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Pricing CLEAN Contracts for Solar PV in the U.S.

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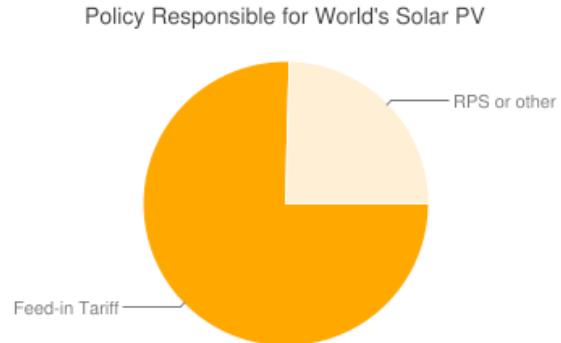


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The price of solar is dropping fast, opening new opportunities for community-scale renewable energy across the country. But despite the improving economics and tremendously sunnier skies, the United States lags far behind other countries, most notably Germany, in installing new solar power.

The biggest difference is policy. The U.S. has two major federal incentives (a 30% tax credit and accelerated depreciation) for solar power, and a few state programs for solar power. Germany and most other developed countries use a [feed-in tariff](#) for renewable energy, a policy responsible for three-quarters of the world's solar power capacity.



What might happen if the U.S. adopted Germany's flagship "[feed-in tariff](#)" policy, responsible for 10 gigawatts of solar in just two years? Let's take a look at how such a program would be priced.

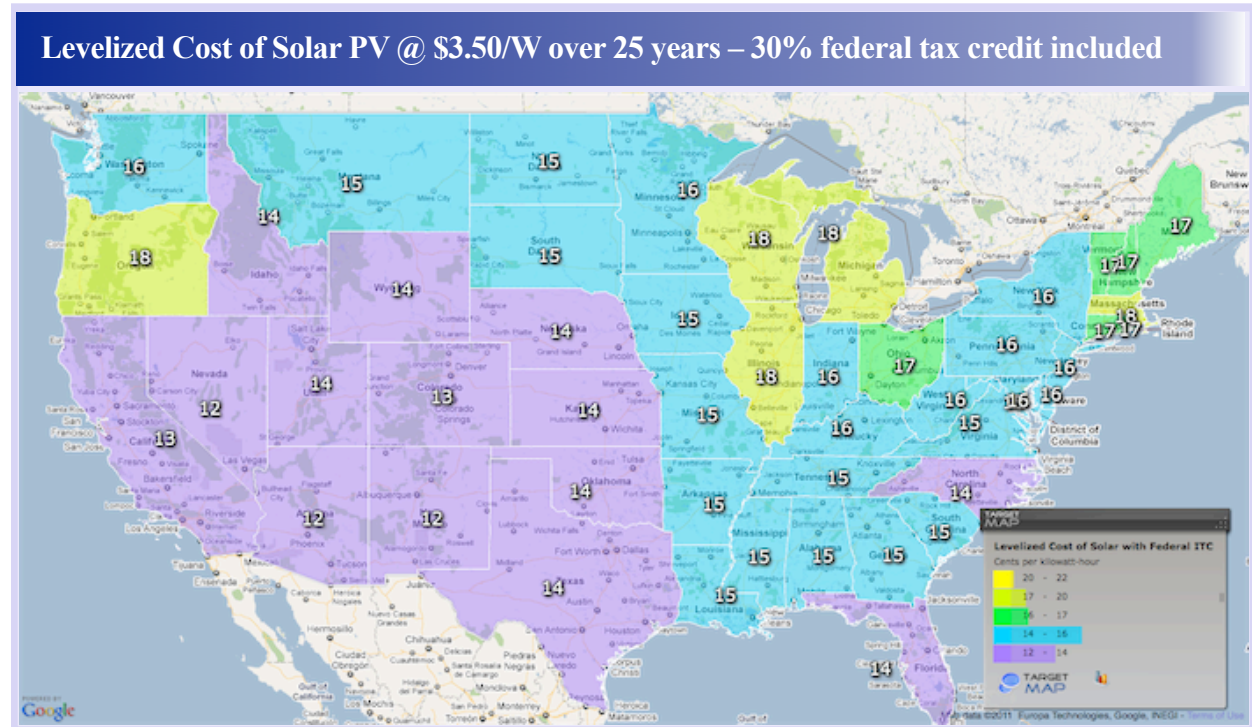
First, we're marketing conscious in America, so we'll call it something better, like a [CLEAN contract](#), for Clean Local Energy Accessible Now.

