

NEW YORK COMMUNITY SOLAR CASE STUDIES

Opportunities and Challenges

Published January 2017 by the Community Owned Shared Renewables Group of the Energy Democracy Alliance



EXECUTIVE SUMMARY

In July of 2015, Governor Cuomo announced the Shared Renewables Initiative, which aims to make solar power accessible to the millions of New Yorkers who currently lack access, by enabling innovative solar projects that could serve hundreds of homes and businesses remotely. This sparked an explosion in interest across the state. In fact, demand for community shared solar has been growing faster than any other segment of the solar industry in NY. The National Renewable Energy Laboratory (NREL) estimates that community solar could make up half of the distributed PV market as early as 2020. This makes sense when we consider that the vast majority of Americans either: 1. don't own their home, or 2. don't have an appropriate roof or other space solar panels, or 3. don't think they have the financial resources to be able to get conventional solar loans or leases.

This high level of interest is very good news for anyone who wants to accelerate the clean energy transition. Experience has shown, in countries like Denmark and Germany, that when widespread participation and ownership opportunities are afforded to citizens, broad public support for energy transition policies result. However all of these projects face significant hurdles. Despite the interest and enthusiasm, only one community solar project was switched on within the year and a half following the Governor's announcement, and it does not serve low and moderate income families.

KEY RECOMMENDATIONS

- Increase New York Sun Incentives in Rest of State (ROS) outside of the Hudson Valley and capital district to compensate for lower electric rates.
- Create incentives specifically to help low-income and moderate income New Yorkers participate in shared renewable energy projects.
- Provide pre-development support – including grants and technical assistance – to help get shared renewable projects in low- and moderate-income communities off the ground in the first place.
- Facilitate the creation of a revolving loan fund that would include some form of loan forgiveness for instances where community solar projects met pre-feasibility requirements and did not get off the ground for no fault of the communities.
- Fund regional proof of concept shared solar pilot projects in each region of the state with a view to creating replicable, scalable business models appropriate for our diverse state.
- Ensure any final rule for the Value of Distributed Energy Resources (VDER) will improve access to solar energy, provide local and community developers a level playing field, and accelerate Community Solar development in the state.

¹ Feldman, David; Anna M. Brockway; Elaine Ulrich; and Robert Margolis. "Shared Solar: Current Landscape, Market Potential, and the Impact of Federal Securities Regulation." National Renewable Energy Laboratory. U.S. Department of Energy. April 2015.

CASE STUDIES

The following five examples showcase the inspiring progress being made, and the significant challenges that diverse community groups are facing in developing shared solar.

1 *Solar One – Affordable Solar Partnership for LMI Communities in NYC – Ten 20kW Arrays*

Solar One is a non-profit organization that is working with affordable housing providers and multi-family housing cooperatives to implement new forms of onsite shared solar projects. In addition to spearheading regulatory and outreach innovations, they were instrumental in advocating for the development of solar canopies that elevate solar panels well above flat roofs making them compliant with city fire code. Canopies also dramatically increase the usable area for solar installations on city buildings. The relatively small size of most of their urban rooftop shared solar projects reduces some of the key upfront costs and other hurdles, but also results in difficulty accessing debt and equity financing. Solar One is overcoming this barrier by aggregating projects within defined time periods as well as working with strategic finance partners. In addition to facilitating conventional single-meter projects that reduce utility payments for common load electricity, Solar One is also advancing projects that deliver solar access opportunities and value to individually metered building tenants, by pioneering an alternative on-site, small-scale utilization of New York State's community shared solar regulation.

2 *PUSH Buffalo Community Solar – 80-100kW*

Push Buffalo is an economic justice non-profit organization that is working to put a community solar installation on the roof of a decommissioned school that it is redeveloping for mixed uses including affordable housing. They have site control and a preliminary system design, and are now evaluating a proposal from a local solar installer/developer around an equity investment and ownership flip partnership deal. They are working within a short pre-development timeline due to the deadlines associated with an award of Low Income Housing Tax Credits by New York State in May 2016. Employing local installers and paying fair wages are strong priorities.

CASE STUDIES

3 *Binghamton Regional Sustainability Coalition (BRSC) - Southern Tier Solar Works (STSW) Bainbridge Project - 624 kW*

Southern Tier Solar Works is the Binghamton Regional Sustainability Coalition's clean energy program, which partners with diverse organizations to educate and connect Southern Tier residents, businesses, non-profits and public entities with affordable clean energy solutions. STSW is developing a 624kW subscription-based community shared solar project to serve residents of Bainbridge, a small rural town located in the Southern Tier. The Bainbridge mayor is very supportive of the initiative, and both the property and utility infrastructure on-site are first rate. STSW has partnered with Co-op Power, who is designing a partnership-flip business model, so that project members will retain ownership of the asset after 5-6 years. The partners are seeking low-cost debt and equity financing and pre-development support to build in 2017.

4 *Red Hook - Conservation Advisory Council Community Solar Project – 1.7MW*

The Conservation Advisory Council is a municipal group in the Hudson Valley that is working to develop a 1.7 MW community solar array on municipal land that would be owned initially by Hudson Solar (Pre-Flip) with community buyout in year six once the tax attributes are used. Hudson Solar has completed the preliminary engineering

and submitted the initial interconnection application. They were informed that there were already 6.5 MW ahead of it in the queue, which would exceed the capacity of the feeder. They are waiting to find out whether those are real projects or whether they will be kicked out in the next round of the SIR.

5 *Jockey Hill Solar Farm for 9/11 First Responders – 4MW*

Solar Alliance Freedom, Inc. (SAF) was founded in 2012 by a 9/11 first responder who was injured in the line of duty, to develop community solar projects to serve LMI families, businesses, organizations and 9/11 first responders in the regions surrounding NYC. SAF purchased land on a capped landfill in the mid-Hudson valley for the first two projects: one 2 MW Subscription Offtaker Model, and one 2 MW Direct Co-op Ownership Model. A portion of the profit generated from the sale of electricity will be used to pay medical bills and provide support for 9/11 first responders and victims still suffering. SAF submitted their interconnection applications early, before applications flooded the SIR Queue and has a guaranteed place marker for connection. However, the project still needs more development funds to move forward to the next stage of completion. They are currently working to crowdfund that cost and solicit investors.

