PUBLIC-PRIVATE PARTNERSHIP & CLEAN ENERGY FINANCE: The Green Bank Model

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Executive Summary

National, state, and local governments and communities are seeking to jump start the clean energy, energy efficiency, and low carbon infrastructure markets. Many states, cities, and localities in the United States have found success in achieving this goal through a vehicle known as a green bank.

Green banks create multiple and growing benefits: consumers save money, businesses and investors have new growth opportunities, and governments increase their efficiency and reach their goals. They allow public dollars to go further, facilitating low-cost market growth and enabling job creation and economic development.

This process can take time and involve a significant amount of technical, financial, and human resources. After an extensive literature review covering green bank benefits and barriers, organizational structure, capitalization sources, financing structures, and financing products, interviews were conducted with four green banks in the United States to fill in gaps in the current information landscape and dive deeper on topics such as stakeholder engagement. This report outlines the results of this research effort, which is synthesized below into the common steps for creating a green bank to achieve clean energy, energy efficiency, and low carbon development.

Steps to Create a Green Bank

Determine Market Needs

Is a green bank the right mechanisms for achieving a government's goals of accelerating growth in clean energy and energy efficiency markets? Are there additional policy, economic, and social goals that could be achieved by green bank development? Are the types of financing mechanisms used by a green bank aligned with the needs of market participants? These questions should be answered before creating a green bank. This starts by understanding the goals the government and community are trying to achieve, the barriers that must be overcome to meet these goals, and any co-benefits that come from bank creation. Entities looking to start a green bank should conduct a thorough market analysis to answer these questions and determine the barriers that exist to clean energy and energy efficiency adoption.

Stakeholder engagement

Stakeholder engagement is necessary to determine market needs and inform the development of a green bank. Talking to stakeholders is critical to understanding the barriers to market interaction and how the green bank can fill these gaps. It is necessary for easing concerns that a green bank could be a financial competitor and is rather a facilitator. Stakeholder engagement helps determine the products and services to bring to market and aides in their successful uptake. Finally, stakeholder engagement is necessary to gain critical buy-in.

Governments typically begin the process of stakeholder engagement by initiating a market analysis and conducting conversations with market participants such as community members, developers, businesses, and financial institutions to determine gaps and needs. Early on, it is often beneficial to engage supporters like environmental groups and local financial institutions to work as advocates for the green bank and target social investing type capital to build a base of successful projects. When approaching private institutions, it is important to develop a pitch that outlines the market gaps found, how the institution can benefit from filling this gap, and how the green bank can facilitate this move.

Legalization

Create the green bank through one of three typical structures: independent/quasi-independent, repurposed financing authority, or refocused infrastructure bank. A quasi-independent structure can take several forms, either through designation of a non-profit as the government green bank, a signed memorandum of understanding with another entity, or by passing legislation that creates a formal, statutory relationship.

Capitalization

Define the ideal volume of dollars needed to meet program goals, estimate capitalization timeline needed, and identify possible sources of funding and frequency of replenishment for the green bank to reach this volume. Common sources include government budgets, repurposing existing funds, redirecting utility ratepayer dollars, creating a new ratepayer surcharge, utility merger funds, and foundation grants. These funds can be a one-time infusion, an annual influx with a sunset clause, or a perpetual annual infusion of funds.

Board of Directors

Appoint a Board of Directors for governance purposes. Members should be leaders in their fields and have prior board experience. Members should also have connection to the community and reflect a wide variety of experience including clean energy, financial, banking, private sector, and development fields. The Board typically has minority representation from a government's various departments including energy and environment; economic and community development; treasurer/chief financial officer; and/or the executive office. The size, configuration, terms, selection process, and responsibilities of the Board should be outlined in enabling legislation or quickly established in standard operating procedures and bylaws. A Board of Directors should strive to maintain a governance role of the green bank and minimize their activity in the day-to-day management of the organization.

CEO and Staffing

Board of Directors should quickly hire a Chief Executive Officer. Once appointed, the CEO should hire staff depending on the size of the market the bank is planning to serve, the type of financing the bank is intending to offer, and the amount of money a green bank is willing (or able) to spend on operations.

Operationalized Green Bank

Determine Target Financing Market and Technologies

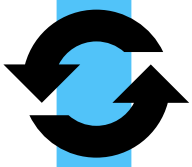
The typical market sectors a green bank can target include residential, commercial, industrial, non-profit, low-to-moderate income households, schools, universities, hospitals, and municipalities. Green banks focus on deployment stage technologies including renewable energy, grid modernization, and/or energy efficiency. Emerging areas of interest include energy storage, microgrids, other resilience measures, and clean transportation.

Launch Financing Products and Services

Develop and launch products and services structured for adoption by the market sector identified and technology chosen. Financing techniques include credit support, co-investment, and securitization; financing products include loans, leases, and credit enhancements; and services include technical assistance, turn-key product design and delivery, and information dissemination.

Collect, Analyze, and Report Data

As products and services are launched, collect financial, environmental, and societal performance metrics. Analyze and publish the data annually, semi-annually, or quarterly. Publicly available information ensures goals are being met and increases understanding of project risk profiles to spur market participants. Common metrics include carbon dioxide emissions avoided, capital committed and deployed, number of projects in operation and closed, total project value, leverage ratio, energy savings, jobs created, and pollution reduced.



Operational Self-Sufficiency

Products and information are launched and refined to reach operational self-sufficiency. This goal occurs when a bank's loan portfolio is big enough that the returns from loan repayment, fees, and interest are enough to cover the costs of operation and any reasonable losses. This is the point where the green bank does not need annual infusion of public dollars for day-to-day operations and all public investment can go towards market creation and growth.

Exit Mechanisms

Eventually, a green bank will reach a point where it has met its stated goals and/or is done with quasi-public management and the future of the green bank is under consideration. Only one instance exists of a green bank dissolving its quasi-public status and becoming private. Other mechanisms, such as complete dissolution, have not been attempted.

Introduction

A green bank, also known as a clean energy finance corporation, green investment bank, or clean energy finance authority, is a public or quasi-public financial institution that provides financing options and market development tools in partnership with the private sector to encourage and hasten the adoption of clean energy technologies, energy efficiency, or other low carbon, climate-resilient infrastructure.[1]

Green banks have capital and own debt like other financing institutions. They differ from a typical financing institution because they do not take deposits; they have the sole purpose of financing low carbon, climate-resilient projects, which are typically not pursued by traditional banks; and they provide attractive financing options for green investments. Green banks often seek to revolve its funds, either through repayment, securitization, or participation. But a green bank differs from a pure revolving loan fund. Where a revolving loan fund recaptures and relends its funds over a long period of time, a green bank continuously lends, so it must repeatedly replenish the cash on its balance sheet through faster means other than just loan repayment.[2]

There are over 16 green banks globally, ranging from country level green banks to city level green banks.[3] Each of these entities have been set up using different mechanisms, for different purposes, and with different financing instruments. This paper seeks to provide a thorough analysis and information about successful green bank models. This paper will pull from the experience of four different green banks in the United States: the Connecticut Green Bank, the New York Green Bank, the District of Columbia's Green Bank, and Montgomery County, Maryland's Green Bank. Each of these entities represents different stages of green bank development – established versus emerging – and different levels of scope – state versus city versus county.

The Connecticut Green Bank (CTGB) was established on July 1, 2011 by the Connecticut General Assembly through Public Act 11-80. CTGB is the nation's first green bank and since its inception has caused over USD $1.6 billion in capital for clean energy projects in the state as of December 2019.[4]

The New York Green Bank (NYGB) was created in 2013 as a division of the New York State Energy Research and Development Authority (NYSERDA). Since its inception NYGB has invested around $ 960 million towards energy efficiency, solar, sustainable transportation, and fuel cell projects and helped leveraged a total project value of $2.0-2.4 billion in public and private funds.[56]

The District of Columbia's Green Bank (DCGB) is officially known as the District of Columbia Green Finance Authority. The bill to establish the DCGB became effective after Congressional review on August 22, 2018. The DCGB is the nation's first city green bank.[7]

Montgomery County, Maryland's Green Bank (MCGB) was established in 2015 as a publicly-chartered nonprofit and designated as the County's green bank in 2016. MCGB is the nation's first county-level green bank. It was initially capitalized with $14.1 million from settlement funds of a utility merger. MCGB launched its first loan product in 2018 for commercial customers.[8]

National, state, and local governments can create green banks to suit their own needs. This process can take time and involve a significant amount of technical, financial, and human resources. In general, there are five elements that are critical to successfully creating a green bank from scratch: 1) motivation, 2) stakeholder buy-in, 3) legalization, 4) capitalization, and 5) high-quality personnel for managing and administering green bank activities.

Motivation gives the "why" behind starting a green bank and helps determine whether this vessel is the best avenue for meeting government goals (section 2 discusses government goals, the barriers that green banks overcome, and the additional benefits a green bank provides). Stakeholder buy-in is key for green bank creation because it ensures that all parties – government, private industry, and consumers – are working together to identify the barriers to market growth and avenues for removing those barriers, which dictates the products and services provided by a green bank (chapter 3 discusses the motivations of these different stakeholders and ways for engagement). Legalization is the first step to create a green bank and it often defines the structure, role, and authority of a green bank by addressing the following issues: legal nature and structure, governance, capitalization, types of investment, technology and project eligibility, and power and authority (see sections 4.1 and 4.2 for more details on legal formations and governance of green banks). Capitalization is the initial source of funds that jump start green bank activities. Identifying this source or sources will shape the structure and products offered by a green bank (section 5.1 covers this topic). Quality personnel is the final element for successful creation of a green bank because the bank's board of directors and leadership team conduct stakeholder engagement and influence the formation timeline (sections 4.2 and 4.3 discuss the hiring of a bank's board of directors and management personnel). All of these elements and more are discussed in detail in the following chapters.

Chapter 2: Conception

Before embarking down the path of green bank creation, it is important to determine what policy or societal goals exist that the current infrastructure is failing to achieve and what problems exist in the market that the current infrastructure is failing to fix. Once the market need is established, it is feasible to determine how a green bank can successfully achieve these goals and overcome these barriers.

2.1 Motivation

The main motivation behind the creation of a green bank is to accelerate growth in clean energy and energy efficiency markets. Additional policy, economic, and social motivations inform green bank development, including making energy more affordable and cleaner for consumers, driving job creation, increasing the efficiency of tax dollars, and connecting customer demand and capital supply.[9] These broad public policy goals are typically documented in a bank's enabling legislation or mission statement. Table 1 lists the different Vision/Mission/Purpose statements for the CTGB, NYGB, DCGB, and MCGB. All four have a focus on clean energy and the need to partner with the private sector.