Then we'll need to adjust the German prices in three ways:

1. Convert euros to dollars
2. Adjust for U.S. sunshine
3. Adjust for federal tax incentives

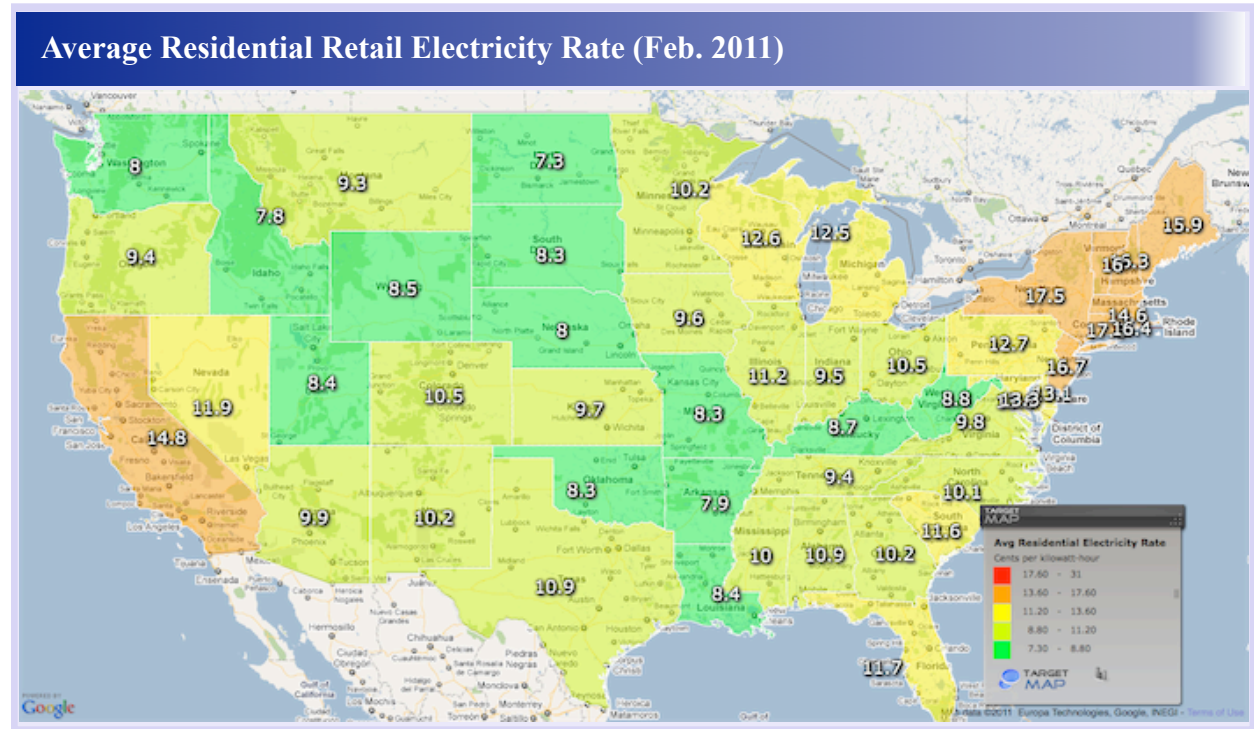
But before we dive in to the German solar program, let's quickly look at the raw cost of producing solar electricity in the U.S. along with the major federal incentive. The following map ([click here for a larger, interactive version](#)) illustrates the so-called "levelized cost" of solar PV, the total cost of the system (minus the 30% federal tax credit) divided by its expected electricity production over 25 years, based on an installed cost of \$3.50 per Watt (common in Germany, and possible for distributed solar PV in the U.S.).*

* We used \$3.50 per Watt for the cost of solar for two reasons. First, it represents the low end of projected costs for currently contracted solar PV projects in the U.S., thus solar is commercially available at this price. Second, solar PV price reductions have come at a furious pace – 50% in 5 years – and thus \$3.50 will be a common installed cost by the time any state adopts a CLEAN contract policy.



These prices represent what a solar project would need to break even (e.g. make no profit). A cautionary note: we used a single city within a state (e.g. New York City, NY) when computing the levelized cost of solar for that state, but solar insolation can vary significantly. For example, Buffalo, NY, has a solar resource 15% weaker than New York City.

