Growing
the Maryland Clean Energy Economy

MARYLAND CLEAN ENERGY CENTER

Green Bank Study
Final Report

Delivered to the Maryland General Assembly
December 1, 2015

Prepared for the Maryland Clean Energy Center
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Town Creek Foundation

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The MCEC Board of Directors would like to express sincere appreciation to the Town Creek Foundation for supporting efforts to study and build financing solutions for clean energy improvements in Maryland.

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Letter from Green Bank Report Steering Committee Chairman & Maryland Clean Energy Center Board Member Anton Cohen

December 1, 2015

The Maryland Green Bank is a transformative opportunity for our state. As chair of the Maryland Clean Energy Center Green Bank Steering Committee, I see the clear opportunity for innovation advancement and job creation in the renewable energy sector in Maryland. The green bank model has proven to be a successful partnership between public and private sectors in other forward-thinking states, and could provide the same economic benefits to Maryland.

The findings of this report show that the public policy goals for renewable generation, energy efficiency implementation and greenhouse gas reduction set by state leaders cannot be met by public sector funding alone. Through various programs and policies, Maryland currently invests over $449 M in public funds, mostly in grants to achieve these goals. This report concludes that, to successfully address market demand, it is imperative to strategically leverage a percentage of that public investment with pragmatic financial solutions that will attract private capital investment.

I look forward to the potential implementation of a Maryland Green Bank, the recommended outcome of this study, which will enable stable, dependable and reasonable investment over time. The study recognizes MCEC as well positioned to continue serving as the green bank it has become with current financial product offerings in place.

Along with fellow members of the Maryland Clean Energy Center Board of Directors, I encourage you to support this initiative and its potential to benefit the residents, business owners, and tax payers of Maryland.

Sincerely,

Anton Cohen, CPA
Steering Committee Chair, MCEC Green Bank
Co-National Director, Renewable Energy Practice, CohnReznick LLP

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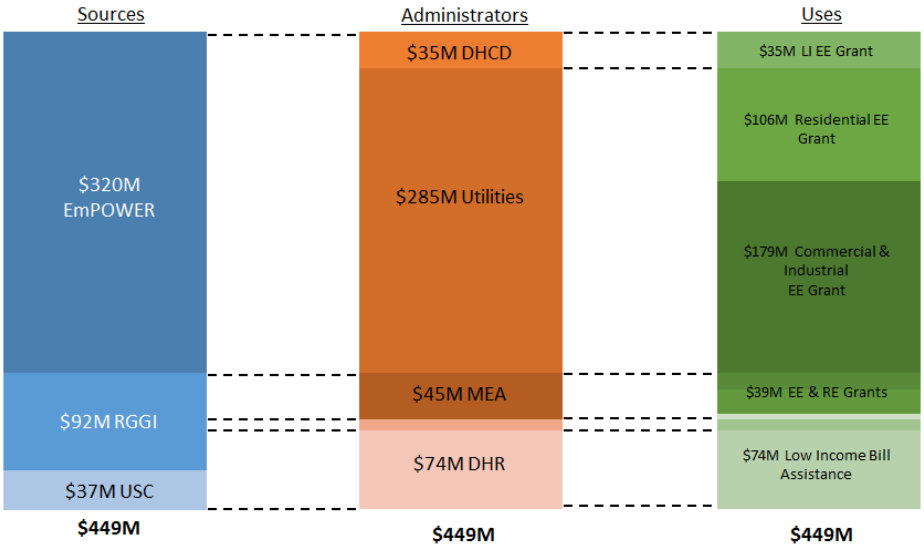
Executive Summary

With green bank financing, more Maryland businesses and households can lower their energy costs and use cleaner energy, without any out-of-pocket cost and with immediate cash flow savings. A Maryland green bank also means more demand for clean energy, which must be served by new and growing businesses. By opening up clean energy markets and stimulating more investment, green banks can be an engine for economic growth and job creation in the state. This second phase of Maryland's green bank study builds on the findings in Phase 1 – *there are significant gaps in the clean energy financing markets in the state; there is a need for greater market development support; and that a green bank can play these roles to stimulate clean energy market growth.* Phase 1 also found that *there is presently a need for more than $8 billion in clean energy investment to satisfy the state's Renewable Portfolio Standard and unlock economically viable energy efficiency.*

Public funding alone, clearly cannot address the need. Today, Maryland spends nearly half a billion dollars per year on clean energy programs, with effectively all of that capital going to grants and rebates. These programs play a vital role in attracting demand for adoption and raising awareness of clean energy. However, they largely are not designed to stimulate the private, third-party investment that is needed to truly bring markets to scale. For instance the large residential and commercial EmPOWER programs only leverage 31 cents of private investment for each public dollar used. Green bank financing can complement these grants, as it is specifically designed to maximize leverage. Green banks are capable of drawing in 10 dollars of private investment for each public dollar used. This way, each public dollar goes farther, getting more "bang for the buck" on taxpayer/ratepayer dollars.

Figure 1: Maryland Public Clean Energy Spending



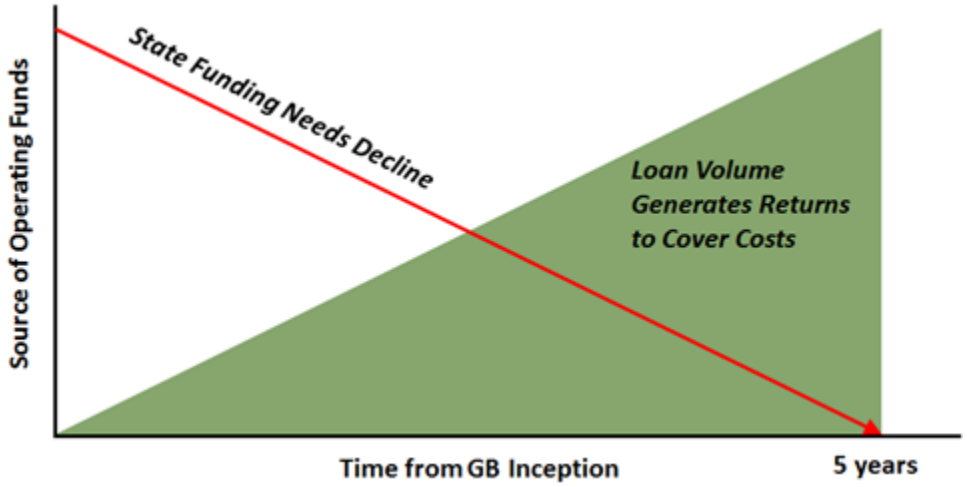
Leveraging public funding resources to attract additional private sector investment through a green bank model demonstrates efficiency in government. A green bank creates revenue-generating assets for the state, while grants require annual re-appropriation of funds. Loans are repaid with interest, and capital is preserved for further lending activity into the future. From the recipient's perspective, financing enables adoption with no upfront cost. And from the government's perspective, green banks are a way to preserve

public dollars in contrast to grant programs. Therefore green banks enable government to accomplish their object of growing clean energy penetration while reducing the permanent public expense.

In 2014, the state used $449 million on grant programs including $320 million for residential and commercial EmPOWER grants. Over its entire history, EmPOWER has spent $1.4 billion in total, and will continue to collect and spend hundreds of millions each year into the future. These programs are cost-effective, in that they produce efficiency at a lower price than other sources of electricity, and should remain a central component of Maryland's approach to clean energy development. However, grant programs are expensive for Maryland's citizens. When a grant is spent, the money is gone forever, and the only way to continue the grant program is to collect more money from citizens.

A $40 investment of public capital in a Maryland green bank would be sufficient to make a significant market impact and attract private capital. By leveraging these funds at multiples of 4 to 1, $40 M of public capital becomes $160 M of private investment. And given the state's $8 billion clean energy investment need, anything less than this amount would fail to make meaningful progress toward filling that gap.

Figure 2: Path to Maryland Green Bank Self Sustainability



A Maryland green bank will put money back into the pockets of citizens. Green bank financing enables more demand by allowing adoption with no upfront cost, meaning more customers can upgrade their buildings to obtain cheaper and cleaner energy. And, financing, when paired with existing grant programs, allows for much deeper retrofits than are currently achieved. So those interested in clean energy can save even more money than possible today. And because green banks preserve public capital with financing, a green bank can accomplish these market objectives at reduced expense for citizens.

A Maryland green bank will stimulate new businesses and jobs. With financing, the greatest barrier to demand and adoption of clean energy is eliminated. With new demand, there must be more contractors, services, and businesses to serve that demand. And because financing enables customers to perform deeper energy retrofits with more advanced technology, green banks can increase the size of a typical project. This means more savings for customers, as well as more revenue for businesses serving the market. Also, by partnering with private lenders, green banks create new profitable investment opportunities for the private sector. By drawing in private lenders that may be more comfortable investing in clean energy with credit enhancements to reduce the risk profile, green banks help investors participate in a new, growing market with enormous potential. A green bank also sends a signal to the clean energy industry regionally and

nationally that Maryland's clean energy economy is "open for business," which can attract leading clean energy providers and investors that may not yet operate in the state. By supporting clean tech innovation a green bank can facilitate business growth in an evolving industry sector.

A Maryland green bank will help address the critical gap faced by the low-to-moderate income sector, which is currently shut out of clean energy financing solutions. A green bank could unlock energy savings for those that need it most. A green bank can overcome the greatest barrier to clean energy adoption – the upfront cost – by facilitating 100% financing for clean energy technologies at reasonable rates and long terms. A Maryland green bank brings numerous benefits to the state. A green bank can use public dollars in innovative ways that leverage greater private investment per public dollar.

A Maryland green bank acting as a "concierge" to provide centralized access to resources and information will increase government efficiency, by helping coordinate state programs and support across agencies to make them more accessible for market participants. Today in Maryland, MEA, MCEC, five investor-owned utilities, DHCD and DHR all administer energy and clean energy-related programs for various market segments. This creates a complex and confusing landscape that consumers, businesses and contracts are left to navigate unassisted. Because green banks are solely focused on growing markets, a Maryland green bank is an ideal host for a new, unified and coordinate approach for market engagement. A green bank can coordinate its programs to ensure that any customer seeking financing can also get a grant, and vice versa. And a green bank can provide new information services, like a single point-of-access website for market participants to learn about energy and programs from all agencies. All green bank products and activities will be designed to be complementary to existing programs, enhancing performance for all agencies.

A Maryland green bank will also facilitate a more resilient grid by providing funding and technical assistance for microgrid and storage project development. And a green bank can also help to simulate new cleantech businesses in Maryland with annual competitive awards for equity investments.

A Maryland green bank will fill the critical market development gap by providing technical assistance, access to information and the institutional capacity, currently lacking in parts of Maryland, to guide market participants toward their optimal solution. Using a not-for-profit, apolitical entity serving as a green bank to provide critical technical assistance for various actors to learn how to actually adopt clean energy, will be especially helpful to municipal partners who lack the capacity to develop and execute energy saving project measures operate more efficiently, with a goal of building a mature market.

Maryland Clean Energy Center (MCEC) is well suited to fill the role of a Maryland green bank. To date, despite a broad legislative mandate to deliver on a related economic development mission, MCEC has not been provided with a consistent or dependable source of funds to operate or run financing programs. Since 2009 the instrumentality has been able to stimulate $37 million in private clean energy investment with only an initial infusion of approximately $4 million in public capital, and this has been achieved with a small staff of 4. Additional staff would be engaged over time to run both financing and market development programs. The required next steps to act on the recommendations in this green bank plan would be to identify and commit funds to MCEC for green bank activities. This would likely require legislation if it involved SEIF funds, QECB reallocation may only need executive action, and applying for federal funds requires no state action.

This Phase 2 study finds that, with an expanded financing and market development portfolio capable of accelerating clean energy deployment at lower cost to the state the Maryland Clean Energy Center, among all existing or potentially new green bank structures, is best suited for the role of the Maryland green bank. Its

statute is written in a fashion remarkably similar to that of other green banks, including its market-oriented mission and directives. MCEC already operates and promotes three financing programs that in effect are green bank financing products. Using MCEC as the state's green bank would be more efficient and practical than creating a whole new entity or repurposing one that is not already aligned toward green bank activity.

An MCEC green bank could improve upon and expand its current programs to make them more cost-effective and broaden their reach. MCEC could expand its overall program portfolio to enable financing in more markets, and cover more of the gaps found in the Phase 1 study. Current programs would allow more and deeper projects for residential single-family homes, and more financing options for non-profits, governments, schools, and hospitals. A new PACE financing program is already being rolled out for commercial building upgrades. All new products can be launched to finance upgrades for small businesses that struggle to find long-term financing for clean energy.

Table 1: Summary of Proposed Green Bank Programs

Program Type	Target Market	Program	Description
Financing Solutions	Residential Buildings	Enhanced MHELP Financing	Unsecured private loans, backed with loan loss reserve
	Large & Medium Commercial Buildings	M-PACE Financing	Private loan secured by lien
	Non-Profits & MUSH Market Projects	Expanded MCAP with Gap Financing	Bonds, gap loans, credit enhancements
	Small Businesses Projects	Loan Fund	Loans for projects <$100k
	Low-to-Moderate Income Households	Whole-Home Financing Solution	Likely combo of loan/ lease/ enhancement
	Grid Reliability	Microgrid & Storage Project Development & Deployment Support	Financing through bonds, technical assistance, and design study support.
	Cleantech Innovation	Business Development Award	Annual equity investment awards via associated program partners
Market Development	Market Development & Education	Technical Assistance Program	No financing – market support

There are a range of possible funding sources to capitalize a Maryland green bank. This includes the RGGI-funded Strategic Energy Investment Fund (SEIF), possible restructuring of EmPOWER rate collections, various bond structures, federal resources now available for green banks, and even a revamped settlement of the Exelon-Pepco merger. Among these options, by far the most accessible funds that can be drawn upon with least impact to existing activities is the SEIF, because the SEIF is presently running a fund surplus of over $30 million with additional surplus projected by MEA.[1] A green bank would be an ideal use of these unexpected and unused funds, and would not affect existing SEIF-funded programs. In addition, the SEIF is slated to receive $40 million in additional funds from the Cove Point LNG settlement. Also, there is nearly $50 million in unused allocations of federally subsidized Qualified Energy Conservation Bonds (QECBs) in the state. If MCEC were assigned the right to issue these completely unused bonds, the green bank could take advantage

[1] Maryland Energy Administration, Analysis of FY 2016 Maryland Executive Budget, 2015 (D13A13), at 24

of this access to low cost of financing that is currently unrealized by the state. And the green bank can also partner with state agencies to help deploy existing pools of capital, or help projects access federal funds.

$40 million in green bank funding should be invested into MCEC, with funds coming either all at once or spread out over time. And because green bank financing can be self-sustaining, with operating costs covered by financing proceeds, state funding need not be perpetual like other state activities. However, to effectively service related operations MCEC will need to grow as an organization, adding more staff and more capabilities.

Table 2: Green Bank Funding Plan Options

Option	Funding Plan	Capital Type	Allocation to Green Bank ($M)				
			Yr 1	Yr 2	Yr 3	Yr 4	Yr 5
Plan #1	All investment and operating capital allocated to GB upfront. 7-10% of that allocation used annually for operating expense. No further funds needed.	**Investment**	$40	$0	$0	$0	$0
		Operating	$0	$0	$0	$0	$0
Plan #2	Only investment capital allocated to GB upfront, plus annual operating allocation needed for 5 years, after which GB self-sustaining.	**Investment**	$30	$0	$0	$0	$0
		Operating	$3.4	$2.3	$2.0	$1.3	$1
Plan #3	Investment capital allocated to GB over 3 years, rather than all upfront. Annual operating capital still separate, with plan for self-sustainability in 5 years.	**Investment**	$10	$10	$10	$0	$0
		Operating	$3.4	$2.3	$2.0	$1.3	$1

Implementing a Maryland green bank would be a step toward faster clean energy market growth, greater investment and job creation in Maryland, and more money in the pockets of Maryland citizens. The green bank model has been proven to work with great success, and is being adopted or explored by over a dozen states in the country. With over $8 billion in clean energy investment needs, clearly new approaches are needed to both attract more private capital and facilitate widespread demand. Maryland is now well positioned to build in its past clean energy efforts by launching a green bank to fill market gaps and drive broader and faster market growth.

Chapter 1 – Phase 1 Findings & Phase 2 Process

In the spring of 2014, the Maryland General Assembly passed Senate Bill 985, directing the Maryland Clean Energy Center (MCEC) to conduct a study of the need, feasibility and role of a potential Maryland Green Bank. In addition to leading the study project, MCEC was also directed by legislation to collaborate with the Maryland Energy Administration (MEA) and the Coalition for Green Capital on project execution. The study was designed to be conducted in two phases, with the first phase assessing the need for a green bank, and the second phase identifying specific green bank structures, financing products and activities to be potentially implemented. The Phase 1 study ("Phase 1") was completed in 2014 and delivered to the General Assembly on December 1, 2014, as directed by the legislation. This study, prepared by the Cadmus Group, Catalyst Financial, the Center for Climate and Energy Solutions, and the National Association of State Energy Officials, concluded that Maryland does indeed exhibit a need for a green bank. This Phase 2 study ("Phase 2") was conducted over the second half of 2015, picking up where Phase 1 left off, with the goal of identifying specific implementation strategies and financing activities for a Maryland Green Bank. This report was delivered to the General Assembly on December 1, 2015, as directed by the legislation.

Phase 1 Study Findings

Phase 1 found that Maryland would benefit from the creation of a green bank. As stated in the report:

> Maryland will need to leverage private-sector capital in order to meet its more than $8 billion energy efficiency and renewable energy need. Many of the Maryland stakeholders that are facing financing gaps, like small businesses and low-to moderate-income residents are also those with the most need. A green bank could centralize and coordinate Maryland's many existing finance programs, fill the associated technical assistance gaps, leverage private-sector capital to address the State's outstanding clean energy needs, and create jobs. Green banks in other states, like New York and Connecticut, provide models of how this can be done successfully.[2]

This conclusion was reached based on an assessment of the existing set of state programs, private financing activity, and remaining gaps in support for clean energy market development.

Investment Need Found

Phase 1 found that, $5.7 billion of investment in renewable energy generation is called for in order to meet the state's mandated Renewable Portfolio Standard.

In order to identify the existing financing gaps in the state, Phase 1 assessed the full market size of potential investment opportunity/need to penetrate the economically viable clean energy markets. In addition, previous market analyses cited in Phase 1 had determined that there are approximately $2.6 billion in cost-effective efficiency investment opportunities in the state. Therefore the state's clean energy investment need is over $8 billion, far surpassing the current investment generated by public programs. As stated in Phase 1:

[2] Maryland Clean Energy Center, "Blueprint for Building the Energy Economy in Maryland: Green Bank Preliminary Findings Report," December 1, 2014 (Phase 1 Study), at 2.

> At an average of $20 million in lending per year, the amount of financing available through these programs is insufficient to meet the State's energy efficiency and renewable energy financing needs. Private-sector capital will need to be leverage to meet this need.[3]

Financing Gaps Identified

Phase 1 found specific and noteworthy gaps in private and public financing for certain parts of the Maryland clean energy markets. These segments of the market were unaddressed by existing public programs and struggled to access ample and affordable financing from private lenders. The specific financing gaps identified included:

- Financing for small commercial and small business upgrade projects between $5,000 and $2,000,000 in cost;
- Financing for low-to-moderate income residential projects;
- Small municipal projects between $50,000 and $1,000,000; and
- Emerging clean energy technologies across all sectors.

In each of these cases, new financing solutions are needed to enable market growth and penetration of significant market potential for energy savings.

Market Development Gaps Identified

In addition to market-specific financing gaps, Phase 1 found that there are gaps in other forms of support for clean energy market development. As clean energy markets are fairly nascent, and many technologies are just now becoming economically viable, there are still obstacles to reaching market maturity that could be filled by a green bank. These include:

- The need for more education and awareness of clean energy technology adoption and saving opportunities;
- Market and industry capacity building to serve a growing market;
- Technical assistance to guide new market participants through sometimes complex technology procurement, project design and project financing;
- Coordination of multiple agencies and government entities to minimize market confusion and deliver efficient services; and
- Increased standardization of market activities and documents to streamline transactions.

Addressing these market development gaps is essential to building demand for clean energy solutions. Green bank financing solutions can only be successfully deployed and widely adopted if they are delivered to an educated and efficient market.

Phase 2 Process

Phase 2 was led by MCEC and overseen by a Steering Committee assembled from leaders in relevant industries, as well as various government representatives, in Maryland. The Steering Committee's role was to provide guidance and feedback on specific components of the green bank organization and product design and ensure the green bank proposal was aimed at filling market gaps. Steering Committee members (listed at the beginning of the report) came from state government, utilities, non-profit organizations, energy efficiency and renewable energy contractors and installers; energy services companies (ESCOs), industry associations, and other groups critical to designing an inclusive green bank proposal. The Committee was

[3] Phase 1 Study, at 23.

chaired by Anton Cohen of CohnReznick, also an MCEC board member. The Steering Committee met on three occasions – September 29, October 21 and November 17 – to review specific green bank proposals related to financing products, market development tools, organization structure, and funding approach.

In addition to Steering Committee input, MCEC held three Stakeholder Meetings on October 7 and 8, to vet early study findings and get specific guidance from industry participants. Each of the three meetings was designated for three distinct groups: industry and market participants, the banking and finance community, and municipal governments and clean energy advocates. Participating stakeholders were presented with initial drafts of possible green bank products and structures, and asked to give feedback based on their specific viewpoints and experience in the clean energy space. This input was critical to uncovering specific aspects of the green bank proposal that were most valuable, and ensuring that the most important market gaps were filled by the green bank.

In sum, over the course of several months, the green bank concepts and products presented in this report were viewed, edited and refined six times by Maryland's leading clean energy experts and practitioners.

Chapter 2 – Maryland Clean Energy Market Review

Maryland has long supported the development and growth of clean energy markets, including renewable energy and energy efficiency. By adopting clean energy, Maryland citizens can reduce their energy bills, get cleaner and healthier energy, and make their energy system more reliable. For many years clean energy was viewed as an expensive alternative, only suitable for wealthy or those politically inclined to support the environment. However, that framing has been radically altered with the rapid decline in the cost of certain clean energy technologies. Now, clean energy can and should be available to all citizens while *also* making energy cheaper. The economically viable market size for renewable energy and energy efficiency technology in Maryland is over $8 billion. The current set of policies and programs in Maryland can certainly help cause initial market penetration, but to cause truly meaningful market penetration, a massive surge in public and private investment is needed, along with better coordination of programs across agencies.

