

CUYAHOGA COUNTY GREEN BANK OPPORTUNITY REPORT



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Executive Summary

With a dire need for clean energy solutions to combat climate change, clean energy funds, most commonly called Green Banks, have become popular solutions for governments to reach their climate targets. These mission-driven financial institutions use public or philanthropic capital to invest in clean energy projects that would otherwise struggle to secure capital while also mobilizing private co-investment in the same projects. All stakeholders benefit: private investors make their desired return on projects that would otherwise have been unattractive, mission-driven capital achieves investment impact, and communities enjoy clean energy that is cost-competitive with local grid power as well as the accompanying jobs. Given the critical need for the rapid development of safe, local job opportunities in the wake of the Covid-19 pandemic, clean energy projects supported by Green Banks offer an opportunity to invest in long-term infrastructure and put people safely to work.

Globally, Green Banks have supported over \$50 billion in clean energy projects.¹ In the US, Green Banks currently exist in over 14 cities and states across the country and have supported nearly \$4 billion in investment. As more states and cities across the country take advantage of the benefits of this financing model, federal leaders are also taking note. Legislation to establish a National Climate Bank has been introduced in both houses of Congress, and would provide \$35 billion in federal funds to capitalize state and local green banks as well as directly investing in projects and mobilizing private capital.

The following report is a feasibility study to determine the potential for a Green Bank to support clean energy development in Cuyahoga County. This work was done with support from the Cleveland Founda-

tion, the George Gund Foundation, and the Cuyahoga County Government. In order to determine the feasibility of a Green Bank, the Coalition for Green Capital conducted a market-gap analysis of the current clean energy financing landscape in Cuyahoga County from June to November of 2019. The goal of this research was to identify how projects are financed under current conditions, what types of projects are struggling to reach completion due to financing barriers, and how a Green Bank could support the market and encourage greater development. The output of this report is a set of suggested financial solutions that a Green Bank could bring to the Cuyahoga County market to increase the development of clean energy projects. This work is meant to inform the county and foundations as they consider the creation of a Green Bank in Cuyahoga County.

Working in collaboration with an advisory committee of local clean energy experts, CGC identified the solar and energy efficiency markets as the two priority markets to be analyzed in its initial research. After analyzing both markets, CGC believes that a Green Bank could make the most immediate impact in the county by offering debt to small-scale (sub 500 kW) commercial solar power purchase agreement (PPA) projects.

Currently, small-scale solar projects are unable to access financing through PPAs because the thin economic margins for small-scale projects in Cuyahoga County drive up the price of solar power offered through a PPA to above-market rates. By providing flexible capital, a Green Bank could enable these solar projects to offer competitive power prices to customers. This would allow customers to purchase solar generation at affordable rates without having to provide upfront capital to pay for the project. This

1 Green Bank Network. *Green Bank Impacts Through June 2019*. <https://greenbanknetwork.org/gbn-impact/>

solution could attract private capital to co-invest in these projects and spark growth in an underdeveloped part of the county's clean energy market.

CGC estimates that this solution would be able to create nearly 450 jobs and double the amount of installed solar capacity in the county from 14 to 28 MW in five years. Over the lifetime of the those projects, this would reduce county greenhouse gas emissions by 656,000 metric tons of CO₂, the equivalent of removing 140,000 passenger cars from the road or planting 11 million seedlings.²

Financing for small-scale solar PPAs is presented as the recommended first solution that a Green Bank could bring to the Cuyahoga County market to encourage greater clean energy development. Over time, additional financing solutions, including some explored in this report, should be identified and brought to market as a potential Green Bank reaches maturity in Cuyahoga County.

Following the release of this report, CGC will continue working with local partners to establish a Green Bank in Cuyahoga County. CGC will work towards incorporating and staffing the Green Bank, developing a detailed business plan, and meeting with a variety of foundation and public sector funders to raise

investment and operating capital. CGC would welcome conversations with potential partners interested in deploying capital through the Green Bank.

This effort builds on Cuyahoga County's track record of sustainability leadership. By successfully implementing a Green Bank, the county can not only mobilize clean energy to benefit local communities, but can serve as a model to others, from the local level up to federal policymakers.

ABOUT CGC

CGC, a 501(c)(3) non-profit, has been the leading creator, advocate, and expert on Green Banks since 2009. CGC has worked on the development of public institutions such as the Connecticut Green Bank and the New York Green Bank, as well as more recent, nonprofit Green Banks like the Colorado Clean Energy Fund and the Montgomery County Green Bank. CGC manages the American Green Bank Consortium and is currently leveraging its experience and the scale of Green Bank operations across the country to create a national network of Green Banks that can collaborate to more effectively drive capital into clean energy markets.



2 Environmental Protection Agency. EPA Greenhouse Gas Equivalencies Calculator. <https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator>

Introduction

The following report is an opportunity assessment for a new, mission-driven clean energy fund in Cuyahoga County, Ohio. This work was done with support from The Cleveland Foundation, The George Gund Foundation, and the Cuyahoga County Government. This project was motivated by the desire to develop a tool that could spur greater investment in the county's clean energy markets and accelerate progress towards the county's ambitious climate goals.

What is a Green Bank?

Green Banks are mission-driven financial institutions that provide capital to clean energy projects. They blend commercial, public and philanthropic capital to finance clean energy projects that otherwise would struggle to secure capital. Green Banks possess local expertise on market conditions, the policy landscape, finance actors, and development partners, and use that expertise to connect low-cost capital with clean energy projects that need it. Green Banks are not depository institutions.

The goal of this investment mobilization is to reduce GHG emissions, though the associated benefits are numerous. By using market-based solutions, Green Banks are only in the business of delivering clean energy that lowers costs for end-users. As a result, Green Banks also lower energy costs and provide low-to-moderate income households access to the clean energy transition while lowering their energy burden. Green Banks also stimulate job creation, as there is no way to install a solar panel or upgrade the efficiency of a building without putting labor on the ground in the local market.

Given the success of Green Banks at furthering those goals in other geographies, this work explores the potential for a Green Bank to support clean energy development in Cuyahoga County.

This study shows that there is significant, untapped potential in the county's clean energy markets, and clear areas where a Green Bank could add value to the current financing landscape. After the completion of its market analysis and the publication of this report, CGC will work closely with potential capital providers to create and capitalize a fund that could engage in this activity.

ENERGY MARKET OVERVIEW

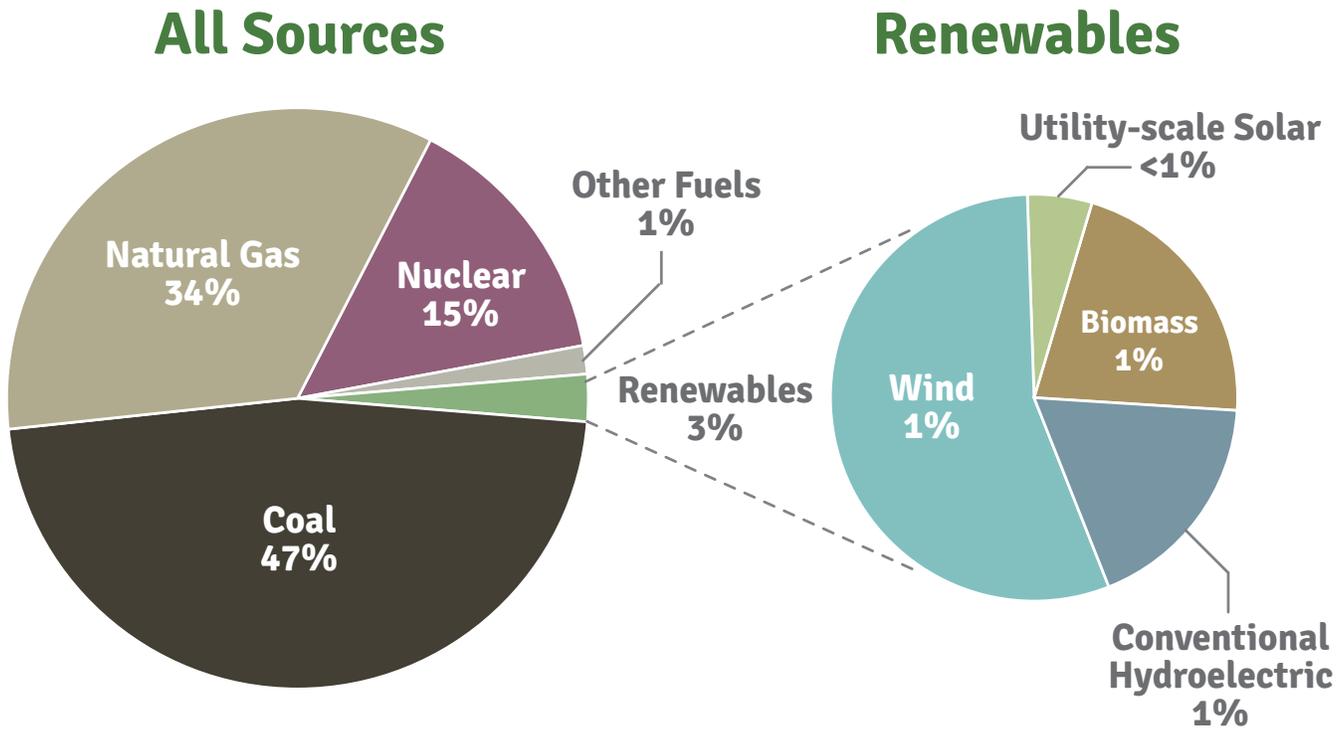
Cuyahoga County has a track record of years of leadership in sustainability, despite being located in a state that has often failed to support clean energy technologies. The energy market in this county presents unique challenges and opportunities when considering the viability of a Green Bank, including middling power prices, an aging building stock, and a unique utility environment. The following is an analysis of key facts that impact the success of mission-driven finance in the county's clean energy markets.

Energy Use

After Indiana and Texas, Ohio is the third largest consumer of coal in the country. 47% of the electricity generated in Ohio comes from coal, with the majority of other electricity coming from natural gas and nuclear. Only 3% of the total electricity produced in the state comes from renewable sources. This is far behind leading states in the country, and is also behind many of Ohio's neighbors like Michigan (8%), Indiana (6%), and Pennsylvania (4.5%).³

3 US Energy Information Administration. *Ohio - State Energy Profile Overview*. May 2019. <https://www.eia.gov/state/?sid=OH#tabs-3>

Figure 1. Ohio Net Electricity Generation by Source⁴



Overall, electricity prices in Ohio are close to the national average. At around \$.11/kWh, the county’s residential rates are below the national average of roughly \$.12/kWh but about average compared to the rest of the state.⁵ At \$.13/kWh and \$.10/kWh respectively, the county’s commercial and industrial electricity rates are among the highest in the state, and well above the national averages of \$.10/kWh and \$.07/kWh.⁶

Ohio allows for competitive choice among electricity producers and over 57% of electricity customers in the state purchase their electricity from a competitive retail electric supplier (CRES). In FirstEnergy’s territory, the number of customers choosing to buy power from a CRES is over 52%.⁷ Competitive choice

has allowed many customers to negotiate lower costs for their electricity. CGC’s conversations with market participants suggested that rates between \$.07–.09/kWh are not uncommon for off-takers with a relationship with the utility, particularly larger customers.

Despite the ability to choose a retail electric supplier, the overall cost of energy has not decreased across the state with the adoption of choice. For customers in FirstEnergy’s territory, prices actually rose between 2011 and 2019. This is largely due to an increase in non-bypassable riders, which are required to be paid by all subscribers in the territory, regardless of the electricity supplier. Although the portion of the average commercial FirstEnergy customer’s

4 Ohio Public Utilities Commission. *How does Ohio generate electricity?* <https://www.puco.ohio.gov/be-informed/consumer-topics/how-does-ohio-generate-electricity/>

5 Ohio Public Utilities Commission. *Ohio Utility Rate Survey*. February 2019. <https://www.puco.ohio.gov/industry-information/statistical-reports/ohio-utility-rate-survey/february/>

6 US Energy Information Administration. *Average Price of Electricity to End Use Customers by End-Use Sector*. August 2019. https://www.eia.gov/electricity/monthly/epm_table_grapher.php?t=epmt_5_6_a

7 Ohio Public Utilities Commission. *Ohio Customer Choice Activity*. <https://www.puco.ohio.gov/industry-information/statistical-reports/ohio-customer-choice-activity/>

bill that came from the standard service offering (SSO) charge (the price of generation) decreased by 20%, the non-bypassable rider portion of their bill increased by 121% during that same time. This meant that their overall average electricity price increased slightly from \$.101/kWh to \$.102/kWh. To contrast this, commercial customers in Duke Energy's service territory saw their average price drop from \$.123/kWh to \$.081/kWh (a 34% decrease) with the introduction of choice.⁸

A sizable portion of the county's population currently face high energy burdens. With 18% of the county in poverty (above the national average of 12%),⁹ roughly 21% of the county (257,000 people) spends between 7–20% of their annual income on energy expenditures. This is more than double what the average American household spends (3.5%).¹⁰

Currently the benefits of renewable energy are not reaching many members of the Low and Moderate Income (LMI) community. In 2018, the average income of a household with solar in Cuyahoga County was \$59,000, well above the county's average household income of \$46,720.¹¹

State Energy Policies

In 2008, Ohio's legislature created a renewable portfolio standard (RPS) that set a target of 12.5% renewable generation across the state by 2025. This was innovative at the time, but compared to the ambitious targets set by national leaders like New York (80% renewable by 2050) or Colorado (100% renewable by 2040), the state's RPS is considerably lower.

