgrades. Questions focused on market segments and solutions that give more energy choice, cleaner options, and lower costs for consumers. Through the interview process, Pennsylvania stakeholders identified several key market segments that are underdeveloped and have difficulty implementing clean energy projects. These markets include:

- Residential Solar
- Commercial and Industrial Solar
- Residential Whole-Home Energy Efficiency
- Small-to-Medium-Sized Commercial and Industrial Energy Efficiency Retrofits
- Residential and Commercial Micro Hydroelectric and Geothermal Heating
- Low-to-Moderate Income Residential Solar and Efficiency

Beyond these specific market segments, other aspects of the broader clean energy market in Pennsylvania that limit market development include information gaps, market complexity, and the lack of turnkey product design.

Stakeholders also identified several markets that can presently access clean energy financing more readily: residential solar in urban areas for homeowners with high credit scores (through the national solar installers); utility-scale wind (through large project developers and large capital providers); and efficiency in large, credit-rated commercial buildings (through energy services companies and the PennSEF program).^v The sections below are based on interviews with Pennsylvania market participants and stakeholders.

Residential Solar

As was shown by basic modeling of the levelized cost of electricity from solar provided in the *Pennsylvania Clean Energy Market Report*, solar is economically viable for many homeowners in Pennsylvania, yet there are low levels of market participation.

The only solar-focused financing products for homeowners in Pennsylvania are offered by national installers such as SolarCity. The national installers are active in Philadelphia, Pittsburgh, and central Pennsylvania, and offer financing in the form of a lease or loan to homeowners in these areas. Local and regional installers mainly serve wealthier segments of the market that can afford to pay for solar systems in cash, or have access to their own financing. Such homeowners are a relatively small portion of homeowners in Pennsylvania. Many of the local and regional installers cannot compete with the national

^v Until very recently, financing for residential efficiency for homeowners with high credit scores and low debt-to-income ratios was available through the state's KeystoneHELP program, but the KeystoneHELP program is now on hiatus.

installers because they lack access to third party financing that would allow homeowners to avoid upfront costs and enjoy cash flow positive solar projects. If they had such financing, not only could they compete with the national installers in Philadelphia and Pittsburgh for the segment of the market that is financeable but cannot afford paying for solar in cash, they could also serve those segments of the market outside of the Philadelphia and Pittsburgh areas, to the extent the local and regional installers are active outside those urban areas.²

Several of the market participants interviewed for this report indicated a strong desire among contractors for a third party financing solution for residential solar systems. The presence of the national installers in Pennsylvania has spawned considerable consumer interest in residential solar. Contractors report being called by homeowners that have spoken to a national installer and wish to get a competing quote from a local installer. Many contractors wish to capitalize on that interest, but need third party financing options to do so.³ Providing products customized to respond to consumer demand in Pennsylvania's residential market is one path to stimulating market activity and further unlocking job creation potential.

It should be noted that there are several factors in Pennsylvania that constrain the growth of residential solar. Getting interconnection applications approved in southeast Pennsylvania is difficult—the electricity distribution company (EDC) in that region, PECO, has limited the number of interconnection applications it has approved due to the increased volume of national installer activity and resulting line voltage and congestion issues. Another factor constraining the growth of distributed solar (both residential and commercial) is the fact that many competitive electric generation suppliers (EGSs) do not offer net energy metering, so customers that select competitive suppliers may also be limiting their ability to adopt solar energy on their building.^{4vi} Finally, the Solar Renewable Energy Credits (SRECs) generated by solar projects under the Alternative Energy Portfolio Standard (AEPS) do not currently provide any meaningful value for distributed solar projects in Pennsylvania because the AEPS allows out-of-state projects to be counted toward Pennsylvania's solar goals, and numerous out-of-state projects have registered into the AEPS, creating an oversupply of Solar Renewable Energy Credits (SRECs) and dramatically reducing their market value to the point where they have virtually no positive impact on solar project economics.⁵ Despite these limitations, residential solar models suggest that solar projects in Pennsylvania are viable with financing. New financing solutions for this market would allow local and regional installers to serve a greater portion of the Pennsylvania market and unlock additional solar market growth.

Commercial Solar

Solar projects in the commercial and industrial sectors have two primary financing options. The Commonwealth Financing Authority's Solar Energy Program (SEP) and the regional Sustainable Energy Funds (SEFs) both finance non-residential distributed solar projects. The SEP has \$30 million in lending capacity and is unlikely to receive new funds from the government. The SEP has attractive terms (22 years at approximately 5%), yet it does not finance 100% of project costs—it requires that 25% of project costs be financed with a matching investment.⁶ This creates additional transaction costs for projects, as

^{vi} In Pennsylvania, only electric distribution companies (EDCs) are required to offer net metering. Electricity generation supplies (EGSs) may offer net metering on a voluntary basis, and most EGSs do not offer net metering.



developers must hunt down another capital provider such as a commercial bank, a grant provider, or simply get the property owner to pay for that 25% of project costs in cash. There is also little or no channel marketing of this program, so awareness among building owners and contractors is low. Participation in this program has been very low.

The other main financing option for commercial solar projects in Pennsylvania are the SEFs. The SEFs generally determine their terms on a case-by-case basis. Depending on the project, financing from the SEFs has rates that range from 3.5% to 9% and terms in the 3-10 year range. For commercial solar projects, the short terms offered by SEFs may reduce the prospects of the projects being cash flow positive.

Each of the SEFs has a unique application and underwriting process. Each of the five SEFs has a different lending capacity, which collectively approximates \$30 million,^{vii} yet because they all operate as revolving funds, they must lend this out slowly over time, or negotiate an asset sale with another financial institution, to avoid running out of lending capital. Other limitations include engaging in few marketing activities, either individually or in coordination with other SEFs, and a minimal pipeline of loan applications. The SEFs are each regionally constrained to specific EDC service territories to varying degrees—some have made loans outside their designated service territories, but they mostly operate within their designated territories. Most of the SEFs offer grants as well as loans, which may inspire potential borrowers to avoid loans in favor of seeking a grant.

Though there is loan capital available for commercial solar in Pennsylvania through the SEP and the SEFs, the following constraints attached to that capital create market barriers for potential borrowers: information gaps, market complexity, transaction costs, and lack of focused financing products that match terms to the expected useful life of the technology financed. These barriers—along with the issues related to net metering, SREC prices, and interconnection applications mentioned in the previous section—may explain why there are few loan applications for these programs, and why the number of commercial solar projects financed in Pennsylvania is low despite the economic viability of solar in this sector as demonstrated by the LCOE modeling in the *Pennsylvania Clean Energy Market Report*.

Residential Whole-Home Efficiency

The residential energy efficiency market has huge potential in Pennsylvania, yet market penetration of efficiency technologies in the state has been slow. A wide variety of efficiency technologies, including heating equipment that use cleaner fuel types, are available to help Pennsylvania homeowners to improve home comfort and save money and energy. Yet the financing options for whole-home efficiency, or even efficiency in general, are limited.

Currently, efficiency upgrades tend to happen on a one-off basis, rather than on a whole-home basis. Energy efficiency upgrades are typically “reactive”—that is, homeowners only upgrade to more efficient technology when an old system breaks. When contractors are fixing aging or broken home essentials (e.g. an air conditioning system) this can be the best time to perform a comprehensive home upgrade. For example, a home may be able to replace some windows and add sealant and attic insulation at the same

^{vii} This figure is an estimate based on available resources and stakeholder interviews.

time they replace an aging AC system, therefore allowing the homeowner to buy a smaller and more efficient AC unit. Such a comprehensive whole-home approach can often save homeowners money, but may require a larger upfront investment.

Paying this upfront cost in cash is often a challenge, as homeowners typically have other competing demands for the money, so financing options are needed. Yet financing options are limited for Pennsylvanians that wish to finance a whole-home upgrade, even if that upgrade will save them money over time.

Until recently, KeystoneHELP was the primary option for financing efficiency upgrades, and could finance numerous measures. The KeystoneHELP program is now on hiatus as Renew Financial, the company that ran the program, has pulled out of Pennsylvania to emphasize its core business concentrations in other states. The latest iteration of the KeystoneHELP program did not emphasize a whole-home approach for efficiency upgrades (which may have reduced the average number of measures financed). The Renew Financial contractor network was trained to understand the KeystoneHELP program and use it in their sales process, which drove adoption of home efficiency upgrades. Stakeholders suggested that participation in the KeystoneHELP program was lower than it could have been, and that it served only a fraction of the addressable market.

There is little private activity in this space—a few private banks offer loans for efficiency which are subsidized by equipment manufacturers and the contractors themselves. These loans also tend to be single-measure projects, and also tend to serve the prime borrowers. For low-income Pennsylvanians, the Pennsylvania Housing Finance Authority (PHFA) offers the Homeowners Energy Efficiency Loan Program (HEELP), which provides subsidized financing for homeowners below certain income thresholds.

There are millions of dollars of Act 129 efficiency rebates provided by utilities and their partners. Each utility has a unique set of rebates, and they are only for electric efficiency. Contractors are often unfamiliar with the variety of rebates, incentives, and financing options available and how they can work together. These home efficiency resources are sometimes marketed at the program level, but most have no marketing efforts at all. Homeowners are largely unaware of these home efficiency resources. This results in many homeowners simply replacing broken equipment, often without the benefit of financing or rebates, and not making proactive whole-home upgrades that can help them “right size” their systems and save money over time.

The efficiency financing options in Pennsylvania only serve the top and bottom of the market, and do not incentivize a whole-home approach. Uptake for these efficiency financing options is lower than it could be.

Energy Efficiency in Small-to-Medium-Sized Commercial and Industrial

Small and medium commercial and industrial buildings in Pennsylvania collectively represent a huge opportunity for energy efficiency investment. Though they have much to gain in terms of energy savings, reduced operating costs, and increased comfort, these businesses mostly do not have credit ratings, and are too small to be served in a potential Commercial Property Assessed Clean Energy (C-PACE) program.



These businesses often do not have the internal resources to devote time to pursuing energy efficiency opportunities.

Efficiency projects in small and medium commercial and industrial buildings have a couple financing options. The Department of Environmental Protection's (DEP) Green Energy Loan Fund (GELF) and the regional Sustainable Energy Funds (SEFs) both finance energy efficiency projects in the commercial and industrial sectors.

The SEFs finance non-residential efficiency projects, and have a combined capacity of around \$30 million with rates that range from 3.5% to 9% and terms in the 3-10 year range. While those term lengths may allow single-measure efficiency projects to be cash flow positive for the building owner, they also may preclude a multi-measure whole-building efficiency retrofit from being cash flow positive. However, due to the time commitment that is often required of a business owner to go through a retrofit, projects that don't produce significant near-term savings may be less attractive to pursue. The SEFs generally do not have coordinated and targeted outreach efforts, so small and medium business owners may never learn what efficiency financing options may be available to them. Some of the SEFs also have limited resources to originate and perform diligence on deals, so given the fixed costs they face, they are incentivized to pursue larger deals. The geographical and lending capacity issues described in a previous section may also impact the ability of the SEFs to serve the small and medium businesses that could benefit from efficiency projects.

The GELF has less than \$1 million in lending capacity and is unlikely to receive new funds from the government. The GELF has offered loans for 15 years at 4-5% for building energy projects that reduce energy consumption by 25% or more. GELF loans range in size from approximately \$100,000 to \$2,500,000, and because the capital for GELF loans came from federal sources, loan recipients are subject to various requirements, including the Davis Bacon Act and the National Environmental Policy Act, among others.⁷ The GELF is unlikely to be recapitalized, and its remaining funds are insufficient to be a reliable source of financing for the Pennsylvania market. Furthermore, the extra compliance burdens create additional transaction costs that may reduce the utility of this financing.

Some local private banks may be willing to financing efficiency in small and medium businesses, but without having in-house expertise on energy or underwriting the projected savings, the rates on private financing are likely to be unfavorable for efficiency projects.

Though the small- and medium-sized commercial and industrial sectors are nominally served by some financing programs, without a financing product and outreach efforts tailored to the segment's unique needs, this small-to-medium commercial segment will continue to miss out on the opportunities to invest in the energy efficiency of their properties.

Micro Hydro and Geothermal Heating

Some clean energy technologies, such as micro hydro systems and ground source geothermal heating systems, have a significant market potential in Pennsylvania but limited access to capital. Many capital providers are even less familiar with these technologies than solar and efficiency. Consumers, even more



than capital providers, know little about these distributed technologies and the benefits they could provide.

Distributed clean energy projects deploying technologies such as these can seek financing from the SEFs, which finance a broad array of clean and alternative energy technologies, but face constraints, as outlined above. As most of the SEFs do not actively originate deals or engage in marketing, contractors and property owners often must find and educate themselves about the SEF programs to develop these projects.

The CFA's Renewable Energy Program (REP) offers loans up to \$5 million for 10 years at about 5% for geothermal systems, but the program will only finance 50% of the total project cost. The REP has about \$4 million in remaining capital, but also draws on that same pool of money to give out grants and loans for wind projects.⁸ The REP has made 26 loans totaling \$1.7 million since its inception, much of which has been for geothermal heating systems.⁹

Because geothermal projects can access capital from the SEFs and the REP, and micro hydro systems can access capital from the SEFs, perhaps the most serious challenges are information gaps and learning curves associated with these technologies and financing them. Even if financing is available, if few people understand the benefits of these technologies, demand for financing and deal volume will remain quite low.

Low-to-Moderate Income Residential Solar and Efficiency

Low-to-moderate income (LMI) homeowners are often the market segment with the lowest clean energy penetration. This is undesirable because LMI homeowners use a higher proportion of their disposable income on energy costs, and thus have the most to gain from the potential savings of clean energy.

While low-to-moderate income homeowners in Pennsylvania have some access to efficiency grants and rebates through the Act 129 programs, the Act 129 rebates and grants only cover electricity, and usually do not cover the entire upfront cost of the measures.

