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SOLAR ENERGY TECHNOLOGIES OFFICE

NREL
NATIONAL RENEWABLE ENERGY LABORATORY

BERKELEY LAB

Community Solar Program Design and Subscription Models

April 2022

This slide deck provides an overview of Community Solar program design and subscription models. It introduces program and subscription design considerations, explains the different components of program and subscription design, and ends with best practices when designing a community solar program. This slide deck was originally developed as part of a working group under the National Community Solar Partnership's Municipal Utility Collaborative.

Contents

Program and Subscription Design Considerations

Program and Subscription Design Considerations

Each design element below is covered in more detail in the following slides.

1. Anchor tenants: inclusion or exclusion
2. Customer classes eligible to enroll (residential, LMI, commercial) -aka “participant mix”
3. Project-based vs. Portfolio-based programs
4. Subscription minimums and maximums
5. Term limits, exit rules, and transferability
6. Subscribers keep RECs vs. No environmental benefits
7. Upfront signup fee vs. No upfront fee
8. Monthly subscription payment: Fixed payment vs. Floating

Connecting Program Goals with Design Considerations

Decisions within each design element of program and subscription design may impact the success of overarching goals of a community solar program. This table reviews where each element discussed in this slide deck connects to four common program goals.

		Design Elements							
		Anchor Tenants	Customer Classes Eligible to Enroll	Project Based vs. Portfolio Based Program	Subscription Minimums and Maximums	Term Limits, Exit Rules, and Transferability	RECs and Environmental Benefits	Upfront and Fixed Fees	Fixed or Floating Monthly Payment
Community Solar Goals	**LMI Access to Solar**		X		X	X		X	X
	Customer Cost Savings	X	X	X				X	X
	Renewable Energy Goals / Environmental Leadership						X		
	Customer Demand for & Access to Solar	X	X			X	X		X

Anchor Tenants

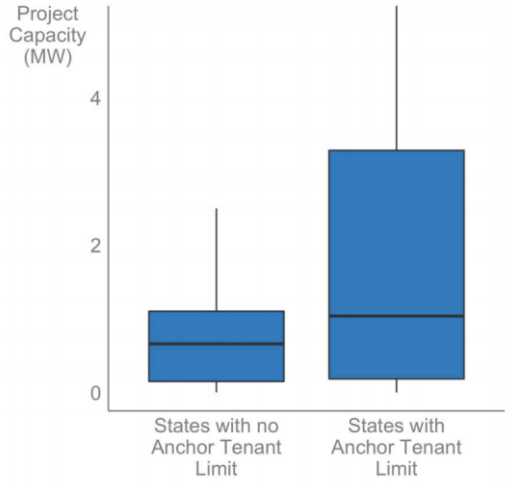
Anchor tenants are large customers that subscribe to a significant portion of a community solar array.

Anchors may be:

- Local business or franchise with large electricity demand
- Municipal buildings/accounts (library, schools, city hall, etc.)
- Community partners or nonprofits with strong local presence

Anchors can potentially:

- Provide more revenue certainty
- Reduce total project costs through reduced financing and customer acquisition costs
- Reduce subscription costs to non-anchor subscribers



Project size distributions in states with and without limits on anchor tenants

Programs can limit the subscriptions held by anchor tenants, to maintain the “community” element and ensure sufficient shares for smaller subscribers.

- Some states limit the capacity that can be held by anchor tenants (CA, IL, MD, MN, NC, NY, OR)

Whether there is an anchor tenant (and how much of the project they subscribe to) impacts whether the project is representative of the customer base.

Participant Mix: Customer Classes Eligible to Enroll

- Some programs prioritize a participant mix that reflects the utility customer mix
- Many programs include a carve-out for LMI participation
  - Typically, a certain % of the project is set aside for LMI subscribers
  - Including an LMI carve-out may require cost premiums for other customer classes
- Choices regarding the desirable participant mix will inform other program design elements, including:
  - Subscription minimums and maximums
  - Term limits, exit rules, and transferability
  - Upfront fees
  - Monthly payment structures

Best Practices

✓ Allow all customer classes to participate

✓ Provide an LMI carve-out that ensures cost-parity or cost-savings for LMI customers

