U.S. Department of Energy
Energy Efficiency and Renewable Energy
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DOE Solar Energy Technologies Program Peer Review

Solar Resource Characterization

Denver, Colorado

April 17-19, 2007

Relevance/Objective

•Describe the overall research objective or purpose of the work as it relates to the DOE SETP Multi-year Program Plan and the program's mission.

The Solar Resource Characterization Project Addresses System-level Performance Metrics by

- Improving the quality and reliability of domestic and international site-time-specific solar resource data sets and related meteorology to optimize solar energy system production and lower levelized cost of energy
- Developing solar resource data products that increase system efficiency and improve investor confidence
- Creating easy access to data and products for all consumers, solar developers, and planners.

Summary of Activities

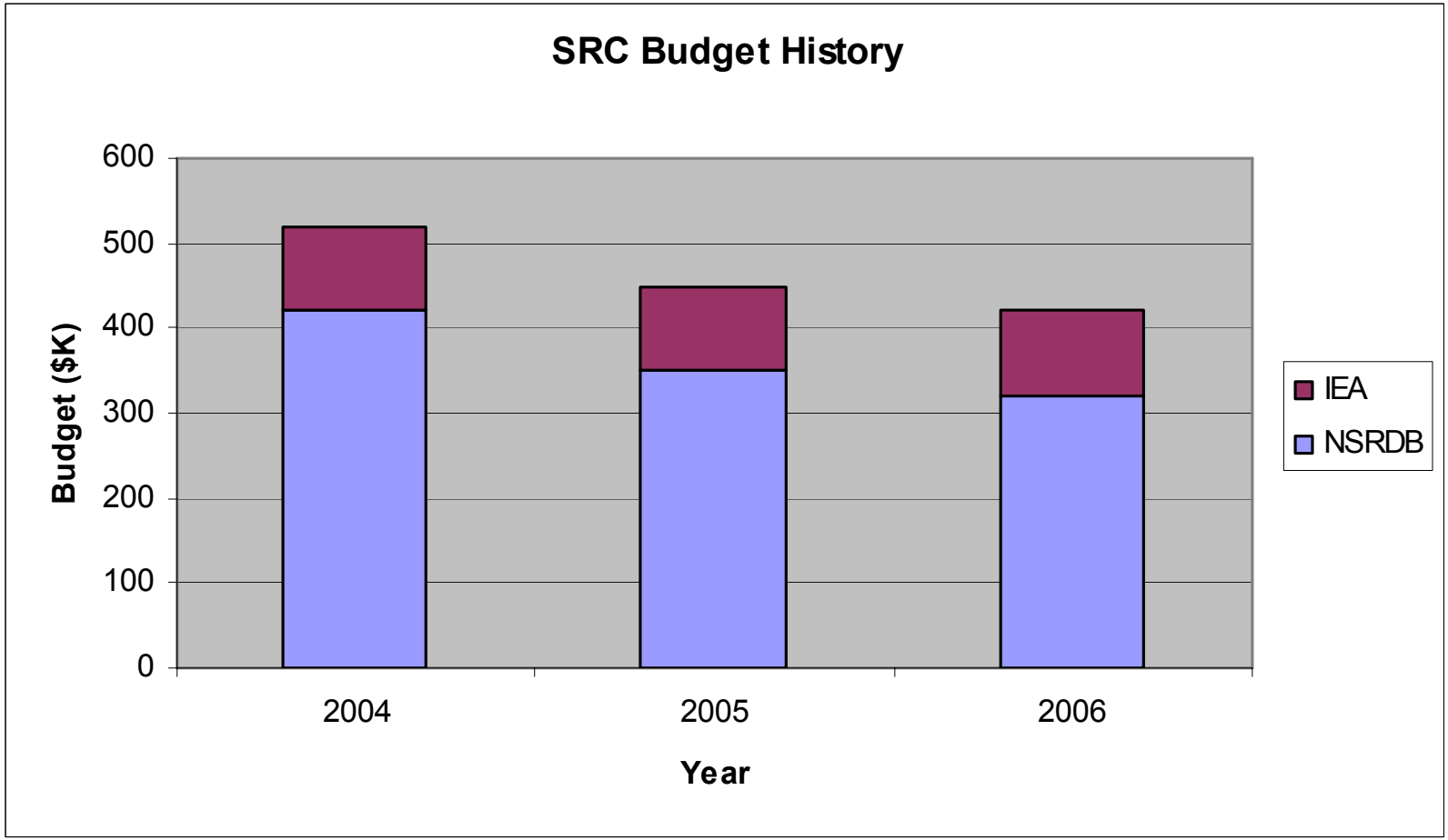
•Summarize the main activities in terms of technical focus, participants, methods, outcomes, etc.

