



MASSACHUSETTS INTERFAITH  
POWER & LIGHT

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## EVERYDAY ENVIRONMENTAL STEWARDSHIP



### Financing Solar Panels

By Jim Nail

Solar panels provide a renewable source of electricity that emit no climate-change-causing emissions and have become more affordable in recent years. In addition, several financing options have become available that make it even easier. This EES Brief compares these options based on the example House Of Worship (HOW) and system described to the right.

#### **Baseline: Buying panels vs. buying electricity from the utility**

If the example HOW continues buying electricity from its utility, it can expect to spend about \$124,000 over 20 years, assuming a 2.27% annual inflation rate. (2.27% is the average inflation rate for electricity in Massachusetts since 1990.)

IF this HOW were to buy the panels outright, the solar panels would pay for themselves in about 12 years, even without any incentives, tax credits, etc. However, Massachusetts HOWs that purchase panels will receive an incentive called a Solar Renewable Energy Credit. (Abbreviated as SREC, the sidebar explains SRECs in more detail.) The value of the SRECs for the example system at 2014 prices would be over \$60,000. This would reduce the payback time to about five years. However, given the unpredictable nature of the value of SREC's this is not guaranteed. Indeed the value is likely to be lower.

Purchasing panels is a good option for a HOW with an endowment. The HOW should "borrow" the money and repay the endowment with the dollars earned from the SRECs plus some of the savings from what would have been paid to the utility.

However, most HOWs don't have the \$90,000 to buy the panels upfront. There are two (2) financing options that don't require any upfront money are often available.

### SOLAR EXAMPLE

To illustrate the different financing options, this paper will use the following example system, based on Massachusetts Interfaith Power & Light's experience and approximate system costs as of spring 2014.

House of worship total annual electricity use:  
40,000 kilowatt hours (kwh)

Electricity cost 2014:  
\$.17/kwh

System size: 25.0 kilowatts

Annual estimated solar electricity production:  
27,500 kwh

System cost: \$90,000

## Power Purchase Agreement (PPA)

A PPA is a contract in which a separate entity such as a financing company actually owns the panels and the HOW pays the owner for the electricity they produce. There is little or no upfront cost. Monthly payments vary according to how much electricity the panels produce each month. Bills will be higher in the summer when the days are longer and bills will be smaller in the winter months.

The terms of a PPA are similar to the terms of the lease (described below), with these differences:

- **Term:** PPA terms are typically for 10 – 20 years.
- **Starting cost per kilowatt hour (kWh):** Typically, this will be at or below what is currently paid to the utility. It will be influenced by the type of equipment and the difficulty of the installation, eg, slate roofs are more difficult and costly installations so the cost per kWh would be higher than a similar building with an asphalt shingle roof, with both higher than a building with a flat roof.
- **Monthly payment:** Each month's payment will be calculated by multiplying the number of kilowatt hours of electricity the panels produce by the contractual cost per kWh. For ease, sometimes the payments will be set at a fixed amount, dividing the estimated annual production by 12 and multiplying by that year's cost per kWh. Actual electricity production and cost will then be reconciled periodically, with a credit to the HOW if the panels have produced less than expected or an incremental payment to the owner if they have produced more.
- **Pre-payment options:** A PPA may allow the HOW to make advance payments for the electricity, usually in exchange for a lower cost per kWh rate.
- **Escalator:** PPA's usually include an annual increase in the cost per kWh, in the range of 0 – 3%. While a zero or low escalator is appealing, often the monthly payment will be higher to compensate.
- **End of term options:** Often with a PPA, there is no residual value. The ownership is transferred to the HOW at the end of the term. There may be the option to remove the system at no expense to the HOW.
- **Early buyout options:** This is a provision whereby the HOW can purchase the system before the end of the contract. Because the finance company must own the system for five years to claim the federal tax credits, this option usually starts in Year 6. SRECs

## SOLAR RENEWABLE ENERGY CREDITS

Massachusetts created Solar Renewable Energy Credits (SRECs) as part of the Renewable Portfolio Standard (RPS), requiring utilities to get 20% of their electricity from renewable sources by 2020. The law has a "solar carve out", requiring that a designated amount of this renewable energy comes from solar power. They can fulfill this requirement either by building their own solar electricity generating capacity or by buying SRECs.