Other states (including Connecticut and Florida) have experimented successfully in LMI communities with efficiency and solar loans that use alternative underwriting criteria (such as bill repayment history), innovative financing mechanisms, and net cash flow positive projects.

Information Gaps and Market Complexity

Across nearly all clean energy technologies and market segments there are information gaps and overlapping, difficult-to-navigate program structures that inhibit consumer demand and market growth.

The numerous clean energy programs throughout Pennsylvania often have complicated structures. Most offer grants, loans, and equity investments. Most are run as revolving funds with limited annual lending capacity, little or no marketing or outreach, and few relationships with contractors and other channel partners. Most of the programs passively receive and review applications, rather than being structured and staffed to manage deal volume. Some add additional hurdles such as matching requirements, federal



regulations, technological requirements, income requirements, geographical requirements, and/or a predetermined focus on a specific sector or sectors. The domains of some of these programs overlap, and even some of the programs' acronyms are confusingly similar. Each program has its own unique requirements, application process, fees and pricing, and underwriting process. End users and project developers face a much steeper learning curve and much higher transaction costs than are necessary. The result is a highly complex clean energy financing landscape that is difficult to navigate for market participants.

The market complexity in turn creates numerous information gaps. Without a central repository for all information and resources, information is diffuse and requires time and effort to obtain. Demand for the financing offered by the clean energy programs in Pennsylvania is low in part because the market is unaware of them. The limited marketing that does occur happens at the program level, and with more than a dozen clean energy financing programs in the state, marketing each program individually is unlikely to be effective. A coordinated marketing effort and a central online clearinghouse for all information and resources related to clean energy close information gaps, address market complexity, and increase demand for clean energy financing.

Lack of Turnkey Product Design

A turnkey product maximizes ease-of-use for the end user. In the context of clean energy, a turnkey financing product would be one for which the end user bears almost no burdens or difficulty associated with the research, implementation or financing of the clean energy. A turnkey clean energy financing product might include implementation, financing at terms that fit the expected life time of each technology, insurance, SREC purchase contracts, quality assurance, a built-in cash flow positivity requirement, and savings measurements for the customer—all in a single easily understandable product. That same turnkey product also would be built to be easy for contractors to use. With a turnkey approach, the contractor would be trained and certified as a trusted purveyor of the financing product, have clear forms and easy-to-understand branded collateral, and enjoy an open channel of communication with the lender (i.e. the provider of the turnkey product).

Very few clean energy financing products fit this description in Pennsylvania (such as the products offered by the national solar installers). Most of the clean energy financing available in Pennsylvania is not designed to be turnkey. Much of available financing is not constructed for ease-of-use, and has various constraints that make the financing more difficult for the end user. The low participation and low rates of consumer demand for clean energy financing programs across the state are explained in part by the lack of turnkey product design. Simply making financing available is not enough to connect capital to demand—the overall design of the financing product plays a huge role in enabling demand and connecting capital to end users.



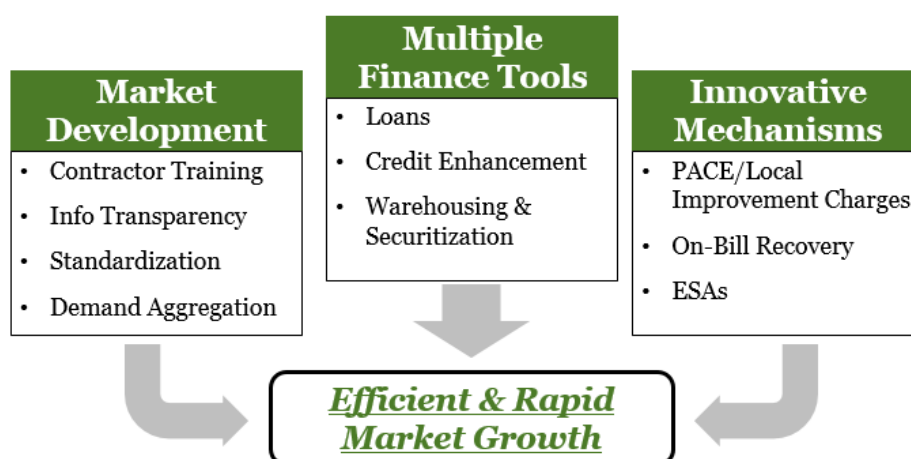
Energy Investment Partnerships

Many of the gaps and needs present in Pennsylvania’s clean energy market exist in one form or another in other states and regions. These challenges have been addressed successfully in other geographies using a structure the DOE refers to as Energy Investment Partnerships (“EIPs”), also commonly referred to as Green Banks or Green Bank-like entities.¹⁰ The following sections outline the core model of EIPs and provide five EIP case studies.

Model

An Energy Investment Partnership is a public, quasi-public, or independent private institution dedicated to financing the deployment of renewable energy, energy efficiency, and other clean energy and green infrastructure projects in partnership with private lenders. EIPs can be capitalized with public funds, philanthropic grants or program-related investments (PRIs), various bond structures, or other forms of private investment which are then used to offer loans, leases, credit enhancements and other financing services for clean energy projects. EIPs also offer a variety of market development services, such as demand aggregation, contractor training, and online clean energy information hubs.

Figure 1: Key Roles for an EIP



The central goal of EIPs is to close gaps in markets for clean energy projects and facilitate financing to increase market penetration using market-oriented approaches. EIPs can leverage private capital; provide financing to underserved market sectors; increase consumer protection, information transparency, and ease of adoption; offer stability and continuity during periods of policy change and fiscal uncertainty; and serve as a flexible and adaptable institution that reacts quickly to the market.

The following sections discuss the potential legal structures, capital sources, financial activities and market development activities of EIPs in greater depth.

Legal Structures

An EIP can be a direct part of government, a quasi-public entity, or it can be completely independent of government. When part of government, EIPs can be created by legislation, regulation, or an administrative act. Independent EIPs can be for-profit or nonprofit corporations, though nonprofits are more common. Nonprofit EIPs are typically 501c3 tax-exempt corporations. An EIP could also be designated a community development finance institution (CDFI).

An EIP can be established under multiple potential structures, each possessing certain advantages and drawbacks. Organizational structure, governance and market orientation, legal powers and potential restrictions that come from implementing certain structures all should be considered. In some cases, a particular organizational structure and associated legal process may be necessary to allow specific EIP funding sources to participate. However, in most cases the nature of the organization's legal structure is distinct from the question of how the EIP would be funded.

No matter the structure chosen, the EIP must be well aligned and coordinated with existing clean energy structures and must have the flexibility to offer financing needed to meet identified gaps in the Pennsylvania market. The exact structure chosen is typically dependent on a few key factors.

Capital Sources

There are many sources of capital and bonding structures that an EIP could draw upon. An EIP should consider any and all of these funding sources, particularly for its initial capitalization. The best source of funds for this capitalization is the one that is most accessible, with the least amount of restrictions placed on the use of the funds. The EIP should, of course, also seek to minimize its cost of funds as much as possible. (A grant, for instance, has no cost because it doesn't have to be repaid. This means it can be used flexibly and lent at low-cost. For example, a loan from a capital provider with a 5% interest rate means that the EIP must on-lend that money to projects at an even higher interest rate, eroding the underlying project's economics. Therefore, lower cost seed funding is most attractive.)

It is also possible, and likely prudent, to try to draw from multiple funding sources. Nearly all existing EIPs are funded from multiple sources or streams of lending capital. An EIP can be funded purely with an upfront capitalization, where that large pool of money is used to cover both operating budget and lending activity. Or an EIP can continuously receive or seek to raise capital to increase the size of its balance sheet. Some potential sources of capital include the following, many of which have been used by existing EIPs in other locations:

- Foundations
 - Foundation grants
 - Foundation program-related investments
- Federal sources
 - Grants or financing from the U.S. Department of Energy
 - Grants or financing from the Treasury's CDFI Fund
 - Capital from EPA via the SWRLF



-
- Grants or financing from the USDA, particularly the Rural Utility Service
 - Private Sources
 - Community Banks
 - Credit Unions
 - Money Center Banks
 - CRA Investors
 - Mission-Driven Organizations^{viii}
 - Impact Investors
 - High Net Worth Individuals
 - Other Financial Institutions
 - Bond Structures
 - QECBs
 - CREBs
 - Private Activity Bonds
 - Nonprofit Conduit Bonds
 - Industrial Revenue Bonds
 - Asset-backed Securities
 - GO Bonds of State/Local government
 - State Sources
 - Ratepayer Dollars
 - Legislative Budget Allocation
 - Investments from State Agency Programs
 - Remaining ARRA Funds
 - Repurpose Existing Funds

Some of these sources are well suited for certain aspects of EIP operation, while some can be used for general purposes. For instance, a foundation grant may be ideal for start-up activity to launch the EIP prior to having a large pool of lending capital. Money that is loaned to the EIP, perhaps from an impact investor, may be most suitable when the EIP has a pipeline of projects or a specific program that needs loan capital. And the bond structures may be best used when the EIP has a pool of self-financed assets on its balance sheet that it is looking to sell into capital markets.

As will be discussed in greater detail in the following sections, existing EIPs have benefited from nearly all of the capital sources in this list. Though some on this list may be difficult to access, many of the potential sources of capital are attractive, viable sources for an EIP in Pennsylvania.

Financial Activities

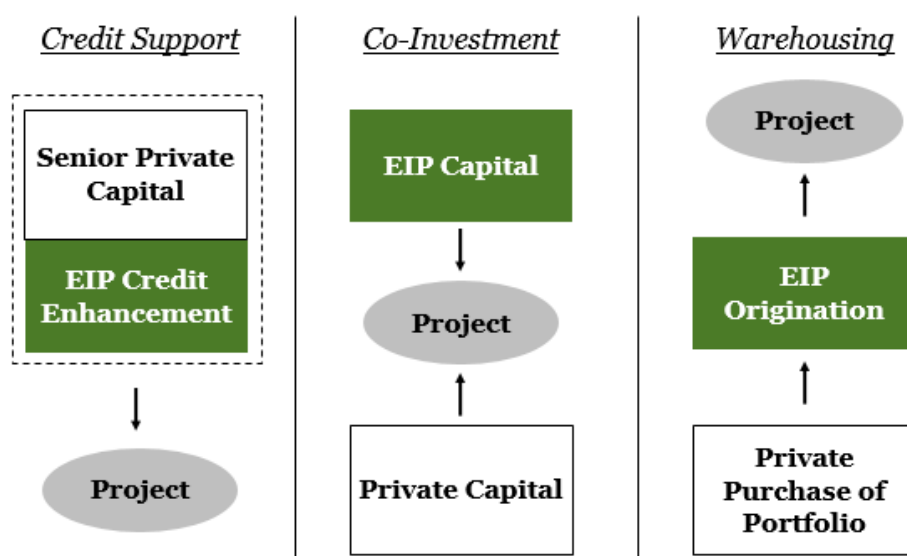
EIPs typically engage in project financing, that is, investing in the deployment of mature, commercially viable technologies—not in early stage tech or in clean energy companies. The goal of an EIP is to

^{viii} Mission-driven organizations may include foundations acting through their endowment side with mission-related investments, not their philanthropic side.

accelerate the deployment of clean energy by removing the barriers to adoption (such as upfront costs or information gaps) and leveraging greater private investment in clean energy. EIPs make it easier for building owners to install clean energy technologies and easier for investors to commit capital to clean energy and earn a return. EIPs can also help states meet their policy objectives related to increasing the amount of renewable energy generated, increasing energy security, and increasing economic activity. And to the extent an EIP uses public dollars for financing, EIPs are an efficient use of public money because financing (as opposed to grants) allows public dollars to be preserved through loan repayment.

Though many individual investment structures are used (such as senior debt, subordinated debt, second loss reserves, etc.), most EIP financing methods can be categorized in three buckets.

Figure 2: Simplified Forms of EIP Investment



- **Credit Support** – EIPs use various credit enhancement mechanisms to mitigate risks for private investors and incentivize investment on better terms. This technique is most useful for encouraging lenders who may be considering making capital available, but only at terms that prevent meaningful market penetration. This can be in the form of a first or second loss reserve, a partial loan guarantee or subordinated debt. An EIP may decide to charge a fee to earn a return for the risk it takes.
- **Co-Investment** – An EIP could direct lend into a project alongside a private sector partner. For instance, an EIP could provide 50% of the necessary project debt, and a private lender could provide the other 50%. By participating, the EIP makes the investment more attractive for the private lender, whose risk exposure is lessened by the diversification of capital supporting the project. The EIP might additionally aid the project by requiring a lower rate of return on its capital, making the blended project cost less. This technique is useful when there is a specific gap in capital needed to complete a project. It might also provide better financial returns for the EIP.

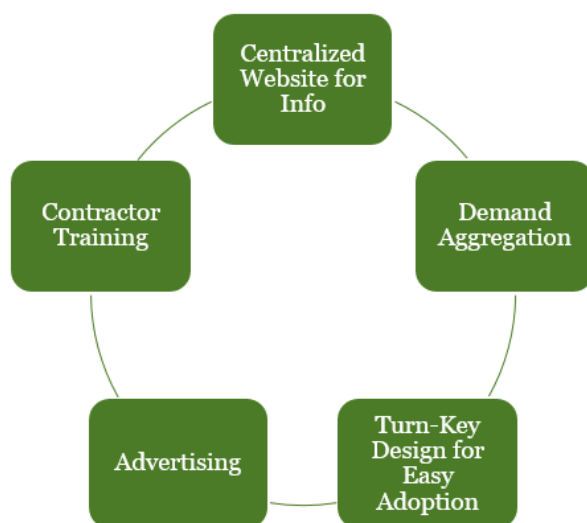
-
- *Aggregation, Warehousing & Securitization* – Aggregation is a critical EIP method of lending to and bundling small clean energy projects that are traditionally difficult to finance. Many clean energy projects, like distributed generation and building efficiency, are inherently small, scattered and have varying credits. This makes them unappealing to underwrite for private lenders. EIPs can directly originate, or aggregate these kinds of loans to achieve scale and diversity of risk. This can lead to securitization, which allows the EIP to recapitalize its warehouse, like the WHEEL program.

