

SOLAR FOR ALL (Rev. 5)

A proposal by Bruce Karney for Assembly Member Paul Fong

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The California Solar Initiative (CSI) provides generous subsidies for those who install photovoltaic (PV) systems on the roof of their single family home.

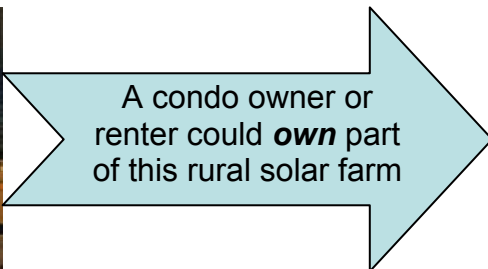
What about renters? And condo owners? And people in mobile homes? The CSI program does nothing for them – except that they have to pay a little bit each month to support the subsidies for homeowners.

This just isn't right! Fortunately, the Legislature can **solve this problem**, and, at the same time, **dramatically lower the cost of solar energy for homeowners** too!

Part 1 of the solution is to let any residential electricity customer offset up to 100% of their bill using energy produced by a PV system that the customer owns and which is located on a “solar farm.” Solar farms could be in rural areas or on large rooftops in urban and suburban areas. They would always be within the boundaries of the utility that serves the resident.

This approach is sometimes called **Remote Net Metering (RNM)** and is also known as **Virtual Net Metering (VNM)**. It's already in operation in SMUD territory, where it's called “SolarShares” and has been extremely popular. It's also authorized for multi-family affordable housing under the CSI “MASH” program and for **local government entities** throughout the state under AB2466¹.

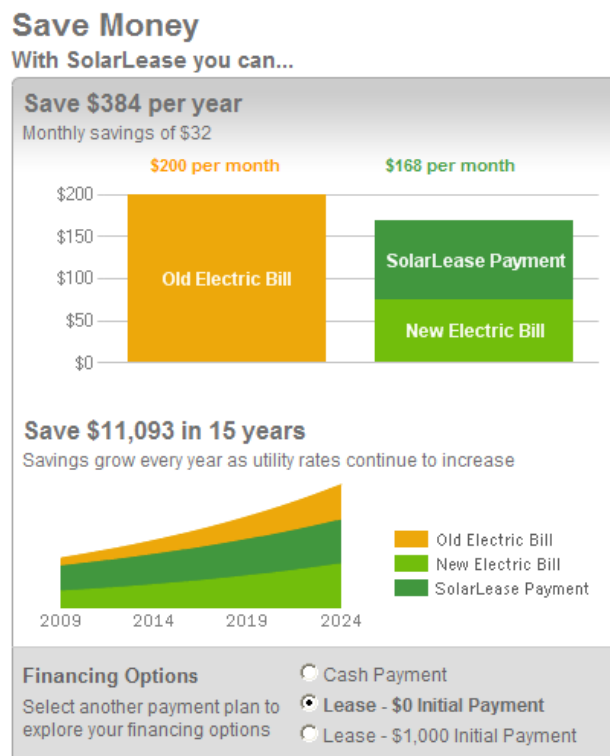
Under SOLAR FOR ALL, condo owners, renters and mobile home residents could buy PV panels at a solar farm and use the energy produced there to reduce their electric bill as much as they want (but not below zero). They would be able to “go solar” and benefit from solar rebates just like California homeowners have for years.



¹ RNM for local governments was authorized in 2008 by AB 2466.

Part 2 of the solution is to make sure that participants in SOLAR FOR ALL have the option of **leasing** solar panels. Homeowners can lease a rooftop PV system today, and leasing has proven to be very popular. SolarCity pioneered residential solar leasing in mid-2008 and its market share soared as a result. SolarCity learned that many people wanted the benefits of solar, but did not have the capital to buy a system outright. With solar leasing, most customers pay no money down and actually **save money from day one**. That's because the solar electricity obtained by leasing panels costs \$.20-.23/kwh, which is less than the grid power it is displacing. (Tier 5 residential power currently costs \$.44/kwh in PG&E territory, \$.29/kwh in SCE territory, and \$.27/kwh in SDG&E territory.)

SolarCity uses charts like the ones below to explain the savings from leasing solar, and similar savings will be provided by other solar leasing companies.



A condo owner or renter could **lease** part of this urban solar farm



Not just market expansion, but cost reduction!

SOLAR FOR ALL would do far more than expand the market for solar to renters and the owners of condos and mobile homes. It **would lower the cost** of solar very significantly. Here's how.

