

Program Highlights—Fiscal Year 1996

Leveraging program investment with that of the private sector to support high-tech research and development bolsters the achievements and future plans of the U.S. Department of Energy's Solar Thermal Electric Program.

Fiscal year (FY) 1996 was a year of accomplishment and some sadness for the Solar Thermal Electric (STE) Program. It was a year in which we saw the inauguration of Solar Two, this country's newest power tower plant. FY1996 accomplishments also included demonstrating dish/engine systems, developing and testing new technologies, and analyzing systems and potential markets.

But it was also a year when a long-standing partner of the U.S. Department of Energy's (DOE) STE Program, Cummins Engine Company in Columbus, Indiana, ended its joint venture with DOE to develop solar dish/engines. As others step in to continue the work, we wish Cummins well and thank both its management and its staff for their many contributions to the advancement of solar power over many years of working together.

Solar Two

On April 4, 1996, Solar Two supplied power to Southern California Edison Company's distribution grid for the first time. Soon afterward, integrated operation, including simultaneous solar energy collection and electricity generation, was achieved. It has also generated power at close to its design level of 10 megawatts (MW), including generation on-sun and from storage.

Over the course of the following year, the project engineers tested subsystems and isolated problems, including the heat trace system, that have been resolved. By the end of 1996, they had improved the availability of the heliostat field to the point where more than 85% of the heliostats were ready for operation on any given day. By March, 1997, average availability was greater than 95%. It should be noted that many of the heliostats were reused from Solar One, which was in operation in the 1980s. Research into system design and improvements continues into 1997.



Warren Grez, NREL/PIX02241

On June 5, 1996, then Secretary of Energy Hazel O'Leary dedicated Solar Two near Barstow, California. Solar Two can generate up to 10 MW of electric power during Southern California Edison's peak demand periods and, with its unique system for storing energy, can supply the same power output for up to 3 hours after dark.

Dish/Engine System Joint Venture

After the joint venture with Cummins ended, our other joint venture to develop and commercialize solar dish/engine systems with Science Applications International Corporation (SAIC) in Golden, Colorado, began its second phase in November 1996. In the first phase of this venture, SAIC's 25-kW dish/engine system operated for more than 300 hours on-sun, providing power to the local utility grid. In March of 1997, the Arizona Public Service Company in Tempe, Arizona, joined SAIC as a utility partner. In FY 1997, SAIC will build and, together with the utility, operate and test three to five more pilot solar dish/engine systems.

Developing Technology

Along with our technical support of industry's commercialization activities, the STE Program is working with industry to develop low-cost components for solar dish/engine systems and power towers. Developments include solar concentrators, high-efficiency engine/generators that operate both on solar energy and fossil fuel (in a hybrid mode), and high-performance receivers. Program highlights include the development and testing of:

- an advanced power tower receiver, developed by the Rocketdyne Division of Boeing North American, Canoga Park, California, that is smaller and more efficient than current designs used, for example, at Solar Two. New receiver panels will undergo testing in FY 1997 at SunLab's National Solar Thermal Test Facility, which is located at Sandia National Laboratories in Albuquerque, New Mexico, and at Solar Two.
- a new heat-pipe receiver for hybrid operation of dish/engines that will operate both on-sun and with natural gas or other fuels regardless of time of day.
- components manufactured at lower costs under the Solar Manufacturing Technology (SolMaT) initiative. As a follow-up to these studies, program engineers will fabricate and deploy four heliostats and will fabricate a full-scale power tower receiver panel for installation at Solar Two in FY 1997.



Craig Miller Productions/PIX02399

In July 1996, Cummins showed tens of thousands of people from all over the world how dish/engines work at the Summer Olympic Games in Atlanta, Georgia.

- conceptual design of a hybrid power tower that runs on solar energy and natural gas, allowing continuous operation throughout the day and night.
- innovative designs for lower-cost solar concentrators, such as fiberglass or foam-core facets.
- a prototype Video SHOT system, which is used to rapidly evaluate mirror and concentrator performance.
- adhesives used to bond thin-glass mirrors to a support material on SAIC's stretched-membrane facets.
- a high-performance, nickel-based absorber to be used in high-temperature solar thermal collectors, and a cermet selective surface coating that reduces heat losses by 40% in parabolic troughs.
- new mirrors capable of operating in high winds at the Solar Electric Generating Systems (SEGS) VI and VII trough power plants in Kramer Junction, California.
- a new, highly effective technique for washing mirrors.
- solar resource data for promising international markets.

The activities described above will continue into FY 1997, as will the following:

- development of new drives for solar concentrators.
- implementation of a new dish/engine program allowing industry to test and evaluate advanced receiver-engine packages.
- several advanced research projects that will provide technical improvements over the long term.

For on-line information about the U.S. Department of Energy's Solar Thermal Electric Program, please visit its web site at: <http://www.eren.doe.gov/sunlab>

For more information on renewable energy or for additional copies of this brochure, contact the Energy Efficiency and Renewable Energy Clearinghouse (EREC): **1-800-DOE-EREC (363-3732)**



Produced for the
U.S. Department of Energy (DOE)
1000 Independence Avenue, S.W.
Washington, DC 20585-0121



Produced by **Sun•Lab:**
Bringing together solar energy expertise from Sandia National Laboratories and the National Renewable Energy Laboratory, DOE national laboratories.

DOE/GO-10097-392
July 1997



Printed on recycled paper