ASSESSING WIND POWER POTENTIAL OVER THE EXTREME TERRAIN OF NEPAL HIMALAYA

Sajan SHRESTHA* and Ram P. REGMI
National Atmospheric Resource and Environmental Research Laboratory (NARERL)
Central Department of Physics, Tribhuvan University, Kirtipur, Kathmandu, Nepal
*Corresponding Author: pcl_sajan@yahoo.com

ABSTRACT

Assessing wind power potential over the extreme terrain of Nepal Himalaya is a challenging task. However, as techniques of wind resource assessment have improved greatly in recent years, it is possible to assess regional-scale wind power potential at desired spatial grid resolution and accuracy taking advantages of advanced mesoscale meteorological models and geographic information system. In this paper, we will present an integrated methodology that can be utilized for an accurate wind power assessment over the complex terrain of Nepal Himalaya with a demonstrative case study over the world's deepest river gorge, the Kali Gandaki River Valley, in Mustang District of Nepal. Imposing the geographic, social, economic, and technological restrictions under Multi-criteria Decision Making procedures, the annual theoretical wind power potential over the valley turns out to be around 9500 GWh. However, practical power production depends on the efficiencies and physical limitations of wind turbines. Possible power productions in reference to power curves available for different types of and company make turbines will also be presented. Present projection of wind power production over the Kali Gandaki valley, to the best of our knowledge, is the most realistic one as we have, for the first time, assessed regional wind power potential at the horizontal grid size of 1 km^2 with the adoption of Multi-criteria Decision Making procedures.

KEYWORDS: Himalaya, Mesoscale Meteorological Model, Geographic Information System, Multi-criteria Decision Making