In the background, there are specific motivations for individual green banks that are typically drawn from realities on the ground. For the Connecticut Green Bank, upon establishment in 2011, they were faced with the country's fourth highest population density, an aged building stock that was not energy efficient, and some of the highest electricity rates in the nation. In addition, the existing Connecticut Clean Energy Fund (CCEF) was set up to only provide one-time

incentives and rebates, which was not enough to meet the price tag required to transform the state's energy infrastructure.[10] Given these realities and state climate policy to reduce emissions to 80 percent below 2001 levels by 2050, a Green Bank was the preferred avenue to fulfil state policy objectives.[11]

Table 1. Green Bank Vision/Mission/Purpose Statements		
Bank	**Vision/Mission/Purpose Statement**	
CTGB[12]	**Vision**	A world empowered by the renewable energy of community
	Mission	To confront climate change and provide all of society a healthier and more prosperous future by increasing and accelerating the flow of private capital into markets that energize the green economy[13]
NYGB	**Mission**	To accelerate clean energy deployment in New York State by working with the private sector to transform financing markets[14]
DCGB	**Mission**	The Authority shall increase the use of private funds for sustainable projects and programs by offering and promoting the use of loans, loan guarantees, credit enhancements, bonds, or other financing mechanisms for sustainable projects and programs. Sustainable projects and programs include clean energy, energy efficiency, infrastructure, clean transportation, stormwater best management practices, water efficiency, or green infrastructure projects and programs.
MCGB	**Mission**	Dedicated to accelerating affordable energy efficiency and clean energy investment in Montgomery County, MD by partnering with the private sector to build a more inclusively prosperous, resilient, sustainable, and healthy community and supporting Montgomery County's goal to reduce its greenhouse gas emissions[15]

The NYGB, as a division of NYSERDA, is a means to help achieve NYSERDA's vision, mission, and goals. NYSERDA's vision is to "serve as a catalyst – advancing energy innovation, technology, and investment; transforming New York's economy; and empowering people to choose clean and efficient energy as part of their everyday lives" and their mission is to "advance innovative energy solutions in ways that improve New York's economy and environment".[16] DC's Green Bank was driven by the need to reach the sustainability goals in the District's Climate Ready DC plan[17] and its ambitious greenhouse gas (GHG) emissions reduction target of 100% by 2050.[18] The Montgomery County, with over one million population and a median household income of roughly $100,000[19], has also announced ambitious target to reduce GHG emissions. MCGB's establishment was driven by the County's aggressive climate goals to reach 0% GHG emissions by 2035, the need to improve energy efficiency and clean energy, and the need to leverage settlement money from the Pepco-Exelon merger.[20] Overall, the motivations that eventually drive the establishment of a green bank will differ between entities, but the unifying theme is the need to transform clean energy and energy efficiency markets by leveraging the private sector.

2.2 Barriers to Adoption

The reason that countries, states, cities, and localities choose the green bank model to drive market transformation is due to the model's ability to overcome the barriers to clean energy and energy efficiency adoption. These barriers include high upfront installation costs for customers, real and perceived investor risk, unrealistic financing terms that erode project economics, organizational delay, information asymmetries for both customers and investors, and inadequacy of traditional government subsidy programs to drive real market growth.

2.2.1 Upfront Costs

The biggest barrier to adopting clean energy technologies is the upfront cost of tackling a new project or retrofit. Projects can range from a couple hundred dollars to millions of dollars depending on the size of the project needed to satisfy the entity's demand. For example, an 8-kW residential solar PV installation in the state of CT can cost on average $28,420. Most homeowners do not have this type of money on hand to purchase a system with cash, even after the U.S. Federal Investment Tax Credit of 30 percent, a $19,894 purchase can still be a major impediment.[21] This barrier is especially tangible for lower income buyers who would arguably benefit the most from renewable energy and efficiency investments. A green bank can provide no-upfront cost financing, which enables a homeowner or other entity to be cash flow positive on their project from day one.

2.2.2 Unrealistic Rates and Terms

For the banks or financial entities that do exist in the market that are willing to back low-carbon, climate-resilient projects, they often offer loans with high interest rates and short terms, do not include consideration of energy savings in cash flow projections, and have strict credit and debt-to-income requirements for borrowers. This scenario shuts out large market potential. A green bank can work with private partners to provide financing that meets the structure of a clean energy or energy efficiency installation to maintain favorable project economics, which typically means low interest rates, consideration of energy savings, and terms that match the expected lifetime of the project. This enables low-cost market growth because a customer's new utility bill plus loan payments is less than their utility bill would have been without the investment.

2.2.3 Real and Perceived Risks

Another major barrier, especially for small-scale projects, affects the supply side of the green investment market – investors are hesitant to provide financing for these types of investments because of real and perceived risk in the market. Commercial banks have not typically invested in this market segment, so they have very little data on how different types of projects perform and how borrowers act. This uncertainty also stems from the fragmented nature of the project landscape, which sees varying sizes of projects owned by different entities with varying credit requirements, scattered over a large geographic range. Due to this uncertainty, the underwriting process for projects can be complex and expensive and the resulting terms of the financing offers incorporate this premium. A green bank can overcome this barrier by giving investors the chance to learn about a new market with the security of a government or non-profit partnership as well as provide a means to bundle multiple projects together to reduce risk and thus offer more favorable rates.

2.2.4 Organizational Delay

Organizational delay refers to the time and investment that is required for a traditional bank to set up a new department within its business. For traditional banks to provide lending to the clean energy and energy efficiency markets, they would need to set up a new division within their existing structure that focused on this market segment.

The set-up process would entail hiring of new staff, gathering data on market risks and processes, and determining the kinds of projects they are willing to lend to and at what levels. This whole process takes considerable time and money, so banks have deferred this undertaking and therefore deferred investment in this market. Green banks can overcome this barrier by being the knowledge partner that undertakes all these activities to expedite financing availability.

2.2.5 Informational Gaps

Finally, there are several information gaps that result in barriers to clean energy and energy efficiency adoption. For customers, they may not trust the technologies, or the savings projected; the purchase process can be complicated; they believe it is harder to sell their property; they will not realize any value because they will not live in the property for long; and the effect on property value is misunderstood. For investors, they also may not trust the technologies and projected savings and as discussed above do not understand the market or see that demand exists. A green bank can overcome these concerns by being a central source for information about the trustworthiness of the technologies, the legitimacy of savings that can be realized, and counter many misconceptions about an installation's effect on one's property.[22,23]

2.2.6 Ineffectiveness of Traditional Financing Structures

The traditional government response to stimulate market growth is through rebates, grants, or other one-time incentives. These programs are not sufficient to address the barriers to clean energy and energy efficient technology adoption. Rebates do not reduce the purchase price of technology enough to enable a zero-dollar out-of-pocket cost. Rebates cannot stimulate consistent market growth because there is typically a finite amount of public dollars that can only support a finite number of incentive outlays. Traditional government programs do not solve risk issues for investors because these programs lack the authority or flexibility to work with the private sector to be a risk off taker in exchange for clean energy support. Finally, in addition to limited funds leading to a limited number of available incentives, inadequate funds result in a lack of ability to provide a robust program support office that can solve other informational gaps that green banks are able to satisfy to enable market transformation.

2.3 Benefits

In addition to overcoming the barriers addressed above, green banks provide additional benefits for governments and the public. Green banks allow public dollars to go further and enable job creation and economic development. A green bank creates a win-win-win situation where consumers save money, businesses and investors have new growth opportunities, and governments increase their efficiency.

2.3.1 Public Dollars Go Further

The ability of green banks to leverage their limited public dollars to "crowd-in" private sector investment is a hallmark element for pursuing the green bank model. This strategy increases the reach of a constrained public fund, makes government more efficient by preserving public capital and reducing total expenditures, and facilitates low-cost market growth. In essence, by governments spending one dollar to de-risk the market or plug information asymmetries, several dollars in private sector investment flow in to accelerate clean energy deployment, and as the customer pays back loans for their projects, the money is recycled back into the green bank.

2.3.2 Job Creation

Green banks allow for greater job creation and economic development because the availability of financing removes barriers and increases demand for clean energy and energy efficiency installations. As demand grows, new businesses will come into the market and existing businesses will scale up their operations, which in turn means more hiring of contractors, engineers, installers, sales staff, and other related professions.[24] For example, the CTGB created over 20,000 direct, indirect, and induced jobs between fiscal year (FY) 2012 and FY 2019.[25]

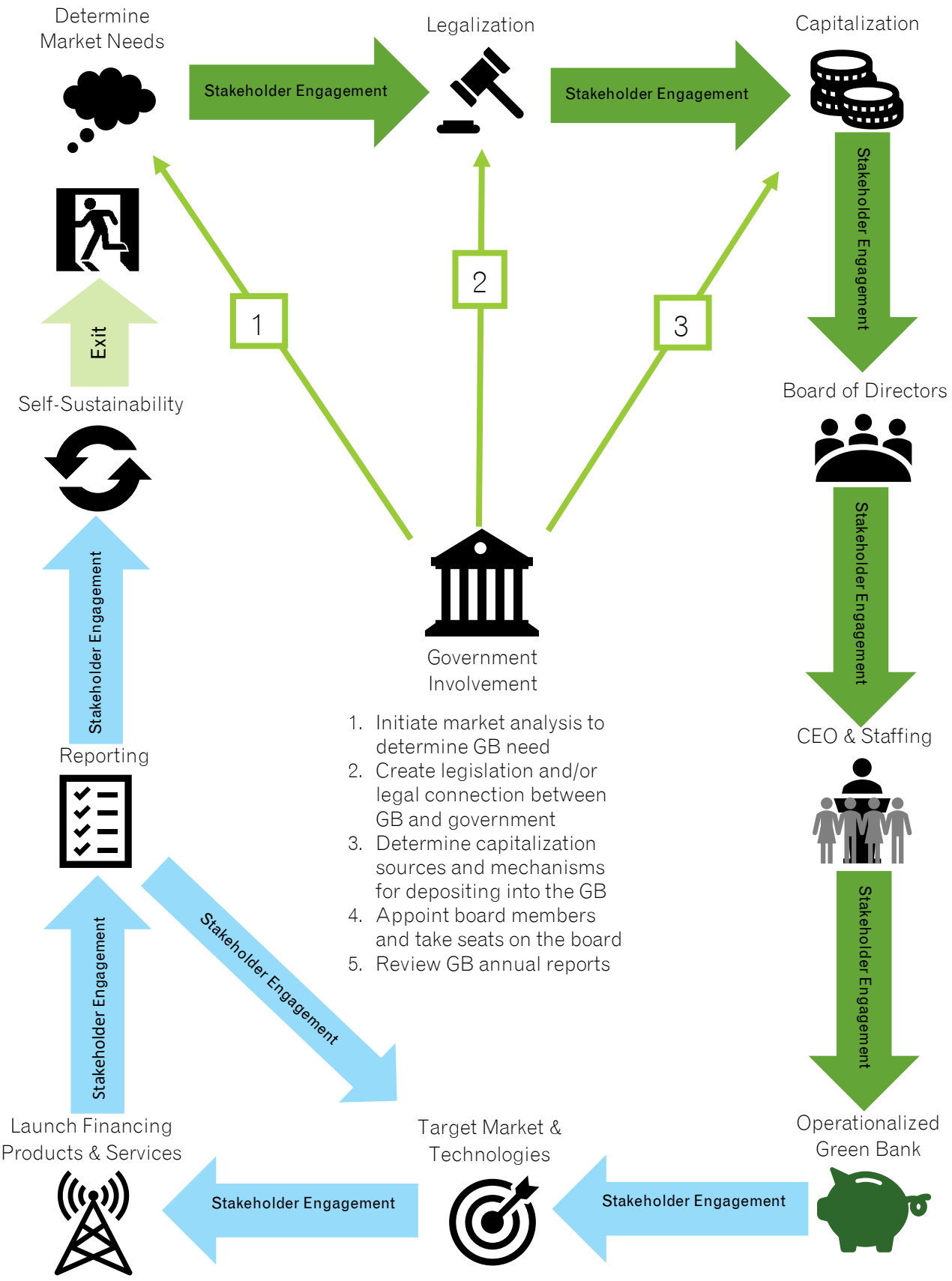
Stakeholder engagement is necessary for a successful green bank. The primary stakeholders are the government, the private sector, and the consumers of clean energy and energy efficiency technology. Talking to stakeholders is critical to gain buy-in; understand the barriers to market interaction and how the green bank can fill these gaps; ease concerns that a green bank could be a financial competitor and is rather a facilitator; and help determine the products and services to bring to market and aide in their successful uptake. Figure 1, at the end, of this chapter shows how stakeholder engagement is necessary throughout all stages of green bank development and operation.