Clean Energy Market Size & Potential for Investment

There are a number of ways to measure the market size for clean energy technologies. One simple way is to look to state laws and requirements, which may state that a certain amount of a renewable technology must be deployed by a specific year. In the case of Maryland, that means looking to the state's Renewable Portfolio Standard (RPS), which requires 20% of all electricity to come from renewable sources by 2022, and for 2% to specifically come from solar by 2020. By definition, achieving this standard will require the construction of new renewable generation capacity to produce the necessary number of MWh's of clean electricity. Or, stated simply, an RPS is also a mandate for capital investment. As stated in Phase 1, meeting Maryland's standard requires $5.7 billion in investment.

Figure 3: Summary of State Climate & Energy Goals

- Renewable Portfolio Standard
  - 20% of all retail electricity sales from renewables by 2022
  - 2% of all retail electricity sales from solar PV by 2020
- EmPOWER Maryland Efficiency Goals
  - 15% reduction in per capita energy consumption from 2007 to 2015
  - Post-2015, 2% annual reduction in electricity sales staring in 2018
- Greenhouse Gas Emissions Reduction
  - 25% reduction in emissions from 2006 levels by 2020.

It is important to recognize that the need for billions in investment *capital* is entirely separate from the question of what the potential *cost* to ratepayers will be. Investment capital is not in itself a cost – it earns a return and is repaid. So investment in a clean energy project creates an asset that retains and earns value. The link to potential ratepayer impact is dependent on the cost of the technology and the cost of the capital that is invested. The cost of technology and financing terms determine the price of electricity from a given project. Thankfully the cost of clean energy technology has fallen rapidly, particularly with solar PV, so that under reasonable financing terms the resulting price of power is competitive with current utility rates. So Maryland can reach its RPS mandates without necessarily increasing the price of electricity or harming ratepayers. But, as stated above, this holds true only with investment capital that is reasonably priced. This means interest rates commensurate with risk, and long terms of expected repayment that match the lifespan

of a given project. With adequate and reasonably priced capital to fill the $5.7 billion investment need for renewables, Maryland can meet its objectives without harming ratepayers.

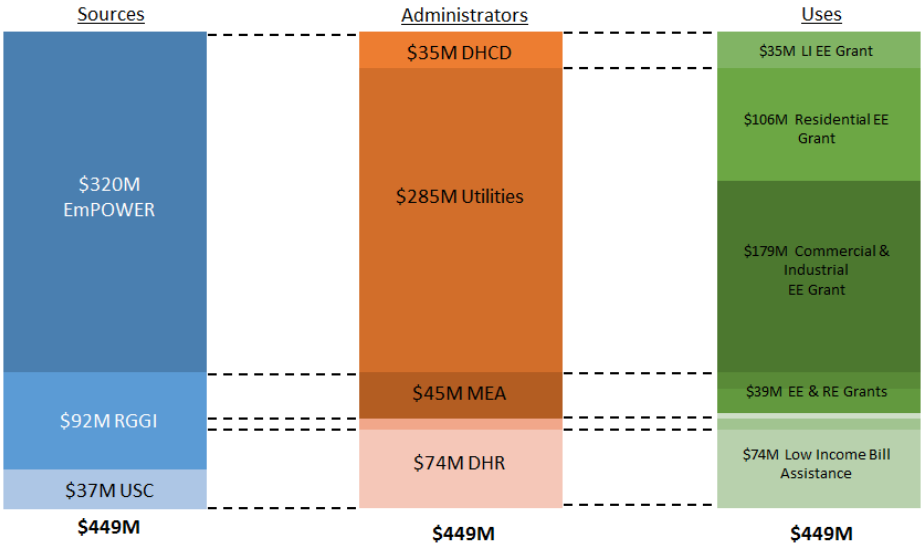
The state's energy efficiency investment potential, found to be $2.6 billion in Phase 1, is not based on a state mandate but rather on economic viability. While the cost of renewable technology has had to fall by a significant amount to make it cost-effective, energy efficiency today is already cost effective in many applications. Building upgrades specifically are highly cost effective, with a range of possible technologies allowing building owners to reduce energy bills and generate a net savings. This savings opportunity can only be realized, though, with an upfront capital investment in the project. Though the vast majority of existing buildings in the state can likely benefit from an efficiency upgrade, that potential cannot be meaningfully penetrated without the investment capital ($2.6 billion of it) to pay for the efficiency measures.

The total market potential of over $8 billion in clean energy investments represents both a profitable investment opportunity *and* a path toward lowering energy bills for Maryland citizens. This outcome can be achieved by substituting fossil-fuel based energy with cost-competitive renewable energy *and* lowering the total amount of energy consumed through energy efficiency. But it all depends on finding sufficient capital as reasonable costs.

Current Flow of Public Capital for Energy

In 2014, $449 million of Maryland public dollars were used to support clean energy deployment or pay citizen electric bills. Effectively 100% of those dollars were spent on grants or bill assistance – nearly half a billion dollars were collected and then spent in a single year, with the process to repeat itself again the next year. These dollars were collected through three primary channels.

***Figure 4: Maryland Clean Energy Program Cash Flow*[4]**



The first and largest avenue for collecting funds is the EmPOWER surcharge collected by in-state utilities. In total the 2014 EmPOWER program spending (and resulting ratepayer collection) was $320 million.[5] $285

[4] In the Administrator column, not shown are $2.7M for DHCD, $3.5M for Department of Health & Mental Hygiene, $3.3M for Department of the Environment, and $0.4M for Department of General Services, all coming from RGGI proceeds. In the Uses column, not shown are the $9.9M listed above, and $5.9M in MEA administrative costs.

million of those funds stayed with the utilities, which then spent the dollars in the form of energy efficiency grants. These grant programs targeted residential and commercial customers, and were intended to spark adoption of efficient technologies. The remaining $35 million of EmPOWER funds went to Maryland's Department of Housing and Community Development (DHCD). DHCD used the funds to pay for efficiency measures through the Low Income Energy Efficiency Program (LIEEP).[6]

The second largest pool of funding for public energy programs was the proceeds for Regional Greenhouse Gas Initiative (RGGI) auctions of emissions allowances. All RGGI proceeds go into the state's Strategy Energy Investment Fund (SEIF). In 2014 (FY15) RGGI brought in $92 M (this number typically is between $80 and $90 million), and the funds were allocated between various programs according to statutory formula. Small amounts from this pool were given to DHCD and the Department of the Environment, but the largest portions went to MEA and the Department of Human Resources (DHR). In FY15 $45 million was allocated to MEA to support a long list of energy efficiency and renewable energy grant programs, as well as to cover the administrative costs of MEA. And $37 million was allocated to DHR to for low-income energy bill assistance.[7]

Table 3: Strategic Energy Investment Fund Allocation Formula[8]

Funding Category	% by Rule	FY15 Appropriation	Planned FY16 Allowance
Energy Assistance	50%	$37.2 Million	$34.8 Million
Low-to-Moderate Income Energy Efficiency	10% (>=50% EE)	$11.8 Million	$12.1 Million
All Sector Energy Efficiency	10%	$10.2 Million	$8.9 Million
Renewable Energy/Climate Change/Resiliency	20%	$26.1 Million	$20.1 Million
MEA Administration	10%	$6.3 Million	$5.4 Million
Total	100%	$91.6 Million	$81.8 Million

The final pool of public funding for energy programs is state Universal Service Charge, which ratepayers also fund to pay for low-income energy bill assistance. In 2014 the Universal Service Charge collected $37 million, which when pooled with the $37 million from RGGI, totaled over $74 million to be distributed through the Electric Universal Service Program (EUSP). [9]

Of the $449 million in total funds collected, $121 million are specifically used to support low-income households, either with direct bill payment or efficiency installation. And the remaining funds are used to support a range of renewable and efficiency grant programs across a wide range of market segments. The

[5] The EmPOWER Maryland Energy Efficiency Act Standard Report of 2015, April 2015. Does not include $72 million in spending on Demand Response programs.
[6] EmPOWER Maryland Energy Efficiency Act Standard Report of 2015," April 2015, at Table 22.
[7] Maryland Energy Administration FY2016 Operating Budget Documents, at 22.
[8] Maryland Energy Administration FY2016 Operating Budget Documents, at 23.
[9] Maryland DHR Family Investment Administration Office of Home Energy Programs, Electric Universal Service Program Proposed Operations Plan for FY 2016, Submitted to the Maryland Public Service Commission, at 2.

biggest single pools are the $179 million of EmPOWER funds used to offer commercial building efficiency grants, and $106 million of EmPOWER funds used to offer residential building efficiency grants.

The state also receives federal funding to support energy programs. This includes State Energy Program dollars from the Department of Energy, as well as weatherization and low-income bill assistance funds.

Current Set of Public Grant & Financing Programs

Phase 1 included a detailed cataloguing of the current set of specific grant programs that are funded with the public dollars described above. Phase 1 also reviewed the small set of existing financing programs that that were created over the last several years to support clean energy deployment. These include the Be SMART loan programs run by DHCD, and seeded with federal ARRA funds; the Jane E. Lawton Conservation loan program operated by MEA; and the financing programs already offered by MCEC.

Taken in sum, the program catalogue from Phase 1 and funds analysis point to one very clear conclusion – ***the state's current set of clean energy programs are effectively all grant programs, and the state allocates none of its nearly half a billion dollars of annual public spending toward financing.*** Given the massive, $8 billion clean energy investment need, this current set of programs and allocation of funding is not designed to penetrate this market potential quickly or minimize the number of public dollars needed to do so.

The Role of Grants

There is a long track of record of states using grants, rebates and cash incentives to spur adoption of clean energy technologies. Maryland's EmPOWER efficiency grant programs were created 7 years ago in 2008 and have already spent $1.4 billion of ratepayer dollars.[10] And with that spending, the state has installed efficiency measures that will yield over $4 billion in lifetime savings, making those investments cost-effective. Maryland's grant programs have demonstrated a strong track record of success and have allowed the state to make meaningful progress towards its efficiency goals.

Though the programs are cost-effective, it is also important to understand the economic and market role that grants play. As stated earlier, most energy efficiency is already cost effective today. As a simple illustrative example, by installing a technology that costs $100, a homeowner may save $150 on his/her electric bill. The net savings are $50. This means that if consumers were purely economically rational, demand for energy efficiency would be enormous, with building owners clamoring to get their net energy savings. **However, for a range of behavioral reasons energy efficiency demand and adoption is incredibly low. These barriers include:**

- **The upfront cost of the technology;**
- **The long payback periods required to accumulate savings that exceed the cost of the installation;**
- **The implicitly high discount rate that many individuals use when considering future savings; and**
- **Lack of faith that savings will be realized, among many others.**

These barriers and the slow adoption of efficiency led to the creation of grant and rebate programs intended to spur demand. In effect, grants for efficiency are a marketing tool, intended to entice a customer to do something they might not otherwise do. *Energy efficiency grants are not economically necessary*. Because energy efficiency is already cost effective on its own, grants are not needed to bring down the cost of the technology. Grants are designed to stimulate adoption that otherwise might be stifled by the barriers listed.

[10] EmPOWER Maryland Energy Efficiency Act Standard Report of 2015," April 2015.

This economic reality may lead to two conclusions. The first is that efficiency grants should be viewed as an operating expense (e.g. marketing), rather than a direct investment in technology. And the second is that the state should seek to spend the least amount of money on marketing as is needed to achieve the desired amount of market adoption. From the state's perspective, if it can convince 10 homes to adopt energy efficiency by offering $100 in grants, or it can convince 10 homes to adopt energy efficiency by offering $50 in grants, it is always better to offer $50 in grants, so as to minimize the necessary public expenditure.

Efficiency grants are a permanent expense. Once a grant is paid, that money is not coming back. It is not an investment that earns a return. Grants certainly generate benefits for the recipient and can have a broader positive economic effect. However, from a government cash flow perspective, grants are an annual cost to taxpayers/ratepayers. Yes, the expense may generate a benefit that exceeds the expense (as energy efficiency grant programs typically do), but the form in which in the money is spent is still a permanent expense that is never paid back to the utility/state/ratepayers. There may be segments of the population where public spending on energy efficiency is actually more akin to a direct investment, like for low-income populations. In some cases it may make sense for an efficiency program to be designed to pay for a sizable portion of the cost of an installation.

Grants for renewable energy adoption play a slightly different economic role than do grants for efficiency. For most of their history, renewable energy technologies were so costly that the effective price of electricity generated by that technology was more expensive than the price of grid-based electricity. Grants for renewables then, were (and in many cases still are) necessary for economic purposes. Though a grant may be offered as an upfront payment to offset the upfront cost of the technology, the true economic impact of that upfront grant is that it lowers the effective price of electricity coming from that system in order to make it more economically competitive with grid power. Grants for renewables do likely have an important marketing affect that stimulate interest in adoption, but their most important function is making renewables cost effective. Just like with efficiency grants, a state should reasonably aim to use the least amount of public dollars necessary to stimulate a desired amount of renewables adoption.

The Importance of Financing

As stated above, effectively 100% of the $449 million collected in 2014 to support energy programs was used to provide grants. Very little new funding went to financing programs. However, financing plays a critical role in spurring adoption of clean energy because it addresses the number one barrier to adoption – the upfront cost. A 5kw solar system at $3.50/w installation cost has a total system cost of $17,500. The federal Investment Tax Credit will cover 30% of that cost, but it is not paid to the owner of the system until well after it is built. MEA's Residential Clean Energy Grant Program offers a $1,000 grant for a solar system of this size.[11] Even if this is paid prior to project payment (which it typically is not), that still leaves $16,500 in out-of-pocket cost to the system owner. This huge upfront payment is untenable to a vast majority of the population and greatly reduces potential adoption. Just like in housing or automobiles, financing to cover the upfront cost of the purchase is critical. A residential rooftop solar PV system is similar in cost to a small automobile, and in Q1 2015, 84.9% of all new vehicles were purchased with financing.[12] There is little reason to think clean energy adoption patterns would differ significantly.

Without available financing, most potential clean energy customers will simply be unable to afford adoption. But even those that do have the cash on hand will be forced to assess the purchase through the lens of "payback period." Through this lens, a person considering clean energy adoption will calculate how many

[11] MEA, Residential Clean Energy Grant Program, as viewed November 3, 2015.
[12] Melinda Zabritski, "State of the Automotive Finance Market – First Quarter 2015," Experian.

years it will take for the total savings created by their clean energy purchase to match the upfront cost of the installation. Businesses and consumers are attracted to short payback periods, and typically will not go through with a purchase that has a payback period greater than four or five years. Unfortunately, the great majority of clean energy projects have a payback period far greater than five years.

Some energy efficiency technologies have a short payback period. Lighting, for instance, may pay for itself in less than two years. However, lighting is a relatively shallow retrofit and does not significantly reduce a building's overall energy consumption. Multi-measure, deep retrofits or renewable energy projects typically have payback periods greater than ten years. These kinds of projects are really only viable if there is financing to pay for the upfront cost.

Financing overcomes the challenge presented by the payback period lens because it makes payback period a moot metric. If 100% of the upfront costs are paid for through financing, then there is no out of pocket cost that must be overcome over time through the accumulation of savings. Payback period does not exist on a project that is 100% financed. Instead, what becomes critical is cash flow, and specifically, that a project is net cash flow positive throughout. A project that is net cash flow positive is one that is financed, and where the total savings from the project exceed the financing repayment. If a project saves $100 in the first month, and has a $60 loan repayment, then the net savings are $40 and the project is net cash flow positive.

With financing, a potential customer's decision-making framework becomes much simpler – do the financing terms offered allow the monthly payments to be less than the projected total amount of savings? This points not only to the need for capital, but the need for *appropriately priced capital*. Financing capital offered at 3 years and 10% interest will not yield a net cash flow positive project. But financing offered at a tenure that matches the life of the project and an interest rate that is commensurate with the technology and repayment risk will almost always yield a net cash flow positive scenario.

Grants and financing have a positive interactive effect when paired. For renewable energy projects, financing is a logical and essential tool to be offered alongside a grant. When considering the MEA grant program, the $1,000 grant helps make the project cost competitive, and then the financing helps the customer actually pay for the technology. In this situation, the grant is what makes customers even consider solar adoption (as little adoption can be expected if renewable electricity has a higher price than grid electricity). And the financing is what actually allows them to *buy* the solar system.

In the case of efficiency projects, financing may actually allow grants to be reduced, reducing public expenditure. As efficiency grants are effectively used for marketing purposes and stimulating demand, financing can help reduce the marketing burden carried by grants. This is because financing address the primary inhibitor to demand, which is the upfront cost. If a customer knows that s/he will have no out of pocket cost to pay for an efficiency project, then that customer may also need less of an enticement in the form of a grant to consider the purchase. This is particularly true for a deep, multi-measure project, which is really only feasible with financing. To induce a deep retrofit project with just grants will likely require the grant to shift from a marketing tool to a direct investment tool, where the state effectively ends up paying for the project itself. Economically speaking, this is an inefficient use of public capital, as the project is cost-effective and could be paid for using public or private financing. In the case of private financing, there is no

cost at all to the state. And in the case of public financing, the public dollars being used are preserved and repaid, which is, in effect, infinitely less expensive than a grant.[13]

Financing cannot be offered in a vacuum. Financing must be well marketed and brought to customers in tandem with the technologies themselves, and grants if they are available. The most effective financing programs are those that are turn-key and easily adoptable by customers with minimal red-tape or administrative burden placed on the customer. For instance, MCEC's residential financing program is offered to customer directly through contractors who are closely trained on how to describe and sell their services with financing. Simply making capital available is not sufficient to stimulate demand.

In sum, financing is an essential part of any plan for significant clean energy market growth, because:

- the upfront cost of clean energy technology is the greatest barrier to adoption;
- 100% financing eliminates the upfront cost associated with clean energy;
- Financing eliminates the need to meet short payback period requirements;
- And financing enables customers to be net cash flow positive immediately.

Leverage & Impact of Current Programs

There are many ways to measure the effectiveness of clean energy programs. One can test whether they are cost effective; how much of the potential market they penetrate, how efficiently the dollars are used; or how much private investment the public dollars leverage. By some measures, the current set of Maryland programs are successful. But other measures show that there is great room for improvement, both in terms of market penetration and efficient use of public funds.

For instance, the standard regulatory test applied to measure the effectiveness of the EmPOWER efficiency grant programs is the Total Resource Cost (TRC) test. This is a pure and simple cost-benefit assessment that tests if the benefits of the program exceed the costs. Program costs include both the cost of administering the program and the cost of the efficiency measures installed. Importantly, this assessment considers *the full cost of the installation, borne by both the utility (in the form of a grant) and by the participant (in the form of private investment*). This test is indifferent to who pays for an efficiency measure – if a utility grant covers 100% of the technology cost or 10% of the technology cost, it does not matter. This difference will not show up in the TRC. This does not make TRC irrelevant – in fact it is an excellent measure of whether or not the administrative costs of running a program are so great that they overwhelm the inherent economic cost-effectiveness of efficiency grants. In 2014, the residential and commercial sector grants offered by utilities had TRC ratio of 1.81. This means that $1.81 of benefit was created for each dollar of cost – where cost includes the administrative cost and the full cost of the measure. This measurement confirms that the administrative costs of running EmPOWER do not exceed the benefits created.[14]

However, the TRC cannot be relied upon to help the state the most efficient way to use public dollars. TRC does not tell policymakers and regulators if the grants offered by utilities cover more of the technology cost than is needed. The leverage ratio of private investment per public dollar is better suited for this kind of assessment.

[13] This is not meant to be hyperbole. A grant of $50 costs the state $50 – it is a 100% expense. A $50 loan made by the state will be worth *more* than $50 when the loan is repaid. From the state's perspective, the different between a grant and a loan is total loss compared to increased asset value.

[14] EmPOWER Maryland, Cost Effectiveness Results for 2014 Energy Efficiency Programs in Maryland, Final, September 10, 2015, Presented by Cadmus, at 6.

In 2014 that total cost of all residential and commercial EmPOWER programs across utilities was $374,402,170.[15] The reported utility spending for those programs was $284,536,302.[16] This means the private "participant cost" for these programs was $89,865,868. This means that utility programs, on average, are covering 76% of the cost of installed technologies. This also means that every dollar of public investment is leveraging 31 cents of private investment.[17] Given that these programs are used to stimulate projects that are cost-effective on their own without any grants, it is possible to imagine the same number of dollars being used to support an even greater number of projects.

Maryland's existing clean energy finance programs achieve greater leverage. MCEC's MHELP program achieves significant leverage, using $3.44 million in credit enhancements to drive $22.2 million in private lending. MCEC's MCAP program draws in $14.8 million in private capital through tax-exempt bond issuances to finance clean energy projects. These projects in sum have generated $37 million in investment in clean energy with a leverage ratio greater than 10-to-1.

Public Sector Coordination and Market Development

Maryland has clearly made a significant commitment to supporting clean energy market growth, as measured by the hundreds of millions of dollars spent every year on clean energy programs. However, one challenge created by the broad set of programs and support offered by the state is that it can be complex for consumers to navigate and understand how to actually procure clean energy. Across multiple utilities, MCEC, MEA, DHCD and DHR market actors must work with at least half a dozen separate entities to maximize benefits and understand opportunities. Multiple websites with differing information are rarely coordinated, preventing the state from presenting a unified and easily-navigable interface with the markets.

To truly turn the clean energy sector into a highly functional market, there must be far more coordination, simplicity and communication between government, market actors and customers. This includes easy access to information, close coordination between programs offered by different entities, and turn-key solutions that can be delivered to customers with little hassle.

All elements of the state's clean energy effort should be designed to reduce barriers to demand, which in some cases includes public programs themselves. Financing, grants, information, origination and installation can work together to maximize market penetration per public dollar. Any move toward increased public-private financing in Maryland should, therefore, also include an effort to facilitate cross-agency coordination, technical assistance for market actors, and access to information for customers through a central entity.

[15] EmPOWER Maryland, Cost Effectiveness Results for 2014 Energy Efficiency Programs in Maryland, Final, September 10, 2015, Presented by Cadmus, at 6.
[16] The EmPOWER Maryland Energy Efficiency Act Standard Report of 2015, at 26, Table 22.
[17] Data is not presently available to perform this analysis on all Maryland clean energy grant programs.

