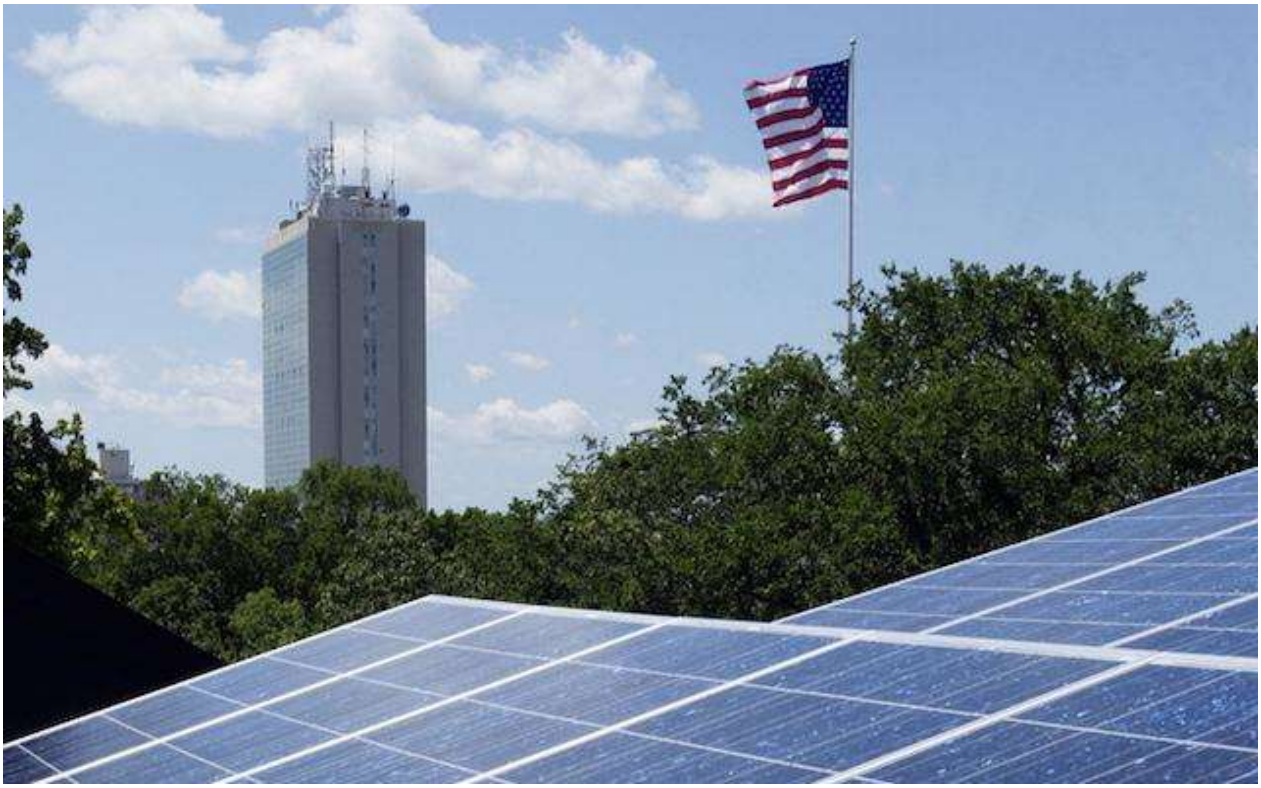
Accelerating Solar Development on Michigan Brownfields:
Challenges and pathways forward

Brian Schaap, Claire Dodinval, Kseniya Husak, Genevieve Sertic
Faculty Advisor: Sarah Mills
Prepared for the Michigan Land Bank Authority
Ann Arbor, MI



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Michigan's renewable portfolio standard requiring that 15 percent of retail electricity sales come from renewable energy sources by 2021 motivates an exploration of ways in which Michigan might best use its resources to achieve its renewable energy targets. Brownfield sites owned by the Michigan Land Bank are plentiful state-owned resources that have great potential to be used as solar development sites. However, several challenges exist that hinder this seemingly evident solution. This report primarily draws upon knowledge gained via interviews with a variety of stakeholders, aimed at both defining these barriers and proposing avenues forward.

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Executive Summary

The state of Michigan has set a 15 percent renewable energy electricity target for 2021, and the state's largest utilities—Consumers Energy and DTE—are moving forward with ambitious plans to expand their solar energy production. These utilities are seeking suitable site locations to host their solar arrays, and are coming to recognize the potential environmental benefits of siting solar production on brownfields rather than greenfields. At the same time, the State of Michigan Land Bank has within its possession thousands of abandoned or foreclosed properties—many of them contaminated brownfields—which it aims to put back to productive use. However, developments on brownfields tend to entail enhanced risk and cost, deterring many would-be developers. The benefits of utilizing brownfields for solar energy production seem clear, but experts perceive a host of challenges standing in the way. This report aims to clarify these perceived challenges, and outline potential solutions so that the tremendous environmental and economic benefits of solar development on brownfields can be realized.

The findings of this report are based primarily on key informant interviews conducted with a wide range of stakeholders with deep knowledge of brownfields, the electricity sector, and solar energy development in Michigan. Through discussions with stakeholders and research into existing brownfield solar project successes and challenges, we uncovered several key findings. Significant hurdles exist for most brownfield solar projects that the Land Bank might pursue under current economic and policy conditions. Solar developers see clear advantages in siting on greenfields rather than brownfields for numerous reasons, including factors such as the risks of liability, increased costs for development, utility control and resistance, difficulties in identifying suitable sites, and potential community resistance. However, solutions to these problems are possible, and could include: clarifying the liability regime and streamlining the process for avoiding retroactive and future liability; partnering strategically with utilities; bolstering economic incentives to make brownfields more cost-competitive with greenfields; centralizing information on brownfield site characteristics and available state resources; and identifying and engaging with local communities to win acceptance for solar developments on brownfields. Furthermore, certain brownfield site characteristics make some locations more financially viable than others, such as large plots of land with already existing infrastructure and grid interconnections.

If siting solar developments on brownfields is treated as more than a purely economic calculation, and is given the necessary incentives to level the playing field with the advantages currently held by greenfields, then brownfield solar projects have potentially great appeal. The community can benefit from making use of a blighted property and from receiving carbon-neutral electricity; the utility can strengthen relations with its customers while making progress on reducing the carbon footprint of its electricity production; and the city can benefit as a potential user of electricity and from the new tax revenue it receives from development of the site. If brownfield solar projects are examined from a variety of stakeholder perspectives, with a broad view of the types of value that the projects can deliver, then solar developments on brownfields are more likely to win the political, economic, and technical support they will need to become a reality.

Introduction

Background and Motivation

The state of Michigan is facing an array of environmental challenges as industrial and economic trends change land use and Michigan prepares for environmental mandates. One such issue is Michigan's struggle to reach its mandate from the Michigan Public Service Commission to produce 15 percent of its energy from renewable sources by 2021, outlined in the Clean, Renewable, and Efficient Energy Act of 2008 (Public Act 295). Additionally, scientific and diplomatic bodies are calling for global carbon neutrality by 2050. Currently, Michigan is not on pace to meet this mandate on renewable energy production or to meet more general global carbon neutrality goals. Many utilities, state agencies, and renewable energy project developers are turning to solar energy production as a solution, particularly as it becomes price-competitive with fossil fuels. Key challenges include where to site the needed solar production facilities, how to encourage coordination of renewable energy sales agreements between developers and utilities, and how to generate the required level of public support among affected communities and landowners.

