National Renewable Energy Laboratory
Innovation for Our Energy Future
A national laboratory of the U.S. Department of Energy
Office of Energy Efficiency & Renewable Energy

Workplan and Annex: Solar Resource Knowledge Management

D. Renné

Presented at the 2004 DOE Solar Energy Technologies Program Review Meeting
October 25-28, 2004
Denver, Colorado

Conference Paper
NREL/CP-710-37607
January 2005

NREL is operated by Midwest Research Institute • Battelle Contract No. DE-AC36-99-GO10337

Available electronically at http://www.osti.gov/bridge

Available for a processing fee to U.S. Department of Energy and its contractors, in paper, from:

U.S. Department of Energy
Office of Scientific and Technical Information
P.O. Box 62
Oak Ridge, TN 37831-0062
phone: 865.576.8401
fax: 865.576.5728
email: mailto:reports@adonis.osti.gov

Available for sale to the public, in paper, from:

U.S. Department of Commerce
National Technical Information Service
5285 Port Royal Road
Springfield, VA 22161
phone: 800.553.6847
fax: 703.605.6900
email: orders@ntis.fedworld.gov
online ordering: http://www.ntis.gov/ordering.htm

Printed on paper containing at least 50% wastepaper, including 20% postconsumer waste

Workplan and Annex: Solar Resource Knowledge Management
Solar Program Review 2004

D. Renné
National Renewable Energy Laboratory
Golden, Colorado USA
david_renné@nrel.gov

ABSTRACT

"Solar Resource Knowledge Management" will be a new task under the International Energy Agency's Solar Heating and Cooling Programme. The task development has involved researchers from Germany, France, Switzerland, Spain, Portugal, Italy, Canada, the U.S. that have been engaged in the use of satellite imagery to develop solar resource maps and datasets around the world. The task will address three major areas: 1) "Benchmarking" of satellite-based solar resource methods so that resource information derived from approaches developed in one country or based on a specific satellite can be quantitatively intercompared with methods from other countries using different satellites, as well as with ground data; 2) Data archiving and dissemination procedures, especially focusing on access to the data by end users; and 3) basic R&D for improving the reliability and usability of the data, and for examining new types of products important to the solar industry, such as solar resource forecasts.

1. Objectives

In a Systems-Driven approach, accurate and current solar resource information is fundamental to establishing efficient systems design and performance across all solar technologies, and reducing the cost of planning and deploying solar energy systems. Solar Resource Knowledge Management will be a new task in the International Energy Agency's (IEA's) Solar Heating and Cooling (SHC) Programme. The work on this task will be conducted by an international group of experts using satellite imagery to develop solar resource information from around the world. The National Renewable Energy Laboratory will serve as the Operating Agent. The objective of the Task is to establish accurate, high quality and reliable site-time specific worldwide solar resource and climatological information using ground-based and satellite methods.

2. Technical Approach

An integrated multidisciplinary approach, involving key stakeholders will be used in carrying out the work in this Task. The approach is to provide globally comparable products based on data and methods from all over the world. The IEA provides an ideal framework to foster and guide such an international effort, which is important for three of its Implementing Agreements in the Renewable Energy Working Party: The SHC, Photovoltaic Power Systems (PVPS,) and Solar Power and Chemical Energy Systems (Solar PACES).

There will be three subtasks in the Task:

2.1 Subtask A: Standard qualification for solar resource products

This subtask will develop deliverables designed to provide:

- Coherence and benchmarking of models producing surface irradiance values from satellite data
- Accessibility and coherence of ancillary model input data such as atmospheric conditions and land surface parameters
- Sensitivity analyses
- Ground truth validations with high quality data
- Definition of validation protocols and measures of end-product confidence
- Cross-satellite platform and cross-model comparisons

2.2 Subtask B: Common structure for archiving and accessing resource products

This subtask will develop deliverables designed to provide:

- Worldwide networking between distributed data centers resulting in a global coverage for high-quality solar resource data
- Information and data exchange protocols
- Reliable and fast end-user access
- Preparation of data documentation for specific end-user applications

The main outcome of Subtask B would be a unique Web entry point that provides a networking of resources and products. Specifically, Subtask B will build upon the existing knowledge and precursor Web services within various participating organizations to provide a distributed information system. The Web entry point will be designed to provide ease of access, and maintenance.

2.3 Subtask C: Improved techniques for solar resource characterization and forecasts

This subtask will develop deliverables designed to provide:

- Short-term (hours) to medium-term (days) solar resource forecasting

- Analysis of long-term variability of solar resources
- Improved exploitation of existing satellite resources (e.g. very high spatial resolution for system micro-siting)
- Adaptation of resource assessment techniques to the capabilities of new generations of satellites
- New methods for providing improved products such as spectrally- or angular-resolved information.