Project-Based vs. Portfolio-Based Programs

Project-based programs allow subscribers to sign up for a *specific project*

- Subscribers know exactly where their project is located
- Improved marketing opportunities and customer identification with solar development in the community
- Subscribers concerned about land use (or other issues) can ensure their project meets their personal criteria

Portfolio-based programs allocate subscriptions based on aggregated solar capacity across the utility's solar portfolio

- Subscription costs are tied to overall portfolio cost
- Aggregates projects together that have different installation costs
- Distributes the advantage of falling solar prices across all program subscribers
- Encourages customers to support more solar development, even if they are already subscribed
- Passes cost savings from the utility's increasing solar capacity directly to program subscribers

Subscription Minimums and Maximums

- Subscription **maximums** limit an individual subscriber's monthly capacity
  - Most programs set the maximum subscription level at ~100% of a subscriber's average annual load, based on previous year's utility bill
  - Maximum subscription level:

    total project capacity ÷ minimum number of customers to which you want to offer shares

- Subscription **minimums** require subscribers to commit to a minimum monthly allocation
  - Estimated cost to manage subscribers can inform a minimum subscription level
  - A subscription minimum may be a barrier to entry (e.g. apartment-dwellers have a smaller energy profile compared to single-family homes)

Term Limits, Exit Rules, and Transferability

Shorter subscription terms with an easy in/out process typically lead to reduced subscriber acquisition costs.

- **Term Limits** set the minimum time a subscriber is required to maintain their subscription (multi-year, annual, or month-to-month)
- **Exit Rules** determine if a subscriber must pay a fee for ending their subscription prior to the term limit, and how early they must provide notice
- **Transferability** either allows or disallows subscribers to 'transfer' their subscription to a different utility account within the utility's territory
  - Can ease the impact of exit fees and term limits
    - Customer moves and wants to keep their subscription
    - Customer wants to transfer their subscription to another customer's account

Best Practices

- ✓ Allow for transfer of subscriptions within the utility territory
- ✓ Do not include a cancelation fee
- ✓ Use a month-to-month term structure

RECs and Environmental Attributes

RECs from a community solar project can be:

- **Retained** by the solar project owner, utility, or administrator to use for its own claims
- **Retired** on behalf of the subscriber (person or business buying from/participating in the community solar program)
- **Provided** to the subscriber
  - *Note: due to the complexity of the REC market, this option may only be desirable for large commercial customers*

Only the party that owns the RECs can claim the green power benefits from the solar project.

Subscribers should be informed about how RECs are handled and given appropriate language to help them make claims consistent with standard environmental practice.

States with existing RPS or clean energy standards have implemented ways for electric suppliers to procure RECs from community solar projects (e.g., Massachusetts, Colorado)

Upfront Fees: Options

Option	Description	Subscriber savings begin….
Full up-front payment	Subscriber pays for all projected solar electricity generation over a set duration (e.g. 20 years), locked in at a set rate per kWh. Some companies offer a discount for up-front payment vs. ongoing payments. You then work to apply solar credits to the subscriber's bill over the duration of the contract, typically through the utility you work with or through whatever bill subscription means you choose.	In a few years – this arrangement is akin to purchasing a system, in that savings are deferred until the initial investment is recouped.
Upfront payment + Monthly payments	Hybrid that combines an upfront payment with either a fixed or floating monthly payment (see slides below for monthly payment options).	Immediately or in a few years – depending on the price of solar electricity under the program.

Upfront Fees: Pros and Cons

- Can be combined with monthly payments
- Can help the utility hedge against a community solar project's construction or financing costs
- Can help with customer retention
- Can present a barrier to entry for LMI participants
- Programs with *no* upfront fees (easy entry) typically have lower customer acquisition costs

Best Practices

✓ No upfront fees

✓ If upfront fees are required, set the fee level low enough to ensure no barrier to entry for LMI customers

