



CASE STUDY

Access to Solar for Low-Income Residents of Multifamily Affordable Housing

Lessons learned from current ICAST efforts to install solar PV on multifamily properties

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SUMMARY

ICAST (International Center for Appropriate and Sustainable Technology) is a 501(c)(3) nonprofit social enterprise that has been selected by the U.S. Department of Energy's Solar Energy Technologies Office (SETO) to implement a ~\$2 Million initiative to overcome the hurdles of deploying solar energy for low-income populations. The project will develop, coordinate, and pilot a new approach that partners with local utilities, affordable multifamily housing (MFAH) owners, investors, and other stakeholders, to create a utility-scale program that aggregates demand from MFAH properties into a solar project for the utility to own and manage.



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- For more information on ICAST visit: <http://www.icastusa.org/>
- For more information on SETO and this Department of Energy program visit: <https://www.energy.gov/eere/solar/seto-fy2018-photovoltaics>

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Introduction

Adoption of shared solar (sometimes referred to as community solar) is accelerating across the country in many programmatic forms. The total capacity of shared solar is nearing 1,000 MW.ⁱ But, low-to-moderate income (LMI) households’ access to the benefits of shared solar programs remains challenging due to many factors: the lack of State policy directed to the unique barriers to LMI access, incentives and financing, customer acquisition and turnover, and siting to name just a few.ⁱⁱ

ICAST believes it was selected by the DOE to run this project because of its extensive expertise in the affordable multifamily housing (MFAH) and clean energy industries. ICAST has over 17 years’ experience working with MFAH owners and managers, delivering clean energy solutions that preserve the affordability of housing and provide community development benefits through its workforce training programs. ICAST has successfully launched dozens of innovative new programs in its 17-year history, including a commercial scale solar development venture.

The following report captures lessons learned from ICAST’s recent experiences in deploying solar PV for the LMI residents living in MFAH. The report also analyzes key design elements that may be utilized to lower the barriers for access to solar energy for LMI populations.

ICAST chose New Mexico as the state location for documenting its case studies because it provides examples of various types of solar installations to overcome the current barriers faced by both the MF community at large and the LMI population in particular.

Case study I: Truth or Consequences Commercial Solar

ICAST has seen a steady increase in interest in solar PV from its MFAH customers. One such customer is Truth or Consequences Housing Authority (TCHA), in Truth or Consequences, NM. The client wanted to reduce their utility consumption with solar PV to the maximum extent possible, which in their case was under 95% of load, per their local utility rules. ICAST implemented an energy performance contract (EPC) for TCHA using the approval process from the US Department of Housing and Urban Development (HUD). Since HUD does not allow PPA's, this project was funded through 100% EPC financing with no equity owner to monetize the Investment Tax Credits (ITC) or depreciation for the solar investment. Basic details of the project are:



- Number/Type of units: 100/ row homes
- Type of Project: Energy Efficiency Retrofit, Water Conservation, and Solar PV
- Percent of load offset by solar: 90%
- Total size of aggregated solar project: 230 kW
- Solar installation: Ground Mount in Common Recreational Area
- Utility Type: Municipality
- Interconnection: Net Metering Policy
- Project Financing: Triple Bottom Line Foundation (TBL) Fund

The property is a low-rise, single story row home complex for seniors and low-income families. Roof mounted solar was not viable due to shade from trees and poor quality of roof that would need replacing in the next 5-10 years, so a ground-mounted solar system in common recreational area was the only viable option. Because the property is in a rural area and has sufficient land area, the ground mount option was possible. The unique aspect of this project is that it is a master-metered electric load. This made it easier to meet the net metering laws while installing one typical solar array for the property. The Municipal Utility was agreeable to net meter the 230kW load. In terms of scalability, there are not too many master metered electric properties to replicate this

project. Also, Truth or Consequences is not a large town with many MF properties to aggregate demand locally and replicate this project.

Opportunities as it relates to ICAST/SETO Project	Barriers as it relates to ICAST/SETO Project
<ul style="list-style-type: none"> Residential rate (\$0.12/kWh) is sufficient to finance the project under advantageous interconnection policies 	<ul style="list-style-type: none"> No shared solar programs or tariffs No TOU or demand charges (lowers value of storage) Limited multifamily market on small town so hard to aggregate demand or finance

