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HYDROGEN PRODUCTION FROM THE WIND: PROSPECTS FOR OKLAHOMA

M. MEO[1], T. HUGHES[2] and J. LAGUROS[3]

[1]Science and Public Policy Program
[2]Environmental Verification and Analysis Center
[3]School of Civil Engineering and Environmental Science
University of Oklahoma, Norman, OK, USA 73019
E-mail: mmeo@ou.edu

EXTENDED ABSTRACT

Industrial movement toward cleaner fuels poses both a challenge and an opportunity for windy states in the U.S. Great Plains region, which includes Oklahoma. While motor vehicle manufacturers indicate their intention to deploy automobiles powered by fuel cells in the second half of this decade, some uncertainty exists about the exact source of the hydrogen fuel that will be used to power these vehicles. Due to rising concerns about greenhouse gas emissions from fossil energy sources, wind-generated hydrogen could become an attractive source of energy, particularly if distributed production patterns coincide with vehicular fleet requirements. In this paper, the potential for hydrogen production from wind in Oklahoma under a distributed energy planning scenario is examined. First, the feasibility of producing electric power from wind turbines by evaluating the state's extensive wind resource is calculated. This is done by incorporating six years of detailed wind speed data from a network of 114 real time monitoring stations (the Oklahoma Mesonet) into a Geographic Information System (GIS) framework that accounts for surface roughness, terrain variability, and direction. Next, estimates of electric power production are calculated for wind class areas identified in the state that are economically competitive. The economic feasibility of hydrogen production through electrolysis is estimated based on current technology and assessed for a development scenario that includes distributed production and storage. The paper concludes that while promising, wind hydrogen is not yet economically competitive with conventional fossil fuel, but could be in the future.

Key words: wind, hydrogen, feasibility, Great Plains, Oklahoma