

Community Solar for the LMI Community

Background

The Maryland State Legislature adopted Community Solar legislation (Public Utility section 7-306.2) during its 2015 session. It directed a three-year Community Solar Pilot Program covering 1.5% of the state's 2015 peak electricity demand (in MW). The Maryland Public Service Commission (PSC) adopted regulations for the program in July 2016 and subsequently approved Community Solar tariffs from the investor owned utilities in April 2017.

Approximately 194 MW of solar capacity will be included in the Community Solar Pilot Program, split over the three years as approximately 77 MW, 77 MW and 39 MW.¹ These numbers are only approximate as actual capacity is assigned to each Investor Owned Utility (IOU) service area based on the actual peak demand (in MW) recorded in FY 2015.² Utilities have the option to accept project capacity that exceeds 1.5% of their maximum 2015 peak demand, but must notify the PSC.³ The Pilot Program requires 30% of the solar capacity be assigned to Low and Moderate Income (LMI) projects, with 30% of that energy to be used only for the Low Income participants.

Of the 77,000 kW authorized in the first year, 30% (23,100 kW) are designated LMI projects. Of this capacity, 30% (6,930 kW) are designated to be used for people who meet LMI criteria.⁴ Of this energy, 2,310 kW must be used for those in the Low Income category.

While members of the LMI community are eligible to participate using either an "ownership" or a "PPA" model, most projects available to the LMI community are expected to use a PPA model. Projects marketed to the LMI community should address their needs, which include:

- Portability: Some members of the LMI community move frequently and therefore the Subscription Agreement contract must be portable.
- Term of Commitment: Many LMI consumers may shy away from signing long term financial commitments. As such, short term commitments may be preferable to long term commitments.
- Savings: Projects should save the LMI household money, not just at the beginning of the contract but throughout the contract.
- Knowledge: Few members of the LMI community have experience with PPA type contracts and may not fully understand aspects of the Subscription Agreement contract. Project marketing must ensure LMI consumers are knowledgeable of key aspects of the Subscription Agreement that could affect them during the term of the contract.
- Qualification for the Subscription Agreement: In order to gain a favorable financing rate, solar array developers must show a low financial risk, i.e. the ability to reliably pay off the loan on time. Developers show this low financial risk by signing up subscribers that have a high credit score. Many in the LMI community do not have a high enough credit score to serve as one of these subscribers. As such, an LMI

¹ <http://www.psc.state.md.us/electricity/community-solar-pilot-program-frequently-asked-questions/>

² Maryland has four major Investor Owned Utilities: Potomac Edison (covering western Maryland), PEPCO (now owned by Exelon) covering Washington DC and much of two surrounding counties, Baltimore Gas and Electric Lighting (covering the greater Baltimore Area), and Delmarva Power and Light, which covers much, but not all, of the Eastern Shore of Maryland

³ COMAR 20.62.02.A(4)

⁴ Moderate income includes Maryland residents who earn <80% of the median state income (\$92,500 in 2017) Eighty percent of median state income is \$74,000 (in 2017). Low income includes Maryland households who earn less than the 175% of the federal LMI rate (which is based on household size). This data is from "Income Limits 2017" published by the Maryland Department of Housing and Community Development, Housing and Economic Research Office.

project must include a credit enhancement mechanism to reduce the financial risk of having subscribers without stellar credit scores.

Strategy

The Maryland Energy Administration Community Solar incentive is designed to support the LMI community and consists of three interlocking efforts:

Education of LMI: MEA will fund and encourage disinterested third party educators to help the LMI community understand the pros and cons of PPA style Subscription Agreements, to include the key paragraphs that impose duties or costs on the consumer, or require consumers to contact the subscriber organization. This aspect may include promulgation of literature aimed to this community, speaking at sales meetings of the solar developers, and providing outreach into the community independent of the sales efforts. These advocates are solely devoted to ensuring that the LMI subscriber understands key elements of the PPA style Subscription Agreement.