Chapter 3 – The Green Bank Model

A green bank is a public or quasi-public institution that finances the deployment of renewable energy, energy efficiency, and other clean energy projects in partnership with private lenders. Green banks are capitalized with public funds, which are then used to offer loans, leases, credit enhancements and other financing services to close gaps in the private capital markets for clean energy projects. Green banks invest in the project deployment of mature, commercially viable technologies – not in early stage tech or in clean energy companies. The goal of a green bank is to accelerate the deployment of clean energy by removing the upfront cost of adoption, leveraging greater private investment in clean energy, and increasing the efficiency of public dollars. Through green banks, consumers and businesses can install clean energy technologies with no upfront cost while reducing energy costs. And because public dollars are used for financing, rather than grants, all public dollars are preserved through loan repayment. For a number of reasons discussed below, economically viable, low-risk clean energy projects are often unable to access affordable private financing. Green bank financing methods "crowd-in" private capital to fill financing gaps by reducing real and perceived risk, and allowing private investors the chance to learn about a new market opportunity with the security of government partnership. As private lenders gain experience and information about the processes, risks and addressable market size in clean energy, they can become increasingly comfortable and confident lending into these markets. Green banks have shown that with experience and data, private investors are more eager to enter clean energy markets at scale, ultimately without any green bank support.

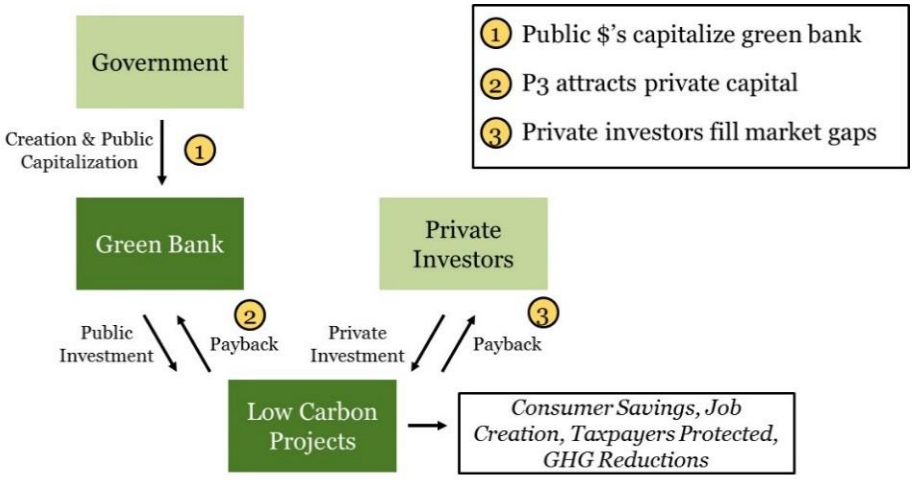
Green banks and public clean energy financing programs are increasingly common across the U.S., as governments recognize the importance of financing in addition to traditional grant models. Historically, many governments have supported the adoption of mature clean energy technologies by offering incentives, rebates, tax credits and other forms of subsidies. These programs have been effective in improving the economics of clean energy installation (primarily for renewables) and stimulating demand among consumers.

However, rebate programs have two primary weaknesses that financing can address. The first is that rebates traditionally only cover a small portion of a project's cost. If a rebate covers $2,000 of a $15,000 efficiency project, for example, then the customer still must find $13,000 in cash. This requirement for upfront, out-of-pocket cash stands as a significant barrier to adoption. The second problem with grants is that they are expensive, as they are permanent expenditures of taxpayer dollars. To bring clean energy markets to meaningful scale using grants would require more public expenditure than is available or politically viable. Therefore new program solutions are needed that address upfront costs for consumers and the expense of public capital.

Green Bank Organization

A green bank is effectively a public fund used to offer financing and support the growth of clean energy capital markets. The green bank institution that manages the fund is typically directly part of government, contracted by government, or is a quasi-public entity. The green bank fund is traditionally capitalized with public dollars (though other alternative capital sources can be considered).

Figure 5: Green Bank Structure Diagram



The green bank, through government direction and internal governance, determines how the capital should be invested in order to grow clean energy markets and attract private investment. Green banks invest in partnership with private lenders in projects. Private lenders would not invest into the green bank itself, but rather in a specific project alongside a green bank. Green banks are able to attract private lenders through broad engagement and building partnerships. Lenders may range from local credit unions and community banks to large institutional investors. Different lenders are well suited for different kinds of investment structures, but in all cases the green bank must actively seek out and solicit partnerships. For instance, a green bank that seeks to encourage lending for single-family home energy efficiency retrofits may partner with local lenders who know that community. But if a green bank wants to build a warehouse facility to originate loans itself, it may seek out an institutional investor to help seed that warehouse. To date the most successful green banks or similar clean energy financing programs are ones that actively seek out private lending partners. Less robust public financing programs that rely on private lenders to enter the market without encouragement and engagement (financial or otherwise) are often left with minimal lending activity.

The precise terms, structure and ratio of public to private capital are determined through programmatic design and individual project conditions. Green bank management works closely with private lenders to understand their needs and hesitations to entering the clean energy project finance market. That way financing products can be designed that address those obstacles and allow private investors to move into the market. Green banks look to use as little capital as needed to draw in private investment at scale.

Green Bank Operating Principles

Green bank's aim to grow clean energy markets by *enabling* market forces. They use public sector tools to allow private markets to grow to scale. A green bank is not considered a success by merely existing. Success comes from executing and achieving actual deployment and penetration of clean energy markets. And green banks aim to achieve this goal by using public dollars as wisely and efficiently as possible with careful concern for the flow of value between taxpayers, customers and businesses. Unlike many existing energy efficiency grant programs that purely focus on whether a measure is cost-effective, green banks are concerned with cost effectiveness *and* the question of who pays. Given the limited nature of public capital and the power and speed that come from market forces, green banks seek to bring clean energy markets to truly meaningful scale by deploying the cleanest energy possible with the public dollars used as efficiently as possible. Green banks are tied together by these common operating principles

Market-focused Mission

A green bank's objective is to meaningfully penetrate clean energy markets. Success is measured in installations, homes served, energy saved, jobs created and investment stimulated. Establishing a green bank and financing products is not the end game. This means that green banks work hand in hand with market participants – customers, businesses and investors – to identify and fill market gaps with solutions that can be broadly deployed. Green banks work relatively quickly to maintain pace with real work market developments, and, importantly, are adaptable. Green banks recognize the need to be iterative in their program design, learning from what works and doesn't, updating products as needed to serve the market. In this way a green bank is seen as a trusted partner of market actors, not an impediment to market growth or a source of market confusion. Importantly, because green bank financing doesn't purely rely on annual budgetary decisions, green bank activity is more predictable from year to year than traditional public programs that vary every year. This kind of policy uncertainty deters businesses from moving to the state.

Primarily Provides Loans, Not Traditional Grants

For decades governments have aimed to support clean energy adoption by using public dollars to offer grants, rebates, and incentives. These tools play a valuable role in creating demand and appealing to customers who otherwise might not adopt clean energy. In the case of energy efficiency, these grants are primarily a marketing device aimed at attracting customers. This is because efficiency is cost-effective on its own and does not need a grant to be economical. Renewable energy grants may play an important role in improving the economics of renewable electricity in order to be competitive with grid power. No matter the specific role of grants, unless they cover 100% of the cost of a technology, they still leave the customer with some out of pocket-cost for adoption. For deeper and multi-measure projects, this cost can be incredibly high and can only be covered with third-party financing. Green banks aim to fill this role in the market, drawing in more capital to cover the upfront costs. This has the added benefit, compared to grants, of preserving public dollars and makes green banks far more sustainable policy solutions than grant programs that must be continuously funded each year. As primarily a lending institution, this means green bank activity and staff may look significantly different from traditional utility or government-run grant programs.

Works with Existing Programs & Institutions

Green banks work most effectively when they operate in concert with existing programs institutions in the state already working to increase clean energy deployment. Green banks are complementary to many on-going efforts, and financing should be paired with grants and other forms of government support. Together the entire clean energy policy and program ecosystem can strive to scale markets quickly, using public dollars wisely and strategically. This kind of efficiency only comes with close coordination. This coordinated effort between green banks and other parts of government also ensures that market participants have a clear and singular understanding of the services provided by the state. Redundancy or poor communication between agencies can sow market confusion.

Financing Role of the Green Bank

Green bank financing activity is specifically aimed to animate the private sector, not replace private sector financing that is working well to serve the market. Green banks use their capital to fill precise market gaps that can also maximize the leverage of each public dollar.

Leveraging Public Dollars

Green banks leverage public dollars with private investment through public-private partnerships. Green banks use a range of financial techniques and structures to achieve this leverage (described below), but across products, green banks can draw in multiple private dollars of investment per public dollar. For

example, a loan loss reserve credit enhancement may enable $10 of private lending per $1 of public investment put in reserve. This 10:1 ratio stands in stark contrast to the $0.30 of private investment per $1 of public investment currently achieved under certain Maryland grant programs. Through these structures, public dollars go farther. And because public dollars are lent and repaid, the same public dollar can be recycled and used to draw in more private dollars again in the future.

Stimulating Private Investment

Clean energy markets conceivably can only reach meaningful scale with significant private investment. Capital markets are of size and liquidity needed to inject the many billions of affordable and accessible capital that can spur rapid growth. Therefore green banks use methods specifically aimed to draw in that private capital to ensure lenders and capital providers are comfortable with the risks, processes and cash flows of clean energy lending. It is only with experience and assurance that private capital will begin flowing to parts of the market that currently aren't served.

Fill Financing Gaps

Green banks design their financing activity strategically to fill financing gaps in the market, not replace or compete with effective existing private financing. For instance, the high-credit residential solar market is well served by third-party leasing financing providers, and is not likely to need green bank support. However, small business energy efficiency upgrades are notoriously hard to finance for a number of reasons, and would therefore be a target market for a green bank.

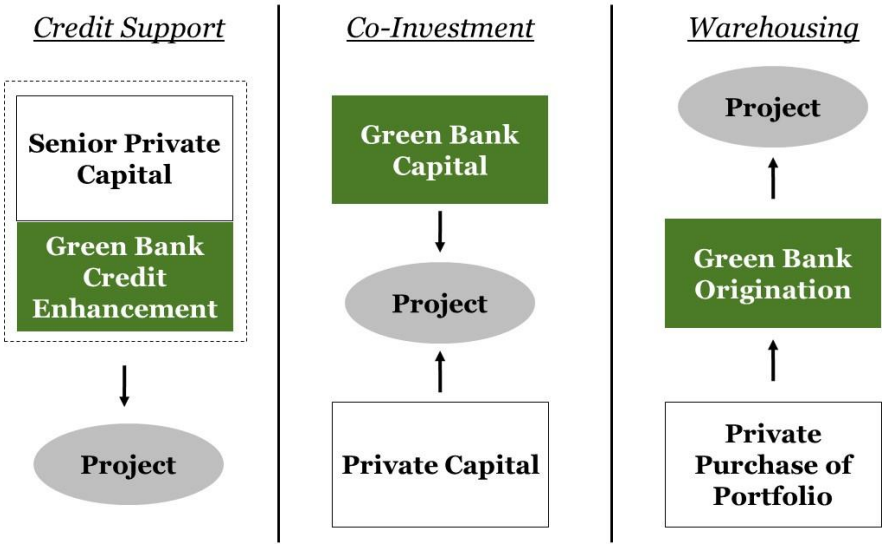
Green Bank Financing Techniques

Green banks can offer a wide range of types of financing to leverage private capital, but they can broadly be bucketed into three categories.

Credit Enhancements

A credit enhancement is a tool offered by a green bank with the goal of increasing private lending activity and/or improving the terms of private financing. Green banks accomplish this through multiple means, but loan loss reserves and loan guarantees are most common. This technique is suitable for a market where private lenders are interested in entering the market but are hesitant due to perceived risks. Or, a credit enhancement can be used when private lending is available, but at terms and rates that reduce the economic viability and market potential for clean energy projects. Under a loan loss reserve structure, a green bank will put aside capital to cover a certain portion of a lender's losses, up to a capped amount of dollars. A reserve can be in the first loss or second loss position in relation to the lender. This structure provides a lender assurance that some portion of potential losses would be covered, while also giving the lender incentive to assess risk appropriately because most losses are still borne by the lender. These kinds of investments can achieve high leverage ratios, stimulating many dollars of private investment per public dollar of investment.

Figure 6: Green Bank Leverage Techniques



Co-Investment

Co-investment involves direct green bank investment in a clean energy project alongside a private investor. Unlike credit enhancements, where public dollars are not actually invested in the project technology, co-investment can take multiple forms and structures of actual project investment. A green bank may provide senior debt, subordinated debt, or equity in a project, which is then paired with multiple potential forms of private investment. For instance, a green bank and private bank may each make a 50% debt investment in a project. Or, a private investor may offer 80% of the debt needed for a project, and the green bank makes a 20% subordinated debt investment. This structure fills financing gaps and acts as a credit enhancement for senior debt. The leverage achieved on co-investments depends on the precise product structure, and by its nature requires the presence of a private lender willing to make some level of investment in a project.

Warehousing

A third category of green bank financing is warehousing and securitization. In the event no private lender is willing to underwrite loans, even with a credit enhancement, it may be suitable for a green bank to underwrite 100% of a loan itself. This situation may arise if the technology itself is perceived as too risky or new, if the market segment is viewed as having more credit, or if the investments themselves are not cost-effective to underwrite. This final challenge is a significant barrier to private investment in small and geographically dispersed projects like residential or small business energy efficiency projects. By their nature the projects are relatively low cost and may differ in terms of credit, technology and location. This makes the projects relatively expensive to underwrite for a bank and not cost effective. However, if a pool of these kinds of loans were bundled together to diversify risk and achieve scale, the projects then become far more attractive to lenders. A green bank can accomplish this by underwriting loans directly and warehousing them until scale is reached. At this point the green bank can sell the loans to private investors. This can be done either through a private placement of the whole loans, a private securitization, or a public securitization. If the green bank is able to sell its entire stake in the portfolio of loans, then 100% of public dollars are replaced with private capital, effectively achieving infinite leverage. This technique is critical to allowing small clean energy projects to access the low-cost capital that can be found in publicly traded debt markets that are tapped through securitization.

Together, these forms of investment draw-in private investment, giving private lenders comfort and experience in the market while preserving public capital. Over time, these partnerships will give private

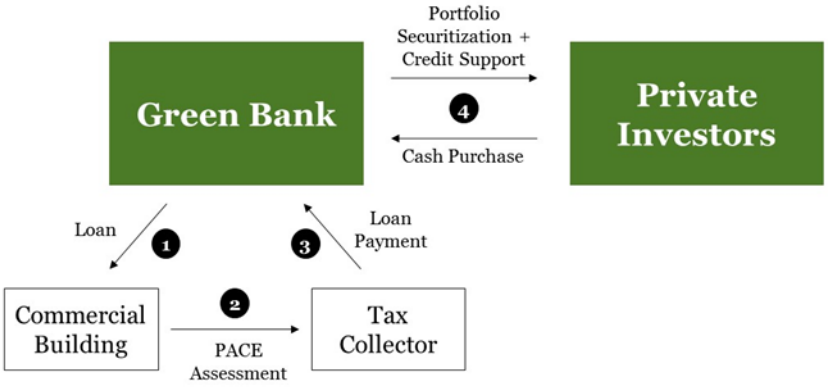
lenders the information and familiarity needed to provide financing with reduced or no green bank support, but still offering terms that are reasonable and attractive to borrowers. The forthcoming second report will address this topic in greater depth, including cash-flow modeling of hypothetical investments to demonstrate the leverage effects and savings to borrowers.

Other Green Bank Structures

In addition to using green bank capital to finance projects, green banks can also help implement the use of innovative new financing structure. These include Property Assessed Clean Energy Financing (PACE) or on-bill repayment (OBR). In both cases, green banks can play the role of program administrator, deal originator, program marketer, or capital provider. The precise role played by a green bank in each market depends on the existing laws, statutes and programs in place.

PACE financing is a structure through which a building owner repays an energy upgrade loan through property taxes via a new lien on the building. PACE liens typically sit senior to all other non-tax liens on a building, including the mortgage, significantly reducing repayment risk. In any state that has passed legislation and any municipality that then allows PACE, technically a PACE loan can be made by any lender. The lender would provide a loan to a building owner to implement energy efficiency, for instance, and then the tax-collecting agency would place a new lien on the building equal to the loan repayment. That repayment is collected by the taxing agency and remitted to the lender. Though simple in concept this is difficult to execute and has struggled to attract private lenders in many states. A green bank could step in to provide the loan capital in order to kick-start a market (as was done in Connecticut). A green bank could also offer a credit enhancement to entice private lenders into the PACE market.

Figure 7: PACE Finance Warehousing



On-bill financing or repayment (OBR), like PACE, is a financing structure designed to increase the likelihood of loan repayment. It is a structure through which an energy upgrade loan is repaid through the customer's utility bill. Similar to PACE, this structure creates greater security for the lender because historically utility bills have a very high rate of repayment. On-bill financing has additional benefits, too, because it addresses the split incentive between building owners and tenants. By attaching a loan to a utility meter, rather than the customer, a tenant can reap the benefits of efficiency, repay only the portion of the loan that is due while still a tenant, and then hand the remaining payments to the next tenant who continues to benefit from the efficiency. This has the power to open up many new markets for efficiency financing that otherwise would be unsuitable. Like PACE, a green bank could act as a program administrator and/or a lender for on-bill programs. (Note: On-bill financing typically refers to programs where the utility itself uses its own capital to issue the loans. On-bill repayment refers to the programs that allow non-utility lenders to issue loans, where

the utility merely acts as a collection platform.) OBR, it should be noted, can be quite complex to implement, and requires strong collaboration and support of utilities. In some states, Maryland included, utilities have expressed concern with being given this role that may not align with this business model.

Demand Generation & Market Development

In addition to animating investment in clean energy, green banks can also help stimulate demand for clean energy products. Adoption of clean energy technology like efficiency and distributed generation has been slow, despite the fact that these investments pay for themselves through savings. The lack of financing to pay for upfront cost plays a major role in the slow uptake. But demand is also low because clean energy technologies lack of a robust, transparent and efficient market.

When compared to the ease of purchasing consumer goods, as one would on Amazon for instance, the clean energy purchase process is immensely complex with little information available to consumers. In addition, clean energy technologies are yet to be intrinsically desired the way homes and cars are. For those products, a consumer decides that s/he wants to make the purchase, and the financing is what makes the purchase possible. In clean energy markets, simply having financing available does not generate demand on its own. The financing must be presented to customers in tandem with the overall value proposition of clean energy. Therefore any green bank financing would have to be offered in a way that stimulates demand and facilitates the creation of efficient market structures.

This has resulted in the common refrain that, “capital isn’t the problem – it’s the demand.” This is a reference to the notion that plenty of capital is available and ready to enter the market, but the lack of consumer demand is the reason that markets are not growing quickly enough. The reality, though, is more complex, as offering capital for clean energy is not a binary condition. A bank or a government program may ostensibly make capital available, but because there is no robust market for clean energy technologies, the multitude of activities and parties needed to bridge the distance between supply of capital and demand for technologies does not exist. Capital made available in a vacuum, or at unusable terms, is ultimately not very useful.

Turn-Key Solutions

Multiple activities are needed to connect capital supply to customer demand including marketing; dedicated origination channels; partnerships with contractors; contractor training on how to sell their services with financing; coordination of financing with other subsidies; coordination of multiple contractors on multi-measure projects; and many others. In addition, often the capital made available for financing is not well-suited for the purposes of clean energy investing. For instance, a loan may be offered with a short-term that prevents deep retrofits; at an interest rate that prevents projects from being cash flow positive; with a loan size that prevents deep retrofit projects; and with credit restrictions that shut-out a majority of the market.

This long list of market and financing deficiencies, not surprisingly, results in low demand for clean energy technology. Consumers do not have the time, knowledge or interest to navigate a complex purchase process, learn about different technologies and program options, and seek out possibly inadequate financing entirely on their own. Therefore, a green bank can play a critical role in stimulating demand by both offering suitable financing *and* delivering that financing to customers through turn-key program design. A green bank cannot be built on the flawed clean energy financing premise that, “If you build it, they will come.” Rather a green bank can design financing programs in coordination with delivery mechanisms, access to information, and consumer marketing techniques to overcome demand shortage problems. Whether the green bank itself is engaging in this market creation activity or doing so in partnership with private partners will depend on product and organizational design. But no matter the design, a green bank should strive to ensure customers are presented with simple offers that are cash flow positive with minimum customer effort required.

Minimize Consumer Confusion

Few energy consumers are well educated in the clean energy alternatives and options available to them. Not only is market awareness low, but clean energy installation projects and financing can be complicated and may require multiple steps and coordination of multiple agencies or contractors. This makes clean energy adoption appear potentially confusing, especially when multiple government agencies may offer related forms of support. This means that clear education and consumer engagement is critical to market penetration. Green banks can help minimize consumer confusion and provide confidence by "normalizing" clean energy market activities and increasing access to information. For instance, a singular customer facing website or technical assistance to guide consumers can significantly reduce confusion and give customers the confidence needed to actually purchase clean energy.

Cross-Agency Coordination

An important part of minimizing consumer confusion is ensuring that agencies coordinate how their programs operate in the market. When marketing a grant program, for instance, contractors should be armed with information to also offer green bank financing, and vice-versa. Agencies can also coordinate to create a single web page landing spot for market participants to learn about what programs are available to support their clean energy purchase decision. A single, state-run website can appropriately direct customers to the right agency, program, or material best suited for them. This kind of coordination will ensure government efforts are stimulating demand, rather than stifling it with confusing and competing information.

Existing Green Bank Institutions

To date, five states operate green banks in the United States. Nearly a dozen other states are also at some stage of green bank exploration or development. There is also one official county green bank. Each of these green banks has a slightly different model and approach, tailored to suit the institutional landscape, legal requirements and market objectives of that jurisdiction. Some green banks are directly part of government, while others are quasi-public. They draw on a range of public capital sources, and have varying legal authorities. Some green banks are established with a specific list of financing programs that they must implement, while other green banks are less structured, offering capital in response to market requests.

