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This policy brief was drafted by David Yovanoff, a student at the University at Buffalo School of Law, and edited by Michael Brown, a 2017 Western New York Prosperity Fellow at PPG.

The brief discusses how community-owned solar projects and micro grids offer a sustainable alternative to reliance on the large power grid and polluting fossil fuels. It explains how micro grids work and looks at how they are connected to and can improve standard power grids or macro grids.

The brief shares examples of community-owned solar projects, from PUSH Buffalo's latest project at School 77 to projects in Colorado and Massachusetts.

PPG produced this policy brief for the Crossroads Collective, which is comprised of nine organizations working at the intersection of climate justice with economic and racial justice in Western New York.

A NEW ECONOMY FOR PEOPLE & PLANET
CROSSROADS COLLECTIVE

Policy Brief

Community-Owned Solar Power and Micro Grids for New York State

JULY 2018

New York has experienced a growing interest in community-owned renewable energy models. Communities across New York recognize the benefits solar and wind farms present; less reliance on fossil fuels means healthier ecosystems, cheaper energy costs, and an overall higher quality of life. Community-owned solar is a way to bring the benefits of renewable energy to tenants, people with low incomes, and homeowners whose roofs are not suitable for solar power.

Additionally, communities recognize the positive impacts created by a self-sustaining energy production system such as a micro grid. Without total reliance on a utility-owned energy grid, communities are better equipped to withstand price fluctuations, natural disasters, and severe weather, all of which have become increasingly frequent as climate change worsens.

Community-Owned Solar at PUSH Buffalo

PUSH Buffalo is a non-profit that combines community organizing with neighborhood development. In its Green Development Zone on Buffalo's west side, PUSH is creating housing that is both green and affordable. PUSH's latest project, School 77, has transformed an abandoned public school into affordable senior apartments as well as office space for PUSH. The large roof of School 77 is the site for Buffalo's first community-owned solar project – developed for PUSH by Montante Solar, with support from New York State's Department of Homes and Community Renewal and its Energy Research and Development Authority.

S77 Solar will be a community distributed solar array owned and operated by PUSH. The 64kW system will supply energy to the local power grid. PUSH Buffalo is registering with the state as a distributed energy resource provider and offering the energy credits from the solar array to the tenants of the building as a subscription service at a rate much cheaper than that of the local investor-owned utility.

The revenue beyond maintenance of the system will be used in a participatory budgeting process at the end of each year of operation; the buildings' tenants will decide how to allocate it for onsite projects and services – offering a model of energy democracy.

Because the project serves tenants who are also living in the same building and facing similar energy efficiency opportunities, PUSH hopes to use this project as a way to incentivize demand side management with education around energy efficiency and real energy savings opportunities. Reduced consumption will mean less use of more expensive, less sustainable power from the grid.

PUSH did not have sufficient funding to add battery storage and turn this community solar project into a micro grid, but it hopes to add that capacity in the future so that School 77 can be a resiliency hub during times of extreme heat and extreme cold.

What is a Micro Grid?

In its simplest form, a micro grid is a local energy grid with control capability, meaning it can disconnect from the traditional, public utility grid and operate independently.[1]

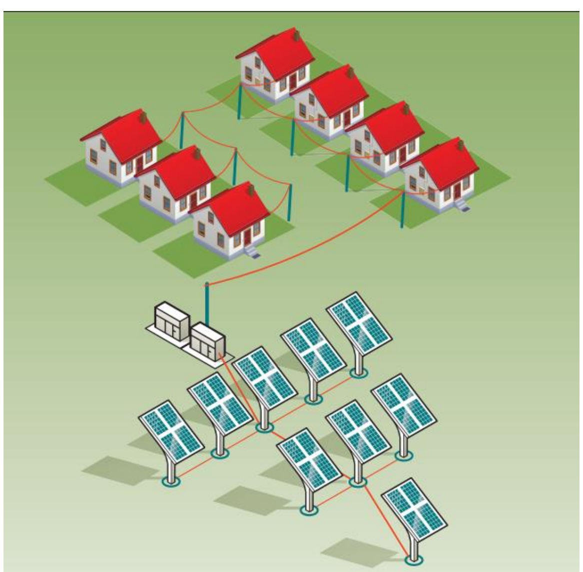
To understand how a micro grid works, one should understand how the standard grid works. The standard grid connects buildings to central power sources, which in turn, allows society to use appliances, heating and cooling systems, and electronics.[2] While this interconnectedness is convenient when all is well, if part of the grid becomes damaged or requires maintenance, large numbers of users are affected.

This is where the micro grid steps in. A micro grid generally operates while connected to the standard grid, but it can break off and operate on its own during storms, power outages, and routine maintenance updates.[3] Micro grids can be powered by distributed generators, batteries, or solar panels.

Depending on the fuel source, a well-managed micro grid has the ability to run indefinitely.[4]

A micro gird connects to the typical utility grid at a point of common coupling that maintains voltage at the same level as the main grid. Switching away from the main grid can occur automatically or manually, with the micro grid then functioning as its own island.[5] Thus, the micro grid provides backup power in the case of outages on the main grid. In addition, it can cut costs, and it can connect to local energy resources that are too small for traditional grid use.[6]

Micro grids come in a variety of designs and sizes. They can be used to power a single facility like the Santa Rita Jail in Dublin, California, or power a much larger area, such as the Fort Collins micro grid designed to power an entire district, all while generating the same amount of energy it consumes.[7]



How does a Micro Grid Work?

