

# SOLAR ENERGY IN NORTH CAROLINA

It's getting easier to  
soak up the sun in the  
Tar Heel State

By Michael E.C. Gery



Solar radiation reaches North Carolina in sufficient amounts to make it practical as a clean energy source. How practical it is, of course, depends on the time of year, the weather conditions on a given day, what obstacles may block the sun at a given location, and the technology available to take advantage of solar energy.

Engineers have calcu-

lated that after it passes through the earth's atmosphere, the solar energy on the ground level (called insolation) in North Carolina, in electric energy terms, averages 4 to 4.5 kilowatt-hours per square meter per day. (The value remains in all regions of the state and is slightly better in summer.) That's about enough to run a clothes dryer and a refrigerator freezer for a year if you had full sun every day.

North Carolina's Touchstone Energy cooperatives recently sent staff representatives to a solar energy seminar conducted by Advanced Energy in Raleigh. The cooperatives are one of the utility sponsors of Advanced Energy, a nonprofit energy research and testing corporation formed in 1980. Advanced Energy's Evan Pritchard, a mechanical engineer, led the seminar.

Pritchard said, "By far, the most cost-effective use of solar energy in North Carolina right now is for heating water." A typical solar water heating system for both residential and commercial use can pay for itself in energy savings in about five years, he said. State and federal tax incentives have made installing this technology even more attractive.

Solar water heating systems typically include flat panels that absorb the sun's heat and transfer it to pipes that carry water to a water tank for use throughout a building. The heating systems vary and include passive ones with no moving parts and active ones that integrate an electric pump. Systems can provide 60 percent of a home's hot water, depending on the location of the site and how much water the place requires. Most systems last 15 to 20 years. An active, flat plate solar collector system will cost approximately \$2,500 to \$3,500 installed and produce about 80 to 100 gallons of hot water per day. A passive system will cost about \$1,000 to \$2,000 installed but will have a lower capacity.

If you're interested in researching a system, you are

advised to check with solar resource professionals and installers to examine your site and advise you on the type of system that would suit your location.

## Solar Electricity

The technology to convert sunlight to electric energy—called photovoltaic ("light to electricity") technology—has improved markedly in recent years. But the cost to install these systems has kept them from widespread use in the residential market. Pritchard said the cost of an installed photovoltaic (PV) system ranges from \$6,000 to \$10,000 per kilowatt. "Even with tax incentives out there today," Pritchard said, "you're looking at a lifetime payback period for these systems. The reasons people install them usually have to do with a desire to supply energy with minimal environmental effects, or because the application is in a remote location."

Examples of remote location applications are on-site signage and water pumps for livestock where there may be no convenient tie into the local electric utility system.

Installing a PV system to supply electricity to a building requires a storage capacity, typically a bank of batteries, as well as an inversion technology to convert the DC power generated to AC power for common appliances. The generating devices are an array of flat panels sited to take advantage of the most solar gain during the day; some panels can move during the day to follow the sun's path.

Putting into perspective the power of a PV system, Pritchard said you would need three panels of the 15-volt systems available at Sam's Club to power a typical laptop computer. See an example of a PV installation on page 15.

## The North Carolina Solar Center

During the past 20 years, the North Carolina Solar Center has become one of the nation's leading institutions for information about solar and other renewable energy. Located at North Carolina State University, the N.C. Solar Center maintains a database of information about the various financial incentives available for homeowners and businesses who install solar energy systems, as well as basic information on solar energy and system professionals and contractors. The center also maintains the North Carolina Solar House, which allows the general public to see a variety of solar energy applications at work in a typical residential setting. ⓘ

### TO LEARN MORE

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