The Solar Radiation Research Laboratory (SRRL) has been collecting continuous measurements of basic solar radiation components since 1981. It offers integrated metrology, optics, electronics, and data acquisition capabilities and provides facilities for outdoor performance testing of new research instrumentation and energy conversion devices such as photovoltaic modules.

The SRRL is located on the National Renewable Energy Laboratory’s South Table Mountain site in Golden, Colorado, where it has excellent solar access because of its unrestricted view of the horizon from sunrise to sunset throughout the year. Located at 6,000 ft (1,829 m) above sea level, the SRRL provides a unique outdoor research facility to support renewable energy conversion technologies and climate change studies for the U.S. Department of Energy.

Laboratories
Improving Measurement Science and Technology

The SRRL, a 2,600-square-foot facility completed in 2000, houses:

- The Metrology Laboratory, which provides World Radiometric Reference traceability for solar absolute cavity radiometers, pyrheliometers, pyranometers, and pyrgeometers. The Metrology Laboratory also provides National Institute of Standards and Technology traceability.

- The Optical Metrology Laboratory, which ensures that optical radiation resource measurement equipment is calibrated to national or international standards to provide the quality and traceability of data.

- The Data Acquisition Laboratory, which collects solar and meteorological data for public access from the Measurements and Instrumentation Data Center (www.nrel.gov/midc).

- The Electronics Laboratory, which develops instrumentation systems for collecting solar resource measurements.

Advanced Solar Measurements
Improved Resource and System Performance Models

At the SRRL, researchers use pyranometers, pyrheliometers, pyrgeometers, photometers, and spectroradiometers to provide the solar resource data necessary for renewable energy research and development. Since 1981, researchers have continuously gathered solar radiation information, and they now gather high-resolution data (in 1-minute intervals) from World Meteorological Organization first-class instruments. Staff also perform daily instrument maintenance and annual calibrations to ensure data quality. Measurement activities support a number of Department of Energy renewable energy programs as well as its Atmospheric Radiation Measurement Program, which applies radiometry to climate change research.

Radiometer Calibrations
Traceable to the World Radiometric Reference

NREL calibrates hundreds of instruments annually to ensure data quality. Calibration involves comparing an instrument output signal with a measurement standard traceable to a recognized standard to identify and eliminate deviations in accuracy. Calibration allows researchers to compare data from different sources, be confident in those data, and produce better estimates of the uncertainty of an instrument, system, or process.

Solar Resource Climatology
High-Resolution Measurements Since 1981

NREL calibrates hundreds of instruments annually to ensure data quality. Calibration involves comparing an instrument output signal with a measurement standard traceable to a recognized standard to identify and eliminate deviations in accuracy. Calibration allows researchers to compare data from different sources, be confident in those data, and produce better estimates of the uncertainty of an instrument, system, or process.

Standards Development
Domestic and International

- ASTM International
- National Institute of Standards and Technology
- International Standards Organization
- International Electrotechnical Commission
- International Energy Agency

NREL is a national laboratory of the U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, operated by the Alliance for Sustainable Energy, LLC.