# Solar and Wind Energy Resource Assessment (SWERA)

**UNEP**

## Project Overview

As energy planners seek cleaner energy solutions using renewable energy technologies, the availability of reliable, accurate, and easily accessible solar and wind energy resource data is critical and can greatly accelerate the deployment of these technologies. The *Solar and Wind Energy Resource Assessment* (SWERA) is a pilot project designed to compile such data in 13 developing countries and to facilitate investments in solar and wind energy projects.

With a US$9.3 million investment including US$6.8 million from the Global Environment Facility (GEF), SWERA is developing new informational tools for energy planners and project developers. These tools include regional and national maps of solar and wind energy resources and a geographical information system (GIS) that will allow easy access to the detailed information contained in these maps (see box right). These information tools can then be used to screen projects at their pre-investment planning stage.
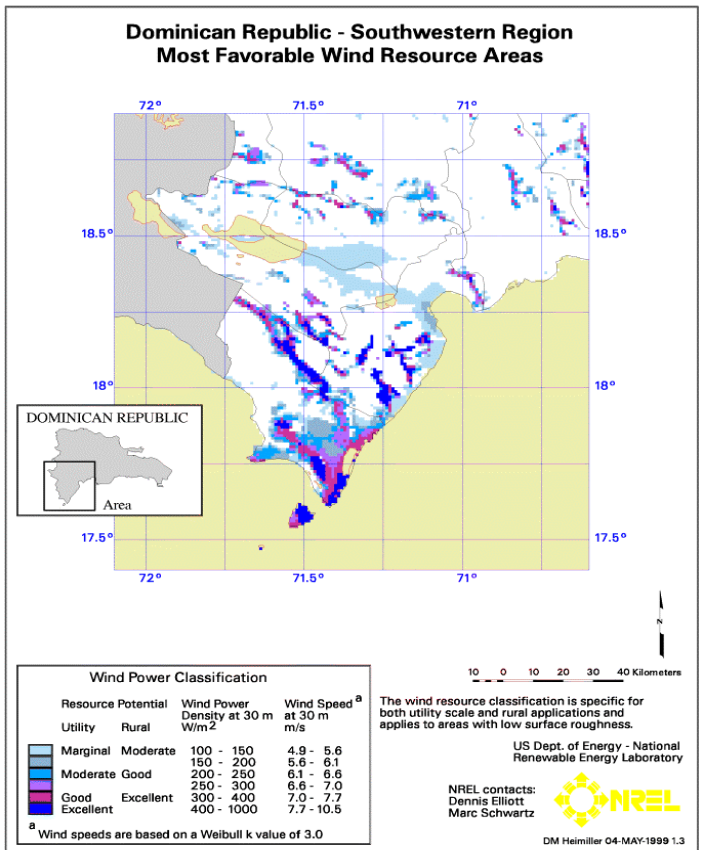
## Project Aim

The aim of SWERA is to support informed decision-making, develop policy based on science and technology, and increase investor interest in renewable energy projects. Through SWERA, UNEP encourages industry, investors, researchers, and government agencies to continuously share information that will facilitate decisions to deploy solar and wind energy projects. SWERA is also aimed at transforming the ability of developing countries to assess the technical, economic, and environmental potential for broad scale investments in solar and wind energy facilities while leveraging their ability to create private and public sector investments

## Project Outcomes

SWERA is designed to deliver a number of important outcomes, including:

- *Consistent, reliable, verifiable, and accessible global data for international and in-country investors and other stakeholders*

Many countries are already involved in some activity to measure solar radiation and wind velocity. However, SWERA will go



Dominican Republic - Southwestern Region
Most Favorable Wind Resource Areas

DOMINICAN REPUBLIC
Area

Wind Power Classification

| Resource Potential | | Wind Power Density at 30 m W/m2 | Wind Speed [a] at 30 m m/s |
|---|---|---|---|
| Utility | Rural | | |
| Marginal | Moderate | 100 - 150 | 4.9 - 5.6 |
| | | 150 - 200 | 5.6 - 6.1 |
| Moderate | Good | 200 - 250 | 6.1 - 6.6 |
| | | 250 - 300 | 6.6 - 7.0 |
| Good | Excellent | 300 - 400 | 7.0 - 7.7 |
| Excellent | | 400 - 1000 | 7.7 - 10.5 |

[a] Wind speeds are based on a Weibull k value of 3.0

The wind resource classification is specific for both utility scale and rural applications and applies to areas with low surface roughness.

US Dept. of Energy - National Renewable Energy Laboratory

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### SWERA is Reliable, Accurate and Easily Accessible Data

Through a network of international and national agencies collecting and analyzing data on solar and wind energy resources, SWERA is creating a global archive of this information and a technical review service that can also help developing countries assess their own national resources.

