

MADISON SOLAR PV CASE STUDY: PRIVATE RESIDENCE



HOME STATS:

Type: 2-story,
hip-gabled home

Lot: 45° off south,
mature trees

Assets: Taller than
surrounding trees, no
dormers on 2 sides

Solar window:
7% overall shading

System installed:
5.8 KW solar electric

Annual output:
7,000 KWH

Incentives:
25 cents per KW
buyback, ~\$1,700
annually

Avoided Annual CO₂:
8 tons



Homeowners Overcome Challenges Typical to Many Madison Homes

Patty Prime and Richard Linster were strongly motivated to find out if solar could be made to work on their property. They contacted the MadiSUN program to have their property assessed for solar. The MadiSUN program, funded by a grant from the US Department of Energy's Solar America Cities program, offers solar assessments and renewable energy consulting to any business or residential property owner within the city of Madison. (See madisun.org for more information on the program.)

MadiSUN's solar assessor visited Patty and Richard's home to measure its "solar window", which checks for obstructions that would create shading problems, and to estimate the costs and paybacks of a solar energy system. The assessor also gave them a presentation summarizing how solar works, how it might fit on their home, and what incentive programs are available to reduce out-of-pocket costs.

At first glance, Patty and Richard's house did not appear to be an especially good candidate for solar energy. The house is located on the near east side of Madison, where streets run at a 45 degree angle. Solar panels produce the maximum annual output when they face due south, and mounting panels

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at 45 degrees off due south results in a reduction in annual output of around 3–5%. This is not a huge loss, but it is in addition to any losses from shading due to surrounding trees and buildings.

Additionally, the house has a “hip-gabled” roof, meaning that each roof segment is triangular (rather than the more common rectangular shape). Trying to fit rectangular panels into a triangular space tends to reduce the total capacity that will fit on a roof.

Finally, their neighborhood, like most near east (and near west) neighborhoods in Madison, is filled with tall mature trees. While providing beneficial shade and cooling, these trees frequently produce large amounts of shading on roofs.

Despite what seem like problematic circumstances, their house turned out to have only 7% shading, as it was tall enough to “see over” the neighborhood trees. Both the southeast and southwest roof areas were identified as good locations for solar panels, as they did not have any dormers or chimneys to interfere.

Patty and Richard received a report summarizing their home’s solar potential and the estimated

costs and paybacks of a solar energy system. After reviewing it they decided to install a 5.8 kilowatt solar electric system, which filled both roof areas right to the edges.

Their system qualified for MG&E’s solar buyback program. This program accelerates the payback of a solar electric system by paying 25 cents per kilowatt-hour for the first 10 years of ownership. That’s about double the MG&E rate for residential customers and more than double the rate for most commercial customers, so this program makes a significant improvement in the economics of a solar energy system.

Their system produces about 7,000 kilowatt-hours of electricity each year, worth about \$1,700 in buy-back payments, and eliminates about 8 tons of CO₂ emissions each year.

Patty and Richard also had a Focus on Energy energy efficiency audit performed on their home and followed the report’s advice to add insulation and other energy conservation measures. This combination of energy efficiency and renewable solar power saves them money and makes the house more comfortable while adding to its resale value.



MadiSUN provides free solar assessments and buyer’s assistance for commercial and residential properties in the City of Madison. For more information: email solar@cityofmadison.com, call (608) 243-0586, or visit MadiSUN.org

MadiSUN is supported through the City of Madison’s participation in the Department of Energy Solar America Cities Program. For more information about Solar America Cities, visit: www.solamericacities.energy.gov