INTRODUCTION

Solar is booming in NY State and around the world, promising to bring with it dramatic economic, environmental and societal benefits. In the U.S. from 2005-2015 the installed solar capacity doubled every two years and the average installed cost dropped by 70%. Thus far, however, in the U.S. the vast majority of residential solar has been deployed in upper middle- to upper-income communities while more than a third of Americans have low to moderate income levels. According to the NY State Governor's office, "A total of 40 percent of New York State households have incomes considered low to moderate, which means they earn less than 80 percent of the median income in their area."

In addition, many Americans don't own property or don't own property with an appropriate space for a solar installation (e.g. facing the right direction, un-shaded, etc). So from a pure market growth perspective, in order to continue its rapid growth, the solar industry will have to develop new innovative ways to serve the majority of Americans who are either LMI, and/or don't own, and/or don't own a property that is appropriate for solar. From a societal perspective, for solar to produce the important economic and social benefits in addition to environmental benefits, it will have to become available to people of all income levels.

So how can the solar market expand to reach these tens of millions of Americans? One of the leading answers so far is community solar.

"A community solar project—sometimes referred to as a solar garden or shared renewable energy plant—is a solar power plant whose electricity is shared by more than one household." Shared solar projects

are usually large solar arrays that serve numerous households and/or businesses. Currently in NYS, to be considered community solar, there must be at least 10 offtakers, the project size must be no larger than 2 MW, there can be an 'anchor' offtaker who uses up to 40% of the power produced, and all other offtakers may not use more than 25kW worth of power. 'Community solar' can refer to both 'community-owned' projects as well as third party-owned plants whose electricity is shared by a community. Participants in shared solar projects can either own panels or "subscribe" to a portion of the large array that is owned by a third party. Either way, participants receive credit on their bill for the solar energy that their portion produces. Project participants not only get clean energy at a guaranteed price over time, the power costs less than the price they would ordinarily pay to their utility.

In July 2015, when the NY Public Service Commission approved the order that enabled the development of community distributed generation, the following statements were made:

"The Shared Renewables initiative will help people and communities across the state save money on local clean energy projects. This program is about protecting the environment and ensuring that all New Yorkers, regardless of their zip code or income, have the opportunity to access clean and affordable power." – *Governor Andrew Cuomo*

"Democratizing the production of power allows individuals and communities to take control of their energy future and realize the economic, social, and environmental benefits of solar and other renewable resources. As a direct result of Governor Cuomo's

² Community-Scale Solar: Why Developers and Buyers Should Focus on This High Potential Market Segment. Rocky Mountain Institute. March 2016. Written by Kevin Brehm et al. <http://www.rmi.org/Content/Files/RMI-Shine-Report-CommunityScaleSolarMarketPotential-201603-Final.pdf>

³ "Governor Cuomo Announces \$3.6 Million Available to Help Low-to-Moderate Income Residents Access Clean, Affordable Solar Energy." December 6, 2016. <https://www.governor.ny.gov/news/governor-cuomo-announces-36-million-available-help-low-moderate-income-residents-access-clean>

⁴ Energy Sage. <https://www.energysage.com/solar/community-solar/community-solar-power-explained/> Accessed December 29, 2016.

⁵ What's Going On with Net-Metering in NY? Energy Democracy Alliance guide to the changing "value of solar" energy policy in New York http://www.allianceforagreeneconomy.org/sites/default/files/Value_Of_Distributed_Energy_Policy_Guide.pdf

INTRODUCTION

leadership and the Reforming the Energy Vision initiative, New York State is once again at the forefront of progressive energy policy by empowering millions of our residents, schools, and businesses to choose renewable power for the first time.” – *Richard Kauffman, Chairman of Energy and Finance for New York.*

“Under Governor Cuomo’s REV initiative, Shared Renewables expands consumer access to reliable, low-cost electricity generated from renewable energy facilities. Shared Renewables places customers who do not own homes on an equal footing with traditional single-home customers and creates opportunities for low- and moderate-income families who don’t have access to electricity generated from renewable resources.” – *Public Service Commission Chair Audrey Zibelman*

Yet, more than a year after those statements were made, New York has seen little on-the-ground development of shared renewable energy. To date, only one shared renewable energy project has been connected to the grid and it does not serve LMI citizens. According to GTM Research, New York has approximately 2 GW of proposed community solar projects, but progress has been sluggish.

In response to public pressure, in early December of 2016, Governor Cuomo announced that \$3.6 million would be made available through NY-Sun “to address barriers to solar for low- to moderate-income residents in properties not served by conventional solar.”

Example Community Solar Array



⁶ Press release from Governor Cuomo’s office. “Shared Renewables Program Provides New Opportunities for New York Residents and Businesses to Access Clean and Affordable Energy” <https://www.governor.ny.gov/news/governor-cuomo-announces-expanded-access-renewable-energy-millions-new-yorkers>

⁷ NYSERDA Announces Completion of State’s First NY-Sun Community Shared Project. <https://www.nyserda.ny.gov/About/Newsroom/2016-Announcements/2016-10-18-NYSERDA-Announces-Completion-of-States-First-Shared-Solar-Project>

⁸ NY Has Nearly 2 Gigawatts of Proposed Community Solar. Greentech Media. By Katherine Tweed. August 24, 2016. <https://www.greentechmedia.com/articles/read/new-york-has-nearly-2-gigawatts-of-proposed-community-solar>

⁹ Governor Cuomo Announces \$3.6 Million Available to Help Low-to-Moderate Income Residents Access Clean, Affordable Solar Energy. Dec 6, 2016. <https://www.governor.ny.gov/news/governor-cuomo-announces-36-million-available-help-low-moderate-income-residents-access-clean>

KEY BARRIERS

These efforts, and others like them, are engaging low and moderate-income communities, farmers, schools, as well as a range of other stakeholders. In different ways, the projects are overcoming implementation and investment challenges through a variety of innovative approaches, business models and ownership structures. However, despite all of this progress, many of these projects may never come to fruition due to several key barriers:

- Lack of risk capital for upfront development costs
- Lack of access to term financing and tax equity
- Interconnection challenges
- Policy Changes

In the case of small projects, as seen with the examples 1 and 2 from Solar One and PUSH Buffalo in the multifamily housing sector, the challenge is not the risk capital required to develop any single roof, but rather the lack of access to term financing and tax equity. (Although, note that they e.g. Solar One could also run into the challenge of not having enough resources to build enough projects to aggregate.)

