

## NREL Helps Apply Renewable Energy and Energy Efficiency Technologies Worldwide

The National Renewable Energy Laboratory (NREL) applies its technical expertise and capabilities to promote the use of renewable energy (RE) and energy efficiency (EE) technologies throughout the world. NREL's international work spans our full range of capabilities, which include three primary areas of expertise:

- **Analysis** — NREL provides technology-neutral information, global and regional assessments and decision tools, and expert advice.
- **Research and Development** — NREL conducts collaborative research and development (R&D) and shares methods and results with leading research institutions throughout the world.
- **Deployment/Commercialization** — NREL teams with private industry, other countries, and international institutions to increase the speed and scale of investments in RE and EE technologies.

NREL conducts its international programs in support of the U.S. Department of Energy (DOE), U.S. Agency for International Development (USAID), U.S. State Department, U.S. Environmental Protection Agency (EPA), U.S. Trade and Development Agency, the United Nations Environment Program (UNEP), and other sponsors and partners.

### Multilateral Partnerships

#### Asia-Pacific Economic Cooperation

NREL provides analytical support in the area of biofuels for the Asia-Pacific Economic Cooperation (APEC). Products include a survey of biomass resource assessments, Web site, and an assessment of biomass resources on marginal lands.

[www.biofuels.apec.org/](http://www.biofuels.apec.org/)

#### Coordinated Low Emission Assistance Network

NREL has convened the Coordinated Low Emission Assistance Network (CLEAN) to promote harmonized support for clean energy assessment, plans, and programs in developing countries across international technical institutes around the world.

#### Energy Development in Island Nations

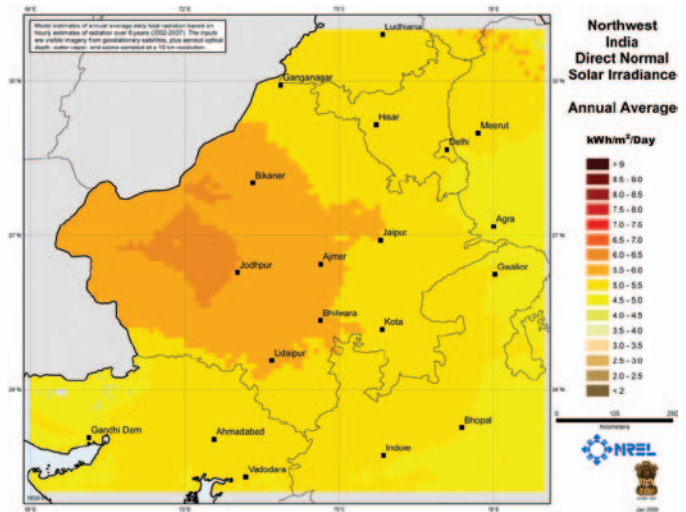
NREL provides technical support for the International Partnership for Energy Development in Island Nations (EDIN), which is a partnership of the United States, New Zealand, and Iceland.

#### International Energy Agency Implementing Agreements

NREL provides technical support for International Energy Agency (IEA) technology implementing agreements in the areas of biomass, buildings, solar, wind, and hydrogen. [www.iea.org/](http://www.iea.org/)

#### International Partnership for Energy Efficiency Cooperation

NREL provides technical support for energy efficiency policy, finance, and training projects in support of the International Partnership for Energy Efficiency Cooperation (IPEEC).



NREL's Geospatial Toolkit integrates data and geographic information system (GIS) technology to create detailed resource maps.

### International Partnership for the Hydrogen Economy

NREL supports the International Partnership for the Hydrogen Economy (IPHE) through its work with the HyWays IPHE program, which compares hydrogen roadmapping and modeling activities across countries. [www.iphe.net/](http://www.iphe.net/)

### Bilateral Partnerships

#### Brazil

NREL is working with partners in Brazil on biofuels assessment and R&D, analysis of renewable energy for rural electrification, and silicon solar cell research.

#### Canada

NREL is working with partners in Canada on clean energy projects including production of biofuels from large-scale cultivation of microalgae and thermochemical conversion of beetle-killed pines.

#### Caribbean Region

NREL is providing the Caribbean Region with training on energy efficiency and renewable energy technologies and practices.

#### Chile

NREL is assisting Chile's National Commission on Energy (CNE) as it establishes a new renewable energy center to serve as a clearinghouse of information and analytic tools on RE technologies and policies.

#### China

NREL teams with Chinese partners on biofuels, wind, solar, and buildings projects. The biofuels work includes collaboration on ethanol synthesis processes. China and NREL also have a continuing partnership on wind resource assessment and economic analysis. NREL has provided technical assistance to Chinese partners on PV standards and certification. The buildings work includes adapting building energy efficiency simulation models for use in China.

#### Costa Rica

The government of Costa Rica and the Natural Resources Defense Council (NRDC) are creating an Energy Efficiency Center in

Costa Rica. NREL will help create training programs and training materials to run two initial energy efficiency auditor courses.