Caveats aside, solar prices have fallen so much that they are comparable to or lower than retail electricity rates in selected states in the Southwest (with great sun) or Northeast (with high electricity rates). The following map illustrates ([click here for a larger, interactive version](#)).



So, solar is narrowing the gap with retail grid electricity rates.

Now, back to the analysis of a U.S. CLEAN contract program. We start with the rates the Germans pay for solar PV under their feed-in tariff. The euro to dollar exchange rate is currently around 1 to 1.4, giving us the following starting rates for rooftop solar PV projects in U.S. dollars per kilowatt-hour.

Size	Contract Price
< 30 kW	\$0.41
30-100 kW	\$0.39
> 100 kW	\$0.37
> 1000 kW	\$0.30

The Germans pay these rates to anyone who can put up a solar panel, per kilowatt-hour sent to the grid, for 20 years. These rates may seem high, but they are comprehensive. Germans get no tax credits, rebates, or other incentives that add to the modest return on investment (6 to 8%). We'll account for this and other factors below.

For the first adjustment to the German rates, we have to adjust down to account for the significantly better sunshine in the U.S. For illustration, Albany (NY) has 33% better sunshine than Munich (Germany), even though Munich is in the "sunny south" of Germany. Los Angeles

gets almost 70% better sunshine than Munich. We'll pick St. Louis, MO, for its central location and average U.S. solar resource. The following table illustrates the dramatic drop in the price required to offer a modest return on investment for a rooftop solar project.

CLEAN Contract Rate for Solar PV in St. Louis (no federal incentives)

Size	Contract Price
< 30 kW	\$0.27
30-100 kW	\$0.26
> 100 kW	\$0.25
> 1000 kW	\$0.21

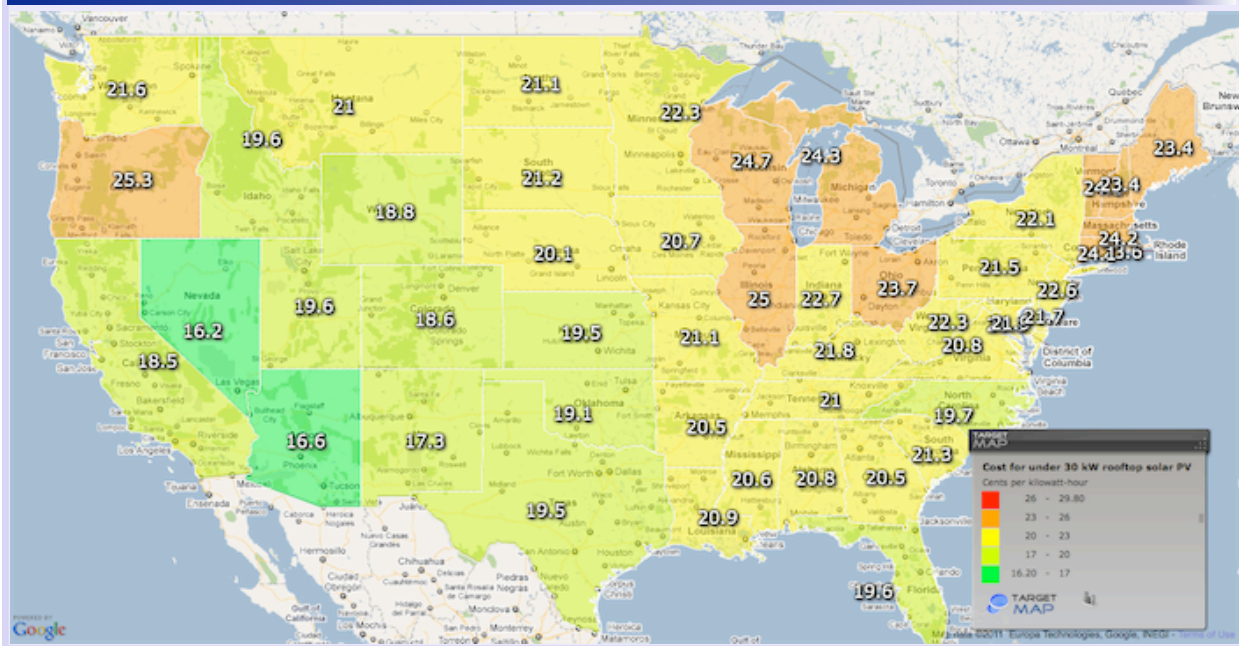
As good as these values look, these prices leave money on the table. While the Germans use the feed-in tariff as a comprehensive policy, the U.S. favors tax credits. Almost every solar PV project built in the U.S. will take advantage of the 30% tax credit (even if they have to [let a third party skim off up to half its value](#) via a leasing arrangement or tax equity financing deal). With a full 30% discount, however, the prices for solar PV projects in St. Louis would drop as follows.