To complicate matters further, the legislature passed legislation to freeze the state's RPS for two years in 2014, resulting in the target's extension to 2027 and continued uncertainty over the future of the RPS. Although Ohio has never repealed its RPS, legislation passed in 2019, known as HB6, further reduces the RPS requirements to 8.5% by 2026.¹²

To comply with the current RPS, Ohio utilities have largely opted to purchase renewable energy credits (RECs) from existing projects rather than develop their own significant portfolios of renewable energy capacity in state. Currently, utilities use RECs to meet roughly 30% of their RPS targets. Compared to other states, the REC market in Ohio is quite cheap. In early 2019, RECs in Ohio traded at \$20/credit. More competitive markets like DC or Massachusetts trade at prices well over \$300/credit.¹³ After the passage of HB6 in July 2019, the Ohio REC market dropped to \$4/REC.

Before 2014, RECs were trading at about \$70/credit. As part of the legislation that passed the 2014 RPS freeze, however, the regulations around RECs were altered so that buyers did not have to offer preferential rates to in-state producers of renewable energy. When the Ohio market was opened to projects sited in many neighboring states including Pennsylvania, Indiana, Michigan, Kentucky, and West Virginia, the market was almost immediately flooded with an oversupply of RECs which dropped roughly 80%. In 2015, Ohio RECs traded for \$15/credit and bottomed out at a low not seen again until the passage of HB6 at \$5/credit in 2018.¹⁴ This was a large win for REC

8 Northeast Ohio Public Energy Council. *Update on Electricity Customer Choice in Ohio*. 2019.

https://www.nopec.org/media/1573/19nop32-whitepaper_web.pdf

9 United States Census Bureau. *Quick Facts, Cuyahoga County, Ohio*. July 2018.

<https://www.census.gov/quickfacts/fact/table/cuyahogacountyohio,US/PST045218>

10 American Council for an Energy-Efficient Economy. *Lifting the High Energy Burden in America's Largest Cities: How Energy Efficiency Can Improve Low-Income and Underserved Communities*. April 2016. <https://aceee.org/research-report/u1602>

11 Stanford University's DeepSolar tool. May 2019. <http://web.stanford.edu/group/deepsolar/home>

12 Green Tech Media. *HB6 Coverage*.

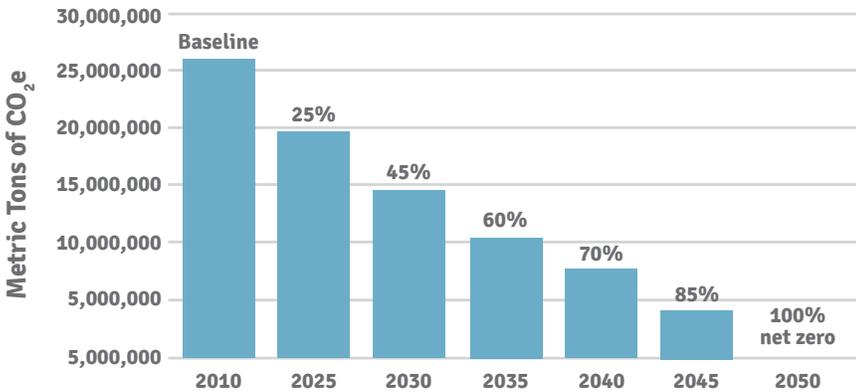
<https://www.greentechmedia.com/articles/read/ohio-delays-bill-to-bail-out-nuclear-and-coal-plants-gut-efficiency-and-ren>

13 SREC Trade. Ohio Market Prices. Accessed September 2019. https://www.srectrade.com/srec_markets/ohio

14 SREC Trade. Ohio Market Prices. Accessed September 2019. https://www.srectrade.com/srec_markets/ohio

Figure 2. Cuyahoga County GHG Reduction Goals

Overall Emission Reduction Goals



| YEAR | % REDUCTION | EMISSIONS (CO ₂ E) |
|------|-------------|-------------------------------|
| 2010 | BASELINE | 26,100,000 |
| 2017 | 10 | 23,500,000 |
| 2025 | 25 | 19,575,000 |
| 2030 | 45 | 14,625,000 |
| 2035 | 60 | 10,440,000 |
| 2040 | 70 | 7,830,000 |
| 2045 | 85 | 3,915,000 |

consumers like utilities but a major loss for renewable energy projects, which saw a potentially valuable revenue stream dry up overnight.

Local Energy Policies

Although support from state policies for renewable energy has been limited, local policy leaders in Ohio have led the charge to champion sustainability. In Cuyahoga County, both the City of Cleveland and Cuyahoga County governments have been active in creating a more favorable climate for sustainable investment.

The City of Cleveland has committed to reducing their GHG impact 80% by 2050 through energy efficiency and green buildings, clean energy, sustainable transportation, clean water and vibrant green spaces, food waste reduction, and cross-cutting priorities like equity, jobs, and resilience.¹⁵ The city also has an active 2030 district, with reduction targets from existing and new buildings.

In 2019 Cuyahoga County released a climate action plan and committed to achieving net-zero emissions by 2040.¹⁶ As part of this goal, the county wants to

transition to 100% clean energy by 2050. Given this ambitious target, a Green Bank is one tool that could effectively increase the amount of investment flowing to clean energy projects in the county.

To complement its goal setting, the county has also been leading through action by developing clean energy capacity. In 2018, the county completed a 4 MW solar project in Brooklyn to supply power to county buildings, one of the largest installations in the state. The project is built on one of the many brownfield sites that exist in Cuyahoga County, which total to make up over 5 square miles of land.¹⁷ In 2018, the county also released an RFP and is moving forward with a solar aggregation opportunity to further develop solar capacity for government buildings.

THE GREEN BANK MODEL

To understand how a Green Bank could fit into the Cuyahoga County energy landscape, it is helpful to understand the Green Bank model more generally and the impact that Green Banks have achieved in other geographies.

15 Cleveland Climate Action Plan. 2018 Update. <https://drive.google.com/file/d/1Z3234sMp7S7MjaXvMgcZtcAaYs4x2oHE/view>

16 Cuyahoga County Climate Action Plan. May 2019. https://www.countyplanning.us/wp-content/uploads/2019/05/Final_CCCCAP-1.pdf

17 Ohio EPA. Brownfield Inventory Guide. November 2009. <https://www.epa.state.oh.us/portals/30/SABR/docs/BrownfieldInventoryGuide.pdf>

Green Banks are mission-driven finance entities designed to drive greater capital into clean energy projects by addressing and alleviating financing barriers in their markets.¹⁸ Given the highly localized nature of energy markets, Green Banks are often created as local institutions. They are market-oriented, seeking to achieve returns on their investments, in part to demonstrate to private investors that attractive returns are possible. They use various techniques to offer favorable terms to clean energy projects, including loan guarantees, technical assistance, and lower-cost or longer-term loans.

Green Banks apply their specialized expertise in energy to undertake transactions that private sector capital providers are less likely to do on their own. They focus on scalable solutions, dedicating capital and staff time to demonstrate innovative financing structures that can be replicated across multiple projects. The term “Green Bank” is a description of the kind of role an entity plays in the market. Green Banks are not deposit holding institutions.

Green Banks have served as powerful tools to help states and cities achieve their sustainability goals and drive greater investment into clean energy markets. For example, The Connecticut Green Bank, the state’s quasi-public Green Bank, has used \$250 million in public funding to drive over \$1.6 billion in overall investment in the state’s clean energy market.¹⁹ Michigan Saves, Michigan’s independent, nonprofit Green Bank, has used \$19 million in public and philanthropic funding to drive over \$190 million of investment into the state’s clean energy market.²⁰

Overall, Green Banks across the country have helped drive nearly \$4 billion of investment into clean energy projects. (See chart next page.)

Given their dedicated expertise in clean energy finance, Green Banks have served as thought leaders for clean energy development in their geographies. Given the complicated nature of financing clean energy projects, Green Banks use their market-specific expertise to do the initial ‘brain damage’ to develop a solution for gaps in the market. The Green Bank is then able to prove these strategies and products for other actors to use, including the private sector. This information is disseminated through white papers, webinars, and participation in conferences and roundtables. For example, the Connecticut Green Bank hosts quarterly webinars highlighting key market insights that may be relevant to developers, financiers, and customers interested in developing clean energy projects in the state.²¹ In Cuyahoga County, there is the potential for a Green Bank to play a similar role as the fund analyzes and works to develop solutions across the multiple clean energy markets that are a focus for county development.

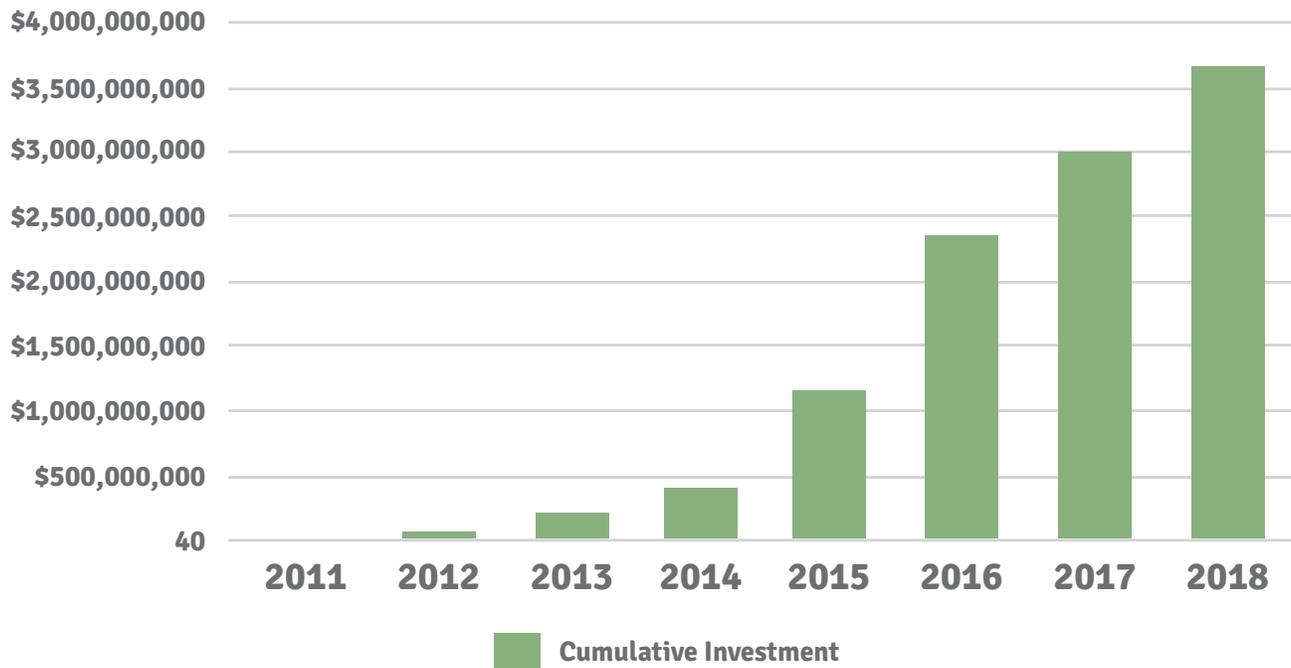
Green Banks have been created using a variety of different structures including public, quasi-public, and nonprofit forms. Earlier Green Banks, like those in Connecticut and New York, were created as public institutions and capitalized using large amounts of public funding. As the Green Bank model has expanded to less politically-unified geographies, the nonprofit model has become increasingly popular.

18 Coalition for Green Capital. *The Nonprofit Model for Green Bank Development*. January 2019. <http://coalitionforgreencapital.com/wp-content/uploads/2019/05/Nonprofit-Model-Memo.pdf>

19 Connecticut Green Bank. *Comprehensive Annual Financial Report*. 2018. https://www.ctgreenbank.com/wp-content/uploads/2018/10/Green-Bank-CAFR_2018.pdf

20 Michigan Saves. *2018 Annual Report*. <https://michigansaves.org/michigan-saves-2018-annual-report-your-journey-is-our-story/>

21 Connecticut Green Bank. Webinars. <https://ctgreenbank.com/news-events/webinars/>

Figure 3. Investment Caused by US Green Banks²²

This model allows for Green Banks to draw upon funding from a variety of sources including the public sector, commercial lenders, and philanthropic capital.