Today, residential solar systems cost about \$7,500 per DC kilowatt before state incentives. A typical 4 kilowatt system costs \$30,000 before incentives and \$25,000 after the state rebate. After subtracting the 30% federal tax credit, the net price to the homeowner is \$17,500.

However, when constructing a 1,000 kilowatt solar farm, there are many economies of scale. The cost would be about \$6,000 per DC kilowatt, not \$7,500. A 4 kilowatt share of that big system would cost \$24,000 before incentives and \$19,000 after the state rebate. The net price after the 30% federal tax credit would be \$13,300. Thus, the economies of scale of a solar farm save about 25% compared to a traditional residential rooftop installation. The operator of the farm would also have the tax benefit of depreciating the asset, which would lower their costs even more, and they could pass some of these savings along to their customer.

Under optimal conditions – no shade, south-facing, properly tilted -- a PV system in Northern California produces about 1,450 kWh per year for each DC kW of panels. Solar farm PV systems would only be built where conditions are optimal, so they would achieve this high level of output. Contrast this to the lower performance of typical residential PV systems. They frequently face 40-90 degrees away from due south. The mounting angle of the panels matches the pitch of the roof and is often far from ideal. Residential panels are often shaded part of the day or in winter. As a result, their typical production averages 1,250 kWh per year per kW of panels, which is 14% less than a solar farm would generate from the same number of solar panels.

The table below shows how dramatically these two effects combine to reduce the cost of solar energy from a Solar Farm. The cost of solar electricity drops to \$.148/kWh, which is lower than the average price paid by residential customers today! While grid prices are expected to continue to rise, these prices will be locked in for 30 years.

	Status Quo	SOLAR FOR ALL (Owned)	Percent improvement
Price per DC kW	\$7,500	\$6,000	20%
Price for a 4 DC kW system	\$30,000	\$24,000	20%
CSI incentive	(\$5,000)	(\$5,000)	0%
Federal Tax Credit	(\$7,500)	(\$6,700)	-11%
Net Price	\$17,500	\$13,300	24%
Average kWh per DC kW per year ²	1,250	1,450	16%
kWh from a 4 kW system over 30 years	150,000	174,000	16%
\$ per kWh, ignoring time value of money ³	\$.117	\$.076	35%
\$ per kWh, assuming 5% customer discount rate ⁴	\$.225	\$.148	34%

² PV systems produce about ½ to 1% less energy each year. This figure is the average over the system's 30-year life.

³ This calculation divides the number of kWh produced over the 30 year life of the system by its Net Price.

⁴ This calculates the Present Value of 30 years of equal payments that equals the Net Price using a 5% discount rate. That figure is \$1127 for the Status Quo scenario and \$857 for Solar for All. This is then divided by the average annual production in kWh.

Solving the “What Happens When We Move?” Problem

Even some of the most ardent potential solar purchasers wonder whether PV is an investment that will be valued by the person who buys their home. Homeowners in California move every 5-7 years, while PV systems last 30 years. Renters, of course, move even more often. The SOLAR FOR ALL plan solves this problem. As long as the move is within the territory of the Investor-owned Utility (IOU) where the solar farm is located, all that would be necessary would be to reassign the solar output to the utility account at the new residence.

If the plan participant moves out of the IOU’s territory, they could sell their share in the farm to a new buyer on the secondary market. (This approach is similar to the secondary market for timesharing vacation properties, and undoubtedly a new brokerage industry will spring up to facilitate such sales.)

Removing Other Non-financial Barriers

Many homeowners who could afford solar PV today still don’t buy it, due to the seven reasons listed below (and others). The SOLAR FOR ALL plan addresses all of these concerns.

- 1) concerns about the aesthetics of appearance of panels
- 2) worries about roof leaks
- 3) concerns about roof replacement in 5-10 years
- 4) the expense of possibly having to update an outdated electrical service panel
- 5) concerns that the roof isn’t strong enough to support the weight of panels
- 6) having too much shade on the roof for solar panels to operate efficiently
- 7) having a roof that is oriented in the wrong direction or pitched at a bad angle

When your PV system is located at a solar farm, not on your roof, these concerns are no longer relevant!

Precedents

SMUD has pioneered something quite similar with their SolarShares program (<http://www.smud.org/en/community-environment/solar/pages/solarshares.aspx>).

