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GIS-based preliminary wind-hydrogen energy assessment: A case study for Pakistan

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While the world is making progress on incorporating renewables in the electricity grid, the transport sector is still widely locked into using gasoline and diesel fuels. Simultaneously, wind energy is encountering resistance due to its intermittent nature. Wind to hydrogen energy conversion poses a solution to this problem, using wind powered electrolysis to produce hydrogen which can fuel the transport sector. In this report a preliminary assessment for wind to hydrogen energy conversion potential of Pakistan was made considering two different turbines; Vestas V82 and V112. Using available wind speed data, processed in ArcGIS, the hydrogen potential was calculated. Finally, the economic feasibility and potential environmental savings were assessed. From the results it was concluded that Pakistan has a good potential for wind to hydrogen conversion, with 63,807 and 80,232 ktons of hydrogen per year from the V82 and V112 turbines. This corresponds to 2,105 and 2,647 TWh of energy per year respectively. Only using 2% of that potential could give emissions savings of up to 11.43 and 14.37 $MtCO_2$-eq, which would give good reason for more in-depth studies to evaluate the feasibility of a project in Pakistan.