- Development of the updated National Solar Radiation Database for 1991-2005 (Global, Direct, and Diffuse)
  - Completed cloud cover algorithms to derive total and opaque cloud measurements from the Automated Surface Observing System (ASOS) network.
  - Produced a satellite-derived data set in collaboration with the State University of New York at Albany.
  - Worked with expert group from NASA, National Climatic Data Center, universities, and private enterprise to complete the NSRDB
- International Energy Agency/Solar Heating and Cooling (IEA/SHC) Programme (Task 36 Solar Resource Knowledge Management)
  - Convened experts from around the world to leverage activities for producing high-quality, harmonized solar resource data sets
  - Formulated a portal mechanism for making international data products readily available to users.
  - Distributed a questionnaire to gather information on user needs for solar resource products.
  - (NREL designated as operating agent for this task)

Budget History

Project Task(s)	Total Value
NSRDB	$320K
IEA/SHC	$100K
Grand Total	$420K

Budget History

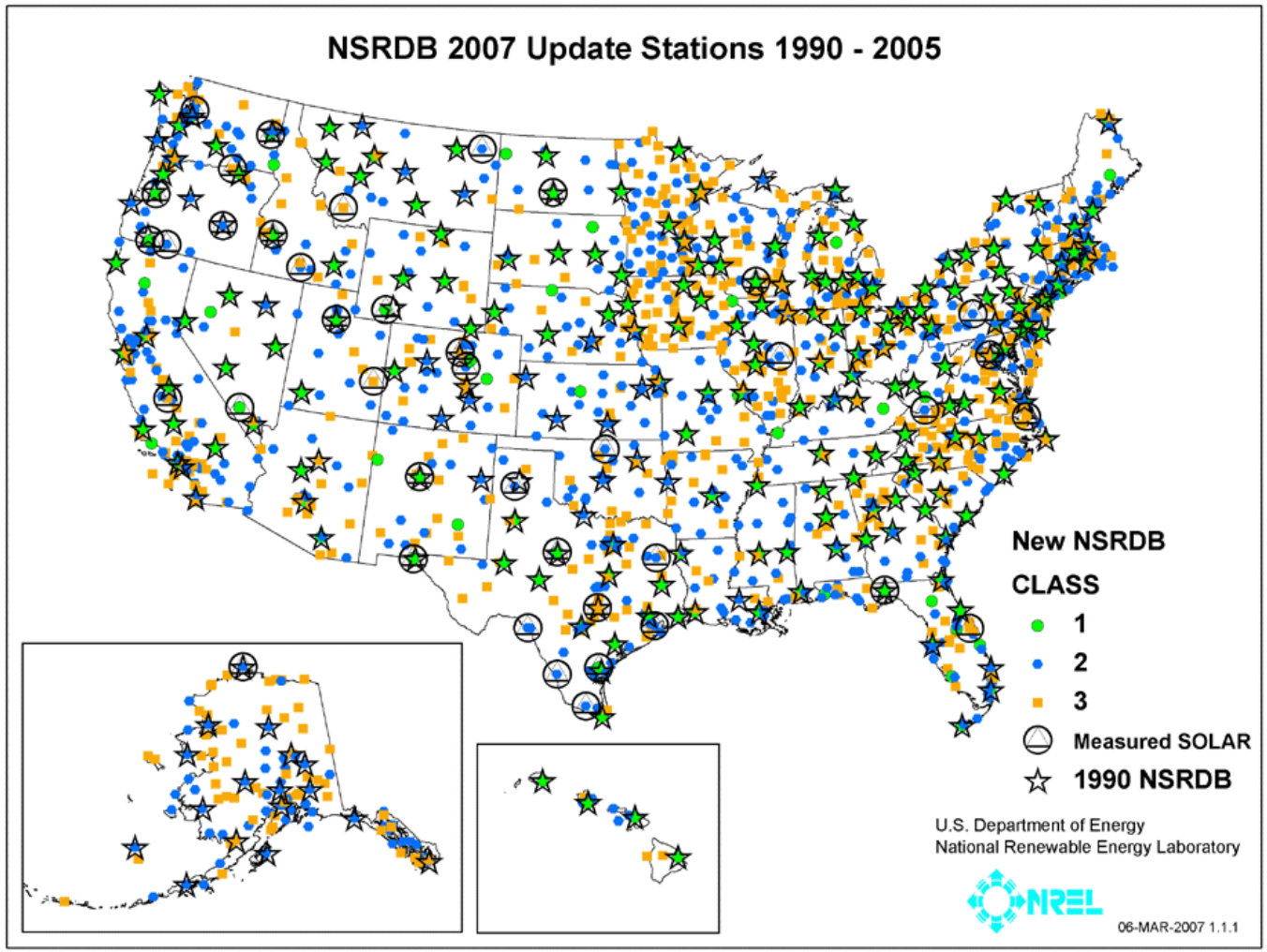


Accomplishments

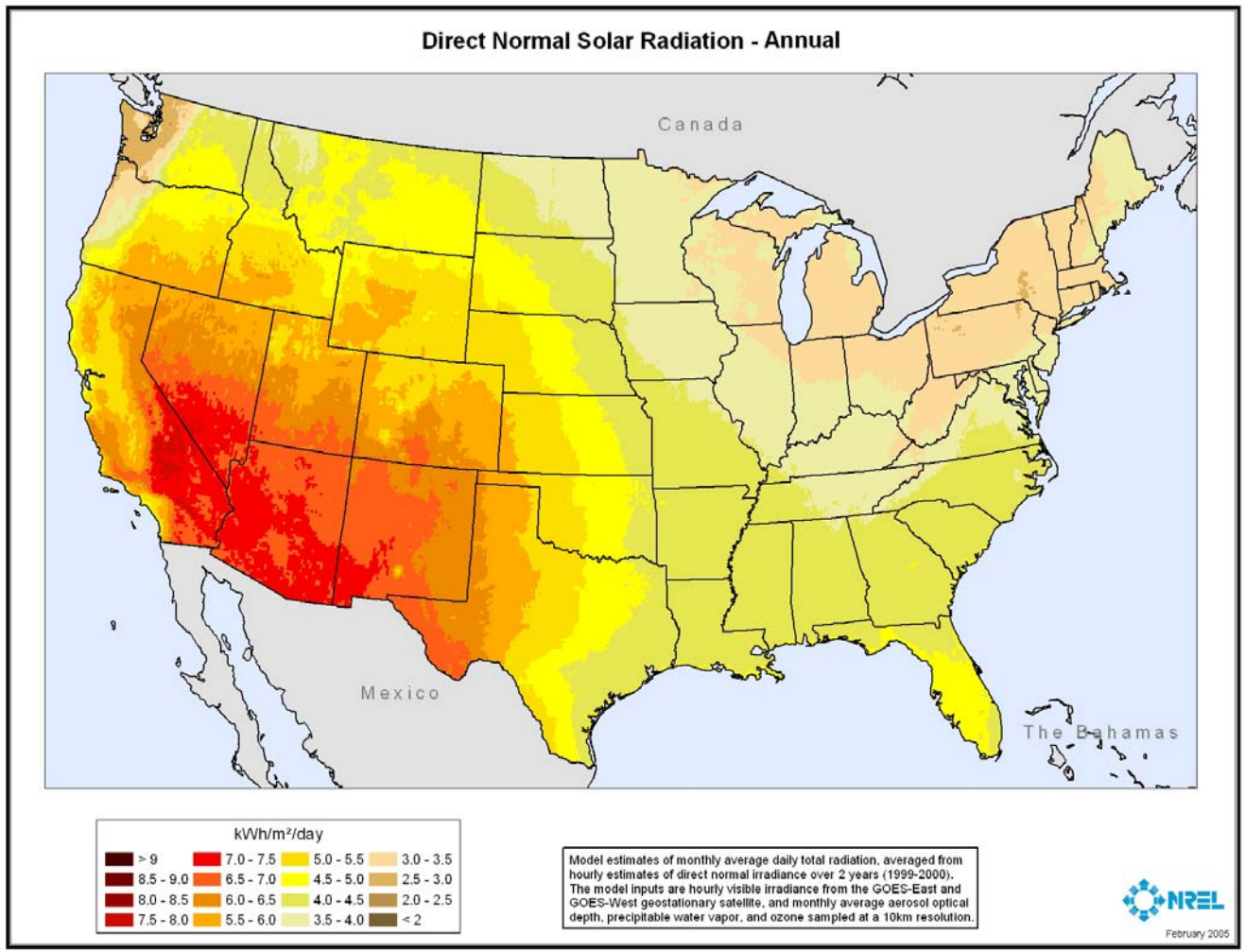
Summarize the major accomplishments of this project. What major developments have resulted from this research.