Another major issue is the underutilization of blighted or unremediated state-owned lands. The Michigan State Land Bank Authority manages almost 3,000 properties within the state's boundaries. Many of these lands are underutilized, and represent an opportunity to promote economic development activities that will generate local tax revenues. Some of the Michigan Land Bank's properties are contaminated or potentially contaminated areas ("brownfields") that are difficult or impossible to use for farmland, residential use, commercial building use, or other land uses that require uncontaminated land. The environmental liabilities and remediation demands that brownfield sites carry make them unattractive for many traditional residential and commercial land developers. These types of land parcels have limited use in most applications for which most Land Bank lands are typically employed.

Project Goal

Increasing solar development on brownfields addresses both of these challenges simultaneously. Michigan could make use of its contaminated land that would have limited use otherwise in order to help reach its environmental goals. However, installing solar projects on brownfields comes with its own set of challenges in economic, legal, and environmental realms. This project seeks to provide information and direction on the advantages and challenges of solar development on brownfields and shed light on next steps.

Overview of Brownfields and Land Banks

Brownfields are abandoned or underused parcels of land that face barriers to redevelopment due to potential or existing contamination that poses a risk to human or environmental health. They decrease the tax base of nearby areas and often act as sources of blight. Since owners have difficulty selling to buyers wary of becoming liable for environmental cleanup costs, they often remain unused and unremediated. Examples of brownfields include sites of old railroads, chemical storage facilities, and manufacturing plants. The benefits of developing brownfields are manifold, and include removing blight from the community, increasing the tax base of the surrounding area, creating new jobs, and contributing to

human and environmental health and safety. Several state and local laws and financial incentive programs have been created in an attempt to alleviate the uncertainty around liability issues and remediation costs surrounding land banks.

Land banks are state and county level entities which manage and repurpose abandoned lands from a variety of sources. These include 1) foreclosure via failure to pay property taxes, 2) the owner of the land walking away, 3) foreclosure by the EPA due to a violation, and 4) a transfer property mechanism (gift/purchase). Both state and county-level land banks exist; however, this report is primarily focused on the State of Michigan Land Bank. It is hoped that this report contains conclusions that can be extended to county-level land banks as well.

Methods

Our research methods were largely influenced by conversations with our client Jim Ticshler throughout the duration of the project. Leaning on his expertise and advice we were able to identify the most important research questions as well as how to best address them. In order to explore the advantages and challenges of solar development on State of Michigan Land Bank lands, we relied predominantly on primary research via 24 interviews with a wide variety of stakeholders: utilities, solar developers, regulatory bodies, Michigan government representatives, and a brownfield remediation company. We gathered information from these interviewees on value propositions of solar development on brownfields from each of their perspectives as stakeholders; barriers to solar development on brownfields and how they might be overcome; factors that may make a brownfield site particularly desirable for solar development; their views on the current state and local policies surrounding the issue; and thoughts on potential improvements to these policies. These interviews provide the backbone of this report. Views, ideas, and common themes identified from these interviews inform and motivate much of the report's analysis. From these interviews, we gained insight into new research areas to explore and new stakeholders to interview, and so conducted a smaller secondary round of interviewing as well as a more focused round of secondary research in order to determine the root causes of barriers to solar development on brownfields. We reviewed our resulting writeup with our faculty advisor and incorporated her feedback on overarching patterns that had developed during our research and how to best emphasize these results. From there, we arrived at our final results and recommendations.

This report contains two major sections in its body, and includes two appendices supporting and elaborating on its content. Principally, the report includes a discussion of five key challenges to solar development on brownfields and proposed corresponding solutions, and a section detailing the attributes of brownfields that make them most suited to serve as solar development sites. Appendix A delves into four case studies on existing brownfield solar development projects and emphasizes key challenges and key success variables for each. Appendix B outlines existing brownfield solar incentive programs that are in use in other states. Appendix C summarizes the opportunities and challenges of brownfield solar projects. Finally, Appendix D outlines the interviewed parties that informed this project. Together, these sections seek to provide a narrative detailing the difficulties associated with siting solar on brownfields, and examine ways in which, despite these difficulties, a solar brownfield project may find success.

Key Challenges and Pathways Forward

#1: Environmental Liability

Challenge

One of the major barriers preventing solar development on brownfield sites is the possibility—or at least perception—that a developer may assume legal liability for the pollution at the site. Our key informant interviews revealed that actors from a wide range of sectors perceive liability concerns to be a major barrier. Utilities and third-party solar developers are both wary of what they perceive to be a complicated and costly process to ensure that they will not be held liable for the pollution already existing at the site.

Various provisions of Michigan statutes can help to solve the liability challenge. These provisions include eliminating liability for pre-existing contamination and ensuring that if due care is taken, the developer will not be held liable for future contamination. Under Michigan law, a solar developer looking to purchase or lease a brownfield site can be protected from liability if they conduct a baseline environmental assessment (BEA) and disclose it to the state and to all subsequent purchasers and transferees of the property. However, there are many barriers that make it difficult for solar developers to take advantage of these mechanisms to eliminate their liability. Conducting a BEA takes time and money, which serves as a disincentive for development on brownfields as compared with other sites. Also, in the absence of legal guidance or contract templates from the state, each solar developer starts from scratch to determine how to craft legal agreements that will eliminate its liability. This is a costly and daunting task. Thus, in many cases, fear of liability tips the scales away from brownfields and toward other sites with less perceived risk.

Solution

The state of Michigan should clarify the legal liability regime and streamline processes for: (1) ensuring that retroactive liability does not attach to solar developers on brownfields; (2) conducting Baseline Environmental Assessments of prospective sites; and (3) establishing Due Care requirements for solar energy production on brownfield sites. The state should consider creating a work program among all relevant state agencies to develop targeted solutions to streamline processes for helping developers manage liability.

Past Contamination - Eliminating Retroactive Liability: The multi-agency working group should create a standard template or legal form contract that eliminates retroactive liability for solar developers choosing to develop on brownfield sites currently in the possession of the Land Bank, either as a buyer or lessee of the land. This standardized template should clearly enumerate: the immunities the State is providing to the developer; any remaining liability risks; the actions the developer will need to take to avoid triggering these remaining risks; and a mechanism for providing the developer with ongoing assurances that its actions are in compliance with the agreement and are not triggering any liability risks.

