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Restoring Power to the People: A Feasibility Study of Community Solar for Flint Residents A WIP Paper

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Abstract

This Work in Process paper documents a study that explores the feasibility of community solar programs as a means of expanding renewable energy access to underserved communities. As part of the growing interest in sustainable energy solutions, community solar is seen as a key opportunity for increasing solar energy adoption without the need for individual property ownership or installation. This paper falls under the "Sustainability, Green Systems and Energy" track and aims to assess the viability of community solar in a specific region while evaluating its impact on local communities. The aim of this study is to evaluate the technical, financial, and social feasibility of implementing a community solar program. Research questions include: What are the barriers and opportunities for launching community solar in this region? What are the key financial models that can support its sustainability? How can local community engagement enhance the success of such a program?

Keywords
Renewable Energy, Community Solar, Feasibility Study, Energy Accessibility, Sustainability, Environmental Justice.

1. Introduction

Environmental Justice

Flint is in the 80th percentile for socioeconomic factors that increase susceptibility to environmental health risk factors such as pollution, but more solar would benefit all residents by reducing fossil fuel emissions and cost of living. Community energy has the potential to increase actor diversity and local acceptance of renewable energies and has therefore been highlighted to be conducive to energy transitions (Meister et al. 2020). There are seven investigators

on the research team, two universities and local non-profit organization are represented. This community focused project seeks to give all relevant stakeholders a voice in the conversation.

Energy Burdens
Flint residents (after Detroit residents) have the highest energy burdens in Michigan.

Goal of the feasibility study
There is a need for greater energy affordability and democracy in Flint using renewable energy. A solar co-operative could synergize much of the work happening in Flint to improve climate resilience and increase energy democracy. Some on the project team are currently working on developing a climate bill package that serves as an opportunity for state-wide policy change to erase impediments to community solar. The political landscape and current regulation prohibit full implementation.

Community engaged research
What has been successful in establishing other community solar co-operatives is introducing valuable external knowledge and expertise into the planning and policy development process, creating opportunities for shared learning, and improving relations among previously conflicting stakeholders, leading to improved environmental outcomes. Residents still have reservations about researchers, government agencies and large corporations after the water crisis. The research team acknowledges the complex nature and often negative history of higher educational institutions in this community. Our efforts to build relationships with honesty and integrity were lengthy, time consuming and necessary. New relationships between local residents, politicians, and faith leaders, were formed by the end of the study.

1. Literature Review

Related Work
Community solar has emerged as a promising solution for expanding renewable energy access, reducing energy burdens, and advancing environmental justice. Prior research has examined its feasibility, barriers to adoption, policy considerations, and energy justice implications.

1.1 Feasibility and Technical Potential of Community Solar

Several studies have assessed the technical and economic viability of community solar projects. The National Renewable Energy Laboratory (NREL) estimates that 967 GW of technical potential exists in the U.S., capable of serving 53.2 million households currently unable to adopt behind-the-meter solar. This study highlights that market constraints, rather than physical limitations, are the primary obstacle to widespread deployment. In a separate analysis, NREL explores barriers and project models for community solar deployment in multifamily affordable housing, identifying financing limitations, split incentives, and policy inconsistencies as key issues.

Aldarsi (2024) provides a comprehensive review of community solar models, comparing ownership structures, financial mechanisms, and programmatic best practices in the U.S. and internationally. His findings underscore the importance of third-party financing models and state-led incentive programs in accelerating adoption.

Beyond technical assessments, studies have examined the economic feasibility of centralized vs. distributed solar systems. Aghamolaei et al. conclude that centralized community solar installations are more cost-effective due to reduced storage and infrastructure costs. The Michigan Technological University (MTU) feasibility study on L'Anse Community Solar presents a real-world example of community-led solar, emphasizing affordability and local engagement as critical success factors.

1.2 Barriers to Community Solar Adoption

Despite its potential, numerous barriers limit community solar adoption. Thakur and Wilson identify 12 major obstacles, including lack of consumer awareness, inadequate regulations, and unclear business models. Similarly, Bansal et al. highlight financial and administrative burdens that disproportionately affect low- and moderate-income (LMI) households, often making solar inaccessible due to restrictive financing structures. At the policy level, Michaud demonstrates how electric utility lobbying and legislative inaction prevent state-level expansion of community solar programs. Noll (2014) examines the role of peer influence in community solar adoption, demonstrating how Solar Community Organizations (SCOs) can effectively increase solar uptake by leveraging local trust networks. His

findings indicate that peer-driven educational programs can reduce barriers related to misinformation and policy confusion.

Energy Justice and Equitable Solar Access
Community solar is frequently cited as a mechanism for addressing energy justice concerns. O'Shaughnessy et al. find that community solar adopters are 6.1 times more likely to live in multifamily housing and 4.4 times more likely to rent, demonstrating that community solar improves access to clean energy for populations traditionally excluded from rooftop solar programs. Reames further explores racial and socioeconomic disparities in solar adoption, showing that low-income communities—despite having high solar potential—are systematically underrepresented in solar programs. Ross et al. extend this analysis by mapping geospatial intersections between disadvantaged communities and renewable energy deployment opportunities, identifying areas where solar investment can provide the greatest social impact.

Hoesch et al. examine energy justice outcomes in a low-income community solar project, evaluating how distributional, procedural, and recognition justice principles influence program success. Their findings reinforce the need for inclusive governance and financial accessibility mechanisms to ensure equitable solar expansion.