Today, there are more than 300,000 miles of sprawling transmission lines twisting and weaving through the United States.[8] Yet, despite the sheer size of the U.S. grid system, outages cost Americans $150 billion annually.[9] Much of this has to do with the fact that electricity has to be used the moment it is generated. Power plants cannot store surplus energy to power our air conditioners in anticipation of the next heat wave. Properly distributing power through the grid is difficult to balance at times. Power usage in a given area changes depending on the time of day and season, and conditions have become more volatile due to climate change. When temperatures rise or fall dramatically, regions as a whole require more power. But, since power plants have limited production capacities, sometimes the balancing act fails. In the past, the only way to solve this issue was to build more power plants and expand the existing grid.

Two general solutions to macro grid problems now exist: off-grid and micro grid. Off-grid systems are more expensive but have their uses. An off-grid solar system uses solar power to provide power for your home or business when the sun is up, and then stores electricity in battery cells for later use when the sun is down.

The off-grid system requires a charge controller that monitors how much energy is stored in the battery and an inverter that converts the DC power (direct current) from the solar panels and battery into AC (alternating current) power used to power appliances within the home or business.[10] Such a system, in addition to being expensive, provides a limited amount of power that is inadequate for large projects.

The grid-tied system is the preferred micro grid. These systems convert the power from solar panels directly into AC power. The power produced is fed into the building's electrical panel and provides power for all the appliances inside. Any excess power automatically flows out of the micro grid, spinning the user's meter backwards. This greatly reduces the need and expense of a charge controller and battery system in the off-grid model. As the sun goes down, the user transitions from sending power to the macro grid to taking power back, all while the meter keeps track of the directional flow.[11] Over the course of a year, there are days with more sun or clouds, and the amount of daylight seasonally fluctuates. The goal is to provide the majority of the power needed off the grid, only using the grid when absolutely necessary.

Other Examples of Community Solar

Colorado

Colorado legislation passed in 2010 that requires the Public Utilities Commission to direct investor-owned utilities to offer rebates for community-owned solar (COS) projects.[12] Multiple towns in Colorado now host 500 kW community-owned solar facilities through Xcel Energy.[13]

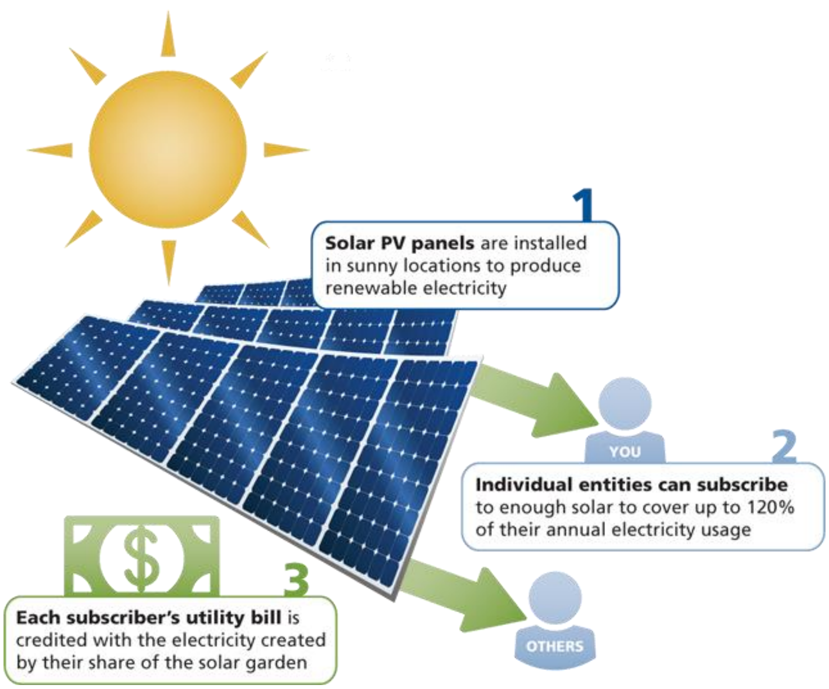
Such systems have gained intense popularity, often selling out of membership subscriptions before construction of the physical solar farm is complete. Colorado's Clean Energy Collective (CEC) designed a COS model to provide every ratepayer in a utility territory the chance to purchase individual solar panels in a shared, locally-sited, utility-scale array.[14] CEC's idea makes solar ownership realistic for renters, people in multi-dwelling buildings, properties with poor solar exposure, and low-income residents.[15]

Massachusetts

Massachusetts' Green Communities Act calls for neighborhood net-metering, authorizing a group of neighborhood residents or entire towns to pool their resources to cover the capital cost of installing a solar panel array.[16] The residents of Brewster, frustrated by a lack of solar-suitable roof space, poor sunlight exposure, and overall high up-front costs, found energy independence by forming their own COS cooperative.[17] Beginning in 2012, My Generation Energy collaborated with the newly-formed Brewster Community Solar Garden to turn a former brownfield site into a 346kW solar garden.[18]

Over a five-year term, each of the 50 members receives a credit of $6,400 on their electric bill, equating to an average savings of over $100 per month, per person.[19] After just two years, the Brewster Community Solar Garden produced 1,000,472kWh of energy for a total savings of $137,669 to the Brewster community.[20]

To date, this Community Solar Garden has offset 1,400,662 pounds of carbon dioxide emissions as well as 1,500.7 pounds of nitrogen dioxide emissions—not to mention having saved the equivalent of 13,976.6 trees.[21]



Notes

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[15] Laurel Passera, "Colorado solar opportunities continue to grow as three more community-owned solar facilities come online," *Interstate Renewable Energy Council Regulatory Reform News*, (Nov. 14, 2013) at http://www.irecusa.org.
[16] Falmouth Community Solar Garden, April 15, 2010.
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