The City of Ashland, Oregon calls their program “Solar Pioneers” (<http://www.ashland.or.us/Page.asp?NavID=10994>)

The State of Maine requires IOUs to provide net metering for shared ownership renewable generation facilities.⁵ As many as 10 ratepayers can jointly own a renewable facilities (of almost any type) up to 660 kW in size. The original law authorizing this was enacted in 1998.

Pennsylvania already offers something similar as well. According to the DOE’s DSIRE database: “Pennsylvania’s rules allow meter aggregation on properties owned or leased and operated by a customer. This primarily benefits farms that are commonly owned and operated. Aggregation is limited to meters (in a single utility’s service territory) that are located on properties within two miles of the boundaries of the customer’s property. The utility must provide the necessary equipment for physical meter aggregation, but the customer must pay the costs. In addition, "virtual meter aggregation" is allowed for properties owned or leased and operated by a customer and located within two miles of the boundaries of the customer's property and within a single utility's service territory. For virtual meter aggregation, the customer is responsible only for any incremental expense involved in processing the account on a virtual meter aggregation basis.”⁶

Let’s build on these efforts and scale them up so that we can **achieve the Million Solar Roofs vision!**

FAQ

Q. Would solar farm owners need to be regulated as electric utilities?

A. No. The CPUC, the three IOUs and LADWP have already determined that companies that lease solar equipment to homeowners **are not utilities** and should not be regulated as such. Solar farm owners do not sell power. In the case where residential customers own their panels, they lease space and provide other services to their customers. In the case where customers lease panels, the owners of the solar farm provide equipment leasing and ancillary services, not electricity.

Q. How would this plan impact “green jobs”?

A. One of the ways that SOLAR FOR ALL lowers costs is by reducing the person-hours required to sell, design and install a given amount of PV. At the same time, by dramatically lowering the price it will expand the amount of PV that is purchased or leased. If the labor content of each kW is reduced by 50%, but lower prices cause the market to be 3 times larger than it would otherwise have been, then SOLAR FOR ALL will create 50% more jobs. See the table below for an example.

	Status Quo	SOLAR FOR ALL
Labor hours per residential solar kW	50	25
Residential kW installed per year	50,000	150,000
Total labor hours per year	2,500,000	3,750,000
Residential solar jobs	1,250	1,875

⁵ http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=ME02R&re=1&ee=1

⁶ http://www.dsireusa.org/library/includes/incentive2.cfm?Incentive_Code=PA03R&state=PA&CurrentPageID=1&RE=1&EE=1

Q. What kinds of jobs would be most impacted?

A. I project an expansion in sales and tele-sales jobs, which are among the highest paid positions in the solar industry today. There would also be an expansion in installation jobs because there would be so many more panels to be installed. The demand for small-scale PV system designers would decrease. Other effects are hard to predict.

Q. Would each customer have his or her own individual electric meter at the solar farm?

A. This would be more expensive than having them get credit for their pro-rata share of the farm's output as measured by a master meter, but there is no technical barrier to doing so if the utilities required it. The extra one-time expense would be something on the order of \$300 per account.

Q. Would customers of a solar farm be required to be on a time-of-use (TOU) rate plan?

A. This would be up to the legislature or CPUC. The viability of the SOLAR FOR ALL plan is not dependent on whether TOU is required or optional at the customer's dwelling. (The Remote Net Metering available to cities under AB2466 requires that the generation account and the consumption account both be on a TOU rate plan.)

Q. Could the SOLAR FOR ALL approach be used by business and commercial customers?

A. Absolutely. However, because residential customers pay the highest marginal rates for electricity, I believe that the program should first be offered to residential customers. The economic value proposition is most compelling for residential electric accounts.

Q. If a residential ratepayer leases panels at a solar farm, would the solar farm owner claim the CSI rebate at the "Residential" or "Commercial" rate?

This would be up to the Legislature as part of the process of authorizing residential Remote Net Metering. Currently, when a homeowner leases panels that are installed on their roof, the leasing company gets the residential rebate. Because the savings from SOLAR FOR ALL are so large, the program would be financially viable either way. The residential rebates are currently higher than the commercial rebates by the amounts shown: PG&E: \$0.45 per AC watt; SCE and SDG&E: \$0.35 per AC watt.