Existing Programs

Upfront fee in existing programs surveyed ranged from $75-$325

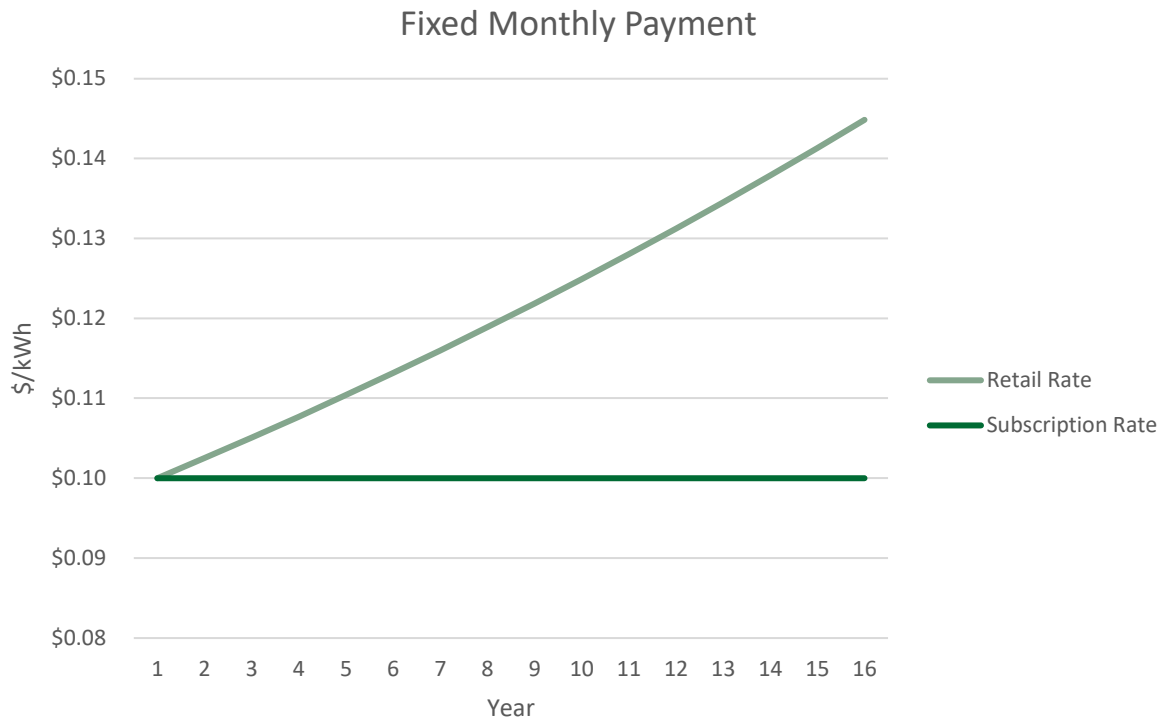
Monthly Payment Options: Fixed

Option	Fixed or Floating Payment	Subscription & Fee Description	Bill Credit Description	Subscriber savings begin….
Fixed Monthly Fee	Fixed	Fixed monthly subscription fee.	a) Set number of solar credits (kWh) every month. b) Bill credits vary each month based on actual solar production of the capacity associated with the subscription.	Immediately or in a few years. Savings seen as utility rates rise and solar payments remain fixed.
'Lease to Own'	Fixed	Fixed monthly fee for a set number of years, after which point solar credits are 'free'.	Bill credits vary each month based on actual solar production of the capacity associated with the subscription. Most similar rooftop solar ownership.	Immediately or in a few years – depending on the price of solar electricity under the program.
Fixed per-kilowatt hour (kWh) solar rate	Fixed	$/kWh rate for solar paid by subscribers never increases.	a) Set number of solar credits (kWh) every month. b) Bill credits vary each month based on actual solar production of the capacity associated with the subscription.	Immediately or in a few years – initial solar rate may be higher or lower than standard electricity rate.

Monthly payment options: Fixed

Fixed monthly subscriptions

- Provide cost stability/predictability to subscribers
- Offer simple marketing and customer communication
- Not sensitive to retail rate changes year-over-year
- May or may not be a cost premium or cost saving to subscribers



