

**MEMORANDUM OF UNDERSTANDING**  
 Between  
**THE NATIONAL AERONAUTICS AND SPACE ADMINISTRATION**  
 Office of Earth Science, Applications Division  
 and  
 THE NATIONAL RENEWABLE ENERGY LABORATORY DIVISION  
 of the Midwest Research Institute  
 A National Laboratory of  
**The United States Department of Energy**

I. Purpose and Scope

- A. This Memorandum of Understanding (**MOU**) provides a general framework for cooperation between the National Aeronautics and Space Administration (NASA), **Office** of Earth Science Applications Division and the National Renewable Energy Laboratory (NREL) Division of the Midwest Research Institute, a National Laboratory of the United States Department of Energy (**DOE**).
- B. The purpose of this MOU is to apply NASA's extensive Earth science data and model products to **NREL's** efforts to enhance the nation's ability to expand the use of renewable energy technologies in a number of end-use applications. This MOU seeks to benchmark methods for incorporating NASA enabled Earth science data products into NREL decision-making tools that support the planning and managing of renewable energy solutions.
- C. Addressing energy planning and management is of critical concern to the health and vitality of a growing economy. NREL as a national laboratory of **DOE's Office** of Energy Efficiency and Renewable Energy has a key responsibility for developing decision-making tools that assist in the worldwide application of renewable energy technologies (solar, wind, **small-scale** hydroelectric, and biomass). Among these tools are procedures for (1) determining the distribution in space and time of the renewable energy resources available to these technologies and (2) the infrastructure available or required to access the renewable energy resources to meet energy load requirements.
- D. NASA's **Office** of Earth Science Applications Division provides systems engineering solutions that employ research that is focused on improving the understanding of Earth-atmosphere processes through advances in satellite remote sensing and analysis techniques. Recent and planned NASA Earth observation satellite missions (*i.e.*, **QuikScat**, Terra, Aqua, Calypso, **CloudSat**, GIFTS, *etc.*) will improve global data records of winds, clouds, aerosols, solar energy, temperature, and

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humidity. The measurements of the Earth derived **from** these missions will provide for improved assimilation and prediction of key quantities in atmospheric models. NASA has sponsored the production of historical meteorological parameters from previous analyses to support renewable energy applications worldwide. Research and data from the new planned NASA missions will improve meteorological and climatological data sets and provide a mechanism for the prediction of meteorological parameters directly relevant to renewable energy technologies.

#### II. Authorities

- A. NASA enters into this MOU pursuant to section **203(c)** of the National Aeronautics and Space Act of 1958, as amended 42 USC 2473 (c).
- B. NREL, acting on behalf of DOE, enters into this MOU within the statutory guidelines of the Department of Energy Organizing Act 42 USC 710 (c)
- C. Nothing in this MOU alters the statutory authorities of NASA or DOE. This MOU is intended to facilitate cooperative services, support, and technical assistance between both departments in the conduct of science and technology research, development, transfer utilization, and commercialization programs and activities. This MOU does not supersede or void existing **MOUs** or agreements between NASA and DOE or NASA and NREL.

#### III. Role of the Parties

- A. NASA intends to:

Provide NASA-derived Earth observations data and models for developing decision-making tools that assist in the worldwide application of renewable energy technologies (solar, wind, small-scale hydroelectric, and biomass), including past, current and future mission data.

- B. NREL intends to:

Provide NREL technical expertise for performance, planning review, or consultation in areas of mutual interest.

Pursue the collaborative application of NASA data and scientific models at NREL to identify specific decision support processes, assessments, and systems that require predictions and observations that may be provided by NASA Earth science and remote sensing systems, including but not limited to the following:

1. **Identify** performance expectations/requirements for NASA inputs to renewable energy decision support processes.
2. Collaborate with NASA on the evaluation, verification and validation of results for component solutions.
3. Benchmark with NASA to establish quantifiable improvements in system performance.

C. It is intended that NASA and NREL will jointly:

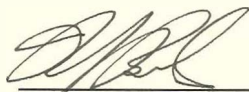
1. Collaborate with the goal to improve the efficiency and cost-effectiveness of renewable energy technology applications in a number of ways:
  - accelerate time-line to project development;
  - improve data bases required for project design;
  - optimize energy system operations - particularly in grid-connected applications – through forecast data products;
  - **quantify** seasonal, interannual, and decadal variations in renewable energy resources;
  - enhance understanding of the environmental benefits of and barriers to the widespread use of renewable energy technologies; and
  - provide opportunities to **further** support other DOE energy efficiency and renewable programs such as buildings and distributed energy resources.
2. Support the exchange of technical information – through databases, information systems, clearinghouses, conferences and other means – on research, development, demonstration, and technology transfer opportunities.
3. Encourage through education and outreach, in partnership with both public and private organizations, the public awareness and access to space-based advances in renewable energy technology.

#### IV. Principal points of contact

The principle points of contact with responsibility for implementing this MOU are listed below:

For NASA:	Dr. Paul Stackhouse Earth Science Enterprise National Aeronautics and Space Administration
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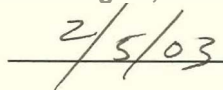
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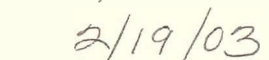
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