Connecticut Green Bank

The Connecticut Green Bank was created in 2011 as the first state green bank in the U.S. 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.[18] The new Green Bank 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 Green Bank 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 Green Bank Strategy, approving green bank products and initiatives, and approving loans.

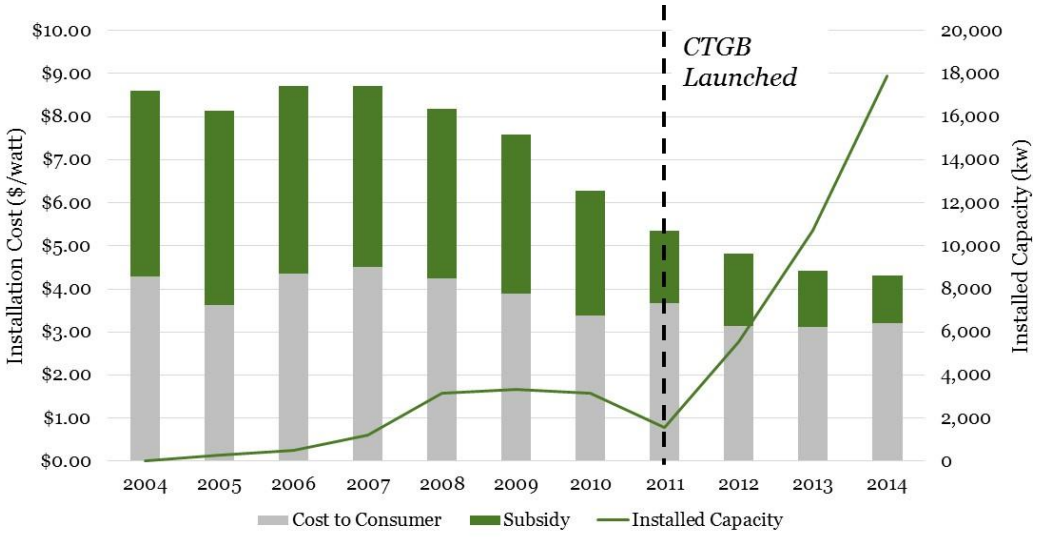
The Connecticut Green Bank is capitalized by two sources, both of which were identified in the legislation. The first is a systems benefit charge that collects roughly $20 to $25 million dollars per year. This was an existing system benefits charge, already in place prior to the creation of the Green Bank. Previously the entire ratepayer collection went towards state-managed grant programs. The re-allocation of those funds to the Green Bank represents only a portion of the total collection, with the remaining funds still going toward grants. The second source of Green Bank funds are the state's proceeds from the sale of emission allowances

[18] PA 11-80 creating the Connecticut Green Bank, passed the House by a vote of 139-8 and the Senate 36-0.

through the Regional Greenhouse Gas Initiative (RGGI) Program. The Green Bank receives approximately $5 million of the states RGGI proceeds. In total, this adds to a total annual infusion in the Green bank of approximately $30 million. This repeated and perpetual capitalization means that the Connecticut Green Bank's balance sheet, and capacity to issue loans, continuously increases. In addition to these public capital sources, the Connecticut Green Bank is authorized to issue its own bonds based on its own balance sheet. The Bank also has limited ability to issue bonds that are supported by a state bond reserve fund. The Bank has not yet issued bonds of this type to increase its lending capacity.

In addition to its broad financing authorities and capital sources, the Connecticut Green Bank was given two key statutory requirements in its enabling legislation. The first is that the Bank must manage the execution and ultimate wind down of the state's residential rooftop solar rebate program. Though this grant-making role is distinct from the Bank'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 Bank lowered grants consistently through multiple steps, the increased availability of financing drove unprecedented market growth.

Figure 8: CT Green Bank Residential Solar Growth



Connecticut 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 the state. Similar to financing products offered by companies like SolarCity, the 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. The Green Bank itself created and owned a special-purpose vehicle through an equity investment. The Green Bank also provided subordinated debt, as well as a loan loss reserve credit enhancement with remaining ARRA stimulus funds. The senior debt was provided by a syndicate of private banks, and the tax equity was provided by U.S. Bank. 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. This financing tool was deployed through local installers, who otherwise would have been unable to offer financing to consumers. This tool enabled local installers to compete with national companies that had their own financing, and opened up the market for consumers who did not have the $20,000 or more of cash on hand to buy solar.

In addition to the Solar Lease, the Green Bank 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 Green Bank seeded a loan fund with a $5 million investment. This was deployed through an origination partnership with Sungage. This fund led to two noteworthy transactions that demonstrate how a green bank can transform markets. The first was that the Green Bank sold its $5 million loan portfolio to Solar Mosaic, the crowd-funding solar investment platform. This was the first secondary-market transaction of this type in the nation, where individual investors in California could own solar loans in Connecticut. The second noteworthy event was that 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 Green Bank capital once it was expended. In only a year and with only $5 million of public capital invested, the Green Bank effectively demonstrated the value of solar investment to a private lender, crowding-in capital as desired. The Green Bank effectively ended this program, allowing private capital to serve the market.

The final residential solar product offered, that can support solar, efficiency or other technologies, is the Smart-E Loan. Through this structure, the Green Bank provides a standard-offer loan loss reserve, to multiple local lenders and credit unions 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 Green Bank's loan loss reserve, the banks agree to offer capital at specific terms that don't exceed a cap. These terms are designed to compensate banks appropriately for risk, but ensure projects can be cash flow positive for borrowers. This structure has been used for residential solar, as well as bundles of deeper energy upgrades.

In addition to managing the wind-down of the solar grant program, the Green Bank was directed administer a state-wide PACE program. Through Commercial PACE, CT offers 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.[19] The Connecticut Green Bank is able to finance these projects through its Commercial PACE, or C-PACE, program.

PACE is legally authorized in over 30 states, but Connecticut is one of only a two states to achieve significant scale with the program. Unlike in most states where each local government is charged with creating their own program, the Connecticut Green Bank is tasked with administering the program across the entire state. Through central administration the Green Bank implements programmatic consistency and standardization, critical elements for private investment. And the Green Bank 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 Green Bank uses a standardized technical underwriting method to ensure that every project has a savings-to-investment ratio ("SIR") greater than 1 (as required by enabling legislation).

Many PACE programs have struggled to attract private capital because of program complexity and small investment scale. Connecticut initially struggled with this same problem, having designed a robust administrative platform, but unable to draw in private capital to fund the PACE loans in a meaningful way. However, the Connecticut Green Bank was able to kick-start the market by originating and underwriting PACE loans using its own public dollars. After building a portfolio, the Green Bank sold 80% of the PACE loans,

[19] To date, roughly 50% of projects are PV only, 25% are EE only, and 25% are both PV and EE.

drawing in $24 millions of private investment.[20] This was the first commercial efficiency securitization in the country, attracting specialized and institutional investors to participate in the market. Without green bank investment and coordination, the market would have remained dormant as it has in many other states. After only one portfolio sale, the Green Bank has demonstrated market opportunity to draw institutional investors eager to originate the loans, reducing the need for public investment. Recent securitizations of residential PACE loans in California suggest that this new private capital will come with ever lower interest rates.[21]

The Connecticut Green Bank is a mature financial institution that has sparked remarkable growth in the state's clean energy markets. In FY2015, the Green Bank facilitated $365 million of investment, while achieving a private: public leverage ratio exceeding 5-to-1. This stands in sharp contrast to the market condition prior the Green Bank's creation, where there is little leverage or investment. In the eleven years of operation of the prior Clean Energy Fund, a total of $350 million was invested during that whole time period. And of that total, approximately half of the funds were public dollars, and nearly all were in the form of grants. Under the Green Bank, markets have grown quickly through greater private investment. And the public dollars that are used are returned to the Green Bank through repayments on financing.

Table 4: CT Green Bank Success v Prior Grant-Making Entity

	FY 2000 – FY 2011 (CCEF)	FY 2012 – FY 2014 (CGB)	FY 2015 (CGB)
Model	Subsidy	Financing	Financing
Years	11	3	1
Energy (MW)	43.1	65.3	62.6
Investment ($MM)	$350	$350	$365
Leverage Ratio	1:1	5:1	5-10:1
Investment % Loans	9%	57%	77%

New York Green Bank

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. Legal analysis determined that the state's energy office, NYSERDA, had all the legal authorities a green bank would need to provide financing. In addition, New York wanted the green bank to be directly part of government. Therefore it was determined that the New York Green Bank (NYGB) entity would be a division within NYSERDA. This action could be taken simply by administrative decision.

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

[20] Lombardi, Nick, "In a 'Watershed' Deal, Securitization Comes to Commercial Efficiency," Greentech Media, May 19, 2014.

[21] Roselund, Christian, "Renovate America and 400 Capital complete $129 million PACE securitization," PV Magazine, November 20, 2014.

funds collected annually to support grant programs. The NYGB would also receive the state's RGGI proceeds. The funding plan laid out by NYSERDA in the summer of 2013 called for a five-year capitalization structure, with multiple infusions of capital summing up to $1 billion, after which no further funds would go into the NYGB. 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.[22] This led to PSC approval of NYGB funding in December 2013, initially allocating $165.6 million in ratepayer dollars.[23] Combined with the annual $45 million in RGGI proceeds, this brought the NYGB's initial capitalization to $210 million.[24]

The NYGB is now a fully staffed entity, operating 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." Many renewable energy and energy efficiency technologies are eligible to receive funding. Similar to Connecticut, the NYGB can offer funds in many different forms, including senior loans, subordinated loans, credit enhancements, warehousing and securitization. To date, the NYGB has received $734 million in proposals and has an active project pipeline of $338 million.[25]

Hawaii Green Infrastructure Authority

Hawaii's green bank institution is called the Green Infrastructure Authority (GIA), which was created through legislation. The GIA was placed within the state's Department of Businesses, Economic Development and Tourism (DBEDT), which operates the state's energy office. The GIA is minimally staffed, relying on third-party contractors to administer its financing program. The GIA's first program, approved by the public utility commission in 2014, is the Green Energy Market Securitization (GEMS) program. GEMS provides solar lease financing to underserved market segments, particularly LMI households.

Hawaii has experienced a residential solar boom as the cost of solar fell and is highly competitive with expensive grid electricity in the state. However, solar adoption was concentrated among high-income households. 27% of households earning $90,000 or more had solar, but only 6% of households with less than $60,000 in income had solar. This was a clear gap in private financing markets that had serious economic welfare consequences. GEMS is designed to fill that gap, leveraging public capital in an innovative way.

The GEMS program is funded with an existing and redirected ratepayer surcharge. Ratepayer dollars are collected by GIA through the utility. Rather than wait for the collections to reach scale, the GIA issued a $150 million bond that will be paid off with the future ratepayer collections. Because bond repayment is linked to utility collections, and not individual lease repayments, the bond received an AA-rating and a 2.99% taxable-rate. These funds are then combined with private tax-equity capital to create a solar lease fund. To further reduce the rate lessees will be charged, the solar leases will be repaid through on-bill repayment mechanisms that were established in parallel to the GIA's creation. The lease repayments will go back into the GIA fund,

[22] "New York State Green Bank Business Development Plan," Booz & Co., September 3, 2013.
[23] "Order Establishing New York Green Bank and Providing Initial Capitalization," Case 13-M-0412, New York Public Service Commission, December 19, 2013.
[24] "Governor Andrew Cuomo Announces NY Green Bank Open for Business," Press Release, New York Green Bank, February 11 2014.
[25] "Clean Energy Fund Information Supplement," Case 14-M-0094, NYSERDA, June 25, 2015, at 159.

and can be revolved. By combining multiple elements of strong clean energy financing policy (public-private leases, leveraging ratepayer funds, and on-bill repayment), Hawaii was able to build a program that is low-risk and open to a broad segment of the population. In spring 2015 the GIA rolled out its first lease product, targeting the non-profit and small commercial space, with the LMI-targeted product to be released soon.

California CLEEN Center

In the fall of 2014, the California Infrastructure and Economic Development Bank (IBank) announced the creation of the new California Lending for Energy and Environments Needs (CLEEN) Center. The CLEEN Center will act as a green bank to initially support municipal and commercial building efficiency upgrades, before expanding to finance broader clean energy markets. For much of 2014, a bill to create a new stand-alone California green bank advanced through the state legislature. As a result of negotiations between Governor Brown and the bill's lead sponsor, the IBank was chosen to house the new green bank entity.

As described in the business plan, the objective of the CLEEN Center's programs is to "drive down the cost of EE projects and retrofits, leverage existing public programs, encourage private investment and earn investment returns for the IBank and partner with market intermediaries."[26] This statement encompasses the broad set of objectives typically held by a green bank. The CLEEN Center's first two programs will be the Statewide Energy Efficiency Program (SWEEP) and the Commercial & Industrial Energy Efficiency Programs (CEEP). The programs will fill market gaps where viable efficiency projects are unable to access reasonable financing, specifically targeting the municipal, university, school and hospital (MUSH) market, as well as the Commercial & Industrial (C&I) market. The CLEEN Center is also designing a specialized LED street lighting program that will enable municipalities to swap out old street lights for LEDs while remaining cash flow positive throughout the term of the loan. Through each of these programs, the CLEEN Center will typically offer senior debt, subordinated debt, or credit enhancements to enable private sector investment.

The funding for the CLEEN Center is the IBank's existing pool of cash raised from bonds. The CLEEN Center sits under the existing Infrastructure State Revolving Loan Fund (ISRF). This is the IBank's largest program and is entirely funded through bonds. Bonds are issued to recapitalize this program nearly every year, and at a very large scale. For instance, In May 2015 the IBank closed on an ISRF 2015A Series bond in the amount of $125 million, at 3% interest rate (rated at AAA). Presently, the IBank has roughly $200 million in cash assets available for lending, most of it for the ISRF program that includes the CLEEN Center. Finally, the IBank does have equity on hand (cash that does not have to be used to repay bond holders.) The IBank will use those equity dollars to create loan loss reserves and other credit enhancements to enable more private investment.

Rhode Island Infrastructure Bank

When Rhode Island Governor Gina Raimondo assumed office in January 2015, she quickly followed through on her campaign promise to create a green bank. Rhode Island had an existing set of state and utility-run rebate programs, and had tried to build a residential PACE program. A new green bank, though, would increase financing across clean energy markets, and drive investment in infrastructure and job grow. Rhode Island's economy has stagnated, and Governor Raimondo saw a green bank as a tool for growth.

Rhode Island determined that the best path to creating its green bank required legislation. And rather than build an entirely new institution, the green bank 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 green bank. The CWFA would be given expanded authorities to

[26] "Business Plan," California Infrastructure and Economic Development Bank, Clean Energy Finance Center, February 17, 2015, p. 5.

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 budget legislation.

The RIIB was assigned responsibility for two specific financing programs in the legislation, which are to become the first green bank products in early 2016. RIIB has responsibility for designing, administering and possibly financing both commercial and residential PACE in the state. RIIB chose to follow the Connecticut model with a single, 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 is also legally authorized to make the PACE loans itself should private investors not step in, though new capital sources would need to be identified to serve that function.

Green Bank Highlights: More States Explore Green Banks

Many states around the country are at some stage of green bank consideration and development. Nevada in 2015 passed a bill similar to Maryland, directing its state energy office to complete a formal green bank study. There are presently two green bank creation bills introduced in the Massachusetts legislature. In the fall of 2015, the Virginia Governor's Climate Change and Resiliency Commission voted a green bank their number one recommendation to the Governor. Washington, DC began a formal green bank study this summer. And Vermont, Delaware and others are currently considering green banks or new clean energy finance initiatives.

The RIIB was also tasked with implementing an Efficient Buildings Fund, 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 will reduce government budgets at a time when the state needs to maximize the value of all public dollars. The state's Office of Energy Resourcesis tasked with developing criteria for viable projects and building a list of priority projects, which will guide EBF financing decisions.

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 energy conversation bonds (QECBs). In sum, these funds are intended to both serve as an equity portion of a broader bond issuance, as well as 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. The legislation that created the RIIB also directs the formation of a green infrastructure strategic advisory council, which will advise RIIB's board on industry advances and potential program opportunities/improvements. Council members include RIIB's executive director, RIIB's chairman, and heads of the office of energy, transportation, health, housing, commerce and environmental management.[27]

Montgomery County Green Bank

In June 2015, Montgomery County, MD became the first county in the U.S. to create an official green bank. The green bank was created through County Council legislation, which was passed unanimously. The green bank was given a broad mandate and set of tools to fill financing gaps and accelerate the growth of energy markets. The county, which had already begun its own PACE program, saw a green bank as critical to meeting its own clean energy goals and opening access to all customers. The county is currently administering a public working group process that will more precisely inform the operations and focus of the green bank.

The county did not want to directly operate the green bank itself within the government, but was also unable to establish a separate quasi-public. So instead of directly creating the green bank, the legislation precisely

[27] 2015- H 5900, State of Rhode Island Appropriations, Article 14.

defines a mission and set of functions to be performed by a purpose-built 501(c)(3) non-profit that would be the county's green bank. The County Council would designate the non-profit entity as the county's green bank for a specified term, during which time it would operate under the governance and legal definitions of the green bank as written in legislation. The primary funding source is meant to be approximately $20 million of funds the County was to receive from Exelon through the merger with Pepco.

Table 5: Summary of Green Bank Institutions

Institution	Eligible Technology	Key Products	Source of Funds and Initial Capital	Oversight/Structure	Staff
Connecticut Green Bank	• Solar, fuel-cell, geothermal, biomass • Energy efficiency	• C-PACE • Smart-E loan • Solar Lease II • Solar Loan	• RGGI funds, utility bill surcharge • ~$35M per year	• Quasi-public • Independent board of directors	• 33
Hawaii Green Infrastructure Authority	• Solar (primary focus) • Energy efficiency	• Solar leases for LMI and non-profit sector, paired with on-bill recovery	• $150 million bond issuance backed by ratepayer fee	• PUC oversight • Econ Development Agency administration	• 5
New York Green Bank	• Renewable energy • Energy efficiency • Clean transportation	• Issued RFP for private sector financial intermediaries	• $218.5 M initial capital from repurposed utility bill surcharge, RGGI funds	• PSC oversight • Division of state energy office	• 12
California CLEEN Center	• Efficiency (first priority) • Renewable generation	• SWEEP (MUSH market efficiency) • CEEP (commercial market efficiency)	• Pre-existing bonding authority of the state IBank	• Division of state Infrastructure Bank • Governor appoints the board	• TBD
Rhode Island Infrastructure Bank	• Renewables • Efficiency • Grid and demand-side upgrades	• Commercial & Residential PACE Program • Efficient Buildings Fund for municipal buildings	• $3M from RGGI • $2M from ARRA • $2M from ratepayers • QECBs • General bonding authority	• Body politic of the state • Governor appoints board	• 12
Montgomery County Green Bank	• Renewable energy • Energy efficiency • Grid and demand-side upgrades	• TBD	• $20M from utility merger settlement, *TENTATIVE*	• Independent non-profit • Has official designation, bylaws and board as defined by county	• TBD

Chapter 4 – A Maryland Green Bank

As discussed in Phase 1, Maryland badly needs to stimulate greater investment and adoption of clean energy technologies through ample and reasonably priced financing. Phase 1 calls for a green bank as the right model to drive clean energy investment and help the state achieve its clean energy goals. There is significant market potential that is left untapped, and the current set of programs are both expensive and incapable of achieving scale because they do not address the barrier of upfront costs. Current programs, primarily grants, can play an important role in attracting demand, but are not designed to drive adoption of high cost technologies at scale. Broad adoption of clean energy can only be achieved with financing.

A Maryland green bank could deliver significant value to Maryland, and can be a win-win for all stakeholders.

- Customers benefit by being able to lower their energy bills and get cheaper energy with no upfront cost;
- Lenders benefit because green banks open up investment opportunities in clean energy;
- The Maryland economy grows as the clean energy industry is able to serve more customers, offer deeper retrofit projects, and hire new employees;
- And the Maryland government wins because it is able to achieve its desired market outcomes by using public dollars more efficiently.

For all these reasons, Maryland can unlock multiple points of value by creating a green bank.

The Value of a Maryland Green Bank

Leveraging Private Capital

A Maryland green bank can stimulate greater total investment in clean energy with fewer public dollars by leveraging those dollars effectively and pairing them with private capital. As described earlier, many of the state's current grant programs are not designed to focus on leverage, and therefore achieve very little leverage. For example the EmPOWER residential and commercial efficiency grants leverage only 31 cents of private investment per dollar of public spending.

> ***Industry Quote:*** "Many (arguably most) regional and community banks have little experience in project finance and tax equity (with the exception of Low-Income Housing Tax Credit financings). As a result, many banks have difficulty understanding and providing financing to renewable energy and energy efficiency financing opportunities due to a variety of factors. By providing credit enhancement and facilitating transaction scale, a green bank could help bring greater private capital into the market place." – ***Maryland Banking Industry Stakeholder.***

Green bank financing in other states, on the other hand has leveraged between 5 and 10 dollars of private investment per public dollar deployed. Maryland can achieve similar leverage by using the financing tools and structures proven to be effective by other green banks around the country. Tools like credit enhancements, co-investment and warehousing are designed to enable private investment and recycle public dollars.

For example, the Connecticut Green Bank's Smart-E Loan program achieves 10:1 private: public leverage by offering a standard second loss reserve that provides a cushion of support to private lenders who actually originate the desired clean energy loans. In exchange for the risk mitigation provided by the reserve, lenders offer 10 dollars of loan capital for each dollar held in reserve. And they agree to offer those loans at or below certain interest rates, ensuring that the benefits of the state's risk mitigation are actually passed on to the

customers, rather than merely absorbed by the lenders. By building this kind of leverage into each green bank financing product structure, Maryland can get greater "bang for the buck" on its public dollars.

More Efficient Government

Green bank financing makes government more efficient in a number of ways. The first is that by offering financing, rather than grants, green banks preserve public capital and reduce total public expenditure while still driving positive market outcomes. As described earlier, financing is critical to achieving broad market uptake, yet public dollars used for financing are far more valuable to the public sector because they do not represent an expense. For example, over the course of five years under the current set of energy programs, Maryland will collect and spend over $2 billion of taxpayer/ratepayer dollars on grants and bill assistance, with no money remaining at the end of five years. However, a hypothetical $40 million investment in a green bank would still be worth $40 million in five years because the funds are preserved through financing.