Market Development Activities

As many clean energy market participants can attest, the presence of clean energy financing options alone often is not enough to stimulate market activity. For example, even the most well-structured clean energy financing product will go unused if market participants do not know about it. EIPs can also play an important role beyond financing with various market development activities that build market efficiency and generate demand for clean energy solutions. Some EIPs do this activity internally, while others do so in partnership with government agencies and/or private actors.

An EIP is an excellent platform for efforts that help create a market landscape with fewer barriers to growth such as information gaps, latent demand, and unnecessary transaction costs. An EIP can perform many useful roles that improve the functioning of the clean energy market, including: acting as a hub of information and resources related to clean energy throughout the state to increase market transparency and simplicity; creating structures that aggregate demand and reduce customer acquisition costs for project developers and lenders; training contractors how to use available financing options in sales to reach more market segments; coordinating marketing and outreach efforts across programs and products; and engineering features of products (beyond the rate and term) to increase ease of market adoption and facilitate deal flow.

Figure 3: Some Potential EIP Market Development Activities



- *Turn-key product design* – EIPs help deliver clean energy financing solutions that are simple for customers, which eases adoption. This includes everything from the terms of financing, to the application process, to the marketing channels, to the technical review process. In order to spark rapid market growth, clean energy customers must bear a limited burden in the adoption process. Good product and marketing design is essential.
- *Information transparency & simplicity* – For efficient markets to grow, consumers and businesses need access to simple and transparent market information that informs purchase decisions. Information on programs, technologies, pricing, contractor quality and financing must be accessible and easy to find. The more standardized the documents, contracts and information, the easier it is for consumers. EIPs support implementation of this kind of transparency, either directly or in partnership with others.
- *Technical Assistance* – Building owners are often interested in financing clean energy projects, yet they have no way of knowing whether or how an energy improvement would work on their property, and what type of savings could be expected. An EIP can play an important role in the market by partnering with an engineering firm or by having in-house technical expertise to help building owners overcome technical barriers and by vetting the work of contractors.

In many clean energy markets, including Pennsylvania, market participants often note that capital is available for clean energy projects and there is demand for such projects, yet market activity nevertheless remains below expectations. In these markets there are often additional factors that must be addressed beyond the availability of capital and demand for projects. Between its financing activities and its market development activity, an EIP seeks to more effectively connect capital for clean energy projects to the demand for those projects.

Figure 4: Factors an EIP can address to Connect Supply and Demand



Case Studies

The following sections discuss five existing EIPs to demonstrate the breadth of possible roles an EIP can have in improving clean energy markets.

Connecticut Green Bank

Connecticut Green Bank - At a Glance

Structure and Form: Quasi-public entity created by legislation with mixed board of directors

Capital Sources: Utility bill surcharge; Regional Green House Gas Initiative (RGGI) revenue; Foundation PRI; Balance sheet loan from private lender;

Financing Activities: C-PACE loan, lease, Power Purchase Agreements (PPA); Whole-home Energy Efficiency + Solar Loan; Solar Lease for Commercial and Industrial (C&I); Solar Loan for homes, C&I; Pre-development loans for multi-family energy efficiency

Market Development Activities: Contractor training; Central online hub; Demand aggregation; Coordinated outreach and advertising; Turnkey product design

Organization

The Connecticut Green Bank (CGB) was created in 2011 as the first state Green Bank in the U.S., and is one of the most successful EIPs to date. Originally named the Connecticut Clean Energy Finance & Investment Authority, it was created through bi-partisan legislation that was initiated by newly elected Governor Dannel Malloy.^{ix} The new institution was born out of the existing grant-making institution, the Connecticut Clean Energy Fund. The Fund was repurposed and turned into a deployment financing entity. The CGB was created as a quasi-public agency, with a board of directors that are a mix of government officials and independent directors. The government officials include the State Treasurer, the Commissioner of the Department of Energy and Environmental Protection, and the Commissioner of the Department of Economic and Community Development. The board is charged with setting CGB strategy, approving CGB products and initiatives, and approving loans.

The CGB is capitalized primarily by two sources, both of which were identified in the legislation. The first is a systems benefit charge that collects roughly \$20 to \$25 million dollars per year. This was an existing system benefits charge, already in place in the state prior to the creation of the CGB. Previously the entire ratepayer collection went towards state-managed grant programs. The re-allocation of those funds to the CGB represents only a portion of the total collection, with the remaining funds still going toward grants. This re-allocation of funds was driven by a desire to maximize private leverage from public funds and get

^{ix} PA 11-80, the act creating the Connecticut Green Bank, passed the House by a vote of 139-8 and the Senate 36-0.



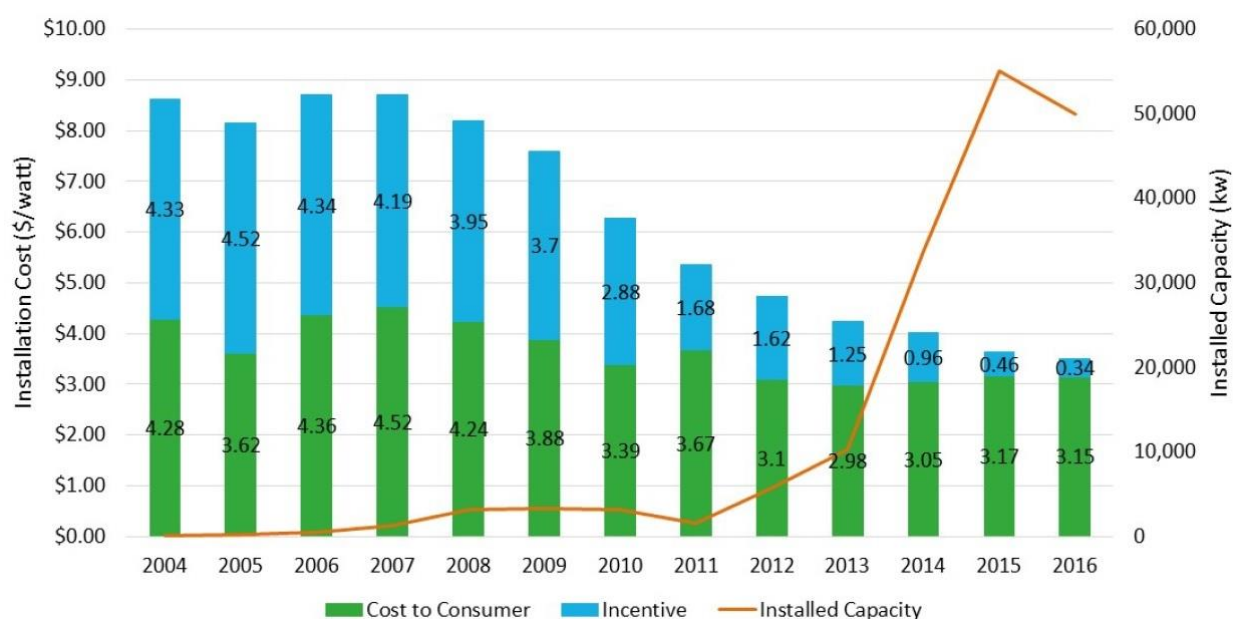
the greatest “bang for the buck” for each public dollar. The second source of CGB funds are the state’s proceeds from the sale of emission allowances through the Regional Greenhouse Gas Initiative (RGGI) Program. In total, the above funds add up to a total annual infusion in the CGB of approximately \$30 million per year.

In addition, the CGB is authorized to issue its bonds based on its own balance sheet. The CGB also has limited ability to issue bonds that are supported by a state bond reserve fund. This is not equivalent to full faith and credit, but does enable borrowing at lower rates based on the state’s credit rating. The CGB has not yet issued bonds of this type to increase its lending capacity.

Activities

By statute, the CGB must manage the wind down of the state’s residential rooftop solar rebate program. Though this grant-making role is distinct from the CGB’s broad financing mission, the ability to manage the ramp down of grant levels and then increase financing under a single coordinated strategy has proven highly effective for market growth. As seen in the chart below, as the CGB lowered grants consistently through multiple steps, the increased availability of financing drove unprecedented market growth.^x

Figure 5: CT Residential Solar Market Installation Costs, Rebates, and Capacity¹¹

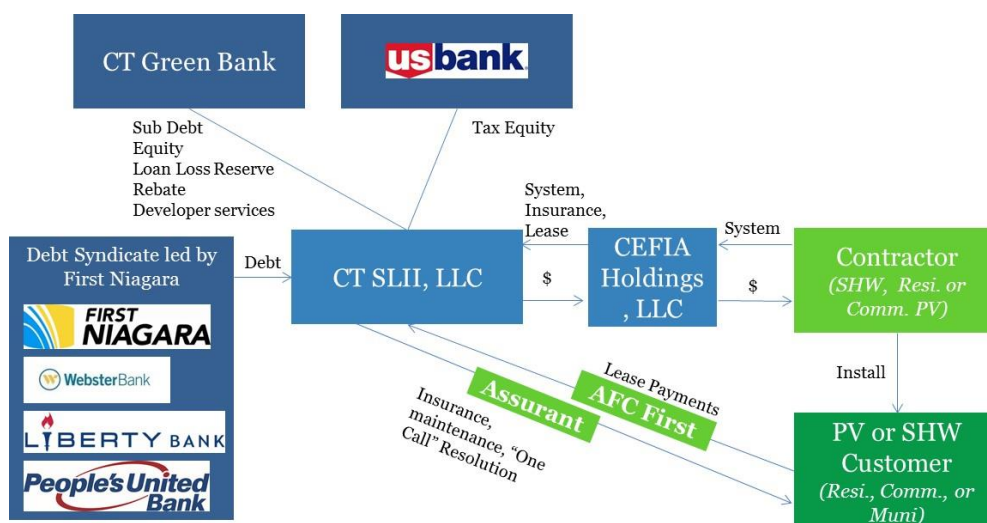


The CGB offered three different financing solutions for the residential market to support solar installation. The first was a unique, state-sponsored solar tax-equity lease fund that could be used by any installer in

^x In fact, the chart shows that the net cost of solar faced by the consumer, after the rebate, has remained fairly constant in CT over the last decade. This is because the decline in the gross cost of installation was absorbed by the state in the form of reduced rebates. Therefore, the spike in market adoption is attributable to new financing tools that allowed consumers to adopt solar without paying the remaining net cost of installation upfront.

the state. CT Solar Lease 2 was a public-private partnership structure that brought \$50 million of lease financing to the market, with a 5-to-1 private:public leverage ratio. This kind of tax-equity fund enables homeowners to put solar on their roof at no money down, and pay a low monthly price by taking advantage of federal tax benefits for solar.^{xi} This financing tool was deployed through local installers, who otherwise would have been unable to offer financing to consumers.

Figure 6: CT Solar Lease 2 Financing Structure¹²



In addition to the Solar Lease, the CGB created the CT Solar Loan product for consumers who wanted to directly own their own solar panels but did not have the cash on hand for the installation. Through this structure, the CGB seeded a loan fund with a \$5 million investment. Sungage, upon proving the market viability and demand for solar loans, was quickly able to raise \$100 million of private capital from Digital Federal Credit Union to replace the CGB capital once it was expended. In only a year and with only \$5 million of public capital invested, the CGB effectively demonstrated the value of solar investment to a private lender, and drew in \$100 million of private capital.

The final residential solar product offered, that can support solar, efficiency or other technologies, is the Smart-E Loan. The CGB provides a standard-offer loan loss reserve to multiple local lenders to support their loans into the residential market. These banks were either offering capital at high rates and short terms, or not making loans into the space at any terms. And those that were willing to lend into this market were not actively building deal flow with contractor partnerships or other methods. In exchange for receiving the benefit of the CGB's loan loss reserve, the banks agree to offer capital at specific terms and

^{xi} A tax equity investor effectively invests cash in exchange for the 30% federal Investment Tax Credit (ITC) and the accelerated depreciation tax benefits enjoyed by solar. This tax value only comes through a tax-equity based structure, and allows consumers to pay a lower price for the solar power than they would if they owned the solar themselves. It should be noted that the ITC steps down to 26% in 2020 and 22% in 2021. After 2021, the residential credit will drop to zero while the commercial credit will permanently drop to 10%.

rates that don't exceed a certain cap. These terms compensate banks appropriately for risk, but ensure that projects can be cash flow positive for borrowers.

The CGB also has a public-private partnership with PosiGen through which they jointly offer a solar lease with an energy savings agreement to lower the energy burden of low-to-moderate income households.¹³ When underwriting the financing of solar and efficiency upgrades in low-to-moderate income households, CGB and PosiGen use alternative underwriting criteria instead of a FICO score. To qualify for the product, a customer's credit quality is measured by utility-bill repayment history, as that is a better corollary to whether or not an energy loan will be repaid. This program was originally a pilot but was later expanded.¹⁴

In addition to managing the wind-down of the solar grant program, the CGB's enabling legislation also directed the CGB to administer a state-wide Commercial Property Assessed Clean Energy (C-PACE) program. C-PACE programs allow commercial buildings to service debt incurred for clean energy projects through the placement of a lien on the property and assessments on a property tax bill.

Through C-PACE, commercial buildings can more easily access whole-building commercial energy retrofits. The whole-building approach to energy upgrades has long been viewed as the most effective way to significantly curtail energy consumption, but the projects are hard to execute and finance. They include multiple energy efficiency technologies and can also include roof-top solar when appropriate.^{xii} The CGB is able to finance these projects through its C-PACE program.