In Cuyahoga County, there is potential for a Green Bank to leverage existing expertise by housing the institution within a local lending organization. This structure would decrease the cost and time to start up a new green lending business in the county and would allow the Green Bank to utilize capacities that exist at the parent organization including underwriting and loan processing capabilities. The New York City Energy Efficiency Corporation (NYCEEC), another locally-scaled Green Bank, followed a similar model successfully by incubating within the New York City Economic Development Corporation and taking advantage of back office services already present at that organization.

Depending on the needs of the market they are trying to address, Green Banks have achieved impact in a variety of ways. Green Bank financing solutions can take the form of techniques like credit enhancement, co-investment or warehousing, dedicated debt to support structures like Property Assessed Clean Energy (PACE) finance or on-bill repayment programs, or market development like information sharing, developer training, or program coordination. Earlier-stage Green Banks have traditionally focused on one or two solutions as they seek to establish themselves, while larger, more mature Green Banks have often expanded their offerings to include a suite of different solutions that can maximize their impact in a variety of markets.

22 American Green Bank Consortium. *2018 Industry Report*. <https://static1.squarespace.com/static/59bc05f0c534a543a9f96b0d/t/5d0d25e4b1ed350001884b0d/1561142759155/Green+Banks+in+the+US+-+2018+Annual+Industry+Report.pdf>

Figure 4. Sample Green Bank Financing Solutions

| Targeted Financing Solutions | Examples |
|--|--|
| Aggregation & securitization: pooling small investments for resale or larger capital providers | Rhode Island Infrastructure Bank's aggregation of municipal energy efficiency projects |
| Credit Enhancement: improving customer credit to enable access to finance | Michigan Save's loan loss reserve for solar and efficiency upgrades |
| First-in-kind investments: proving the viability of clean energy projects for private investors | Connecticut Green Bank's market development of CPACE |
| Direct loans: direct financing for short term or difficult to finance projects | New York Green Bank's investment in bridge loans for solar |

The solutions a Green Bank chooses to offer are largely driven by the conditions present in the target market. Not all solutions work in all markets. For this reason, Green Bank structures and solutions have differed widely across the country. The Cuyahoga County market is no exception and presents a unique environment for clean energy investment. By thoroughly understanding the current gaps and needs present in the county's clean energy market, a Green Bank in Cuyahoga County will be able to offer a financing solution that is specifically tailored to most effectively drive clean energy investment in the county.

METHODOLOGY

At the beginning of this project, CGC formed an advisory committee of clean energy experts in the county to guide and inform its work. In collaboration with these stakeholders, CGC narrowed the scope of its study to analyze the solar and energy efficiency markets, which were identified as priority markets for clean energy development in the county. Both were chosen due to the large potential for greenhouse gas reductions from developing more projects and

the historic success of the Green Bank model in these markets. Due to a desire to perform a deeper analysis of select target markets, this project did not explore the potential for a Green Bank to support projects in other markets, including wind generation, biofuels, micro-grids, clean transportation, or resiliency. Throughout the market-gap analysis process, CGC worked closely with the advisory committee through monthly meetings to discuss outreach strategy, technical findings and the feasibility of potential financial solutions.

CGC's market-gap analysis between June and November 2019 centered on interviews with over 90 market participants including developers, financiers and end-use consumers (see Appendix 4). Market participants were selected by their ability to describe current clean energy financing activity in the county. These interviews covered topics ranging from current financing methods for clean energy projects, objectives and goals for clean energy development as well as tactics for encouraging greater development in the county.

Using the information gathered from interviews and research, CGC developed a series of financial models

to analyze the economics of clean energy projects in the county and the relative impacts of lower-cost, longer-term financing for those projects. The purpose of the interviews and analysis was to understand the current landscape for clean energy financing in the

county, identify existing market gaps and model the impact of financial solutions that could potentially bridge gaps in both the solar and energy efficiency markets. The output of this work is detailed in the following sections.

Solar Market Opportunity in Cuyahoga County

The Ohio solar market is an underdeveloped market when compared to the rest of the country. At the end of 2018, there were 207 MW of installed capacity throughout the state. For comparison, Indiana had 352 MW and Pennsylvania had 433 MW of installed capacity at the end of 2018. The majority of the capacity in Ohio has been driven by larger, commercial and industrial (C&I) and utility scale installations. Although there are many factors that affect the economics of a solar project, one of the most important is the market's electricity price. In Cuyahoga County, residential electricity costs are around \$.11/kWh, which is consistent the national average of \$.12/kWh but lower than neighboring markets like Pennsylvania (\$.13/kWh) and Michigan (\$.14/kWh). These low power prices make it difficult for solar projects to pencil economically.

Net metering is the most important policy that affects the solar market in Cuyahoga County. Net metering is available in Ohio, but, due to revisions that passed the state legislature in November 2017, it is less effective than in other states. In FirstEnergy's utility territory (and the territory of other investor-owned utilities), net-metered system owners are only reimbursed for the generation portion of the costs of their electricity if their solar system produces more than their usage for a certain month. For example, if a solar system produces 500 kWh in a given month and the utility customer only used 450 kWh that month, FirstEnergy would reimburse the customer at the end of the month for the dollar

value of the excess 50 kWh worth less than what the customer would have been charged to buy 50 kWh of electricity from FirstEnergy. The result of this net metering policy is that all 'behind the meter' systems are downsized slightly so that they produce less than each user actually consumes.

This policy does not apply to utilities that are not investor-owned. Importantly, Cleveland Public Power allows net-metered system owners to roll any extra kWh over at the end of the month and count them as credits towards their next month's bill. This effectively maintains the value of each kWh produced by the system and keeps the price constant.

There are currently nine solar projects larger than 3MW in capacity operational in Ohio. Of these nine projects, one of them, the Brooklyn Solar Array (4MW), is in Cuyahoga County. Currently, Cuyahoga County has an estimated 14 MW of installed solar capacity.²³

Commercial and industrial solar: Similar to the state market, the majority of capacity at the county level is from C&I installations: an estimated 80% of the county's solar capacity comes from C&I projects while 20% comes from residential projects.

This presents a strategic choice when thinking of how to expand solar in the county. Focusing the efforts of Green Bank finance on C&I projects will maximize clean energy capacity and GHG emissions reductions.

23 PUCO. *Ohio's Alternative Energy Portfolio Standard – Certified Renewable Energy Facilities*. June 2019.

Residential solar: Although commercial solar makes up the greatest share of installed capacity, by number of installations, there are significantly more residential projects than commercial and industrial projects. This implies that focusing on residential solar could

yield a greater number of projects, although analysis finds that the projects would require a substantial amount of grant capital to support. These considerations are described in greater detail in the following section.

Figure 5. Ohio Annual Solar Installations²⁴

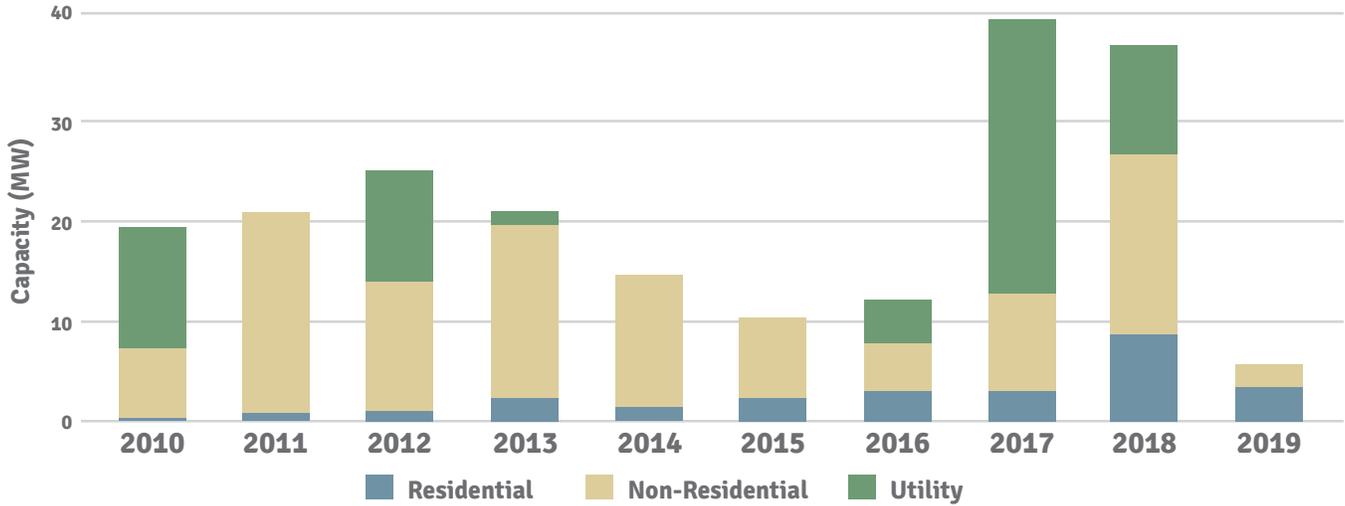
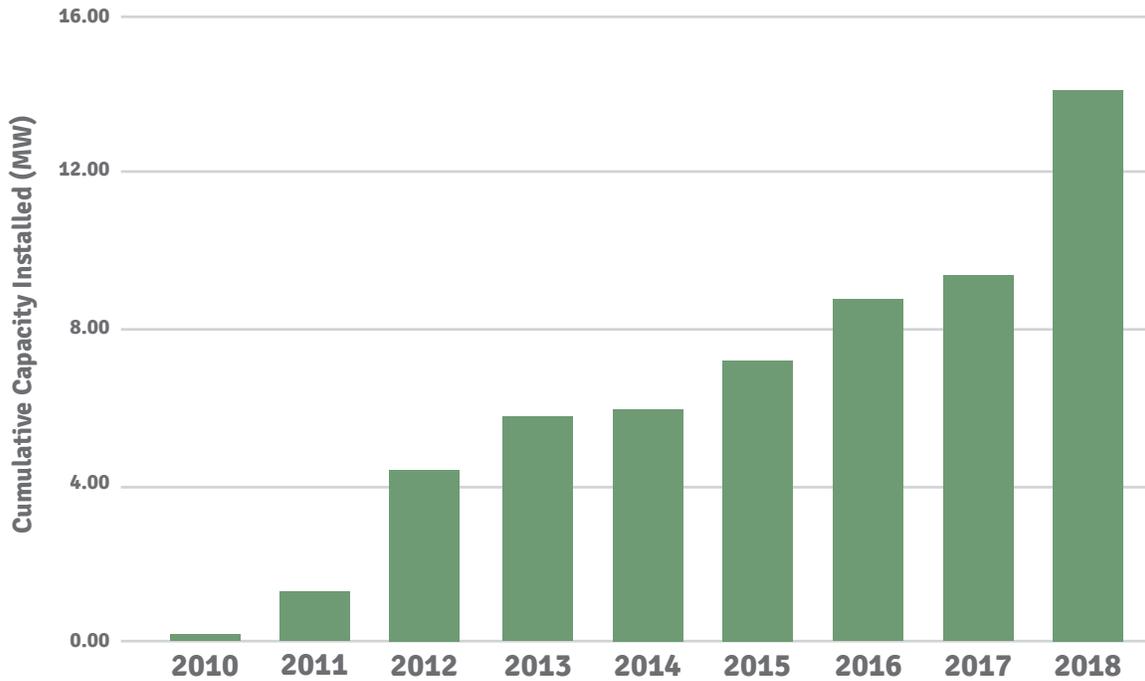


Figure 6. Solar Capacity in Cuyahoga County²⁵



24 Solar Energy Industries Association. *State Solar Policy: Ohio*. Data Current through Q1 2019. Accessed June 2019. <https://www.seia.org/state-solar-policy/ohio-solar>

25 PUCO. *Ohio’s Alternative Energy Portfolio Standard – Certified Renewable Energy Facilities*. June 2019.

Community solar: Ohio does not have a strong policy environment to support community solar. The four investor-owned utilities in the state do not offer virtual net metering, so no community solar projects have been completed in their service territories. Municipal utilities and rural electric cooperatives are able to be more flexible in their policies, so there have been exploration projects in several locations, including one currently under way in Cuyahoga County. In these cases, community solar is being explored as a tool for connecting LMI populations to the benefits of solar.