The challenge facing the larger, more technically complex projects outlined in examples 3, 4, and 5 from Southern Tier Solar Works, Red Hook, and Freedom Solar Alliances is pre-development capital. Many investors might be interested in a fully permitted project, but most are not willing to risk capital on the expensive system impact studies and environmental permitting needed to initiate one of these projects.

More specifically, in the case of these larger community shared solar projects, developers need to spend tens of thousands of dollars just to determine whether the project is technically feasible. Pre-development costs include:

- Site selection & assessment
- Interconnection approval fees & upgrades
- System engineering & design
- Community education & subscriber recruitment
- Permitting fees
- Site procurement costs

- Pre-development financing
- EPC - RFP
- Software

The timing of a project is a key determinant of risk. If the developer moves slowly, taking each stage of the process one at a time, they are exposed to much less risk. However, this is not always possible or desirable, from a financial perspective. One of the catch 22's of this upfront funding need, is that community solar groups are finding that in order to get the financing they need to build their solar project, they need to demonstrate control of the site. In order to demonstrate control of the site, community solar developers often need the money to either buy or lease the site.

The SIR Proceeding and a working group are focused on addressing the interconnection challenges that exist. They are working to solve the problems such as: prohibitively expensive [grid] upgrade costs; issues of queue management; and instances of additional costs being layered onto projects by utilities late in the development process.

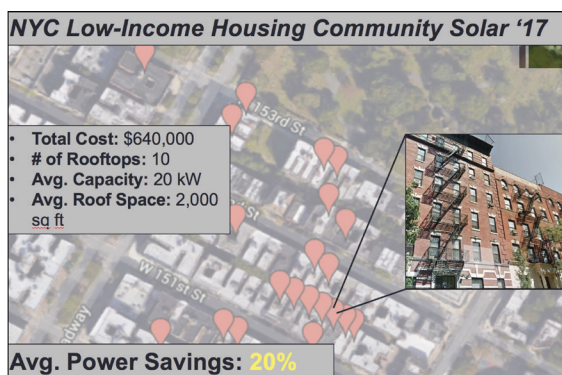
Lack of access to technical expertise is slowing down community solar projects in some instances. And the Federal Tax Credit makes it difficult for municipalities and nonprofits to own and benefit from solar installations, except as off-takers.

Policy changes such as tax credits expiring, net-metering policies changing, etc. can also become key barriers to the success of these projects. A case in point: at the end of October, NY State released the State Staff Report and Recommendations in the Value of Distributed Energy Resources Proceeding, which outlines the state's suggested successor tariff to net metering. While this progress is encouraging, the current uncertainty about how investors in solar will be compensated makes it impossible to know what the return on investments in shared renewables will be until the Value of Solar Proceeding is complete, thus making it nearly impossible to put together the financing for these projects.

CASE STUDY 1: SOLAR ONE

"Solar One and its partners are committed to piloting innovative approaches to deploying solar that expand access to the benefits among low-income communities, affordable housing providers and multifamily building dwellers who face significant barriers to solar adoption. Our pilot aims to demonstrate new models that empower more New Yorkers to participate in our transition to clean, distributed power."

AFFORDABLE SOLAR PARTNERSHIP (ASP) PROJECT OVERVIEW	
Project Location	NYC, NY
Site Type	Multiple Housing Development Fund Corporation (HDFC) rooftops and affordable housing rooftops
Utility & Load Zone	ConEd (Load Zone J)
Project Size	200 kW
Mounting System	Conventional penetrated and ballasted, as well as elevated canopy systems
Project Sponsor	Solar One (Here Comes Solar)
Sponsor Incorporation	Nonprofit
Project Financier / Term Owner	Co-op Power
Selected EPC	GRID Alternatives
Number of Apartments Served	Varies by project: 10 - 80 units
Target CDG Subscribers	Common area loads, residents of HDFCs and residents of affordable housing developments
Project Model(s)	Subscription Model, with preference for ownership stake in the venture for subscribers
Community Solar Member Management	Co-op Power / Housing Provider / HDFC board
O&M	GRID Alternatives
Expected COD Date	August 1, 2017



PROJECT SUMMARY

Shared solar creates new opportunities for multi-family residents and low-income households to reap direct financial benefit from solar. In New York City, starting in the Summer 2016, Here Comes Solar (HCS), an initiative of the non-profit Solar One, will work closely with affordable housing providers and multi-family housing cooperatives to implement new forms of onsite shared solar projects that take advantage of high local demand, while overcoming constraints and barriers that are common to the urban context. Here Comes Solar has partnered with Co-op Power -- a regional energy cooperative specializing in alternative financing strategies -- and GRID Alternatives Tri-State -- the local branch of the nation's largest nonprofit solar installation company -- to bring 3rd party financing and affordable pricing to the multi-family market in NYC through the Affordable Solar New York program. Specifically, HCS is helping groups of cooperatives and community development corporations (CDCs) that own and manage affordable housing properties move forward with onsite rooftop solar projects. In many cases, virtual net-metering will be utilized in order to enable individually metered shareholders and residents to subscribe to shares of the solar arrays on their buildings, and therefore realize direct savings on their individual electricity bills. In addition to virtual net metering, the initiative aims to integrate several novel design elements to make these projects viable and cost-effective, including elevated canopy installation, third-party financing and property aggregation.

