Solar Energy in Rochester's Crescent of Poverty

A GIS Analysis of Public Housing Potential

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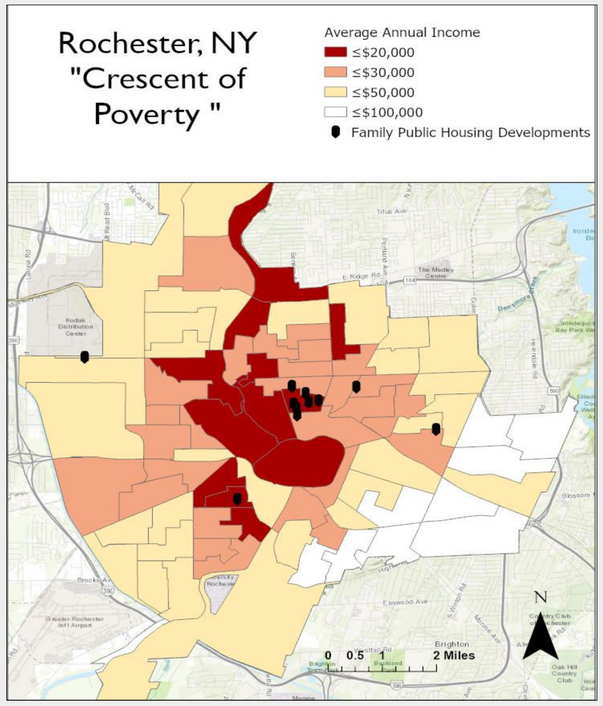
Introduction

With the depletion of our nonrenewable energy sources quickly approaching, and the growing global climate crisis, alternative sources of energy are needed. As a result, the solar energy industry has increased in popularity, providing economic benefits for residential and commercial areas and being environmentally friendly. However, the initial cost of installation and continued cost of maintenance must be considered. More often than not, the life span of solar panels (20 years), outlasts the lifespan of the average residential roof (15 years). Additionally, the average Rochesterian does not have a high enough annual income to spend thousands on a new roof to accommodate for solar panels. However, there is a large quantity of government subsidized public housing within the city of Rochester and more specifically within the "Crescent of Poverty." The peaked and south facing roof of their homes are highly suitable for solar energy. With the implementation of Rochester's Climate Action Plan in 2016 and its successor, the Climate Change Resilience Plan in 2019, turning Rochester into a green and sustainable city is a priority -- public housing could act as the catalyst with no monetary cost to the residents of public housing. Additionally, workforce development can occur through technical training and education.

Study Area

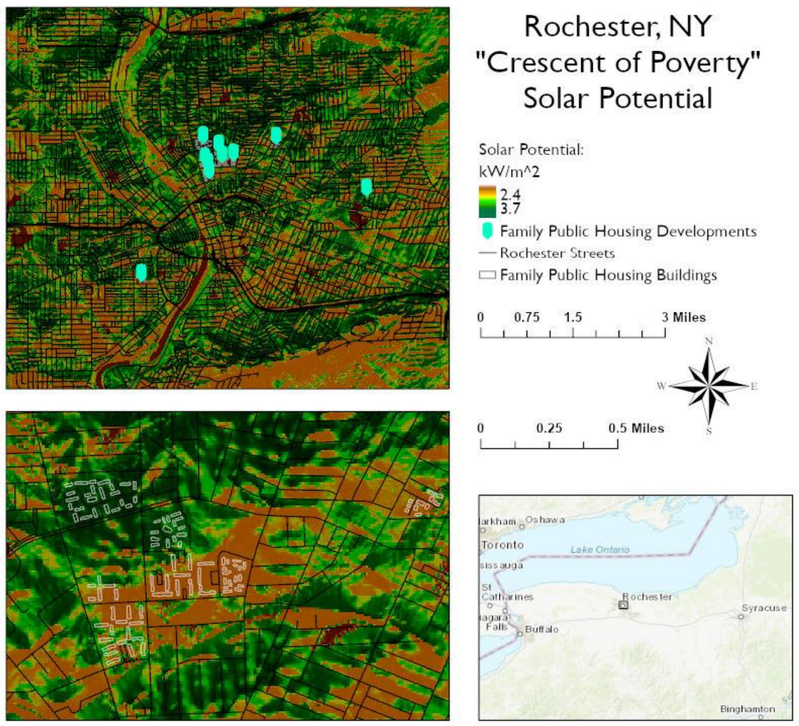
Rochester, New York is a declining rust-belt city that once flourished with major companies like Kodak. In recent years, the city's decline has resulted in alarming poverty rates with few solutions to create a sustainable and inclusive city. Like most of the residents of Rochester, those living in public housing wish to have a valuable stake in society and hope to have a lasting impact on the future of the city. By examining the solar potential for the public housing in the Crescent of Poverty, and then focusing on a single development area, the feasibility of the initiative will become much clearer. The concept of "sweat equity" allows for low-income individuals to assist in installation and maintenance of the panels, to have them on their own homes at no cost to them, thus giving them a valuable stake in the initiative.



