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Evaluating onshore and offshore wind energy feasibility for State of Texas

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Due to the environmental concerns from the use of traditional fuels such as coals, the US Environmental Protection Agency (EPA) is currently requiring power plants to meet air pollution regulations, which could cause power shortages and even blackouts in the state of Texas. The purpose of this study is to evaluate the feasibility of using onshore and offshore wind turbines (WTs) in Texas based on levelized Cost of Energy (LCOE) analysis. This study is based on a scenario that multiple wind turbines can be installed in available onshore lands and offshore seas of the state of Texas. A commercial WT is selected for both onshore and offshore situations and the corresponding LCOEs were analyzed. Secondly, the maximum number of WTs which can be installed in the available areas was determined based on a spatial distance criterion. Lastly, the maximum annual energy output and the maximum average power output for both situations in Texas was estimated. Although offshore WTs are considered to be more promising technology which can produce more energy and power these days, our results showed that the selection of the two wind turbine types may vary using different indices and number of turbines.

1. In terms of LCOE, onshore WT is more economical due to the lower LCOE.
2. In terms of Capacity Factor, offshore WT is more power-efficient due to the higher capacity factor.
3. In terms of Annual/Average energy and power output
 - A. For a single WT, an offshore WT produces more power and energy than onshore WT.
 - B. For WT farm, onshore WTs produce more power due to more number of turbines that can be installed in available windy land.

Biography

Miyako Nakayama obtained her business bachelor degree in Hosei University in Japan in March 2015. Since 2015 fall, he has been majoring in Mechanical Engineering to seek a second bachelor in the University of Idaho. In summer 2017, as a sophomore student, he had completed comprehensive research on Wind Energy based on extensive literature reviews, which covers both technological and business perspectives and has been on the process to publish her research paper.

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