Case study II: Santa Fe Residential Solar

Another MFAH client interested in solar PV is Santa Fe County Housing Authority (SFCHA), in Santa Fe, NM. The client wanted to reduce their fossil fuel consumption with solar PV to the maximum extent possible, which in their case ended up being only 45% of load, due to a host of issues including NM does not allow community solar projects, so it was not possible to aggregate demand from all the individually metered units into one solar array. The IOU was not willing to do any form of virtual net metering either, so the only option was to install individual solar systems for each apartment. Since residents change regularly, ICAST had to plan for the lowest possible consumption per unit to not produce excess energy when a low energy user occupies an apartment. This was to ensure the excess generation does not trigger overproduction rules and pay the tenants the wholesale power rate versus retail rates that offset the retail price being paid by the tenants. Being paid \$0.023/kWh (wholesale power rate) is not financially viable. ICAST implemented an EPC for SFCHA with approval from HUD and funded the project with 100% EPC financing and without any equity owner to monetize the ITC or Depreciation for the solar investment. Basic details of the project are:

- Number/Type of units: 196 / row homes and multiplex located in three different properties across the county
- Type of Project: Energy Efficiency Retrofit, Water Conservation, and Solar PV
- Percent of load offset by solar: 45%
- Total size of aggregated solar project: 220 kW
- Solar installation: Rooftop
- Utility Type: Investor-Owned Utility (IOU)
- Interconnection: Net Metering Policy
- Project Financing: TBL Fund



The three properties are all low-rise, single story row home complexes for low-income families. Roof mounted solar is viable in this case but since the property is individually metered, and NM does not have a community solar program, individual arrays with individual interconnections to each meter were selected as the final solution. The client was not keen to convert to master meter and aggregate the load, which would have to increase the size of the solar install and covered a lot more than the 45% of load, because they did not want to get into the business of billing individual tenants for the electricity. Even with the demand charges for a master meter, this project would have benefitted from going to a master meter because there was little peak load (Santa Fe is 7500 ft. above sea level and does not need air conditioning, and the property does not have A/C, and the peak load during summer is negligible). But due to the reasons outlined above, including Utility and Owner constraints, the project ended up as described. In terms of scalability, there are many individually metered properties with sufficient roof or ground space available to replicate this project in New Mexico and other states where virtual net metering or community solar is not permitted. Also, Santa Fe is a large enough town with many MF properties to aggregate demand and replicate this project locally.

Opportunities as it relates to ICAST/SETO Project	Barriers as it relates to ICAST/SETO Project
<ul style="list-style-type: none"> Residential rate (\$0.11kWh) is typically sufficient to finance the project if interconnection policies were advantageous or shared solar was available Sufficient MF market to aggregate demand and finance 	<ul style="list-style-type: none"> No shared solar programs or tariffs No TOU or demand charges (lowers value of storage) Individual metering of each account is costly as compared to a central system

Case study 3: Aggregated Solar Program

Albuquerque is New Mexico’s largest city with a large and vibrant multifamily (MF) housing market with ~70,000 MF units¹. ICAST has deep relationships with the local MF community and has successfully executed on energy efficiency and renewable energy upgrades for over 7,000 units in the past few years. Many of ICAST’s local MFAH partners are looking to add solar for their property to either reduce or stabilize utility costs (versus unknown increases from the IOU over the next 20 years) or to go Green with solar. ICAST decided to aggregate at least 1000 units of MFAH across as many as 20 properties into one large project to launch this program. The goal is to grow the numbers to twice or three times this initial project. These solar installs are all on-site, i.e. at the MFAH property but are a combination of ground and roof mounted individual and central arrays.

- Number/Type of units: 1000/multifamily
- Type of Project: Solar PV
- Percent of electric load offset by solar: 90%
- Total size of aggregated solar project: 2.5 MW
- Solar installation: On-site Rooftop and Ground Mount



¹ https://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ACS_17_5YR_DP04&src=pt

- Utility Type: Investor-Owned Utility (IOU)
- Interconnection: Net Metering Policy
- Project Financing: TBL Fund

Even though this was a large enough project to have been able to attract equity investors, ICAST was unable to do so because the investors were unwilling to treat the aggregated demand as one opportunity and kept seeing the project as 20 small projects which were all less than their minimum project size. So ICAST ended up funding the program with debt financing that is a CRA eligible investment, through its Community Development Financial Institution (CDFI) ‘TBL Fund’.

Opportunities as it relates to ICAST/SETO Project	Barriers as it relates to ICAST/SETO Project
<ul style="list-style-type: none"> • Sizable multifamily market in utility service area • New Statewide legislative policies are in development to meet Renewable Portfolio Standard, including LMI inclusion and a potential community solar law in 2020 • Moderate residential rate (\$0.11/kWh) helps with solar financing 	<ul style="list-style-type: none"> • Lack of shared solar program • Heavy advocacy lift and long timeframe for utility ownership approval from Public Utility Commission • Shared solar credits at “avoided costs” could be too low to make financing off-site solar project viable

Conclusions

Knowing what ICAST knows now, a repeat of the aggregated solar project in New Mexico will be funded through equity investments because ICAST is confident it can convince investors to view the projects as an aggregate by standardizing the individual property contracts and making sure the profile of each individual MFAH property is similar. Another investor concern was the timing needed to complete the project, which ICAST will have to ensure is completed within the calendar year so that investors can apply for the entire ITC and depreciation for that year. ICAST will be attempting to pilot this aggregated demand for equity investor approach in

New Mexico and grow its current project to 5MW serving 2000 LMI households. ICAST has applied to a local CRA investor for a \$4.5 Million line of credit for its CDFI and is holding preliminary discussions with multiple equity investors.