PACE is legally authorized in over 30 states, but Connecticut is one of only two states to achieve significant scale with the program (along with California). Unlike in most states where each local government is charged with creating its own program, the CGB is tasked with administering the program across the entire state. Through central administration, the CGB implements programmatic consistency and standardization across the state, critical elements for attracting private investment. The CGB also ensures that every loan offered can be paid back entirely through the savings generated by the project, as stipulated in the state's legislation. The CGB uses a standardized technical underwriting method to ensure that every project has a savings-to-investment ratio (SIR) greater than 1.

Connecticut initially struggled to find private lenders interested in C-PACE projects. However, the CGB was able to kick-start the market by originating and underwriting C-PACE loans using its own lending capital. By taking the first step when private lenders would not, the CGB was able to build scale by aggregating projects. After building a portfolio large enough to attract private investment, the CGB sold 80% of the C-PACE loan portfolio through an auction, drawing in \$24 million of private investment.¹⁵ This was the first commercial efficiency securitization in the country, attracting specialized and institutional investors to participate in the market. Without the CGB's investment and coordination, the market would have remained dormant as it has in many other states.

Now that the CGB has demonstrated the mechanics and potential of C-PACE, private investors are preparing to enter the market at far greater scale. To satisfy the growing pipeline of projects, the CGB is

^{xii} According to PACENation, of the C-PACE projects financed in the U.S. to date, 51% are efficiency only, 36% are renewable energy only, and 14% are both renewables and efficiency.



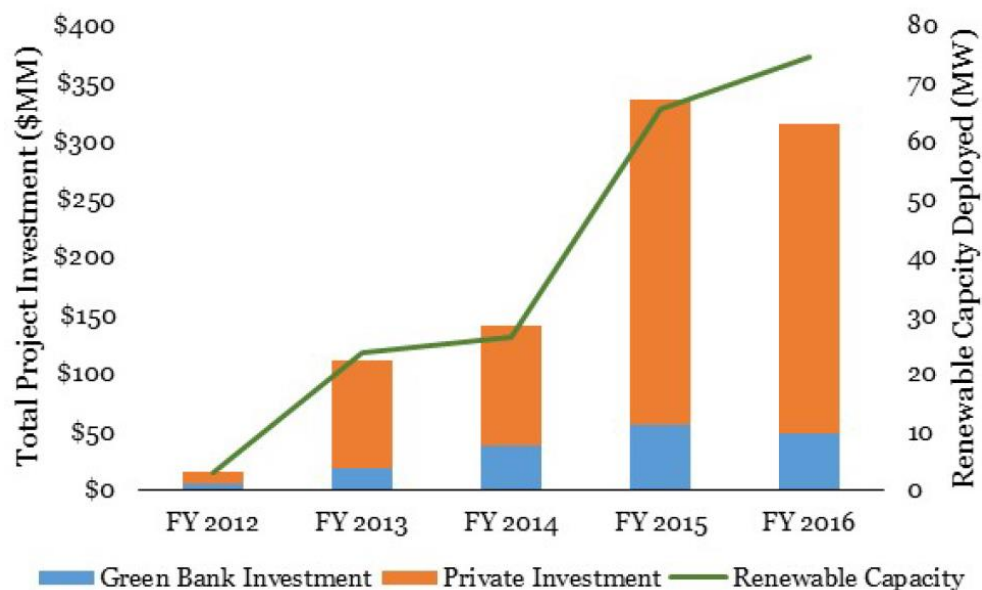
raising an external warehouse of at least \$100 million in private capital that will be used to originate loans. After only one portfolio sale, the CGB has demonstrated market opportunity to draw institutional investors eager to originate the loans, reducing the need for public investment.

After five years of operation, the CGB is now a mature financial institution that has sparked remarkable growth in the state's clean energy markets. In the last two years, the CGB sparked nearly \$650 million in total clean energy investment in the state, while achieving a private:public leverage ratio exceeding 6-to-1. This stands in sharp contrast to the market condition prior to the CGB's creation. In the eleven years of operation of the prior Clean Energy Fund, a total of \$350 million was invested during that period. And of that total, approximately half of the funds were public dollars, and nearly all were in the form of grants.

Table 3: Connecticut Green Bank vs. Connecticut Grant-Making Authority¹⁶

	FY 2000-2011 (CCEF)	FY 2012-2014 (CGB)	FY 2015-2016 (CGB)
Model	Subsidy	Financing	Financing
Years	11	3	2
Energy (MW)	43.1	52.2	139.9
Investment (\$MM)	\$350	\$266.3	\$649.6
Leverage Ratio	1:1	4.4:1	6.3:1

Figure 7: Private Investment in Renewables Leveraged by CGB Investment¹⁷



Montgomery County Green Bank

Montgomery County Green Bank - At a Glance

Structure and Form: Independent nonprofit lender designated as official county green bank with mixed board of directors; originally created in response to legislation calling for an independent nonprofit Green Bank.

Capital Sources: Utility merger settlement; Foundation grants

Financing Activities: Whole-home Energy Efficiency; Multifamily loan

Market Development Activities: Targeted marketing and demand generation; Information and market transparency

Organization

The Montgomery County Green Bank (MCGB) is a relatively new nonprofit EIP created in Montgomery County, Maryland in response to county legislation passed in 2015. The legislation called for the independent creation and official designation of a nonprofit Green Bank. The Coalition for Green Capital, along with the Montgomery County Department of Environmental Protection, created the nonprofit and the nonprofit earned the county's designation as the official Green Bank in 2016. The Board of Directors of the MCGB is comprised of various professionals across the energy and housing professions and two ex-officio members from county government agencies.

The MCGB will be capitalized by utility merger settlement funds over a period of several years. The MCGB has also successfully sought additional supplementary grants from foundations. While its 501c3 status is yet to be granted, pending review from the Internal Revenue Service, the Coalition for Green Capital served as the MCGB's fiscal sponsor, which functionally allowed the MCGB to solicit philanthropic capital while it waits to get 501c3 status of its own.

Activities

The MCGB is not fully operational at the time of writing this report. The MCGB is in the process of developing its initial products, which currently focus on loan-loss reserves that support local private lenders making loans for whole-home energy efficiency projects and commercial properties. The MCGB also plans to be involved with financing energy improvements in multifamily properties as a part of larger housing finance deals.



New York City Energy Efficiency Corporation

NYCEEC - At a Glance

Structure and Form: Independent nonprofit lender with mixed board of directors; originally created as component unit of city government.

Capital Sources: ARRA Grant; Contract with city government; Foundation grants; Private co-investment; Private loans; Public loans

Financing Activities: Equipment Lending; Energy Service Agreements (ESAs) and PPAs; Green Mortgage Loan; Credit Enhancement for Affordable Multifamily energy improvements; Pre-development loans

Market Development Activities: Targeted marketing and demand generation; Information and market transparency; Free technical and legal advice

Organization

The New York City Energy Efficiency Corporation (NYCEEC) is a nonprofit EIP that provides financing for projects in commercial and multi-family buildings that save energy or reduce greenhouse gases. NYCEEC generally finances energy efficiency, cogeneration, clean heat conversions, renewables and demand response projects.

NYCEEC was formed by Mayor Bloomberg's office in 2011, and was the recipient of two federal grants awarded to the City under the American Recovery and Reinvestment Act of 2009. Though it began within the Mayor's office as a public authority, NYCEEC was intended to be a nonprofit lender from the beginning. After three years of operation, NYCEEC made the transition to an independent nonprofit with a Board of Directors comprised of public officials and private individuals.

Though independent, NYCEEC retains a connection to the City through a contract to serve as a consultant. NYCEEC helps lessen the burdens of government with its retrofit accelerator program, financing of oil-to-gas conversions that allow buildings to comply with a local clean air ordinance, and by originating clean energy projects and providing of gap financing for a State efficiency and green jobs program.

The organization maintains a flexible balance sheet from multiple capital sources (public, private, and philanthropic) to support its activities. NYCEEC also partners with various lending organizations to finance energy efficiency and fuel conversion projects while encouraging best practices with respect to energy efficiency retrofit implementation and ongoing performance monitoring.

Activities

NYCEEC offers debt financing, credit enhancements, ESAs and PPAs for clean energy projects in commercial buildings. NYCEEC's deals fall into several general deal-types: equipment loans directly to buildings secured by the equipment; third-party ownership and ESA and PPA financing; mortgage lending



for high performance buildings; credit enhancement for local housing finance organization’s multifamily efficiency loan program; and low and no interest pre-development loans.

Since its inception, NYCEEC has deployed more than \$33 million in loans and has committed \$7.5 million in credit enhancements across 36 transactions with total combined project costs of \$75 million. About 31% of those projects were ESAs and PPAs, 21% were mortgages, and 49% were equipment loans. Of the properties served by the projects NYCEEC financed, 40% were commercial and industrial, 34% were market-rate multifamily, and 26% were affordable multifamily.

NYCEEC has in-house expertise to make construction and permanent loans, to provide credit enhancement in the form of loan loss reserves, and to manage both energy efficiency retrofit technical risk and real estate finance risk. NYCEEC also has a sophisticated outreach effort to drive its deal pipeline, and places a high premium on being a flexible organization capable of serving the particular market segments it was designed to serve.

New York Green Bank

New York Green Bank - At a Glance

Structure and Form: Public entity existing as division of state energy office; created by administrative action and funded by regulatory ruling

Capital Sources: Utility bill surcharge; cap and trade (RGGI) revenue;

Financing Activities Issued RFP for private sector financial intermediaries seeking clean energy project capital

Market Development Activities: Fill information gaps; demand generation

Organization

New York Governor Andrew Cuomo announced his plan to form the New York Green Bank in January 2013 during his State of the State address. His plan was to build a \$1 billion financing institution to fill financing gaps in the New York clean energy capital market. It was determined from the outset of the process that new legislation would not be needed to create the financing entity. The state’s energy office, NYSERDA, had all the legal authorities a Green Bank would need to provide financing. Therefore it was determined that the New York Green Bank (NYGB) entity would be a division within NYSERDA.

Separately, the Governor decided that the best source of funding for the NYGB would be similar to those chosen in Connecticut. The NYGB would be capitalized by redirecting a portion of the ratepayer surcharge funds collected annually to support grant programs. The NYGB would also receive a one-time infusion of state’s RGGI proceeds. The allocation of the RGGI proceeds could be made through administrative action, but redirecting the ratepayer funds to the NYGB required approval by the Public Service Commission (PSC). NYSERDA produced a detailed business plan and explanation of the importance of financing to



support its petition to the PSC.¹⁸ This led to PSC approval of NYGB funding in December 2013, initially allocating \$165.6 million in ratepayer dollars.¹⁹ Combined with the annual \$45 million in RGGI proceeds, this brought the NYGB's initial capitalization to \$210 million.²⁰

Activities

The NYGB operates as a wholesale clean energy finance lender (as opposed to Connecticut, which operates more as a retail lender). Rather than design specific financing products and programs, the NYGB is looking to the market to learn what financing is needed. In February 2014, the NYGB issued an open-ended RFP seeking applicants for funding that could demonstrate that they could not find private funding elsewhere, and that NYGB deal participation would produce “market transformation.”

The first set of NYGB investments were announced in the fall of 2015.²¹ The NYGB used \$49 million of public capital to leverage \$178 million in private capital. Three deals were announced addressing different market segments. The NYGB provided \$25 million in debt to a NY-based solar installer to support a solar leasing warehouse; provided \$4 million in construction financing to a distributed wind installer to support over 160 distributed wind installations in rural New York through a lease structure; and provided \$20 million in credit enhancing capital to enroll the state in the multi-state Warehouse for Energy Efficiency Loans program, which provides home energy upgrade financing. In 2016, the NYGB committed more than \$250 million in clean energy investment which stimulated additional private sector investment of more than \$677 million, resulting in a total investment of \$927 million in clean energy in New York.²² Recently, Governor Cuomo announced that the NYGB has, one year ahead of schedule, generated \$2.7 million in positive net income as a result of \$291.6 million in investments in clean energy transactions across New York.²³

In addition to financing, NYGB undertakes several activities to help fill information gaps and generate demand for clean energy financing. These activities include an annual meeting series held in numerous locations throughout the state, strategic partnership development throughout the state, and quarterly webinars. These activities ensure stakeholders and market participants are aware of NYGB financing options.²⁴



Rhode Island Infrastructure Bank

Rhode Island Infrastructure Bank - At a Glance

Structure and Form: Quasi-public body politic of the state, with board appointed by Governor; created by legislation.

Capital Sources: ARRA Grant; cap and trade (RGGI) revenue; utility bill surcharge; Bonding Authority; re-directed operating funds; QECBs

Financing Activities: Efficiency loans for the public sector; Potential R-PACE and C-PACE credit enhancement or lending; Water project lending

Market Development Activities: Statewide R-PACE & C-CPACE administration

Organization

When Rhode Island Governor Gina Raimondo assumed office in January 2015, she very quickly followed through on her campaign promise to create an EIP, the Rhode Island Infrastructure Bank. Rhode Island had an existing set of state and utility-run rebate programs, and had attempted to build a residential PACE (or R-PACE) program. A new EIP, though, would increase financing across new clean energy markets, and drive investment in infrastructure and job growth.

Rhode Island determined that the best path to creating its EIP required legislation. And rather than build an entirely new institution, the EIP would be built upon an existing entity with a track record of success. The state's Clean Water Financing Authority (CWFA), which had financed water projects in the state for many decades, was tapped to become the EIP. The CWFA would be given expanded authorities to address clean energy markets, and be renamed as the new Rhode Island Infrastructure Bank (RIIB). This new organizational structure was passed into law in June 2015 as part the Governor's fiscal year budget legislation.