Green banks represent more efficient government because they use public dollars in a way that is able to achieve greater market outcomes. Specifically, a public dollar put towards financing rather than grants will enable deeper energy efficiency retrofits to occur. As described earlier, deep, multi-measure efficiency or clean energy projects have long payback periods, and therefore are only viable with 100% upfront financing at long terms. A public dollar used for a grant cannot facilitate this kind of project unless grants will pay for the most of or the entire cost of the project, which is an extremely expensive approach to market growth. However, that same public dollar used to financing can achieve greater energy savings and dollar savings for energy users because financing is the key to unlocking deeper retrofit projects.

Green banks can also help government operate more efficiently by helping to coordinate cross-agency efforts to engage with and stimulate clean energy markets. By offering technical assistance to potential clean energy adopters, providing easy and clear information, and guiding customers to the appropriate state program, whether housed in the green bank or not, a Maryland green bank can ensure that government support is effectively reaching market actors. Presently the wide range of government programs offered can create market confusion, with customers unsure how to access government support, or which agencies to reach out to. A green bank can spur greater coordination among government programs in order to present a more unified and simple face for customers to interact with.

Job Creation & Economic Growth

A Maryland green bank would also be an engine for economic growth and job creation, spurring direct investment in Maryland's communities. The availability of financing removes barriers to adoption and helps increase demand for clean energy technologies and installations. This in turn drives new businesses to develop and existing businesses to grow to meet this demand. A growing clean energy economy means more contractors, more installers, more engineers and more employees in other related services. Through its first three years of activity, the Connecticut Green Bank created nearly 4,000 direct and indirect jobs.[28] And because clean energy projects are typically located at buildings or other local sites, jobs created through green bank investment cannot, by definition, be outsourced. Installing new technologies will require local jobs with boots on the ground at the point of installation. And because green banks leverage public dollars with greater private investment, each public dollar can cause more clean energy deployment and, therefore, more job creation than under current grant programs.

A green bank can stimulate economic activity in another way, by opening up new and profitable investment opportunity for the lending community. Presently, cost-effective, low-risk and profitable clean energy

[28] Connecticut Green Bank Comprehensive Annual Financial Report Fiscal Year Ended June 30, 2014.

investment lay fallow for lack of capital. By working with local lenders, green banks draw in more market participation and increased market understanding for credit unions, community banks and other local lenders. Green banks allow lenders to learn about the risks and processes of clean energy investment while operating with a safety net that comes with a credit enhancement or government co-investment. As demonstrated in other states, initial green bank investments can quickly lead to huge in-flows of private capital. For example, the Connecticut Green Bank seeded a $5 million solar loan fund in 2013 to demonstrate market potential. Within a year, that pool of dollars had been expended, and the private origination partner had been able to source its own private capital. Because the Green Bank shone a light on the market opportunity, the Digital Federal Credit Union created a new $100 million warehouse for solar loan investment, allowing the Green Bank to pull back its capital and let the private sector take over.[29] This is a perfect example of how green bank activity in Maryland can increase business opportunities for lenders.

Putting Money Back in Taxpayer's Pockets

The bottom line benefit of a green bank is that it can save money for Maryland taxpayers and ratepayers, putting more money back in their pockets. A green bank can do this in two ways. The first is that by using dollars for financing, rather than grants, green banks can preserve public dollars and reduce the amount of annual expenditure that must be used to stimulate market growth. Where grants are collected, expended, and lost every single year, a green bank retains its value, preserving dollars through financing. Those dollars could conceivably be return to taxpayers at some point in the future, or repurposed for other government needs. And because the public dollars used for financing are also able to leverage far greater private investment, the public sector burden for clean energy market growth can be reduced.

The second way that green banks can return dollars to taxpayers is by achieving deeper energy savings and expanding cheap, clean energy opportunities. As discussed earlier, financing is critical to penetrating deep energy efficiency retrofit markets. So a green bank can extract more energy bill savings for Maryland businesses and residents by allowing more comprehensive energy retrofits. And more broadly, financing creates access to all sorts of clean energy projects that otherwise were inaccessible to those without the ability to pay large upfront costs. A customer who can pay a lower price for rooftop solar electricity than for grid electricity can only access those savings with upfront financing. Today private lenders are serving that market, but only a portion, specifically those with high credit scores. A green bank can democratize access to cheaper clean energy and energy savings.

The Right Maryland Institution

A key element to creating a Maryland green bank is identifying the appropriate institutional home. A green bank can be directly part of government as a public entity, it can be quasi-public, or it can be a private non-profit. Most green banks in other states and nations are either directly part of government or are quasi-public entities, which sit between government and markets. The Connecticut Green Bank, the most successful green bank in the nation, is itself a quasi-public entity, receiving public funds and operating under the policy direction of the government, but not actually part of government. This affords the Connecticut Green Bank flexibility in its hiring and investment decision-making. It also allows the Green Bank to operate quickly, more easily matching the needs of the private sector that can change rapidly in the clean energy space.

In addition to considering the type of institution, Maryland will also need to decide if it should create a new institution to serve as the green bank or use an existing entity within the state. Creating a new entity may have the benefit of building something from scratch that can be purpose built with the green bank mission.

[29] Reporter's Notebook, "Green Bank partner lands $100M solar investment," Hartford Business Journal, November 10, 2014.

However, this can be legally complicated and potentially create market confusion. By adding another government or quasi-government entity to support clean energy development, market actors may be further confused about how the new green bank fits within an already complex landscape of government institutions. If Maryland were to consider using an existing institution it should assess if there is already an entity that fits the green bank mold, or which entity can be repurposed to fit the needs of a green bank.

MCEC as the Maryland Green Bank

Considering Maryland's institutional and legal landscape through this lens, MCEC stands out as the logical candidate to act as the state's green bank. This is true for a number of reasons. Its mission, statute and powers are very similar to those used to constitute other purpose-built green banks, making it legally viable. It also already has a track record of successfully running financing programs that are, in every sense, green bank financing products. And MCEC also has the benefit of being quasi-public, sitting between government and the market. This position has given MCEC the ability to build private sector partnerships and adapt to the needs of the clean energy market.

Other state entities that one could consider for the role of green bank, like the Maryland Energy Administration, the Department of Commerce, or the Department of Housing and Community Development, all have qualities that could make it suitable for hosting a green bank. But in each case their mission, authorities and track-record make them second-best alternatives.

MCEC Statute

MCEC's statute is written in a way that makes MCEC look much like other green banks. The organization's mission is to transform the energy economy in Maryland by promoting clean energy, energy innovation, economic development and job creation. As stated in enabling legislation, the purpose of MCEC is to:

1) Promote economic development and jobs in the clean energy industry sector in the State;
2) Promote the deployment of clean energy technology in the State;
3) Serve as an incubator for the development of clean energy industry in the State;
4) Collect, analyze and disseminate industry data; and
5) Provide outreach and technical support to further the clean energy industry in the State.

This mission and directives clearly align with the goals and purpose of any green bank. MCEC also has the authority to issue grants, loans and equity investments to clean energy projects. MCEC also has the authority to borrow money and issue tax-exempt bonds in order to finance private clean energy projects.[30] In effect, MCEC was set up with the mission, directives and powers of a green bank when originally created. This legal mission and authority is unique among existing public and quasi-public entities in the state, and make it a logical home for a fully-defined Maryland green bank.

MCEC Activities

MCEC is not just similar to a green bank in name only. The organization's actual financing and market development activity since its inception is similar to a green bank. Specifically, its two current and third planned financing products look very much look traditional green bank financing tools. MCEC's MHELP residential efficiency programs is extremely similar in concept to the Connecticut Green Bank's Smart-E Loan program, as it uses public funds to provide a credit enhancement to a private lender in order to finance projects. MCEC has achieved tremendous leverage through this program, and financed $22.2 million in residential efficiency projects. In addition to MHELP, the MCAP program has raised $14.8 of private capital

[30] House Bill 1337.

through tax-exempt, conduit bond issuances to finance large clean energy projects for non-profits, municipalities, universities and hospitals. By accessing low-cost private capital and offering off-balance sheet financing, MCEC has stimulated market development using tools commonly offered by green banks.

In addition, MCEC is currently rolling out what will be its third clean energy finance product, MPACE, which will finance commercial building upgrades via a property tax assessment. The capital to finance the projects will come from private sources. PACE financing is a popular and innovative tool spreading across the country, with the most successful commercial PACE program in the nation operated by the Connecticut Green Bank.

MCEC has been able to build the beginnings of a green bank financing portfolio and leverage $37 million in private investment with no regular state funding and only $3.44 million in upfront investment from ARRA funds, used as a credit enhancement.

Cross-Agency Coordination

MCEC is well suited to act as the Maryland green bank because it has experience working with state agencies and other related private sector partners. This is the kind of coordination necessary to make clean energy markets grow efficiently and minimize consumer confusion when engaging state programs. MEA's Director serves on the board of MCEC, and MCEC's financing products are typically paired with grants from MEA or EmPOWER. This familiarity with state energy programs and broad network of private sector partners, municipalities and non-profit organizations means MCEC is already positioned to build partnerships, work with contractors and design financing products that will work in concert with other state activity.

Based on this landscape and institution assessment, the remainder of this study proposes a green bank portfolio of activities and state funding that presumes MCEC will act as the Maryland green bank. Product designs, funding schemes and impact are based on the finding that MCEC is the natural and de facto home for a Maryland green bank. This framing and assumption makes sense given the statutory authority, experience and actual financing products offered by MCEC.

Chapter 5 – Existing MCEC Green Bank Programs

MCEC already successfully operates two green bank financing programs, and is in the midst of launching a third. These programs have generated $37 million in private clean energy investment with only $3.44 million of public investment. This 10.8-to-1 private investment leverage ratio stands in stark contrast to other programs in the state, demonstrating how a green bank can bring markets to scale with efficient use of public funds and innovative product design. These programs serve as a strong baseline from which MCEC could build a more robust green bank portfolio of activity.

Maryland Home Energy Loan Program (MHELP)

MHELP, launched in 2009, is a residential energy efficiency loan program, designed to enable homeowners to perform energy upgrades and reduce overall energy bills. Under the program's design, MCEC does not actually directly issue the loans itself. Rather it provides a credit enhancement to a private lender, which in turn offers more capital at better terms than would have existed without the credit enhancement.

The $3.5 million given to MCEC to start the program came from federal ARRA funds. They have been used solely as credit enhancement tools, with a mix of a loan loss reserve and interest rate buy-downs paid to the lender. Both risk mitigation techniques were used to bring down the interest rates of the privately issued loans. Through its history, there has been a single lending partner, Mariner Finance. As the loans provided are entirely unsecured, Mariner said that their ordinary interest rate for the loans would be 13.99%. But with the MCEC credit enhancements, the rate offered was dropped to 9.99% with a maximum term of 10 years. Loan size can be between $1,500 and $20,000, and can cover up to 100% of the project's costs. Borrowers must have a FICO scores of 620 or above, and the home being updated must be their primary residence.[31]

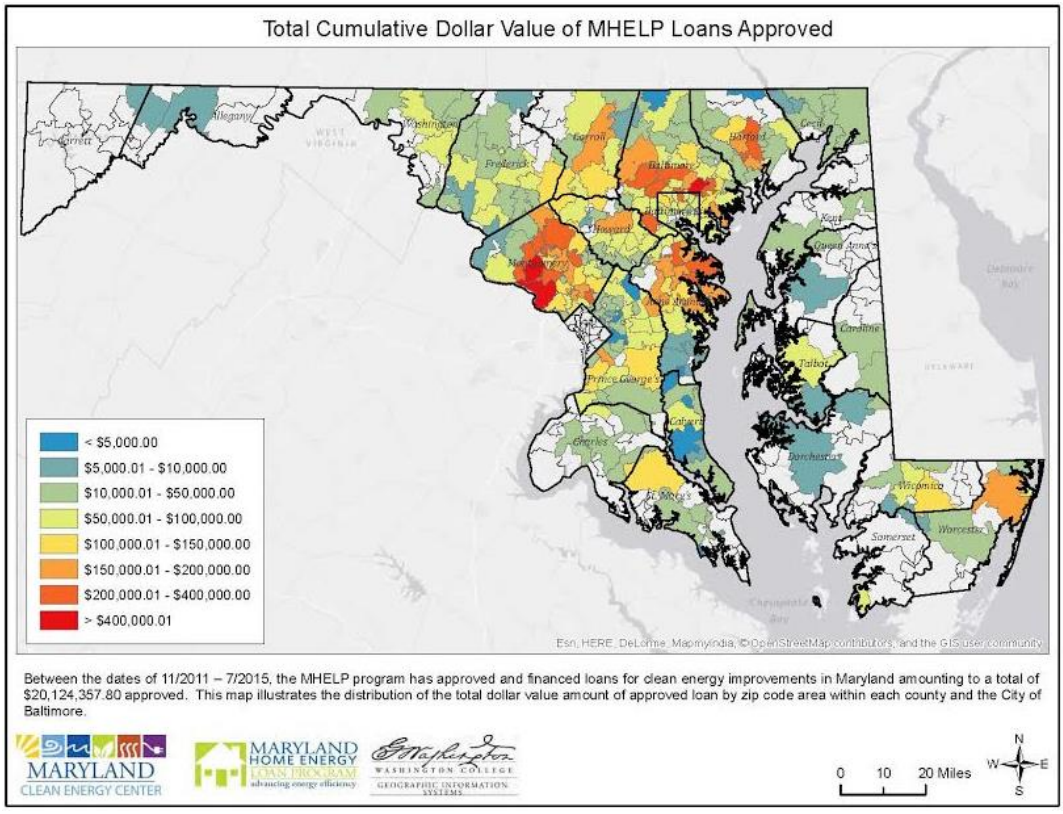
> ***Industry Quote:*** "Since the beginning of the MHELP program, participating contractors have used it to finance energy improvements for many customers who were not able to afford to make this investment without affordable, relatively easy to obtain financing. Many banks discontinued their consumer loan programs, a problem that still exists today, and those remaining were charging APR's in excess of 21%. Even worse, their stringent credit criteria disqualified many middle class and lower middle class ratepayers. The ones who would benefit most from saving money by saving energy. When we first met with MCEC officials to discuss this financing problem, a survey of contractors showed that on average 50-60% of applications were being turned down. That's a serious loss of business for contractors, which was causing job cut backs and a serious loss for the EmPOWER Program for failing to recognize this problem and the large amounts of energy that could be saved but wasn't – because of a lack of available financing. This all changed with the inception of the MHELP loan program. MHELP is one of the most valuable tools in the contractor's selling tool kit. High efficiency equipment and Home Performance upgrades are expensive. Using a low interest program we can show a customer how easy it is to upgrade to the more expensive higher efficiency equipment for just a few more dollars a month. It's not an expense, it's an investment that pays for itself by saving energy and makes your home more comfortable." - ***Michael Giangrandi, A.J. Michaels Company***

[31] www.mcecloans.com, as viewed on November 5, 2015.

Only energy efficiency technologies are eligible for loans. This includes insulation, duct sealing, equipment replacement, weather stripping, and related technologies. Window and door replacement is not eligible. And solar PV, geothermal and other renewable technologies are not eligible.

To date, the program has closed 2,942 loans, with a volume of $22.2 million in investment. This has resulted in over 10 million kWh of savings, and approximately 50,000 full-time equivalent job hours.[32] And all of this has been generated with less than $3.5 million of public investment. Loans have been issued to support projects all across the state, thanks to a broad network of contracts working with the MHELP program.

Figure 9: MHELP Loan Volume Map[33]



MHELP is a strong example of a green bank-style financing product, where limited public dollars are used to animate and leverage greater private investment. In this case, MHELP has achieved nearly 10:1 private-to-public leverage, with over $20 million in lending with only $3.5 million of public risk mitigation. And the default rate on the entire portfolio of loans is only 0.2%, providing further proof that clean energy loans are extremely low risk and can tolerate ever lower interest rates. If MCEC were to engage in a broader green bank strategy, possible product enhancements include expanding the eligible technologies, including more lenders, lowering rates, and eliminating interest rate buy downs in favor of loan loss reserves. These changes will be discussed in greater in detail in the chapter to follow.

[32] MCEC.
[33] MCEC.

Maryland Clean Energy Capital (MCAP)

MCEC's other successful finance program already in operation is MCAP, which is designed to finance medium-to-large clean energy projects for non-profits and the municipal, university, school, hospital (MUSH) market. As MCEC itself does not have a balance sheet, MCEC is able to finance projects by acting as a conduit-issuer of tax-exempt debt to fund projects for program participants. As defined in statute, MCEC is able to issue debt into private capital markets, where the coupons on that debt are non-taxable. This means the capital MCEC can raise through the program has relatively low cost, typically 3-4% interest rates. A wide range of possible projects are eligible, so long as they reduce overall energy consumption. This can include both energy efficiency and renewable energy technology.

> ***Industry Quote:*** "Alternative financing structures, like MCAP, help companies like Siemens drive infrastructure improvements for government entities that are cautious about the impacts that these investments will have on their balance sheet and bond ratings. MCAP and its service level agreement provides an excellent alternative to debt financing. With technical support to evaluate the deals provided by MCEC, local government entities will go into these deal structures with much more confidence that they are in the best interest of the municipality." – ***Kevin Bellamy, Siemens Industry Inc.***

Deals are typically structured in partnership with an energy services company (ESCO) that scopes the project, installs the measures, and guarantees the savings. MCEC issues the debt, and passes on the proceeds to the ESCO to pay for the installation. The participant then remits payment to MCEC in order to repay the bond, with the expectation that the savings on reduced energy costs are greater than the bond payment. In the event there is a savings shortfall, the ESCO pays MCEC as per the savings guarantee.

To date MCAP has provided $14.8 million in financing, to create at least $16 million in lifetime energy savings.[34] Program participants were able to reduce their energy bills with no upfront cost, and save more than the cost of the loan repayment, making the projects cash flow positive. And because MCEC held the debt as a conduit-issuer, participating organizations did not have to carry the debt themselves.

Table 6: MCAP Conduit-Issuance Case Studies

Participant	Coppin State University	U of Maryland Baltimore County
Installed Technologies	Lighting, HVAC, solar hot water, building envelope, chiller, water conservation measures	Lighting, water irrigation upgrades, equipment controls to include demand control ventilation
Project Capital	$6.2 million, 100% financing	$5.2 million, 100% financed
Avg. Annual Savings	$609, 900	$693,000
Avg. Annual Debt Service	$570,000	$613,000
Utility Rebates	$200,000	$629,190
Financing Terms	15-years, 3.15%	10 years, 3.45%
Lender	SunTrust Bank	SunTrust Bank
ESCO	Energy System Group	Noresco

[34] MCEC.

In addition to conduit-bond issuing under the energy guaranteed savings structure, MCAP can also provide equipment leases for participants. Under this structure, MCEC leases clean energy equipment, and then sub-leases that equipment to the participant. This tax-exempt lease structure is able to attract low-cost capital, and again gives the benefit of providing an off-balance sheet solution for borrowers. In one example under this structure, The National Aquarium was able to make a $3.4 million upgrade to their building with no upfront cost, with financing terms of 15 years and 3.68%.

MCAP has been able to drive $15 million in clean energy financing without a single public dollar of investment. Despite this success, far more could be accomplished if MCEC had its own balance to offer gap financing in order to help more deals close. This will be described in greater detail in the next chapter.

Maryland Property Assessed Clean Energy (MPACE)

MPACE will be the newest clean energy financing program offered by MCEC, and will target the commercial building upgrade market. PACE, or property assessed clean energy, is a financing construct whereby a building energy upgrade loan is paid back through a new property tax assessment on the building. By attaching the financing repayment to the property itself, PACE greatly increases security for lenders, and also allows upgrades for rental properties or owners who may soon sell their property. As the lien stays with the building, remaining loan repayments are automatically passed to a new tenant, who both enjoys the savings from the upgraded building and pays the appropriate share of financing charges. In Maryland, the property tax lien sits senior to the existing mortgage, giving financing repayment the highest priority. This lien seniority combined with the fact that the lien cannot be expunged in bankruptcy, gives lenders a high degree of confidence in repayment.

The nationwide commercial PACE market is approximately $166 million, with the Connecticut Green Bank operating by far the most successful commercial PACE program in the country.[35] MCEC is looking to bring the successful model to Maryland for nearly state-wide deployment.[36] This program will be described in greater detail in the next chapter.

With its existing programs and the new PACE program about to be rolled-out, MCEC has the makings of a Maryland green bank. It has demonstrated an ability to draw in private financing, achieve leverage, and growth the state's clean energy markets and industry. This provides a strong foundation for expanding the portfolio and building more robust green bank institution in Maryland.

[35] PACENation, http://www.pacenation.us/commercialpace/, as viewed on November 5, 2015.

[36] Montgomery County has already created its own PACE program. No other county has passed PACE-enabling statutes and launched an active program, and MCEC will look to provide PACE in all remaining counties.

Chapter 6 – New Maryland Green Bank Portfolio

If MCEC were to expand its set of activities to resemble a full green bank, this would likely include improvements to current programs and additions of new programs. New programs would both provide new financing products and offer new market development services to stimulate demand and awareness for clean energy. The proposed green bank activities listed below were chosen and designed to fill market gaps identified in Phase 1 and with significant input from stakeholder groups and the Steering Committee. A broad set of market intelligence was gathered in order to identify the precise green bank mechanisms that could be successfully implemented to provide comprehensive coverage to the clean energy market while stimulating private sector activity. The proposed green bank activities are listed below based on the market sector that they address.

Green Bank Operating Principles

A new and expanded green bank institution and product portfolio will be built around a set of operating principles intended to meet the market where it is. Rather than building a rigid organization with heavily prescriptive programs and methods, the green bank would meet the market's needs and operate in an efficient manner. The core operating principles are described below.

Program Flexibility

A key attribute of the green bank will be its program flexibility. During the Phase 2 study process, MCEC consistently heard from many stakeholders that the rigidity of many existing state programs made them difficult to use or unusable. Strict rules around eligible technologies and application processes, made it complex to execute projects and receive support from the state in a timely manner. A outlined below, MCEC is proposing an initial set of green bank programs meant to address the financing gaps identified through this study. But the programs are all intended to be flexible and user-friendly, accessible for multiple technologies and sectors and project sizes. Also, because specific green bank activity will not be dependent on annual budget allocations or regulatory rulings, the green bank can modify its activities and programs as needed to meet the market needs.