One SREC represents 1000 kilowatt hours of electricity produced by the panels. Any system smaller than 25 kilowatts receives 1 SREC for each 1000 kilowatts, larger systems receive a smaller number of SRECs.

SRECs are "minted" – ie, created and deposited in the solar owner's online account -- each quarter and then can be sold at the next auction where utilities buy SRECs to meet their RPS.

Because SRECs are sold at an auction, the pricing changes based on the results of the auction. In most states, SREC values have been unpredictable.

continue for 10 years so if the finance company owns the SRECS the buyouts are likely to remain high until Year 11. The contract will include a table listing the purchase cost year-by-year.

## Lease

Many people are familiar with this form of financing because it is used for cars. There is little or no upfront payment required. It does require paying a fixed monthly amount. The leasing company actually owns the car. The monthly payment is for the use of it for a period of a few years. At the end of the lease, the car is returned to the leasing company or purchased at a depreciated cost.

Leasing solar panels is similar — A fixed monthly payment for a fixed number of years, with similar options at the end of the lease. Leases are common option today for homes or commercial installations but less common for non-profits due to provisions in the law concerning the Investment Tax Credit (ITC) by which the financier cannot claim the Investment Tax Credit – worth up to 30% of the cost of the system— when the lease is to a non-profit organization. Lease terms are similar to PPAs with the following exceptions:

- **Residual value:** Since quality solar panels typically have 25 year guarantees and are expected to continue to produce electricity for 30 or more years, at the end of the lease the panels will still have value. Leases typically state that the residual value will be the greater of the “fair market value” as determined by an independent appraisal or a percentage of the original system cost, usually 15 – 20%.
- **Lease end options:** At the end of a lease, the system has a residual value. The HOW will have the option to purchase the system or have the leasing company remove it and restore the roof to its original condition. Some financiers offer the option to finance the purchase price over several years. Thus in the example the HOW doesn't have to come up with the \$13,500 - \$15,000 to purchase the panels.

In addition to these terms, some leases also offer:

- **Pre-payment option:** Pre-paying some portion of the lease allows the leasing company to offer a lower monthly payment.
- **SREC ownership:** In most cases, the leasing company or installer will own the SRECs and use that money to lower the monthly payment. If the HOW is willing to take on the risk and responsibility of selling the SRECs, some finance companies offer the option for the HOW to keep them, but the monthly payment is significantly higher.

## Forecasting Solar Electricity Production

In each of these types of financing, the financial calculations rely on accurate forecasts of the amount of electricity the system will produce. While some years might be sunnier or cloudier than others, there is a difference of only about 4% from one year to the next, so this is a relatively small variable.

Solar installers use software that forecasts the amount of electricity a system will produce, taking into account the orientation and pitch of the roof, the type of panels used (standard efficiency vs high efficiency), the amount of shade, and other factors. These programs have been refined. An experienced installer will be able to make an accurate forecast. Variables such as how cloudy a particular month is or how long snow obscures panels may still result in lower electricity production than the forecast in a particular year. Some contracts will include a guarantee the the panels will produce at least 90% of the forecast amount, with a refund or credit given if the amount falls below this.

### **Solar Panels Are Now Affordable and Proven**

At least two dozen HOWs in Massachusetts have installed solar panels. Interest in them is growing among faith communities who want to put their faith in action to address climate change. Many of their examples can be seen at this site <http://bit.ly/MASolarHOWs> which was created as part of the 2013 Solar House of Worship Tour, which MIP&L spearheaded as part of the Northeast Sustainable Energy Association's Green Building Open House.

**Join these leaders by contacting MIP&L today to evaluate the potential for your House Of Worship to generate its own solar electricity.**

*June, 2014*

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