Activities

The RIIB was assigned responsibility for two specific financing programs in the legislation. RIIB has responsibility for designing, administering, and possibly financing both commercial and residential PACE programs in the state. RIIB chose to follow the Connecticut model by becoming the sole state-wide PACE administrative authority. Though the RIIB hopes that private investors will originate and underwrite PACE loans, the RIIB is able to provide credit enhancements to those lenders should it be necessary. The RIIB was also tasked with designing and implementing an Efficient Buildings Fund (EBF), which will finance energy upgrades for municipal buildings in the state. RIIB was given general authority to design the optimal financing structure to serve this market, which has been broadly underserved. This program was given priority because reducing energy bills in public buildings would reduce government budgets at a time when the state needs to maximize the value of all public dollars.



This past year RIIB completed the first round of EBF funding, which used an innovative structure and partnership with the state energy office to finance 17 municipal projects across 6 towns with \$17.2 million of capital.²⁵ The projects are cash flow positive and will save \$20 million in energy costs for citizens.

RIIB activities are funded through a combination of RGGI proceeds, system benefit charges, remaining federal ARRA funds, and a small amount of re-directed operating funds. The RIIB also has the authority to issue state qualified clean energy bonds (QECBs). In sum, these funds are intended to serve as an equity portion of a broader bond issuance and support a larger agency operation. The bond issuance, the proceeds of which will finance the EBF program, is estimated to raise \$20 million. RIIB, like the CWFA before it, is a quasi-public agency with a board of directors, where the chairman is appointed by the Governor.

Florida Solar Energy Loan Fund (SELF)

SELF - At a Glance

Structure and Form: Independent nonprofit CDFI lender; created through county government initiative.

Capital Sources: ARRA Grant; Foundation grants; Loans from faith-based organizations; Loans from mission-driven investors; Technical Assistance Grant for CDFIs

Financing Activities: Energy and home improvement loans for LMI; Crowd-funded loan; C-PACE loan with partner

Market Development Activities: C-PACE administration; Contractor network; M&V; Alternative underwriting and de-risking techniques

Organization

The Solar Energy Loan Fund (SELF) is a certified nonprofit CDFI designed to provide financing for sustainable residential and non-residential building improvements, including energy efficiency improvements and solar systems. As a CDFI, SELF primarily provides clean energy financing for low and moderate-income Floridians.

SELF was created in St. Lucie County, Florida in 2010 with a \$2.9 million grant from the DOE Better Buildings Neighborhood Program. St. Lucie County supported the creation of SELF, but is not directly or legally connected to SELF. SELF has supplemented that seed capital by securing numerous small, mission-driven investments from community banks, foundations, impact investors, faith-based organizations, and the crowdfunding platform KIVA. Since 2010, SELF has made more than \$5 million in affordable loans that have allowed more than 600 homeowners to upgrade their homes and lower their energy costs.



Activities

SELF offers three key products. First, it has a direct residential loan using SELF's own balance sheet capital. Second, SELF has a residential loan that draws on crowd-sourced funds collected through KIVA. Finally, SELF has a C-PACE lending program. The two residential loans are available statewide. SELF's C-PACE program is only available in St. Lucie County, as it is the county's designated PACE administrator. For its C-PACE program, SELF has a partner that provides capital for the C-PACE projects. SELF is currently preparing to launch an R-PACE program, which is legal in Florida.

SELF's overall delinquency rate on loans is less than 1%—an impressive feat considering they lend almost entirely to low-to-moderate income homeowners. In the underwriting process, SELF collects personal financial information from the borrower through a survey to understand the household budget and typical expenses to figure out the potential borrower's ability to pay. SELF staff manage this process closely, building trust and helping borrowers understand their typical expenses and budget. SELF usually lends to people who have 30% of their income as disposable cash, and then sculpts the loan for each person so that the monthly payments fit the ability to pay. SELF runs a credit report to understand the credit background of potential borrowers, but there is no credit score requirement.

SELF aims for (but does not require) a debt-to-income ratio of 45% among its borrowers. SELF aims for home loan-to-value ratio of 80% among its borrowers, and will not lend to borrowers with a loan-to-value ratio above 100% (i.e. properties that are "underwater"). For some slightly more risky borrowers, SELF asks them to pay into a self-funded loan-loss reserve to de-risk to the project. SELF also reports to credit companies so the borrowers can improve their credit scores.

SELF has a network of 185 contractors. Contractors drive about 50% of the projects that SELF finances, while the other 50% are customer initiated. In contractor initiated projects, SELF makes sure the quoted cost looks reasonable. When customers initiate a project financing inquiry, SELF gives them a list of recommended contractors and asks them to get quotes for the project. SELF will then review the quotes.



Possibilities for a Pennsylvania Energy Investment Partnership

Though many of the EIP organizations and activities from other states are instructive, Pennsylvania's clean energy market has a unique set of challenges and gaps that require a customized response. Pennsylvania also faces some unique constraints that would prevent a Pennsylvania EIP from imitating some of the features of EIPs in other states. For the purposes of this assessment, it was assumed that a proposal to create a Pennsylvania EIP as a new government program or public entity would likely face policy and fiscal challenges. An EIP would need to be tailored to fit Pennsylvania's circumstances, drawing on the pertinent and replicable best-practices of other EIPs. The following sections outline a set of recommendations for an EIP in Pennsylvania to address the specific market conditions, barriers and opportunities identified through this research.

The EIP should be founded with a start-up, entrepreneurial culture. Because it will not be a government agency or part of government, the EIP can and should take on a lean and flexible posture, prioritizing speed, multi-tasking, and outcomes over structure and bureaucracy. And because it will be capitalized as a start-up, pulling in foundation dollars and investment capital as and where it can, it will necessarily have to run a small operating budget to start. And, importantly, the EIP should seek to complement a small in-house staff by drawing on the know-how contained in the broader community of clean energy project financing organizations. Best practices on product design, go-to-market strategy and recommendations on service providers and other potential partners can all be gleaned from the generous and growing network of clean energy lenders. To the extent possible, the entity should also seek to piggy-back on the back-office functions and overhead of other partner organizations until it can reach a scale where it can sustain such expenses itself. The EIP should also seek to heavily leverage technology solutions wherever possible, building in paperless and people-less standard operating procedures from founding.

The EIP will necessarily run a lean organization, with small staff and minimal overhead expenses. Small startup funding and capital base means the EIP will have to prioritize revenue generation, closing deals quickly, and minimizing product development costs. The EIP should initially focus on a very small number of financing products to maximize its limited resources, balancing immediate market needs, desire for deals that can be closed quickly, and specific initial staff expertise. Borrowing from the activities and know-how of others will be essential.

Organizational Form

Although EIPs often are public or quasi-public institutions, research and various stakeholder interviews suggest that the most expeditious and viable path for an EIP in Pennsylvania is the creation of an independent nonprofit lender that is well-aligned with the missions of the relevant government entities in the state. A 501c3 nonprofit has the benefit of tax-exemption, which will allow the EIP to receive grants from foundations and other philanthropic donations. The ability to receive philanthropic capital is an absolutely crucial feature of the EIP, since a nonprofit EIP in Pennsylvania should not be entirely dependent on funding from government. This model of a nonprofit loan fund is common across the country.



Though 501c3 status can sometimes take many months to achieve, a nonprofit EIP can quickly obtain functional 501c3 status by acquiring a fiscal sponsor. An existing organization with 501c3 status can agree to be a nonprofit EIP's fiscal sponsor, which will allow the EIP to receive philanthropic capital while it waits for its own 501c3 status to be granted.

EIPs have a public purpose, are mission-driven, seek to collaborate with and supplement existing market activity, and offer financing that the private sector is unable to offer today. Broadcasting this special mission of the EIP is particularly important in Pennsylvania because the EIP will not have the halo effect of being a direct governmental entity. As a nonprofit, an EIP can better establish itself as a mission-driven entity and establish public trust and comfort for all borrowers, partners, or government collaborators. Various for-profit corporate forms might give market participants the impression that the EIP is profit-motivated, and seeking to compete with other players. A nonprofit can also more easily align itself and partner with government, even if it is not legally affiliated with government.

A nonprofit EIP can also harness many of the benefits of for-profit corporate forms (without losing access to philanthropic sources of capital) by creating for-profit subsidiaries (such as limited liability corporations) as special purpose vehicles for particular products and funds. Private co-investors can then directly invest in the products or funds, rather than the parent nonprofit, and get returns on their investments accordingly.

Nonprofit EIPs and Special Purpose Vehicles

The nonprofit 501c3 corporate form is a common and flexible structure used by many EIPs and loan funds across the country. The fact that it is a nonprofit, though, does not mean it is unprofitable or cannot be a vehicle for profitable investment by private, profit-maximizing investors. EIPs intend to earn a return on their capital to be self-sustaining – they are not designed to lose money. They are designed to be at least break-even. And several existing EIPs (including the UK GIB are specifically designed to be “green and profitable.”

In addition, EIPs can and do create special purpose vehicles (SPVs) for the purpose of holding EIP and private co-investments related to specific products or projects. Many SPVs used by EIPs are limited liability companies (LLCs), and are used to receive and deploy investments from private actors. For instance, the Connecticut Green Bank's solar lease product is actually held by a SPV, which in turn owns the underlying projects. Private investors in turn own a portion of the SPV and earn the profitable rate of return they expect. Nonprofits are therefore a flexible corporate form that can attract philanthropic funding while also allowing profit-seeking private investment.



There are several existing EIPs that provide a precedent for the independent nonprofit lender: NYCEEC and SELF are two prominent examples (among many), and they are discussed in greater detail above. More broadly, there are mission-driven nonprofit lenders throughout the country in clean energy, as well as other market sectors. The broad universe of CDFIs, for example, are primarily locally-oriented, nonprofit corporations that specifically lend the bulk of their capital to underserved markets. Of the more than 1,000 certified CDFIs across the country, 524 are loan funds that collectively manage more than \$14 billion in assets and 119 of the CDFIs are banks or thrifts that collectively manage nearly \$38 billion in assets.²⁶ Many of these CDFIs are organized as nonprofits.

Capital Sources

There are many sources of capital that a Pennsylvania EIP could draw upon. Any and all of these funding sources, should be pursued. An EIP has two general uses for capital: operating funds and lending capital. While both are vital, in the early stages of an EIP it is more important to secure operating funds for the EIP to cover expenses such as rent, salaries, and other startup costs. These expenses do not provide a return, and therefore are best funded by capital that has no return requirement. The best sources of funds for the EIP's operating funds are those that are most accessible, with the least amount of restrictions placed on the use of the funds. Philanthropic grants or public investments are thus very useful for an EIP in the startup phase, before it has built a portfolio of revenue-producing assets that can help cover expenses.

A diverse array of capital—including capital that requires a return (such as program-related investments from foundations and private investments)—can be used to support an EIP's financing activities. Because each source of capital has a unique set of requirements and constraints attached to it, the sources of capital have an impact on the types of products an EIP can offer. For example, money that needs to be repaid in 7 years might not be suitable for a solar loan fund, but might be sufficient for residential efficiency.

It is possible and prudent for an EIP to draw from multiple funding sources. Nearly all domestic EIPs are funded from multiple sources or streams of capital.

Some of the specific sources of funding that a Pennsylvania EIP should look to include:

- Foundation grants
- Foundation PRIs
- Product specific investments from government entities and funds
- Mission-driven investments from various organizations and high net worth individuals

Products and Activities

Once the EIP is established and operational, it has to make strategic decisions about which markets to focus on, what types of financing support to offer, and how to generate and access latent demand. This section addresses each of these issues, and identifies the activities the Pennsylvania EIP could prioritize for early success. (The EIP cannot immediately launch all possible products to serve all possible markets.)



One area of potential focus for the EIP is the financing of distributed solar photovoltaic systems. Pennsylvania's distributed solar market represents over \$2.9 billion in investment opportunities. Separate solutions would be needed for the residential and commercial sectors.

Additional focus areas for a Pennsylvania EIP could be developing a central online hub for all clean energy resources and information, and providing central and uniform administration of the C-PACE programs of any local governments in Pennsylvania that participate in C-PACE, should the authorizing legislation be enacted.

The following sections describe these potential EIP activities in greater detail, along with two additional options for EIP activity. Furthermore it should be noted that the potential EIP activities discussed in the following sections are not meant to preclude EIP activity in other technologies and market segments.