Chapter 3: Stakeholder Engagement

3.1 Government Engagement

The presence of government is often a major part of green bank development, governance, and even management. The government is often needed for the creation of a green bank, discussed in more detail in chapter four, and for funding and support. Even as green banks move towards "lighter-touch" start-up models, governments play an important role in their existence. Therefore, a positive government relationship is key and can be fostered with continual dialogue with key governmental departments and inclusion of government in decision making (see Figure 1 for an overview). For example, the DC Department of Energy and Environment is heavily involved in the creation process of the District's green bank (see Box 1) and Montgomery County's green bank has regular interaction with the County government (see Box 2).

Figure 1. Importance of Stakeholder Engagement and Government Involvement



Box 1: DCGB Government Involvement

The DCGB is in the very early stages of development such that it has not taken on its quasi-independent role. Instead, as the sponsoring agency for the legislation, the District's Department of Energy and Environment (DOEE) staff are responsible for developing the organizational infrastructure to launch the new organization until the Board of Directors (BOD) is approved. The DOEE has two individuals on staff working on stakeholder engagement across government departments and programs and preparing the Bank's bylaws, standard operating procedures, and outreach plan for approval by the BOD. For example, the DOEE bank staff is working closely with the District's Sustainable Energy Utility to coordinate marketing and training efforts; leverage technical assistance; and partner with their verified contractors and interested customers to expand the DCGB project pipeline. DOEE will continue to work in a coordinating capacity after the organization is launched, allowing the independent agency to manage day-to-day and strategic operations.

The day-to-day operation of a green bank sometimes continues to include the government as well. The government can be engaged as members on a bank's board of directors. Their opinions will be included in board discussions and creation of board governing documents. The bank typically reports annually to the government and may have to meet annually or semi-annually with governing bodies. In addition, banks will interact with different government departments depending on the market they are targeting or financing they are delivering. For example, a green bank may benefit from coordinating with a government's housing authority if they are attempting to target low-income customers or may benefit from partnering with a utility to leverage the administrative expertise and existing customer base of their current offerings. Government involvement and coordination should be facilitated by the Bank's BOD and CEO and the representative from those departments on the BOD would be responsible for executing necessary tasks within their agencies and helping coordinate across agencies because those communication channels are expected to already be in place.

3.2 Private Sector Engagement

Key to green bank success is the ability to leverage private dollars to get to the needed loan portfolio volume that will sustain operations such that public funds can fully support market development. This goal requires that green banks are able to attract private capital and motivate investors to engage with the green bank. Green banks in the United States, including the four case study banks, accomplish this through stakeholder engagement.

Box 2: MCGB Government Involvement

The MCGB regularly interacts and coordinates with the County government to support progress toward County's emission reduction goals. The MCGB's structure is dictated through resolution and they must report to the County Executive and County Council annually. MCGB interacts with many County departments, including the Department of Environmental Protection (DEP), Housing and Community Affairs (HCA), and Housing Opportunities Commission to partner and coordinate on programs. The DEP is a special advisor to the MCGB, which is critical for the MCGB in aligning its programs with DEP and tapping DEP's expertise in program development.

Especially in the early stages of the green bank, talking to stakeholders is critical to understanding the barriers to market interaction and how the green bank can fill these gaps. These early discussions are also necessary so that the private sector and financing institutions are comfortable with the idea of a green bank and that the green bank is a facilitator, not a competitor.

Within discussions with the private sector, especially potential loan partners, it is useful to have a pitch ready that outlines where the market gap is, how the institution can benefit from entering this market, and how the green bank will facilitate this interaction by acting as a risk mitigator, either through co-lending or credit enhancement. To prepare for these interactions it is important to manage expectations by understanding the laws that govern different institutions and what may be required for them to move forward with a new loan product. For example, a regulated bank is typically more credit risk sensitive whereas private capital is more return sensitive. Therefore, the green bank must present a product that will add value for the financing partner yet provide the best outcome for the green bank and customer. This balance must be determined on a case by case basis.

Green banks can also attract private investment by creating green energy projects that are CRA eligible. Private capital investment is not only driven by the bottom line, but also by growth in the economy and community development. The Community Reinvestment Act (CRA), enacted by Congress in 1977, encourages banks to lend in low- to moderate-income and underserved communities, and banks are graded on how well they meet their CRA obligation. Green banks can use CRA to attract more private investment in underserved communities.[26]

Another way for a green bank to prepare for these interactions is to create an outreach plan and outreach materials before reaching out to banks. This is the approach that the DCGB is taking by utilizing information from stakeholder interviews that were done pre-green bank establishment. It is also beneficial to get the obvious stakeholders onboard relatively quickly, like environmental groups, so they can be a vocal supporter during development of products and outreach.

In addition, it is helpful to have proven results in the market before going after bigger players. Therefore, it may be beneficial for green banks to target social investing type capital first whose missions are aligned with that of a green bank. These entities, such as community banks or credit unions, are normally willing to provide more favorable rates and produce returns that can sway larger capital players.

3.3 Consumer Engagement

When developing a financing product/service or selecting a certain financing technique, stakeholder engagement with potential customers is key to determine the needs of the market.

The typical market sectors that green banks attempt to reach with their products include residential, commercial, industrial, non-profit, low-to-moderate income (LMI), and MUSH (municipalities, universities, schools, and hospitals). There are different needs and risks levels associated with each market sector, which may warrant different financing sources and staff expertise. These differences can differ from community to community, therefore stakeholder engagement is critical to understand these nuances.

All four of the case study banks conducted or hired a consulting firm to conduct a market analysis of clean energy and energy efficiency financing in their area before even establishing a green bank. This analysis provides the evidence as to why a green bank is the appropriate vessel in the market, but also lays out the barriers to adoption of different market sectors, which provides the building blocks to develop products that breakdown these barriers.

Chapter 4: Organization & Structure

The core characteristics of a green bank include a mandate to mobilize private investment using public funds by intervening in the market to mitigate risks and enable transactions; innovative financing structures and market expertise; independent authority with the flexibility to design and implement interventions; and a focus on cost-effectiveness, performance, and operational self-sustainability. This chapter will review the possible organizational structures that allow green banks to deliver these core characteristics highlighting the differences and similarities between the case study banks. Specifically, the chapter will address the institutional, governance, and management structure of a green bank, the staffing requirements, and the coordination with and between government agencies and offices.

4.1 Institutional Structure

When creating a green bank, the first step is to determine where the bank itself will "live". There are three typical green bank structures that can be used: independent/quasi-independent, repurposed financing authority, or refocused infrastructure bank. This is an important piece to determine because it will impact the organizational structure as well as the capitalization methods and activities that the green bank can attempt.

4.1.1 Independent or Quasi-Independent

The independent/quasi-independent structure occurs when existing clean energy and efficiency funds are used to capitalize a new entity. The new entity is typically a nonprofit with a 501(c)(3) status.[27] The link between the government and the green bank with an independent/quasi-independent structure can be set in one of three ways. There could be no actual link between the government and the green bank, and the government just announces its support for the organization or designates the entity as the preferred bank of the government (fully independent). This option allows flexibility as a non-governmental entity but still signals to the market that the organization is a trusted actor. Another option is to sign a memorandum of understanding (MOU) between the government and the green bank to establish a link between the two, yet not bind anyone to a contract (quasi-independent). The final option is to have a formal, statutory relationship that is laid out in enabling legislation (quasi-independent). The legislation will outline how involved the government is, for example, by designating the number of government employees that must take seats on the Board of Directors of the green bank.[28] CTGB, for example, is a quasi-public agency established by the Governor and Connecticut's Generally Assembly through Public Act 11-80, and its statutory purposes are codified in Section 16-245n of the Connecticut General Statues.

4.1.2 Repurposed Financing Authority

Another option for starting a green bank is by repurposing existing state financing authorities and their funds into a lending model as opposed to the traditional rebate issuing model. This option capitalizes on an existing operational structure within the government, which limits expenditure on office set up and hiring, and maintains continuity with the public in terms of who has responsibility over the clean energy and energy efficiency marketplace. However, additional staff and training will be required to ensure appropriate administration of lending aspects. To allow the green bank to use private funds with this set up, partnership agreements can be used to include private funds.

4.1.3 Refocused Infrastructure Bank

Finally, a green bank can be created by attaching a clean energy and efficiency division to an existing infrastructure bank.[29] Similar to the repurposed financing authority, this option also capitalizes on an existing operational structure within the government, which limits expenditure on office set up and hiring. An infrastructure bank also has expertise on different lending model. This model, however, will require outreach to the community and within the existing organization to establish purpose and direction.

4.1.4 Institutional Structure Examples

The four green banks studied in this report used one of these three approaches when initiating their organizations. These examples show that there is no standard way of starting a green bank, though some sort of relationship with the state or local government in writing appears to be important.

1. The state of Connecticut used the repurposing of financing authority model for the creation of the CTGB. CT Public Act 11-80 merged the Connecticut Clean Energy Fund (CCEF) into the CTGB.[30]

2. New York took advantage of the third origination option by creating the NYGB within NYSERDA. NYSERDA had the authority to create its own divisions internally and provide financing in the form required for a green bank, so no legislation was needed to establish the entity.[31]

3. The MCGB is an entirely new entity as a publicly-chartered nonprofit corporation. MCGB has no structural link with the government yet has been chosen as the County's green bank because they meet all aspects of Bill No. 18-15.[32] Bill No. 18-15 of the Montgomery County Council authorized the County government to "designate a County Green Bank to promote the investment in clean energy technologies" and specified a process to "designate a nonprofit corporation to function as the Green Bank" if the nonprofit met the requirements within the legislation.[33] A services contract between the County government and MCGB makes this relationship binding and lays out the logistics of transferring money from the government to the green bank[34].

4. The District of Columbia also created a quasi-independent organization, except the District used legislation (B22-0257) to form a formal, statutory relationship between the government and the green bank, such that the DCGB is an instrumentality of the District government to increase availability of financing for climate-resilient technologies.[35]

4.2 Governance Structure

Regardless of the organizational structure chosen above to implement the green bank, almost all of the green banks in the United States have a board of directors (BOD) for governance purposes. The size, configuration, terms, selection process, and responsibilities of the BOD vary by bank. These elements are typically outlined in the bank's enabling legislation or organization's standard operating procedures (SOPs).

4.2.1 BOD Size and Expertise

A BOD ranges in size from five to thirteen members with non-governmental positions having the majority. The credentials of board members should reflect a wide variety of expertise in the clean energy, financial, banking, private sector, and development fields. These credentials are typically outlined in a bank's enabling legislation and/or in the organization's bylaws and SOPs, however, it is not required. Key requirements for selecting members of a BOD include someone with clean energy finance expertise, someone with prior board experience, members with connections to the community, and members with prior leadership experience in their fields at a senior level.