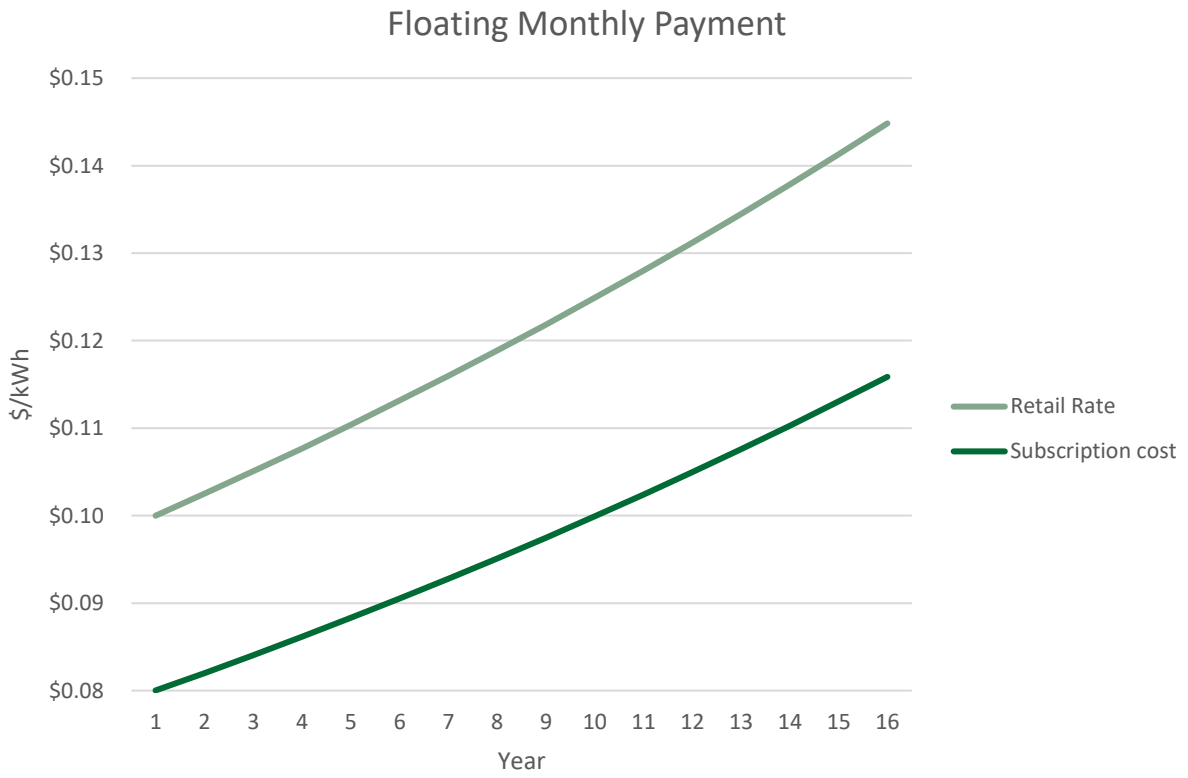
Monthly Payment Options: Floating

Option	Fixed or Floating	Subscription & Fee Description	Bill Credit Description	Subscriber savings begin….
Fixed Discount	Floating	The $/kWh rate for solar fluctuates with the utility rates but will always be lower than the standard rate. Note that collaboration with your utility is essential if you will compare loads with past energy rates.	Subscriber bill is credited a certain % of monthly load. Subscription could be kW based, but credits are usually kWh based.	Immediately, unless program charges a membership/signup fee. Subscriber receives set discount.
Dynamic solar subscription rate	Floating	In year one, subscriber pays a set rate for solar (per kWh or kW). In all subsequent years, solar rates are re-evaluated and either increase or decrease.	a) Set number of solar credits (kWh) every month. OR b) Bill credits vary each month based on actual solar production of the capacity associated with the subscription.	Immediately or in a few years – depending on the price of solar electricity under the program.

Monthly subscription payment: Floating

Floating monthly payments:

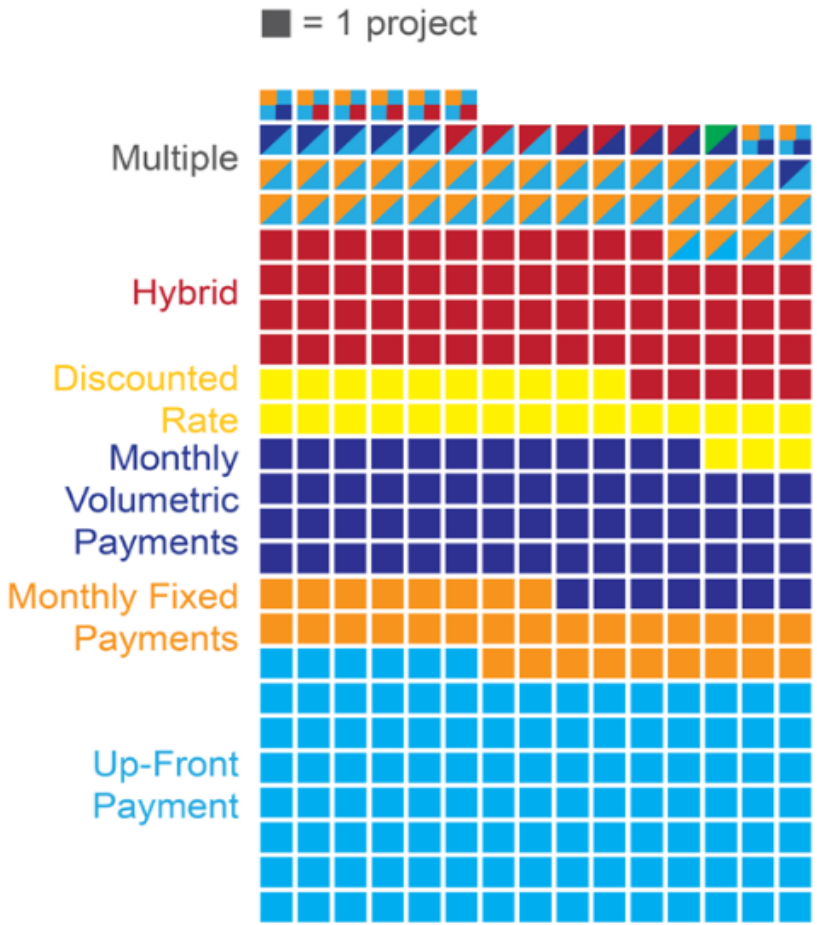
- May be more complicated to explain to subscribers
- Hedge against retail rate changes year-over-year
- May or may not be a cost premium or cost saving to subscribers
- Can guarantee savings for subscribers while providing greater utility cost recovery



Residential Payment Terms are Diverse

As of 2020, community solar projects throughout the country utilized varying payment structures:

- **Full up-front payments** are the most common payment structure (46% of projects).
- **Monthly volumetric payments** are the second most common payment structure (22% of projects).
- About 21% of projects offer a hybrid model (combining different **up-front and monthly payments**).
- About 15% of projects offer **multiple payment structures**, most commonly a combination of upfront and fixed monthly payments.
- About 8% of projects offered a **fixed discount** over the customer's electricity rate instead of a payment. This model is expected to grow.



