

# Photovoltaics in the National Parks

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## Photovoltaic energy systems bring nonpolluting solar electric power to popular U.S. national parks and recreation areas

One of the biggest challenges facing the National Park Service (NPS) is to protect the nation's parks and recreation areas while enabling people to enjoy them, both now and in the future. One way to achieve this is through effective energy management, which reduces the adverse impacts of energy use on the environment in scenic areas. As part of its energy management program, NPS has been actively promoting energy conservation and the greater use of renewable energy technologies such as photovoltaics (PV).

PV is proving to be a very effective way to produce electricity in our parks. At the request

of NPS, staff at the U.S. Department of Energy's (DOE's) Sandia National Laboratories began surveying PV energy systems already installed in several parks and identifying opportunities for future PV projects. Sandia found that Glen Canyon National Recreation Area in southern Utah is not unusual in respect to using PV—nearly all of our national parks could use PV in some fashion.

On the northern shore of Glen Canyon's popular Lake Powell is Dangling Rope Marina, a frequent stop for vacationers

### Highlights

- **Demonstrated the feasibility and market potential of PV-generated electric power**
- **Eliminated the risk of costly oil and diesel fuel spills in scenic areas**
- **Reduced local air-polluting emissions dramatically**
- **Provided excellent opportunities to educate the public about renewable energy and technology transfer**
- **Demonstrated quiet, new, renewable energy, and power conversion systems that will save millions of dollars in energy costs over their 20-year lifetimes**
- **Achieved widespread success, with more than 30 projects installed in 15 states.**



NREL/PIX04923

**This quiet photovoltaic-hybrid electric energy system, installed at Dangling Rope Marina on Lake Powell in Utah, has replaced a diesel system using more than 65,000 gallons of fuel each year. (Photo courtesy of the National Park Service)**

## Project Partners

U.S. Department of Energy:

Office of Photovoltaic Technology

Federal Energy Management Program

Sandia National Laboratories

Applied Power Corporation

ARAMARK Leisure Services, Inc.

ASE Americas, Inc.

C&D Power Systems, Inc. (now C&D Technologies, Inc.)

KENETECH Windpower, Inc. (now Trace Technologies Corporation)

National Park Service

Pacificorp

U.S. Environmental Protection Agency

Utah Department of Natural Resources

Utah Power and Light

needing fuel, supplies, and minor boat repairs. There, a new 115-kilowatt PV array is now converting sunlight to electricity for the marina's visitors and staff. This quiet, non-polluting array, which consists of 384 PV panels, is accompanied by a 2.4-megawatt-hour battery bank for storage, a propane-fueled engine generator for occasional backup power, and a 250-kilowatt dc-to-ac hybrid-power converter.

In 1996, the new PV-hybrid system replaced the marina's old diesel power system, which was noisy and expensive to operate. It consumed about 65,000 gallons of diesel fuel

*“This system will be noticed by thousands of visitors each year and will have enormous educational benefits. It will also enhance the potential for technology transfer.”*

*—Jeff Burks, Director, Office of Energy and Resource Planning, Utah Department of Natural Resources*

annually, which had to be delivered 35 times a year in a 10-hour, 70-mile round-trip by barge. Some of that fuel nearly spilled into the lake during a recent mishap.

To find an alternative, NPS teamed up with several private and public organizations on a \$1.5-million renewable energy project. The new hybrid energy system is expected to save as much as \$2.3 million in energy costs during its 20-year life. In addition, analysts at Sandia predict that using the new hybrid energy system will reduce the annual emission of air pollutants by at least:

- 2000 fewer pounds of sulfur dioxide
- 5180 fewer pounds of carbon monoxide
- 27,000 fewer pounds of nitrogen oxides
- 540 fewer tons of carbon dioxide.

The improvements at Dangling Rope Marina are just one example of the results being achieved with PV-generated electricity in more than 30 current DOE/NPS projects in 15 states. Projects such as these enable the NPS to maintain essential services in the nation's parks and recreation areas with minimal impact on our environment.

## For More Information:

To find out more about Sandia's Renew the Parks program, see the publication at:  
<http://www.sandia.gov/pv/lib.htm>

To learn more about photovoltaics, visit these Web sites:

Energy Efficiency and Renewable Energy Network:  
<http://www.eren.doe.gov>

U.S. DOE Photovoltaics Program:  
<http://www.eren.doe.gov/pv>

Sandia National Laboratories Photovoltaics Home Page:  
<http://www.sandia.gov/pv>

National Renewable Energy Laboratory Photovoltaics Home Page:  
<http://www.nrel.gov/pv>

or contact:

Energy Efficiency and Renewable Energy Clearinghouse (EREC)  
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