- An updated National Solar Radiation Database for 1991-2005 (Global, Direct, and Diffuse)
  - Fifteen-year hourly time series data for 1,454 ground stations (up from 239 for the 1961-1990 NSRDB)
  - Eight-year hourly time series data for 100,000 grid cells using satellite-based model
  - Summary statistics with solar resource maps and underlying data
- International Energy Agency/Solar Heating and Cooling (IEA/SHC) Programme
  - Defined benchmarking procedures for standardized, validated worldwide solar resource data sets.
  - Identified essential R&D to improve the accuracy and the spatial and temporal coverage of current techniques, including the introduction of solar resource forecasting products.
  - Prototyped a user-oriented information system, such as a distributed data system, for archiving and accessing solar resource data.

NSRDB Spatial Coverage



Gridded Satellite-derived Data



Schedule of Major Events/Milestones

- Released prototype NSRDB for review and received input from expert committee
- Held two IEA task meetings that resulted in definition of products required by industry for international project development.
- Results of national and international work presented at major conferences and successfully peer reviewed.

Multi-Year Research Plan

Future work targets both domestic and international renewable energy markets via

- Annual NSRDB updates using improved methodology to provide current resource estimates
- Production of a Typical Meteorological Year data set based on updated NSRDB.
- Benchmarking of international data sets in collaboration with international partners
- Development of solar resource forecasting methods to benefit utilities
- Improved dissemination of data and resource knowledge.

Summary

Solar Resource Characterization

- Provides engineers, designers, and researchers with up-to-date tools for accessing and utilizing solar resource data in the United States
- Increases understanding how the U.S. data compares with other data sets from around the world.
- Supports the rapid expansion of solar markets, both domestically and internationally
- Lays the foundation for additional products and resource assessment tools, such as solar forecasts for use by utilities for power management.
- Engages the international community to provide significant leveraging opportunities to ensure critical solar resource information is available to our industry.
- Adds confidence for both domestic and international market assessments.