The archive will include existing wind energy resource data such as:

- global ocean surface wind speeds (applicable to coastlines and small islands),
- high resolution maps from countries where previous mapping has been undertaken, and
- new wind mapping in 5-7 regions.

The new maps will use either a 1 km empirical/analytical mapping method, a 5 km Regional Circulation Model, or a modeled interpolation of ground measurement maps. Solar information will include the NASA global horizontal solar radiation information and other higher resolution solar mapping information available from previous studies. New regional solar mapping efforts will be cover major areas of developing countries in South America, Central America, southern, north-eastern and north-western areas of Africa and most of South and East Asia.

The solar and wind energy information will be assembled into widely usable CD-ROMS, and incorporated into a user-friendly Geographical Information System (GIS) tool. The solar or wind energy potential in 14 countries will be assessed by national collaborating partners as a means to attract investors and contribute to a better analysis of global solar and wind energy resources.

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further and provide the data, information, and tools necessary to fill the gap between what is being provided by the baseline activities, and what is needed to accelerate the development and deployment of solar and wind energy projects

- *Better targeting and increased confidence associated with investment and development decisions for solar and wind energy projects.* Reduced uncertainty will, in turn, decrease uncertainties in the design, cost, and performance of solar and wind energy systems, which should also increase investor confidence and the confidence of key stakeholders, such as government agencies responsible for facilitating clean energy development.

- *Increased awareness among key stakeholders and decision makers of the potential to utilize solar and wind energy resources* This awareness will help stakeholders understand the relevance of resource information to the development and deployment of various solar and wind energy technologies and how these technologies can be included in the energy planning process.

- *Increased capacity at the local, provincial, national, and regional levels to plan for solar and wind energy projects*

The availability of high quality solar and wind energy resource data, and the training to make use of such data, will facilitate better planning for solar and wind energy development. It will also help project developers and energy planners to have a much more complete picture of their country's renewable energy resources. In some countries, large-area high-resolution wind and solar energy resource mapping is expected to reveal far larger commercial potential than is currently believed.

In order to demonstrate the outputs of SWERA, national energy planning and investment alternatives for solar and wind energy development will be undertaken. These planning and promotion activities will be linked to national efforts as well as World Bank, UNDP, and other renewable energy investment development activities.

Information will be accessible publicly through http://SWERA.UNEP.Net



Estimated Global Horizontal Solar Radiation
1985 to 1988 Annual Average
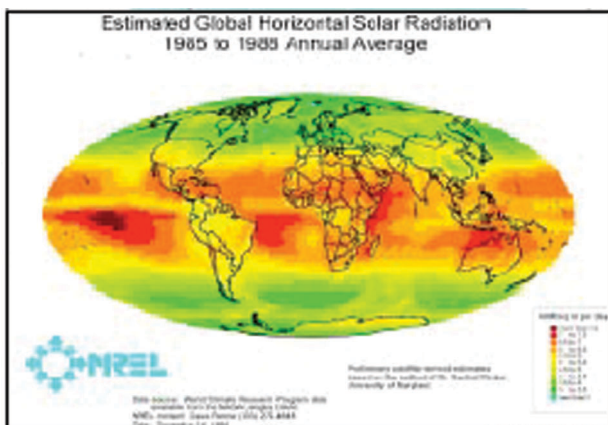
**SWERA Partners** *Institutions from around the world are participating:*

Tata Energy Research Institute TERI (India)

National Renewable Energy Laboratory (United States)

Risoe National Laboratory (Denmark)

State University of New York (USA)

UNEP Global Resource Information Database GRID/Sioux Falls

National Institute for Space Research – INPE (Brazil)

German Technical Cooperation Agency GTZ

German Aerospace Center DLR,

Brazilian Wind Energy Centre CBEE

Universidade Federal de Santa Catarina (Brazil)

Chinese Renewable Energy Industry Association

University of Dhaka (Bangladesh)

Centre for Energy Studies and AEPC, (Nepal)

National Engineering Research and Development Centre (Sri Lanka)

Ministry of Mines and Energy (Ghana)

Ministry of Energy (Kenya)

Ethiopian Rural Energy Development Centre

Energia y Minas (Guatemala)

Ministerio del Energia (Nicaragua)

Ministra de Recursos Naturales y Ambiente (Honduras)

University of Central America (El Salvador)

Agencia de Ciencia y Tecnologia (Cuba)

Natural Resources Canada RETScreen

Renewable Energy in the Americas (OAS)

National Aeronautic and Space Administration (USA)



Dominican Republic - Most Favorable Wind Resource Areas

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