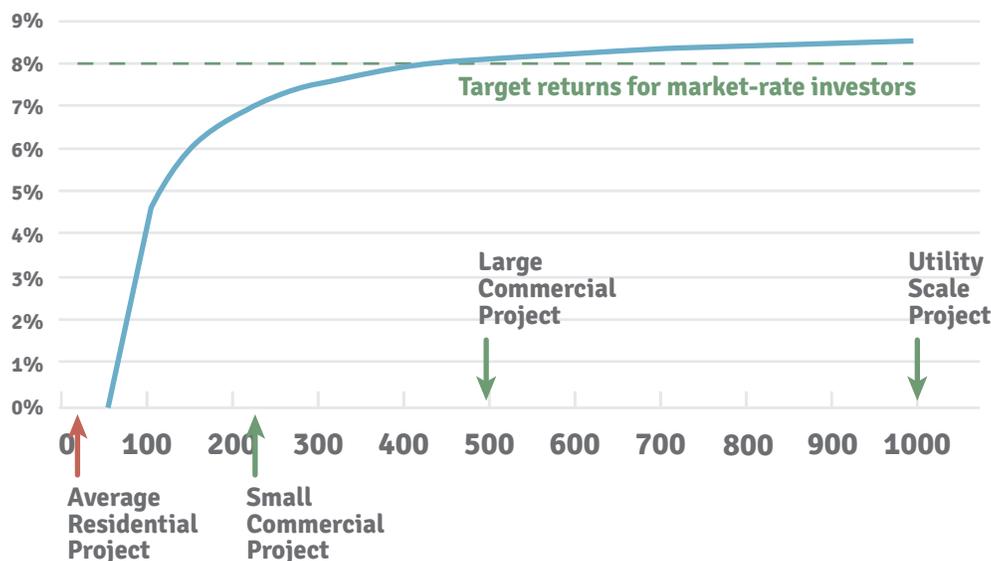
One example of a community solar project being completed in Ohio is in Butler County, where the Butler County Rural Electric Cooperative was able to create a community solar project to serve its local subscribers. Customers subscribing to this project paid, on average, \$2 more per month on the electricity bills.²⁶

Utility-scale solar: Utility-scale solar is largely affected by state policies. Since REC prices are readily available at affordable prices in Ohio, utilities cur-

rently buy roughly 30% of their renewable energy requirements from RECs instead of developing their own clean energy projects. With the passage of HB6 further reducing state mandated targets, utilities may be even less motivated to invest in renewable generation.

CGC’s findings: In a market with thin margins, economies of scale can make an important difference in project profitability. Using inputs from local developers, CGC’s modeling suggests that returns are much higher for projects greater than 100 kW than for projects in the sub-100 kW range. While regional and national developers would be interested to pursue larger scale projects, those in the ~100 kW range often fail to get attention because of their low returns. Therefore, there may be a market role for the Green Bank to play in small scale commercial projects in the 100-200 kW range, where returns are still present, but the rate is not sufficient to attract larger developers and investors. Given the low returns of projects <50kW, it is unlikely that a Green Bank would be able to focus on that segment of the market due to a lack of commercially viable projects.

Figure 7. Estimated Returns by Solar Project Size (kW)²⁷



26 Butler Rural Electric Cooperative, Inc. *Butler Rural Community Solar*. Accessed June 2019. <https://www.butlerrural.coop/content/butler-rural-community-solar>.

27 Assumes a 6% loan with a 10-year term, EPC costs of \$1.7/Watt, and a net productivity factor of 1200 kWh/kW.

DEVELOPER LANDSCAPE

There are a handful of solar developers/installers actively completing projects in Cuyahoga County. Before the 2014 freeze of the RPS and the subsequent collapse of the REC market, the higher revenues for solar projects attracted larger, national developers. Now, two of the most active developers in the market are locally focused and work exclusively in Cleveland and the surrounding area with another two other active developers working regionally in Ohio and a few neighboring states. These developers are relatively small in scale, all-together installing a couple MW of capacity each year. These developers are actively seeking to grow their businesses, particularly with regards to the number for C&I projects they can complete.

Most of the developers active in the county have small staffs that focus on sales and installation. These developers do not focus on developing in-house financing capabilities and therefore, do not offer their own financing to customers. Instead, these developers/installers rely on third parties to develop their financing. None of the leading, national solar developers with sophisticated financing partnerships are active in the county. As one developer put it “if a developer could do solar in another market, they would.” This is due to the relatively low returns from Ohio’s solar projects when compared to other markets across the country and region.

CGC’s findings: The limited number of developers with a strong growth mindset in the county suggests that a Green Bank will need to focus on building strong relationships with existing developers and finding solutions that work for the market’s current actors to drive greater solar penetration. The lack of in-house financing among developers suggests that a Green Bank should bring a simple, productized financial solution to the market that can be readily adopted by developers without significant training.

RESIDENTIAL MARKET

Residential solar projects in the county are systems marketed to individual homeowners averaging about 6 kW in size. Most of these systems are roof-mounted, although in less-common cases, ground mount systems are completed.

Although local banks like KeyBank and Huntington were generally cited as the most common capital providers for residential projects, a variety of other capital providers are being used or considered by developers for residential projects. The developers CGC interviewed indicated that they faced little difficulty helping their good-credit customers access market rate capital around 6% with 5-10-year term for residential projects. Collectively, developers listed over 10 distinct capital providers offering debt for solar loans that they choose between. Some of this money comes with particular complications, however. For example, one developer cited access to capital that came from a national solar financier but included a dealer fee of 10% of the overall project cost.

According to CGC’s conversations with developers in the market, 30-50% of residential customers are currently self-financing new solar projects. This is largely driven by system owners’ unwillingness to take on more debt. Those who do decide to utilize financing for their solar projects are almost exclusively using loans as their financing method. Although third-party ownership of solar installations is legal in Ohio, meaning both solar leases and Power Purchase Agreements (PPAs) are options for financing new solar projects, these options are much less commonly used than loans.

A PPA, or Power Purchase Agreement, is a third-party ownership strategy for installing solar in which a customer enters an agreement to purchase power at a fixed rate from a third-party owner of a solar system, usually while acting as the host for that solar system. Under a PPA model, the investor, not the

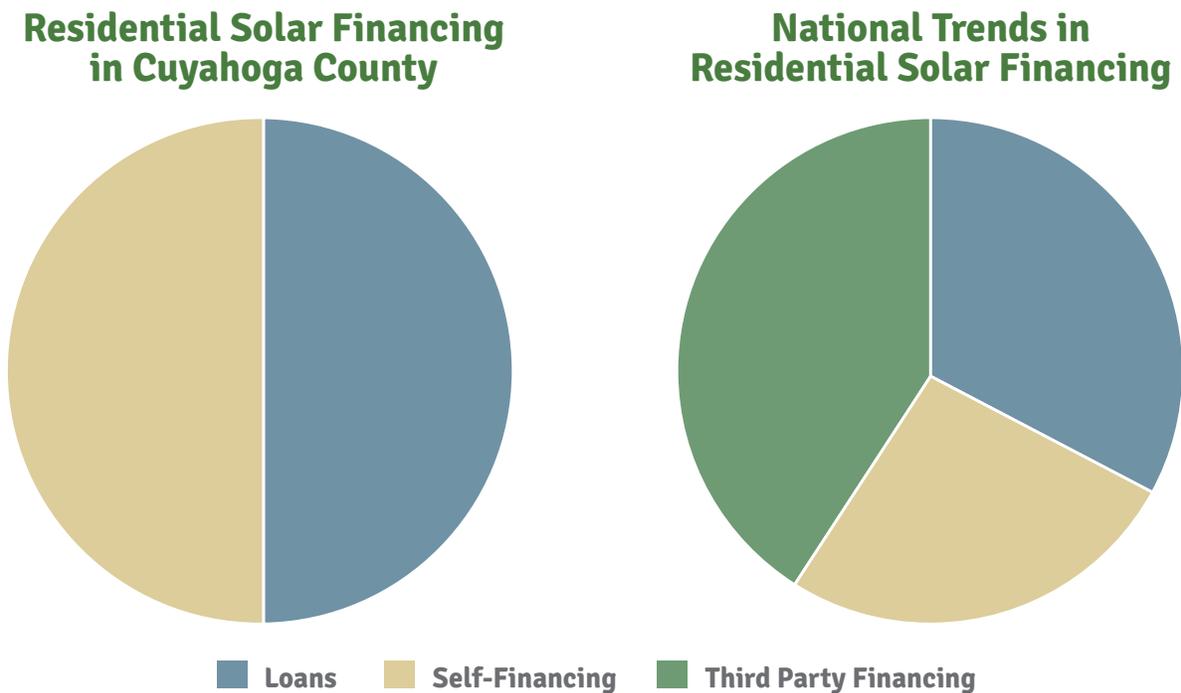
customer/host, pays for the upfront cost of the solar system and recoups its investment over time through the customer’s fixed electricity payments. The customer/host benefits from immediate installation of solar without upfront costs and a lower \$/kWh rate for their electricity.

Nationally, there are many providers of PPAs for solar projects, including other Green Banks and their affiliates. In Cuyahoga County, there are currently only PPAs available for large-scale, commercial projects. Due to the lower returns from smaller scale projects, no residential PPAs are currently being done in the market. This is very different from the national solar market, where over 40% of solar projects are financed through a third party ownership model like a PPA or a lease.

Projects using loans for residential projects often take advantage of existing support programs like ECO-Link. ECO-Link is an interest rate buy-down provided by the state’s treasury department. Developers

reported that approximately 30% of system owners taking loans expressed interest in using the ECO-Link program to support them. According to the Treasury, ECO-Link has helped provide roughly \$800,000 worth of loans for solar projects in the county since 2011. Assuming an average cost of \$13,000 for each of the 516 residential systems completed in the county, this means that ECO-Link has been responsible for financing a little more than 10% of the residential projects in the market to date. This type of interest rate buy-down program, while interesting to consumers and beneficial to lenders, does not support the penetration needed to bring the market to scale. One issue preventing ECO-Link from supporting more projects is that it only extends the interest rate buy-down for 7 years, which makes longer term debt arrangements impossible to finance. Another is that it only supports traditionally bankable customers. Both longer term capital and capital willing to work with underserved market segments will be needed to help residential solar reach greater scale in the county.

Figure 8. Residential Financing Methods at the County and National Level²⁸



28 National Renewable Energy Laboratory. *Solar Lending Practices by Community and Regional Financial Institutions*. June 2018. <https://www.nrel.gov/docs/fy18osti/71753.pdf>

CGC’s findings: The lack of third-party financing solutions for the residential market in Cuyahoga County suggests that the market economics are not competitive enough to attract the attention of commercial investors. CGC estimates that the returns for a typical residential solar PPA are too low to earn even minimal returns. This suggests that, while a Green Bank may be able to drive growth in the market by using grants or market development tactics, investments in residential PPAs are unlikely to earn sufficient returns to payback the Green Bank’s investment.

COMMERCIAL AND INDUSTRIAL MARKET

Commercial solar projects in the county are systems marketed to larger electricity consumers like a small business, school, or government and are generally between 50kW and 1 MW in size. Depending on the roof of the off-taker, commercial systems can be roof-mounted or ground-mounted. Capital for larger scale commercial projects is generally more competitive than residential projects due to the higher returns for these projects. One developer who focused on larger scale projects sited that they had access to federally subsidized capital with rates less than 6% and terms up to 20 years for large-scale (>1MW) commercial projects but had difficulty finding demand for these types of projects in the county.

Commercial projects are more easily financed by PPAs than residential projects and commercial PPAs continue to be done across the state. Despite their relatively greater popularity when compared to the residential market, commercial PPAs are still much less common in Cuyahoga County and Ohio than in the national market, where they finance over 55% of all solar projects.²⁹ PPAs completed in Ohio today are usually done on a case-by-case basis that makes each one unique and complicated due to the amount

of work needed to make each project work in the current market. In an interview with one developer, they were able to list the handful of unique, commercial PPAs they had completed over the course of their career, all for projects larger than 500 kW in size. In Ohio, national developers like SunRun have also offered PPAs, but only to large partners they work with on the national scale like Walgreens, which installed solar on several of its big-box store locations.

CGC’s findings: Since the focus for commercial projects has historically been on the large-scale projects, the Green Bank could potentially fill a need in the market to support small-scale commercial projects in the sub-500 kW range that are not currently able to secure financing.

Commercially priced capital will not enable competitively priced PPAs for sub-500 kW projects in the current market. According to CGC’s modeling, this type of PPA structure would need to be funded with below market capital from either public or foundations dollars to make its electricity rates attractive to customers.

MARKET GAPS

CGC’s research and conversations identified the following market gaps preventing the growth of solar in Cuyahoga County. A Green Bank in the county should design its products to address one or some of these gaps, although it is unlikely that any single product will be able to address all of them.

- Currently, many solar projects, especially smaller-scale, residential projects, have high upfront costs or debt payments that are not immediately covered by energy savings. This deters customers from committing to solar and makes it more difficult for developers to sell projects in the market.