Present Status - Baseline Environmental Assessment: The multi-agency working group should create a streamlined process for conducting Baseline Environmental Assessments (BEAs) of promising sites. The BEA is required both to establish the pre-existing type and severity of contamination, and also to establish within which of the state's five contamination categories a site falls, and consequently what types of due care actions are required by the solar developer. This streamlined process should create an efficient and user-friendly way for the state to partner with interested solar developers to provide grants, concessional loans, or

other co-financing to conduct the BEA on sites of interest. The state could institute various types of preferences for assisting solar developers in conducting BEAs on brownfields. These could be both substantive, such as preferential access to financing, and procedural, such as technical assistance with conducting the BEA or a fast-track review and approval process.

Future Required Actions - Due Care Obligations: The state should streamline and accelerate the process among state agencies for determining what specific due care obligations are required for solar installations under each of the state's five contamination categories.[1] The BEA would determine the category any given site would fall within, but the state should seek to minimize the burden on the solar developer to translate these categories into forward-looking due care obligations for a prospective solar installation. To the extent that state agencies could delineate the types of due care requirements a solar developer would have to take, this would reduce the uncertainty facing a developer and also minimize its burden, as it would otherwise have to start this process from scratch in consultation with the state.

#2: Utility Control and Resistance

Challenge

Perhaps the most significant challenge of siting solar on Land Bank brownfield sites is securing utility approval for interconnecting a system to the grid. The state's two largest investor owned utilities (IOUs), DTE and Consumers Energy, have demonstrated a clear preference for creating utility-owned solar projects that they build and control—rather than entering into power purchase agreements (PPAs) with third-party solar developers—effectively making it very difficult to build non-utility, third-party projects. Unless the Land Bank enters a leasing agreement with IOUs to host utility-scale solar, we anticipate major roadblocks in accelerating the development of solar projects.

While IOUs serve an overwhelming majority of the state, Michigan also has 65 municipal and co-op utilities that are obligated to comply with the updated RPS mandate. Developing solar with these utilities presents its own challenges as each utility has a different attitude towards solar and might approach renewable energy development (i.e. compensation rate, interconnection procedures, solar fees) differently, which may entail solar project roadblocks.

Solution

Develop partnerships with Consumers Energy and DTE: Since DTE and Consumers Energy service territories comprise the majority of the state, it is important for the Land Bank to start building partnerships with these IOUs. Because they have a strong preference for building solar themselves, the primary mechanism for making brownfield solar viable is to lease Land Bank brownfield properties to be developed by utilities into utility-scale solar farms. IOUs would own the solar, while the Land Bank would continue as the property owner. Another option would be to develop brownfield solar in partnership with a third-party developer and sell the power to IOUs by entering into a PPA. However, as discussed, the second option may be more difficult to implement.

Develop partnerships with smaller local utilities: Given the challenges of siting solar within IOU territory, the Land Bank should also consider building partnerships with smaller local

[1] These include: unrestricted residential; unrestricted site-specific; restricted residential; restricted non-residential; and restricted site-specific.

utilities. Of the four case studies we conducted, two brownfield solar projects developed in Michigan — the East Lansing Community Solar project and the Coldwater Solar Field project—were developed with publicly-owned municipal utilities (see Appendix A). There are a few reasons why brownfield solar might be more viable in partnership with these utilities. Firstly, publicly owned municipal utilities are accountable to the community they serve, and as such, these utilities are invested in making decisions that more closely address the community's needs. Therefore, if a community strongly wishes to have more renewable energy, these utilities are more likely to invest in renewable energy. Brownfield solar is sensible in places where municipal utilities are already keen on renewable energy because communities can benefit from both the clean-up and the solar.

#3: Cost - Brownfields vs. Greenfields

Challenge

It is inherently more expensive to develop solar on brownfields than on greenfields. A number of interviewees identified the lack of dedicated funding for brownfield solar as a major deterrent to the use of brownfields for solar development projects. Without financial incentives to alleviate the cost differential, brownfield solar is simply not cost-competitive with greenfield solar. The costs of remediation, permitting, building, and monitoring are all higher for brownfield sites when compared to greenfields.

Moreover, with an abundance of greenfield sites across the state and relatively little pushback against siting renewables on them, a creative solution is needed to make brownfields more attractive for solar. Michigan has an abundance of flat green farmland that requires little, if any, land preparation, providing a relatively affordable leasing alternative for siting solar. Greenfield solar is not just financially attractive to developers; it is financially attractive to land owners as well. Although there is some pushback, many farming communities across Michigan are becoming increasingly open to hosting solar in exchange for extra income. To quote one interviewee: "Farming in Michigan is very difficult. From what I've seen, many farmers are old, and their kids don't want to go into farming—so they're pretty excited about leasing solar because they get money back from the lease." Moreover, a representative from a private solar development company expressed the company's view that solar development on farmland is the "lowest-hanging fruit" given the current policy and legal landscape. Importantly, in June of 2019, the Farmland and Open Space Preservation program (PA 116),[2] was amended to allow farmland in the program to be used for commercial solar, effectively making a large amount of farmland available for development.[3]

Solution

In the short term, the state of Michigan should focus on leveraging existing incentive programs for brownfield redevelopment to specifically target solar. In the long term, creating

[2] The program was designed to provide tax incentives for farmers who voluntarily assume use restrictions of their lands thereby restricting their use exclusively for agricultural purposes. See: Department of Agriculture & Rural Development. "The Farmland and Open Space Preservation Program." State of Michigan, 2019. https://www.michigan.gov/mdard/0,4610,7-125-1599_2558-10301--,00.html.

[3] Michigan Farm Bureau. "Michigan to allow commercial solar panels on PA 116 farmland." 2019. https://www.michfb.com/mi/policy-politics/michigan-to-allow-commercial-solarpanels-on-pa-farmland/.

dedicated funding for solar projects on brownfields would provide the best mechanism for incentivizing brownfield solar.

Amend existing brownfield redevelopment programs: Our interviews with various stakeholders indicated that current state-level brownfield redevelopment programs are not positioned to make brownfield solar attractive. A number of interviewees commented on the role that two brownfield financial incentive programs administered by the State—the Tax Increment Financing (TIF) and the Brownfield Redevelopment Grant and Loan Program—could play in promoting this development. One interviewee pointed out that neither program currently includes capital costs of siting renewable energy projects on a brownfield as an "eligible activity." It would be tremendously beneficial to amend the scope of "eligible activity" in one or both of the programs to explicitly include capital expenses for solar energy development as eligible expenses.

Secure dedicated funding for brownfield solar: A more long-term solution for incentivizing solar on brownfield sites would be to create dedicated funding specifically for solar brownfield projects. Based on our research, four other states provide targeted incentives for brownfield solar—Massachusetts, Rhode Island, New Jersey and New York (see Appendix B for full details). All four programs have been successful in narrowing the cost gap for brownfield solar and in making brownfields more attractive for solar development. However, creating a similar program in Michigan would require legislative action and tremendous coordination amongst key stakeholders, and consequently might not be feasible in the near future. In spite of this, we believe there is great value in understanding what has been done in other states to promote brownfield solar.

#4: Identifying Ideal Sites

Challenge

Creating an efficient way for utilities or third-party solar developers to identify brownfield sites suitable for solar development is an ongoing challenge. As some of our interviewees pointed out, trade-offs between urban and rural site locations can make identifying suitable sites difficult. Urban brownfields are often closer to suitable grid connectivity—making them more attractive to solar developers—but they also tend to have higher potential for other types of development that could bring more jobs and tax revenue. Conversely, brownfields in rural locations are typically farther away from suitable grid connectivity—making them less attractive to solar developers.