Capital Allocations in Response to the Market

The advantage of being a green bank with a balance sheet, rather than a strictly regulated or legislative public entity with funding allocated for specific programs, is that funds can be allocated as needed, in reaction to the market. Not only will the green bank be flexible in its program design, it will also be responsive to the market in how it internally allocates capital. Green bank governance and management will act like a financial institute with a pool of available funds, putting financing capital toward programs that work, and redeploying the money when programs are less successful. For instance, the Connecticut Green Bank quickly realized that its C-PACE financing program had large potential and significant demand. The board responded appropriately by doubling the pool of internal funds available for the program from $20 to $40 million. This structure ensures the green bank follows demand, and that all capital is used.

Focus on Filling Gaps

A core principal of the Maryland green bank will be a focus on filling market gaps and working with the private sector to address underserved markets. It is not the goal of the green bank to compete with or replace private market activity that is working well and requires no public support. For instance, homeowners in Maryland with adequate roofs and credit scores can qualify for solar leases of power-purchase agreements to finance rooftop solar. Therefore the green bank will not focus on or need to provide financing to support the high-credit, single-family home rooftop solar market. However, it would be appropriate for the green

bank to consider financing solar for those that do not fit under the model described above. By operating in this way, public dollars are used efficiently to animate private activity in markets that currently cannot access private capital.

Maryland Green Bank Portfolio

Given the market gaps identified in Phase 1, the input from stakeholders through Phase 2, and the existing set of financing programs offered by MCEC, this report proposes the following set of financing and market development programs to be run by a Maryland green bank. They include the current set of financing products offered by MCEC (some with improvements), as well as new products to serve other markets and other elements critical to overall market growth.

Table 7: Summary of Proposed Green Bank Programs

Program Type	Target Market	Program	Description
Financing Solutions	Residential Buildings	Enhanced MHELP Financing	Unsecured private loans, backed with loan loss reserve
	Large & Medium Commercial Buildings	M-PACE Financing	Private loan secured by lien
	Non-Profits & MUSH Market Projects	Expanded MCAP with Gap Financing	Bonds, gap loans, credit enhancements
	Small Businesses Projects	Loan Fund	Loans for projects <$100k
	Low-to-Moderate Income Households	Whole-Home Financing Solution	Likely combo of loan/ lease/ enhancement
	Grid Reliability	Microgrid & Storage Project Development & Deployment Support	Financing through bonds, technical assistance, and design study support.
	Cleantech Innovation	Business Development Award	Annual equity investment awards via associated program partners
Market Development	Market Development & Education	Technical Assistance Program	No financing – market support

Residential Sector – Enhanced MHELP

As described earlier, MHELP has been a great success with only limited funding. MHELP serves a critical market gap, enabling private lending for small to medium-sized residential energy upgrades. MHELP historically has allowed nearly 3,000 homeowners across the state to lower their energy bills with no upfront cost. Under a green bank program, MCEC can enhance the MHELP program to broaden its reach, support more kinds of programs, and make it more fiscally sustainable. MCEC can pursue the following improvements:

- Loan loss reserves in place of buy-downs – Historically, MHELP has primarily operating by providing interest rate buy-downs (IRBs) to a private lender as compensation for offering lower interest rates than would otherwise be available. This form of credit enhancement is expensive and largely unnecessary given the program's track record. Going forward, public funds should be used to offer a loan loss reserve credit enhancement, rather than IRBs. MCEC cash can be placed in reserve and

drawn upon by participating lenders only in the event of losses – it is not an immediate expense the way an IRB is. Under an IRB structure, if the loan performs well with no losses, MCEC has still paid the IRB. But under a reserve structure, public capital is preserved if there are no losses. This can make the program more sustainable in the long-term, with no need for annual cash infusions. The precise terms of the reserve product will be determined based on negotiation with lenders. But be design the reserve would cover something far less than 100% of losses (possibly 10-20%), up to a capped amount of total dollars. This ensures risk is shared appropriately between the state and the lender, given the underlying risk of the project.

- More participating lenders – Today, MCEC works with a single lender, Mariner Finance, who actually makes the MEHLP loans. MCEC provides the credit enhancement, and Mariner Finance then offers the loan at better terms than they otherwise would. To transform the financing market, broaden market coverage, and create competition, MCEC should seek to bring multiple lenders into the MHELP program. Similar the Connecticut Green Bank's Smart-E Loan Program, MCEC can increase awareness among lenders and increase market coverage by bringing more lenders into the program.

- Better loan terms – An enhanced MHELP program should seek to lower interest rates and extend the maximum tenor of loans. Presently, loans offered by the private lending partner are for 9.99% for 10 years. Given the extremely low default rates the program has seen to date, and success of energy efficiency lending programs broadly, the interest rates for MHELP loans can and should be lower. And tenor can also be extended to allow deeper, more expensive projects that have a longer payback period. For example, under the Connecticut Smart-E Program that operates similarly with credit enhancements, lending terms to end-users are far more favorable.

Figure 10: Connecticut Green Bank Smart-E Loan Terms[37]

Loan Term	5	7	10	12
Maximum Rate (varies by lender)	4.49%	4.99%	5.99%	6.99%

- More eligible technologies – Presently, MHELP loans can only be used for energy efficiency upgrades. This can be expanded to include renewable technologies like solar PV and geothermal. This would allow homeowners to perform comprehensive, whole-home upgrades using a single loan product. And combining efficiency and generation into one project is also more effective, because renewable systems can be "right-sized" to support a home that has already reduced its load through efficiency.

- Increased loan cap – The current loan size cap for MHELP is $20,000. To accommodate renewable projects and deeper energy upgrades, this cap will need to be increased. A cap of $50,000 would be adequate to support most comprehensive upgrades that include both renewables and efficiency.

The improvements described will enable MHELP to reach more customers, achieve greater market penetration, and becomes more cost-effective for the state. Better terms mean more projects become cash-flow positive, thus increasing the pool of viable projects. And a conversion to a loan loss reserve credit enhancement will end the on-going expenses of IRBs. The only funding required for this program is an

[37] http://www.energizect.com/residents/programs/smarte, as viewed November 8, 2015.

upfront investment into the green bank for the loan loss reserve, and modest operating expenses to market the program and manage relationships with participating lenders.

Table 8: Residential Building Upgrade Market Program with Enhanced MHELP

Program Description	
Product: Maryland Home Energy Loan Program	**Market:** Residential Customers
Market Gap: Reasonably-priced financing with long term for home energy improvements	
Current Program Parameters	
Eligible Measures: Energy Efficiency	
Financing Tool: MCEC interest-rate buydown (IRB) to enable a single private lender to provide loans at 9.99%. Loans frequently prepaid in 1 year, but IRB is not refunded.	
MCEC Green Bank Enhancements & Needs	
Expand Eligible Measures: Solar PV, Solar hot water, geothermal	
New Financing Tool: (1) No more IRBs – too expensive. Replace with a loan loss reserve; cash is preserved, only drawn by bank in event of loss. (2) Bring more lenders into program.	
Type of Capital Required: One-time credit enhancement capital.	
Impact	**Leverage:** 10:1 - Up to 10 private dollars per dollar of public investment.
	ROI: Public capital earns interest while in reserve, balanced with loss.

Large & Medium Commercial Building Sector – M-PACE

M-PACE is a new financing product that is already being rolled out by MCEC. The program is targeted at commercial building, which typically struggle to find private financing at long enough terms to support deep energy upgrades. This was a gap identified in Phase 1. As per state legislation, eligible technologies include efficiency, solar PV, geothermal, combined heat and power (CHP), and other renewable energy.

As described earlier, PACE allows the building's energy loan to be paid back through a new property tax assessment on the building. Local property tax assessors (in Maryland, county governments), must agree to allow PACE loans in their jurisdiction. A PACE loan program also requires a large amount of administrative support to manage legal documentation, collections and repayment from building owner to county to lender. To date, the only county in the state to enable PACE and create their own program is Montgomery County. Anne Arundel County has enabled PACE, but not actually created a PACE programmatic structure.

To fill this void, MCEC is now launching a PACE program and administrative platform that can be used throughout the state by any county. MCEC has already hired a third-party administrator, PACE Financial Services (PFS), to operate the program in all interested counties. PFS will work with counties to understand the program structure, pass required statutes, implement administrative structures, vet program applications and manage collections. By taking this approach, MCEC can create near-uniformity in PACE program structures across the state, making it far easier and more attractive for private capital to begin making loans.

The PACE program structure being implemented relies on private capital provides to make 100% of the commercial PACE loans in the state. No public dollars are expected to be used for lending. Rather, the security of PACE and proven track record of PACE in other states can attract private capital looking to support

these markets. Because of the administrative costs of the program, the minimum viable project size is expected to be $100,000. Though there is no stipulated maximum, projects typically don't exceed $2 million.

MCEC has already contracted with PFS and communicated with counties. There is no on-going cost for the work performed by PFS, and no public capital is needed for actual lending. Therefore only a modest amount of funding is needed to bring this program to scale. Funding is primarily for program marketing and small staff needed expected to coordinate with PFS and manage any customer inquiries.

Table 9: Commercial Building Market Program with M-PACE

Program Description	
Product: Maryland Property Assessed Clean Energy	**Market:** Commercial Buildings
Market Gap: Long-term financing for commercial building upgrades between $100k & $2M	
Current Program Parameters	
Eligible Measures: Energy Efficiency, Solar PV, Geothermal, CHP, Renewable Energy	
Financing Tool: Third-party administrator establishes program guidelines and platform across the state. Any private lender can originate loan. No MCEC financing.	
MCEC Green Bank Needs	
Expand Capacity: Minimum dedicated internal staff to work with counties & administrator.	
Type of Capital Required: Annual marketing capital, sunsets when self-sufficient.	
Impact	**Leverage:** Loans are 100% private. Approaching infinite leverage per public $.
	ROI: N/A, no public capital invested.

Non-profits & MUSH Market – Expanded MCAP

MCAP has already raised $14.8 million in private financing for clean energy projects for the non-profit and MUSH market. However, there are projects that seek MCAP financing that cannot be closed or are never completed because there is a financing gap. Either a portion of the project cost cannot be covered through current MCAP structures, or the terms don't quite lead to a cash flow positive deal. Therefore, MCAP can close more deals and complete more projects by filling this financing shortfall with gap financing.

With a dedicated set of funds on MCEC's balance sheet, MCAP can offer senior and subordinated loans, and credit enhancements to help close deals. MCAP can also help serve projects that may be too small for individual bond issuances, which typically have a minimum threshold of $2 million. With a balance sheet, MCAP can lend to these projects and issue a bond that covers multiple projects. This could be particularly valuable for local municipal clean energy projects that struggle to find financing, as identified in Phase 1.

In addition, the deal flow for MCAP has been slowed by limited bandwidth at MCEC. With only minimal current staffing, MCEC has not been able to move as many deals as could be possible with more dedicated staff. In sum, by giving MCAP a dedicate capital pool to provide gap financing and increased operating funds, MCEC can fill more gaps in the market and increase penetration of clean energy markets.

Table 10: Non-Profit & MUSH Market Program with MCAP Improvements

Program Description	
Product: Maryland Clean Energy Capital	**Market:** Institutions, Non-Profits, MUSH
Market Gap: Low-cost debt for medium-sized projects for non-commercial owners, including muni.	
Current Program Parameters	
Eligible Measures: Energy Efficiency, Solar PV, Geothermal, CHP, Renewable Energy	
Financing Tool: MCEC issues tax-free bonds on behalf of project owner, giving access to low-cost capital. MCEC can keep on balance sheet, offer equipment lease.	
MCEC Green Bank Enhancements & Needs	
New Financing Tool: Use expanded MCEC balance sheet to offer *gap financing* and *credit enhancements*. Also add muni-specific direct lending for projects under $2M threshold.	
Expand Capacity: Increased staff to handle high volume of demand	
Type of Capital Required: Annual operating capital, sunsets when self-sufficient.	
Impact	**Leverage:** Bond debt 100% private. Gap financing will, by nature, have high leverage.
	ROI: Public capital return will depend on terms – likely 1% to 6%.

Small Businesses – New Loan Fund

The green bank will add a new financing product dedicated to small business upgrades. Small businesses struggle to find long-term financing at low rates because they are difficult to underwrite. Without credit ratings or FICO scores, banks find it typically isn't cost-effective to provide financing for this market. This market segment could also include the state's large agriculture industry. Projects for this market are more similar to residential projects in scope in size, and are likely below the $100,000 threshold for PACE projects. Therefore a dedicated, loan fund for small businesses would fill a clear market gap in Maryland.

Program Call Out: Small Business Energy Advance – Pepco and BG&E run the first on-bill financing programs in MD, targeting small businesses. Grants cover up to 80% of costs, and the remaining can be covered by the "advance" repaid over 12 or 24 months at no interest. This program indicates that MD regulators have already recognized the importance of financing. The project eligibility and size criteria are slightly restrictive, it is a program objective that MCEC can build upon.

This revolving loan fund would be seeded with upfront capital and provide direct loans to businesses. Efficiency and renewable technology would be eligible. MCEC can accumulate loans in a warehouse, and then sell the portfolio to recapitalize the fund. Alternatively, the fund could be set up as a revolver, with the pool replenished by loan repayments, and then lent again when sufficient funds are available. The only downside of the revolving loan approach is that it can take several years to recapture dollars needed to make more loans. A warehousing and sale approach can recapitalize the fund more quickly to increase lending.

One structure to consider is seeding the business upgrade loan fund with the state's unused allocation of federally-subsidized QECBs. There are nearly $50 million of unused Maryland QECBs allocated to local government.[38] The state could try to reclaim these allocations and direct them to MCEC to create a loan pool.

MCEC could also partner with the Maryland Department of Commerce to use existing financing tools. For instance, the Maryland Industrial Development Financing Authority (MIDFA) encourages private lending

[38] Energy Programs Consortium, "Qualified Energy Conservation Bonds (QECBs)," October 2015, at 26.

through credit support and loan guarantees. MCEC and Commerce are exploring an agreement to allow MCEC projects to leverage this credit support. Similarly, the Small, Minority & Women-Owned Business Account could be another complementary resource for financing small business upgrades.

Table 11: Small Business Loan Fund Program

Program Description	
Product: Small business upgrade loan	**Market:** Commercial buildings
Market Gap: Long-term financing for commercial building upgrades under $100k	
MCEC Green Bank Product Design & Needs	
Eligible Measures: Energy Efficiency, Solar PV, Geothermal, Renewable Energy	
Financing Tool: MCEC loan fund, providing direct loans to small businesses with reasonable term and rate. MCEC accumulates loans and sells portfolio to recapitalize; or revolves over time.	
Type of Capital Required: One-time capital infusion to seed loan fund	
Impact	**Leverage:** Loan fund capitalized with QECBs are 100% private.
	ROI: N/A, no public capital invested.

Low-to-Moderate Income Residential – New LMI Tailored Whole-Home Solution

A critical clean energy market gap in Maryland is the low-to-moderate income (LMI) market segment. LMI households having the greatest energy burden, but are least able to access the financing that is critical to reduce that burden. A number of programs in the state are designed to support those with the greatest need, specifically the ratepayer assistance programs. And DHCD's low-income efficiency grant programs also serve this market. However there are households that do not qualify and these programs are inherently expensive to operate. A new financing program targeted at whole home improvements can drastically reduce energy costs for those in need, while also allowing state funds to go farther in serving this market.

LMI homes often do not have credit scores high enough to qualify for certain kinds of finance. And many products on the market, like solar leases, are only accessible for single family home owners. Renters or multi-family tenants are left out. Many of these limitations on LMI lending are not based on true lending risk. FICO scores are not a perfectly accurate predictor of risk for clean energy loans. Repayment of a clean energy loan is more akin to repayment of a utility bill than a credit card bill. Clean energy financing repayments effectively replaces one utility for another. Utility bill default rates, even for LMI, are far lower than default rates for other forms of financing.[39] Therefore LMI financing can only grow if alternative underwriting criteria is used.

There are some examples of innovative new models to address this market gap. For instance, the Connecticut Green Bank has launched a new LMI-focused program. The Connecticut Green Bank has partnered with a private clean energy installer and lender to specifically serve the LMI market segment. LMI homes can receive an energy efficiency upgrade, followed by a rooftop solar PV installation through a single financing product that requires no money down. The combined efficiency and solar installation produces significant and immediate energy savings, making the project "cash-flow-positive" from day one. The mechanics underlying this financing solution is a solar lease structure for the solar PV and an energy savings agreement for the energy efficiency. From the customer's view, though, the entire package is unified.

[39] The percentage of utility bills deemed uncollectible is only 0.4% by one estimate. *See* Bell, Catherine, Steven Nadel, and Sara Hayes, "On-Bill Financing for Energy Efficiency Improvements," Report Number E118, Dec. 2011.

PosiGen, a clean energy installation and financing company, developed an efficient structure for deploying and underwriting these projects. PosiGen first installs efficiency upgrades, so that the solar system can be "right-sized" to serve the reduced energy load. A standardized set of efficiency measures are offered, minimizing complexity. And PosiGen uses an alternative underwriting process that does not consider FICO score. Rather, to qualify for financing one must demonstrate 12 consecutive months of on-time utility bill payment. In the pilot installation, the home energy costs fell from $500 per month to roughly $150 month, including the financing charge. This project was celebrated by CT Governor Dannel Malloy.[40]

This kind of innovative financing yield breakthroughs and market penetration. A number of entities in Maryland, such as Grid Alternatives and Fuel Fund, already seek to address this market gap. And SMECO has rolled-out an LMI financing program, Assisted Home Performance with Energy Star. SMECO will provide financing for upgrades for customers who do not qualify for Low Income EmPOWER grants, but cannot afford the upfront cost of an upgrade. The green bank could expand this kind of market support through the state and work in partnership with private organizations focused on serving LMI. A product design, by nature, would vary across sub-segments of the market. For instance, financing structures will likely vary across single-family homes, rental multi-unit rowhouses, and large multi-family units. Because of the split-incentive challenge between landlords and tenants, single family home solutions are the easiest to design and require the least external support through structures like OBF and PACE. Therefore, MCEC may initially focus on product development for single-family homes as the fastest way to make progress in the market.

Table 12: Low-to-Moderate Income Dedicated Financing Program

Program Description	
Product: Low-to-moderate income (LMI) home energy upgrade	**Market:** LMI households
Market Gap: Home energy upgrade financing solutions for LMI households who may have low credit scores and struggle to access clean energy technologies that would reduce their energy costs	
MCEC Green Bank Product Design & Needs	
Eligible Measures: Energy Efficiency, Solar PV,	
Financing Tool: MCEC analysis will identify precise financing structure needed. Could include solar lease & efficiency loan with private lender and contractor partners. DOE LPO potential interest.	
Type of Capital Required: One-time capital infusion to seed financing fund.	
Impact	**Leverage:** Objective will be greater than 2:1.
	ROI: TBD, based on precise partnership structure. Expected 1% - 3%.

Grid Reliability – New Micogrid & Storage Deployment Program

To spur greater reliability of the electric grid and grow innovative new clean energy markets, MCEC can launch a new program focused on supporting the deployment of microgrid and energy storage projects. Microgrids at critical facilities like hospitals and wastewater treatment plants can be invaluable at times of grid outage or during large storms. New technologies make these programs technically possible and economically attractive. However, projects are hard to develop and finance.

Maryland has already recognized the importance of resiliency through MEA's Energy Resiliency Grant program, which provides back-up generation for gas stations. MCEC can build on that commitment to

[40] Dixon, Ken, "Malloy Touts Solar Energy Savings," CTPost, July 21, 2015.

resiliency by offering a comprehensive set of services to help build microgrid projects. This includes project financing through MCEC's tax-exempt bond-issuing authority, as well technical assistance for project planning and funding support for project feasibility studies. A dedicated pool of $1 million per year could be set aside to support initial development of multiple projects in the state. The program can be modeled on the successful NY Prize program, which supports early project design and development.[41] This early support would ultimately lead projects to completion and financing through MCEC bonding structures. This full suite of support, from conception to deployment, will demonstrate how microgrid and storage projects can be more widely deployed across the state.

This type of program can both stimulate development of crucial infrastructure projects, as well as attract new businesses to Maryland. Microgrid and storage projects require specialized development and engineering knowledge. This dedicated program can signal a new interest in this technology in Maryland and bring new businesses to the state. The program would require an annual source of funds for specialized technical assistance and feasibility study support.

Table 13: Microgrid Project Deployment Program

Program Description	
Product: Technical assistance, study support & project financing	**Market:** Critical infrastructure
Market Gap: Large need for investment in resiliency infrastructure, microgrids and energy storage. Designing and developing projects is difficult and expensive, hard to finance.	
MCEC Green Bank Product Design & Needs	
Eligible Measures: Microgrids, battery storage, distributed generation, distribution technology.	
Financing Tool: Tax-exempt conduit bond-issuing (similar structure to MCAP) to finance project deployment, and annual awards of technical support and funding to defray cost of feasibility studies.	
Type of Capital Required: Annual program capital to operate.	
Impact	**Leverage:** No initial leverage, but will enable privately financed projects.
	ROI: N/A.

Cleantech Innovation – New Cleantech Business Development Award

A noted gap identified in Phase 1 is the lack of funding for cleantech business development in the state. As Maryland seeks to build new companies, become a dynamic business environment and become a leader in various forms of innovation, a green bank can help that mission by supporting cleantech growth. A program around cleantech would fit well within MCEC's standing mission and directives, as named in statute, to support clean energy business development.

> ***Industry Quote:*** "Sustainable Systems International is a Maryland start-up company that designs and manufactures solar powered bulk milk chillers for export to dairies in developing countries. One of our biggest challenges is capitalizing the production of orders before we receive payment from the customer. A Green Bank would be very helpful if it provided loans against the orders as collateral or help make the loan less risky for banks to lend to entrepreneurs and innovators like us. The Green Bank would allow our business to grow more rapidly and create many new jobs in the region." – ***John Spears, Sustainable Systems International***

Under a cleantech program, MCEC could provide annual awards to Maryland based companies that are

[41] http://www.nyserda.ny.gov/All-Programs/Programs/NY-Prize/Competition-Structure, as viewed November 8, 2015.

attempting to develop new clean energy technologies or design new clean energy business models that can increase market penetration. The awards would be in the form of an equity investment, which is a charge specifically given to MCEC in its statute. MCEC can work in partnership with existing entities in the state that are already built and designed to incubate and grow new Maryland businesses.