29 National Renewable Energy Laboratory. *Solar Lending Practices by Community and Regional Financial Institutions*. June 2018. <https://www.nrel.gov/docs/fy18osti/71753.pdf>

- The margins for current solar projects in the county are thin. Economies of scale make larger projects more cost-effective than smaller projects. Although larger, commercial projects closer to 1 MW are able to secure financing, medium to small projects struggle to find financing.
- There are a limited number of developers in the county and the active developers do not have in-house financial offerings for their projects. Because of this, it is important that any Green Bank solutions be able to effectively partner with these actors to bring the solution to the market. Designing a simple product that is able to be used by the current developers in the market should be an important goal for the Green Bank.
- Community solar is not permitted in First Energy Territory due to state legislation. In Cleveland Public Power (CPP) territory, where community solar is possible, it has so far been unable to offer competitive rates. This mirrors other parts of Ohio, where successful attempts to install community solar systems have resulted in higher electricity prices for end customers.
- Developers face difficulty reaching LMI markets due to the lack of financing available to LMI customers. Many LMI populations have low credit/FICO scores and are considered un-bankable by the traditional investment community. For example, 45% of consumers in the Cleveland-Elyria region with credit scores less than 660 had severely delinquent (90+ days overdue on payment) debt.³⁰ However, many of these populations stand the most to gain from installing clean energy upgrades to their properties and represent a large portion of the potential market for solar.

POTENTIAL SOLUTIONS

Given the market gaps identified above, CGC believes there are several potential solutions to offer to the solar market in Cuyahoga County.

- ➔ Financing for sub-500 kW PPAs. Because traditional lenders are willing to supply financing to PPA projects greater than 500 kW, the Green Bank could target small-scale (<500 kW) solar PPA projects which are not currently getting attention from the developers/financiers in the market. Financing projects in this subset of the market would allow the Green Bank to avoid competition with the private sector while enabling greater development of solar projects. Given the high upfront costs that were cited are a major barrier for solar customer adoption, a zero-dollar-down solution could be an important solution to encourage adoption. Third-party financing through PPAs or solar leases could allow for customers to choose solar without taking on more debt or spending money out of pocket.
- ➔ Incentives and market development to support residential solar. Since residential projects are unable to access PPAs in the current market, creating an incentive program to spur development is a potential solution that a Green Bank could offer. This is a model that has worked for other Green Banks but one that requires a substantial amount of grant capital to support, making it a difficult solution to implement. Further details on this solution are presented in an appendix to this report.
- ➔ Standardized financing solutions for local installers. Because developers in the market do not engage in-house, standardized financing, CGC recommends that a Green Bank design a standardized financial offering that can be offered through developer-partners who may or may not have existing in-house financing expertise.

30 Federal Reserve Bank of Philadelphia. Consumer Credit Explorer. Accessed October 2019. <https://www.philadelphiafed.org/eqfx/webstat/index>

- ➔ Dedicated financing for LMI solar. Given the lack of dedicated financing that targets clean energy projects for the LMI community, the green bank could potentially offer dedicated funding for those communities. This would allow for financing to reach historically underserved segments of the market and encourage a more equitable development of clean energy across the county.
- ➔ Dedicated financing for community solar in CPP service territory. Because that community solar is a

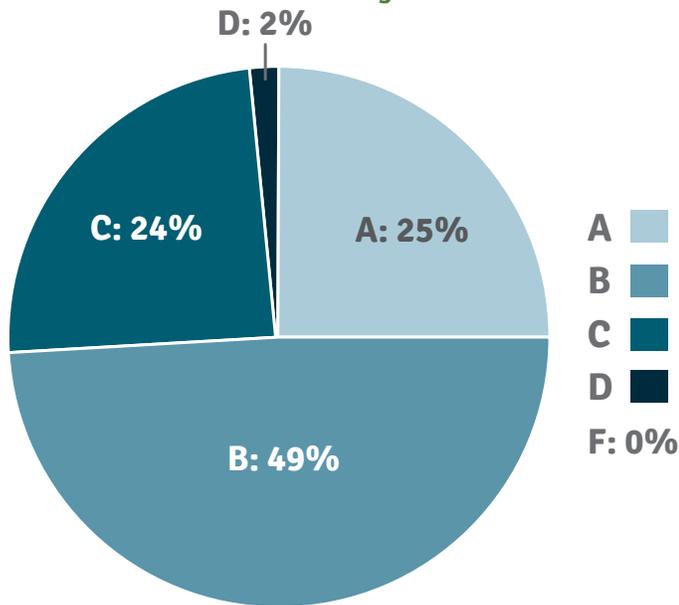
powerful tool to deliver the benefits of solar power to underserved markets, one potential solution that the Green Bank could develop is dedicated, low-cost financial support for community solar projects in the county. This would be done to improve the economics of community solar projects and enable more competitive electricity rates for end customers. All projects would need to be completed in CPP service territory where community solar is permitted.

Energy Efficiency Market Opportunity in Cuyahoga County

Cleveland’s building stock suggests a market that has a high potential for energy efficiency retrofits. Hit hard by the 2008 mortgage crisis, Cleveland’s real estate market left many structures in a state of vacancy or disrepair. The Western Reserve Land Conservancy surveyed 158,854 parcels of land in Cleveland in 2015 to determine their condition and status.³¹ In their 2018 update, the Land Conservancy noted that, of the buildings that were occupied, 27% of those

buildings were graded C or below (up from 23% in 2015). This indicates structures that “...need maintenance and repair. If properties requiring maintenance are not addressed in a timely manner, their continued deterioration could impact [the value of] adjoining properties”. This suggests that over a quarter of the structures in Cleveland could benefit from some kind of energy efficiency upgrade including insulation, windows and envelop sealing, or roof replacements.

Figure 9. Condition of Occupied Structures in Cleveland³²



Key:

- A: Excellent.** The structure is new, newly renovated or well maintained and cared for. No visible deterioration, historic detailing, unique.
- B: Good.** Though basically sound, the structure needs basic improvements, minor painting, weed removal and/or cleaning.
- C: Fair.** The structure shows cracks in brick or wood, crumbling concrete, cracked windows or stairs, and may need major painting.
- D: Deteriorated.** The structure shows major cracking of brick or wood, bricks or siding missing, broken or missing windows or open holes.
- F: Unsafe/hazard.** The house is open and a shell; inspectors could see straight through it. It might be ransacked.

31 Western Reserve Land Conservancy. Cleveland Neighborhoods by the Numbers: 2018 Update. <https://www.wrlandconservancy.org/clevelandpropertyinventory2018/>

32 Western Reserve Land Conservancy. Cleveland Neighborhoods by the Numbers: 2018 Update. <https://www.wrlandconservancy.org/clevelandpropertyinventory2018/>

Energy bills for commercial and industrial customers in the Cleveland area are the highest in the state. According to the Public Utilities Commission, holding constant for consumption, the energy bills for an average commercial customer in Cleveland are 45% higher than the average commercial customer in Cincinnati. For industrial customers, Cleveland's bills are, on average, 58% higher.³³ This relatively high cost per kWh of electricity consumed suggests that energy efficiency projects will be able to realize higher savings in the Cleveland area than in other parts of the state.

CGC's findings: Support for energy efficiency projects varies across the different market segments in Cuyahoga County. In order to support further development, a Green Bank could offer financing solutions that target underserved segments of the market or markets primed for greater activity. Supporting underserved markets can ensure that the benefits of clean energy access reach parts of the Cuyahoga County market that need it most but might not see development without dedicated support. Supporting markets primed for growth can maximize the impact of the Green Bank's capital and the number of projects that come online to help the county/city achieve its climate goals.

To inform a decision on which markets are best suited for Green Bank investment, CGC's findings of the programmatic support and current activity in each of the county's markets are presented below.

COMMERCIAL AND INDUSTRIAL MARKET

The commercial and industrial market is the most widely developed and programmatically supported in Cleveland. However, financing offerings are lack-

ing. According to their most recent Energy Efficiency plan, FirstEnergy offers roughly \$18 million per year in incentives to the commercial and industrial market.³⁴ These incentives are offered to consumers through equipment rebates and a per kWh incentive on electricity saved. First Energy's incentives have a significant impact on a commercial project's economics. For one developer, utility rebates paid for almost 30% of the project costs of a small commercial lighting retrofit. Given that HB6 would remove the state's Energy Efficiency Standards, there is the potential for these incentives to evaporate from the market in the coming years.

Funded by First Energy, COSE offers free energy audits to its members in order to identify the need for energy efficiency savings. Through this program COSE has conducted over 1,000 energy audits, identifying tens of millions of dollars in value through improvements including lighting, HVAC improvements and envelope sealing.

A nonprofit, the Cleveland 2030 District, works with building owners in downtown Cleveland and the University Circle area in order to help those properties reach their energy efficiency targets of 50% reduction in energy use by 2030. As Cleveland 2030 highlighted in its 2019 update, the District's members are currently on track to meet their energy reduction targets with energy use reductions averaging 24%.³⁵ Many of these members are motivated by the desire to reduce their carbon footprint as well as the economic potential of energy efficiency.

Financing energy efficiency projects through PACE has become a popular trend in the county. With over \$21 million of projects in the pipeline, PACE is an increasingly common tool for financing develop-

33 Ohio Public Utilities Commission. *Ohio Utility Rate Survey*. January 2019.

<https://www.puco.ohio.gov/industry-information/statistical-reports/ohio-utility-rate-survey/january/>

34 First Energy. *Energy Efficiency and Peak Demand Reduction Program Portfolio Plans (2017-2019)*. December 2017.

<https://dis.puc.state.oh.us/TiffToPDF/A1001001A17L21B55201F03232.pdf>

35 Cleveland 2030 District. *2018 Progress Report*.

https://www.2030districts.org/sites/default/files/atoms/files/2018_C2030D.annual_report_7.29.19.Final_.pdf

ment. While national PACE lenders like Greenworks and Petros are active in the county, small scale PACE projects are financed on a more local level. For example, the energy aggregator, NOPEC has a \$2 million loan program to finance smaller-scale PACE programs in the \$100,000-500,000 range. NOPEC offers a complementary program of unsecured loans for sub-\$100,000 energy efficiency projects in its membership. Through both of these programs, NOPEC has financed nearly 10 projects to date with several more in application. Through CGC's conversations with developers, adoption of PACE remained sporadic, with developers either not completing a single PACE project or using it as a common tool in most of their upcoming projects. This suggests that PACE still requires more awareness be built to better understand the opportunity of the program but that, once a developer becomes familiar with PACE, they will recognize it is applicable to many projects. One drawback to PACE in the county is the length of time necessary to secure project approval at the municipal level. Under the current process, a PACE project must complete three reviews by the municipal board before it can be approved. The length of this process, which can take months, has been a cause of frustration among customers. To quote one developer, "PACE takes longer than childbirth." This timeline, along with the lack of understanding of PACE mechanics among project developers, makes PACE financing a difficult fit for some projects.

Outside of PACE financing, many customers struggle to find loans for energy efficiency projects. Customers expressed difficulty securing loans from smaller and regional banks to complete energy efficiency projects. Several mentioned switching from their past bank to KeyBank in order to take advantage of the Key4Green program, which is one of the few in the market from a commercial bank.

Many commercial customers, particularly on the smaller side, must rely on self-financing for their energy efficiency projects due to their inability to secure a loan from a commercial bank, their existing debt caps, and/or their credit. Interviewed customers said that they took funds directly from their operating budget to secure funds for energy efficiency projects.

CGC's findings: With some of the highest energy bills in the state, industrial customers represent a potentially strong market for energy efficiency measures. In Cuyahoga County alone, there are 1,800 small manufacturers that employ less than 500 people each. These customers are often building tenants and find it difficult to plan long term. Developers cited difficulty convincing customers to pursue energy efficiency projects with paybacks longer than 2 years. Such a short payback window potentially excludes projects in a deeper retrofit that could enhance efficiency and savings if given more time to generate savings.

RESIDENTIAL MARKET

The residential market in Cuyahoga County is the least developed and most difficult to access. Residential energy efficiency has historically been a difficult to develop market segment because of the difficulty physically accessing and educating a widely diverse and distributed customer base combined with small project sizes and high transaction costs that diminish returns for developers and investors. Developers reported similar barriers in the Cuyahoga County market, preferring to target larger scale projects that can earn them bigger pay-offs for their time and money.

According to their most recent Energy Efficiency plan, FirstEnergy offers roughly \$12 million per year in incentives to the residential market.³⁶ As in

36 First Energy. *Energy Efficiency and Peak Demand Reduction Program Portfolio Plans (2017-2019)*. December 2017. <https://dis.puc.state.oh.us/TiffToPdf/A1001001A17L21B55201F03232.pdf>

the commercial market, these incentives are offered to consumers through equipment rebates and a per kWh incentive on electricity saved.