Given this set of challenging constraints, the best way to find a match is to allow solar developers to access information on a wide range of sites that might potentially interest them. Our stakeholder interviews revealed a desire among utilities and third-party solar developers to have better access to information about the brownfield sites held by the Land Bank. At present, interested developers do not feel as though they have easy access to the types of critical information about Land Bank brownfield holdings that would enable them to efficiently compare and evaluate sites for suitability as potential solar development projects.

Solution

Consolidate information on site characteristics in a user-friendly online portal: The Land Bank could take a more active role in helping to identify ideal sites for solar development—including by potentially recruiting solar developers to utilize the most promising sites. A key

first step in this direction would be to develop a user-friendly, publicly-accessible, centralized online portal containing information about all of the brownfield sites held by the Land Bank. Utilities and third-party solar developers could then access this portal and search for and identify sites that fit within their development priorities and parameters. Massachusetts provides an example of a state that has had success in using an online portal to assist solar developers in identifying suitable brownfield sites.[4]

Centralize state resources and information for solar developments on brownfields: Beyond creating a searchable portal of all brownfield properties and their characteristics, the state should also endeavor to create a one-stop-shop for all information and resources related to renewable energy on brownfields within the state. This could include information about the relevant statutes and regulations, available financial incentives, technical assistance, and other resources that are of relevance to prospective developers looking to site solar on brownfields. Connecticut has done an effective job of this, with a web page containing a wealth of resources devoted specifically to the topic, within the state's Department of Energy and Environmental Protection website.[5]

#5: Community Acceptance

Challenge

Any brownfield-to-solar project will have a higher chance of success if it secures acceptance from the local community. However, renewable energy production has been facing growing resistance from many communities in Michigan, particularly in the context of wind energy, but increasingly including solar production as well. In addition, some cities are experiencing what one stakeholder we interviewed referred to as "brownfield redevelopment fatigue." Brownfield redevelopment often requires concessions from the city and its residents, such as tax deferrals through TIF. In cities with many brownfield redevelopments, community members may begin asking whether the incentives are truly needed, or whether the developer is simply taking advantage of the incentives to enhance its profit. Further, when deferred taxes from several projects in a city could otherwise be going to fund public amenities that benefit the community, such as libraries, parks, or schools, the appetite for further brownfield redevelopment in these cities may begin to decline.

Solution

In seeking to foster community acceptance of solar developments on brownfield sites, the Land Bank should follow a two-pronged approach.

Prioritize cities with renewable energy goals: First, it should consider prioritizing sites within Michigan cities that have formal renewable energy goals or that have expressed interest in prioritizing renewable energy. Projects proposed for these cities are more likely to meet enthusiastic acceptance from the community than in cities where renewable energy is not a priority. Further, the solar energy produced from these projects could be claimed by the city

[4] See: John David Baldwin. "From Brownfield to Solar Field: A Case Study." *Solar United Neighbors*, 2017. https://www.solarunitedneighbors.org/news/from-brownfield-to-solar-field-a-case-study/.

[5] See: Department of Energy & Environmental Protection. "Siting Clean Energy on Connecticut Brownfields." *State of Connecticut*, 2019. https://www.ct.gov/deep/cwp/view.asp?a=2715&q=607554&deepNav_GID=1626.

as direct progress toward its goal, incentivizing partnership by the city in supporting and implementing brownfield-to-solar projects.

Engage the local community early and often to ensure support: Second, proactive community engagement was recommended by many stakeholders as the best way to design solar projects on brownfields that meet community needs, and to win community acceptance. Examples of these dynamics and lessons learned are discussed in the case studies below with respect to projects in East Lansing and O'Shea Park in Detroit.

Site Selection: Key Factors to Consider

Many factors go into solar site assessment, and the conversation becomes even more nuanced when considering brownfield development. Tradeoffs must be made between what is ideal for local governments and what is ideal for developers, and both parties should be willing to make concessions. Solar plots are ideally large sites with easily accessible grid interconnection infrastructure, but it may be challenging to find both on the same parcel of land. Other factors such as contamination level and community dynamics also affect the success of a project. Differing incentives between sites will ultimately determine a project's feasibility. The factors below provide an outline of some of the key types of information that a state-level database of landbank lands should include.

Site Size

According to interviewees, developers need about five to six acres to generate one MW of solar in Michigan. Potential sites should be at least 10 acres of suitable land area: enough for a minimum of two MW capacity. According to representatives of a brownfield remediation for energy development firm, it is harder to develop sites of less than even 50 acres (10 MW) in Michigan, as larger developments' budgets benefit from economies of scale. They noted that Land Bank properties unfortunately tend to be smaller properties that may not be able to accommodate large utility-scale solar. In turn, many interviewees suggested that the Land Bank target its larger parcels capable of medium-scale solar: enough for 5 to 20 MW—between 25 and 140 acres.

Land Attributes and Degree of Contamination

Physical characteristics such as topography, groundcover, and subsurface soil quality also factor into the feasibility of a brownfield solar project. Multiple interviewees noted that open, flat sites without trees are conducive to such projects, to prevent panel shading. Additionally, Michigan experiences large amounts of precipitation, which affects a project's feasibility as well. Because excessive soil moisture can prevent development, high and dry sites are a "huge motivating factor for developing a solar site." Beyond moisture, subsurface soil contamination can present dangers to both human health and the environment. Many brownfield sites, like landfills, will require modifications to conventional solar panel setups, such as ballasted foundation systems that sit on top of the soil surface and avoid drilling that may disturb or release contaminants. If the Land Bank can identify minimally-contaminated sites where ballasts are not needed, they can avoid incurring what was one interviewee described as the "biggest driver of cost" besides distance interconnection expenses. The less remediation required on a site, the easier it is to justify a project. Interviewees recommended old parking lots and landfills that have passed their post-closure period and are stabilized. The Cadillac project done by Consumers Energy is on a site that previously contained rubble and asbestos,

which was relatively easy to clean. One interviewed brownfield development project manager also recommended urban or industrial fill sites, or old auto factories or dealerships—which may have relatively minimal contamination.

Site Location

Location of the parcel will also determine a solar farm's success. Key factors include proximity to interconnection infrastructure and power demand, as well as property value. Existing road access to facilitate construction and maintenance is important, as is proximity to existing transmission lines and substations. A group of renewable energy developers noted that brownfields close to semi-modern industrial sites hold some appeal, as a solar developer can save costs by "uplifting" the site rather than starting from scratch, and the power infrastructure is already close to sufficient for the new project. One interviewee noted that the state owns a large amount of property in rural counties that are sparsely populated and have relatively low property values. However, these parcels are rarely near population centers or the grid, so they can be very expensive to interconnect because long transmission lines would need to be constructed. Finally, linking each potential Land Bank site to the electric utility controlling the territory of the site will be important, as some utilities will be more eager than others to add solar electricity to their grid.