For example, Maryland Industrial Partnership (MIPS) at the University of Maryland has worked for multiple years with Maryland DNR to fund innovative projects that can help restore the Chesapeake Bay. DNR's Innovative Technology Fund is supports research and business development projects at MIPS, with DNR and MIPS working together to selecting projects that will be awarded funds.[42] MCEC could adopt a similar structure, passing funds to a partner already dedicated to developing and incubating businesses, with MCEC setting parameters and helping to select winning projects. The program would require an annual source of funds to provide awards on an on-going basis. This program could work in great partnership with MEA's Game Changer Competitive Grant Program, which offers awards to pay for early commercialization projects or demonstration projects for new clean energy technologies. A business could be incubated and grown through MCEC's investment, and then be able to commercialize its technology through an MEA grant.

Industry Quote: "As a new company in biofuels, the assistance provided by MCEC has been invaluable. When we began to explore the National Capital Region for a site to locate our facility the resources and information that MCEC brought to our attention made our decision to locate our facility in the State of Maryland a seamless one. Not only has MCEC been instrumental in assisting us on locating in Maryland it has taken the time to understand our business mission and goals. This has also enabled the MCEC to introduce our company to a few of our strategic partners. These partnerships have not only increased the breadth and depth of our company, they have increased our profile within the biofuels industry." - ***Wendall Jenkins, Capital Biodiesel***

Table 14: Cleantech Business Development Investment Program

Program Description	
Product: Funding for clean technology development	**Market:** Cleantech
Market Gap: As Maryland attempts to attract and develop innovative new businesses in growing markets, the state can incentivize cleantech growth with annual development awards.	
MCEC Green Bank Product Design & Needs	
Eligible Applicants: Maryland-based businesses developing new clean energy technologies.	
Financing Tool: Annual equity investment award given to applicants via existing state partners that already focus on developing start-ups through incubators and business expertise	
Type of Capital Required: Annual program capital to support investments.	
Impact	**Leverage:** Will enable business and job growth; leverage will vary by company awarded.
	ROI: TBD, parameters of investment to be set by green bank.

[42] http://dnr.maryland.gov/ccs/intechfund.asp, as viewed November 8, 2015.

Market Development & Education – New Technical Assistance Program

A final, yet crucial program to be offered by a Maryland green bank is technical assistance for market development. Requested by stakeholders more than any other form of support, a Maryland green bank can provide critical know-how, guidance and information to market actors to understand how to acquire clean energy technology and take advantage of state programs. For most market participants, the mere idea of choosing how to use and consume energy is a new concept. Therefore there is a sizable need for education and information. Consumers and businesses need to learn about technologies, clean energy economics, and adoption or purchase options. Procuring clean energy technologies, even in a straight-forward energy efficiency building upgrade, can be incredibly complex and daunting for new customers. The green bank can address these market challenges with a technical assistance program.

Program Call-Out: Energy Performance Contracting Assistance Program (EPCAP) – MEA's EPCAP program provides technical assistance to local governments and public housing authorities to help identify and implement energy performance contracts to upgrade buildings. An MCEC Technical Assistance program would specifically partner with MEA to ensure local governments take advantage of the EPCAP program.

MCEC can offer a range of forms of market support. A "concierge service" can direct customers, contractors and businesses to the appropriate place in government to access various forms of support and information. A new website can provide clear, simple and comprehensive information about clean energy technology and the state's current programs. MCEC staff can help municipalities understand the project development process and direct them to engineers or contractors. And MCEC staff can give detailed guidance on financing options from MCEC or other potential sources.

By streamlining information and creating a single point of access to learn about state programs, MCEC can greatly reduce market confusion and make clean energy seem more accessible. This initiative could be part of a broader Maryland branding effort around clean energy, unifying all state clean energy programs under a single banner. Consistent websites and language can help market participants make sense of the complicated landscape of state entities trying to serve the market. And a website operated by MCEC, in collaboration with all other relevant entities, can serve as a central entry point for the market, where visitors can be directed to the appropriate program and entity depending on the visitor's needs.

By combining finance, information, and project guidance under one roof, a Maryland green bank can support markets efficiently, maximize the impact of state dollars, and facilitate clean energy adoption where confusion may otherwise stymie market growth.

Table 15: Technical Assistance Market Development Program

Program Description	
Product: Assistance to support market growth	**Market:** Installers, muni's, MUSH, lenders
Market Gap: Lack of knowledge how to invest in clean energy; how to develop clean energy projects; how to procure clean energy technology; how to navigate multiple state programs	
MCEC Green Bank Program Design & Needs	
Program Design: MCEC acts as single point of contact to educate market participants on project development road-map; guidance on project development and contracting; how to structure projects with multiple technologies, understand risks and processes of clean energy lending; connect MCEC financing with other grants; single point of access website to inform about all state programs.	
Financing Tool: No financing	
Type of Capital Required: Annual operating capital to staff, build website.	
Impact	**Market Development:** More informed market participants, more demand.

Potential Future Green Bank Products

The clean energy industry is constantly evolving, and a Maryland green bank could be well positioned to help deploy new technologies and take advantage of new financing models. Though not immediate needs, there are a broad set of financing and market development solutions the green bank could deploy in the future, in partnership with other Maryland agencies. These might include:

- Residential PACE – Currently only commercial-sector PACE is operating in the state, and very few states have deployed residential PACE due to possible complications with Federal Housing Financing Authority regulations. Residential PACE is right now being vetted by federal housing regulators, with industry guidance expected soon. Should Maryland wish to enable residential PACE under this new federal guidance, the green bank could bring this new tool to the market.
- Virtual Net-Metering / Community Solar – In May 2015, Maryland passed HB1087 to launch a pilot program for virtual net-metered solar installations, or "community solar." Community solar is a model that creates the economic equivalent of roof-top solar for the customer, without actually having to put the solar on the roof. Instead, a large, centralized solar system is built that multiple households can "subscribe" to, thus opening solar to renters and those with inadequate roofs. It is a complex regulatory and financing model, and the green bank could play a critical role filling financing gaps for pilot projects.
- Distributed On-Site Storage – As battery costs fall, the combination of rooftop solar and on-site storage will become increasingly economical for commercial sites, and then residential customers. A green bank would be poised to help that industry grow through early project finance.

Chapter 7 – Potential Maryland Green Bank Impact

A $40 million investment in a Maryland green bank can drive $160 million in total clean energy with just the initial leverage achieved, before recycling. Over time, public dollars can be recycled to leverage private dollars repeatedly. In addition to driving more investment and clean energy deployment, the green bank can cause market transformation and deliver many other public benefits to the state.

Clean Energy Investment & Deployment

Given the proposed set of products and green bank activities, and $40 million in funding, the green bank can generate $140 million in clean energy investment under a hypothetical capital allocation. Accounting for overhead and administrative costs, $34 million of capital could be used to draw in $138 million in private investment. This would create a total of $160 million in actual direct investment in clean energy technologies.[43] This includes $20 million in initial investment in residential home upgrades, $100 million in financing for large projects in the non-profit and MUSH sector, $24 million in financing for the LMI market, and an initial $6 million for small businesses. In addition, MPACE can be expected to enable approximately $10 million in financing statewide, using entirely private capital.

For the MHELP residential upgrade program, a hypothetical $2 million allocation to a loan loss reserve could leverage ten times as much investment, based on what has been achieved by other green banks. This would create $20 million in direct investment in projects, which would include efficiency, renewables or a combination. If the $20 million in investment was used solely for solar, this could finance solar on over one thousand homes, deploying nearly 6 MW of installed solar.[44] If used solely for efficiency, the investment could be expected to produce similar results to the $22.2 million already invested through MHELP, which includes over 10 million kWh of savings, and approximately 50,000 full-time equivalent job hours.

The MCAP gap financing fund could be given a $20 million budget, with $10 million allocated for direct financing (loans) and $10 million used for credit enhancements. Assuming that the gap loans are used to cover a quarter of project costs, this could leverage $30 million in private investing for a total of $40 million of direct project investment. In addition, the $10 million of credit enhancements can leverage at a 5-to-1 ratio, creating another $50 million of investment. This sums to $90 million of investment in clean energy for the non-profit and MUSH sector. In addition, MCAP can be expected to generate $10 million of project investment simply using the existing conduit bond structure. This adds $100 million in total investment.

MPACE is designed to use 100% private capital to finance commercial building upgrades. Given the market size and need, MPACE can generate $10 million of private investment at the start of the program. Over time, this number will certainly increase. Connecticut, a state 2/3 the size of Maryland, has generated approximately $100 million in commercial PACE financing in just over 2 years. And again, this requires no direct public investment.

A $6 million fund for small business upgrade loans could be used to directly offer 100% financing initially. However, this amount can be recycled and leveraged on the back end of the loan program. For instance, if the green bank builds a portfolio of loans with diversified risk, the portfolio could be sold to a private lender

[43] The use public dollars as credit enhancements does not count toward direct project investment, as the public funds are not actually used to buy and finance technology. Rather, they are held in reserve to support private investment.

[44] Assumes total solar installed cost of $3.50/watt, and an average 5kw system size.

who otherwise would not have made the direct underwriting and investment. This could allow for 100% leverage and total replacement of public capital by private capital. Or, more conservatively, the green bank may need to hold a credit enhancing position (as was the case when the Connecticut Green Bank sold its C-PACE portfolio). Even if the green bank retains a 20% stake in the portfolio in a subordinated position, the $6 million will ultimately have a 4-to-1 leverage ratio.

Finally, if the green bank allocated $6 million for LMI financing, this could be paired with up to $18 million in matching private capital. A hypothetical public-private partnership with current market actors looking to serve the LMI solar market could draw upon a number of other funding sources, like donated panels, in-kind labor, and SREC value, and state grants, with green bank capital filling the gap that currently is not covered by any other funding source. This could create $24 million in total investment for LMI home upgrades.

Table 16: Hypothetical Green Bank Investment Allocation & Results

Product	Public Investment Type	Green Bank Allocation	Initial Private Investment	Initial Project Investment
MHELP	Loan Loss Reserve	$2M	$20M	$20M
MCAP	Gap Loans	$10M	$30M	$40M
	Loan Loss Reserve	$10M	$50M	$50M
	All Private	N/A	$10M	$10M
MPACE	All Private	N/A	$10M	$10M
Small Business	Loan Fund	$6M	N/A	$6M
LMI	Loan Fund	$6M	$18M	$24M
Total		$34M	$138M	$160M

In total, $34 million of total capital allocation for financing can create a total $160 million in direct investment in clean energy deployment. This is based on a hypothetical allocation across the programs. True allocation may be determined based on market needs and policy choices of the state. For instance, the state and the green bank may feel that, even if $40 million in capital is not given to the green bank, the LMI-focused program should receive a set minimum level of funding. This could be done to reflect the recognition that this market segment shows the greatest need for financing support. An LMI minimum funding level would also be in line with the state's track record of supporting the energy needs of LMI households.

Market Transformation

In addition to the direct investment outcomes, the green bank can also transform the state's clean energy markets. Part of this will be through specific awards of funding, but also through the Technical Assistance and market development work described in the report.

The Grid Reliability competitive award program can award $1 million in the initial year of operation, potentially supporting up to 4 microgrid and storage feasibility studies. Microgrids are critical to Maryland's electric and infrastructure reliability, and are becoming ever more economical. However, the project

development process may be complex and expensive, which is why the award to study feasibility is an essential early stage boost for programs. Microgrids could be deployed at critical infrastructure like hospitals, water and wastewater treatment facilities, schools and other public buildings used for shelter during emergencies. As the threats of climate change and stronger storms increase, Maryland can be better prepared with a hardened infrastructure, enabled by the green bank.

Separately, the Cleantech Innovation competitive award can spark business growth and technology development in a sector that can play a major role in Maryland's economy going forward. To transform Maryland into a hub of clean energy leadership, new businesses must be nurtured and drawn to the state. A $1 million prize for business model and technical innovation in clean energy can spur this kind of in-state activity. By working through partnerships with existing incubators and business development organizations, the green bank can identify promising companies and technologies and support their growth. This growth can include more jobs, output and economic productivity for the state.

The Technical Assistance provided can, in combination with financing, enable greater demand and higher utilization of all public clean energy programs. A key element of the growth and maturation of any market is transparency and access to information. A green bank can provide that information to create a more educated consumer base, increase awareness of the economic opportunity available through clean energy, and "normalize" clean energy transactions. For Maryland to build a new clean energy platform and penetrate the vast market potential, know-how and familiarity among all market participants will be critical.

Together the green bank's financing and market development activities will transform the clean energy market, where knowledgeable consumers can demand *and* access a range of cost-saving clean energy technologies with no upfront cost. There will be greater market confidence and more private investment.

Public Benefits

In addition the increase investment and clean energy market transformation, a green bank can create numerous other public benefits for Maryland.

- Economic Growth & Jobs – Direct investment in Maryland's clean energy economy will enable demand for deeper/larger projects, which will need to be served by local businesses and employees. There is no way to outsource energy efficiency installation, so a green bank creates job opportunities in Maryland. And businesses will be able to grow to meet the increased demand.
- System Resiliency – A green bank can drive greater penetration of distributed generation, which reduces the burden on centralized power and increases reliance. Microgrids and storage can harden critical parts of the state grid. And increased energy efficiency lowers the overall need for energy. Greater reliability reduces broad macroeconomic risks that come with major emergency events of black outs that might otherwise shutter the economy.
- Cleaner Environment – By increasing penetration of renewables and efficiency, Maryland can accelerate its path toward desired greenhouse gas emissions reductions. With a lower dependence on fossil fuels, Maryland can enjoy less pollution and a cleaner environment.

These benefits are in addition to the direct benefits to those that adopt clean energy – most importantly, increased savings on energy bills.

Chapter 8 – Green Bank Funding

To date, MCEC has never received any regular funding from the state. No ordinary state budget funds, SEIF dollars or ratepayer dollars have been allocated to MCEC for ordinary overhead or program operation. Despite this, MCEC has been able to stimulate $37 million in private investment with only $3.44 million in ARRA funds from one up-front payment.

However, to build on this success, expand the clean energy market, and stimulate private investment, more capital is needed. Each of the financing products and programs described in this report requires an infusion of capital. To expand from the current MCEC organization structure to a proper green bank lending institution, MCEC will also need transitional operating funds. However, over time, the required input of state funds will be reduced if not entirely eliminated, as the green bank gets to scale and can cover operating costs with lending proceeds (described more below).

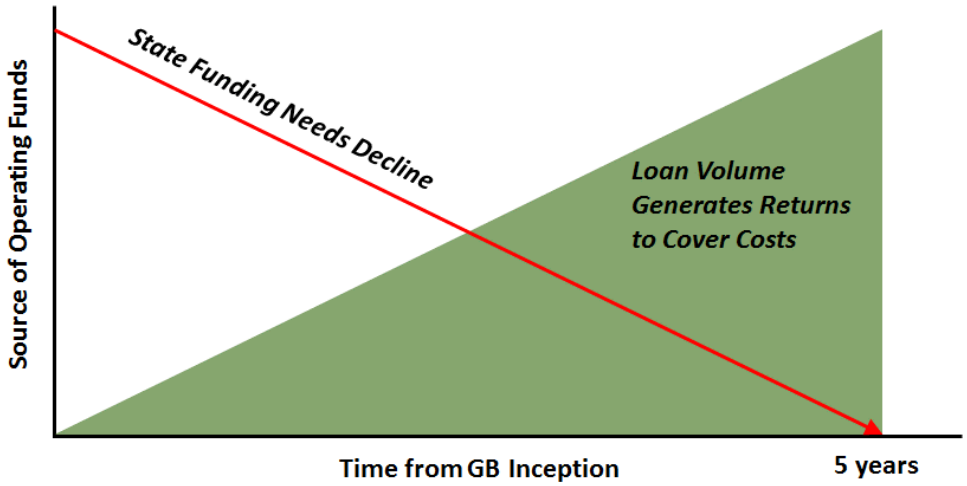
Based on market need, estimated budgets and a series of factors, this study finds that $40 million in funding for a Maryland green bank would be both sufficient for driving market growth and financially feasible for the state. $40 million, leveraged even at 4-to-1 ratio, could generate $160 million in private investment. Estimated operating costs and potential capital allocations across the proposed projects point to $40 million as sufficient for standing up the organization, injecting sufficient capital into the market, and, importantly, signaling legitimacy and seriousness to market actors. Part of any green bank's role is to shine a spotlight on the state, declaring the state's intentions to harness market forces and turn their clean energy industry into an economic engine. New York achieved then when it announced that it would create a $1 billion institution. Though $1 billion is not feasible in Maryland, $40 million is certainly large enough to signal to market actors from across the country that the state is making a serious and innovative effort to stimulate clean energy market growth.

Though every public dollar is sacred and must be carefully allocated, $40 million represents a wise investment for the state that is actually quite feasible. Given that the state currently takes in and spends $449 million of public capital on energy programs each year, $40 million represents less than 10% of only one year's worth of funding. And because the green bank does not rely on perpetual annual budget allocations due to its financing nature (as opposed to grants), a green bank could be funded with only a brief impact on other funds. $40 million also pales in comparison to the $8 billion need, so anything less than this figure would fail to meet the threshold of being meaningful in the market and significant in the eyes of market actors. And funding need not solely come at the expense of existing programs. A number of possible funding sources exist that draw on unused capital.

Green Banks & Self-Sustainability

Funding a green bank is different from funding other typical government programs because green banks can ultimately pay most, if not all, of their own operating expenses. A typical clean energy program organization like MEA must receive annual infusions of cash, in perpetuity, to cover both operating expenses and program expenses. As detailed in the SEIF allocation formula (discussed below), 10% of the SEIF funds are designated for MEA administration indefinitely going forward. This is in addition to the annual draw from SEIF to refill the pool for grant and rebate programs each year. A green bank does not require this form of funding because it offers financing, which can generates returns that cover operating expenses.

Figure 11: Green Bank Path to Self-Sustainability



A green bank can reach a point of self-sustainability over time. At creation, the green bank does not yet have loan volume to create return and cover operating expenses. Therefore at the start, a green bank needs a dedicated pool of funds to hire staff and cover other upfront costs. But over time, as loan volume increases, it can generate more returns, reducing the need for on-going cash infusions for operating expenses. Over the course of an estimated five years, the green bank can become self-sustaining, and can become continuously operational without more state funding. Any returns will be off-set by losses experienced on green bank loans and financing. Losses are to be expected, like in any financing activity, which means rates and terms offered must account for those expected losses. Across nearly 1,500 loans, the Connecticut Green Bank has experienced zero defaults, and six late payments.[45] This low rate of loss means a green bank can recover operating expenses through its financing activity, while still offering rates that enable market growth.

Note that if the green bank takes on multiple market development programs, minimal continued funding may be needed. Programs like technical assistance do not generate returns because they do not offer financing. Returns from other financing programs may be able to cover the costs of the lending programs and some of the costs of other market development programs. However, if a significant amount of market development activities are pursued; state funding will need to continue for a longer period.

Funding Sources

The $40 million needed to fund and capitalize the green bank could come from a number of sources. Some funding avenues would require redirecting dollars currently going to existing programs, while other avenues could draw on new funds with no impact on programs. Some of the potential options are listed below.[46]

[45] Connecticut Green Bank.

[46] The list of funding sources addressed in this paper do not represent an endorsement of any specific funding path by Steering Committee members. Rather, this discussion is meant to provide a thorough accounting of relevant and sizable funds presently used for clean energy and possibly suitable for a green bank. The pros and cons of using any given funding source are addressed below. The Steering Committee held no votes on the inclusion or exclusion any funding sources that were considered.

Table 17: Summary of Green Bank Funding Options

Funding Source	Pros	Cons	Potential Funds
SEIF			
Fund Balance	Surplus dollars, greater than needed to fund existing programs. No impact on current programs.	None.	~$31.6 million
Cove Point Settlement	Broadly available, not already allocated to other programs. No impact on current programs	Won't be fully invested in SEIF until five years after Cove Point begins.	$40 million, available over five year period
Reallocation	Constantly replenished source that is not a tax on citizens.	Means temporary impact on funding existing programs.	$80-$90 million annually available
EmPOWER			
Reallocation	Steady stream of existing dollars that can be directed for more efficient use.	Temporary impact on funding existing programs. Complex to accomplish.	$320 million collected in 2014
New Surcharge	Dedicated funds for green bank, modeled on other states.	Negative ratepayer impact from new collection. Complex to accomplish.	N/A
Bond			
QECB	Untapped source of low-cost capital, subsidized by federal government.	Hard to collect from local government. Complex process for issuance.	$47.8 million in sub-allocations to local governments.
Gen. Obligation Bond	Large source of low-cost capital based on state's credit rating.	Adds to state debt burden.	N/A
Project-Backed Bonds	Capital that is repaid directly by returns on invested proceeds. No impact on state credit.	Requires line of sight, or pipeline of specific projects. High minimum project size due to transaction costs.	N/A
Federal Resources			
USDA	Federal resources dedicated to financing clean energy in rural America.	Long application process; only part of state is eligible.	Billions of dollars.
DOE LPO	Large loan guarantees dedicated to innovative clean energy projects – green banks eligible.	Long application process; not a true capitalization source, must be project specific.	Billions of dollars.

Strategic Energy Investment Fund

The SEIF, funded annually with RGGI proceeds, is currently allocated by formula, determined by Maryland law. Under the current formula 50% of funds go to low income ratepayer assistance, 40% going towards clean energy programs (mostly operated by MEA), and 10% going to MEA overhead. Because the SEIF receives $80 - $90 million per year from non-ratepayer or taxpayer sources, it is a good option for drawing funds for a green bank. The SEIF is also a recipient of one-off investments into the state for clean energy programs, which are not already allocated. The SEIF is a logical place to look for green bank funding.

The most viable path toward green bank funding through the SEIF is to utilize an existing fund balance, or surplus, in the SEIF. Though the SEIF was initially designed to be filled regularly by the RGGI auction proceeds and spent on programs at matching scale, over time a balance has accumulated in the SEIF. The MEA FY 2016 budget analysis describes this balance in detail, calculating an expected balance of $31.3 million at the end of FY 2016.[47] MEA also notes that this estimate, based on calculations performed by the Governor's office, likely understates fund revenue, and therefore the actual balance at end of FY 2016 may actually be higher.[48]

Another way the SEIF could be drawn upon for funding a green bank would be through altering, perhaps temporarily, the SEIF allocation formula. Dollars could be pulled from the SEIF for only a limited period of time to fund a green bank. And any dollars directed to a green bank are soon replenished from quarterly RGGI auctions which flow back into the state, and can go back to funding the current activities. This would not constitute a new tax or an increased in electricity rates for Maryland citizens. Rather, it would be a temporary redirection of a recurring source of funds.

