

Technical Assistance

Case Study



Energy-Efficient Retrofits at the Carl Hayden Visitors Center

With help from FEMP, the Bureau of Reclamation retrofits the Carl Hayden Visitors Center at Glen Canyon Dam—saving energy, water, and money.

Located on the north end of the Grand Canyon, the Glen Canyon Dam is one of the 20th century's engineering marvels, drawing almost one million tourists from around the world each year.

The Carl Hayden Visitors Center was built in 1966 to accommodate these visitors. Sitting atop one of the country's most impressive sources of hydropower, the 21,000-square-foot (1951 square meters) building houses exhibits, gift shops, bathrooms, an auditorium, and administrative offices.

In 1993, Bureau of Reclamation officials saw opportunities to improve energy efficiency and reduce water use in the 27-year-old visitors center. Because the center relies on electricity as its primary source of energy, saving energy also meant saving money. The Bureau of Reclamation turned to the Federal Energy Management Program (FEMP) for help in getting the energy efficiency project under way.

Lights, windows, low-flow fixtures, and solar energy

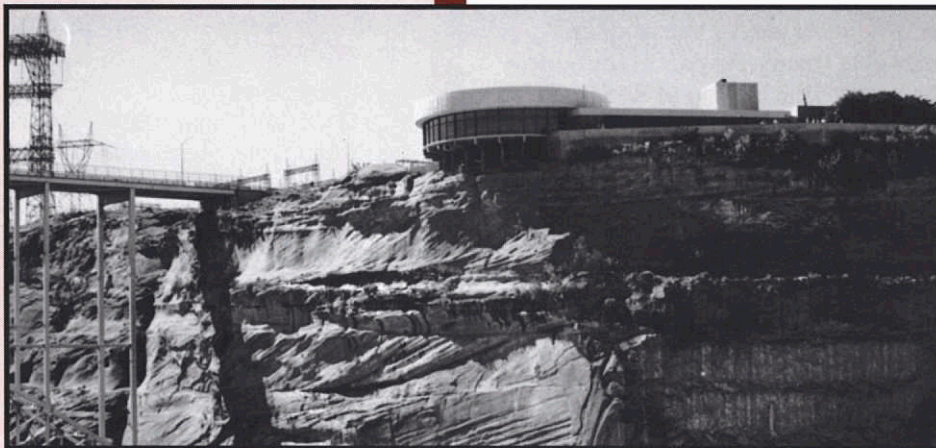
FEMP kicked off the project with a SAVEnergy audit in September 1994. The audit identified a dozen energy conservation measures that would substantially reduce the building's electricity use.

In the months that followed, the bureau implemented many of the audit-identified measures.

- All fluorescent 40-watt T-12 bulbs and ballasts were replaced with energy-efficient 32-watt T-8 bulbs and electronic ballasts.
- All incandescent lights were replaced with compact fluorescent lights where practical.
- Standard flood lamps were replaced with energy-efficient, long-life halogen bulbs.
- Occupancy sensors were installed in offices and administrative areas.
- Night set-back thermostats were installed throughout the facility.
- Timers were installed in the restrooms to control lights and exhaust fans.
- Outdoor wall-mounted flood lights were replaced with compact fluorescent lights.
- Outdoor walkway lights were replaced with compact fluorescent lights.

These measures reduced the center's lighting load by 33%, saving about 13,000 kilowatt-hours each month. The simple cost payback period for the lighting and zone control measures was only 3.3 months.

In the near future, the bureau intends to implement a number of additional conservation measures recommended by the SAVEnergy audit, including modifying the center's heating and

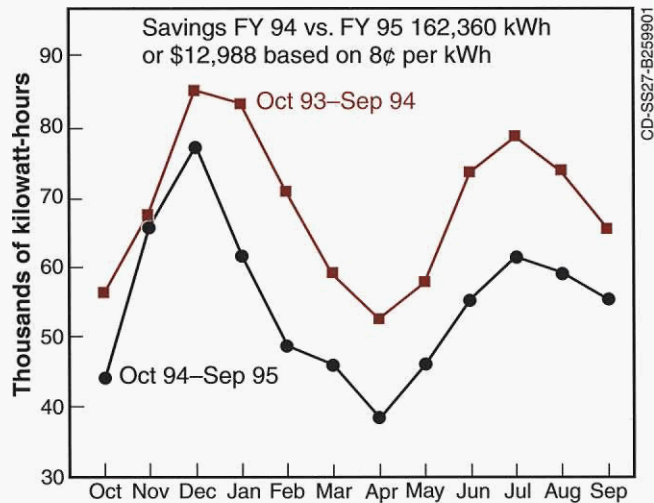


Larry Gordon, Bureau of Reclamation/PIX03689

The visitors center at Glen Canyon—an Energy Saver Showcase facility—uses a variety of energy-efficient, renewable energy, and water conservation technologies.