### **Dominica**

NREL is assisting Dominica in assessing the viability of smaller, distributed wind generation as an alternative to traditional, megawatt-class, utility-scale turbines.

### **European Union**

NREL works with a large number of countries in the European Union (EU) on collaborative research and development on biofuels, buildings, hydrogen, ocean, solar, wind, and vehicle technologies. This includes partnerships with technical institutes in Denmark, Finland, France, Germany, Iceland, Netherlands, Spain, Sweden, and the United Kingdom as well as the European Commission.

### **Haiti**

NREL is assisting Haiti with use of energy efficiency and renewable energy to support reconstruction activities.

### **India**

NREL teams with partners in India on biofuels, solar, wind, and building efficiency projects. This includes biodiesel life cycle assessment (LCA), solar resource and policy assessment, joint work on wind turbine testing and assessment, and energy-efficient building design in its commercial sector.

### **Israel**

NREL is supporting implementation of a bilateral agreement between DOE/EERE and the Israeli Ministry of National Infrastructure to advance cooperation on several projects including the production of biofuels from microalgal feedstocks.

### **Japan**

NREL is working with institutions in Japan on a concentrating solar PV project, as well as collaboration on vehicles and hydrogen.

### **Korea**

NREL is working with partners in Korea on photovoltaic research projects and other RE areas.

### **Mexico**

DOE/NREL and Mexico's Secretary of Energy/Electrical Research Institute are partnering on wind resource assessment and mapping, advanced wind technology development and testing, and technical assistance to the manufacturing industry.

### **Peru**

NREL is supporting the Peruvian Ministry of Energy and Mines as it develops an Energy Efficiency Center.

### **South Asia**

NREL supports USAID's South Asia Regional Initiative for Energy (SARI/E) in developing wind and solar resource data for several countries in the region, including Afghanistan, Pakistan, India, Nepal, Bhutan, Bangladesh, Sri Lanka, and the Maldives. [www.sari-energy.org/](http://www.sari-energy.org/)

### **Turkey**

NREL is providing training and analysis to support utility-scale solar development in Turkey.

### **United Arab Emirates**

Through its relationship with the United Nations Environment Programme, NREL is supporting the development of solar and

wind resource maps and related geospatial analytic tools for the United Arab Emirates (UAE).

## **Climate and Environmental Initiatives**

### **Climate Technology Initiative**

NREL serves as a technical resource to the Climate Technology Initiative (CTI) to support clean energy technology transfer efforts under the United Nations Framework Convention on Climate Change (UNFCCC). [www.climatetech.net/about/](http://www.climatetech.net/about/)

### **Integrated Environmental Strategies Program**

NREL provides technical support for the Integrated Environmental Strategies (IES) Program, which promotes integrated planning to address local environmental concerns and also reduce associated global greenhouse gas (GHG) emissions. [www.epa.gov/ies/](http://www.epa.gov/ies/)

### **Intergovernmental Panel on Climate Change**

NREL is working with the Intergovernmental Panel on Climate Change (IPCC) on the scoping for the Special Report on Renewable Energies and integrated assessment models. [www.ipcc.ch/](http://www.ipcc.ch/)

### **Low Emission Development Strategies**

NREL is preparing a methodology and toolkit to assist developing countries with the preparation and implementation of low-carbon clean energy growth plans.

### **U.S. OpenLabs Program**

In partnership with the U.S. Agency for International Development (USAID) and DOE, NREL and other DOE labs have established a multilaboratory expert team that is assisting developing countries on clean energy and climate issues. [www.openei.org/uslabs](http://www.openei.org/uslabs)

### **Open Energy Information (OpenEI)**

NREL has established the OpenEI portal for DOE to serve as a global community platform for information on clean energy technologies, analysis, policies, and resources. [www.openei.org/](http://www.openei.org/)

## **Energy Assessments and Resources**

### **Geospatial Toolkits and Resource Maps**

NREL has developed Geospatial Toolkits (GsT) — a map-based software application that integrates resource data and geographic information systems (GIS) — for countries such as Brazil, China, and Ghana. [www.nrel.gov/international/geospatial-toolkit.html](http://www.nrel.gov/international/geospatial-toolkit.html)

### **Solar and Wind Energy Resource Assessment**

In cooperation with the United Nations Environment Program (UNEP) (see [www.unep.org/](http://www.unep.org/)), NREL has produced high-resolution maps and data sets of solar and wind energy resources for many countries (see <http://swera.unep.net/>).

### **Biomass Resource Assessment**

NREL has conducted biomass resource assessments in several countries. [www.nrel.gov/international/biomass\\_resource.html](http://www.nrel.gov/international/biomass_resource.html).

### **Global Energy Assessments**

NREL is collaborating with the International Institute for Applied Systems Analysis (IIASA) on the Global Energy Assessment (see [www.iiasa.ac.at/Research/ENE/GEA/index\\_gea.html](http://www.iiasa.ac.at/Research/ENE/GEA/index_gea.html)) and with the International Energy Agency on renewable energy scenarios for the World Energy Outlook.

[www.nrel.gov/international/](http://www.nrel.gov/international/)