Development Stage of Project:

In partnership with Co-op Power and Grid Alternatives Tri-State, Solar One is working to identify sites through the fall of 2016 with the intention of breaking ground on the first set of 3rd-party financed community solar in NYC in the Spring of 2017.

DEVELOPMENT PROGRESS AND BUDGET			
Activity	Completed?	Date Completed	Cost
Site Control - Roof(s) Identified	Yes	<i>Rolling Basis</i>	Covered by Solar One
System Engineering and Design	Yes	<i>Rolling Basis</i>	Covered by GRID Alternatives
Interconnection Application(s) Submitted	No	<i>Rolling Basis</i>	Free
System Impact Study Report	N/A	-	-
Interconnection Agreement Executed (beginning utility upgrades construction)	No	<i>Rolling Basis</i>	<\$5,000/project - built into EPC budget
Civil & Environmental Engineering	N/A	-	-
Environmental Permitting	N/A	-	-
Contingency Budget	N/A	-	-
Development Cost Total:	-	-	<\$5,000 / project

Main Barriers

Access to Capital for Small Sized Projects. It is difficult to find equity and debt investment for 20-40 kW projects, which characterize much of the multi-family solar opportunities. By aggregating multiple properties at once, either through networks of private co-ops or with portfolios commonly owned by a single CDC, this barrier can be mitigated.

Lack of Term Financing Options. In the solar industry, small commercial projects like this are known as the “donut hole” from an investment standpoint. Solar investors like to have 250 kW at a time, if not 500 kW due to the complexity of each deal. This leaves many small commercial projects without access to financing unless they are bundled with other similar projects. Solar One partner Co-op Power is a unique actor in the solar financing space in that they are actively targeting small and moderate-sized projects that are typically avoided by the industry as a whole. Project aggregation within defined time periods is one of the keys to mitigating project finance challenges related to scale.

NYC Permitting & Construction Challenges. Permitting and construction in NYC take longer and involve higher levels of uncertainty than in many other markets . This is due to the complexity of local building and fire codes, and the high level of effort required to comply with the latter in order to obtain permits. However, significant progress is being made at the city level to remove bureaucratic barriers and streamline permitting and inspection processes.

Fire Code. The NYC fire code requires access pathways for firefighters on rooftops that restrict solar capacity potentially significantly for flat roof projects. The only way around this constraint in many cases is to elevate arrays higher than 9 feet off the surface of the roof with a canopy structure. This design alternative can make ineligible sites viable, and increase capacity potential significantly. However, canopies also entail greater material investments and therefore add to overall project costs.

Project Follow Up Resources

- Website: <http://herecomessolar.nyc/>

CASE STUDY 2: PUSH BUFFALO

"Our goal in developing community solar is to maximize benefits - living wage jobs, energy security, and community control - for low income residents and working families on the West Side of Buffalo. Right now we're struggling to meet that goal in a policy environment that is lacking in financial incentives for projects that deliver direct benefits to low and moderate income communities."

AFFORDABLE SOLAR PARTNERSHIP (ASP) PROJECT OVERVIEW	
Project Location	Buffalo, NY
Site Type	Decommissioned school slated for mixed use redevelopment featuring affordable housing
Utility & Load Zone	National Grid (Zone A)
Project Size	80 kW - 100 kW
Mounting System	Rooftop ballast-mounted system
Project Sponsor	PUSH Buffalo
Sponsor Incorporation	Nonprofit
Project Financier / Term Owner	<i>TBD - in discussion with Co-op Power</i>
Selected EPC	<i>In discussion with local solar installers/ developers</i>
Number of Apartments Served	20-25 (~3 kW/ household) + non-profit anchor (PUSH)
Target CDG Subscribers	Low-income community members; PUSH Buffalo as anchor
Project Model(s)	Subscription Model, with preference for ownership stake in the venture for subscribers
Community Solar Member Management	PUSH Buffalo
O&M	Local solar installer/ developer
Expected COD Date	<i>TBD</i>

PROJECT SUMMARY

Push Buffalo, a community organization dedicated to economic, social, and housing justice for low income residents living on the West Side of Buffalo, NY, is redeveloping an old school building for affordable housing and mixed use office space for the organization and two additional non-profit tenants. Hoping to further the organization's dual missions of environmental sustainability and energy democracy, the building is being developed to not only be energy efficient but to house an 80-100 kW rooftop solar PV array. PUSH is struggling to work within a short pre-development timeline associated with an award of Low Income Housing Tax Credits by New York

State in May 2016. They have been in negotiations with a local solar PV installer/developer about a potential PPA arrangement where the solar development company would monetize the tax credit and potentially sell the system back to PUSH after 7-10 years. PUSH is looking into community ownership structures for a future buy-back and is consulting with community members about attaching high road labor standards to the project, such as local and targeted hiring and prevailing wage requirements.

Development Stage of Project:

PUSH Buffalo has site control and a preliminary system design, and is now evaluating a proposal from a local solar installer/developer around a PPA and ownership flip partnership deal.

DEVELOPMENT PROGRESS AND BUDGET			
Activity	Completed?	Date Completed	Cost
Site Control - Roof(s) Identified	Yes	2016	-
System Engineering and Design	Yes	December 2016	-
Interconnection Application(s) Submitted	No	-	\$750
System Impact Study Report	N/A	-	-
Interconnection Agreement Executed (beginning utility upgrades construction)	No	-	Unknown
Civil & Environmental Engineering	N/A	-	-
Environmental Permitting	N/A	-	Unknown
Contingency Budget	No	-	Unknown
Development Cost Total:	-	-	-

Main Barriers

Small Size of Project. Difficult to find equity and debt investment in a project of this size.

Lack of Term Financing Options. Low cost of electricity in upstate NY, small project size, and limited CDG block incentives in ROS make project unattractive to developers.

Valuing the Role of the Nonprofit Project Sponsor. Because nonprofits cannot monetize the tax credit, they currently have to work with a for-profit entity that can. It is proving difficult to put a monetary value on the nonprofit's role as initiator and intermediary in the project when negotiating contract terms with solar developers.