Commercial and other Non-residential Solar

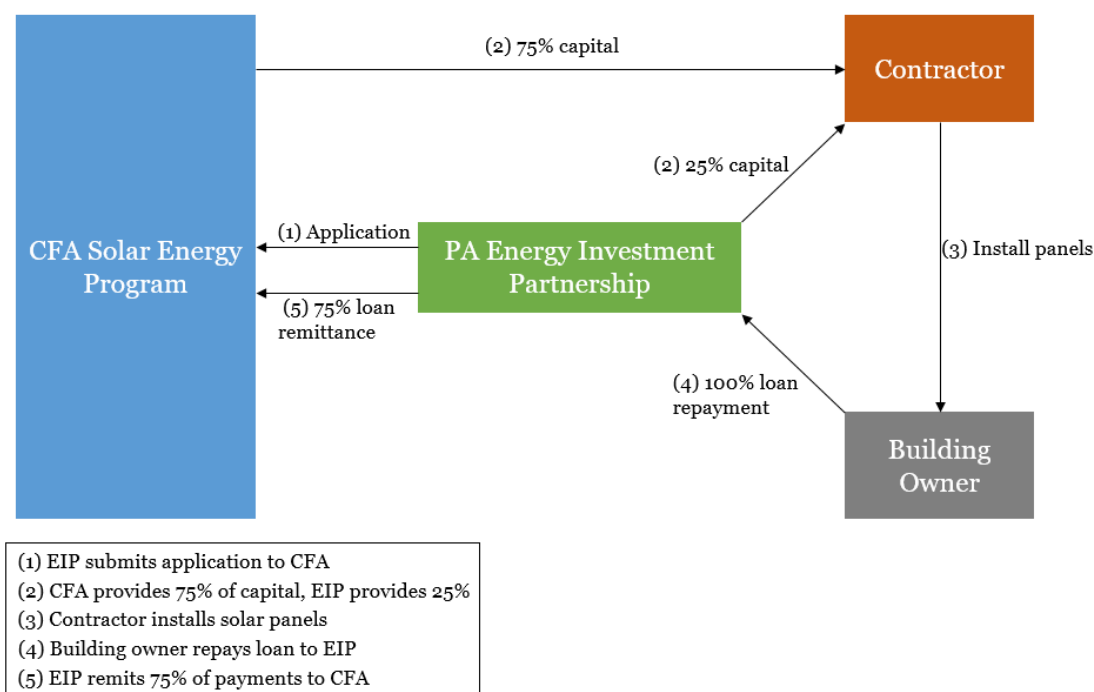
In November 2016, the Commonwealth Financing Authority (CFA) of the Department of Community and Economic Development (DCED) reorganized its Solar Energy Program (SEP) into a loan program that offers long-term financing for non-residential solar projects. The program originally received \$80 million as part of the Alternative Energy Investment Act of 2008, and has expended most of that money through grants and other financings. The SEP now has about \$30 million in funds that are available for loans to solar generation and manufacturing projects.²⁷

SEP will make loans for solar projects on non-residential buildings at approximately 5% for 22 years.^{xiii} Solar systems generally have an expected useful life of 25 years or more, and often benefit from longer term financing, so the SEP's terms are well suited to financing solar. Despite the attractive terms, the SEP program has had almost no uptake in the market. There are two key barriers to increased program participation. Due to limits on its budget and authority, the CFA's marketing efforts around the SEP are somewhat limited, so many project developers and potential end users may be unaware of its existence or unclear on its value. The SEP also has a matching requirement, which results in the SEP financing a maximum of 75% of the total costs of any project.²⁸ This creates a barrier that renders the SEP financing much less attractive. Any project developer using SEP's financing must also find a second source of financing, effectively doubling the transaction costs associated with securing financing for the project, or pay for the final 25% of the project costs in cash.

The Pennsylvania EIP could solve both of those problems for the SEP, dramatically increasing participation in the program. The EIP would perform two functions that would both complement and reinforce the SEP program—it would market the program and help originate projects, and it would finance the remaining 25% of project costs not covered by the SEP at the same terms as the SEP, or at a variable rate that changes inversely to SEP's rate (which is based on the Treasury rate) such that the weighted average rate paid by the borrower appears to be fixed.

^{xiii} The interest rate for the loan is fixed at the 10-year Treasury plus 250 basis points, and is updated every quarter.

Figure 8: Add-On Product for SEP Solar Energy Program



Essentially, the EIP would create an add-on structure attached to the SEP product such that the combined product would be turnkey. A single application would allow customers to get 100% financing for their solar projects. The EIP could coordinate and market the unified product. This EIP activity would effectively unlock \$30 million in capital for non-residential solar projects that is currently sitting unused.

Though the beginnings of this product are sketched out above, a few additional factors must be addressed before a product like this can be successfully launched:

- Buy-in from the CFA and various agreements between the CFA and EIP around product structure and institutional responsibilities
- Precise terms of the EIP financing as well as agreements about risk exposure and allocating losses
- Clear and simple means for transferring commercial ratepayers to a competitive electricity supplier that offers net metering

Residential Solar

Currently, homeowners in Pennsylvania who want to benefit from solar while avoiding or minimizing the upfront cost of the system have limited options. If they live in one of the few urban areas served by the national installers active in Pennsylvania, and have qualifying credit and a good roof, they can get a solar system financed and installed. Most Pennsylvanians, however, do not qualify based on those parameters. Alternatively, homeowners can use more expensive forms of private financing such as credit card debt. Or they can get a home equity line of credit, which today has fairly competitive rates. Yet these other



financial options remain unattractive, either because they are expensive, or because they are not tailor-made to fit the assets being financed. A customer seeking to finance solar using these methods would have to do much of the legwork of the project for themselves.

There are many local and regional solar contractors in Pennsylvania that do not provide financing for their customers, so they primarily serve the portion of the market that can pay for solar systems in cash, or use the financing methods mentioned above. These contractors are unable to compete with the national installers for the consumers who cannot pay for solar in cash but is nevertheless an attractive potential customer for solar system financing. The presence of the national installers and their various marketing campaigns have increased interest in residential solar across Pennsylvania, yet local and regional solar installers are unable to serve the increased market demand without some sort of purpose-built residential solar financing. Many contractors have explicitly expressed interest in a financial product that would allow them to serve Pennsylvanians who want to benefit from solar systems but are unable to pay for the entire system in cash.

According to the results of the solar financial modeling that was published in the Pennsylvania Clean Energy Market Report, solar panels can result in cheaper-than-grid electricity costs for many Pennsylvania homeowners. The model was used to calculate the levelized cost of electricity (LCOE) of solar on a per kWh basis across various financing scenarios, using very conservative assumptions about system size, generation, expected useful life, interest rates and discount rates were used in the model.^{xiv}

The results of the modeling show the LCOE per kWh of solar with a variety of installation costs and SREC prices as well as a variety of rates and terms on a loan. Solar was considered “economically viable” if the LCOE calculated by the model are below the average retail price of electricity paid by customers: 14 cents^{xv} per kWh for residential customers.²⁹ If a homeowner can pay an LCOE per kWh of self-generated solar electricity that is less than the price of grid electricity, that means they can make money (in the form of energy bill savings) with a distributed solar system, and distributed solar is economically viable.

The per kWh LCOEs of residential rooftop solar calculated with the model are shown in tables below. Installation costs and SREC prices that produce an LCOE that is below the state average retail electricity price for the given sector are highlighted in green, meaning that solar is economically viable under these conditions. Installation costs and SREC prices that produce an LCOE that is below the western Pennsylvania average retail electricity price for the given sector are highlighted in dark green, meaning that solar is economically viable under these conditions. Installation costs and SREC prices that produce and LCOE that is above the retail electricity price for the given sector are highlighted in red, indicating that they are not economically viable in these conditions.

^{xiv} The residential system was assumed to be a 7.7 kW system generating 100% of household demand. Expected useful life for the system was assumed to be 25 years and the capacity factor was assumed to be 16%. The term of the loan was assumed to be 20 years and the interest rate was assumed to be 6%.

^{xv} In certain parts of western Pennsylvania, electricity prices are below the average retail rate. It is assumed that in western Pennsylvania, average residential rates are 12 cents per kWh.

LEGEND

<14	Solar is cost-effective compared to average utility rates
<12	Solar is cost-effective compared to state's lowest utility rates
>14	Solar is not cost-effective

Figure 9: LCOE of Loan-Financed Residential Solar System, varying Rate and Term (cents/kWh)

		<u>Residential Loan</u>							
		SREC = \$10 \$/W = 3.00							
		Term (yrs)							
		3	5	7	10	12	15	20	25
Rate	10%	10.25	10.83	11.42	12.30	12.88	13.73	15.09	16.34
	9%	10.05	10.53	11.02	11.74	12.21	12.90	14.00	15.03
	8%	9.85	10.24	10.62	11.18	11.55	12.09	12.95	13.75
	7%	9.66	9.94	10.22	10.64	10.91	11.30	11.93	12.51
	6%	9.46	9.65	9.83	10.11	10.28	10.54	10.94	11.31
	5%	9.27	9.36	9.45	9.59	9.67	9.79	9.99	10.17
	4%	9.08	9.08	9.08	9.08	9.08	9.08	9.08	9.08
	3%	8.89	8.80	8.71	8.58	8.50	8.39	8.21	8.04
	2%	8.70	8.52	8.35	8.10	7.94	7.72	7.38	7.06
	1%	8.51	8.24	7.99	7.63	7.40	7.08	6.59	6.15
	0%	8.32	7.97	7.64	7.17	6.88	6.47	5.85	5.30

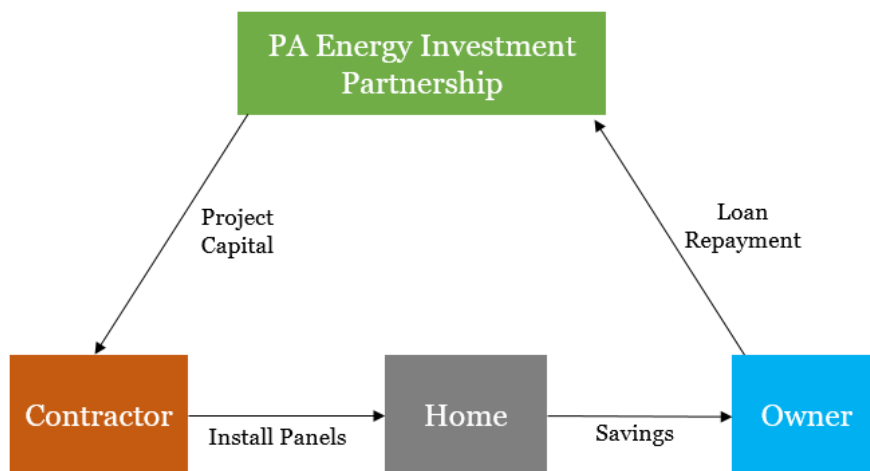
Figure 10: LCOE of Loan-Financed Residential Solar System, varying Cost and SREC (cents/kWh)

<u>Residential - Loan</u>		SREC Price (\$/MWh)										
		\$0	\$10	\$20	\$30	\$40	\$50	\$60	\$70	\$80	\$90	\$100
Cost (\$/W)	\$3.50	13.93	12.93	11.93	10.93	9.93	8.93	7.93	6.93	5.93	4.93	3.93
	\$3.40	13.53	12.53	11.53	10.53	9.53	8.53	7.53	6.53	5.53	4.53	3.53
	\$3.30	13.13	12.13	11.13	10.13	9.13	8.13	7.13	6.13	5.13	4.13	3.13
	\$3.20	12.74	11.74	10.74	9.74	8.74	7.74	6.74	5.74	4.74	3.74	2.74
	\$3.10	12.34	11.34	10.34	9.34	8.34	7.34	6.34	5.34	4.34	3.34	2.34
	\$3.00	11.94	10.94	9.94	8.94	7.94	6.94	5.94	4.94	3.94	2.94	1.94
	\$2.90	11.54	10.54	9.54	8.54	7.54	6.54	5.54	4.54	3.54	2.54	1.54
	\$2.80	11.14	10.14	9.14	8.14	7.14	6.14	5.14	4.14	3.14	2.14	1.14
	\$2.70	10.75	9.75	8.75	7.75	6.75	5.75	4.75	3.75	2.75	1.75	0.75
	\$2.60	10.35	9.35	8.35	7.35	6.35	5.35	4.35	3.35	2.35	1.35	0.35
	\$2.50	9.95	8.95	7.95	6.95	5.95	4.95	3.95	2.95	1.95	0.95	



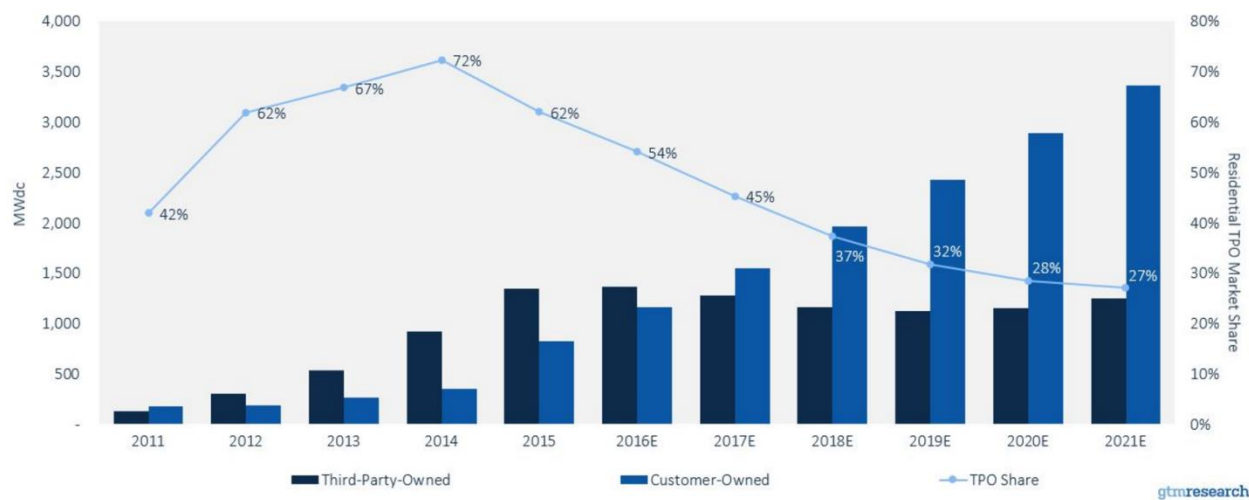
The Pennsylvania EIP could offer a residential solar loan to fill this market gap. The term of the loan should be on the order of 20 years or more, to match the expected useful life of the solar technology. The rate should be as low as possible while still providing the EIP with a reasonable return. The loan should eventually be offered on a statewide basis, so homeowners and local and regional solar installers throughout the state can benefit from solar financing.

Figure 11: Basic Schematic of Residential Solar Loan Transaction



A Pennsylvania EIP should offer a loan rather than a lease. Loans are increasingly attractive as the costs of installing solar panels come down. These lower costs mean the value of the investment tax credit, pegged at 30% of the total system cost, is shrinking. Now more homeowners are able to fully monetize the credit. As solar penetration increases throughout the country, and solar becomes a more familiar and well-understood technology, homeowners are more comfortable owning the solar assets, rather than leasing them from a third party. Loans also allow the end user to enjoy a greater portion of the savings, as there is no additional third party with whom end users must split the savings.