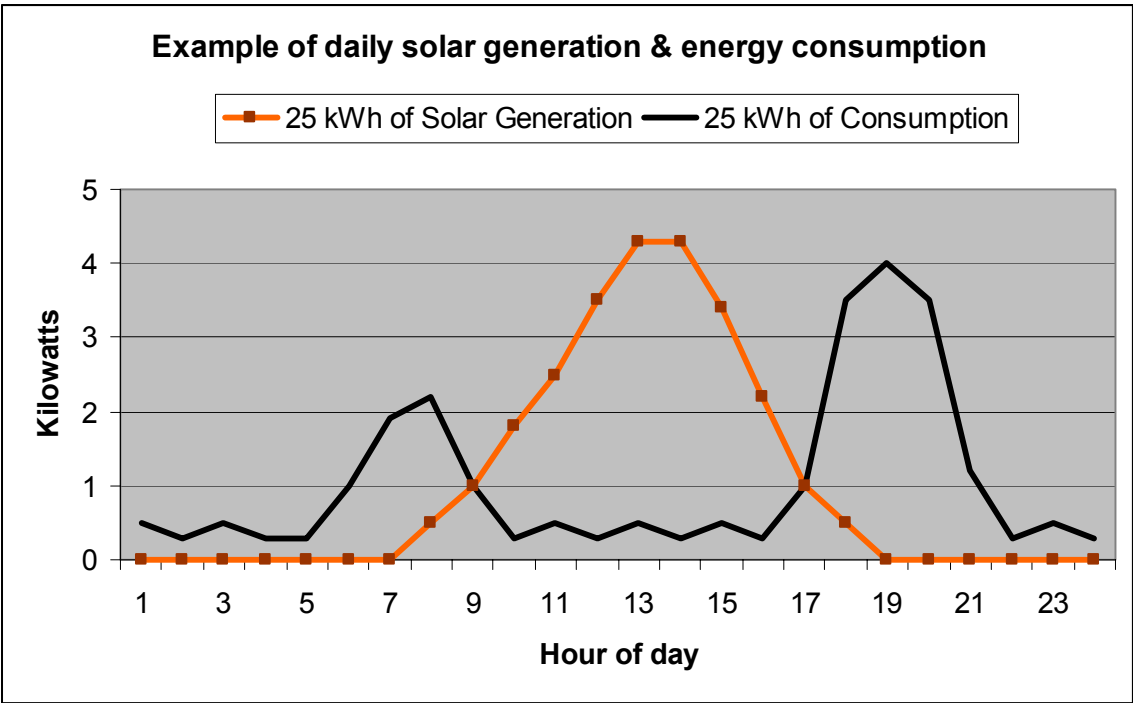
Q. Would a resident who owns a PV system on a solar farm be eligible for the 30% tax credit?

A. This is an important question, but the answer is unclear. The IRS definition of qualified solar property⁷ reads:

The term "qualified solar electric property expenditure" means an expenditure for property which uses solar energy to generate electricity *for use in a dwelling unit* located in the United States and used as a residence by the taxpayer. [emphasis added]

⁷ <http://www.dsireusa.org/documents/Incentives/US37Fa.htm>

As shown in the graph below a typical residential PV system exports a very significant portion of the energy it produces to the grid. The grid then delivers it to neighboring homes and businesses. The graph shows the energy generated and used during a typical weekday in a home where everyone is at school or work from 9 a.m. to 5 p.m. In this example, the amount of energy used and produced during the day is the same: 25 kilowatt hours. 77% of the solar-generated energy is exported (this represents the energy generated between 9 to 5 that exceeds the needs of the home) and only 23% is used within the home. Thanks to net metering, the homeowner is credited for the exported energy and uses the credit to pay for energy purchased from the grid when their demand exceeds the output of the PV system.



The scenario represented by the graph does not fall outside the intent of the IRS definition, but does it fall outside the “letter” of it? The home generates 25 kWh and it uses 25 kWh – but 77% of the time the electrons the home uses are not the same ones its PV system generates.

In a residence that obtained its solar energy through Remote Net Metering the amount of energy generated remotely would also match the usage within the home. However, in the case of RNM, 100% of the electrons would be exported to the grid rather than 77%. Should this 23% difference be the difference between a 30% tax credit and no tax credit? I certainly hope not. At the very least, I believe it’s fair to say if roof-mounted solar PV systems are not outside the spirit of the current IRS definition then neither are customer-owned panels at a solar farm.

Q. Does the uncertainty about the 30% tax credit apply to leased systems?

No, there is no similar uncertainty for leased systems. The California legislature can authorize the leased form of SOLAR FOR ALL without any changes in tax law (or interpretation of tax law) at the Federal level.

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