Project Follow Up Resources

- Website: <http://pushbuffalo.org/>
- Facebook: <https://www.facebook.com/push.buffalo>

CASE STUDY 3: BINGHAMTON REGIONAL SUSTAINABILITY COALITION (BRSC) & SOUTHERN TIER SOLAR WORKS (STSW) BAINBRIDGE PROJECT

"Southern Tier Solar Works and the Binghamton Regional Sustainability Coalition are committed to developing shared solar projects that provide an environmentally sound alternative to fossil fuels in the Southern Tier Region. While the regional economy is on the rebound, rural areas in particular remain depressed, so our shared solar projects prioritize access for LMI residents. We see shared solar as an alternative to Fracking, which almost consumed the region, and as an economic and employment engine. It also provides a sustainable way that landowners can profit from their properties, while preserving them for future generations."

BRSC & STSW PROJECT OVERVIEW

Project Location	Bainbridge, NY
Site Type	Ground Mount
Utility & Load Zone	NYSEG (Load Zone E)
Project Size	624 kW
Mounting System	3.5 acres (\$1,250/acre)
Project Sponsor	BRSC/STSW
Sponsor Incorporation	Nonprofit
Project Financier / Term Owner	Co-op Power
Selected EPC	TBD
Number of Apartments Served	TBD
Target CDG Subscribers	Businesses, Organizations, LMI Families, and other families in and around Bainbridge
Project Model(s)	Subscription Model, with preference for ownership stake in the venture for subscribers
Community Solar Member Management	Co-op Power
O&M	TBD
Expected COD Date	TBD

PROJECT SUMMARY

In the fall of 2016, several residents of Bainbridge, a small rural town located in the Southern Tier county of Chenango, invited Southern Tier Solar Works Program manager Adam Flint to meet with Mayor Phillip Wade to discuss developing a community shared solar project to serve the mostly low and moderate income residents of the town. Mayor Wade was already familiar with NYSERDA programs, and had already explored whether the town's load could be offset by solar. Because Bainbridge receives a very low rate from the New York Power Authority it – like most upstate municipalities – could not save through conventional solar investments.

Adam also pointed out that the subscription model that would provide access regardless of credit or income was not currently economically viable, given insufficient NYSERDA incentives and lack of access to pre-development funds. They decided to persevere regardless and, after going through the initial interconnection phases and property analysis, the STSW team returned to report that the site and available NYSEG infrastructure is first rate.

Together with their development partner, Co-op Power, STSW is modeling the project, and the development funding needed is outlined in this case study. The team is also getting cost estimates from installers in the region. In order

to deliver at least 15% savings, and allow the broadest subscriber access, the project will require debt financing below 5% and equity financing at around 17%, both of which are well below market rates. The partners are approaching current and potential finance and philanthropic partners to secure capital on terms necessary to develop the project as envisioned.

Development Stage of Project:

BRSC's engineering partner, Taitem Engineering, has completed the preliminary system design, and has evaluated the property as first rate for solar development. NYSEG's response indicates that there are no other projects on the circuit, making this a great opportunity. BRSC repurposed funds from an existing grant and paid \$5,000 to NYSEG for a full study (CESIR) and to hold the project's place in the interconnection queue.

DEVELOPMENT PROGRESS AND BUDGET			
Activity	Completed?	Date Completed	Cost
Site Control - Land lease initial due diligence & first year payment (\$1,250/acre)	No	Pending	\$4,500
Town Permit Application Fee	No	Pending	\$550
System Engineering and Design (interconnection)	Yes	In Process	\$5,000
Interconnection Application(s) Submitted	Yes	In Process	\$750
System Impact Study	No	In Process	\$5,000
Civil Engineering Survey; Site Prep	No	TBD	\$10,000
DEC Modified Closure Permit and Storm Water Permit	Awaiting Development funds.	TBD	\$3,550
Contingency Budget	Awaiting Development funds.	TBD	\$10,000
Development Cost Total:	-	-	\$39,350



Bainbridge site view



Site aerial (owner's house circled in red)

Main Barriers

Development Capital. Approximately \$40,000 in pre-development costs are required as a fully at-risk cost, and once it is spent, the result of the study may be that the developer needs to pay over \$125,000 to start the interconnection process. The Binghamton Regional Sustainability Coalition, a non-profit, does not have this risk tolerance or capital. In addition, the recently released NYSERDA pre-development program doesn't cover interconnection, permitting, or initial lease payments.

Lack of Term Financing Options. Low cost of electricity in upstate NY, and limited CDG block incentives in Rest of State (ROS) make project unattractive to developers.

Project Follow Up Resources

- Website: <http://SouthernTierSolarWorks.org>
- Facebook: <https://www.facebook.com/STSWNY>

CASE STUDY 4: TOWN OF RED HOOK

"In keeping with the Town of Red Hook's pledge to reduce GHG emissions by 20% by 2020 as stated in our Climate Action Plan, we have engaged a local developer (Hudson Solar) to design and develop a 1731 kW AC solar garden on Village of Red Hook property. The development of a viable CDG project locally will enable residents, who cannot benefit from residential roof mounted solar programs, to participate in reduction of GHG as off-takers of the community solar garden."

RED HOOK CONSERVATION ADVISORY COUNCIL PROJECT OVERVIEW	
Project Location	Red Hook, NY
Site Type	Town-owned land that's set aside for well water
Utility & Load Zone	Central Hudson
Project Size	1.7 MW
Mounting System	Fixed ground-mounted array
Project Sponsor	Town of Red Hook: Conservation Advisory Council
Sponsor Incorporation	Municipal Group
Project Financier / Term Owner	Hudson Solar (Pre-Flip) with community buyout in Year 6 once tax attributes have been used.
Selected EPC	TBD
Number of Apartments Served	283 (~6 kW / household)
Target CDG Subscribers	Red hook municipal meters and residents
Project Model(s)	Subscription Offtakers
Community Solar Member Management	TBD
O&M	TBD
Expected COD Date	<i>Uncertain due to funding constraints</i>

PROJECT SUMMARY

Denis Collet, and other members of the Red Hook Conservation Advisory Council (RHCAC) want to power their town with truly community-owned solar installations. They are developing a 1.7 MW project in Red Hook which would be built using a tax equity investor flip model which would allow the solar installation to be bought by the community once the tax credits were monetized. Utility delays, high costs, and lack of transparency with Central Hudson have held up this project and made it extremely difficult to develop.

