RSVP RENEWABLES FOR SUSTAINABLE VILLAGE POWER

PROJECT BRIEF

Wind Resource Mapping

by Dennis Elliott and Marc Schwartz 7/98

Background

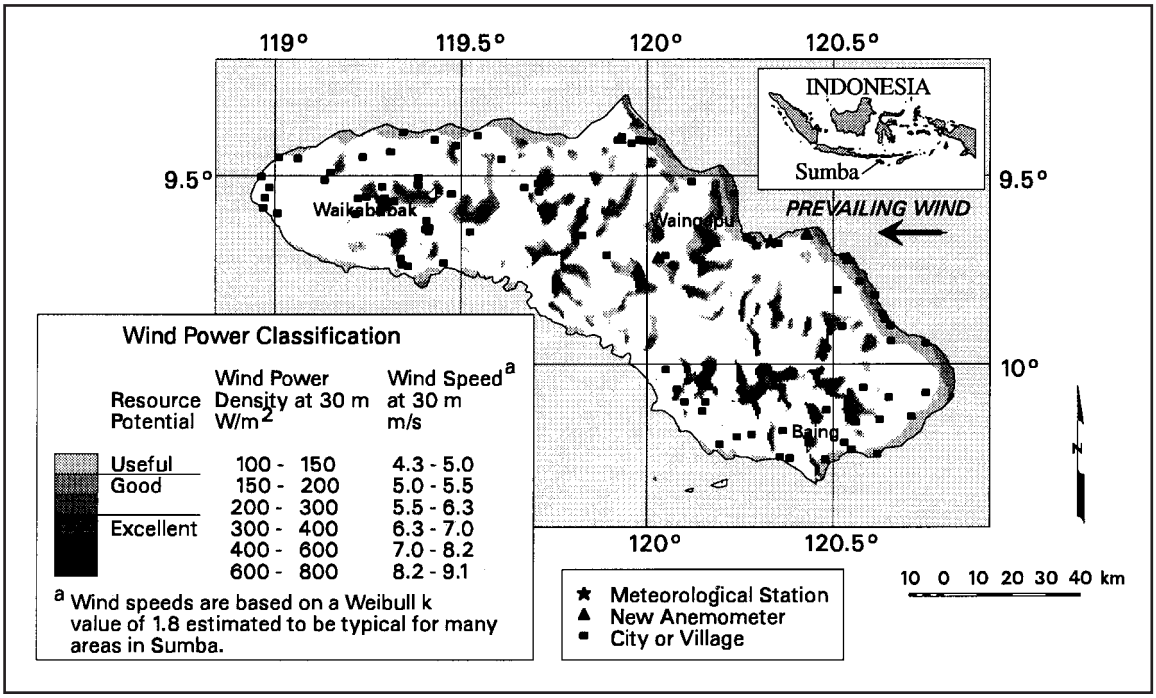
The National Renewable Energy Laboratory (NREL) is to helping to accelerate the deployment of wind energy by producing the most useful and sophisticated wind maps possible. In late 1995, NREL developed an automated wind mapping technique using Geographic Information Systems (GIS) software, improving on previous wind mapping techniques that were limited by laborious and subjective analysis methods.

The distribution of the wind resource for any particular region is often very complex. Previously, maps had to be physically drawn for topographic features such as ridge crests, elevated plateaus, and coastal areas. This process was time consuming, subjective, and often produced inconsistent analyses. NREL's computer mapping technique substantially reduces subjective analysis and greatly improves the accuracy of the maps. The technique enables the analysis of the distribution of the resource to be treated consistently throughout the region of interest. Using advanced computers, the NREL mapping technique reduces the time needed to produce a wind resource map for complex terrain.

Approach

A key component of NREL's wind mapping effort is the development of updated, comprehensive global databases that supply input for the computerized technique. NREL uses a variety of meteorological and geographical data sets in support of wind mapping projects. The principal meteorological data used in NREL's resource assessment projects are surface meteorological data, upper-air (weather balloon) data, and marine wind data from ships and satellites. In some regions, the data are supplemented by surface data from new surface measurement programs. The major type of geographical data used are shaded elevation maps and digital elevation data.

NREL's computer mapping system uses an analytical approach and is designed to portray the distribution of the wind resource over a large area. These maps can be used to identify and target areas for possible project sites and further wind measurement programs.



Results

Wind resource maps generated with the NREL computerized technique have been produced for specific areas of Chile, Mexico, China, and Indonesia. The wind map for the Indonesian island of Sumba (shown here) shows a large island with varied terrain. Sumba has only one meteorological station that has gathered long-term wind data. Nevertheless, using advanced analysis techniques of the regional meteorological data (primarily upper-air and satellite data) and available topographical data, a wind map was generated that delineates the most favorable wind resource areas on the island. Wind measurement activities that will be useful in validating and refining the island's wind resource are underway.

Planned Activities

Additional wind mapping activities for at least eight countries around the world are either underway or planned. The activities include mapping of areas in Chile, Mexico, Dominican Republic, Argentina, China, Indonesia, the Philippines, and Russia. Some of these countries present complex wind flow regimes and topography. Additional modules that take extremely complex terrain and topography into account will be developed and added to the computer mapping system.

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