Other incentives are paid into the market through federal Home Energy Assistance Program and the Home Weatherization Assistance Program, which both provide support for LMI energy efficiency upgrades and bill payment. This program is administered by the Department of Development and, in 2018, the entire state of Ohio received \$154 million from the federal government for these two programs. Despite these incentives, energy efficiency developers mentioned LMI energy efficiency projects in Cuyahoga County as an underserved market.

New construction multifamily buildings, particularly in the rapidly developing urban core, are completing energy efficiency projects to take advantage of the city's green buildings tax abatement. Multiple housing developers mentioned that 100% of their new construction builds to LEED or Enterprise Green Cities standards in order to take advantage of the city's tax abatement, suggesting that the incentive is currently effective. These market rate housing developers are also using PACE financing as a readily available source of capital for their projects and did not cite access to capital as a barrier for further development. These parties are motivated by consumer demand and often build green as an amenity to attract customers.

Working to expand programs to the residential market, the city and county continue to experiment with potential solutions to access this hard-to-reach market.

First, using publicly available utility data from the PUCO, the city of Cleveland implemented a program called Energy\$aver, which created profiles of residential customers in the county and targeted the most

likely beneficiaries of energy efficiency savings.³⁷ The presence of these profiles could be an invaluable tool to helping the Green Bank find a pipeline in the residential market.

Second, Cleveland has been recognized as the first city to be a Green Lease Leader, experimenting with green lease structures to overcome the tenant-landlord split incentive that is often cited as a major barrier to installing energy efficiency upgrades.³⁸ If the practice were to become more common, a dedicated financing source through the Green Bank could be a potential to move energy efficiency in the residential market.

Lastly, on-bill financing, often seen as the 'holy grail' of energy efficiency finance for its ability to offer residential customers a simple financing mechanism as part of their monthly energy bills, can be offered by energy generators in the Ohio market. Engie and First Energy both run versions of on-bill financing programs, although neither have had significant success in the market.

CGC's findings: Despite a variety of attempts to support the residential energy efficiency market, the county has not seen a "silver bullet" for increasing development. The availability of programs like on-bill financing, however, suggests a potential solution that other Green Banks have used to successfully develop more residential projects. To see that same success in Cuyahoga County, a Green Bank could explore the opportunity of optimizing existing efforts to support the market through on-bill financing or data-based opportunity identification to ensure those programs achieve the desired impact.

37 Cleveland Energy Saver. Accessed September 2019. <http://clevelandenergysaver.com/>

38 Institute for Market Transformation. *Green Lease Leaders: Green Leasing Spurs Efficiency Improvements in Cleveland Businesses and City Buildings*. July 2019. <https://www.imt.org/wp-content/uploads/2019/07/Green-Lease-Leaders-Case-Study-City-of-Cleveland-and-MAN-Holdings-LLC.pdf>

PUBLIC SECTOR/NONPROFIT MARKET

The public/nonprofit sector has seen patchy development of energy efficiency, largely influenced by the actions of local government and their budget priorities.

The ESCO model, where a company signs a contract with a customer to develop their energy efficiency opportunities while taking a piece of the savings as a profit, has been very successful at developing energy efficiency projects in some parts of the state, particularly in regard to Ohio's schools. In 2007, the state's Facilities Construction Commission adopted a LEED standard for all schools across the state. As a result, Ohio now has 342 LEED certified schools, more than any other state in the US.³⁹ Since 2009, ESCOs have done \$690 million worth of projects with public buildings in Ohio.⁴⁰ In Cuyahoga County, larger government, nonprofit, and university customers have also taken advantage of the ESCO model to finance their energy efficiency projects.

Individual municipalities are responsible for maintaining and upgrading their municipal building stock. Most of these projects are paid for through the city's deferred maintenance budget, although some are financed through municipal bonds. For example, the City of Cleveland Heights issued a general obligation bond in 2017 for building improvements with a coupon rate of 3% and a rating of AA- from Standard & Poor's.⁴¹ In Cuyahoga County, there are 57 ring cities, each with an independent government.⁴² (See *Figure 10, next page.*)

In 2012, funding from the American Recovery and Reinvestment Act (ARRA) was used to audit municipal buildings in each of the ring cities and identify their potential for energy efficiency savings. Despite the opportunities identified, many of these ring cities did not complete an energy retrofit. Many of these cities face tight budgets and have specific development goals. As a result, energy efficiency is often deprioritized in favor of other activities.

Non-profits struggle to finance energy efficiency projects. Many face cash constraints and difficulty securing board approval for loans. Of the nonprofits interviewed for this study, discrete capital-raises were surfaced as the most effective tool for financing energy efficiency projects. One nonprofit mentioned that it took them seven years to raise capital for a boiler replacement, highlighting the length of time and difficulty raising capital for energy efficiency projects.

CGC's findings: Despite the success of the ESCO model to allow public sector clients to overcome budget constraints and install more energy efficiency projects, some of the interviewed parties expressed frustration that the promised savings were not realized to the extent they were told at their projects' inception. This has created a skepticism among public sector and nonprofit interviewees that future projects would be a prudent investment. This suggests a Green Bank would do well to develop trust in the market and partner with proven developers that can guarantee savings to customers before pursuing investment in similar projects.

39 Ohio Facilities Construction Commission. *Green Schools*. Updated November 2018.

<https://ofcc.ohio.gov/Services-Programs/Energy-Services/Green-Schools>

40 Ohio Facilities Construction Commission. *What's New with Energy Conservation*. 2017.

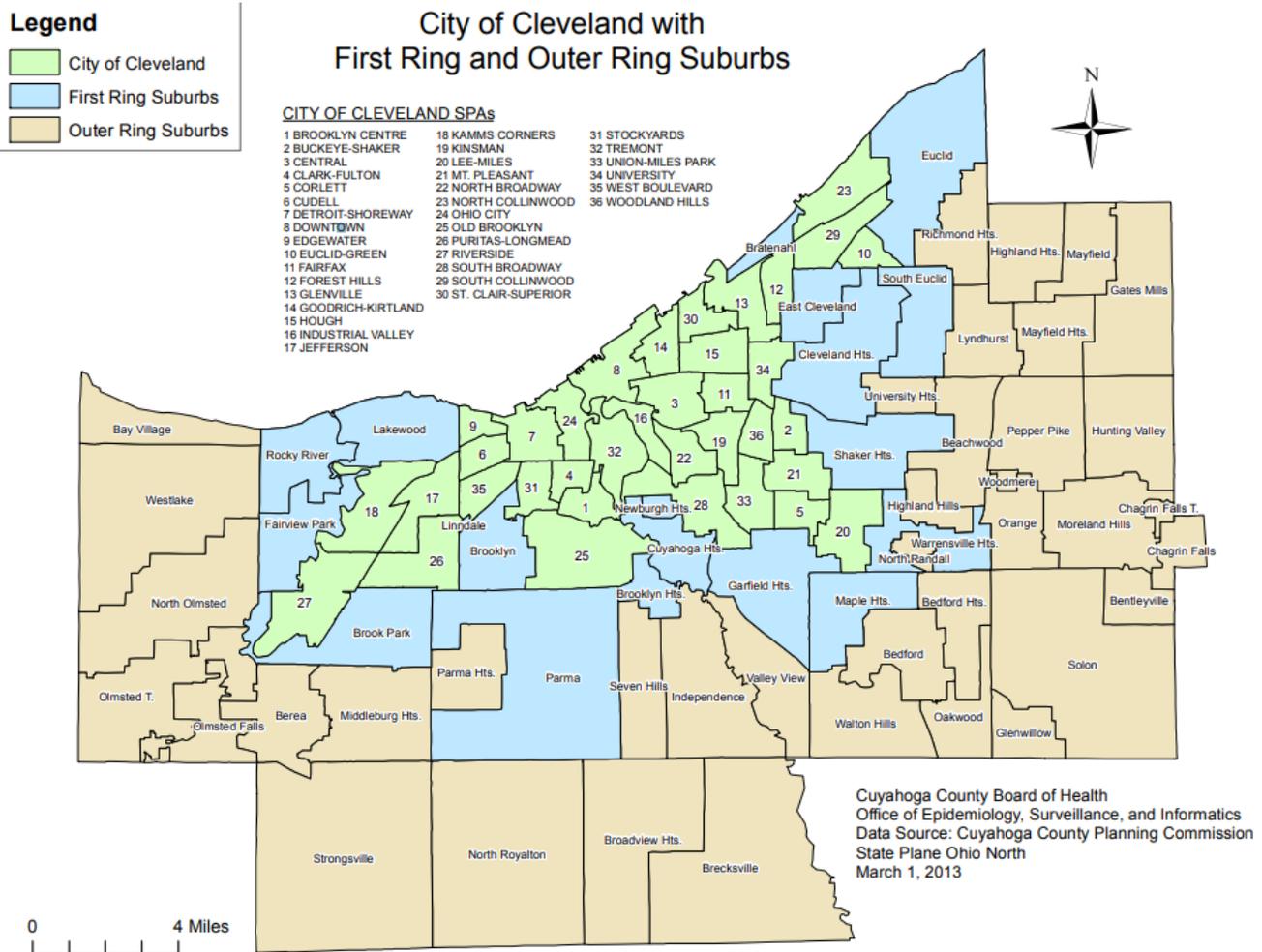
<https://ofcc.ohio.gov/Portals/0/Documents/News-Events/Training/BASA-2017-Energy-Presentation.pdf>

41 <https://emma.msrb.org/IssueView/Details/ER381077>

42 Cuyahoga County Planning Commission. *State Plane Ohio North*. March 1, 2013.

http://www.ccbh.net/wp-content/uploads/2016/09/Section-4_Appendix-I.pdf

Figure 10. City of Cleveland and the First Ring and Outer Suburbs



MARKET GAPS

CGC’s research and conversations identified the following market gaps preventing the development of energy efficiency projects in Cuyahoga County. This list is not comprehensive, but instead lists the most pressing gaps that were present in CGC’s discussions with market participants. A Green Bank in the county focused on energy efficiency could design its products to address one or some of these gaps, although it is unlikely that any single product will be able to address all of them.

- In the residential market, developers identified small project size, high transaction costs, and difficulty marketing to consumers as barriers to

completing more projects. Due to these factors, developers are unable to realize the profits necessary to engage in residential efficiency projects. On the other side of the equation, residential consumers highlighted a lack of knowledge of potential savings and a lack of available capital to pay for projects as barriers for them.

- In the commercial and industrial market, developers identified project payback as the largest market gap preventing more projects from getting across the line. Due to various influencing factors, like a customer’s tenancy instead of ownership of their building, many customers are unwilling to complete energy efficiency projects with paybacks longer than 2 years.

- Although PACE is a powerful tool for financing energy efficiency projects, there is a gap in available finance for projects in the <\$500,000 range. Although NOPEC offers loan programs for these sized projects within their customer base, there is a portion of the market that lies outside of the criteria that NOPEC and the national PACE lenders will finance.
- In the public sector market, there is a lack of coordinated financing among the ring city suburbs to address their energy efficiency needs in a coordinated fashion. This disaggregated approach to energy efficiency represents a gap and an opportunity to streamline and pool opportunities for financing.

POTENTIAL SOLUTIONS

Given the market gaps identified above, CGC believes there are several potential solutions to offer to the energy efficiency market in Cuyahoga County.

- ➔ On-bill financing for residential energy efficiency upgrades. In order to address the lack of development in the residential energy efficiency market, one potential option the Green Bank could offer is dedicated debt for an on-bill financing program. This solution would offer a simple financing mechanism for residential customers, who may not have access to upfront capital from a lender or savings. This solution would require the Green Bank to partner with an electricity provider in order to access a customer's utility bills and market the product through their membership base.
- ➔ Flexible financing for small-scale commercial and industrial customers. In order to increase the development of energy efficiency projects among small scale commercial and industrial clients with sensitivity to long term paybacks, the Green Bank could potentially use its lower return requirements and longer term debt to improve the project economics of energy efficiency projects for those clients so

that they are more willing to complete energy efficiency projects. With cheaper capital, the project payback period would be lessened and therefore more likely to be agreeable to customers on the fence about energy efficiency.

- ➔ Specialized finance for public sector projects. Through its conversations with public sector actors in the market, CGC identified a number of actors in need of more capital to develop energy efficiency projects. This solution would be a dedicated pool of flexible capital for individual members of the public sector needing greater capital reserves for energy efficiency projects. This solution would require the Green Bank to partner closely with one or more public sector actors to develop tailored financing.
- ➔ Aggregation of municipal energy efficiency opportunities. To address the lack of coordinated financing among municipalities, the Green Bank could serve as an aggregator of municipal projects, working with the county to issue high-credit bonds for securitized projects to pass savings on to smaller municipalities. Currently, the county issues bonds with coupon rates between 1.8-4% with a AA rating from Standard & Poor's.⁴³ Given the lack of priority given to energy efficiency projects to date, a centralized pool of capital could serve to motivate municipalities to develop more projects. For more information on this potential solution, see Appendix 3.