Credit Enhancement: Financial risk can be minimized by providing a guaranty of loan payment. The use of a credit enhancement mechanism (such as a loan guaranty fund) can serve this function by providing funding in place of LMI subscribers who miss, or are late on their monthly energy payments. Subscribers who fail to make payments will be unsubscribed and a new subscriber found who will meet the monthly obligations. As such, the subscriber pool should demonstrate reduced risk over the life of the project as unreliable subscribers are replaced by reliable subscribers. MEA will contribute to one or more credit enhancement method which will guarantee payments from the subscriber organization to the financial backers for the portion of the array subscribed to LMI subscribers (only).

Incentives: MEA will provide incentives to subscriber organizations to provide PPA type Subscription Agreements that provide real value to the LMI community. These incentives will encourage contracts of shorter term, as well as guaranteed savings throughout the life of the agreement. The development of the incentive terms is provided below.

- PPA type subscriber agreements will normally attempt to show savings at the beginning of the contract, but will often include a cost escalator clause to account for estimated inflation and cost of energy escalation during the contract period. A common escalator factor currently in use increases the agreement's cost of energy by 2.9% per year, however other options are negotiable. If the actual cost of electricity increases by less than the assumed escalator rate, the value of the savings will be diminished over time, and it is possible that the subscriber agreement rate will exceed the energy rate charged by the utility. To prevent this loss of value over the life of the contract the subscriber organization could agree to maintain a constant percentage savings throughout the life of the contract. This could be achieved by having the subscription agreement escalator rate match the long term rate of electricity cost increase in Maryland (about 2%), or by having the subscriber organization agree to set its price as a percentage of the retail price of electricity within the subscriber's electric utility service area. The value of the MEA incentive is designed to recompense the subscriber organization for taking on this additional inflation risk.
- Most PPA type subscription agreements will try to provide a clear value to the customer during

the first year of the contract (with the value during subsequent years being controlled by the utility's electricity sales price and the subscriber agreement's escalator clause as discussed in the above paragraph). For the LMI community, MEA is willing to incentivize savings that exceed 20% below the utility's Standard Offer Service (SOS) rate. The greater the saving, the greater the incentive.

- The term of commitment risk is addressed by developing an incentive that increases with shorter term contracts. The risk to the subscriber organization is chiefly the cost and management of the added manpower needed to re-subscribe the existing subscribers who wish to remain with the community solar project. The cost of finding new subscribers will be borne by the subscriber organization as they would need to find new subscribers for existing subscribers who can no longer remain with the project.

Analysis:

Term of Commitment:

A 2 MW (2,000 kW) array with 30% LMI subscribers would have 600 kW assigned for LMI use. Assuming an average subscriber will subscribe to 4 kW, the project will have on the order of 150 LMI subscribers. Most of these subscribers are expected to re-subscribe at every opportunity so the actual amount of work is expected to be devoted to no more than 10% of the subscribers. An efficient worker is expected to re-subscribe applicants at a rate of 16 subscribers per working day.⁵ Assuming a man-year cost (including benefits) for this administrative worker is \$100,000, then the cost per year is \$8,333. Projects that re-subscribe every year will encounter 20 such costs, whereas projects that re-subscribe every 10 years would encounter only 2 such costs. As an example:

The Annual Cost is equal to the all-in cost⁶ of one man-month of an administrative person times the number of man-months needed to re-subscribe everyone, divided by the period of subscription in years. In an example where the all-in cost of an admin person is \$100,000, then for a 2 year PPA contract term:

Annual Cost for a 2 year term (600kW) = (\$8,333 per man-month * 1 man-month) / (2 years) = \$4,167/year

The net present value of this funding stream (using the Excel NPV function) is equal to:

$A_0 + NPV(10\%, A_1, A_2, A_3, A_4, A_5, A_6, A_7, A_8, A_9, A_{10}, A_{11}, A_{12}, A_{13}, A_{14}, A_{15}, A_{16}, A_{17}, A_{18}, A_{19})$

Where A_x is equal to the annual cost in year X.

Since no incentive is provided for a 20 year PPA term, the net present value using the annual cost for a 20 year-term is subtracted from the result.