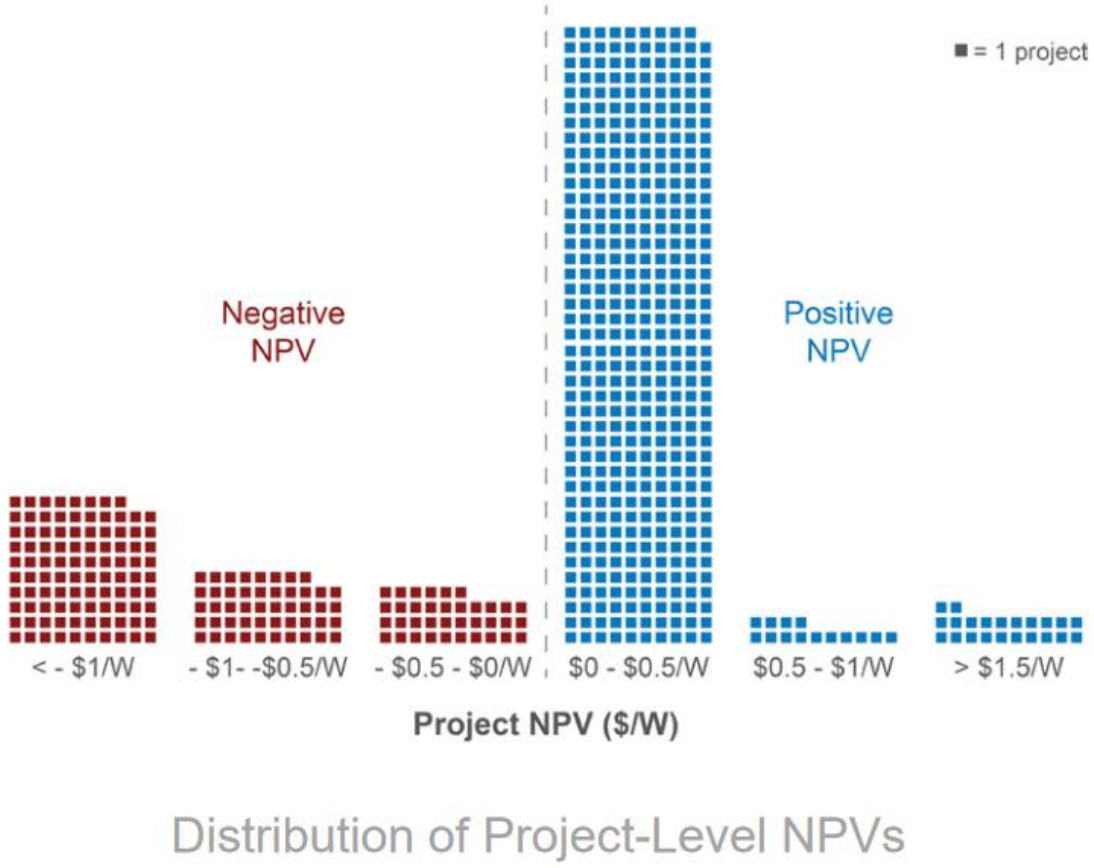
Distribution of Program Payment Methods

https://www.nrel.gov/docs/fy20osti/75438.pdf

More than 80% of Projects have a Positive Net Present Value (NPV) for Residential Subscribers

Across payment terms, the median project-level NPV is about **+$0.37/W** (sensitivity range: +$0.20/W to +$0.46/W) and about 83% (sensitivity range: 74 - 86%) of projects yield a positive NPV.

Most projects result in positive net benefits to the customers over the course of the subscription

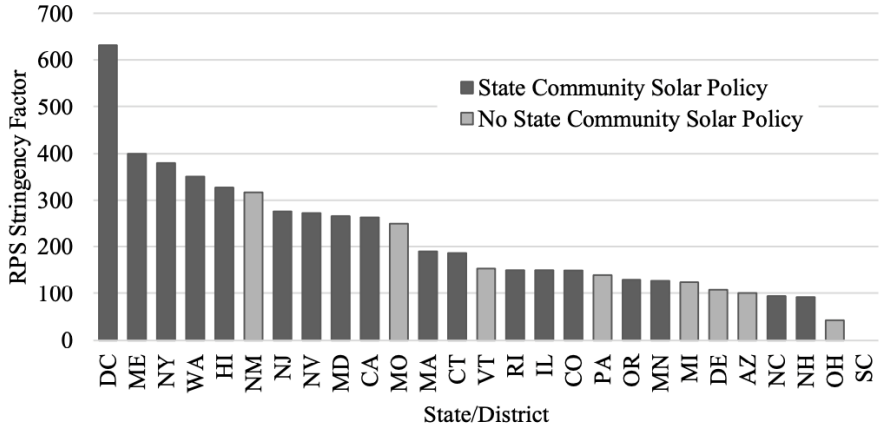


Distribution of Project-Level NPVs

https://www.nrel.gov/docs/fy20osti/75438.pdf

State incentives influence community solar program design

- 70% of of the 25 states + D.C. with RPS mandates also have community solar policies.
- Community solar projects do exist in states without either an RPS, clean energy standard, or community solar policy.
  - Florida, Georgia, and Arkansas have seen utilities develop community solar projects
  - RECs are likely retained by the subscriber as they do not have a market value.
- States with existing RPS or CES polices have implemented ways to procure RECs from community solar projects.