Many of these solutions involve demand generation as the primary function. This activity can consume a large amount of time and resources before payback on investment are seen. Therefore, given the longer timeline and greater resource requirement for the energy efficiency solutions identified, these solutions may be better suited for a more mature Green Bank that has established an operating model and stable source of revenue.

43 Electronic Municipal Market Access. Cuyahoga County, Ohio. Accessed September, 2019. <https://emma.msrb.org/>

Recommended First Financing Solution

When determining the first solution for a potential Green Bank, CGC and the Green Bank advisory committee wanted to find a solution that would 1) earn sufficient returns to pay for its investment 2) maximize GHG reductions 3) offer a new product to the market that would be additive to the current financial landscape without competing with the private sector and 4) save money for end customers. With those goals in mind, CGC recommends that a Green Bank invest first in small-scale commercial solar projects financed by a power purchase agreement. This financial solution could achieve all of the goals set forth by the advisory committee and increase renewable energy deployment in the county for a number of reasons.

- Because traditional lenders are already willing to supply financing to PPA projects greater than 500 KW, the Green Bank should target small-scale (<500 kW) solar PPA projects which are not currently getting attention from the developers/financiers in the market. Through this role, the Green Bank can help those projects on the border of being financeable to secure capital without competing for deals from current lenders.
- Because upfront costs are a major barrier to customer adoption of solar, a zero-dollar-down solution will be important to encourage adoption. Third-party financing through PPAs will allow for customers to choose solar without taking on more debt or spending their own money.
- Because it will have access to attractive, Green Bank debt, these small-scale commercial PPAs will be able to offer customers below-market power prices that will incentivize adoption. These energy cost savings will allow customers to save money by switching to solar power and empower installers to

more effectively sell solar projects to customers in the market.

- Because developers in the market do not use in-house, standardized financing, CGC recommends that a Green Bank design its PPA financing to be simple for developers/installers to utilize and standardized across the market. If the Green Bank were to pursue this model, the PPA would be a standard financial offering that developers could use without any in-house financing expertise and bring directly to customers as part of their marketing.

To offer this solution to the Cuyahoga County market, a Green Bank would develop partnerships with developers and capital providers to crowd in investment from a variety of different sources including debt, project equity, and tax equity. Debt would likely come from local capital providers and sit at the Green Bank level.

In Connecticut, the Green Bank successfully worked with local banks and foundations to create a syndicate for debt investment and formed a relationship with a national tax equity provider who was willing to invest at scale. The Green Bank then offered a PPA product through developers to the state's solar market that allowed for \$43 million of investment in the state's solar industry.⁴⁴ A Green Bank in Cuyahoga County could take a similar approach by syndicating debt and then securing tax equity from a local or national provider. Partnering with developers to supply project equity would round out the capital stack and could be sourced from either local or national developers.

There is a strong potential pipeline for small-scale solar projects in the county. Data taken from NASA and the Cuyahoga County GIS Office suggest that there are roughly 8,600 buildings in the county with

44 Yale Center for Business and the Environment. *CT Solar Lease 2 Case Study*. February 2018. <https://cbey.yale.edu/research/ct-solar-lease-2>

rooftops sized 10,000-60,000 square feet, the size needed for a 100-500 kW solar installation.⁴⁵ Given these numbers, achieving market penetration of even a few percent through a financing solution that supports small-scale solar PPAs would result in a significant increase in the amount of solar capacity. When interviewed about their potential to develop further projects if they could access this type of financing solution, installers quoted that they believed they would be able to install multiple megawatts of additional capacity per year, confirming that they believe there is large potential for small-scale solar development in the current market waiting to be unlocked.

ESTIMATED IMPACT

If implemented in Cuyahoga County, CGC estimates that this solution would double the county's installed solar capacity from ~14MW to over 28 MW, reduce greenhouse gas emissions by 656,450 metric tons of CO₂ (the equivalent of taking 140,000 passenger vehicles off the road or planting 11 million seedlings),⁴⁶ and leverage \$24-30 million in overall investment into clean energy projects in the county. Assuming similar job creation to the national solar industry and local Green Banks of 13-15 jobs per \$1 million invested, this investment could potentially create nearly 450 jobs in Cuyahoga County.⁴⁷

These estimates are based on CGC modeling, which includes an assumption that a Green Bank could potentially invest over \$13 million into small-scale solar PPAs over a five-year period. Examples from other counties suggest that similar mobilization of capital is possible. For example, the Montgomery County Green Bank in Maryland operates on a similar scale with \$14 million of investment capital.

MARKETING FOR SCALE

Achieving the above impact in Cuyahoga County will require aggressive marketing on behalf of a Green Bank. The intimal product is designed to be marketed through local installers, who have pre-existing relationships with potential customers. Leveraging this network of previous contacts, installers using the Green Bank's capital would be able to target customers who were/are interested in solar but were/are unable to complete projects because of their economics for the first tranche of projects. Separately and on an ongoing basis, a Green Bank would engage in high level marketing and education campaigns to raise awareness in market about the availability of its products and the value of clean energy development in the county. As new products to support other markets are developed, this type of marketing and education would become increasingly important for the Green Bank to source projects at the desired scale.

45 Cuyahoga County GIS Department. 2017

46 Environmental Protection Agency. EPA Greenhouse Gas Equivalencies Calculator. <https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator>

47 Connecticut Green Bank Comprehensive Annual Financial Report 2019. <https://ctgreenbank.com/wp-content/uploads/2019/11/2019-Green-Bank-CAFR-FINAL-10-31-19.pdf>

Conclusion and Next Steps

The purpose of this report is to present the potential financial solutions a Green Bank could offer to increase the development of clean energy projects in Cuyahoga County. By employing one or several of these solutions, a new Green Bank could fill existing market gaps to expand access to financing for solar and energy efficiency projects.

With this analysis, CGC concludes that offering debt to small-scale commercial solar PPA projects should be the first solution a Green Bank in Cuyahoga County brings to the market. Once a Green Bank is established, more varied solutions could be explored and offered to expand the Green Bank's impact to other markets including energy efficiency, resiliency, and clean transportation.

After identifying significant potential for a Green Bank to make an impact in Cuyahoga County, CGC will continue working closely with its partners to develop the fund. In this role, CGC will perform

work that includes developing a detailed business plan, meeting with a variety of foundation and public sector funders to raise investment and operating capital, and ultimately incorporating and staffing the Green Bank. CGC would welcome conversations with potential partners interested in deploying capital through the Green Bank.

The effort to establish a Green Bank builds on Cuyahoga County's track record of sustainability leadership. By implementing the recommendations in this report and deploying capital through a Green Bank, the county can serve as a model and reach levels of achievement that other municipalities can follow. At the same time, the proposal to establish a National Climate Bank has shown that federal policymakers are taking note of local successes. Creating a county Green Bank can establish Cuyahoga County as both a local and national leader in the fight against climate change.

Appendix

Appendix 1. Green Bank Advisory Committee

| Green Bank Advisory Committee | |
|-------------------------------|--------------------|
| ORGANIZATION | NAME |
| Advanced Energy District | Jennifer Kuzma |
| City of Cleveland | Anand Natarajan |
| City of Cleveland | Matthew Gray |
| Cleveland Foundation | Stephen Love |
| Cleveland State University | Andrew Thomas |
| Cleveland State University | Mark Henning |
| Cuyahoga County | Michael Towarnicky |
| Cuyahoga County | Mike Foley |
| Greater Cleveland Partnership | Nicole Stika |
| George Gund Foundation | John Mitterholzer |
| Key Bank | Andrew Watterson |
| University of Akron | Mario Mastrandrea |

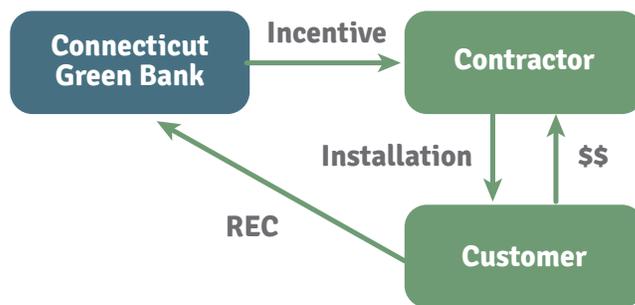
Appendix 2. Performance-Based Incentive for Expanding Solar in the Residential Sector

Currently, PPAs are not being done in the residential solar market in Cuyahoga County. During interviews with CGC, a number of developers mentioned the desire for a performance-based incentive to improve the economics of solar for the residential market. If it is able to secure the appropriate capital, the Green Bank in Cuyahoga County could duplicate the success of other Green Banks in using a performance based incentive to enable PPA financing for residential solar.

The most relevant model for a performance-based incentive is the Connecticut Green Bank's incentive for the state's residential solar market, called the Residential Solar Investment Program (RSIP). Between 2012 and 2018, the RSIP used a little over 115 million public dollars to drive over 750 million dollars of total investment into the state's solar market, achieving a public-to-private leverage ratio of 7.5:1 and helping install over 215 MW of residential solar capacity.⁴⁸ The RSIP improves the economics of residential solar by offering a cash incentive to developers in exchange for the renewable energy credits from their project.

48 Connecticut Green Bank. *2018 Comprehensive Annual Financial Report*.
https://www.ctgreenbank.com/wp-content/uploads/2018/10/Green-Bank-CAFR_2018.pdf

Figure 11. Residential Solar Investment Program Cash Flows and Structure⁴⁹



This structure allows the Green Bank to sell the RECs from the projects it helps develop and earn revenue. As part of the legislation that established the state’s REC system, the states’ two investor-owned utilities are required to buy the RECs generated from these Green Bank funded projects at a fixed price over 15 years. Once the Green Bank has helped install over 300 MW of residential solar projects in the state, the utilities will not be required to purchase RECs from more projects unless the legislation is amended, like it was in 2013 to raise the cap from 30 MW to 300 MW. The stability of utilities purchasing Green Bank

RECs meant that the Green Bank was able to securitize the futures of its REC payments in 2018 through a first-of-kind transaction that gave the Green Bank \$38.6 million in upfront capital that it needed to continue developing the RSIP program.⁵⁰

The incentive was structured in such a way that it decreased over time, in line with the program’s goal of reducing the market’s dependence on rebates and moving it towards innovative, low-cost financing and sustained orderly development. Between 2012 and 2018, the incentive for residential solar decreased 850%.

Figure 12. RSIP Subsidy by Step and Incentive Type

| RSIP Subsidy by Step | Start Date | EPBB (\$/W) | | | PBI (\$/kW) | | LMI (\$/kWh) | |
|----------------------|-------------------------------|-------------|------------|------------------|-------------|------------------|--------------|------------------|
| | | ≤ 5 kW | 5 to 10 kW | > 10 kW, ≤ 20 kW | ≤ 10 kW | > 10 kW, ≤ 20 kW | ≤ 10 kW | > 10 kW, ≤ 20 kW |
| Step 1 | 3/2/2012 | \$2.450 | \$1.250 | \$0.000 | \$0.300 | \$0.000 | N/A | N/A |
| Step 2 | 5/8/2012 | \$2.275 | \$1.075 | \$0.000 | \$0.300 | \$0.000 | N/A | N/A |
| Step 3 | 1/4/2013 EPBB 4/1/2013 PBI | \$1.750 | \$0.550 | \$0.000 | \$0.225 | \$0.000 | N/A | N/A |
| Step 4 | 1/6/2014 | \$1.250 | \$0.750 | \$0.000 | \$0.180 | \$0.000 | N/A | N/A |
| Step 5 | 9/1/2014 | \$0.800 | | \$0.400 | \$0.125 | \$0.000 | N/A | N/A |
| Step 6 | 1/1/2015 | \$0.675 | | \$0.400 | \$0.080 | \$0.000 | N/A | N/A |
| Step 7 | 4/11/2015 | \$0.540 | | \$0.400 | \$0.064 | \$0.000 | N/A | N/A |
| Step 8 | 8/8/2015 | \$0.540 | | \$0.400 | \$0.054 | | \$0.110 | \$0.055 |
| Step 9 | 2/1/2016 | \$0.513 | | \$0.400 | \$0.046 | | \$0.110 | \$0.055 |
| Step 10 | 9/1/2016 | \$0.487 | | \$0.400 | \$0.039 | | \$0.110 | \$0.055 |
| Step 11 | 8/1/2017 | \$0.487 | | \$0.400 | \$0.300 | | \$0.110 | \$0.055 |
| Step 12 | 1/15/2018 | \$0.463 | | \$0.400 | \$0.035 | | \$0.110 | \$0.055 |
| Step 13 | 6/1/2018 | \$0.463 | | \$0.400 | \$0.035 | | \$0.090 | \$0.045 |

49 Connecticut Green Bank. 2018 Comprehensive Annual Financial Report. https://www.ctgreenbank.com/wp-content/uploads/2018/10/Green-Bank-CAFR_2018.pdf

50 Connecticut Green Bank. Press Release: Connecticut Green Bank sells \$38.6 million in monetized solar home renewable energy credits (SHRECs). April, 2019. <https://www.ctgreenbank.com/cgb-sells-38m-in-shreecs/>

If Cuyahoga County were to attempt to replicate this type of program, it would require 1) upfront public capital to begin payments and 2) a potential buyer for RECs from the program.