Based on its past and current conversations with a variety of investors, ICAST sees no issue attracting debt capital for its SETO projects and at attractive rates due to the CRA credits it can offer for the projects. Equity investments will be harder to attract unless it can offer 2MW and larger projects at one location to the investor. ICAST will be focusing its efforts going forward to build its list of potential equity investors who are interested in potentially smaller or aggregated on-site projects.

ICAST has also engaged with several utilities to discuss the ICAST/SETO project concept which allows the utility to manage and own the solar asset once equity investors are paid off in year six. Some of the positive and negative feedback ICAST has received that will need to be resolved moving forward include:

1. Almost all utilities are in favor of the Utility ownership approach that ICAST is proposing. Only hindrance utilities have offered ICAST is a regulatory hurdle, i.e. their state PUC (in the case of IOUs) may not approve of them owning the solar asset.
2. Almost all utilities are in favor of adding Energy Storage to the ICAST project and see storage as an immense value-add for the Utility. But most of the utilities ICAST has approached have not implemented a storage project and need help with piloting such a project, which can be a positive for the SETO program since ICAST plans to add Storage to its solar projects. A hurdle may be the value the Utility is willing to or able to assign for the Storage, i.e. what incentive should it provide the ICAST project for the peak demand reduction it can provide the Utility from its Storage solution. Also, many of the MFAH clients that ICAST has approached for the SETO program are in favor of storage, but for a very different reason and application: Resiliency! And unfortunately, since none of these MFAH clients have implemented such a solution, they are unable to assign any monetary value a Storage system brings to their operation. ICAST expects this issue will be a focus of its feasibility analysis for the SETO program.
 - ✓ Storage is likely to be a component of many of the projects.

- ✓ As climate change impacts the electric grid, Resiliency will become a more significant issue, especially for MFAH catering to seniors and disabled who are on some form of life support or other apparatus that needs electricity to operate.
 - ✓ Consideration should be given on how to incorporate storage solutions at the MFAH site as part of this ICAST/SETO project.
3. Along with Energy Storage, Utility and the MFAH clients are also interested in electric vehicle (EV) technology implementation, including electric vehicle charging stations (EVCS). The reasons for this interest is again different between the Utility and MFAH clients. The Utility sees it as a business opportunity to add new load to its grid while MFAH owners/managers see it as an additional service it can provide its LMI clients who need access to transportation for errands such as visits to a Grocery Store or Doctor. At this stage, ICAST is not sure how or when it might agree to evaluate this additional solution into its solar+storage program with SETO.
- ✓ Utility ownership of EVCS solutions is likely to grow, especially in states where the legislature has already pass or is in the process of passing laws requiring their utilities to go 100% renewable within a certain timeframe (states where ICAST currently operates or is looking to grow that have such laws include CO, NM, CA and NV).
4. Some of the Utility firms ICAST has approached, especially those operating in urban municipalities have raised the issue of “land constraints” i.e. lack of large parcels of land available in the urban corridor to install a utility-scale solution as proposed by ICAST for its SETO program. Ft. Collins Utility and Colorado Springs Utility are two utilities that do not see the viability of accessing the acres of land within their territory and grid system to install the MW scale solar solution, while others such as PEPCO serving Washington DC may have access to the required acreage outside the DC, but then the solar project stands to lose access to the lucrative SRECs offered by the DC government.
- ✓ Aggregated on-site model (even though not as cost effective as utility-scale ground mount systems) may be the only program type that some utilities may consider viable for the SETO program. Interestingly, PEPCO will allow on-site solar deployed at some other site, not the MFAH, and virtually net meter that production towards a MFAH property to make the program work.

ⁱ Dan Chwastyk, Jared Leader, Jeff Cramer, Mason Rolph. 2018. *Community Solar Program Design Models*. Smart Electric Power Alliance.
<https://sepapower.org/knowledge/technical-reference-library/>

ⁱⁱ Heeter, Jenny, Lori Bird, Eric O'Shaughnessy, and Sam Koebrich. 2018. *Design and Implementation of Community Solar Programs for Low- and Moderate-Income Customers*. Golden, CO: National Renewable Energy Laboratory. NREL/TP-6A20- 71652. <https://www.nrel.gov/docs/fy19osti/71652.pdf>.