Anticipated Impact

Prioritizing solar electricity production on brownfield sites is an economic and environmental win-win. This research aims to support the State of Michigan Land Bank to understand both the key challenges constraining solar development on brownfields and potential solutions for overcoming these challenges, as identified by a wide range of knowledgeable stakeholders. By better understanding the most significant barriers limiting solar expansion on brownfield sites, as well as possible pathways forward to address these barriers, the Land Bank will be better positioned to conceptualize and implement targeted solutions to make brownfield sites more attractive for solar developers, in collaboration with other state agencies and actors. This will create numerous positive outcomes, including accelerating the state's transition toward a renewable energy future, putting abandoned and blighted lands back to productive use, and directing solar away from greenfields—thereby preserving their valuable aesthetic and environmental functions.

Next Steps

We believe that the best next step for the State of Michigan Land Bank is to start developing strategic partnerships with Consumers Energy and municipal utilities in order to promote utility brownfield solar projects. We also recommend convening the multi-agency working group to tackle some of the challenges we have outlined in this report related to liability and funding mechanisms for brownfield solar. Given the effort these next steps would require, we believe that the next team of DOW fellows could contribute by helping identify the most appropriate brownfield sites according to the criteria we have developed as well as facilitating conversations between the stakeholders.

Appendix A: Case Studies

East Lansing - Community Solar Project on Capped Landfill

Image credit: Michigan Energy Options

Inception: December of 2018

Location: Burcham Park, a capped landfill in East Lansing, Michigan

Production Capacity: 1,000 solar panels that will produce 430,000 kWh annually, enough to power around 60 homes

Site Size: 1-acre project on a 2.7-acre site

Type of Brownfield: Retired capped landfill

Type of Utility: The Lansing Board of Water & Light (BWL) is a municipally-owned public utility, with 97,000 electric customers.

Type of Developer: Partnership driven by an East Lansing area non-profit—Michigan Energy Options—under the auspices of an LLC it created for the project called Community Energy Options. The partnership also included the Lansing Board of Water & Light, the City of East Lansing, and Pivot Energy—a Denver-based solar energy company that develops, finances, builds, and manages community and commercial solar projects around the country.

Lead Actor: The project was initiated and driven forward by Michigan Energy Options (MEO).

Financing Structure: Lansing BWL customers (residential or commercial) can opt into the program by leasing one or more panels for a 25-year period, at a cost of $400 per panel. In turn, these customers get a monthly credit on their electric bill for the energy produced by their panels. The total annual credit is estimated to be $20-25, leading to an estimated payback period of around year sixteen of the lease.

Customers: Individuals and businesses leasing one or more panels, with the major investors being the city of East Lansing and the Capital Area Transportation Authority, which leased 300 and 189 panels, respectively. In total, about 144 customers signed up for the program.

Economic Benefits: While the cost to lease a panel for the 25-year period is $400, the total estimated on-bill savings over that period is $650, meaning that customers can expect a 60% profit margin on their investment.

Community Benefits: The solar park will include educational signage and offer tours for school and community groups. Community Energy Options will also be planting and maintaining native wildflowers and grasses at the site, which will provide an important food source for pollinating insects and wild birds, and will also beautify the park. The site will also feature the installation of a sculpture by a local artist.

Community Perception: MEO conducted extensive community outreach from the outset of the project, partnering with staff from the MSU extension program to ensure community buy-in. The intention was to bring community members along from the beginning, to avoid the type of potential negative response that other communities in the state have faced in response to renewable energy projects, particularly from wind power generation.

Key Challenges: The project faced numerous delays, as well as a significant unexpected expense stemming from a local government permitting determination that required installation of a fence around the entire project site, which added significant cost.

Key Success Variables: The success of the project was due in large part to a strong partnership forged between a key set of actors: a local environmental NGO that conceptualized and drove the project forward; the municipal utility that saw value in the project and enthusiastically supported it; the city, which helped to secure the land and provided significant investment as the largest buyer of the electricity; and a private solar development company that supplied the technical expertise necessary to implement the vision.

Cadillac Community Solar Project

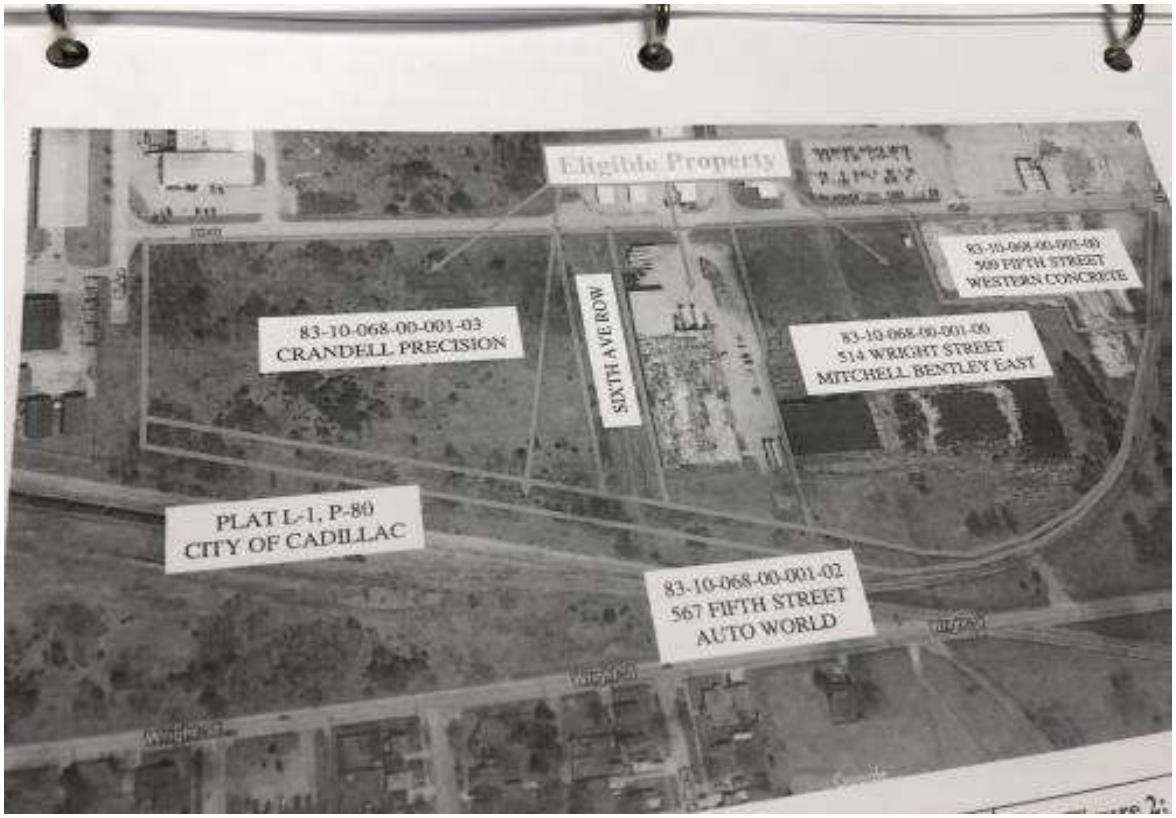

Image credit: Cadillac News

Inception: 2019, with plans to be operational before Summer 2020

Location: Cadillac, MI, on the site of an old Mitchell Bentley plant that burned down in 2013