The term incentive is equal to the [NPV (2 year) – NPV (20 year)] times the ratio of the capacity sold to LMI subscribers divided by the minimum capacity required for the given array (i.e., 30%). As an example, for a 2 MW array (600 kW mandatory for LMI), with an average PPA term length of 2 years, with a 10% discount rate and 800 kW actually provided to the LMI community

⁵ For small arrays, or arrays with few subscribers, this number would be much smaller than 1 man-month.

⁶ All direct and indirect costs of an individual (salary, health care, other benefits, etc.)

Example: Term Incentive Value (800 kW) = [NPV (2 year) – NPV (20 years)] * [Power sold to LMI subscribers/Minimum power required to LMI] = (39,020-3,902) * (800/600) = \$46,825

The Term Incentive Value (600 kW) with a 2-year term and a 10% discount rate would be \$35,118.

For smaller arrays with less than 600 kW mandated to the LMI community, the incentive would be reduced because the number of man-months assigned to the work would be lower (assuming 16 subscribers are addressed in one man-day).

Although the actual term may be reduced to zero (no minimum period), for computational purposes, one year shall be the lowest value used in the calculation.

Subscription Incentive:

Baseline Case: The subscription incentive is based on the difference between the Net Present Value of the savings from a base case and from the proposed PPA case. Assume the initial utility rate for electricity is \$0.14/kWh. The base case assumes the annual increase of the utility rate (SOS) is 2.00%/year. The PPA escalation rate is 2.90%/year; the initial year savings is 20%; and the assumed discount rate is 10%. This base case produces a net present value of the savings stream of 22.15 cents per kilowatt-hour (kWh).

Test Case: In a test case that matches the base case but the subscriber organization agreed to match the rate of cost increase of the utility (i.e. 2.00%), and the initial year discount is 30%, the NPV of the savings stream would be 45 cents/kWh, for a change of 22.85 cents per kWh. Assuming 800 kW of the 2 MW array is dedicated to the LMI community, and that the array achieves 1,250 kWh/kW, the LMI portion of the array would put out 1,000,000 kWh/year. The total incentive would be 1,000,000 kWh/year times \$0.2215/kWh which equals \$228,458.

Step-Down Case: In a step-down case the cost of energy is stepped down at a specified rate until it reaches zero. It remains zero until the end of 20 years or until the subscriber requests to exit the agreement (when the step-down can start again). In the case where the SOS rate is \$0.14/kWh, the first year reduction is 0% below the SOS rate, and a 7-year stepdown period, the incentive would be \$303,517 or \$506/kW of LMI energy. In the stepdown case, the incentive is ½ the net present value of the subscriber savings

Funding Cap:

During FY 18 there is \$4.5M budgeted for Community Solar. About \$1M is set aside for the Residential Community Solar and Commercial Community Solar programs (ownership model). It is expected that very little of this money will be spent this year. This leaves \$3.5M available for the LMI portion of the Community Solar program. Assuming 77,000 kW of capacity available during FY 18, and 6,930 kW dedicated to the LMI community during this period, this means up to \$500/kW is available for all aspects of the Community Solar for LMI program (to include Term Incentive, Subscription Incentive, Guaranty Grants, and LMI education of PPAs). The subscriber organization shall describe their subscription time vs. cost table which shall be mapped into the Test Case model of the LMI PPA Incentive Calculator. If a

step-down model is used, the time vs. cost table shall be mapped into the Step-Down Case model of the LMI PPA Incentive Calculator.

Incentive caps for step-down projects will be agreed upon on a case by case basis.

Assumptions:

1. Figure 1 provides a graphic of the residential cost of electricity to the average Maryland resident.⁷ The absolute value of electricity in 2016 was about \$0.14/kWh, but more important, the rate of growth was about 0.2868 cents per year, a rate of about 1.9%-2.0%. The period of 2007-2012 was associated with the deregulation of the electric industry in Maryland and the economic instability in general. The stable period since 2012 is increasing at \$0.252/year or about 1.8%/year. The subscription incentive will assume an increase in the Standard Offer Service (SOS) of 2%/year and an initial SOS cost of \$0.1400/kWh.

