Economics of Solar PV for a Homeowner: Doing the Math

by Jim Jordan, Director for Educational Outreach, Show Me Solar

When I tell people I installed a solar photovoltaic system, I am quickly asked, “Is it economical?” A year ago, the answer might have been no, but there are a number of monetary incentives that have reduced the cost so that your final cost is greatly reduced. These rebates/tax credits/Renewable Energy Credits vary from locality and utility company. Some only apply if you are connected to the grid.

I live in a six-year-old 2000 sq. ft. single story house in St Louis, MO. It was designed with conservation and universal accessibility in mind. As a result, my utility bills are extremely low. Before the solar install, we consumed between 2,950 – 3,175 kWh annually with a total annual electric bill, less than $300 for the year. We have and use air conditioning. Natural gas bill is about $600 for the year.

I had a 2.1 kW photovoltaic system installed for ~$6/watt for a total cost of $12,350 inclusive.

AmerenUE provided a $4,230 rebate ($2/watt).

The Federal Investment Tax Credit (ITC) of 30% is $2,436.

SREC’s (Solar Renewable Energy Credits) upfront (one time) payment from AmerenUE for 10 year’s SERC’s is $2,700.

Final Installation Cost

$12,350 - $4,230 - $3,705 - $2,700 = $1,715

The life expectancy of the solar panels is 20+ years. The inverters will probably need replacing around 15 years.

If we look at the installation cost spread out over 15 years (I did not take out any loans), **it comes out to $115/year!**

Monthly Electric Bill – Net Metering

The PV panels are tied to the grid. The electricity generated from the PV panels is used in the house first. Any excess electricity produced is pushed back into the electrical grid and recorded for credit at the end of the monthly billing cycle (what people refer to as your meter running backwards). If more electricity is used in the home than is currently being produced from the PV panels, electricity is drawn from the grid and you are billed for the electricity used. The monthly electric bill is calculated by the amount of electricity drawn from the grid minus the cost credited for electricity fed back into the grid. Hence

the name net metering. Unfortunately, the amount charged/kWhr by AmerenUE is greater than the amount credited/kWhr that you sell to Ameren. AmerenUE also charges $8/month for the hookup/meter fee and the net meter (required to receive the $2/watt rebate) was $142.

Why Is AmerenUE Giving Me Rebates?

Good question! Ameren is a for profit utility that has to answer to the shareholders. However, they are bound by legislation passed in Missouri. **Missouri Proposition C**, also known as the **Clean Energy Initiative**, was a citizen-initiated state statute that passed on November 4, 2008. It created a renewable electricity standard in the state. The standard requires utility companies to gradually increase their usage of renewable energy annually until 15% of the energy used in the state is renewable. At least 2% of energy used in the state has to be from solar. Proposition C established a state renewable portfolio standard in Missouri and required the state's investor-owned utilities to offer solar rebates of at least $2.00 per watt beginning in 2010.

Net-Metered Rebate for Photovoltaic Systems

AmerenUE offers rebates to its customers for the installation of net-metered photovoltaic (PV) systems on their properties. The rebate is set at $2.00 per DC watt with a maximum rebate of $50,000. Eligible systems must use new equipment; be permanently installed on the customer's property; and have module and inverter manufacturer's warranties of at least 10 years. Installations must comply with all applicable federal, state and local codes and standards, including the state of Missouri's Interconnection Standards. Rebate recipients must certify that the system will remain in operation on their property for its useful life (deemed a minimum of 10 years). Notably, the customer retains ownership of all solar renewable energy certificates (SRECs) generated by the system.

SRECs Purchase by Electric Utilities

So what is a SREC and how does that give me money? In SREC states, Missouri included, the Renewable Portfolio Standard (RPS) requires electricity suppliers to secure a portion of their electricity from solar generators. The SREC program provides a means for Solar Renewable Energy Certificates (SRECs) be created for every megawatt-hour of solar electricity created.

1 SREC = 1,000 kWh of solar electricity = 1 MWh of solar electricity
10 kW solar capacity = ~12 SRECs per year
(My system produces 2.4 SRECS per year)

SRECs are sold separately from the electricity and represent the "solar" aspect of the electricity that was produced. The value of an SREC is determined by the market

subject to supply and demand constraints (think cap and trade). SRECs can be sold to electricity suppliers needing to meet their solar RPS requirement. The market is typically capped by a fine or solar alternative compliance payment (SACP) paid by any electricity suppliers for every SREC they fall short of the requirement. The sale of SRECs is intended to promote the growth of distributed solar by shortening the time it takes to earn a return on the investment.

There is no assigned value to an SREC. Prices are influenced by supply and demand. The number of solar installations producing SRECs and trading them determines the supply. The demand is determined by individual state RPS solar requirements and the Solar Alternative Compliance Penalty (SACP) set by the state. The RPS solar requirement represents the number of SRECs that the electric suppliers are required to collect each year. The SACP represents a theoretical maximum value of an SREC, since it is the amount paid per SREC by the electric suppliers if they do not collect enough SRECs. In states, such as New Jersey, where the SACP in 2010 is $693, SRECs are worth more than a state with an SACP of $250.

In Missouri, there is only one choice for residential owners of solar PV systems to sell their SRECs. Because of the small size of your system, you cannot go to the auction block to sell your SRECs at market value and Missouri does not participate as a SREC trade state. Long-Term SREC contracts process is used in Missouri. Ameren offers Upfront SREC Payments. Upfront payments are scarce in the SREC markets because the buyer (Ameren) takes on considerable risk when paying cash for SRECs that have yet to be generated. The Ameren contract is for an upfront lump sum payment for 10 years of SRECs.

Federal Tax Credit for Renewable Energy

The American Recovery and Reinvestment Act of 2009 extended many consumer tax incentives originally introduced in the Energy Policy Act of 2005 (EPACT) and amended in the Emergency Economic Stabilization Act of 2008 (P.L. 110-343).

A tax credit is generally more valuable than an equivalent tax deduction because a tax credit reduces tax dollar-for-dollar, while a deduction only removes a percentage of the tax that is owed. This is true if your federal taxes based on your salary is greater than the 30% tax credit for the solar PV system. For people with very low incomes, it may not be applicable. Consumers can itemize purchases on their federal income tax form, which will lower the total amount of tax they owe the government.

Residential Renewable Energy Tax Credits offer consumers who install solar energy systems (including solar water heating and solar electric systems), small wind systems, geothermal heat pumps, and residential fuel cell and microturbine systems a 30% tax

credit for systems placed in service before December 31, 2016. The previous tax credit cap no longer applies.

Final Note

So is solar photovoltaic economical? It most definitely is for me. Each individual should check with his or her utility and state renewable energy credit program to determine what incentives are available. AND this does not take “Doing the right thing” for our planet and children’s children into account. Now is the time to consider solar PV if you have been contemplating it. There are loan programs that will defer your interest payments and other incentives, as outlined above that have tipped the economics of solar electricity to being lower than fossil fuels.

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