The Redhook community is frustrated with the outcomes of the community distributed generation process thus far. The spirit of the initiative was to allow communities to develop solar as a source of energy, yet to date it has primarily provided opportunities for large scale developers leaving grass roots organizations, which are comparatively under-resourced, unable to participate.

Development Stage of Project: RHCAC's selected project developer and contractor, Hudson Solar, has completed the preliminary engineering and submitted the initial interconnection application.

DEVELOPMENT PROGRESS AND BUDGET			
Activity	Completed?	Date Completed	Cost
Site Control - Roof(s) Identified	Yes	Nov 2015	N/A
System Engineering and Design	Yes	May 31, 2016	<i>Designed in cooperation with Hudson Solar.</i>
Interconnection Application(s) Submitted	Yes	June 18, 2016	\$350
System Impact Study Report	<i>Awaiting Development funds.</i>	-	\$35,000
Interconnection Agreement Executed (beginning utility upgrades construction)	<i>Awaiting Development funds.</i>	-	<i>Unknown</i>
Civil & Environmental Engineering	<i>Awaiting Development funds.</i>	-	<i>Unknown</i>
Environmental Permitting	<i>Awaiting Development funds.</i>	-	<i>Unknown</i>
Contingency Budget	<i>Awaiting Development funds.</i>	-	<i>Unknown</i>
Development Cost Total:	-	-	>\$35,350

Main Barriers

- **Interconnection Issues.** After submitting the initial interconnection application, the group found out that there were already 6.5 MW ahead of it in the queue and that it would cost \$35,000 to complete a system impact study. They were also informed that the 6.5 MWs already in the queue would exceed the capacity of the feeder, which would require even more substantial upgrades at the substation to correct. It was initially impossible to tell which developers were ahead of them in the queue until the new SIR regulation corrected this in 2016.
- **Development Capital.** The \$35,000 impact study is required as a fully at-risk cost, and once it is spent, the result of the study may be that the developer needs to pay over \$500,000 to start the interconnection process. Hudson Solar, the partner developer, does not have this risk tolerance or capital. As an example: Cypress Creek paid an average of \$25,000 per (CESIR) to determine the interconnection and infrastructure upgrade costs for 18 of its projects in the Central Hudson queue. The average estimated upgrade cost per project was \$1.5 million. One project upgrade was estimated at \$3.9 million.
- **Lack of Access to Technical Expertise.** Red Hook needs an expert in utility scale power as a resource to look at the utility responses and coach them about what to expect from the circuit.
- **Federal Tax Credit.** Makes it difficult for municipalities and nonprofits to own and benefit from solar installations, except as an off-taker.

Project Follow Up Resources

- Website: <http://www.redhook.org/advisorycommittees/conservationadvisorycouncil.html>

CASE STUDY 5: JOCKEY HILL SOLAR FARM

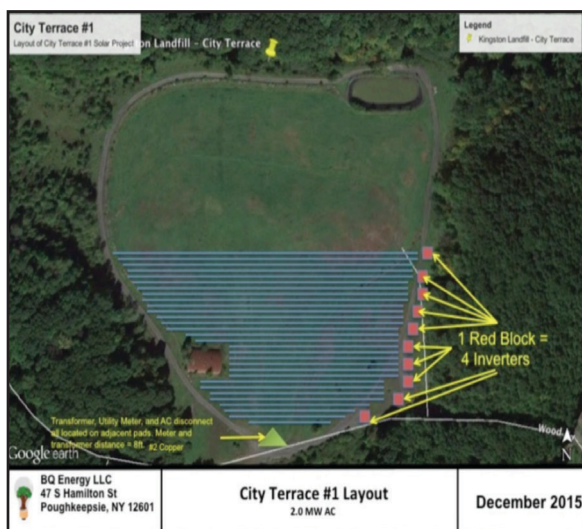
"Solar Alliance Freedom is committed to building affordable sustainable solar projects to benefit quality of life, financial stability, and energy equality through community partnerships. Our CDG programs are targeted to help municipalities, businesses, and low to moderate income residents. 9/11 First Responders in particular, will receive the financial benefits of clean renewable solar energy. Together we can lower Co2 emissions and mitigate climate change."

JOCKEY HILL SOLAR FARM PROJECT OVERVIEW	
Project Location	Mid-Hudson Valley, NY
Site Type	Capped Landfill
Utility & Load Zone	Central Hudson (Load Zone G)
Project Size	Two 2 MW Projects - 4 MW
Mounting System	Fixed ground-mounted array
Project Sponsor	Freedom Solar Alliances Holding Company
Sponsor Incorporation	For-Profit; with a social mission
Project Financier / Term Owner	<i>In the process of contracting with investors/ Solar Alliance Freedom, Inc.</i>
Selected EPC	BQ Energy, LLC, NY also working with 2-3 EPCs to develop - one in California, one New Jersey and one in Albany
Number of Apartments Served	1,333 (~3 kW/ household)
Target CDG Subscribers	Central Hudson Utility Territory, Businesses, Organizations, LMI Families, and 9/11 first responders in the Hudson Valley.
Project Model(s)	One 2 MW Subscription Offtaker Model; One 2 MW Direct Co-op Ownership Model
Community Solar Member Management	<i>Will be run by Solar Alliance Freedom staff or contracted out to vendor.</i>
O&M	TBD
Expected COD Date	<i>Contingent on Access to Development Funds</i>