3. Results and Accomplishments

The Solar Resource Knowledge Management concept was first developed at the Third Workshop on Satellites for Solar Assessment, held in Les Marecottes, Switzerland in March 2003. This workshop convened about 25 experts in using satellite imagery for developing solar resource assessments around the world. It became clear at this meeting that benchmarking of the various methods, which make use of different satellite platforms and incorporate a varying degree of physical processes, needed to be benchmarked against each other, and that some mechanisms for providing a convenient access to the various data sets be established. Furthermore, the need for incorporating certain technical improvements into the methods and for establishing means of developing short-term solar resource forecasts became apparent.

In 2003 the SHC agreed to incorporate the task into their programs. Consequently, many of the Les Marecottes participants, as well as a number of new researchers, convened in Madrid in February 2004 to develop a draft work plan for the task. The SHC Executive Committee approved the draft work plan in Helsinki in May 2004. The countries of France, Germany, Spain, Portugal, Switzerland, Italy, the European Community, Canada and the U.S. have expressed interest in formal participation. Since that meeting a draft Annex has been prepared, and is now being circulated to the IEA and the SHC ExCo for review. We expect that the SHC will formally approve the task at the next SHC ExCo meeting, scheduled for Costa Rica in November 2004.

Once the Annex is approved, implementation of the task will begin. The Task is expected to last four years, with the possibility of a one-year extension. The Task participants will convene within approximately six months after the start of implementation; perhaps at the Solar World Congress to be held in Orlando in August 2005.

4. Conclusions

The Solar Resource Knowledge Management task brings together key experts around the world who are engaged in using satellite imagery to develop solar resource information. The products coming out of the task will provide industry with a set of benchmarked worldwide data sets on the temporal and spatial characteristics of the solar resource in an easy-to-access archiving system. The task will also introduce solar resource forecasting products for the first time, to be used by the utility industry to forecast load matching and to dispatchability of the solar resource.

ACKNOWLEDGEMENTS

NREL is the principal research laboratory for the DOE Office of Ener0.75gy Efficiency and Renewable Energy, operated by the Midwest Research Institute and Battelle, under Contract No. DE-AC36-99GO10337

REPORT DOCUMENTATION PAGE

Form Approved
OMB No. 0704-0188

PLEASE DO NOT RETURN YOUR FORM TO THE ABOVE ORGANIZATION.

1. REPORT DATE *(DD-MM-YYYY)*	2. REPORT TYPE	3. DATES COVERED *(From - To)*
January 2005	Conference Paper	

4. TITLE AND SUBTITLE
Workplan and Annex: Solar Resource Knowledge Management
Solar Program Review 2004

5a. CONTRACT NUMBER
DE-AC36-99-GO10337

5b. GRANT NUMBER

5c. PROGRAM ELEMENT NUMBER

6. AUTHOR(S)
D. Renne

5d. PROJECT NUMBER
NREL/CP-710-37607

5e. TASK NUMBER
PVP49001

5f. WORK UNIT NUMBER

7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)
National Renewable Energy Laboratory
1617 Cole Blvd.
Golden, CO 80401-3393

8. PERFORMING ORGANIZATION REPORT NUMBER
NREL/CP-710-37607

9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)

10. SPONSOR/MONITOR'S ACRONYM(S)
NREL

11. SPONSORING/MONITORING AGENCY REPORT NUMBER

12. DISTRIBUTION AVAILABILITY STATEMENT
National Technical Information Service
U.S. Department of Commerce
5285 Port Royal Road
Springfield, VA 22161

13. SUPPLEMENTARY NOTES

14. ABSTRACT *(Maximum 200 Words)*

"Solar Resource Knowledge Management" will be a new task under the International Energy Agency's Solar Heating and Cooling Programme. The task development has involved researchers from Germany, France, Switzerland, Spain, Portugal, Italy, Canada, the U.S. that have been engaged in the use of satellite imagery to develop solar resource maps and datasets around the world. The task will address three major areas: 1) "Benchmarking" of satellite-based solar resource methods so that resource information derived from approaches developed in one country or based on a specific satellite can be quantitatively intercompared with methods from other countries using different satellites, as well as with ground data; 2) Data archiving and dissemination procedures, especially focusing on access to the data by end users; and 3) basic R&D for improving the reliability and usability of the data, and for examining new types of products important to the solar industry, such as solar resource forecasts.

15. SUBJECT TERMS
PV; solar resource forecast; International Energy Agency (IEA); Solar Heating and Cooling (SHC) Programme; satellite imagery; systems-driven approach; Photovoltaic Power Systems (PVPS); Solar Power and Chemical Energy Systems (Solar PACES);

16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON
a. REPORT	b. ABSTRACT	c. THIS PAGE			19b. TELEPHONE NUMBER (*Include area code*)
Unclassified	Unclassified	Unclassified	UL		

Standard Form 298 (Rev. 8/98)
Prescribed by ANSI Std. Z39.18