CLEAN Contract Rate for Solar PV in St. Louis (with 30% federal tax credit)

Size	Contract Price
< 30 kW	\$0.21
30-100 kW	\$0.20
> 100 kW	\$0.19
> 1000 kW	\$0.16

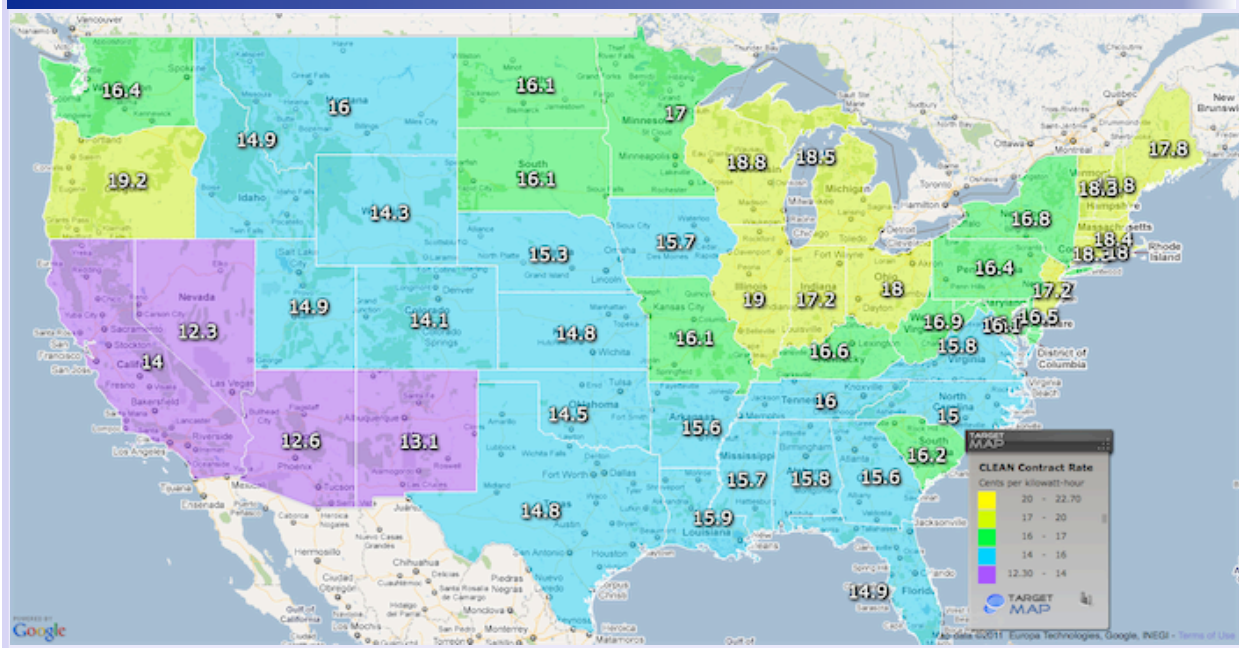
The following map provides a look at the prices for a CLEAN contract for rooftop solar PV (< 30 kW) in each state, based on one of the state's sunnier locations ([click here for a larger, interactive version](#)). Prices would be up to 25% lower for the largest PV projects (over 1 MW).

CLEAN Rate for < 30 kW Rooftop Solar PV @ \$3.50/W - federal tax credit only



In many cases, commercial developers of PV can claim accelerated depreciation in addition to the federal 30% tax credit. With this additional discount (worth around 20% of the project cost), the cost of a CLEAN contract falls even further, as shown on the map ([click here for a larger, interactive version](#)). Once again, prices would be up to 25% lower for PV projects 1 MW and larger.

