

Solar Rating & Certification Corporation; Activities October 2005 – January 2007

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ABSTRACT

The Solar Rating & Certification Corporation (SRCC) develops and implements nationally recognized, uniform, 3rd party certification and rating programs for solar water heating (SWH) collectors and systems, and disseminates technical information concerning the application of these certified products.

SRCC provides standardized solar water heating (SWH) collector and system energy production information for the geographical United States. SRCC acts as the national, technical focal point for easy-to-use information and certification for a constituency which includes installers, contractors, engineers, architects, homeowners, developers, utilities, educators, government officials and planners.

During the period October 2005 through January 2007, SRCC certified 55 solar collectors under the Operating Guidelines 100 protocol (OG-100), and 164 SWH systems under the OG-300 protocol.

In response to the inclusion of a requirement for SRCC certification in the Energy Policy Act of 2005, SRCC has significantly increased its rating and certification activities in order to accommodate increased demand for its services.

1. Objectives

SRCC's primary goal in support of the DOE Solar Energy Technologies Program Multi-Year Program Plan (MYPP) is to reduce a major barrier to the increased utilization of SWH systems: reliability and predictability of performance.

A secondary goal in support of the MYPP is to provide support for the Solar Heating & Lighting Program efforts to reduce the cost and improve the performance of SWH systems. Toward that end, SRCC acts as the Program agency responsible for determining the performance of new solar collector and system materials which can lead to the reduction of installed system costs.

In order to qualify for the EAct 2005 federal Investment Tax Credit, solar water heating equipment must be certified by SRCC. A key objective for SRCC is to provide the rating and certification function, on a timely basis, thereby enabling solar manufacturers to offer for sale properly certified products.

2. Technical Approach

The primary function of SRCC is to provide certification services to the industry, its primary customer. Certification is increasingly important because many state and local incentive programs and standards rely on SRCC certification of SWH equipment. The standards must be promoted among

specifiers, code officials and the public, and the standards maintained among manufacturers, including verification of existing certifications and certified products. As the industry develops new products, SRCC must be responsive in certifying these products on a timely basis to meet customer demands.

Issues being addressed include:

2.1 Selection of Products to be Tested

SRCC must ensure that solar collectors submitted for testing are randomly selected from an inventory of pre-manufactured product. This methodology helps ensure a uniform level of quality and performance of rated and certified products.

Testing is conducted according to SRCC Document OG-100, "Operating Guidelines for Certifying Solar Collectors," and its companion document, SRCC Standard 100, "Test Methods and Minimum Standards for Certifying Solar Collectors" by independent, accredited testing laboratories.

Testing is a combination of efficiency and durability with the test procedures for performance being specified by the International Organization for Standardization (ISO 9806, "Test Methods for Solar Collectors"), American Society of Heating, Refrigerating, and Air Conditioning Engineers (ASHRAE Standard 93, "Methods of Testing to Determine the Thermal Performance of Solar Collectors," and ASHRAE Standard 96, "Methods of Testing to Determine the Thermal Performance of Unglazed, Flat Plate, Liquid Solar Collectors.")

2.2 Indoor and Outdoor Testing

SRCC tests solar collectors in both indoor testing facilities under tightly controlled ambient conditions, and outdoors during an established minimum time period of minimum sunlight intensity (insolation) conditions.

2.3 Disassembly and Inspection

After completing performance testing, the collector is disassembled and subassemblies visually inspected and their condition noted. The format specified in ISO 9806-2, Appendix A.14, "Final inspection results," is used to report conditions observed.

2.4 OG-300 System Certification and Rating

The purpose of this solar water heating system certification and rating program is to improve performance and reliability of solar products. It integrates results of component tests with evaluations against minimum standards of system durability, reliability, safety and operation; as well as factors affecting total system design, installation, maintenance

and service. Giving suppliers the opportunity to submit their SWH system designs to an open-ended review encourages them to produce the best products possible.

