

Industry Manufacturing Assistance

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ABSTRACT

Sandia National Laboratories (SNL) provides technical assistance to the solar thermal industry. Through its Industry Assistance Program, SNL follows a Systems-Driven Approach to help manufacturers improve their products. In addition, the program helps potential technology users design their systems to achieve maximum cost effectiveness. This assistance is often highly leveraged with funding from the U.S. Department of Defense (DoD) and the utility industry.

1. Objectives

- Help solar thermal manufacturers improve their products.
- Help solar technology users design their systems to achieve maximum cost effectiveness.

2. Technical Approach

Solar thermal technology users and manufacturers make a formal request to SNL for technical assistance. Guidelines for making this request are described on the program website [1]. Assistance is given on a "first come, first served basis" to government agencies and to the private sector. Proposed project activities must not compete with those offered in private industry.

3. Results and Accomplishments

Budget allocation during FY 2006 was very limited (\$90K). This allowed us to complete projects begun in FY05 and to provide limited technical assistance to manufacturers and users. No new R&D projects were started. The main areas of activity are described below.

3.1 Deployed a freeze-protected roof-integrated collector project

Roof integration is popular with both builders and architects. Roof integration solves many objections for adopting solar hot water systems that have been raised in the past by builders. The advantages of roof integration include much improved aesthetics, a reduction in the number of roof penetrations, and the ability to replace/repair a roof without removing the solar collectors. In FY 2006, SNL worked with the Building Science Corporation to deploy a roof-integrated design that is capable of operating in a freezing climate. The drainback method was selected as the preferred method of achieving freeze protection.

A demonstration system was installed on a Building-America high-efficiency home (by Artistic Homes) in Los Lunas, New Mexico. The system was flashed into the roof instead of on top of the roof, which has been

the tradition for the past 30 years. SNL engineers designed an energy monitoring system and provided it to Artistic Homes. Data collection began in June 2006.

A system price goal of \$2,000 has been set, given a production scenario of several hundred per year. If this price can be achieved, the system will be cost effective for sunny locations in which natural gas is >\$1/therm; the system can be included in the home mortgage and be paid off by the resultant energy savings.

If the demo is successful and predicted costs are reasonable, Artistic Homes could offer solar hot water as an appliance option to homebuyers.

3.2 Helped RITH Manufacturer achieve SRCC certification

The roof-integrated thermosyphon (RITH) is a "non-freeze-protected" solar hot water system for the new-home market. The collector is the same as installed in the Building America project described above but the design of the remainder of the system is totally different. Unlike the drainback system, the RITH has no pumps and water is circulated through the collector by natural circulation caused by placing the solar tank inside the attic above the elevation of the collector, i.e. the theromsyphon effect.

In FY05, RITH failed its SRCC certification test due to leaks caused by faulty welds. In FY06, Sandia worked with the RITH manufacturer (Energy Laboratory Incorporated) to solve the technical problems that precluded certification. Welding issues were resolved and the unit was resubmitted to SRCC in early 2006. The unit passed the retest and was certified in August, 2006.

The final report that describes the multi-year RITH development effort was published.

3.3 Helped the University of New Mexico establish a solar energy program

During FY2006, the University of New Mexico Mechanical Engineering Department (UNM/ME) was awarded a grant from the State of New Mexico to design, build and operate a solar air conditioning testbed. Sandia was a principal advisor to the UNM/ME team in developing the grant proposal and was instrumental in the design of the plan that was proposed and was funded.

The grant covers the cost of new collectors, a 10-ton absorption chiller, all of the associated balance of system components, and the labor to design and install the testbed. The testbed will be used for graduate and undergraduate studies and will produce chilled water for the UNM/ME building, where the system will be installed.

The UNM/ME faculty will be offering, for the first time in nearly 20 years, solar engineering courses in upcoming semesters, eventually developing solar engineering degree programs at both graduate and undergraduate levels.

3.4 Provided technical assistance to the Solar Rating and Certification Corporation (SRCC)

The Solar Rating and Certification Corporation is the solar hot water industry's certifying organization for systems and collectors. SRCC has only a few paid positions and overhead costs. Historically, DOE has supported SRCC with around one-quarter million dollars per year. However, most of the organizational activities involve volunteer labor, most of it professional, supplied by the industry and supporting organizations. SRCC depends on the involvement of high quality assistance from the national laboratories to continue to conduct its business in a professional manner.

In FY06, Sandia supported SRCC by chairing the Standards committee and serving as technical liaison between the labs and SRCC. The standards committee meets monthly via conference call, with appropriate sub-committees meeting more frequently as needed. The chair is an ex-officio member of each sub-committee and often attends these meetings. Typically, the committee considers detailed technical information concerning testing and certifying collectors and systems and often involves technical analysis and supporting information.

In addition, Sandia providing critical guidance in the development of a strategic marketing plan for SRCC as a whole.

3.5 Other Industry Assistance Activities

We provided solar thermal assistance to several organizations that contacted us through our website. The organizations and the help provided are summarized in Table 1.

4. Conclusions

Sandia provided assistance to help solar thermal manufacturers improve their products. We also aided solar technology users design their systems to achieve maximum cost effectiveness. Program funding in FY06 was small (\$90K). This allowed us to complete 4 major tasks begun in FY05: 1) deployed a freeze-protected roof-integrated collector system, 2) helped RITH manufacturer achieve SRCC certification, 3) helped the University of New Mexico establish a solar energy program, 4) provided technical assistance to the Solar Rating and Certification Corporation. Besides these 4 major tasks we also provided small-scale assistance to several US organizations that contacted Sandia through our website.

Table 1. Additional Assistance

Organization	Description/Title of Research Activity
City of Tucson	Develop a solar HVAC monitoring strategy
US Air Force	Research study to estimate potential of solar on military bases
Concurrent Designs	Provide info on 2-axis solar drives
Shell Oil	Help with study for trough application in Bakersfield, CA
Quest Energy Group	Provide info for solar swimming pool heat project
Sonoma County, CA	Discuss feasibility/economics of possible district heating system
SENTECH	Review solar HVAC report
Puget Sound Energy	Advise on solar tower applications

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REFERENCES

¹www.sandia.gov/Renewable_Energy/solarthermal/Center/index2.htm

MAJOR FY 2006/2007 PUBLICATIONS

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