Abstract

Both the climate crisis and poverty rates in US cities have increased rapidly, with few solutions. This research examines the relative solar potential in areas of public housing developments in Rochester, NY, specifically the area of concentrated poverty called the "Crescent of Poverty." This research also examines the societal benefits that an inclusive solar/sustainability movement provides for Rochester. Rochester is a mid-sized city with a diverse population of 210,000 residents, with an overall poverty rate >30% and a childhood poverty rate >50% (Murphy, 2018). These alarming rates have contributed to the creation of the "Crescent of Poverty", where the majority of family public housing developments are located. The solar potential is analyzed with ArcGIS Pro, where DEMs were converted to measure the solar radiation for Rochester. Solar potential is then overlaid with family public housing developments to show those that exhibit the highest potential for creation of solar energy. Qualitative data required to understand societal benefits were obtained through an examination of literature and interviews with community development officials. Results suggest that many of the areas where solar potential is at its peak are also sites of family public housing. Qualitative results reveal that through implementation of inclusive programs that involve "sweat equity", populations that are normally unable to afford solar panels may be able to actively participate in and benefit from the solar initiative, while increasing Rochester's sustainability in line with its current Climate Action Plan and the Rochester 2034 comprehensive plan.

2018	Rochester, NY	New York State	United States
Population	210,000	19.5 Million	327 Million
Overall Poverty	34%	13.6%	11.8%
Childhood Poverty	52%	19.9%	16.8%

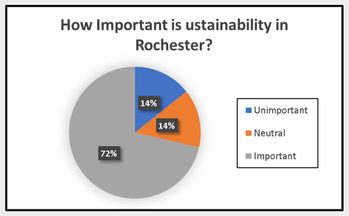


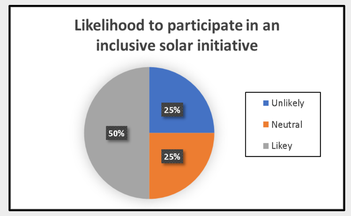
Data & Methods

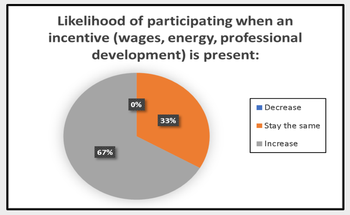
- Average annual income by census tract for Monroe County. Both point and polygon feature classes were digitized for the locations of family public housing developments in Rochester.
- Development addresses were obtained through the Rochester Housing Authority.
- A 1/3rd Arc Second DEM of the Rochester area was obtained for use of the Area Solar Radiation Tool in ArcGIS Pro, showing the solar potential for the Rochester area. This information was overlaid with public housing points to show the general solar potential where public housing developments are located.
- I distributed a Rochester Solar Energy survey through Community Development Corporations in Rochester to gauge interest and willingness to actively participate in an inclusive solar initiative.
- I conducted several interviews with members of Community Development Corporations and city employees.

Current Initiatives in Rochester and Beyond

- Rochester Climate Action Plan (2016) & Rochester Climate Change Resilience Plan (2019). These local plans focus on climate change mitigation and future steps, including community solar.
  - *"By funding solar throughout towns and municipalities in the state, residents invest in solar energy to reduce their energy bills and improve energy resilience in the event of grid failure."* – Climate Change Resilience Plan (2019)
- Efficiency Vermont: A public energy efficiency program, works to reduce the high energy cost burden on low-income communities, while also building relationships among the public and private sector.
- EmPower Maryland: A low-income program hoping to reduce up-front cost for sustainability measures, emphasizing sustainability education in the process.
- California Multifamily Affordable Solar Housing Program: Works to bring solar energy to multifamily homes, aiming to reduce energy costs for owners and tenants.







Results

- ***"It has to be a community effort, like habitat for humanity. In "Sweat Equity" the people who are willing to put in work whether physical or educational need to be the most valued and receive the most benefits."–*** Mubarak Bashir, Urban League of Rochester
- ***"This research could fit well in the Rochester 2034 comprehensive plan and Climate Change Resilience Plan, but securing funding is the first and most difficult aspect of making it a reality."–*** Kevin Kelly & Jill Wiedrick, City of Rochester Planning and Zoning Bureau
- ***"The community support from the Rochester Housing Authority, low-income community members and community development organizations, yet we as a community must now find appropriate funding sources, or one that can reallocate funds to support this initiative."–*** Harold Zink, Lead Engineer, Rochester Housing Authority

Discussion and Conclusions

The results of this research have shown that while solar potential in the city of Rochester is not at the potential found in a rural setting with minimal obstruction, the potential is relatively high with the max value at 3.7 kW/m^2 . The data have also shown that of the places in Rochester with highest potential, there are three family public housing developments that fall within the Crescent of Poverty. Additionally, it is important to note that the value 2.4 (distinguished by a yellow raster display) still holds great solar potential and feasibility for the area and the initiative. Thus all values still support the claim that family public housing can and should act as a catalyst for the solar initiative in Rochester.

If Rochester Public Housing is to be used as a piece of the Climate Action Plan or Climate Change Resilience Plan, low-income members of the community will not only have an important stake in the community through sweat equity, but they will also obtain valuable technical skills and education. If the panels are placed on family public housing, community members would be immediately connected to the green initiative and will likely develop an interest in the field because of the direct impact on them and their city. Using "sweat equity", they will gain technical training and work experience in the growing field of renewables. Because public housing is subsidized, the initial cost of the panels could be funded by the New York State Energy Research and Development Authority (NYSERDA) as part of the Climate Action Plan, as well as through NYSERDA's Clean Energy Program. Not only would low-income populations have a valued stake in the community with technical skills beneficial to their future, but the city would also move toward sustainability.

Future Research

The next steps include examining and developing financial feasibility reports for an inclusive solar initiative that is focused in low-income areas. Feasibility reports will shine light on available grants and state funding that could, and should, be reallocated to support this initiative, and provide beneficial results for all Rochesterians.

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