Note: The RPS Stringency Factor is calculated as $(Mandate_{final} - Mandate_{initial})/(Year_{final} - Year_{initial})$

Summary: Program Design Best Practices

- ✓No upfront fees
- ✓1 year or Month-to-Month term minimum
- ✓5-10%+ savings off standard utility rate
- ✓No credit check
- ✓Consolidated billing
- ✓Easy onboarding
- ✓Engage subscribers with updates and news about their solar project
- ✓Get feedback through surveys to continuously improve

Appendix – Additional Resources

Utility-run programs with LMI participation: Austin Energy

Voluntarily offered utility program

Austin Energy, a publicly owned utility, was directed by the Austin City Council in 2010 to achieve 200 MW of solar power by charge of $0.02895/kWh. beginning in 2018, which was not a part of the original solar directive. The municipal utility has 2.8 MW of community solar currently and plans to expand by 1.5 MW. The project has a 50% low-income carve out. Customers keep the RECs and pay a fixed-rate for the community solar that replaces the fuel charge on their bill for 15years. The current community solar rate is $0.0427/kWh for standard customers and $0.0277/kWh for eligible customer assistance program (CAP) customers, compared to the current fuel charge of $0.02895/kWh. Austin Energy has committed to continue providing these types of benefits to limited-income communities and communities of color by ensuring access to the affordability and dependability benefits laid out in their 2030 Climate Protection Plan.

- https://austinenergy.com/wcm/connect/b08ba414-ce2f-43f8-a78b-676c5583ed73/ourEnergyRoadmap.pdf?MOD=AJPERES&CVID=n89qGZ9
- https://austinenergy.com/ae/green-power/solar-solutions/for-your-home/community-solar
- https://austinenergy.com/wcm/connect/6dd1c1c7-77e4-43e4-8789-838eb9f0790d/gen-res-climate-prot-plan-2030.pdf?MOD=AJPERES&CVID=n85G1po

Utility-run programs with LMI participation: Xcel Energy

Mandated community solar program with a carve out or dedicated LMI projects

The Colorado's Community Solar Gardens Act passed in 2010, requiring a low-income carve-out for community solar projects for the state's investor-owned utilities. Rules allow projects up to 5 MW in size to be developed by third parties; projects are competitively selected through an annual RFP process managed by Xcel Energy. There are about 100 MW installed as of Fall 2020, with about 100 MW in development. Subscribers are awarded a bill credit based on their average retail rate less transmission and distribution charges, which equates to approximately $.0.075/kWh for residential subscribers and $0.065/kWh for commercial subscribers. has evolved over time; initially each project was required to subscribe 5% of its capacity to LMI customers. Developers and others were not happy with this approach, and subsequent changes have allowed Xcel to manage capacity that is 100% dedicated to LMI subscribers.

- https://leg.colorado.gov/sites/default/files/images/olls/2010a_sl_344.pdf
- Xcel Energy presentation 9/15/20.

Utility-run programs with LMI participation: Hawaii

Mandated community solar program with utility ownership of LMI projects

Hawaii, the Community Based Renewable Energy (CBRE) rules for Phase 2 implementation allow the investor-owned utilities including Hawaiian Electric Company and its subsidiaries to operate 9 MW, of which 50% must serve LMI customers. Phase 1 of the mandate was originally implemented in 2017. Phase 2 was approved in April 2020, and currently the companies are in the process of drafting their request for proposals (RFP).

- https://dms.puc.hawaii.gov/dms/DocumentViewer?pid=A1001001A19H20A90614D00155
- https://puc.hawaii.gov/energy/cbre/

Multifamily Affordable Housing (MAFH) Participation in Community Solar

Affordable housing facilities can participate in community solar or community-solar like projects in a variety of ways. Often the type of participation depends on whether tenants pay their own electricity bills.

Options include:

- Building subscription to community solar array for common spaces.
- Tenant subscription to community solar array for their own electricity bills.
- Building installs solar on its rooftop or other spaces and net meters the system; cost savings can be passed on to tenants via property improvements.
- Building hosts a community solar project on its facility.
  - https://www.usgbc.org/sites/default/files/2020-02/DHA%20Case%20Study%20October2019_1.pdf
  - https://www.lowincomesolar.org/dha-community-solar-project-keeps-housing-affordable/

NSCSP has a MAFH Collaborative that addresses participation of this customer group in detail. Please refer to the resources of that collaborative for more information.