Production Capacity: ½ MW installation

Site Size: 5-acre project on a 20-acre property

Type of Brownfield: Former industrial site (rubble, lead, PCE, and asbestos)

Type of Utility: Consumers Energy (investor-owned utility)

Type of Developer: Partnership between Cadillac City Council and Consumers Energy (Consumers Energy acts as the developer itself)

Lead Actor: Brian Warner, an environmental manager at Wolverine Power—a local energy supplier—was interested in the site being redeveloped and used for a solar installation. He worked with both the City of Cadillac and Consumers Energy to determine potential site uses.[6]

Power Buyer: Consumers Energy (utility)

[6] Department of Environment, Great Lakes, and Energy. "Partnerships grow solar garden in Cadillac." *Michigan.gov*, 2019. https://www.michigan.gov/mienvironment/0,9349,7-385-93394-511502--,00.html.

Customers: The end users for the energy produced from this solar field include community residents, the city (65% of municipal facilities), and local businesses.

Community and Economic Benefits: The benefit to the community is the restoration/repurposing of a blighted property. Receiving permission to develop a brownfield unlocks grant money for the city. (The electric rate to the city is comparable to the current price.)

Financing Structure: Any Consumers Energy customer will be able to purchase power generated from this array for a small added cost.

Funding: To fund the redevelopment, Cadillac city received a $700,000 brownfield grant and a $300,000 brownfield loan. It used the funding to clear the remaining buildings on the site and remove debris and contaminated soil.[7] The city will pay off its loan through property tax revenue from future site usage.[8]

Community Perception: The community perception of this project has been positive. Residents are eager to see the blighted property restored to use, and to have an option to acquire cleaner electricity.

Key Challenges: Not many barriers existed for this project; all major stakeholders involved supported it. From the utility's perspective (Consumers Energy), the most difficult part of the project was going through the paperwork and processes to ensure that the utility would not be liable for the contamination that was already on the site. Without going through these processes—with liability remaining vague—liability to remediate past contamination often falls on the party with the most financial resources, which is often the utility. Another difficulty is that small solar projects cannot benefit from economies of scale, although these small-scale community solar projects benefit the community in many other ways (restoring blighted property, helping to meet clean energy goals) that often make this extra cost worthwhile.

Key Success Variables: The major success variables for this project were 1) the widespread support from stakeholders, 2) the inability for the land to be used for most other applications (it is an oddly-shaped piece of land near railroad tracks), 3) collaboration between the city and utility where the utility was willing to make concessions (for example, building a solar array on only a small part of the land area), and 4) already-existing infrastructure at the site to facilitate grid connections.

[7] Department of Environment, Great Lakes, and Energy. "Partnerships grow solar garden in Cadillac". *Michigan.gov*, 2019. https://www.michigan.gov/mienvironment/0,9349,7-385-93394-511502--,00.html.

[8] Andy Balaskovitz. "Michigan utility's first brownfield solar project highlights promise, challenges." *Energy News Network,* 2019. https://energynews.us/2019/11/04/midwest/michigan-utilitys-first-brownfield-solar-project-highlights-promise-challenges/.

Coldwater Solar Field Park

Image credit: City of Coldwater

Location: Site of a demolished Marmon Foundry in Coldwater, Michigan

Date of Operation: February 2018

Size: 7-acre property

Production Capacity: the nearly 5,000 solar panels will produce 1.3 MW, roughly enough electricity to power 150 homes

Type of Brownfield: The site of a demolished foundry

Type of Utility: Coldwater Board of Utilities (CBPU), a municipally owned and operated utility

Type of Developer: Florida-based NextEra Energy Resources LLC installed the farm under a contract with American Municipal Power (AMP) of which Coldwater is a member. NextEra owns and operates the solar facilities.

Lead Actor: The project was spearheaded by CBPU members who wanted to convert the brownfield—which is adjacent to CBPU—into useful space.

Customers: NextEra builds, owns and operates the solar sites. AMP purchases all output from the solar generation and then sells it to CBPU using a take and pay contract.

Community and Economic Benefits: Although there are no direct carve-outs for residents, there is a significant benefit that stems from the clean-up of the former brownfield.

Financing Structure: NextEra Energy Resources' subsidiary and AMP executed a solar power purchase agreement (PPA). CBPU was not aware of state or federal funding for brownfield redevelopment at the time and self-financed the clean-up of the property through utility reserves. Because a for-profit subsidiary was formed, the owners were able to take advantage of the federal investment tax credit, which brought the price of solar down considerably and made the PPA terms very favorable.

Key Challenges: The most difficult challenge that this project faced was reaching an agreement with Marmon, the property owner, over the use of the brownfield site. Heavy contamination from the foundry operation and a diesel oil leak from CBPU tanks next to the property raised concerns over the potential future liability. Marmon, the property owner, was very reluctant to lease or sell the property for any sort of redevelopment due to inherent liability. After six years of negotiations and contract revisions, the City of Coldwater and the Marmon Group entered into an agreement in July 2015 to lease the land for one dollar. In light of the liability concerns, the installation was designed so as to minimize penetration into the ground. Large concrete ballasts were installed, which allowed solar arrays to be directly attached to them. NextEra also continues to monitor the underground pollution.

Key Success Variables: The success of this project is largely due to a steadfast effort on the part of the utility, which wanted to utilize an adjacent brownfield for power generation. The site had been an eyesore for a number of years and was in need of repairs (specifically the fencing). After CBPU reached out to the city officials to discuss the site's potential rehabilitation, the idea of solar was raised by the utility. Afterall, the site is located next to an old CBPU substation and the utility was very eager to broaden its solar portfolio to meet the state's Renewable Portfolio Standard. Once consensus was reached, CBPU began negotiating with the property owner. In the end, CBPU was able to get a contract with Marmon by offering to go above and beyond standard remediation processes and take special precautions during the installation of solar. Most importantly, the utility chose this site because it was interested in its remediation, despite greenfield sites being available for the project.

Solar on the City-Scale: O'Shea Solar Park - Detroit

Image credit: Detroit Collaborative Design Center

Inception: September of 2016; commissioned July of 2017

Location: O'Shea Park in Grandale neighborhood of Detroit, Michigan

Production Capacity: 7,398 solar panels that will produce 2.44 MW annually, enough to power around 450 homes.[9]

Site Size: 9.6-acre project on a 20-acre site.

Type of Site: Large, vacant urban area owned by the city, near a freeway, with interconnection infrastructure. Not formally a brownfield: inactive site, but without concerns over presence or potential presence of a contaminant. Site of decommissioned playground and historic recreation center that had been damaged and shuttered. Surrounding community experiencing blight and population loss.[10]

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[9] J. Rank Electric, Inc. "O'Shea Park Urban Solar Farm," n.d., accessed 2019. https://www.jranck.com/project/oshea-park-urban-solar-farm-detroit-mi/.