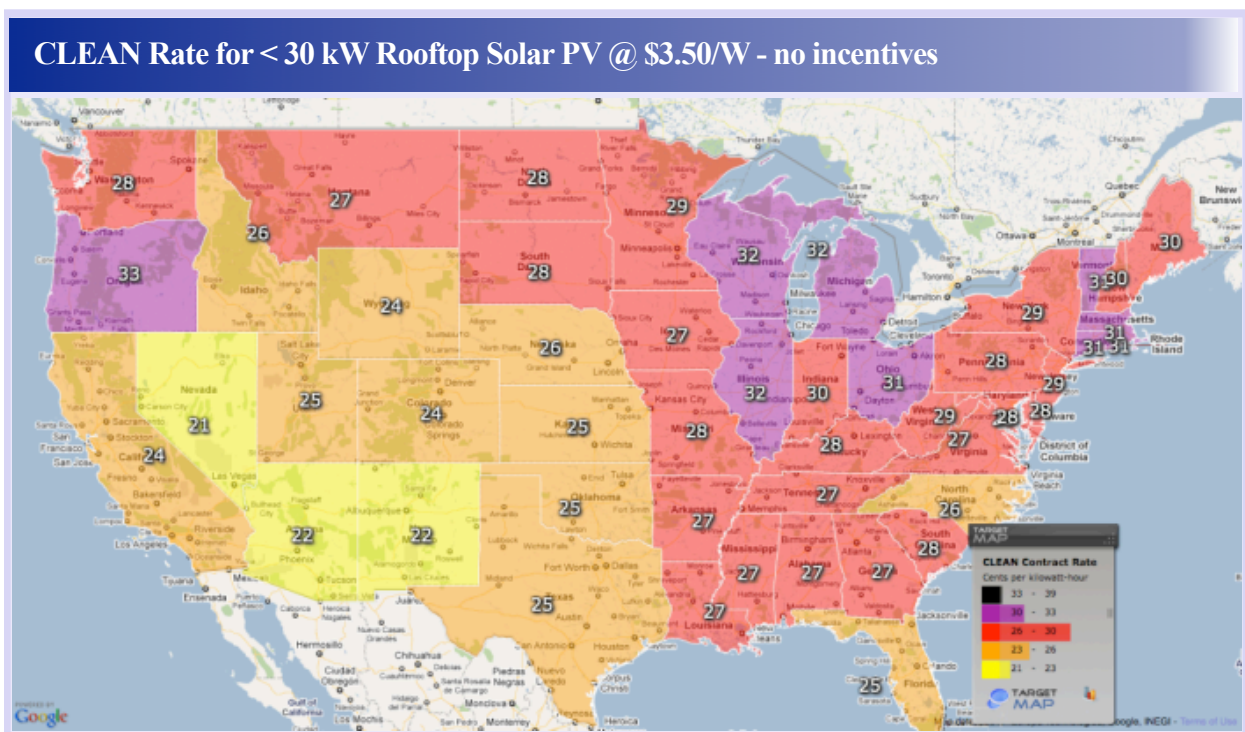
CLEAN Rate for < 30 kW Rooftop Solar PV @ \$3.50/W - federal tax credit and depreciation



There's a danger to looking at CLEAN contract rates with federal incentives, for two reasons:

1. Many individuals and entities (e.g. schools, cities, nonprofits) can't effectively use a tax credit incentive.
2. Tax incentive programs expire or are killed by "budget hawks" (or ideologues) in Congress.

The 30% federal investment tax credit for solar is in statute until 2016, but let's assume for a moment that it expired or that we want to look at the CLEAN contract rates for projects not able to use any federal incentives for solar power (and more comparable to the German program, where the feed-in tariff is the only cash flow for solar developers). We still assume an installed cost of \$3.50 per Watt. The following chart illustrates ([click here for a larger, interactive version](#)).



This chart is a more accurate representation of the state of solar economics (without incentives), showing the prices developers would need to make a small profit on their solar project. It's also the price required for the most democratic solar incentive program, one that would not be prejudiced against participants who couldn't effectively use the federal tax incentives.

In the end, a CLEAN program in the U.S. will likely be premised on the use of one or both federal tax incentives and pay much less than this last chart. It will make sense for ratepayers, but will probably not have the same democratizing effect as Germany's flagship program.

*This analysis originally appeared online at Energy Self-Reliant States:
<http://energyselfreliantstates.org/content/pricing-clean-contracts-feed-tariffs-solar-pv-us>*