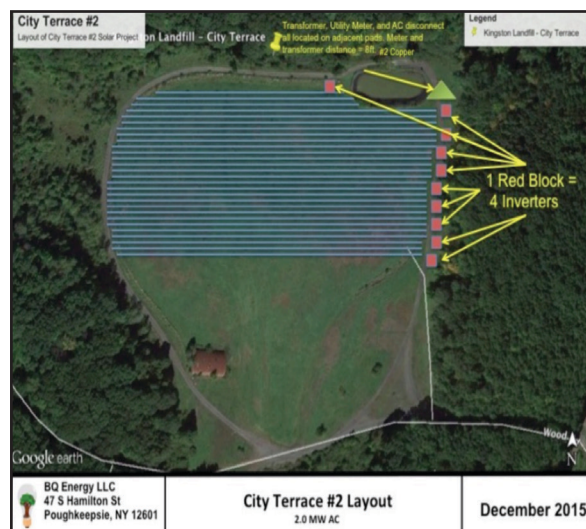
PROJECT SUMMARY

Solar Alliance Freedom, Inc. (SAF) founded by 9/11 first responder Azriel Alleyne, is developing 4 MWs of solar with a unique and important mission: a portion of the profit generated from the sale of electricity will be to use pay medical bills and provide support for 9/11 first responders and victims still suffering. This project will be built on

a 49-acre landfill in NY's Mid-Hudson Valley. The Jockey Hill Solar Farm will generate clean electricity to power homes, businesses and municipalities in the Central Hudson Territory. SAF was founded in 2012, but Azriel began working on a community shared solar program for LMI individuals in 2009. As a 9/11 first responder, he waited over a decade to receive support from the state for his medical bills and injuries caused by the 9/11 attacks. He was frustrated by the amount of resources that were siphoned off by lawyers and doctors and made it his mission to make a difference for 9/11 victims with renewable energy. When he finally receive his 9/11 settlement in 2012, he took a large portion to purchase the land, hired an attorney to create the businesses, and began the process of creating his vision of renewable energy healing the world. The first big step occurred in 2012 when the company purchased 49 acres to begin the process of using a reclaimed landfill for solar. Azriel's investment in the The Jockey Hill Solar Farm project is a way to heal, create clean energy, and give back to other victims by generating ongoing resources for 9/11 first responders who have experienced energy insecurity and a lack of medical and public support.



Jockey Hill Solar Farm Site Overview: (City Terrace#1)



(City Terrace#2)

Development Stage of Project:

In 2015 SAF applied for interconnection approval, (before applications flooded the SIR Queue and before the rules changed), for two 2 MW projects (state limit on size per parcel changed in 2009). These SAF Jockey Hill Solar Projects are grandfathered under Monetary and Volumetric Credits and have a guaranteed place marker for connection.

Central Hudson granted permission to interconnect both projects and, if SAF moves forward with the projects by Feb. 2017, Central Hudson would provide the interconnection at a reduced rate. A preliminary review has been completed and found that only one transformer switch may have to be upgraded. SAF is grateful for the breakthrough and the assistance from Central Hudson and BQ Energy.

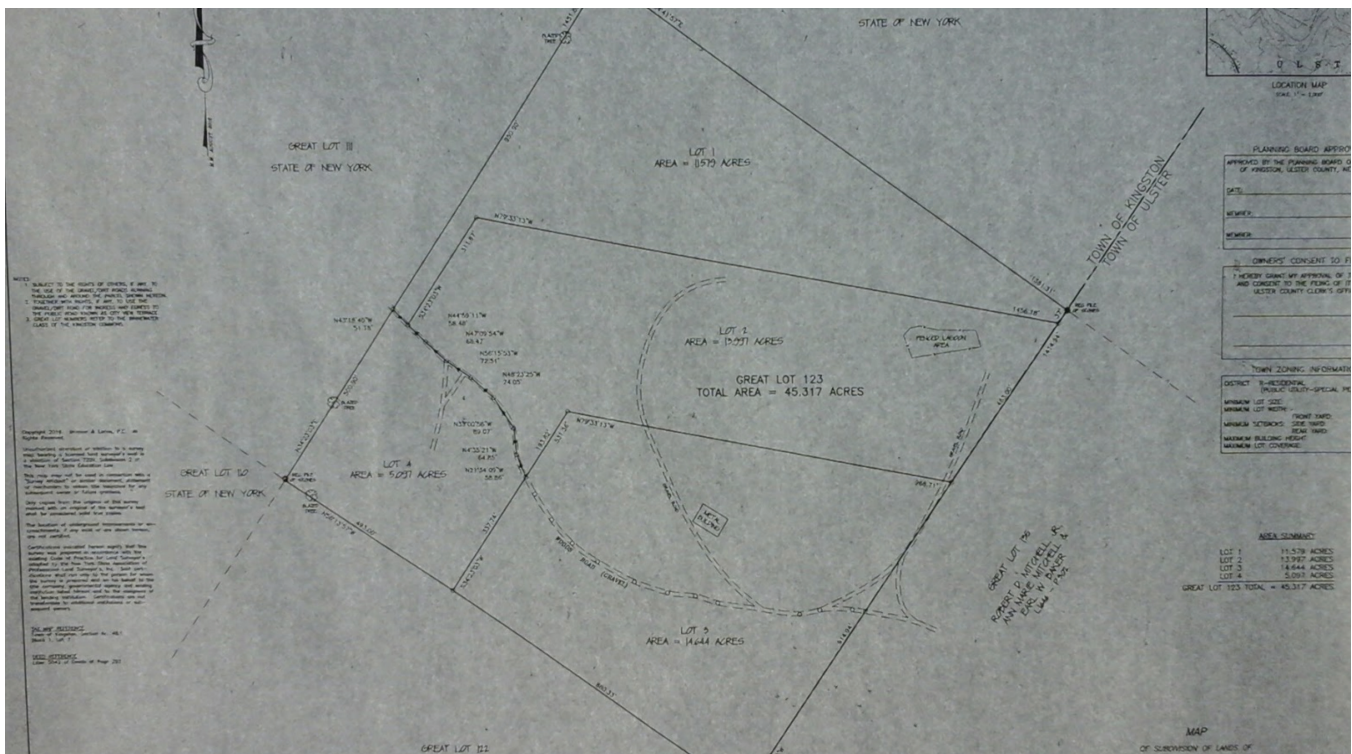
SAF is considering two interconnection options: 1. Connect into the large Hurley substation, which is close by and would enable access to NY State wholesale markets; or 2. Install a line underground to a 13.2 KV interconnection point using Central Hudson distribution lines. This is more cost effective than running a higher priced line to the Hurley substation or buying a step-up transformer. SAF is in the process of solidifying two municipalities as off takers, and beginning the process of soliciting subscription members. The project still needs additional funding to move forward. They are currently soliciting investors and working to crowdfund the needed development capital.