[10] Joe Guillen. "DTE plans 10-acre solar array in Detroit." *Detroit Free Press*, 2016. https://www.freep.com/story/news/local/michigan/detroit/2016/03/27/dte-plans-10-acre-solar-array-detroit/82251592/.

Type of Utility: DTE Energy is a Detroit-based electricity and natural gas investor-owned utility that provides power to much of the state of Michigan, particularly the Southeast. DTE services 2.2 million people with electricity.[11]

Type of Developer: Developed by DTE in partnership with the City of Detroit. DTE carved 2 MW from their 50 MW Lapeer, MI solar project and relocated it in Detroit after talks with the Mayor.

Lead Actor: Around 2015-2016, Detroit Mayor Mike Duggan was interested in a showcase sustainable energy project for the city. Talks ensued with leadership of the local utility (DTE) and Duggan's administration—especially Planning and Development Director, Maurice Cox. Site analysis of city properties landed on Grandale's O'Shea Park. The community was informed after the project was proposed and agreements already had been signed to develop in their local park. The Detroit City Council had to vote to approve the project's 20-year lease to DTE.

Financing Structure: The city received a one-time $25,000 lease payment from DTE, which was directed towards beautification of a separate piece of the 20-acre O'Shea site. DTE has not disclosed how much it is profiting off of the project, which adds to the solar energy base of their MIGreenPower voluntary renewable energy program.[12] MIGreenPower allows DTE customers (residential or commercial) to opt-in to greater shares of renewable electricity for an added cost. It was projected that with new, taxable use of the site, O'Shea Solar Park will generate "$1.4 million in new tax revenue over the 20 year [lease duration]" for Detroit, according to the Detroit Free Press and DTE.[13]

Customers: Individuals and businesses within the entire DTE base: "as of January 2019, all DTE customers receive 12.5% of their energy from renewable resources" and through MIGreenPower, customers can increase their renewables consumption in 5% increments.[14] Notably, O'Shea's solar energy goes to the general grid, not explicitly to local DTE consumers.

Economic Benefits: The Detroit Free Press stated that the City will benefit from approximately $1.4 million in added tax revenue over the 20-year lease. Additionally, they noted that DTE "agreed to maintain a portion of the city property around the 10-acre solar array. The value of the maintenance, which the city would otherwise be responsible for, is estimated at $400,000 over the life of the lease."[15] DTE Customers will see no cost reduction on their utility bills.

Community Benefits: DTE and Detroit leadership pitched the solar park to Grandale as only a solar energy development. The community was not receptive; Grandale was not going

[11] DTE. "About DTE: Leading the Way to a Cleaner, Safer, and Smarter Energy Future." n.d., accessed 2019. https://newlook.dteenergy.com/wps/wcm/connect/dte-web/home/about-dte/common/about-dte/about-dte.

[12] Dana Blankenship. "Detroit re-opening of O'Shea Park and Solar Park." *DTE Energy*, 2019. https://empoweringmichigan.com/detroit-re-opening-of-oshea-park-and-solar-park/.

[13] Joe Guillen. "DTE plans 10-acre solar array in Detroit." *Detroit Free Press*, 2016.

[14] DTE. "MIGreenPower: Overview." n.d., accessed 2019. https://newlook.dteenergy.com/wps/wcm/connect/dte-web/quicklinks/migreenpower/homepage?_ga=2.268619697.112100869.1571522274-1876994853.1571427715.

[15] Joe Guillen. "DTE plans 10-acre solar array in Detroit." *Detroit Free Press*, 2016.

to receive cheaper electricity, nor would their bills automatically be "greener," and their beloved community center was being torn down. The decommissioned O'Shea Park Community Center represented one of the last institutional establishments in the area and had been their hub for generations—many hoped that it could be restored for future generations. City leadership did not see a payoff for rebuilding it, and planned to tear it down; DTE and the Mayor's administration were perceived to be taking a huge part of Grandale's park, for nothing in return.

Ways to rejuvenate the struggling community, spur "green job" growth, and contribute to broader Michigan/DTE sustainability initiatives were strategized through subsequent community meetings with project developers in response to community pressure. Detroit-based DTE contractor, Walker-Miller Energy Services, provided home energy efficiency audits and upgrades to over 100 local families[16] as part of two existing DTE programs: Home Energy Consultation and Energy Efficiency Assistance (EEA is specifically for low-income households). The "free" programs are mandated by the state Public Service Commission's energy efficiency targets, but not all Michiganders know to take advantage of the programs, even though their costs are built into all DTE ratepayer bills. Also, during the O'Shea Solar Park construction, J. Ranck Electric partnered with a pre-apprentice job-training/placement program "to put Grandale and surrounding neighborhood residents to work. For the majority of the project, nearly 40 percent of the electrical apprentice labor was from the park's surrounding neighborhoods."[17]

Solar development subsumes about half of the park area. DTE now manages an urban pollinator garden with native plants between solar arrays, which will attract native insects and animals. The remaining non-solar-panel area of O'Shea Park has a few acres of land that were enhanced with "new walking paths, resurfaced basketball courts, play fields and community gathering space with seating, new trees and native flower beds" based on feedback from the community.[18] To honor the old community center, its foundation was painted, and a brick platform remains for the community to use as stage within O'Shea Park. The site also includes an "educational component [that] will be developed to help kids learn more about solar energy."[19] Detroit Water and Sewer Department created a bioretention garden with native plants within the park to manage stormwater and reduce flooding in the area."[20] This work was funded by the lease payment from DTE and more than $350,000 secured by the city—largely from philanthropic foundations as well as the federal government.

Community Perception: Initially, the solar project fed into Grandale's sentiment of disenfranchisement as low-income community in urban Detroit suffering decades of neglect. City Council members then held multiple community outreach meetings about the project;

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[16] David Lingholm. "O'Shea solar project creates opportunities, engages community." *DTE Energy*, 2016. https://empoweringmichigan.com/oshea-solar-project-creates-opportunities-engages-community/.

[17] J. Rank Electric, Inc. "O'Shea Park Urban Solar Farm," n.d., accessed 2019.

[18] Planning and Development Department. "O'Shea Solar Park." *City of Detroit*, 2019. https://detroitmi.gov/departments/planning-and-development-department/west-design-region/oshea-solar-park.

[19] David Lingholm. "O'Shea solar project creates opportunities, engages community." *DTE Energy*, 2016.

[20] Planning and Development Department. "O'Shea Solar Park." *City of Detroit*, 2019.

Councilman Gabe Leland "described support for the project among residents at the meeting as a 'mixed bag.' He said some residents [were] leery because the area has long been neglected."[21] Many community members did not feel that the project was done with the right intentions: that adding solar panels did not serve the needs of the community in the ways they would have outlined had they been consulted on how to revive the O'Shea site. After meaningful engagement in project development, more community members were receptive.

Key Challenges: Community acceptance was a key challenge. Community members would have been best served if meaningfully and thoughtfully consulted at the outset of Detroit's conversation about the site. The premise under which the project was conducted left some community members feeling that efforts to revitalize their community through the solar project were disingenuous.

