

MAPPING THE FUTURE OF RENEWABLE ENERGY

Scaling up clean energy is an essential part of low emission development around the world. The U.S. Agency for International Development (USAID), the U.S. Department of State, and the U.S. Department of Energy's National Renewable Energy Laboratory (NREL) are partnering with developing countries to identify renewable energy opportunities and attract clean energy investment, while reducing greenhouse gas emissions from the energy sector.

Stakeholders don't need in-depth expertise in geographic information systems (GIS) to access free renewable energy resource data and explore potential sites for wind and solar development.

NREL's **Geospatial Toolkit (GsT)** is an open-source, map-based software application that provides an intuitive, user-friendly interface for visualizing data and renewable energy potential. The GsT is a country-specific tool that maps renewable energy resources (e.g., for solar, wind, and biomass) in relation to enabling infrastructure like roads and transmission lines, providing necessary information for deploying new clean energy generation. The GsT enables users to analyze solar, wind, and biomass potential under a variety of scenarios to inform high-level prospecting and integrated planning. Geospatial Toolkits for over 20 countries are available for free download at http://www.nrel.gov/international/geospatial_toolkits.html. A web-based "Enterprise" GsT for was released in 2016 with improved functionality and accessibility. The EGsT is available for the Lower Mekong region of Asia and is being developed for a number of additional countries and regions. The Lower Mekong EGsT is available at <https://maps.nrel.gov/gst-lower-mekong>.

The **Philippines Wind Prospector** is a web-based GIS application that allows exploration and download of data from the new 2014 Wind Atlas for the Philippines. Like the GsT, the tool visualizes wind and other renewable energy resources relative to enabling infrastructure and land cover characteristics. The Wind Prospector also enables access to a four-terabyte dataset, encompassing over 40 different wind resource attributes. Wind developers can use these detailed datasets to conduct their own advanced GIS analyses. Learn more about the Philippines Wind Resource Maps and Data at http://www.nrel.gov/international/ra_philippines.html.



The Geospatial Toolkit (GsT) is a free, open-source software application that provides a visual platform for exploration and analysis of the Philippines' renewable energy potential.

THE EC-LEDS PROGRAM

Low emission development strategies (LEDS) are development frameworks that promote sustainable social and economic development while reducing greenhouse gas emissions over the medium to long term.

Enhancing Capacity for Low Emission Development Strategies (EC-LEDS) is a flagship U.S. government-led effort that assists countries in developing and implementing LEDS. The program enhances partner country efforts by (1) providing targeted technical assistance and (2) building a shared global knowledge base on LEDS.

EC-LEDS country partners include Albania, Bangladesh, Cambodia, Colombia, Costa Rica, Ethiopia, Gabon, Georgia, Guatemala, Indonesia, Jamaica, Kazakhstan, Kenya, Macedonia, Malawi, Mexico, Moldova, Peru, the Philippines, Serbia, South Africa, Thailand, Ukraine, Vietnam, and Zambia.

EC-LEDS

ENHANCING CAPACITY FOR LOW EMISSION DEVELOPMENT STRATEGIES



Transporting Sonic Detection and Ranging (SODAR) device for remote wind measurement in Bangladesh.

PHOTO BY HARNESS ENERGY

Through the EC-LEDS **Bangladesh Wind Mapping Project**, state-of-the-art measurement systems are collecting wind data in nine strategic locations across Bangladesh. Wind characteristics will be measured at multiple heights to fully understand the wind resource potential using modern wind turbines. At each location, two years of wind data will be collected and analyzed using advanced modeling techniques. These data will be used to develop and validate high-resolution wind resource maps and other resource assessment products for Bangladesh. Learn more about collecting and validating wind resources at <https://www.ec-leds.org/sites/default/files/EC-LEDS%20Chasing%20Wind%20in%20Bangladesh.pdf>.

GENERATING RENEWABLE RESOURCE DATA

Just as renewable energy technologies have advanced dramatically over the last 15 years, so have technologies, methods, and tools for data collection, modeling and mapping. For example, while older annual wind speed maps have been useful in demonstrating national wind potential, the measurement and modeling methodologies used to create these maps may not adequately represent the wind resource available to modern wind turbines and consequently, are not sufficiently rigorous to attract investors. Today, wind researchers employ sophisticated modeling programs and high performance computing capabilities to create validated wind resource models and generate a wealth of data products including annual, monthly, seasonal, and hourly output that includes wind distribution, speed, and power density characteristics.

High-quality wind and solar resource data developed using best practices and state of the art tools and models provide the basis for estimating solar and wind generation potential, characterizing variability and uncertainty, and identifying the best potential locations for new renewable energy development. Coupling this with information on enabling infrastructure provides an invaluable resource for public sector planning and private sector investment.

For questions about EC-LEDS

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<https://www.ec-leds.org/tools-page/geospatial-analysis-tools>

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