After completion of collector performance testing, the complete SWH system, as specified by the manufacturer, is modeled using the Transient Energy System Simulation Tool (TRNSYS). TRNSYS is designed to simulate the performance of thermal energy systems, and can predict with good accuracy the energy production of SWH systems in a wide variety of geographical locations based on long-term solar radiation data collected from 239 stations around the U.S. This "Typical Meteorological Year," or TMY2 weather and sunlight data is compiled by the National Renewable Energy Laboratory (NREL).¹

3. Results and Accomplishments

SRCC is widely acknowledged as the single source for up to date SWH system design and energy production data for the full spectrum of systems available and appropriate for all climatic conditions. This information is being used to standardize the eligibility of SWH systems in a variety of state and utility based solar programs. Further, the data is being evaluated for use in both mandatory and voluntary Renewable Energy Credit (REC) compliance markets. To the extent that SWH is eligible for participation in these markets, SRCC collector and system energy production estimates are a more accurate means of assigning RECs as compared with a nameplate capacity rating. This accuracy will allow for distributed renewable energy generation program administrators to avoid the need for individual system metering, and its attendant costs and logistic complexities.

3.1 Solar Collector Energy Production Data

SRCC currently lists (as of March 2007) the energy production data for 172 individual solar collectors, and presents that data in terms of both heat energy (British Thermal Units, or BTUs) and kilowatt-hours thermal (kWh_{th}) equivalent energy output. These listings are updated on a real-time basis on SRCC's web page at www.solar-rating.org. Due to the nearly daily additions to the listing data, it is unrealistic to maintain a hard copy version, so the web page listing serves as SRCC's "official" listing source.

3.2 OG-300 Certified System Energy Production Data

SRCC currently lists the energy savings data, in both electrical energy equivalent (systems with electric backup) and gas energy equivalent (systems with gas backup), for 594 individual solar water heating systems. This data is further individualized for 76 discrete US cities and climatic zones, allowing for a system to system comparison in a specific location, as well as a climate to climate comparison for a specific system.

3.3 Approved OG-300 System Design Schematics

SRCC maintains a compendium of certified system design schematics, showing the relative locations of each system component, as a means of ensuring that systems are installed in the exact manner as is intended by the system certifier.

System certifiers may also specify approved substitutions for individual system components to allow for maximum flexibility for system suppliers and installing contractors. Substitute components are evaluated in the context of desired system operating parameters during the system evaluation phase of the OG-300 Certification process.

4. Conclusions

SRCC SWH collector and system certification helps ensure that well-engineered, appropriately-sized, high-performance SWH systems are installed in the US, thereby filling a void that contributed to less-than-optimal results when SWH products were widely used in the US 20 to 25 years ago.

Future opportunities include expansion of certification to space heating and commercial size SWH systems, and potentially photovoltaic products.

ACKNOWLEDGEMENTS

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REFERENCES

- ¹ NSRDB - Vol. 1 User's Manual - National Solar Radiation Data Base (1961-1990). Version 1.0.: National Renewable Energy Laboratory and Asheville, NC: National Climatic Data Center. (1992).
NSRDB - Vol. 2 Final Technical Report: National Solar Radiation Data Base (1961-1990). NREL/TP-463-5784. National Renewable Energy Laboratory, (1995).

MAJOR FY 2006/2007 PUBLICATIONS

- J. Huggins, J. Harrison, and S. Long, "Summary of SRCC Certified Solar Collector and Water Heating System Ratings,"
J. Huggins, J. Harrison, and S. Long, "Directory of SRCC Certified Solar Collector Ratings"
J. Huggins, J. Harrison, and S. Long "Directory of SRCC Certified Solar Water Heating System Ratings"
J. Huggins, J. Harrison and S. Long "Annual Performance of OG-300 Certified Systems"
All of the SRCC ratings directories are updated frequently and are available at www.solar-ratings.org/ratings/ratings/htm