Figure 12: Residential Third-Party Owned Solar and Installations by Ownership Type 2011-2021E³⁰



A Pennsylvania EIP could further add value to the residential solar loan product by including panel insurance, maintenance, and other services as part of the financing deal. The EIP should also cultivate a network of solar contractors that have been trained in the solar financing product, and understand how to use it in the sales process. The EIP could also help arrange demand aggregation efforts such as those undertaken by Solarize to help reduce customer acquisition costs for contractors and to drive increased volume for the product.

The EIP could build the loan product from scratch, and use its own balance sheet capital to finance the projects. Alternatively, the EIP could bring in a partner with its own capital and perhaps some elements of a residential solar loan product and create a platform to offer the partner's financing within Pennsylvania. Or a hybrid approach could be used, where a solar loan origination firm uses EIP financing to deploy its product. For example, the CT Green Bank partnered with the origination company Sungage, providing them with a pool of loan capital to deploy with their product.

Though the beginnings of this product are sketched out above, a few additional factors must be addressed before a product like this can be successfully launched:

- Additional market analysis on regional electricity prices, and regional rollout strategy
- Robust pool of contractors to vet and use the product in target regions
- Means of dealing with interconnection issues in certain utility territories
- Clear and simple means for transferring customers to a competitive electricity supplier that offers net metering
- Partnerships with insurance and technical underwriting service providers

Online Clean Energy Hub

The EIP should make all of its information available through a clear and usable website. The website should be designed to be market facing. It should be user-friendly, dynamic and clear, where the user can explore



different solutions and offerings based on their position in the market. For instance, a homeowner should be quickly channeled to only look at residential products. This website should also contain models and tools that give customers and contractors the ability to determine the energy and economic value of a potential product. This kind of interactive platform can enable market participants to engage with clean energy options, understand financing and identify projects for EIP financing that are certain to be accepted. For instance, the EIP could put on its website a model for a commercial building solar project. The model would ask for several inputs and would tell the user that if the model produces a positive result then that project is assured financing. A platform like this would empower market participants and greatly reduce overhead costs associated with vetting projects.

In addition to providing information on its own products and functions, the EIP website could be built to serve as a centralized source of market information that increases consumer and business understanding of clean energy opportunities. Rather than merely list the other programs, it would have direct links to applications and instructions to enable use of the programs. The EIP website should be a hub of information on market basics, and include all the relevant information and links to other clean energy financing programs. The EIP website should help consumers understand different programs, learn about contractors, receive estimates of their own potential savings, and funnel them to the appropriate programs and products (even if that program is run by another organization). For example, if a customer interested in residential efficiency navigates to the EIP website, they would then be funneled to the KeystoneHELP website.

The EIP website can eliminate market confusion by unifying information and resources from programs across the state into a single easy-to-use platform.

That web platform could later be used to launch a uniform branding and coordinated marketing effort that would allow marketing dollars to go much further and be much more effective. Much like milk producers pooled their resources to produce the famous “got milk?” advertisements rather than each marketing their specific milk product, the web platform would allow the various clean energy entities across Pennsylvania to focus their marketing efforts around this single web resource which would in turn match customers with the program that meets their needs. Marketing a single web resource instead of individually marketing a dozen programs would reduce market complexity and foster greater brand recognition and market penetration. The website could serve as a simple, easy-to-use one-stop-shop for all clean energy financing resources across the state. Connecticut has created an effective website and brand using this approach called Energize CT, which cuts across multiple programs and agencies.

C-PACE Administration

Commercial Property Assessed Clean Energy (C-PACE) is a financial mechanism that allows building owners to service debt incurred from financing clean energy projects by placing a voluntary assessment on their property tax bill. Building owners pay for the clean energy projects over time through this additional charge on their property tax bill. The repayment obligation transfers automatically to the next owner if the property is sold.



The C-PACE financial mechanism is very useful for financing clean energy projects in all manner of commercial buildings. Investors like the increased security offered by C-PACE and building owners like that the repayment obligation stays with the building in case they decide to sell it. Yet for C-PACE programs to be successful, contractors and private lenders need standard application and underwriting requirements from county to county. If each county has its own process and requirements, the learning curves and transaction costs create a market barrier to achieving scale in the C-PACE market. It follows that a state should endeavor to have a single statewide C-PACE program and program administrator.

Connecticut was the first state to use this model, and has created a thriving C-PACE market. Rhode Island and Colorado followed suit, tapping central administrators to create a unified platform across the state that any lender or community or borrower can use. Pennsylvania should adopt this burgeoning and clear best practice, should C-PACE- legislation be enacted.

C-PACE enabling legislation is currently being considered in the Pennsylvania legislature. If Pennsylvania passes the legislation, the EIP could serve as the C-PACE administrator for all local governments in the state that opt to have a C-PACE program.

Opt-In QECB Financing for County and Municipal Efficiency Projects

The American Recovery and Reinvestment Act of 2009 created Qualified Energy Conservation Bonds (QECBs), which are Federally-allocated authority to issue bonds to fund renewable and efficiency projects that will have part of their interest payment subsidized by the Federal government. A certain amount of QECBs were allocated to each state by a formula, and additional sub-allocations were given to “large local governments” (such as cities and counties) according to a formula based on population.

Pennsylvania was allocated a total of \$129 million in QECBs across the state, county and city levels. Only \$41 million in QECBs have been issued in Pennsylvania, including nearly all the QECBs allocated at the state level. More than \$87 million in QECB issuing authority (more than 67% of the total allocation) across the various counties and municipalities in Pennsylvania has gone unused.³¹ QECBs are perceived to be inordinately complicated to issue because of fluctuating value of the federal subsidy, and many local large governments with small sub-allocations don’t have technical know-how and bandwidth to use the QECBs, and it may not be cost effective for them to do so. The result is QECBs are a heavily underutilized tool in Pennsylvania.



Table 4: Pennsylvania QECB Allocations

Jurisdiction	QECBs Allocated	QECBs Issued	Remaining QECBs
Adams County	\$1,049,054	\$0	\$1,049,054
Allegheny County	\$9,389,558	\$9,385,000	~\$0
City of Allentown	\$1,112,659	\$0	\$1,112,659
Beaver County	\$1,789,343	\$0	\$1,789,343
Berks County	\$4,187,075	\$0	\$4,187,075
Blair County	\$1,298,611	\$0	\$1,298,611
Bucks County	\$6,449,202	\$0	\$6,449,202
Butler County	\$1,897,507	\$0	\$1,897,507
Cambria County	\$1,497,230	\$0	\$1,497,230
Centre County	\$1,502,002	\$0	\$1,502,002
Chester County	\$5,098,926	\$0	\$5,098,926
Cumberland County	\$2,379,493	\$0	\$2,379,493
Dauphin County	\$2,661,689	\$0	\$2,661,689
Delaware County	\$5,743,491	\$0	\$5,743,491
Erie County	\$1,819,242	\$0	\$1,819,242
City of Erie	\$1,077,044	\$0	\$1,077,044
Fayette County	\$1,493,142	\$1,490,000	~\$0
Franklin County	\$1,488,681	\$0	\$1,488,681
Lackawanna County	\$2,172,492	\$0	\$2,172,492
Lancaster County	\$5,211,811	\$5,200,000	~\$0
Lebanon County	\$1,337,619	\$0	\$1,337,619
Lehigh County	\$2,414,538	\$0	\$2,414,538
Luzerne County	\$3,236,651	\$0	\$3,236,651
Lycoming County	\$1,210,387	\$0	\$1,210,387
Mercer County	\$1,210,200	\$0	\$1,210,200
Monroe County	\$1,712,385	\$0	\$1,712,385
Montgomery County	\$8,071,817	\$0	\$8,071,817
Northampton County	\$3,058,252	\$0	\$3,058,252
City/County of Philadelphia	\$15,015,921	\$6,250,000	\$8,765,921
City of Pittsburgh	\$3,216,462	\$0	\$3,216,462
Schuylkill County	\$1,527,679	\$1,500,000	~\$0
Washington County	\$2,141,358	\$0	\$2,141,358
Westmoreland County	\$3,751,286	\$0	\$3,751,286
York County	\$4,404,813	\$2,200,000	\$2,204,813
Pennsylvania State	\$17,516,380	\$15,810,000	\$1,706,380
TOTAL	\$129,144,000	\$41,835,000	\$87,309,000

Most of the remaining QECB issuing authority in Pennsylvania is held at the county and city level. Many county and city buildings are old and could benefit from whole-building energy efficiency retrofits. In addition to saving money, energy efficiency projects in government buildings benefit all Pennsylvania taxpayers by reducing the costs associated with running the Pennsylvania government.

To address this barrier and tap into an unused resource, the EIP could partner with cities, counties and state agencies to create a centralized program for more efficient issuance. To address the unused QECBs and improve the efficiency of government buildings, the EIP could create a turnkey efficiency financing product for county and city governments with unused QECB allocations. For this EIP product, a county government (for example) would voluntarily allow its QECB allocations to be issued by central conduit issuer (such as PEDFA) working with the EIP that would agree to issue the bonds on behalf of that county



to finance efficiency projects in its government buildings. The EIP could subsidize or pay for energy audits in the government buildings as an incentive to participate in the program and to eliminate an early barrier to participation.^{xvi} The EIP could also offer technical assistance to the county to develop projects, and provide a list of certified contractors and energy services companies to provide quotes for the efficiency projects.

With a product like this, the EIP could help local governments throughout the state benefit from their own unused QECBs and improve energy efficiency and reduce the taxpayer money spent on energy costs.

Request for Proposals

In addition, the EIP should complement an initial product offering with a simple “market-responsive” offering in the form of a request for proposals (RFP). Much like the New York Green Bank, the EIP should immediately draft an RFP and make it available to all market participants which outlines the kinds of projects and financing the EIP will support. The RFP would also outline the criteria for evaluation and decision-making process the EIP will employ to select which projects to finance. This technique has yielded billions of dollars of project proposals in New York, and is a very light-touch way of identifying investment opportunities quickly. Taken together, an initial product offering and an RFP will minimize the cost and time of product development while accelerating forward the point at which the EIP can begin earning revenue.

Creating the Organization & Start-Up Model

As a new organization, the EIP will need to be funded, launched, and become operational. This will require a specific sequence of entrepreneurial actions akin to any start-up activity. But these actions will need to be tailored to the specific needs and goals of the EIP mission.

Capital Needs over Time

Like any start-up, the EIP will need initial operating capital to begin operating. This capital will support initial staff and pay for critical early expenses such as rent, website-creation, initial deposits in a bank account, and other daily administrative expenses. In for-profit businesses, these funds usually come in the form of an equity capital investment. But as a nonprofit, the EIP will likely rely on philanthropic grants or targeted public investments to start operations. These funds are most critical at start-up, and these kinds of funds will likely be needed for the first few years of operation until the EIP can become financially self-sufficient.

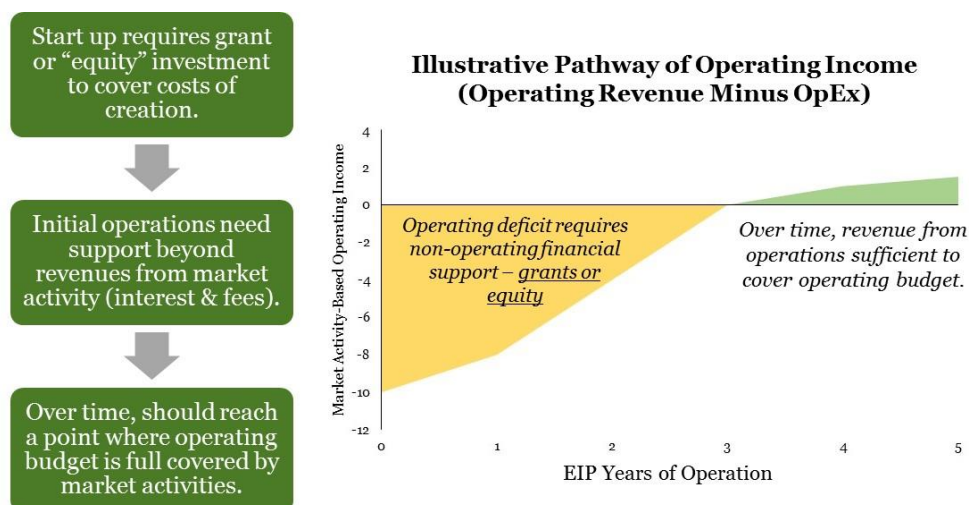
In addition to this initial operating capital, the EIP will need to raise lending capital to actually begin offering clean energy financing to the market. The objective of the EIP is to raise as much capital as possible at the least cost possible. Even if the EIP receives a large installment of lending capital at the day of launch, it will still take time to create the product and build the relationships that enable initial lending.

^{xvi} The Rhode Island Infrastructure Bank used the technique of subsidizing energy audits for municipal participants in their Efficient Buildings Fund. Providing free energy audits was an effective way of incentivizing government buildings to undertake and finance comprehensive energy upgrades in this program.



And then once that lending begins, it will take time to begin receiving interest payments and fees for service. And then it will take time to build the lending portfolio to sufficient scale so that the regular stream of interest payments, and related fees, is sufficient to cover the operating expenses of the organization. A Pennsylvania EIP's goal should be to achieve financial self-sufficiency, meaning operating revenues are equal to or greater than the operating expenses, as soon as possible. This progression of revenues and net operating outcomes are explained visually in the chart below.

Figure 13: EIP Pathway to Financial Self-Sufficiency



Based on this financial model and revenue/cost pathway, the EIP will need a specific fundraising plan to raise the appropriate capital for each stage of development. This plan is discussed further below.