DEVELOPMENT PROGRESS AND BUDGET

Activity	Completed?	Date Completed	Cost
Site Control - Land Purchased	Yes	April 2013	\$11,150
Town Permit Application Fee	Yes	Pending	\$225
System Engineering and Design	Yes	December, 2015	<i>BQ Energy Special rate for 9/11 Solar project</i>
Interconnection Application(s) Submitted - two 2 MW projects	Yes	December, 2015	\$350 x 2 = \$700
Interconnection Agreement Executed (beginning utility upgrades construction)	<i>Awaiting Development funds.</i>	<i>TBD</i>	\$40,000
Civil Engineering Survey; Site Prep; Parcel Subdivision	Yes	November, 2016	Filing fee:\$1,175 Eng:\$8,500 Dep: \$2,125 Balance: \$6,375
DEC Modified Closure Permit and Storm Water Permit	<i>Awaiting Development funds.</i>	<i>TBD</i>	\$1,500
Contingency Budget	<i>Awaiting Development funds.</i>	<i>TBD</i>	\$5,000
Development Cost Total:	-	-	\$70,750



Site Interconnection Points



Site Survey and Subdivision Map

Main Barriers

1. Interconnection Challenges

- Solar Alliance Freedom, Inc. in 2014 originally wanted to develop a 10 MW project to interconnect through the NYISO Transmission Lines, but was forced to downsize to Two 2 MW projects and interconnect through less expensive Central Hudson distribution lines.
- A step-up transformer would have been required for a 10 MW utility interconnection to NYISO 345 KV lines 500ft away from Jockey Hill Site - originally quoted \$2.8 million for step-up transformer.

2. Development Capital. Need estimated at \$70,750 total. This funding is at-risk and will take at least two years to recover. Without alternatives, SAF is working to crowd-fund this cost.

3. Grant Funding Challenges. In 2013 we applied for several grants: one from the National Science Foundation, and one through DOE's SunShot. Grant application responses were pending on the basis that SAF partnered with a municipality or college. Due to not having enough of the development processes completed in 2013, and because municipalities didn't understand the benefits of solar farms enough to partner on the projects, the grant awards were lost.

Project Follow Up Resources

- Freedom Solar Alliance Website: <http://www.freedomsolaralliances.com/>
- Freedom Solar Alliance Facebook Page: <https://www.facebook.com/FreedomSolarAlliancesLlc/?fref=ts>
- Indiegogo Crowdfunding Campaign. The project is crowd-funding it's development costs. See more details here: <https://www.indiegogo.com/projects/the-jockey-hill-solar-farm-for-9-11-responders#/>

REFERENCE MATERIALS

For more information about Community Shared renewables and associated business model innovation, strategies for serving low-income communities, etc see:

- **Breaking Ground: New Models that Deliver Energy Solutions to Low-Income Customers.** Rocky Mountain Institute. 2016. Written by Coreina Chan, Kendall Ernst, and James Newcomb. http://www.rmi.org/elab_leap_resources
- **Community-Scale Solar: Why Developers and Buyers Should Focus on This High Potential Market Segment.** Rocky Mountain Institute. March 2016. Written by Kevin Brehm et al. <http://www.rmi.org/Content/Files/RMI-Shine-Report-CommunityScaleSolarMarketPotential-201603-Final.pdf>
- **Shared Renewable Energy for Low-to Moderate-Income Consumers: Policy Guidelines and Model Provisions.** Interstate Renewable Energy Council. 2016. <http://www.irecusa.org/publications/shared-renewable-energy-for-low-to-moderate-income-consumers-policy-guidelines-and-model-provisions/>
- **Community Solar: Program Design Models.** Produced by SEPA (Solar Electric Power Association) in conjunction with Solar Market Pathways. Written by Dan Chwastyk and John Sterling. http://www.sepapower.org/media/422096/community-solar-design-plan_web.pdf
- **Accelerating Adoption of Community Solar: Demonstration of a survey-based forecasting technique to optimize program design and marketing of community solar.** Written by PCG in partnership with SEPA. http://www.sepapower.org/media/439739/accelerating-adoption-of-community-solar_final.pdf
- **Shared Solar: Current Landscape, Market Potential, and the Impact of Federal Securities Regulation.** National Renewable Energy Laboratory. U.S. Department of Energy. April 2015. Written by David Feldman, Anna M. Brockway, Elaine Ulrich, and Robert Margolis. <http://www.nrel.gov/docs/fy15osti/63892.pdf>
- **A Guide to Community Solar: Utility, Private, and Non-profit Project Development.** US Department of Energy. November 2010. Written by Jason Coughlin, Jennifer Grove, Linda Irvine, Janet F. Jacobs, Sarah Johnson Phillips, Leslie Moynihan, and Joseph Wiedman. <http://www.nrel.gov/docs/fy12osti/54570.pdf>

ABOUT COSHARE

CoShare is a working group of the NY Energy Democracy Alliance (NYEDA) and has grassroots members all across NY State. It was created to allow its members to learn from and support one another as they endeavor collectively to create a new energy paradigm for New York State that is diverse, carbon-free and democratic. CoShare's members actively share knowledge and experience as they develop community shared renewable energy projects, as well as advocate for supportive policy frameworks and greater local control.

EnergyDemocracyNY.org

CoShareNYS.org

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