

RENEWABLE ENERGY

Solar Electricity in the City

CASE STUDY



BIOMASS



SOLAR



WIND

Contact Focus on Energy™ to learn about renewable energy options for your home, business or organization. Full program details, applications for awards and eligibility requirements are available from the Renewable Energy Information Center. Call 800.762.7077 or visit focusonenergy.com.

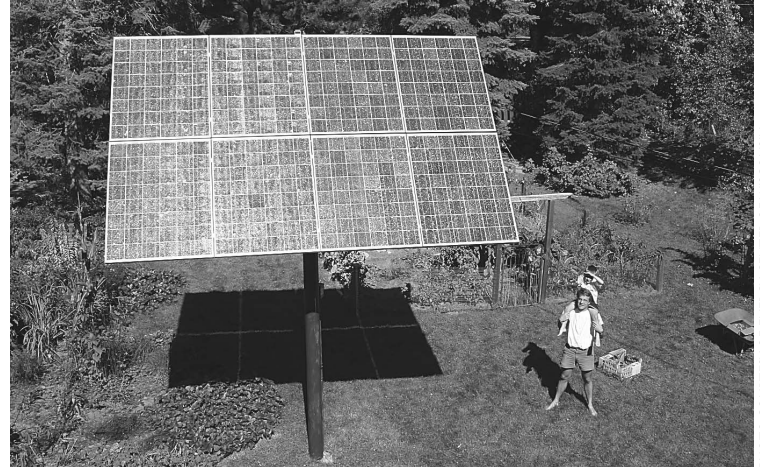
If you live in the city and want to generate your own clean energy, your best option is solar power. The Niels Wolter family of Madison installed a 1.264 kW solar electric (photovoltaic, or PV) system that provides about 95 percent of their electricity needs. Wolter chose to mount the new PV system on a pole in their sunny, suburban backyard rather than on the roof of their home. A tracking mechanism on the pole keeps the PV panels pointed at the sun to maximize electricity production. It's difficult to avoid some shading from neighborhood trees in an urban setting (the Wolter system is about 25 percent shaded). However, this should not discourage others interested in solar electricity.

The Wolter system is interconnected to the utility grid so it doesn't need to meet all their electricity needs. "However," Wolter states, "if you install a system that's slightly undersized, it can inspire you to become even more energy efficient. We cut back on our power use from about 2,000 kWh/year to 1,600 kWh/year since the system has been running."

ENERGY EFFICIENCY FIRST

Purchasing a PV system was not the Wolter family's first step. In 2000, Wolter installed compact fluorescent lights throughout the house. Then in 2002 he purchased an energy efficient freezer, and in 2003, an ENERGY STAR® qualified refrigerator. On electricity bill savings alone the freezer will pay for itself in less than four years. They also use an ENERGY STAR laptop computer and an efficient window air conditioner on hot evenings. Wolter and his son have also developed some simple energy-saving habits around the house such as turning off lights and appliances when they're not needed.

The average single family home uses 10,000 kWh/year. So the Wolter family's annual power



Vegetables aren't all that's harvested in the Wolters' backyard garden since their PV tracker system began producing electricity from the sun.

PHOTO COURTESY OF ENERGY CENTER OF WISCONSIN

needs of 1,600 kWh/year is very low—making them exceptionally electrically efficient.

For Wolter, installation of the PV system was the logical next step in his own commitment to a clean energy future. Never heavy electricity consumers, the Wolter family has cut their use by close to 50 percent. And with the new PV panels, which should last 25 years to 50 years, the Wolters' electricity bill will be less than five percent of what is spent by the average Wisconsin family. Cutting electricity use first meant the PV system could be smaller. The Wolters invested less than \$1,000 in energy efficiency and, as a result, were able to reduce their PV system cost by about \$7,500.

After incentives, the installed PV system cost about \$7,600, with a simple payback of 39 years at today's utility rates. However, rates are increasing and prices of solar electricity systems are declining. Furthermore, by using renewable energy, the Wolter family drastically cut the amount of pollution and greenhouse gases their energy use produces. "Anyone can take these steps," says Wolter. "You don't need to get a giant system. Besides, it's a lot of fun, and every solar electric system makes Wisconsin's future a little greener!"



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The power is within you.

Wolter Dual Tracker PV System

Date Completed: June 2004

CASE STUDY FACTS

<p>PERSONNEL</p>	<p>Owner: Niels Wolter</p> <p>System installed by: H&H Solar Energy Services, Madison, Wisconsin</p>	
<p>BUILDING AND SITE</p>	<p>Location:</p> <ul style="list-style-type: none"> ■ Suburban backyard on Madison's west side ■ The panels are about 25 percent shaded by neighborhood trees ■ 3-bedroom home uses about 1,600 kWh/year 	
<p>EQUIPMENT</p>	<p>Renewable energy technology(s):</p> <ul style="list-style-type: none"> ■ Pole-mounted, dual axis tracking PV system, grid connected (no battery backup) ■ Overall panel size: 8.5 feet x 13 feet ■ Pole height: 13 feet <p>Manufacturer(s):</p> <ul style="list-style-type: none"> ■ PV panels Kyocera, Inverter SMA, and Tracker WattSun <p>Electrical specifications:</p> <ul style="list-style-type: none"> ■ 1.264 KW ■ Generating about 1,550 kWh/year 	
<p>EQUIPMENT COSTS AND BUILDING</p>	<p>Economic costs and benefits:</p> <ul style="list-style-type: none"> ■ Total cost of equipment, labor, permits: \$10,400 ■ Reward from Focus on Energy: \$2,625 ■ Projected annual electricity usage and cost after installation: 50 kWh/year annual cost at current rates. \$30 for power and \$110 connection fee <p>Energy and environmental benefits:</p> <ul style="list-style-type: none"> ■ Anticipated production: 1,550 kWh per year ■ Will offset: 1,550 lbs coal burned per year ■ Pollution avoided per year: 3,410 lbs of carbon dioxide (CO₂); 0.00008 lbs mercury (Hg); 18 lbs sulfur dioxide (SO₂); 8 lbs nitrogen oxide (NO_x) ■ Calculations based on: 2.2 CO₂ lbs/kWh; 4.89 x 10⁻⁸ Hg lbs/kWh; 0.0122 SO₂ lbs/kWh; 0.0057 NO_x lbs/kWh 	