Hiring Needs

The EIP will ultimately be defined by its executives and staff. The people that make up the EIP will create its culture, interpretation of EIP purpose, and forms of market engagement, and are critical to the success of the organization. Staffing models and hiring criteria should be considered from the outset. Filling the EIP chief executive position with an experienced commercial banker with deep finance experience produces a vastly different institution than would be produced by filling the position with a clean energy market expert familiar with the barriers to growth.

The NY Green Bank Business Development Report, which was the basis of the NY Green Bank creation, pointed to four general capability sets needed by a Green Bank: energy capabilities, finance capabilities, business development capabilities, and operational capabilities.³² Some of these capabilities can be developed over time, and some can be borrowed or outsourced. Below is a table that outlines several potential structures of an EIP, and how hiring decisions can be made in each case.

Based on this proposed operating model, the EIP should aim to hire two or three initial staff to operationalize and run the EIP much like a start-up organization. It should recruit entrepreneurial self-starters with experience or know-how in clean energy finance, markets, policy or outreach. Initial staff

should be intrinsically motivated by the mission of the organization, the opportunity to create something long-lasting and impactful.

One of the first hires should focus on communications and the other should focus on finance. The communications person should lead business development, sales, partnership building, government relations and business development. The finance person should focus on product design, deal flow management, and underwriting. One of these two should also be responsible for the organization's budget and operations. It is up to the Board of Directors of the entity which of these two staffers should lead the organization as the chief executive. A third person, if needed, can specifically focus on marketing, communications and contractor training and engagement.

Many administrative tasks can be shared internally among this staff to minimize costs. Multi-tasking and reducing overhead are critical for the organization's start-up phase. The EIP should also seek to procure low-cost online services for functions like HR and accounting, or even better, rely on other EIPs in the broader EIP community. There are many online payroll and HR services available for less than \$1000 per year, and similar accounting-as-a-service organizations specifically serving nonprofits.

Borrowing from Others

Other functions and critical know-how can and should be leveraged from the broader network of EIP and Green Bank actors. Many existing EIPs are happy and eager to help. They allow others to visit their offices and learn from past experience. They share content and materials and legal documents that can be replicated in Pennsylvania. They provide references to service providers and capital providers that might be useful. In addition, the Green Bank Network is a growing centralized resource of know-how about EIP activity around the globe. This includes examples of products, methods for evaluation, and databases of all past transactions. Templates for governance, operational, product development, and communications documents can be easily accessed via this network.

For specific operational needs, the Pennsylvania EIP should also seek to leverage existing resources and functions to cover operating expenses. For instance, the EIP could seek to share office space with another nonprofit, a government office, or a foundation—perhaps for free, or a modest fee. Or the EIP could explore sharing certain services directly with an existing Green Bank.

Start-Up Operations

The acting CEO, as the first staffer dedicated to launching the EIP, will have a long but important list of matters to attend to. This includes:

- Selecting and convening the Board of Directors;
- Drafting & adopting corporate governance materials, such as corporate bylaws, standard operating procedures, conflict of interest policies, employee handbooks, etc;
- Filing necessary forms and applications, such as IRS Form 1023 for 501(c)3 charitable designation;
- Finding and securing office space;



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- Opening an initial bank account;
 - Securing accounting services and creating financial statements;
 - Creating an initial logo/or basic branding;
 - Creating necessary work plans;
 - Launching a landing page website to secure the necessary domain space; and
 - Beginning outreach to key stakeholders in the clean energy community to build active relationships and lines of communications.

This set of activities can take 3-6 months, in addition to the more strategic and mission-oriented activities described in the section below. Though these tasks are administrative in nature, the organization cannot begin to function as a clean energy lender without them.

Governance

The Pennsylvania EIP should be overseen by a Board of Directors with a mix of clean energy financing experience and Pennsylvania-specific market knowledge. At founding, the size of the Board should be between three and five people. A start-up with limited funding and few staff should not have a Board larger than that. It is important to select Board members who are thoughtful and active advisors to the founding staff, but understand their role is not to be managers of the organization. The Board should be particularly focused on supporting fundraising efforts and tapping their existing networks to track down foundation and investment capital for the EIP. Otherwise, they should not be involved in day-to-day activity of the organization.

EIP Business Plan

Creating a business plan should be one of the first tasks the Board and acting CEO or the full-time executives should accomplish after the creation and staffing of the organization. A business plan is second in importance only to the organizing documents that create the EIP. The purpose of a business plan, or comprehensive plan, is to guide the operations of the EIP and provide a framework for decision-making for the organization's leaders. The business plan also provides an important reference for Board members, EIP partners, and outside stakeholders about the scope of activities in which the EIP will engage, and its manner of engagement.

An EIP's business plan should map out many of the details of the organization's mission and goals, product strategies, positioning, capital and pricing strategies, risk management approach, performance metrics, organization, resource requirements, and implementation plans. The Connecticut Green Bank publishes a new "Comprehensive Plan" every two years, and the New York Green Bank updates its Business Plan on annual basis.³³ The CGB and NYGB's business plans provide excellent models for Board members and executives of future EIPs that wish to compose a business plan.



EIP Budget

The acting CEO should create an organization pro forma budget laying out the first year's expenses and lending activity. It should reflect the best estimates of the cost of all facets of the organization, including staff, rent, insurance, internet, website creation, consulting and legal services, partnerships and other aspects of organization formation.

The budget should also include the expected initial level of financing activity based on the estimated or desired level of loan capital to be raised. The EIP should aim to be earning revenue on financing activity by the end of year one.

An estimated start-up budget for an EIP is \$2 million or more per year for the first few years based on activity of similar start-up nonprofit EIP organizations. These initial dollars would be used to fund the startup of the organization (including salaries, office rent, and supplies), while additional sources of funds would be necessary to supply lending capital to the EIP.

Data points and comparables indicate that the EIP should not spend more than 10% of its capital on operating expenses. For example, if the EIP is capitalized with \$20 million, it should allocate absolutely no more than \$2,000,000 per year toward its operating budget. Any more than that, and the ability for the EIP to earn sufficient revenue to cover its operating expenses is diminished. Every dollar spent on operating expenses is a dollar that cannot be used to provide finance, and therefore cannot earn revenue for the EIP.

This figure is derived from a survey of other EIPs and related entities.

- NYCEEC, a government-created nonprofit finance organization, was capitalized with an initial \$32 million, and its first-year operating budget was \$1.7 million. This is 5% of its capital. This is a very comparable organization size to seek to replicate.
- The Florida Solar Energy Loan fund, a small start-up nonprofit lender that raises PRI capital for on-lending, has a loan portfolio of \$6 million and runs a budget of \$650,000, roughly 11%. And this figure is continuing to decline in order to support sustainable operations. This is the strongest direct comparable for the start-up phase of the Green Bank.
- Finally, the NY Green Bank is not necessarily a perfect comparison because it was given a huge initial capitalization, so the ratios and pathway for scaling are different from the situation in Pennsylvania. But at the end of its first full fiscal year of operation, the NY Green Bank had been given \$215 million, and its operating budget was \$3.5 million or 1.7%. That number increased to 2.6% the next year.
- Legislation recently introduced in Washington, DC to create a Green Bank calls for a hard cap of \$750,000 annually on operating expenses. This is based on an initial capitalization of \$7,000,000, with an additional \$7,000,000 provided for four years following.

Taken together, alongside data points from other similar kinds of organizations, the EIP should seek to run an operating budget no greater than 10% of the capital it raises.



Fundraising

The acting CEO and the full-time staff will need to develop a fundraising plan. This includes seeking both philanthropic funds to initially staff and grow the organization and loan capital from a range of resources (discussed separately in this section). Raising even modest amounts of funding for initial operation (to pay for the salary of an acting CEO) is critical. This can be as little as \$10,000 to \$25,000 from individuals or board members to fund a few months of activity. As the EIP is a 501c3, or has the fiscal sponsorship of a 501c3, these kinds of contributions are tax deductible.

The organization should also develop a formal pitch deck to present to as many local, regional or national foundations as possible, though local and regional foundations should be prioritized. The pitch should include a clear articulation of how the funds will be used to scale up operations, what they will be spent and how that will fit into the broader budget that was previously prepared. Some funders may desire to contribute to specific aspects of the organization rather than provide general operating funds, which is acceptable. It is important for the fundraisers to recognize that asking for large sums of operating support (greater than \$100k) will be challenging as a first ask. It is more likely that a number of smaller sums will be needed to get to a point where more significant amounts of funds can be solicited. This includes seeking funding from government, which might be more inclined to extend a contract for services or provide a government grant if some basic architecture of the organization is already in place.

For fundraising loan capital, the EIP should establish an initial goal for an amount of capital needed. For instance, any amount less than \$10,000,000 will be insufficient to generate revenue that makes a tangible difference in the organization's operations. Modeling shows that an active portfolio of \$10 million of loans is the minimum level of capital needed to be a self-sustaining organization (\$10 million outstanding at 5% interest generates \$500,000, which could sustain a modest staff.) So any fundraising plan should aim to raise at least \$10 million of zero-cost lending capital as the target, or perhaps double or triple that amount of low-cost lending capital. This may not come through a single capital source, but maintaining focus on this goal will create a more linear and momentum-based fundraising effort. It is also wise to seek both operational grant funding and PRI loan funds from the same foundation source. This single ask could greatly simplify the fundraising activities.

Product Development

It is critical that the EIP bring its first product to market as quickly as possible. Public evidence and demonstration of progress and success is absolutely essential, and the sooner it arrives the better. Though the EIP will ultimately have multiple products, the staff can only have one top priority, so one product will have to be chosen as the first product to be developed and launched. This should ensure clear focus and efficiency, allowing this first product to be brought to market without delay.

Product development requires numerous specific activities. This includes initial product structuring, engagement with potential lending partners, engagement with product distributors, customer surveys, and financial modeling. It is necessary to build commercial relationships with capital providers and downstream partners to distribute and fund the product. Product development also includes creation of a go-to-market strategy that outlines the channel partners, advertising and detailed step-by-step process

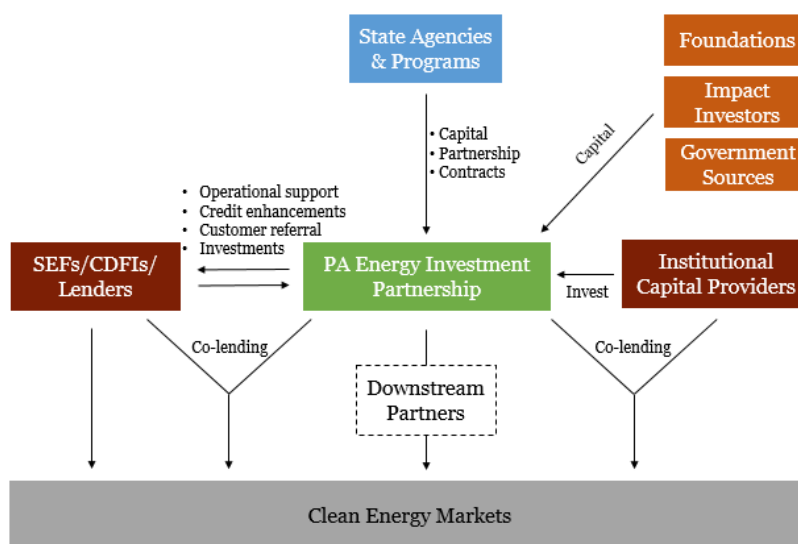


through which a product is offered, applied for, adopted and deployed, per the program mechanics. The successful outcome of the product development activity is the launch of the first financial product or market development solution that is commercially viable and attracts customers.

Relationship to Existing Landscape

A Pennsylvania EIP could have any manner of relationships with many different types of market participants and stakeholders. Several potential relationships with important stakeholders are outlined below.

Figure 14: Pennsylvania EIP Potential Relationships to Existing Landscape



As currently imagined, an EIP will collaborate with many market participants and government agencies to facilitate the improved operation of clean energy markets in Pennsylvania. The EIP could co-lend and provide marketing support for various existing clean energy programs such as CFA and the SEFs, as well as co-lending with various private lenders. The EIP would be open to investments from impact investors and mission-driven investors to help them earn an attractive return from various energy assets, and targeted product-specific investments from certain public entities to improve the effectiveness and reach of existing clean energy programs. The EIP could collaborate with contractors, and help them do more business with financing products. Part of the advantage of being an independent market-oriented entity is the flexibility to form new relationships and partnerships to respond to changing market needs.

Conclusion

The Pennsylvania clean energy market could benefit tremendously from an Energy Investment Partnership. An EIP could enable clean energy growth by offering finance products that target underserved markets, by drawing in more private capital, and by helping unify a fragmented clean energy program landscape.

An EIP in Pennsylvania might best serve the market by initially offering a residential solar financing product, a commercial solar financing product that supplements the CFA's Solar Energy Program, and a central website that provides resources and information for all clean energy market participants across the state. As discussed, beyond these market activities, the EIP could also administer PACE programs on for local governments that wish to participate, and could arrange QECB financing for county governments. Beyond these early-stage program offerings, an EIP could continue to broaden its programming to include other activities not specifically mentioned in this report such as creating a product for SREC aggregation.

A 501c3 is the optimal form for an EIP in Pennsylvania. The EIP could partner with public programs either through a financial or operational or marketing relationship. But because it would not be directly part of government, the EIP must have access to philanthropic grants, program-related investments, and other private, mission-driven capital for its operating and investing capital. As a 501c3 it would be able to receive philanthropic grants, which will be critical for its launch. The EIP should be viewed as a start-up, and should be run accordingly, with a business plan, budget, fundraising plan, and hiring plan to fit the organization. The EIP's product should be market-ready within a year, and ideally the EIP will generate enough revenue after three years to have net positive operating revenue.



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