4.2.2 BOD Time Commitment

A BOD usually meets about four to six times a year, sometimes with more meetings in the early stages of development. The BOD establishes different committees that oversee topics such as product development, investment, hiring, etc. and these committees follow a similar cadence of meetings. Each board member typically serves a term of two to four years. Again, a green bank's legislation, bylaws, and/or SOPs should outline the BOD selection process and term limits and consideration should be given to having board member terms that overlap, so institutional knowledge is kept while bringing new members aboard. It is important to keep in mind that the BOD's responsibility is oversight and not management of the green bank ensuring that the BOD and green bank is run as close to a private company as possible. Table 2 and the following paragraphs explore how each of the case study green banks govern their organizations.

4.2.3 Governance Structure Examples

The CTGB has a BOD that are a mix of government officials and independent directors of which eleven are voting members and two are non-voting members. The President of the CTGB is a non-voting member. The current makeup of the BOD of the CTGB, as of October 2020, includes the State Treasurer, the Commissioner of the Department of Energy and Environmental Protection (DEEP), the Commissioner of the Department of Economic and Community Development (DECD), someone from a residential or low income group, someone from investment fund management, someone from an environmental organization, someone from finance or deployment of renewable energy, two people from finance of renewable energy, someone from labor, and someone from R&D or manufacturing.[36] The Chairperson of the Board is appointed by the Connecticut Governor to serve at the pleasure of the Governor until such time as the Governor's term of office ends or a new Chairperson is appointed. The Board will also elect a Vice Chairperson and Secretary from amongst its ranks. The BOD must meet at least six time per fiscal year. The Board must have four standing committees consisting of an Audit, Compliance, and Governance Committee; a Budget and Operations Committee; a Deployment Committee; and a Joint Committee of the Energy Conservation Management Board and the Connecticut Green Bank. Each committee must have at least three members, one of which must be a non-government employee. Special instructions exist for the Joint Committee of the Energy Conversation Management. Important to note, the members of the CTGB BOD cannot be paid for their service.[37]

The NYGB is unique because it sits within the NYSERDA, which has its own BOD. The NYSERDA BOD consists of 13 members, four of which are government positions who serve ex officio and nine of which are appointed by the Governor of the State of New York with the advice and consent of the New York State Senate. The government positions who must serve on the board include the Commissioner of the Department of Transportation, the Commissioner of the Department of Environmental Conservation, the Chair of the Public Service Commission, and the President and CEO of the Power Authority of the State of New York. The remaining board members must have the following professional focuses as required by statute: an engineer or research scientist, an economist, an environmentalist, a consumer advocate, an officer of a gas utility, an officer of an electric utility, and three at-large members.[38] The NYGB must abide by NYSERDA's Bylaws, Operations and Procedures Manual, Internal Control Manual, Procurement Guidelines, Personnel Handbook, and Board requirements. In addition to NYSERDA's BOD, the Bank has an Advisory Committee consisting of four members from large financial institutions who deliver guidance to the NYGB leadership. The members are recommended by the NYGB president and approved by NYSERDA's President & CEO. The Committee meets at least twice a year.[39]

The District of Columbia's BOD will have 11 members where seven of the 11 are non-government appointees and four of the 11 are government employees with no vote. The seven non-government employees are chosen by the Mayor of DC with approval by the District Council. According to DCGB enabling legislation, the seven non-government employees should include two members with experience at a District-based financial institution; three members with expertise in financial, project development, or legal expertise in clean energy, clean infrastructure, clean transportation, stormwater management, or green infrastructure; and two members with experience in affordable housing or community development. The four government employees on the BOD include the Director of the Department of Energy and Environment, the Deputy Mayor for Planning and Economic Development, the Executive Director of the Office of Public-Private Partnerships, and the Chief Financial Officer of the District.

The Chair of the DCGB BOD is appointed by the Mayor as well. All board members are expected to serve three-year terms, except that the initial appointments to the BOD will have two members serving one-year terms, three members serving two-year terms, and two members serving three-year terms, thereby establishing overlapping positions. Board members can be removed from the Board by the Mayor for inefficiency, neglect of duty, or misconduct of office. The DCGB BOD are not paid positions, so Board members are allowed to hold employment elsewhere. The BOD for the DCGB has not been formally announced, yet once they are appointed, they have 60 days to adopt bylaws, guidelines, and procedures for governing, including the number of times they will meet each year with a legislated minimum of six times a year.[40]

The structure of the BOD for the MCGB was laid out in Bill 18-15. The BOD must have no more than 11 voting members and two non-voting members who are residents of Montgomery County, Maryland. A seat on the MCGB BOD is solely a volunteer position as the members are not allowed to be paid for their services. The configuration of the BOD must include, at a minimum, a representative of residential or low-income groups; a representative of environmental organizations; a representative of business organizations; a person with experience in investment fund management; a person with banking and lending experience; a person with experience in the finance or deployment of renewable energy; a person with experience in research and development or manufacturing of clean energy; the Director of the Montgomery County Department of Environmental Protection (non-voting); and the Director of the Montgomery County Department of Finance (non-voting). The BOD's responsibilities include directing the program, management, and finances of the MCGB. The Board meets about six times a year.[41]

Table 2. Board of Directors				
	CTGB	**NYGB (NYSERDA)**	**DCGB**	**MCGB**
Size of Board	11 voting; 2 non-voting	13	7 voting; 4 non-voting*	11 voting; 2 non-voting
Non-gov: Gov Ratio	8:3	9:4	7:4	8:3
Compensation	Unpaid	Unknown	Unpaid	Unpaid
Appointment By	Governor and legislature	Governor; consent of New York State Senate	Mayor	County Executive may appoint up to 5 members
Term Length	4 years	Not to exceed 4 years	3 years	Unknown
Minimum Meetings Annually	6	4	6	Monthly for first 2 years; Quarterly onward
Mandatory Committees	• Audit, Compliance, & Governance • Budget and Operations • Deployment • Joint Committee of the Energy Conservation Management Board and the Connecticut Green Bank	• Audit and Finance • Program Planning • Waste and Facilities Management • Governance	• Sustainable Committee on Sustainable Program Cooperation • Additional committees not yet established	To be established by Board
Non-gov Member Expertise Required	• Residential or low-income group • Investment fund management • Environmental organization • Finance or deployment of renewable energy • Finance of renewable energy • Labor • R&D or manufacturing	• Engineer or research scientist • Economist • Environmentalist • Consumer advocate • Officer of a gas utility • Officer of an electric utility • At-large members	• District-based financial institution • Financial, project development, or legal expertise in clean energy, clean infrastructure, clean transportation, stormwater management, or green infrastructure • Affordable housing or community development	• Residential or low-income groups • Environmental organizations • Business organizations • Investment fund management • Banking and lending • Finance or deployment of renewable energy • R&D or manufacturing of clean energy

4.3 Management and Staffing

The day-to-day operations of a green bank should be handled by the management team of the organization. The size of the management team and green bank staff will depend on the size of the market the entity is serving, the type of financing the bank is intending to offer, and the amount of money a green bank is willing (or able) to spend on operations. Enabling legislations for multiple green banks in the United States outline the maximum allowable expense that can be spent on the administration of a green bank.

The one similarity of almost all green banks is the designation of a Chief Executive Officer (CEO) or President or Executive Director (ED) to be the lead of the organization. This individual is normally appointed by the BOD as soon as possible following the creation of the Board. The size of the staff will typically grow with the growth of the organization. In addition, some entities may prefer to hire consultants, especially in the early days of a green bank, though it is not recommended as a long-term solution as full time, dedicated individuals are key to the success of a green bank.

4.3.1 Management and Staffing Examples

The MCGB currently has five individuals on staff, a CEO and a Chief Investment Officer, a Business Operations Manager, A residential Solar Program Manager, and an Administrative Specialist.[42] In addition, the MCGB has consultants for legal matters, communications, and for credit risk advising. Additional staff will be identified as needed by MCGB's product and transaction efforts.

For the DCGB, the Board of Directors has hired attorney and clean energy expert Eli Hopson as the organization's first CEO in April 2020[43]. Currently, there is no staff on the payroll. In the interim, the Bank is being developed within the District's Department of Energy and Environment (DOEE). Two, full-time government employees are responsible for creating the bylaws and SOPs for the Bank, so they are ready to be discussed and approved once the BOD is in place. The bylaws will reflect the local hiring target of the organization's staff and management team. The DOEE staff has used contractors and an advisory board that meets quarterly to develop the bylaws and SOPs. The extent of the DCGB's management team and staff will be capped by language in their legislation that states that administrative costs in the first year shall not exceed the higher of 1) $750,000, 2) two percent of the project capital base, or 3) ten percent of projected revenues.[44] Beginning in the third year of operation, administrative costs in a given fiscal year shall not exceed 15 percent of the capital base of the DCGB for the fiscal year.

The CTGB currently has eight members on the management team including a President and CEO, a Vice President of Financing Programs, a General Counsel and Chief Legal Officer, an Executive Vice Present and Chief Investment Officer, a Vice President of Accounting and Financial Reporting, a Director of Incentive Programs, Senior Advisor to the President and CEO, and a Managing Director of Operations.[45] As of June 2019, the CTGB had 37 individuals on staff. [46]

The NYGB, as of October 17, 2020, has 31 employees, seven of which constitute the management team. The management team consists of a President, a Managing Director for Legal and Regulatory Affairs, a Managing Director of Strategy, Impact, and Investor Relations, a Managing Director of Investment and Portfolio Management, a Managing Director of Risk and Compliance, another Managing Director on the Investment and Portfolio Management team, and a Manager Director oversees Investment Administration and Portfolio Management. The remaining employees constitute the staff of the Bank with varying ranks of Director, Vice President, Senior Associate, Associate, Analyst, and Office Manager.[47] The size of the NYGB staff is a direct reflection of the type of work that the Bank does, which is the underwriting of loans and direct lending. These types of financing activities require a much more robust staff with specialized knowledge.

Table 3. Institutional, Governance, and Management Structure Overview				
	CTGB	**NYGB**	**DCGB**	**MCGB**
Year of Creation	2011	2013	2018	2015
Creation mechanisms	Legislation - repurposed financing authority	Division within existing entity (NYSERDA)	Legislation – new entity	Incorporated as a 501(c)3
Status/ relationship with the government	Quasi-public	Public	Quasi-public	Publicly-chartered nonprofit, designated as County's GB
Board of Directors size	11 voting; 2 non-voting	13	7 voting; 4 non-voting*	11 voting; 2 non-voting
Management team count	8	7	1	1
Staff count (excluding management team)	29	24	2	4
Maximum expense on administration	Unknown	8% of initial capitalization or $17.48 million	$750,000 (annually)	Unknown

Chapter 5: Capitalization & Milestones

A green bank cannot attempt to finance clean energy, energy efficiency, and climate-resilient projects by crowding-in private capital without a source of initial funding. These initial funds that launch the green bank off the ground and may continue to support it in the future are known as the capitalization of a bank. Green banks have typically been capitalized by a source of public funds, but recent attempts at green bank creation are relying on philanthropic and private capital as key sources of capitalization. This approach may be particularly attractive for jurisdictions that have small amounts of public funding available for capitalization in conjunction with the independent, non-profit model.[48] Once capitalized, a green bank must show progress on specific milestones such as operational self-sufficiency and leverage ratio. This chapter will outline the different capitalization methods and sources that are available to start a green bank and how a green bank communicates progress on using these funds.