Key Success Variables: Working within the investor-owned utility structure at a time when DTE was interested in developing its own solar at Lapeer was a key factor in having the O'Shea solar project installed in Detroit. This low-MW development would be more unusual as a stand-alone utility solar project. That said, O'Shea Park was attractive for urban solar development compared to other sites in Detroit; large plots with the ease of transmission and distribution connectivity of an urban setting are relatively unique.

Responding to community resistance by identifying a local community leader to run council meetings instead of a planner was important; local voices inspire confidence. The development of community spaces and nature within the park and the investment in local green jobs was also positive. O'Shea Solar Park demonstrates the importance of early and intentional community engagement; it was successful because project leadership and partners rose to the occasion after an initial oversight in planning.

[21] Joe Guillen. "DTE plans 10-acre solar array in Detroit." *Detroit Free Press*, 2016.

Appendix B:
Brownfield Solar Incentive Programs in Other States

Massachusetts[22]

Financial Incentives

Offers financial solar incentives for all solar through Solar Massachusetts Renewable Target (SMART) Program launched in 2018. However, the primary focus of the program is to promote optimal siting of solar (away from greenfield and open space development), which is why the program includes a Brownfield Generation Unit Adder, a 5-factor greenfield subtractor (greenfields would get 5 times as little incentive for solar) to motivate preservation of greenfields and boost brownfield development. This adder is available to solar installations with a generating capacity greater than 25 kW AC and that are sited on a "brownfield". It is currently set at $0.03/kWh for the first 80 MW of SMART units (Tranche 1) and declines by 4% with each successive 80 MW tranche.

New York[23]

Financial Incentives

NY-Sun Megawatt Block Program (MW-Block) provides $1B in financial incentives for developing solar projects on brownfields. Recent changes to the program increased incentives for brownfields specifically to promote redevelopment. In particular, the new changes introduced a $10/W adder for solar projects developed on brownfield and landfill sites in the ConEdison territory. This adder is in addition to the incentive available for all solar developments. A special toolkit was also developed to help guide municipalities in developing brownfield sites into brightfields.

The MW block structure is designed to support solar markets in the areas where support is needed most, and decrease incentives as they become less necessary to a self-sustaining solar market throughout New York. NYSERDA (the program administrator) also maintains dashboards for all available/used incentives.

Regulatory Incentives

Starting January 2019, the State Environmental Quality Review (SEQR) regulations were streamlined to drop the requirement for contractors to make formal assessments of environmental impacts of solar projects on brownfields. As the first update to SEQR in more than two decades, the changes, including the brownfield component, took effect January 1, 2019.

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[22] Massachusetts Department of Energy Resources. "Solar Massachusetts Renewable Target (SMART)." *Commonwealth of Massachusetts,* 2019. https://www.mass.gov/solar-massachusetts-renewable-target-smart.
[23] NYSERDA. "About the MW Block." *New York State,* 2019. https://www.nyserda.ny.gov/All-Programs/Programs/NY-Sun/Contractors/How-the-Dashboard-Works.

New Jersey[24]

Financial Incentives

Subsection t. of the Solar Act (N.J.S.A. 48:3-87), signed into law in 2012, is a program established by the New Jersey Board of Public Utilities (BPU) to provide Solar Renewable Energy Credits (SRECs) to owners of solar electric power generation facilities certified as being located on a brownfield, area of historic fill, or properly closed sanitary landfill facility.

The primary goal of this law was to further efforts to control the influx of SRECs into the market, which could negatively impact supply and price. BPU was essentially appointed as the "gatekeeper" of entry by large non-net-metered and non-on-site generation systems and was tasked with creating and implementing an approval process requirement for such systems to qualify for SRECs. Systems located on a brownfield or closed sanitary landfill site were exempt from this approval process under the law.

The law also provides for the BPU to establish a program to provide SRECs and additional financial incentives—"super SRECs"—to owners of solar projects constructed on a brownfield or closed sanitary landfill facility, as well as to consider the establishment of additional financial incentives for 3MW or greater net-metered solar projects.

Currently, the SREC program is sunsetting and a new solar incentives program is being developed to replace it.

Rhode Island[25]

Financial Incentives

In 2018, Rhode Island's Renewable Energy Fund, which provides financial incentives to solar projects, implemented the Brownfields Solar PV Program, earmarking $1 million in incentives to renewable energy projects that are sited on brownfields. The program was funded through the "system benefit charge" on electric bills and alternative compliance payments received from retail electricity providers. As of August 2019, the program has been completely subscribed. Incentives varied by project ownership type (direct or third party) and generation (DC). It is important to note that the program was the result of conversations among various stakeholders, from environmentalists and municipal planners to farmers and small businesses, and focused on how to leverage existing programs (such as Renewable Energy Fund Program) to promote development specifically on brownfield sites.

[24] Department of Environmental Protection. "Solar in New Jersey." State of New Jersey, 2019. https://www.nj.gov/dep/aqes/opea-solar.html.

[25] Office of Energy Resources. "Programs & Incentives." State of Rhode Island, 2019. http://www.energy.ri.gov/policies-programs/programs-incentives/.

Appendix C:
Summary of Key Challenges and Solutions to Brownfield Solar Development

Key Challenge	Summary of Challenge	Summary of Solution
Environmental Liability	Utilities and third-party solar developers see potential risks in legal liability for site pollution and a costly and complicated process to be protected from liability.	Clarify the legal liability regime and streamline processes regarding protection from retroactive liability, ease of acquiring this protection, and establishing solar brownfield Due Care requirements.
Utility Control and Resistance	Non-utility, third-party solar projects are difficult to build in part due to their required approval for interconnection from utilities, who prefer to create utility-owned solar projects.	Develop partnerships with both investor-owned and smaller local utilities, with the utility as the owner of the solar and the Land Bank continuing as the property owner.
Cost – Brownfields vs Greenfields	It is inherently more expensive to develop solar on brownfields than on greenfields, and there is a lack of dedicated funding to incentivize brownfield development.	Amend existing brownfield redevelopment programs to incentivize brownfields (for example, by including capital costs of renewable brownfield projects as an "eligible activity") and secure dedicated funding for brownfield solar.
Identifying Ideal Sites	It is not always easy for utilities and third-party solar developers to identify ideal brownfield sites; there are tradeoffs for urban and rural sites that often makes the ideality of a site ambiguous.	Consolidate a user-friendly, publicly accessible, online portal that details the characteristics of existing brownfield sites, for use by utilities and developers. The State should also create a centralized collection of resources on brownfield solar development (regulations, incentives, technical assistance) for public use.
Community Acceptance	Renewable projects have been facing growing resistance from many communities in Michigan due to tax deferrals from incentive programs, especially when this money could be used to fund other public amenities.	Prioritize cities with renewable energy goals and engage the local community early and often to ensure support in order to ensure and maintain community support throughout the project.

Appendix D:
Key Informants

Utilities

Solar Developers and Remediation Companies

Regulatory Bodies and Government Representatives

Other Expertise