

RENEWABLE ENERGY RESOURCE MAPPING

A Crucial Prerequisite for Investments in Renewable Electricity Generation

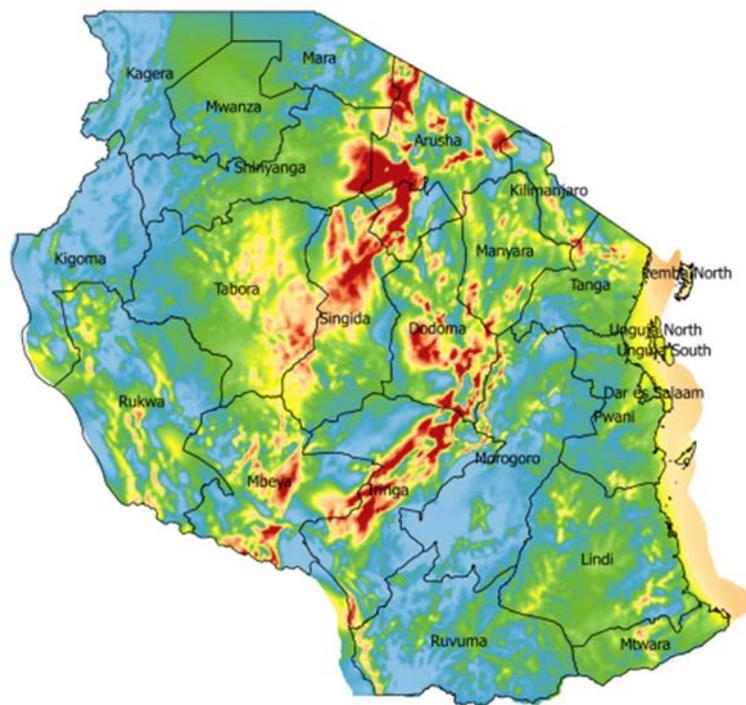
How can countries expand electricity generation from renewable energy resources if they have very limited information on their potential, geographic concentration, or seasonal and daily availability? For many developing countries, this deficit of quality data on resource potential is a significant barrier to strategic planning and commercial investment, and can result in suboptimal decision-making in terms of value for money, environmental sustainability, and transparency.

In response, the World Bank's Energy Sector Management Assistance Program ([ESMAP](#)) has identified renewable energy resource assessment and mapping as a priority intervention for scaling up investment in renewable energy, as evidenced by the high demand seen from World Bank client countries. In 2012, ESMAP launched a major global initiative to support renewable energy resource assessment, mapping, and geospatial planning, including the collection of ground-based data where this does not currently exist. The objective is to map resources at the country level rather than carry out site-specific resource assessment, which is best carried out by commercial developers.

GLOBAL COVERAGE

The ESMAP initiative on [Renewable Energy Resource Mapping](#) covers biomass, small hydropower, solar, and wind, with funding approved for 12 country projects that are designed according to each client country's needs. In addition, ESMAP is using the experience gained from these projects, and from our team of experts and international suppliers, to develop standardized materials to support other countries or development partners carrying out such work independently, including projects financed under the World Bank's lending operations.

With an international scope and work carried out at the country level, the initiative will have an impact on govern-



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ment policy-making and in-country awareness while also benefitting from learning and experience sharing across countries.

EMPHASIZING QUALITY

The ESMAP-funded projects have been explicitly designed to ensure the highest degree of accuracy possible, and a long shelf life for the maps and other data that are produced. In contrast to many previous mapping efforts in developing countries, a substantial proportion of the overall budget will help fund ground-based survey and measurement campaigns to collect high quality agricultural, hydrological, irradiance, and wind data where this does not already exist. Such surveys and measurements help reduce margins of error in the



The Energy Sector Management Assistance Program (ESMAP) is a global knowledge and technical assistance program administered by the World Bank. It provides analytical and advisory services to low- and middle-income countries to increase their know-how and institutional capacity to achieve environmentally sustainable energy solutions for poverty reduction and economic growth. ESMAP is funded by Australia, Austria, Denmark, Finland, France, Germany, Iceland, Lithuania, the Netherlands, Norway, Sweden, and the United Kingdom, as well as the World Bank.

remote sensing and modeling, and provide important reference data to commercial developers, thereby enabling them to shorten the length of their own data collection campaigns and also improve the accuracy of their predictions.

In addition to rigorous methodological and technical specifications, strong emphasis has been given to transparency when it comes to reporting and access, with all modeling outputs and ground-based measurements to be made available as 'open data'.

GEOSPATIAL PLANNING

On its own, a renewable energy atlas has only limited potential to influence government policy or attract commercial investment. An important next step is a process of geospatial planning, including potentially a full Strategic Environmental (and Social) Assessment where appropriate, to analyze areas of high renewable energy potential against other enabling factors or constraints.

The ESMAP initiative includes support for geospatial planning, including access to experts, analytical studies, and targeted knowledge sharing with countries that have recently carried out such an exercise, such as South Africa.

PARTNERSHIPS

ESMAP has partnered with the International Renewable Energy Agency ([IRENA](#)) to enable the visual mapping outputs from each country project to be accessible through the [IRENA Global Atlas](#), with the measurement data published on the World Bank's [Energy & Extractives Open Data Platform](#). ESMAP is also working closely with the US National Renewable Energy Agency, the European Space Agency, and a number of other international organizations to ensure close

COUNTRY	BIOMASS	SMALL-HYDRO	SOLAR	WIND
Ethiopia		✓	✓	✓
Indonesia		✓		
Lesotho (IFC)				✓
Madagascar	✓	✓	✓	✓
Malawi		✓	✓	✓
Maldives			✓	✓
Nepal		✓	✓	✓
Pakistan	✓		✓	✓
Papua New Guinea	✓	✓	✓	✓
Tanzania	✓	✓	✓	✓
Vietnam	✓	✓		✓
Zambia		✓	✓	✓

✓ (small) = Potential project locations
 ✓ (large) = Under implementation

collaboration and benefit from experience sharing.

At the project level, partnerships have been entered into with a number of our development partners, including the European Commission and GIZ, and with local agencies such as institutes of energy, meteorological departments, and universities.

RESOURCES AND TIMELINE

ESMAP has currently allocated US\$22.5 million to this initiative, which will run until at least 2018. An additional US\$2.6 million has been allocated by the Asia Sustainable and Alternative Energy Program ([ASTAE](#)). The initiative is still not fully funded, and an additional US\$20 million would be needed to deliver the mapping outputs requested by the 12 client countries. There is also strong unmet demand from other World Bank client countries which ESMAP will seek to respond to in future phases of the initiative.