5.1 Capitalization

A green bank can have multiple funding sources with varying structures and frequency of capitalization. Common sources of capitalization include pulling from government budgets, repurposing funds from an existing fund, redirecting active utility ratepayer funds, creation of a new ratepayer surcharge, utility merger funds, and any other number of other sources. The frequency of capitalization can range from a one-time upfront infusion of public funds, a schedule of capitalization over a set number of years with a sunset clause (also referred to as a set end date), or a perpetual annual infusion of funds.

Typically, legislation is required to create a new source of public funding for a green bank or to repurpose existing funds for green bank use and transfer these sums to the green bank.[49] Table 4 outlines the different sources of capitalization for the four case study banks.

Table 4. Green Bank Capitalization Sources

Bank	Funding Sources	Amount
CTGB[50]	Utility Ratepayer Surcharge: Systems Benefit Charge (SBC)	$10 per electric customer per year for roughly $26 million per year
	Carbon Trading Scheme: Regional Greenhouse Gas Initiative (RGGI)	$3 to $5 million per year
	Others: foundation funding, federal funds	
	Bonds: Green bond[51]	Issued green bonds in FY 2017 and FY 2019
NYGB[52]	NYSERDA Energy Efficiency Portfolio Standard (EEPS1), SBC 3, SBC 4, and RPS	$165.6 million (2013); $150 million (2015); $30 million annually from 2016 to 2021 and then $112.875 million annually from 2022 to 2025 for a total of $631.5 million
	Carbon Trading Scheme: RGGI	$52.9 million (2013)
DCGB	Repurposing Existing Fund: Renewable Energy Development Fund[53]	$7 million/year for 5 years (sunset clause)
	Ratepayer Surcharge: Sustainable Energy Trust Fund Fee	$105 million total through 2025, including $7 million/year for 5 years from the Renewable Energy Development Fund, and per the Clean Energy DC Act of 2018[54]: $15 million/year for 2 years starting in FY 2020 and $10 million/year for 4 years following the initial 2 years.
MCGB[5556]	Settlement Fees: Pepo-Exelon Merger	$14 million one-time investment
	Montgomery County funding	$17 million one-time investment (2019)
	The Town Creek Foundation	$0.6 million one-time investment (2019)
	The Jpb Foundation	$0.15 million one-time investment (2019)

5.1.1 Pros and Cons of Capitalization Methods

There are pros and cons to the different capitalization methods and frequency of infusion. If the capitalization relies on an annual state budget appropriation, then the bank is susceptible to a changing political environment. Even if the funds are a one-time infusion from the government, a green bank should be hesitant to accept funding that has multiple strings attached for how the funds can be used and/or paid back.[57] One-time funding can also be an issue because it will limit the ability of banks to offer long-term loans as the bank will be reliant on repayment of loans to maintain operations. However, successful demonstration of repayment of short-term loans could show investors that the green bank is a reliable institution. Capitalization sources with a sunset clause can present similar problems as a one-time infusion depending on the term allotted, however, a set end date can be a natural milestone for a bank to strive for operational self-sustainability (see section 4.2).

The repurposing of an existing fund or redirecting ratepayer dollars may receive some pushback from the public depending on how those funds were being spent originally. In addition, creating a new ratepayer surcharge will typically be met with opposition as it initially presents customers with higher utility bills until the savings from green bank projects can be realized. Another concern for receiving capitalization and perpetual infusion via a ratepayer charge is the direction of customer demand for energy from the utility. In many places in the United States, customer demand for electricity is declining, especially as there is a shift towards on-site generation, therefore a ratepayer capitalization may decrease into the future.

Other capitalization sources include private funds from private investors, philanthropic organizations, financial institutions, and socially minded investors; proceeds from carbon trading schemes; settlement fees from legal cases; and renewable portfolio standard (RPS) alternative compliance payments.[58] The emergence of philanthropy as a source for both operational and investment capital has been an important development of recent years. MCGB also benefited from philanthropic support to fund early operations. The support of philanthropy has enabled the creation of non-profit green banks in US states such as Colorado (the Colorado Clean Energy Fund) and Maryland (the Climate Access Fund). Philanthropies have also provided investment capital to Green Banks through Program Related Investments (PRI), which function as loans to the Green Bank with generally low (1-2%) return requirements from the foundation. PRIs have enabled Green Banks like New York City Energy Efficiency Corporation and the Connecticut Green Bank to expand their investment portfolios to support mission driven lending that aligns with the goals of philanthropic partners. Due to their non-profit status, independent, non-profit green banks are the most naturally situated to use PRIs to capitalize their balance sheets.[59]

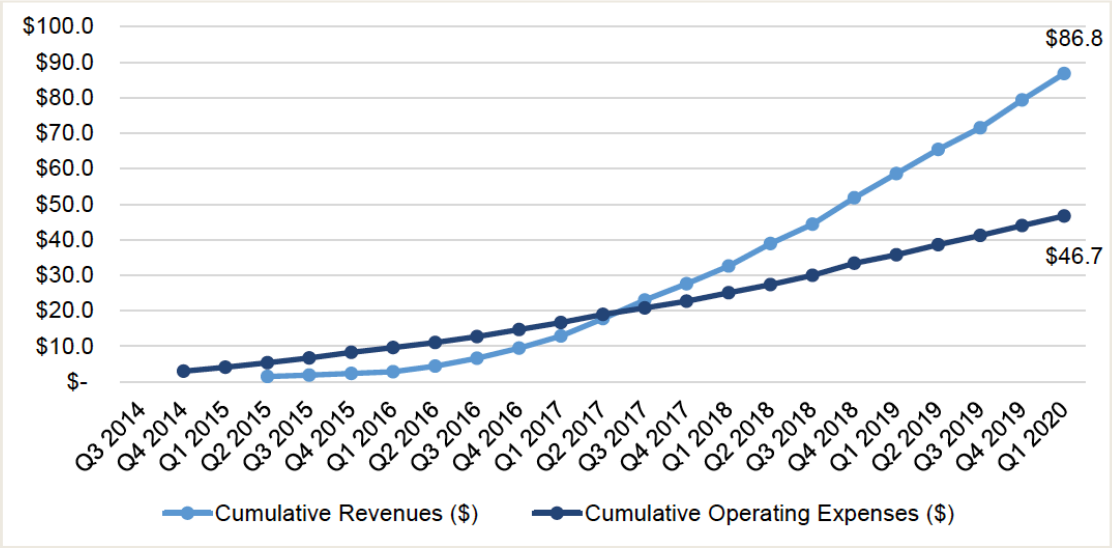
Finally, green banks can use bond proceeds for capitalization if no public dollars are available and if the green bank is authorized to issue its own bonds – bonding authority – or is able to work with an existing entity with bonding authority. Depending on the structure that is used to issue bonds, the borrowing costs for a green bank and thus the interest rates it can offer in the market can vary.[60]

5.2 Operational Self-Sufficiency

Once capitalization has occurred, a green bank must be able to leverage private dollars from the public dollars it has been granted with a goal of reaching operational self-sustainability or self-sufficiency. Operational self-sustainability is the idea that eventually a green bank will be able to cover operational expenses without relying on annual infusion of government funds and therefore public dollars can fully go towards market growth instead of paying salaries and rent. This goal is achieved when ones' loan portfolio gets big enough that the returns from loan repayment, fees, and interest are enough to cover the costs of operation and any reasonable losses. NYGB reached operational self-sustainability with the fiscal year ending March 2017. In addition, between Q2 2017 and Q3 2017 NYGB reach cumulative breakeven where cumulative revenues were greater than cumulative expenses. Figure 2 shows the NYGB self-sustainability progression, which they have continued to maintain as of Q1 2020.[61] Reaching operational self-sustainability means that the continued capitalization the bank has received from the State will go completely to meeting clean energy and efficiency goals.

To reach operational self-sustainability, the Coalition for Green Capital (CGC), a 501(c)(3) nonprofit that accelerates the growth of clean energy markets through the creation of Green Banks, recommends that a green bank dedicate a pool of funds for startup costs and salaries, create lending terms that factor in some expected losses, balance the portfolio so there are a mix of market development activities and return-producing financing activities, and create goals and performance metrics that encourage achievement of self-sustainability in the desired amount of time.[62]

Figure 2. NYGB Cumulative Breakeven – Cumulative Revenues Greater Than Cumulative Expenses ($ millions)



Source: NY Green Bank. (2020). Annual Review 2019 – 2020 and Annual Business Plan 2020 – 2021 (Annual Business Plan No. 13- M– 0412) (p. 23). NY Green Bank. Retrieved from https://greenbank.ny.gov/Resources/Public-Filings

5.3 Leverage Ratio

To ensure that public and private money is being used as promised and the green bank is meeting its goals, green banks use several metrics that demonstrate their progress. One relevant metric is the leverage ratio or mobilization ratio, which is the amount of total investment compared to the amount of green bank dollars (or public dollars) invested, though the definition is slightly refined depending on the bank.[63]

Table 5. Connecticut Green Bank Leverage Ratios by FY Closed

Sector	2012	2013	2014	2015	2016	2017	2018	2019	Cumulative
CTGB Investment ($MM)	$3.4	$18.7	$32.5	$57.1	$39.3	$33.6	$34.8	$40.7	$260.1
Private Investment ($MM)	$6.5	$92.7	$75.3	$267.0	$282.8	$171.4	$218.1	$312.8	$1,427.9
Total Investment ($MM)	$9.9	$111.4	$107.8	$324.1	$322.1	$206.2	$252.9	$353.5	$1,688.0
Leverage Ratio*	2.9	6.0	3.3	5.7	8.2	6.1	7.3	8.7	6.5

*Leverage Ratio = (Total Investment $MM) / (CTGB Investment $MM)

Source: Department of Finance and Administration. (2019). Comprehensive Annual Financial Report: Fiscal Year Ended June 30, 2019. Connecticut Green Bank. Retrieved from https://ctgreenbank.com/wp-content/uploads/2019/11/2019-Green-Bank-CAFR-FINAL-10-31-19.pdf

Table 5 shows CTGB's leverage ratio over the years. A leverage ratio in 2019 of 8.7:1 can be translated to mean that for every $1 of public funds committed by the CTGB in FY 2019, private capital was attracted into the market for a total investment in green projects of $8.70. The CTGB does not have a target leverage ratio, however, they consider 10:1 a high ratio.[64] The CTGB leverages private dollars from multiple sources including local developers, credit unions, and local banks. For example, the residential Smart-E loan that is provided to residential homeowners for energy efficiency improvements and rooftop solar has nine local lenders that homeowners can use including Capital for Change, Coreplus Credit Union, Eastern CT Savings Bank, Ion Bank, Mutual Security, Nutmeg State Financial Credit Union, Patriot Bank, Thomaston Savings Bank, and Union Savings Bank.[65]

