

# Solar Electricity in the City

## CASE STUDY



BIOMASS



GEOTHERMAL



HYDROPOWER



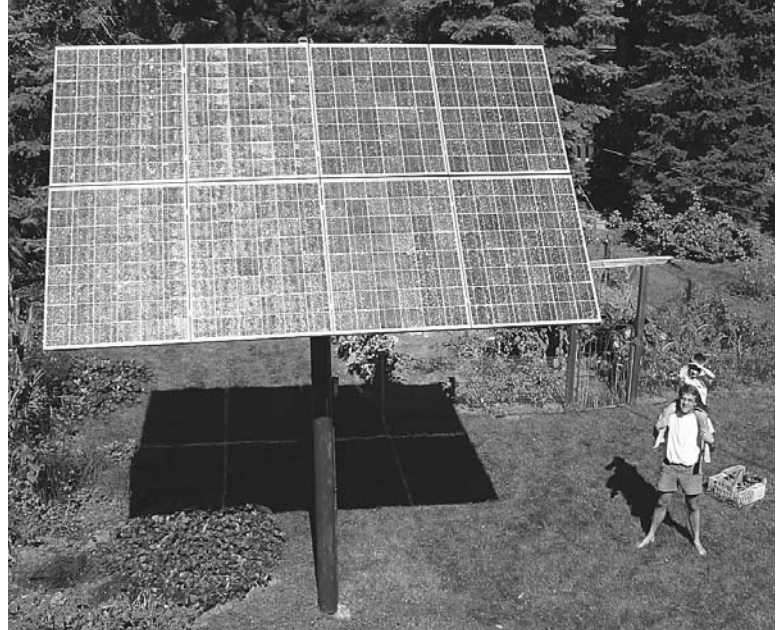
SOLAR



WIND

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If you live in the city and want to generate your own clean energy, your best option is solar power. Recently, the Niels Wolter family of Madison installed a 1.264 kW solar electric (photo-voltaic, or PV) system that provides about 80 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 12 percent shaded). However, this should not discourage others interested in solar electricity.



Vegetables aren't the only crops harvested in the Wolters' backyard garden since their new PV tracker system began producing electricity from the sun.

COURTESY OF ENERGY CENTER OF WISCONSIN

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."

### ENERGY EFFICIENCY FIRST

Purchasing a PV system was not the Wolter family's first step. Beginning 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® 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.

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 Wolter's 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 were thus 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. Data collected by Focus on Energy show that solar electricity system prices have declined by about 25 percent over the last two years. Furthermore, by using renewable energy, the Wolter family drastically cut the amount of pollution and greenhouse gasses 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!"



# Case Study Facts

## Wolter Dual Tracker PV System

Date Completed: June 2004

### Personnel

**Owner:** Niels Wolter

**System Installed by:** H&H Electric, Madison, Wisconsin

### Building and Site

**Location:** Suburban backyard on Madison's west side.

The panels are about 12 percent shaded by neighborhood trees

3-bedroom home uses about 2,000 kWh/year

### Equipment

#### RENEWABLE ENERGY TECHNOLOGY(S)

- Pole-mounted, dual axis tracking PV system, grid connected (no battery back-up)
- Overall panel size: 8.5 feet x 13 feet; pole height: 13 feet

#### MANUFACTURER(S)

- PV panels Kyocera, Inverter SMA, and Tracker WattSun

#### ELECTRICAL SPECIFICATIONS

- 1.264 KW
- Generating about 1,750 kWh/year

### Equipment Costs and Benefits

#### ECONOMIC COSTS AND BENEFITS:

- Total cost of equipment, labor, permits: \$10,400
- Reward from Focus on Energy: \$2,625
- Projected annual electricity usage and cost after installation: 250 kWh/year annual cost at current rate \$130 (75 percent of annual cost are fixed charges for being connected)

#### ENERGY AND ENVIRONMENTAL BENEFITS:

**Anticipated production:** 1,750 kWh per year

**Will offset:** 1,550 lbs coal burned per year

**Pollution avoided per year:** 3,479 lbs of CO<sub>2</sub>; .00006 lbs Hg; 14 lbs SO<sub>2</sub>; 7.3 lbs NO<sub>x</sub>

**Calculations based on:** 1.988 lbs CO<sub>2</sub>/kWh; 4.16 lbs NO<sub>x</sub>; 7.99 lbs SO<sub>2</sub>/MWh