

# RE-MAP: A GEOINFORMATIC-BASED DECISION SUPPORT SYSTEM FOR ASSESSMENT OF RENEWABLE ENERGY RESOURCES TO MITIGATE AND ADAPT GLOBAL CLIMATE CHANGE IN THE PHILIPPINES

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## ABSTRACT

Accurate renewable energy (RE) such as solar, hydro, wind and biomass resources data are important to assess resources to mitigate global climate change and for the proper sizing and life cycle cost analysis of RE systems technologies. Knowledge of the spatial distribution of the RE resources allow for more cost effective design and operation of RE systems for meeting requirements for RE systems. The goal of this task is to develop RE resource assessment for the Philippines that incorporates and builds upon current understanding of the spatial distribution of the resource using 1-km resolution Global Map, Philippines.

For solar energy, high spatial resolution of solar resources using global satellite-derived cloud cover data base and climatological solar radiation model were used. In hydropower resource, the total resources available to this technology can be specified according to the potential power output of flow rate of the water being used by the system and effective head of the water using DEM. The level of the wind power resource is defined in terms of the wind-power-density value, expressed in watts per square meter. This value incorporates the combined effects of the wind speed frequency distribution, the dependence of the wind power on air density, and the cube of the wind speed. To estimate biomass resources, some conservative assumptions were made to make a practical and reliable estimate of the biomass resources in the country. For example, crop straw and stalk outputs are calculated based on crop outputs and the ratio of grain production to stalk mass. These assumptions were related to the type of processing done for a particular commodity by researchers and planners. Other geographic data from land satellites, digital landuse/boundary maps, hydrometeorological data were gathered/downloaded, converted/imported, and compiled as input databases and basemaps. ArcView GIS software was used for the spatial query analysis while Visual Basic 6 programming was used to develop graphic user interface programming to compile the georeferenced input data, as well as the graphic user interface of linking relational databases to GIS application query modules. The long-range energy alternative planning system (LEAP) program was used to account of how RE is consumed, converted and produced in a given region or economy under a range of alternative assumptions on population, economic development, technology, price and so on. Estimation of greenhouse gas (GHG) emissions will also be presented to quantify its mitigation effect on climate change. This assessment provides data that researchers, planners, developers and investors can use to help establish successful business activity RE technologies that can be adapted to mitigate climate change in the Philippines.

Thus, the MMSU-ANEC developed a geoinformatic-based decision support system called RE-MAP or Renewable Energy-Mapping Analysis Program to build wealth of geo-referenced data and information on RE resources (solar, wind, hydro, and biomass) for policy research and development on RE resources and systems. Geo-referenced database and thematic maps as major outputs of RE-MAP showed various indicators on assessment, monitoring and evaluation, and efficiency thrusts that are useful for energy research, planning and policy options for rationalization and resource management of energy mix required under the medium- and long-term energy development and investment plan of the country. The use of remote sensing, geographic information system, and global positioning system for building of wealth of spatial databases on RE resources and systems, as well as other geographic features of the country are innovative geoinformatics mapping tools to share RE data and information which could be easily updated, stored, ready for any subsequent analysis, and can be shared to other twenty ANECs strategically located all over the country, Department of Energy, and other stakeholders.