The NYGB has a target mobilization ratio of 8:1 by 2025 as outlined in the NYS Public Service Commission's "Order Authorizing the Clean Energy Fund Framework", which requires the NYGB to contribute directly to the objectives of the State Energy Plan and Clean Energy Standard. To get to this mobilization ratio, the NYGB sets overarching objectives for each year or "Plan Year". For 2017 to 2018, the goal was a mobilization ratio of at least 3:1. For the NYGB, a mobilization ratio of 3:1 means that for every $3 of a project's total cost, the NYGB has invested $1 in that project. The NYGB was able to maintain a 3:1 ratio on average for the 2017 to 2018 Plan Year with $1.4 billion in cumulative total project costs and $457.5 million in NYGB overall investments to date (mobilization ratio = $1.4 billion / $457.5 million). As of October 17, 2020, the mobilization ratio keeps in the range of 2.3:1 to 2.9:1. [66]They consider themselves to be on track to achieving an 8:1 ratio over 10 years of operation.[67] Similar to the CTGB, NYGB has a variety of different entities that provide private dollars, and these vary year to year and by the project or program that is being offered. In NYGB's Q2 2020 Quarterly Report, a series of seven projects are highlighted that provide a view into the different private entities that are involved in NYGB projects. For example, NYGB is acting as a co-lender, committing $2 million, for a construction-to-term loan for energy efficiency improvements at a senior care facility in NY State. The counterparties include New York Energy Efficiency Corporation (NYCEEC), a specialty financial institution, and Hebrew Home at Riverdale, a healthcare provider. The project developer is Ecosave Inc., who opened a New York office in April 2019 with the goal of developing and completing over $30.0 million in energy efficiency and distributed energy resources (DER) projects in New York by 2029.[68]

Neither the DCGB nor MCGB have sufficient data to calculate a leverage ratio, but each has aspirations. The DCGB is targeting a 5:1 leverage ratio at a minimum with an eye on the success of other green banks in the country like the CTGB and Michigan's green bank with a residential leverage ratio of 20:1. In addition to a 5:1 leverage ratio, the DCGB's early goal is to reach full capitalization at $105 million through 2025. The MCGB has a goal of reaching operational self-sustainability in five to seven years with a 5:1 leverage ratio. In addition, they must achieve a loan portfolio where at least 20 percent is focused on low/ moderate income and multifamily property needs. There is no optimal leverage ratio across green banks. Leverage ratios can and should vary depending on the market gap targeted by the green bank and the financial tool the green banks is using to address that gap.

5.4 Exit Circumstances

Eventually, a green bank will reach a point where it has met its stated goals and/or is done with quasi-public oversight and the future of the green bank is under consideration. Has the market for clean energy and energy efficiency matured? Has the green bank successfully met the goals set out in its mission statement? Could the green bank more effectively reach these goals if it was a fully private entity? There are few examples of government-associated green banks exiting their government relationship or the market altogether, but an example out of the United Kingdom, shown in Box 3, provides a view into one exit mechanism: privatization.

Box 3: Exit Mechanism – Privatization of the UK Green Investment Bank

Creation and Initial Operation

The UK Green Investment Bank (GIB) was a public company established by the UK government in 2012 to facilitate and develop investment in the green economy. In 2013, the UK government developed legislation in the *Enterprise and Regulatory Reform Act* to ensure GIB's "green purposes" and operational independence.[a] GIB received £3 billion of initial funding from the Government with the caveat that it could not raise its own capital until 2015.[a]

With the sunset of GIB's primary source of funding in 2015, the bank had achieved the goals set out in the *Enterprise and Regulatory Reform Act,* having developed a healthy portfolio of profitable investments and having created a market for green projects and ventures. It was successful in facilitating green investment with a leverage ratio of 4:1, so every £1 of public investment in green growth created £4 in transaction value[a]. From 2014-15, GIB reached self-sustainability with a profit before tax of £0.1 million and by 2015-16, GIB had maintained self-sustainability and increased profits of the bank to £9.9 million before taxes.[a] GIB had to determine its next steps.

Moving towards Privatization

As outlined in the UK Government's 2011 Budget, GIB's borrowing powers were restricted until 2015. From 2015-2016, the Government would enable GIB's borrowing ability only if government debt fell under a target percentage of GDP.[a] This constraint significantly limited the growth potential of its portfolio and the impact that GIB could have on the green economy. Due to this limitation, the UK government announced plans to privatize GIB in June 2015 in order to expand GIB's ability to borrow and the types of projects it could support.

To allow GIB to raise capital without affecting the government's debt, the UK government amended the *Enterprise and Regulatory Reform Act of 2013* and removed all public controls including the green directive of GIB. This raised concerns that a change to private ownership would impact GIB's focus on green investment.[a] To preserve GIB's green purposes, the government created a non-statutory special share arrangement called the Green Purposes Company limited (GPC). GPC holds a special share in GIB, which ensures that GIB cannot change its mission unless GPC has provided its consent. Five trustees of GPC were appointed in 2016 and have special voting powers to ensure that GIB continues to invest in green growth.

Privatization and Latest Development

In 2017, GIB was acquired by Macquarie Group Limited and its name was changed to the Green Investment Group (GIG). During its first year of privatization, GIG invested over £1.6 billion in green infrastructure for a total of 10 new transactions located in the UK, Europe, North America, and Asia. These projects will add 85,000 GWh of renewable energy generation to its portfolio, avoid 17,000 kt CO2e of GHG emissions, and avoid 16,000 kt of waste from landfills. In addition, Macquarie has added an Energy Solutions and advisory services arm to GIG.[a]

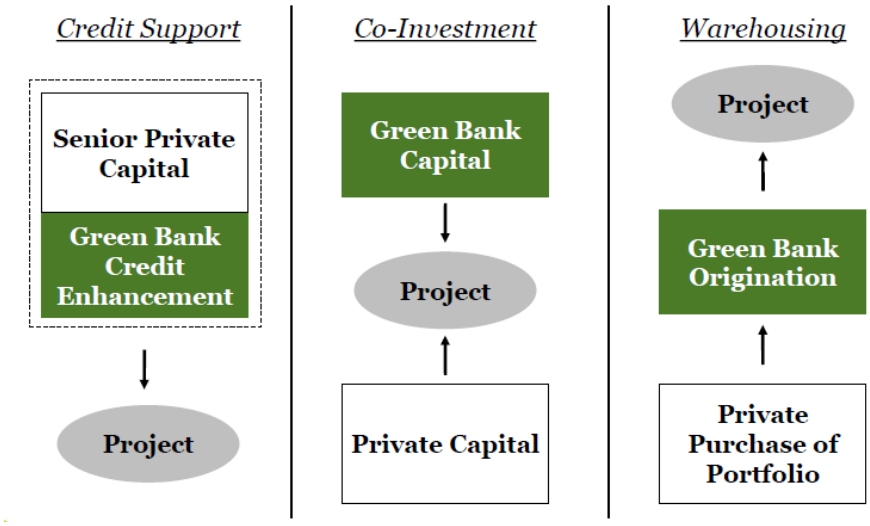
Chapter 6: Green Bank Activities

Once in operation, green banks take part in multiple activities including financing techniques such as credit support, co-investment, and securitization; offering financing products such as loans, leases, and credit enhancements; conducting market development such as technical assistance, turn-key product design and delivery, and access to information; and data collection, analysis, and reporting.

6.1 Financing Strategies

There are several different financing strategies that green banks can use to enable project investment and spread risk between public and private capital. These techniques include credit support, co-investment, and securitization. Figure 3 illustrates how each of these techniques work and Table 5 shows the barriers these techniques overcome. A green bank should ensure that they have the legal ability to take part in these techniques and other kinds of financing that may be critical to the deployment of clean energy and energy efficiency.

Figure 3. Financing Structures Used by Green Banks



Source: Coalition for Green Capital. (2016, October). CGC Goals, History & Strategy – Why we do what we do. Retrieved from http://coalitionforgreencapital.com/wp-content/uploads/2016/06/CGC-Goals-History-Strategy_WEBSITE-VERSION.pdf

6.1.1 Credit Support

Credit support or credit enhancement is a tool to increase private lending activity and/or improve private financing terms by using public dollars to de-risk an investment. Credit support/enhancement is typically offered by a green bank through the creation of a loan loss reserve or loan guarantees. In a loan loss reserve, public dollars are not actually invested in a project. Instead, public capital is set aside based on a fixed percentage of the project to cover potential losses if the borrower defaults. This technique helps overcome perceived risks that investors may have about entering the market, such as loan repayment risk.[69] In addition, this technique can be used to bring down the financing terms and rates that may currently be offered in the market but are restrictive for clean energy and efficiency investments.[70]

6.1.2 Co-Investment

Co-investment means that a green bank invests directly in a project alongside a private investor through the provision of different debt priorities, either senior debt or subordinate debt. Debt prioritization is the process of giving lenders different priority to claims on assets and cash flows. In other words, who gets paid first if the borrower defaults on their loan. Senior debt implies that the investor in a project with this priority will be the first one to get paid back and subordinated debt implies the investor with this priority gets paid after senior debt holders are paid in full. Typically, green banks will offer the private investor the senior debt position in a co-investment deal to remove perceived risk that they will lose money on clean energy and efficiency investments.[71] The subordinated debt position increases the risk that public dollars may not be returned if a borrower defaults.

6.1.2 Co-Investment

Securitization and warehousing are used by green banks if private lenders are unwilling to underwrite loans. As discussed in chapter 1, private lenders may be hesitant to underwrite clean energy and efficiency projects because they perceive the technology as too risky or too new; the target market as credit poor; and/or the project itself as not cost-effective. The last concern occurs with small projects that are geographically dispersed. Therefore, a green bank can initially take on the risk of underwriting several projects and keeping them on their balance sheet (warehousing). Once the number of projects reaches a certain scale, a green bank can remove public risk by bundling several projects (securitization) and selling the package to private investors. This provides an infusion of private dollars to the green bank and removes the risk from the bank's portfolio. The private market is more amenable to a pool of several smaller projects because the probability of all the projects defaulting and not providing revenue is unlikely.[72] This technique can be especially important to give small projects access to low-cost capital.

Table 6. Overcoming Barriers Through Financing Techniques

Financing Technique	Barrier it overcomes	Examples
Credit enhancement/ support	Real and perceived investor risk, unrealistic financing terms that erode project economics, information asymmetries for investors	Climate Access Fund's credit enhancement for LMI solar
Co-investment	Real and perceived investor risk, information asymmetries	NYGB's investment in bridge loans for solar
Warehousing and securitization	Unrealistic financing terms that erode project economics, organizational delay, information asymmetries	Rhode Island infrastructure Bank's aggregation of municipal energy efficiency projects
Fist-in-kind Investments	Proving the viability of clean energy projects for private investors	CTGB's market development of CPACE

6.1.4 Balancing Financial Risk

The level of public risk to private risk of a financing strategy is determined on a product by product basis depending on the needs of the market segment, the technology chosen to pursue, and investor concerns. For example, of the typical market segments discussed in Chapter 3, low-to-moderate income customers will have a lower ability to pay compared to commercial customers and therefore will need different strategies to build a LMI project pipeline, which may involve different debt to income ratios or smaller loans, and thus result in different public-private risk ratios.