A third way to pull dollars from the SEIF into a green bank is to draw upon, or take an advance from a $40 million payment coming from the Cove Point Settlement. In June 2014, the Maryland PSC approved Dominion's Cove Point liquefied natural gas export facility.[49] Part of the approval was conditional upon Dominion making a $40 million payment into the state's SEIF over a five year period, commencing with construction. As stated in the settlement, the funds are to be used for clean energy programs:

> The funds shall be used solely for the purpose of investing in the promotion, development, and implementation of one or more of the following categories: (1) renewable and clean energy resources; (2) greenhouse gas reduction or mitigation programs; (3) cost-effective energy efficiency and conservation programs, projects, or activities; or (4) demand response programs that are designed to promote changes in electric usage by customers.[50]

A green bank would clearly qualify under the conditions detailed in the order, and drawing on these funds would not come at the expense of other programs. The long timeline of SEIF investment under this order could create challenges for upfront green bank funding. As a hybrid, the green bank could be funded initially from the SEIF fund balance as an advance on the funds that will arrive over time from Cove Point.

EmPOWER Program

The largest single source of funding for clean energy programs in the state is the EmPOWER ratepayer-based fund, which collected $320 million in 2014. Across the five participating utilities, $106 million was collected for residential rebate programs, $179 million was collected for commercial rebate programs, and $35 was collected for low income programs. That $35 million was collected by utilities and passed on to DHCD to

[47] Maryland Energy Administration, Analysis of FY 2016 Maryland Executive Budget, 2015 (D13A13), at 24.
[48] Maryland Energy Administration, Analysis of FY 2016 Maryland Executive Budget, 2015 (D13A13), at 23.
[49] Barbara Vergetis Lundin, "MD PSC approves Cove Point LNG – with lots of conditions," FierceEnergy, 6/2/14.
[50] Maryland PSC Case No. 9318, Order No. 86372, at 74.

actually operate the programs, while the utilities kept the remaining $285 to operate programs directly. This ratepayer collection process is a result of both legislation and regulatory oversight from the PSC.

Though this funding source is significant, it may be difficult to draw on EmPOWER for green bank funds. First, accessing these funds would likely require both legislation and regulatory changes. But the greater challenge is that, unlike similar ratepayer funded energy efficiency grant programs in other states, EmPOWER is not a traditional system benefit charge. The system benefit charge system used in states like Connecticut and New York is a regular and specific surcharge on customer utility bills that collects dollar in advance, and then adds them to the pool for the utility's upcoming programs. It is not part of the utility rate base. However, in Maryland, EmPOWER funding occurs in the opposite order, as utilities present program budgets to the PSC, which then approves cost recovery, effectively as part of the utility rate base. Funds are collected from ratepayers after the fact, similar to how utilities recover costs for infrastructure investments. Therefore in Maryland there is no existing fund or pool of dollars that can be tapped. Rather, pulling dollars into a green bank through EmPOWER would require changes to the PSC ratemaking process. In theory, a new surcharge could be added to bills to fund a green bank, but that is highly undesirable and is not on the table.

So despite the attractive size of this funding source, it is not a preferred avenue for seeking capital for a green bank. The complexity of accessing these funds and required engagement with utilities and numerous other parties means tapping into these funds would take a long period of time and tremendous regulatory effort.

Bond Issuance

The green bank could be funded through a number of possible bond structures. The advantage of funding the green bank through bonds is that it doesn't require pulling funds from other programs. However, the downside is that the green bank will have to lend at a higher cost of capital in order to cover the repayments owed on the bonds. If funded through SEIF or a similar funding source, there is no cost of capital – the money does not have to be repaid. This means the green bank has far more flexibility in how it uses its funds and the rates offered. Bonds, by nature have a cost of capital, which would then be passed through to end borrowers.

One possible bonding structure would be funding the green bank through state general obligation bond. A bond issued by the state may support a broad number of activities, and a green bank could be included in any coming issuance. The proceeds could be passed from the state to the green bank. The advantage of this structure is that, because the bonds are backed by the full faith and credit of the state, they typically have a very low cost of capital. Maryland presently has the highest credit rating possible.[51]

Alternatively, a more viable and specific bonding structure available are Qualified Energy Conservation Bonds (QECBs). This bond structure, created by the federal government, allows state and local governments to issue bonds and access low-cost capital for qualifying projects. QECBs are taxable bonds, but interest payments are subsidized by the federal government, thus reducing the ultimate cost of capital the issuer must pay. Congress authorized $3.2 billion of QECB issuance capacity, which was then allocated to state and local government.[52] Maryland received $58.4 million in QECBs, with all but $6.3 million sub-allocated to local governments. The state used its own $6.3 million initial allocation of QECBs in 2011, but $48 million of allocations to local governments still remain.[53] A green bank could be assigned the unused allocation for a wide range of potential uses. Most, if not all, green bank activity proposed would qualify for QECB issuance.

[51] http://www.treasurer.state.md.us/debtmanagement/general-obligation-bonds.aspx, as viewed on 11/7/15

[52] Department of Energy, Qualified Energy Conservation Bonds, http://energy.gov/eere/slsc/qualified-energy-conservation-bonds, as viewed on November 7, 2015.

[53] Energy Programs Consortium, Qualified Energy Conservation Bonds, October 2015.

QECBs could be issued to fund specifically identified projects, or they could be issued to fund a warehouse, which then finances a large number of smaller projects through a dedicated loan program.[54]

Given that the current allowance for QECBs are sitting totally unused, a green bank could present a viable way for the state to finally realize the value offered from the federal government through these bonds. To do this, the state would need to collect the remaining QECB allocations from local governments in Maryland. This may prove legally challenging, as the state attempted to collect QECBs from local governments in the past with no success to date. So this path may prove challenging. However, both Virginia and Rhode Island have recently pursued this strategy in order to unlock all potential funding in the state and realize the scale efficiencies needed for QECB usage.[55] In fact, Rhode Island's green bank was designated the sole issuer of the state's $11.9 million QECB allocation, and built into its program design that any municipality that received a loan from the bank would then transfer its local QECB allocation to the state green bank.[56] If the state proves unable to actually collect the allowances for MCEC, MCEC could instead work directly with local governments to help them design projects and issue bonds to take advantage of the financing capacity.

Finally, MCEC can use its own existing bonding authority to fund projects. Like QECBs, the bonds would be repaid directly by the cash flow generated by the investment of bond proceeds. There would be a direct link between projects and bond repayment, just as there is today under MCEC's MCAP program. The challenge with this structure, as described earlier is that due to transaction costs, there is a minimum viable project size. This structure would also require that bonds be issued to finance specific projects that are already identified for construction. MCEC could not issue a bond under this structure to truly seed a green bank, with funds usable for multiple purposes. A bond could only be issued in connection to specific projects. It is plausible for MCEC to bundle multiple projects into a single issuance, but coordinating multiple projects to align for a single bond issuance can be practically difficult.

Federal Resources

There are federal resources potentially available to support a Maryland green bank. Though no program exists to directly fund and capitalize a full green bank institution, there are a number of lending programs that can provide green banks with loan capital for specific types of projects.

The Department of Energy (DOE) Loan Program Office (LPO) is designed to provide loans and loan guarantees for innovative clean energy projects. Under Title XVII Program 1703, Renewable Energy and Energy Efficiency projects that demonstrate technical innovation can access billions of dollars of financing support. Historically a "project" has been interpreted to mean a large, single installation. However, recent guidance from the LPO made several key clarifications. The LPO confirmed that a project can actually be a portfolio of multiple smaller projects. The LPO also clarified that distributed energy installation qualify. Together, this means a large portfolio of distributed renewable or energy efficiency projects were eligible for financing. And finally, the LPO stated that state green banks were now eligible applicants to the LPO under this program.[57] A green bank could develop a portfolio of small, technically innovative projects (like solar plus storage, or micro-grids at hospitals), and then apply to the LPO for a loan guarantee. The application process is complex and

[54] "Using Qualified Energy Conservation Bonds (QECB's) to Fund a Residential Energy Efficiency Loan Program: Case Study on Saint Louis County, MO," Clean Energy Policy Brief, LBNL, June 20, 2011.
[55] Executive Order Number Thirty Six (2014), "Continuing Qualified Energy Conservation Bonds," Commonwealth of Virginia, Office of the Governor; FY 2016 Rhode Island State Budget, Article 14.
[56] FY 2016 Rhode Island State Budget, Article 14, Section 18, § 46-12.2-4.2.
[57] Third Supplement to Loan Guarantee Announcement, Federal Loan Guarantees for Renewable Energy And Energy Efficiency Projects, Supplement Date August 24, 2015.

expensive, but could be a path to a significant level of financing. This path could also bring positive national attention to Maryland for being the first green bank to apply for LPO funds.

The USDA could also be a potential funding source for the green bank. Similar to the LPO program, the USDA would not be able to broadly seed a green bank, but it could be a source of low-cost funds for specific projects or portfolios of projects. The USDA's Rural Energy for America Program (REAP), Renewable Energy Systems & Energy Efficiency Improvement Loans & Grants provides financial assistance for agricultural producers and rural small business. Through this program, applicants can receive grants and loan guarantees for renewable and efficiency projects.[58] A green bank could tap into this well-funded program to help rural and agricultural parts of Maryland access funding for clean energy projects. The USDA's Rural Utility Service (RUS) also offers the Energy Efficiency and Conservation Loan Program (EECLP), which provides low cost financing to rural utilities to make residential, commercial and industrial clean energy investments. The RUS lends capital to the rural unities, who then on-lend to end-customers to make renewable energy and energy efficiency improvements.[59] Though not rural utility, a green bank could coordinate with the state's four rural electric co-ops to submit a joint application to the RUS for funding.

Green Bank Funding Plan

The $40 million of green bank funding could be transferred under multiple possible structures, which do not all require one-time upfront funding. Rather funding could be transferred over time to spread out the cost to the state. Under each funding plan described below, funding is divided into investment capital, to be used for lending and other program activity, and operating capital, to cover overhead and administrative costs.

Table 18: Green Bank Funding Plan Options

Option	Funding Plan	Capital Type	Allocation to Green Bank ($M)				
			Yr 1	Yr 2	Yr 3	Yr 4	Yr 5
Plan #1	All investment and operating capital allocated to GB upfront. 7-10% of that allocation used annually for operating expense. No further funds needed.	**Investment**	$40	$0	$0	$0	$0
		Operating	$0	$0	$0	$0	$0
Plan #2	Only investment capital allocated to GB upfront, plus annual operating allocation needed for 5 years, after which GB self-sustaining.	**Investment**	$30	$0	$0	$0	$0
		Operating	$3.4	$2.3	$2.0	$1.3	$1
Plan #3	Investment capital allocated to GB over 3 years, rather than all upfront. Annual operating capital still separate, with plan for self-sustainability in 5 years.	**Investment**	$10	$10	$10	$0	$0
		Operating	$3.4	$2.3	$2.0	$1.3	$1

Under Plan 1, all $40 million would be transferred to the green bank in a single lump-sum payment upfront. 7-10% of this would be expected to be used for operations annually, with the remaining funds used for financing and market development programs. Under the five year planning horizon, no other funds would need to be transferred to the green bank.

[58] http://www.rd.usda.gov/programs-services/rural-energy-america-program-renewable-energy-systems-energy-efficiency, as viewed on November 7, 2015.
[59] http://www.rd.usda.gov/programs-services/energy-efficiency-and-conservation-loan-program.

Under Plan 2, $30 million of investment capital would be transferred to the green bank upfront, and $10 million of operating capital would be transferred over a five year horizon. The money would be spread out with more operating funds arriving in Year 1 than in Year 5, reflecting the bank's growing lending portfolio and earned returns over that period. Less state money will be needed each year for operating expenses.

Under Plan 3, investment capital infusions into the green bank would also be spread out over time. $30 million in investment capital to seed the bank would be transferred over three years, at $10 million per year. Separately, the $10 million in green bank operating expenses would be transferred over 5 years, under the same allocation described in Plan 3.

There are pros and cons to each plan. Under Plan 1, the full upfront investment of $40 million gives the green bank the greatest amount of flexibility to operate the best opportunity to build market scale quickly. However, it does have the greatest immediate cost impact for the state. Plans 2 and 3 spread out that cost impact over time, though Plan 3 would inhibit the green bank's ability to launch multiple financing products at once. Under Plan 3, the green bank would almost certainly have to roll out its products and programs in stages until sufficient capital is transferred.

Chapter 9 – MCEC Organization Adaptation

For MCEC to grow into a full green bank from its current form, MCEC will have to adapt. MCEC will need to add more employees, particularly staff with financing expertise. MCEC may also need to alter its current governance structure to be better aligned with a stronger focus on finance. As a quasi-public, new MCEC staff will not be part of the state payroll, and will give MCEC the hiring flexibility needed to find staff suited for the financing and market development mission of a green bank.

Governance

By statute, MCEC is governed by a Board of Directors. The Board has 9 members, 8 appointed by the governor and 1 ex-officio. The board must include two members of the not-for-profit clean energy research sector, two members with expertise in venture capital financing, two members of the state clean energy industry, and two members of the general public. The Director of MEA is the final board member. The Board selects MCEC's Executive Director, subject to Governor's approval. The Board must establish an Advisory Committee that can provide expertise and guidance to MCEC.[60] If MCEC expands its financing activities as the state's green bank, new governance mechanisms to oversee investment decision-making may be prudent. New governance structures may require changes to MCEC's statute, depending on the desired structure. Other state green bank governance structures are instructive.

The Connecticut Green Bank is similar to MCEC in that it is a quasi-public, governed by a Board of Directors. Unlike MCEC's Board, Connecticut's Board members serve on three sub-committees. The Deployment sub-committee oversees capital allocations and approves lending activity. The Deployment Committee is presented with information on each loan or financing program, considering risks, amount of capital, and the public purpose of the loan. After Deployment committee approval, all investments must be approved by the full Board. MCEC could establish a similar structure by creating an investment sub-committee of the Board, made up entirely of current Board members. Alternatively, MCEC could create an investment committee that is made up of both Board members and non-board members, as allowed by statute.

The NYGB is a public agency and part of the state energy office, and does not have a dedicated Board of Directors. The NYGB is overseen by the leadership of the state energy office (NYSERDA) and broader government oversight mechanisms. Within the NYGB, though, there is an Investment Committee that oversees NYGB funding. The Investment Committee is made up of NYSERDA's Chairman, the NYSERDA CEO, the NYSERDA Treasurer, the NYGB President, and NYGB's Managing Directors. The Investment Committee reviews investments and approving deals. In addition to the Investment Committee, the NYGB established an external Advisory Committee, similar in concept to MCEC's own Advisory Committee.

Based on MCEC's statute and these examples, there are two prudent options to consider. The first is creating a sub-committee of the Board, made up of Board Members to act in a similar fashion to Connecticut's Deployment Committee. Alternatively, MCEC could create a new advisory committee made up of *both* Board members and external non-Board members. This structure could allow MCEC to tap into deep finance expertise that resides in the state that is not currently on the Board. One challenge of this structure is that the non-Board members of the investment committee would not have the legal powers and responsibilities given by statute. It is not recommended that MCEC create an entirely external committee to oversee investments. To ensure that MCEC has enough internal project financing expertise, MCEC may find a need to also change the composition of its Board, though this may require altering MCEC's statute.

[60] MCEC Statute.

Organization Structure & Staff

MCEC presently has four staff members. To fill the responsibilities of the green bank, MCEC will have to add both staff and capabilities. MCEC's current team is made up of an Executive Director, a Director of Finance Programs, a Communication Director, and an Administrative Assistant. MCEC will have to quickly increase its financing staff and program staff to run technical assistance and other market development programs. MCEC will also need to increase its marketing and outreach capabilities, as it would be part of the green bank's mission to stimulate demand and market awareness. As a green bank, MCEC will need to be increasingly staffed by employees with specific talent and experience in energy project finance and clean energy markets.

The NYGB Business Development Report pointed to four general capability sets needed by a green bank. This includes Energy capabilities, Finance capabilities, Business Development capabilities, and Operational capabilities.[61] Some of these capabilities can be developed over time, and some can be borrowed or out-sourced. But under any construct, MCEC will need to grow both in head count and technical ability.

Over time, MCEC will likely need to expand from four full-time employees (FTEs) to 8 to 12. Part of the expansion will have to occur initially with the creation of the full green bank, but other staff can be added over time as new programs are rolled out and funding is sufficient. The proposed staffing model shown below is a potential structure of 10 FTEs, with 3 new financing staff, and 2 new technical support and market development staff. And 1 new senior leader. This new executive position of Chief Financial Officer, or equivalent, is typical of green banks and is a critical hire for the Maryland green bank's success. Any final staffing and expansion plans will be dependent on the funding level approved for the green bank.

Table 19: Proposed New Staffing Model

	Current (4 FTE)	Proposed (10 FTE)
Executive Leadership	Executive Director	Executive Director
		Chief Financial Officer
Business Development & Finance	Director of Finance Programs	Director of Finance Programs
		Loan Portfolio Manager
		MHELP & M-PACE Manager
		Small Business & LMI Manager
Technical Support		Technical Assistance (TA) Manager
		TA/Micro Grid Fund Manager
Education & Outreach	Communications Director	Communications Director
Organization Support	Administrative Manager	Administrative Manager

[61] New York State Green Bank Business Development Plan, Final Report, September 3rd, 2013.

Conclusion & Next Steps

There is a clear need for greater clean energy investment in Maryland. Over $8 billion in investment is needed meet the renewables mandate and unlock cost-saving efficiency opportunities. The current set of programs has made positive achievements, however they are almost entirely grant programs, which are expensive and unable to address the biggest obstacle to adoption – the upfront cost. Only 100% financing can enable widespread demand for clean energy. There are many market gaps where financing is unavailable and where information is needed clearly offered to make clean energy market engagement simple.

A Maryland green bank at MCEC can address these issues by offering financing with the private sector. A $40 million investment in a green bank can yield $160 million in investment. These dollars can be recycled to leverage more private capital in the future. With a green bank, the state can achieve desired market outcomes at lower cost to citizens, more efficiently coordinate public programs, and drive more savings for all Maryland citizens. A green bank also yields numerous other benefits like economic development and job creation. Building a true, efficient and mature market for clean energy technologies can only come about with more customer engagement, education, and access to information.

The only required legal steps that must be taken to act on this plan relate to green bank funding, and potentially governance. Depending on which funding source it uses, legislation may be needed to direct funds to the green bank. The funds most accessible for green bank capitalization with least impact on existing programs, are the SEIF fund balance and the Cove Point Settlement payments. These represent over $70 million in funds that must be used for clean energy that are not necessary for any existing programs. If the state choses to use the SEIF fund balance, or surplus, a bill would likely be needed for a one-time change in the allocation formula as it specifically relates to the balance. Or if the state wanted to provide a longer-term stream of funding from the SEIF, a change in the allocation formula would be required to a multi-year period.

The state may also seek to assign MCEC some or all of the remaining statewide allocation of QECBs. Several states have taken legal steps to reclaim sub-allocations of QECBs that currently sit with local governments. In Rhode Island, the legislation to create the RIIB stated that any local government receiving RIIB financing must transfer its QECB allocation to the RIIB. In Virginia, the governor pursued a similar goal an Executive Order. The Governor said that any locally allocated QECBs that were not used within a certain time frame were automatically claimed by the state energy office, and then transferred to a new financing program. Maryland could pursue either of these paths to re-collect the nearly $50 million in unused QECBs in the state.

MCEC may need an updated governance structure to appropriately monitor and vet investments. This may include either a sub-committee of the Board, or a new Advisory Committee made of both Board members and non-Board members. Neither of these governance structures would likely require a change in statute.

Maryland already has a quasi-public entity dedicated to growing clean energy markets, which operates two successful financing programs. Maryland faces few of the hurdles for green bank creation that many other states must address. This is an opportunity Maryland can capitalize on because of the large amount of clean energy funds spent annually by the state, and the funds presently available that are not already allocated for programs. With a surplus and Cover Point payments, there are over $70 million in current and expected SEIF funds above and beyond the needs of existing programs. And there is nearly $50 million in federally-subsidized bonding authority sitting completely unused. Relatively small steps can be taken for a green bank to tap into this funding and begin driving clean energy market growth and transformation in Maryland.

Appendix – Stakeholders Meeting Participants

As part of this Study, MCEC held three stakeholder meetings to get the input, feedback and guidance of those active in the clean energy marketplace in Maryland. Stakeholders gathered in three groups – Industry & Market Participants; Banking & Finance Community; and Municipal & Government/Advocates. Their input has been incorporated into this Study, particularly the product selection and design. Stakeholders who attended the scheduled meetings in Annapolis and provided input are listed below:

Industry & Market Participants
Dave Buemi, Empower Energies
Chris Dellinger, ABM
Brent Hollenbeck, TimberRock energy solutions
Andrew Kays, NMWDA
Steve McHenry, MARBIDCO
Katherine Parris, Greenwill Consulting/Direct Energy
Brad Phillips, Md. Assoc. of Community Colleges
Adam Santry, Mid-Atlantic Geothermal Industry Assoc.
Ryan Slipper, Evolved Environmental Energy

Banking & Financing Community
Brian Hager, Mariner Finance
Eric Heintz, M&T Bank
Del Karfonta, Howard Bank
Kathleen Murphy, Maryland Bankers Assoc.

Municipal & Government/Advocates
Ted Atwood, City of Baltimore
Erica Bannerman, Prince George's County
Diane Fox, Frederick County
Kristen Harbeson, Md. League of Conservation Voters
Arjun Makhijani, Institute for Energy and Environmental Research
Andrea Mansfield, Md. Assoc. of Counties
James McGarry, Chesapeake Climate Action Network
Shannon Moore, Frederick County
Mike O'Leary, Baltimore City Department of Housing & Community Development
Corey Ramsden, MDSUN
Myriam Tourneux, Fuel Fund
Michelle Vigen, Montgomery County
Sean Williamson, UM Environmental Finance Center
Mary Yates, Washington College

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