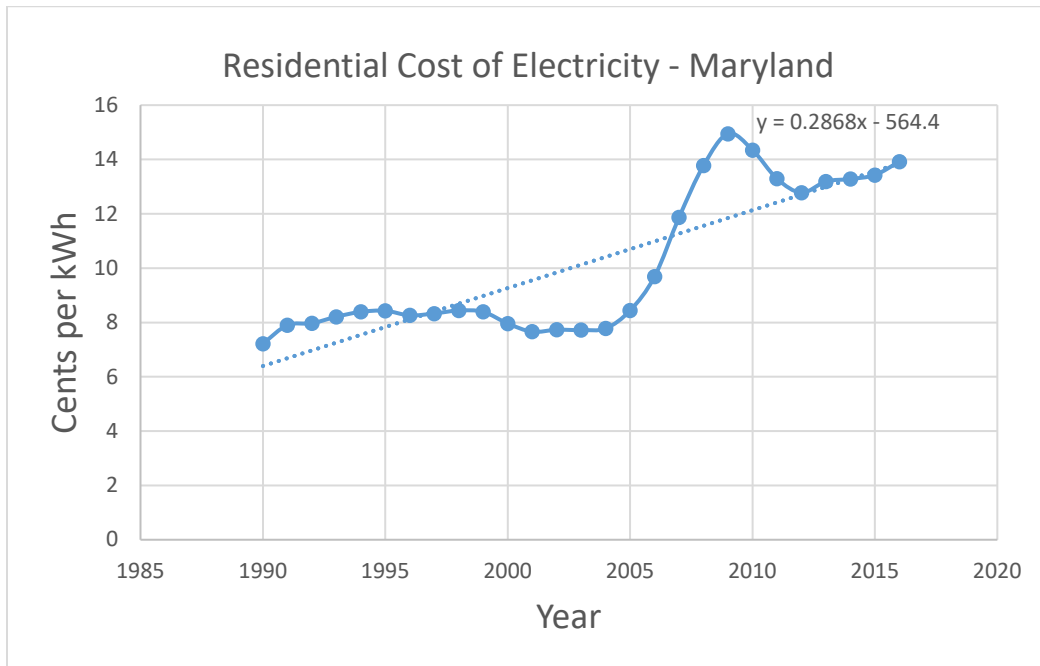


Figure 1: Residential cost of Electricity – Maryland

2. Normal PPA periods range between 15 and 25 years, with most in the residential sector being in the 20-year timeframe. Many <Vendor 1> example problems found on the internet use a 2.9% escalator rate. My discussion with NGOs and potential solar developers in the LMI space indicate a first year discount of 15%-20% under the SOS rate should be expected. The PPA escalator rate is normally between 1 and 5%. The actual rate can be adjusted up or down

⁷ Energy Information Agency website: Average Price by State by Provider (EIA-861)
<https://www.eia.gov/electricity/data/state/>

depending on the initial discount below/above SOS provided to the consumer.⁸ For the purpose of this model it is assumed that the **first year discount is 20% below SOS** and that a **2.9% escalator rate** is assigned by the project owner covering the **20-year period** of the subscriber agreement. **This is the baseline product.**

3. The discount rate is normally selected to account for the time value of money, and reflects the interest rate that the financier would consider reasonable to finance the project. A value of 10% was selected for this model. The discount rate is used when calculating net present value of streams of funding/cost, which is appropriate for calculation of the subscription incentive and the term incentive. Given that the Guarantee Grants only insure for three years, they are not adjusted by the discount rate.
4. The solar capacity factor of 1,250 kWh/kW installed is taken from PVWatts (a NREL calculator) and assumes a south facing solar array at 5-10 degree tilt in the Baltimore Maryland area. It also assumes the solar system will remain on-line for the entire year (i.e. not taken off-line for maintenance). This number is reasonable.

⁸ In reality, the discount and escalator rates are adjusted to achieve the required internal rate of return (IRR) required of the financier.