Target technologies are typically in the deployment stage because they are commercially proven, have low to no technology risk, and are ready for mass market deployment. This contrasts with offering financing for early development stage or commercialization stage technologies. The technology in these stages of development are typically riskier because the technologies have not proven that they can produce steady cash flows, which are required for green bank repayment and operation. Technologies that are typically eligible or targeted by green banks include renewable technologies, grid modernization technologies, and/or energy efficiency technologies. However, green banks also show growing interesting in emerging technologies, including energy storage, microgrids, and clean transportation.[73]

6.2 Financing Products & Services

Green banks offer loans, leases, and other financial services such as PACE and on-bill repayment. Each of these are used to target different market segments that have different needs and capacity to pay.

6.2.1 Financing Products

Both loans and leases can be structured to offer no-upfront cost financing thereby removing one of the market barriers to clean energy and energy efficiency adoption.[74] These financing products typically include fees that are charged to the customer, contractor, and/or lender in order to cover the administrative costs of offering the loans or leases and other services that the green bank provides. Loans are superior to interest rate buydowns, which are essentially permanent cash payments to investors to reduce the amount a customer will pay. Leasing enables customers to access certain assets like rooftop solar PV without purchasing the system to own.

In the United States, two related and unique mechanisms have been developed to access the market including Property Assessed Clean Energy (PACE) financing and On-bill Recovery (OBR). PACE is a financing option that must be enabled at the state level via legislation before a state green bank or local green bank can exercise this financing option. The PACE structure allows customers to repay a loan for an energy upgrade through their property taxes via a lien on the property, which typically has senior priority even over mortgage payments. OBR allows customers to repay an energy upgrade loan through their utility bill. These financing options remove significant repayment risk for investors because, historically, property taxes and utility bills have an extremely high repayment rate. Another benefit of these structures is that the loans will stay with the property and the project, rather than the person, eliminating complicated paperwork that transfers ownership of a project from one person to another if an individual decides to move from the property. The downside to these financing products is the high administrative costs that are required.[75]

Table 7 shows some examples of financing products that the four case study banks have developed and implemented in their markets. Of note is the approach that NYGB uses to accelerate clean energy and efficiency adoption in the State of New York. They use open solicitations seeking proposals from qualified parties based on different terms set out in request for proposals (RFP) instead of developing financing products that their offices administer.

Table 7. Green Bank Financing Product Examples				
Bank	**Product Name**	**Target Market**	**Financing Strategy**	**Product Details**
MCGB	CLEER[76]	Commercial	5% loan loss reserve where payout on losses occurs after 90 days with the green bank covering 80% and the lender 20%. Any eventual repayment goes back into the loan loss reserve	• Provide loans up to $250,000 • Must achieve 15% in energy savings • Project must be aligned with utility's energy savings program • List of approved contractors • 30% of the loan can be used for non-energy, but project related work
CTGB	Smart-E Loan	Residential	Second loss reserve credit enhancement where the lender bears the first dollar of loss and the CTGB takes a portion of the losses after that	• Banks offered loans at extended terms with "not-to-exceed" rates • Loan terms of 5, 7, 10, and 12 years at 4.49%, 4.99%, 5.99%, and 6.99% annual percentage rate respectively • Eligible upgrades: home performance, efficiency, heating & cooling, water heating, and renewables
NYGB	Request for Proposals (RFP) 1: Clean Energy Financing Arrangements[77]	All	The RFP requests proposers describe the financing structure they seek and NYGB's role and proposed terms (expected NYGB investment between $5 million and $50 million)	• Eligible proposers: private sector financial institutions, third-party capital providers, and energy service companies (ESCOs) • Proven clean energy technologies • Demonstrate potential for GHG emissions reductions in NYS
NYGB	RFP 8: Efficiency & Renewables Financing Arrangements[78]	Commercial Industrial Multi-family	• Debt up to full capital cost of project • NYGB underwrites to the credit quality of the underlying asset up to a loan-to-value of 80% and a minimum debt service coverage ratio of 1.40 • Flexible loan offering: mezzanine debt, subordinated debt, or a secondary loan against the property	• Energy efficiency or renewable energy projects using proven technology • Demonstrate potential for GHG emissions reductions in NY State • Payback cannot exceed the useful life of the project equipment being installed

6.2.2 Financing Services

Finally, green banks provide services that are not directly related with financing including technical assistance, turn-key product design and delivery, origination, and access to information. Green banks sometimes offer technical assistance for banks, developers, and customers to provide guidance and market information and teach them about the different technology and purchasing options offered through the green bank. Turn-key product design and delivery is the bundling of all aspects of an energy upgrade—technology, financing, and installation—into an easy-to-understand product that is

presented to a customer all at once. This service requires green banks to train developers and contractors how to sell clean energy and discuss financing in one pitch. This "white-glove" service increases customer confidence in projects. The green bank can also provide access to all clean energy, energy efficiency, and financing information through a central website, acting as a one-stop shop for all energy upgrade needs for customers, contractors, businesses, and banks. A well-designed website can remove many information asymmetries that are typically barriers to wider market adoption.[79]

6.3 Metrics & Goal Verification

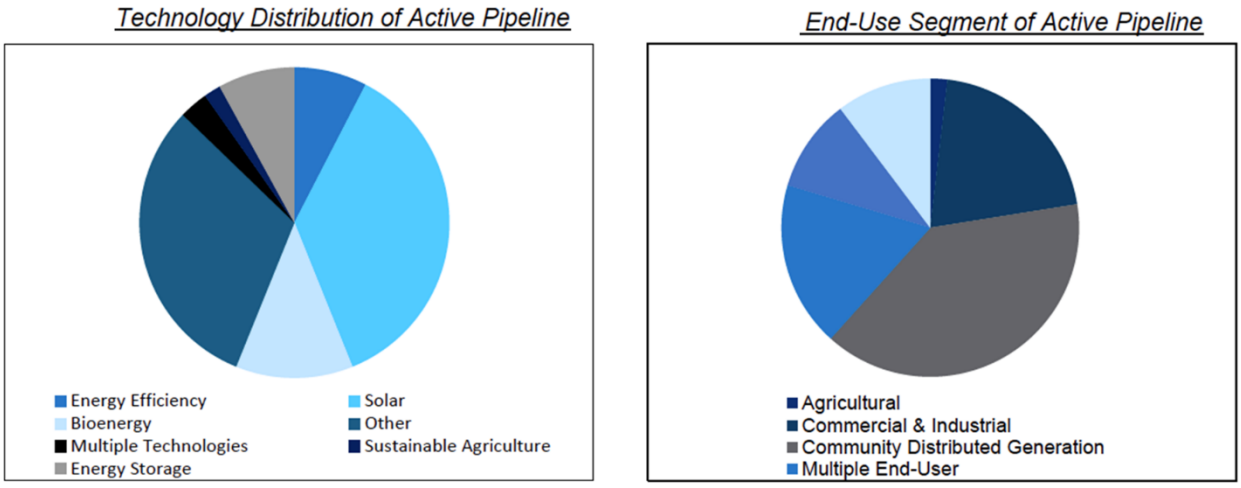
Green banks must track their financial and non-financial performance of their portfolio and of individual projects. With publicly available performance metrics, stakeholders can evaluate whether economic, environmental, and social benefit is being achieved as promised. Another benefit of collecting and sharing green bank performance data is an increased understanding of clean energy and energy efficiency risk profiles that can further spur market development as financiers and borrowers see positive results.

6.3.1 Metrics

Common metrics that green banks track include carbon dioxide equivalent emissions avoided, capital committed and deployed, number of closed projects, number of projects in operation, total project value, capital leverage ratio (see Section 5.3 for detail), energy savings, and active pipeline. The metrics collected will vary depending on the goals of each individual green bank. Green banks will also use different methods to calculate similar metrics.

For example, the active pipelines of the NYGB and CTGB show the types of technologies and target markets that these two entities are servicing but are defined differently. For NYGB, the active pipeline is a snapshot of the bank's current activity that represents the sum of all projects that have been approved by the scoring committee as a project to invest in, but before the project is executed and closed. NYGB's active pipeline for the second quarter of 2020 was $987.2 million and Figure 4 shows the breakdown of the pipeline by technology and target market.

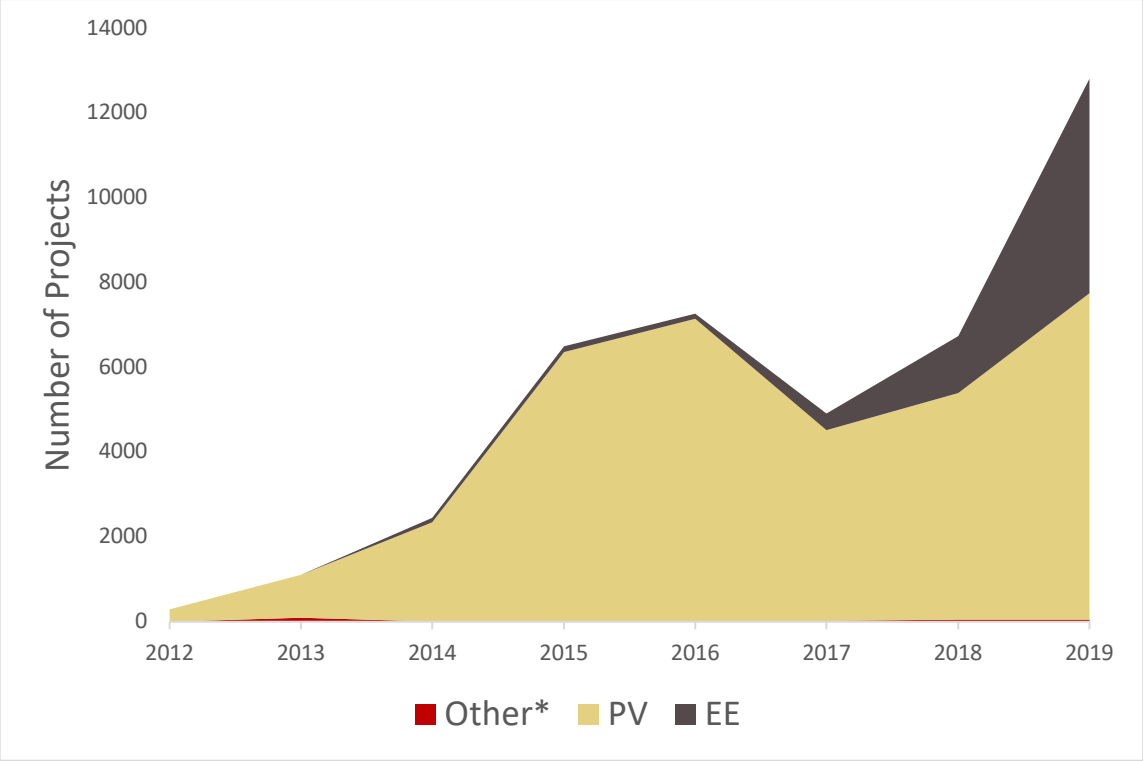
Figure 4. New York Green Bank Q2 2020 Active Pipeline by Technology and Target Market



Data Source: NY Green Bank. (2020)). NY Green Bank Metrics, Reporting & Evaluation Quarterly Report No. 24 (Metrics, Reporting & Evaluation Quarterly Report No. 24) (p. 5). New York Green Bank. Retrieved from https://greenbank.ny.gov/Resources/Public-Filings

For CTGB, they do not define an "active pipeline" like the NYGB. The CTGB, however, characterizes projects as "Approved", "Closed", and "Completed", where "Closed" indicates the projects that have executed all financial and legal documents and secured additional funding as needed, but have not been constructed and installed or completed. "Closed" projects represent the closest comparison to NYGB's active pipeline. Figure 5 shows the growth of CTGB's "active pipeline" by technology since the bank's inception using data from the CTGB's FY19 Comprehensive Annual Financial Plan. It is worth noting that for every residential solar PV project, the CTGB requires an energy audit to identify potential home energy solutions.