For example, if the county were to offer an incentive of \$.03/kWh for 15 years and set a target of 30 MW installed capacity (over double the total solar capacity installed in the county to date), CGC's modeling indicates that the program would cost the Green Bank approximately \$1 million/year for 15 years, or \$15.1 million total. By offering the PBI in exchange for the REC revenues of each project, the Green Bank secures a potential way to recoup these costs. Depending on the ability of the Green Bank to sell its RECs, it can either make or lose money on the PBI.

The REC market in Ohio is not as competitive as Connecticut due to oversupply and has been a historically volatile market for prices. Most solar projects currently sell to REC brokers, who take as much as a 25% cut of the overall price. Even when the market

was at a relative high such as in the summer of 2019, the price of RECs was \$20-25/credit, meaning projects realize as little as \$15 per MWh of production (1 REC), or \$.015/kWh. To contrast, the Connecticut Green Bank has a stable buyer in the investor owned utilities required by law to buy and competitive prices. For example, In 2017, the Connecticut Green Bank sold RECs to the utilities for \$50/credit and in 2018, the Green Bank sold RECs for \$49/credit.⁵¹ Finding a buyer for RECs from the Cuyahoga County Green Bank would be an important part of realizing revenue from this program. If the Cuyahoga County Green Bank could reliably sell its RECs for \$20/credit, the program could realize over \$10 million in revenue from REC sales, reducing the overall cost of the program significantly. If the Green Bank were able to sell its RECs at 30/credit, it would break even. If the Ohio REC market were to recover to pre-2014 levels and the Green Bank were able to sell its RECs at \$70/credit, it would make a profit of \$20 million dollars over 15 years.

Appendix 3. Rhode Island Infrastructure Bank

Created in 2015, the Rhode Island Infrastructure Bank (RIIB) was created from the redevelopment of the state's Clean Water Financing Authority (CWFA) to serve as a Green Bank. RIIB activities are funded through a combination of Regional Greenhouse Gas Initiative (RGGI) proceeds, system benefit charges, remaining federal American Reinvestment and Recovery Act (ARRA) funds, and a small amount of re-directed operating funds. The RIIB also has the authority to issue state qualified clean energy bonds (QECBs). In sum, these funds are intended to serve as an equity portion of a broader bond issuance and support a larger agency operation. RIIB, like the CWFA before it, is a quasi-public agency with a

board of directors, where the chairman is appointed by the Governor.

As part of its initiative to develop more energy efficiency projects in the state, RIIB created its Efficient Buildings Fund (EBF) to finance municipal energy efficiency projects. The Efficient Buildings Fund provides below-market interest rate loans to municipalities, school districts and quasi-state entities to invest in clean energy projects.

In 2016, RIIB completed the first round of EBF funding, which financed 17 municipal projects across 6 towns with \$17.2 million of capital. In 2017 and 2018, RIIB completed another two rounds of funding

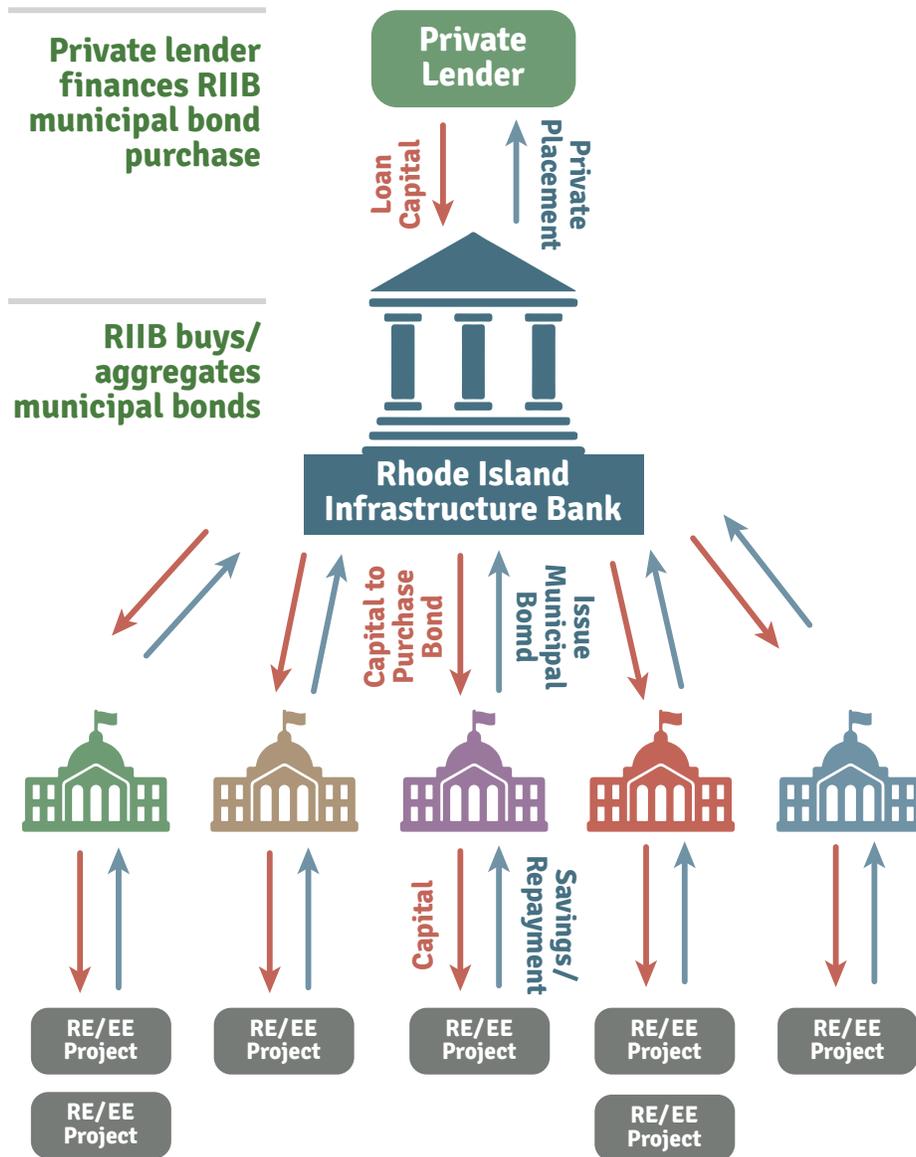
51 Connecticut Green Bank. *PBI Payment Process*. July 2016.
<https://www.ctgreenbank.com/wp-content/uploads/2017/11/PBI-Payment-Process-070116.pdf>

for \$14 million worth of projects in another 6 towns. All projects are cash flow positive and will save millions in energy costs for citizens.

After providing the capital to municipalities, RIIB then took the aggregated projects and issued a Green Bond backed by the projects' cash flows. In 2018, RIIB's inaugural \$18.3 million EBF Green Bond was given a top rating of "AA" by Standard and Poor's (S&P), a higher rating than any of the municipalities could secure on their own.

By mobilizing long-term private capital in the bond market, the Bank was able to combine the limited EBF program capital to meet municipal demand for clean energy projects. Overall, the Bank has provided \$31 million in loans to twelve municipalities across the State. By accessing the bond market, the Bank was able to finance more projects today than would be possible with the limited amount of capital in the program.

Figure 13. RIIB EBF Bond Structure⁵²



52 Yale Center for Business and the Environment. *Case Study: Rhode Island Infrastructure Bank's Efficient Buildings Fund*. June 2017. <https://cbey.yale.edu/research/the-rhode-island-infrastructure-banks-efficient-buildings-fund>

Appendix 4. Market Interviews

| Organization | Name | Organization | Name |
|---|------------------------|----------------------------------|---------------------|
| Bricker and Eckler | Glenn Krasen | Initiative Consulting | Tracy Sabetta |
| Midtown Corridor | Max Upton | McDonald Hopkins | Michael (Mike) Wise |
| Bricker and Eckler | John Caleb Bell | Synapses Consulting | Asa Hopkins |
| ACEE | Tim Janos | Forbes&Fields LLC | Darrell Fields |
| Brewer-Garrett | Tadgh O’Crowley | Go Sustainable Energy, LLC | John A Seryak, PE |
| MAGNET | Matthew Fieldman | Go Sustainable Energy, LLC | John Seryak |
| Better Together | Rob Martens | Western Reserve Land Conservancy | Jim Rokakis |
| Yellowlite | Cody Cooper | Go Sustainable Energy, LLC | Kevin Fisher |
| Yellowlite | Azam Kazmi | Go Sustainable Energy, LLC | Charles Schreier |
| Cuyahoga County | Mike Foley | CMHA | Tina Brake |
| Enerlogics | Scott Ameduri | CMHA | Rachel Loewy |
| Greater Cleveland Partnership | Nicole Stika | CMHA | Larry Davis |
| Third Sun | Geoff Greenfield | Darrel Fields and Associates | Darrell Fields |
| Advanced Energy District | Jennifer Kuzma | Emerald Built Environments | Laura Steinbrink |
| City of Cleveland | Matt Gray | Mann Holdings | Amanda Mayan |
| City of Cleveland | Anand Natarajan | NOPEC | Norma Fox-Horowitz |
| Cleveland Foundation | Stephen Love | MAGNET | Matthew Fieldman |
| Cleveland State University | Andrew R Thomas | Shaker Heights | Laura Engleheart |
| George Gund Foundation | John Mitterholtzer | Long Haul Capital | Patrick Doherty |
| KeyBank | Andrew Watterson | Korman Jackson Krantz | Stephanie Mercado |
| KeyBank | Jamie Feltes | Cuyahoga Community College | David November |
| The Nature Conservancy | Leo Almeida | Cuyahoga Community College | Shehadah Abdelkarim |
| Denison University | Jeremy King | Ronald McDonald House | Mark Destino |
| Cuyahoga County Department of Development | Mike May | Gateway Group | Tom Chema |
| Ohio Treasury | James Bernholtz | Care Alliance | Terrie Carter |
| Cleveland Neighborhood Progress | Dione Alexander | US Communications | Pat Connolle |
| Cleveland Neighborhood Progress | Linda Warren | Cleveland Institute of Music | Rick Hutchinson |
| ECDI | Danielle Sydnor | MRN | Joe DelRe |
| Ohio Environmental Council | Heather Taylore-Miesle | Cleveland State University | Jennifer McMillin |
| Ohio Environmental Council | Miranda Leppla | United Church of Christ | Brooks Berndt |
| EDF Renewables | Ian Schonwald | Parts Pro Automotive | Laura McPhee |
| Enterprise Community Partners | Elizabeth Richards | The Vallejo Company | Katie Yaroshak |

| Organization | Name | Organization | Name |
|--------------------------------|-----------------|--------------------------------|--------------------|
| Solar United Neighbors of Ohio | Autumn Long | Trinity Cathedral | Corinne Wallner |
| Solar United Neighbors of Ohio | Tristan Rader | City of Cleveland | Dan Kennedy |
| Cleveland 2030 | Cynthia Cicigoi | Calfee Halter & Griswold | Ron Stupka |
| Cleveland Development Advisers | Steven A Luca | Greater Cleveland Partnership | Debra Janik |
| Cleveland Development Advisers | Jessica Coffey | CHN Housing Partners | Kate Monter-Durban |
| Pearl Wind and Pearl Lighting | Jon Kaplan | North Coast Credit Union | Brian Boyko |
| Enterprise Community Partners | Mark McDermott | Cuyahoga Land Bank | Gus Frangos |
| KeyBank | Brian Deponte | Grady Associates | Francis Grady |
| Prairie Wind Group | Cliff Wood | Greater Cleveland Partnership | Chris Urban |
| Dovetail Solar | Al Franz | Greater Cleveland Partnership | Sante Ghetti |
| Environmental Defense Fund | Dick Munson | CHN Housing Partners | Kevin Nowak |
| Environmental Defense Fund | Jake Hiller | Cleveland heights | Tanisha Briley |
| New Resource Solutions | Marc Palmer | Cleveland Development Advisers | Yvette Ittu |