Policy and Regulation for Community Solar Expansion
Policy frameworks play a crucial role in scaling community solar projects. Nunez-Jiminez et al. simulate policy scenarios and find that allowing community solar within a 100-meter radius increases installed PV capacity by 21%, demonstrating that regulatory flexibility can significantly impact adoption rates. Adamsson presents a case study on Michigan's community solar pilots, illustrating how state agencies and local organizations can collaborate to lower energy burdens for residents in need.

Environmental Considerations in Solar Deployment
Large-scale solar projects have environmental implications beyond energy production. Turney and Fthenakis provide a comprehensive review of solar energy's environmental impact, identifying land-use intensity, human health effects, and geohydrological changes as key concerns. This underscores the need for environmentally responsible siting strategies, particularly in urban and rural interface zones.

Energy Justice
Community solar can enable energy sovereignty, combat energy burden. Aspects of energy sovereignty include self-reliance, control & ownership, sustainability, equity and justice, resilience, community engagement, economic opportunities. Challenges to energy sovereignty are marked by high initial costs, technical expertise, regulatory barriers, social and political opposition, interconnection challenges. Community-based decision making around energy issues is critical for individual agency and fairness.

2. Methodology
This is a mixed method study. Focus groups and surveys were conducted. Convened community members and leaders in three different wards met around Flint (Wards 1, 2 & 3). After providing foundational community education about what a solar co-operative is and how it can work for residents. Participants were asked how they felt about a solar co-operative as a method to reduce their energy burdens and decrease fossil fuel emissions in the city. They were then asked whether they thought they will receive health and wellness benefits from a solar co-operative. Finally, they were given an opportunity to ask questions about community solar and share any thoughts or concerns.

3. Research Questions
This project is feasibility study of a solar co-operative in Flint, where customers would buy shares in solar arrays placed at a common site and receive credit on their utility bill for the electricity generated by the solar panels they own.

1. Do the residents of Flint want and support community solar as a main source of energy?
2. Did the residents think they would benefit financially and physically from joining a solar co-operative?
3. Do the residents think joining a community solar co-operative is better that than the commercial energy provider they have now?

4. Data Collection

Data was collected during the spring of 2024 and again in the fall of 2024.
In spring 2024, we had three community engagement events in Wards 1, 2, and 3 in Flint, MI focused on educating and engaging residents on the question "What is community solar?" Residents were asked questions throughout the events to encourage discussion and get their perspective on community solar in Flint. A fourth event in spring 2024 focused on reporting out results of the first three events. A total of 39 residents attended the first three events and were surveyed, with age of participants being 25-40 yrs (17.9%), 41-55 yrs (12.8%), 56-70 yrs (30.8%), and >70 yrs (38.5%).

In fall 2024, we hosted three more community engagement events in Wards 1, 2, and 3 in Flint, MI focused on educating and engaging residents on the question "How could community solar work for Flint?" Residents were asked questions throughout the events to encourage discussion and get their perspective on how community solar may work in Flint. A fourth event in fall 2024 focused on reporting out results of the first three fall events. A total of 18 residents attended the first three events and were surveyed, with age of participants being 41-55 yrs (0.06%), 56-70 yrs (22.2%), and >70 yrs (72.2%).

5. Data and Analysis

The majority of residents responded that the most important benefits to their town from a community solar project in Flint would be reduced electricity bills for low- and moderate-income residents ($F_{2, 3}=10.99$, $P=0.042$).
Residents indicated that they would prefer that solar energy be installed at a community resilience center with the least preferred location to be brownfield land ($F_{5, 24}=5.38$, $P=0.0019$). The participants expressed concerned about land ownership changing and losing control of resources.
Residents thought that the most trusted institutions to obtain information about community solar or to sign up for community solar would be existing Flint community centers and local community organizations ($F_{5, 24}=4.29$, $P=0.006$)

6. Discussion/ Findings

According to the participants in this study, several issues concerning energy accessibility, availability, and usage need to be addressed. These items needed to be resolved by the local power company and governing municipalities. These issues are listed below.

1. Power companies don't do a good job maintaining their communities. Flint is not maintained. People lose power often and are without power for extended periods of time.
2. Misinformation about solar exists; people didn't think they could install it on their home.
3. Degrees of NIMBYism (but this isn't the usual NIMBYism because this comes from a space of distrust)
4. Acknowledgement of a level of distrust about "the system" and powers that be (e.g. Consumers, gov, university researchers)
5. There is a high level of distrust about the powers that be in the Flint community, including Consumers Energy, local and state government, and university researchers.
6. The community wants to know how they can contribute to making community solar a reality in Flint.
7. After interacting with the residents, the team comments that they were first being seen as proxy actors for the government.

7. Conclusions

We, the researchers, needed to clearly define what feasibility means from several perspectives, not just a data driven research methodology. We must acknowledge what "feasibility" looks like in the eyes of the end user, i.e. residents of the community. What structure of community solar would best serve their needs in their opinion?
A considerable amount of effort was spent building trust. Given the recent history of the water crisis in Flint and the ongoing economic devastation from deindustrialization, this is a natural reaction for the residents that remain in the area.
The research team approached this challenge with transparency. Total transparency was given in terms of who we are as a team, where we're coming from, what our goals are. The team was not just presenting decisions to residents, but wanted this exploration to be a co-participatory process, residents and participants were true stakeholders. Trust is an important factor when it comes to implementation of community solar in communities like Flint.

8. Future research

Our next steps focus on increasing community awareness of the state senate and house bills designed to loosen restrictions on community solar in Michigan. We also are contacting house of worship leaders across Flint to see if we can help connect them with Solar Faithful, a non-profit organization interested in aiding faith-based organizations in solar. Additional next steps include gaining grant funding for a demonstration project such as funding for solar on a house of worship or community center that would also serve as a community resilience center for Flint residents.

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