Figure 5. Connecticut Green Bank "Active Pipeline" by Technology and Fiscal Year



Source: Data pulled from the Connecticut Green Bank Comprehensive Annual Financial Report (June 30, 2019)
** Anerobic digestion, biomass, CHP, microgrids, waste heat recovery, wind, hydro, geothermal, and fuel cells*

Box 4: NYGB Process for Evaluating Goal Attainment

The NYGB investment process starts with pre-proposal discussions with an interested lender or borrower who then proceeds to submit a proposal meeting the criteria of the RFP. The criteria laid out in the RFP is the first attempt to ensure that the NYGB's mission and goals are addressed by the potential project. The proposal is then reviewed by the Scoring Committee to ensure that the proposal meets the criteria of the RFP. Next, the Greenlight Committee vets all potential investments to confirm that the individual transaction meets credit quality standards and is consistent with NYGB's mission. The final step in the investment process, before project execution, is the Investment & Risk Committee who provides risk management oversight.

Throughout this process, NYGB is evaluating projects for the economic, environmental, and social benefits that the bank has laid out in its mission statement and goals. Specifically, the key investment criteria that NYGB uses are:

1. Expected financial returns – revenues exceed expected portfolio losses;
2. Contribute to financial market transformation in terms of scale, improved private sector participation, level of awareness and confidence in clean energy investments, and/or other aspects of market transformation;
3. Potential for energy savings and/or clean energy generation that contribute to GHG emissions reductions in support of NY's clean energy policies.

6.3.2 Goal Verification Process

Green banks are usually required to have a rigorous and transparent process in place with annual reporting requirements at a minimum to verify that goals are being met. Box 4 highlights NYGB's process for ensuring projects meet the bank's economic, environmental, and social goals.[80]

Once projects have been executed, green banks must verify that the projects continue to meet bank goals. The process that green banks should follow to ensure accurate reporting include data collection, data analysis, impact attribution, performance monitoring, and data verification. When collecting data, green banks must keep in mind the different needs of its partners such as data confidentiality. Therefore, not all information about a project or transaction may be made public, so a green bank must strike a balance between transparency and commercial privacy requirements. The data that is collected is used to calculate metrics or key performance indicators (KPIs).

The NYGB and CTGBs publish annual data on their performance and operation. NYGB publishes a Metrics, Reporting, and Evaluation Plan and the CTGB has its Evaluation Plan Development and Implementation Process.[81] Table 8 provides an overview of the social, economic, and environmental impact metrics that CTGB collects and the results from FY 2012 through FY 2019.

Table 8. CTGB Impact Evaluation (FY 2012- FY 2018)[82]

Goal	Indicator	Impact (FY 2012-19)
Investment in Connecticut	Investment	$1.68 billion investment • $260 million CTGB investment • $1.42 billion private investment
	Leverage ratio	6.5:1
	Tax revenues	$87.1 million state tax revenues • $43.1million individual income tax • $23.0 million corporate taxes • $21.1 million sales taxes
Economic Development	Job creation	20,172 direct, indirect, and induced job years
	Energy burden reduction	Cost reduction on over 40,000 families and 375 businesses
	Accessible and affordable clean energy	Income parity in residential solar PV installation
Environmental Protection	Clean energy deployment	385,2 MW of installed capacity of clean energy
	Pollution reduction	5,8 million tons of CO_2 5.1 million pounds of SO_x 6.3 million pounds of NO_x
	Public health benefit	$206.7-$466.7 million of public health value created

Chapter 7: Conclusion

To meet the current national climate pledges under the Paris Agreement, an estimated extra $130 billion per year needs to be invested on energy efficiency and clean energy globally in the next decade, and this increases to $460 billion per year in order to limit global temperature rise to 1.5°C.[83] This highlights that governments need to accelerate the growth in clean energy and the green bank model is an effective avenue to achieve those goals.

Many national, state, and local governments have jumped started their clean energy, energy efficiency, and low carbon infrastructure markets by creating green banks. Green banks create a win-win-win situation where consumers save money, businesses and investors have new growth opportunities, and governments increase their efficiency and reach their goals.

This report focuses on four green banks in the United States. and uses these case studies to demonstrate how governments can partner with the private sector to deploy energy efficiency and clean energy technologies at a faster pace and how green banks are created and tuned to local needs and circumstances.

There is a growing number of green banks in the United States and globally. In fact, during the writing of this report, a bill was introduced into the United States Senate that would create a national United States Green Bank (USGB). If enacted as is, the USGB would deploy up to $50 billion in capital through the network of state and local green banks.[84] As local and state governments in both the United States and throughout the world start to explore creation of a green bank, we hope this report is helpful in understanding the technical, financial, and human resource requirements involved in setting up a green bank. With properly designed green banks, governments can use public resources more efficiently to advance clean energy deployment, while promoting local economy and foster market transformation.

Appendix: Green Bank Snapshots

The following tables summarize the main points from the four case study banks: CT Green Bank, NY Green Bank, DC Green Bank, and Montgomery County Green Bank. They show the main differences amongst the banks on their development, governance structure, management structure, staffing requirements, capitalization methods, financing products, and target markets. The table also reports some of the main outcomes and successes, both financial and environmental.

Table A1. Governance and Structure				
	CTGB	**NYGB**	**DCGB**	**MCGB**
Year of Creation	2011	2013	2018	2015
Creation mechanisms	Legislation	Division within existing entity (NYSERDA)	Legislation	Incorporated as a 501(c)3
Status/ relationship with the government	Quasi-public	Public	Quasi-public	Publicly-chartered nonprofit, designated as County's GB
Board member count	11 voting; 2 non-voting	13 (NYSERDA's BOD)	7 voting; 4 non-voting	11 voting; 2 non-voting
Management team count	8	7	1	1
Staff count (excluding management team)	29	24	1	4
Maximum expense on administration	Unknown	8% of initial capitalization or $17.48 million	$750,000 (annually)	Unknown

Sources: NY Green Bank Annual Business Plan 2018 – 2019; NY Green Bank Metrics, Reporting & Evaluation Quarterly Report No. 17 (Through September 30, 2018); Montgomery County Green Bank Annual Report FY2018; Connecticut Green Bank Comprehensive Annual Financial Report Fiscal Year Ended June 30, 2018; Coalition for Green Capital. (2017, August 28). NY Green Bank's Path to Profitability. Retrieved from: http://coalitionforgreencapital.com/2017/08/28/ny-green-banks-path-profitability/

Table A2. Operation (As of October 2018)				
	CTGB	**NYGB**	**DCGB**	**MCGB**
Capitalization	• Utility Ratepayer Surcharge: roughly $26 million/year • Regional Greenhouse Gas Initiative (RGGI): $3 to $5 million/year	• NYSERDA EEPS1, SBC 3, SBC 4, and RPS: $165.6 million (2013); $150 million (2015); $30 million annually from 2016 to 2021 and then $112.875 million annually from 2022 to 2025 for a total of $631.5 million • RGGI: $52.9 million (2013)	• RE Development Fund: $7 million/yr for 5 years • Ratepayer Surcharge: $15 million/yr for 2 years starting 2020 and $10 million/yr for 4 years following	• Pepo-Exelon Merger Settlement Fees: $14 million one-time investment
Cumulative Revenues & Expenses	As of 7/30/18 $36.8 mil. (Rev) $43.9 mil. (OPEX)	As of Q3 2018 $44.4 million (Rev) $30 million (OPEX)	N/A	As of 6/30/18 $6.6 mil. (Rev) $0.77 mil. (Exp)
Leverage ratio (2018)	6.1 : 1	2.7 : 1	N/A	N/A
Target Leverage ratio	5 – 10 : 1	8 : 1	5 : 1	5 : 1
Active pipeline ($)	N/A	$581.9 million***	N/A	N/A
Debt Ratio (2018)	Liabilities: $119 mil. Assets: $184 mil. DR = 0.65	Assets: $487 mil. Liabilities: $1.5 mil. DR = 0.003	N/A	Assets: $5.8 mil. Liabilities: $22k DR = 0.004
Target Markets	• Infrastructure • Residential • Commercial • Industrial • Institutional • Multifamily • Low-middle Income (LMI)	• Agriculture • Multiple End-User • Residential • Utility-Scale • Commercial & Industrial • MUSH/Government • Community Distributed Generation	N/A	• Commercial • Industrial • Residential • Multifamily • Low / Moderate Income
Investment area/portfolio	• Solar PV • Energy Efficiency • Water Heating Systems • Electric Space Heating • Anaerobic Digestion • Fuel cells • Small hydro	• Clean Energy (71.8%) • Energy Efficiency (9.6%) • Clean Transportation • Clean Energy Storage • Sustainable Agriculture • Sustainable Water Infrastructure	N/A	• Clean Energy • Energy Efficiency

Key products	• C-PACE • Solar Lease • Residential Solar Investment Program (subsidy) • Smart-E Loan • Low Income Solar Lease and EE Energy Savings Agreement • Low Income Multifamily Energy (LIME) Loan • Multifamily Pre-Development Loans	• Warehousing and aggregation credit facilities • Term loans and investments • Credit enhancements • Construction finance	N/A	• Commercial Loan for Energy Efficiency and Renewables (CLEER)

This value is calculated by multiplying the number of projects have been "Closed" in FY18, which means all financial and legal documents have been executed and any additional funding has been secured for these projects, by the average investment per project since the inception of the CTGB: 7,364 projects * $45,000 per project = $331 million project value *** NYGB Active Pipeline is a snapshot of current activity. The value presented here represents those projects that have passed the Investment & Risk Committee as of 9/30/18.

Sources: NY Green Bank Annual Business Plan 2018 – 2019; NY Green Bank Metrics, Reporting & Evaluation Quarterly Report No. 17 (Through September 30, 2018); NY Green Bank March 2018 Financial Statement; Montgomery County Green Bank Annual Report FY2018; Connecticut Green Bank Comprehensive Annual Financial Report Fiscal Year Ended June 30, 2018

Table A3. Environmental and Economic Impact (as of October 2018)

	CTGB	NYGB	DCGB	MCGB
Installed Capacity	286.3 MW	438.5 – 561.8 MW	N/A	N/A
GHG emissions avoided	4.6 mil. tons of CO2 avoided	7.21 – 9.25 mil. metric tons of GHG emissions reductions	N/A	N/A
Cumulative Energy Generation	9.99 mil. MWh	13 – 17 mil. MWh		
Cumulative Energy Savings	2.58 mil. MMBtu	4.01 – 4.4 mil. MMBtu	N/A	N/A
Jobs Created	15,890 cumulative direct and indirect jobs	Unknown	N/A	N/A

Sources: NY Green Bank Annual Business Plan 2018 – 2019; NY Green Bank Metrics, Reporting & Evaluation Quarterly Report No. 17 (Through September 30, 2018); Montgomery County Green Bank Annual Report FY2018; Connecticut Green Bank Comprehensive Annual Financial Report Fiscal Year Ended June 30, 2018

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