Energy use before and after the lighting retrofits



cooling systems and implementing a submetering program.

In addition to the measures recommended by the audit, energy specialists within the Bureau of Reclamation identified other conservation opportunities at the visitors center, such as refurbishing the center's solar hot water system and replacing the center's many single-pane windows. FEMP personnel provided technical assistance and determined that these projects would be cost effective.

The solar hot water system, which sat dormant for 3 years, was refurbished with a new glycol circulating pump and hot water storage tank. The project cost \$2,500, and the system now supplies 80% (149,600 gallons [566,298 liters]) of the hot water used at the center, saving an estimated \$1,551 annually.

FEMP engineers also provided technical and cost analysis support for replacing the center's 1374 square feet (128 square meters) of single-pane windows with highly efficient, double-pane heat mirror windows. The new windows have an R-value of 4.75, which reduces the heat loss through the windows by 75%. By replacing the old windows, the bureau saves approximately 94 million Btus—or \$4,545—each year.

The bureau also implemented a number of water conservation measures at the center, primarily replacing

traditional bathroom fixtures with low-flow models. For example, the center's existing toilets consumed 4 gallons (15 liters) of water per flush; the new fixtures use 1.6 gallons (6.06 liters). Low-flow urinals and infrared occupancy-sensing sinks were also installed. These measures will save an estimated 2,040,000 gallons (7,722,240 liters) of water annually.

With the implementation of each conservation measure, the Bureau of Reclamation has seen the center's energy and water use decrease proportionally. The graph at the top of the page compares the energy use at the center before and after the lighting retrofit. The Bureau estimates it saved \$12,988 during fiscal year 1995, before the solar system was refurbished and the low-emissivity windows were installed. Collectively, all the conservation measures implemented at the center will have a payback period of about 5 years.

Other benefits

In addition to saving energy and money, the energy-efficient measures implemented at the Carl Hayden Visitors Center are models for educating the public. With nearly 1 million visitors each year, the center is an ideal vehicle for educating the public about the benefits of energy efficiency and renewable energy. As part of the education process the Bureau of Reclamation installed multilingual signs throughout the center to inform visitors about the measures and their associated savings.

Other environmental benefits are also derived from the energy-efficient measures. The measures offset the annual equivalent of burning 76 tons of coal, which reduces carbon dioxide emissions by 195 tons and reduces SO_x and NO_x emissions by a combined total of 2273 kilograms.

Because of its success and the center's high visibility, Carl Hayden Visitors Center was designated a Federal Energy Saver Showcase, one of only 49 Federal facilities to receive this distinction.

Larry Gordon, the Bureau of Reclamation's Energy Manager for the Upper Colorado Region, believes FEMP's assistance was an important part of the conservation project's success. "The audit FEMP sponsored got the project moving and the technical assistance FEMP personnel provided along the way was extremely valuable for helping us determine the services we needed and payoffs we could expect. The FEMP staff was eager to assist us at every stage, and their dedication to conservation and renewable energy helped keep the momentum high."

FEMP

FEDERAL ENERGY MANAGEMENT PROGRAM

For More Information

Anne Sprunt Crawley
Technical Assistance Team Leader
DOE FEMP
(202) 586-1505

For more information about the project, contact:

Karen Thomas
National Renewable Energy Laboratory
(202) 651-7536

FEMP Help Desk:
1-800-DOE-EREC (363-3732)
Internet: <http://www.eren.doe.gov/femp>



Produced for the U.S. Department of Energy (DOE) by the National Renewable Energy Laboratory, a DOE national laboratory

DOE/GO-10096-283
DE96007928
November 1996



Printed with a renewable-source ink on paper containing at least 50% wastepaper, including 20% postconsumer waste