BROWN UNIVERSITY

Offshore Wind Development in Rhode Island

The Advisability of Long-term Contracting with the Proposed RIWINDS Offshore Wind Project

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Executive Summary

This thesis estimates the levelized cost and value of electricity from the proposed RIWINDS offshore wind project. This includes analyses of potential revenue streams and two positive externalities, which are global warming and health benefits. The options for long-term contracting with the project are discussed, and further study is recommended on the impacts of developing the offshore project, particularly on the externalities of wind energy such as its hedge value and economic development potential. The analysis presented in this thesis shows that the market value of the energy is forecasted to be lower than the levelized cost for the majority of the project lifetime.

The primary goal of this research is to shed light on the customer costs and benefits of a long-term contract between National Grid and the proposed RIWINDS project. The cost estimate for the project is informed by the Mineral Management Service's Cape Wind Final Environmental Impact Statement (2009). The levelized cost of energy is estimated to be $137 per MWh for an offshore wind project located near Block Island. This thesis uses various sources to forecast the electricity, capacity, carbon and Renewable Energy Credit (REC) markets, which cumulatively equal the estimated future market value of the RIWINDS energy. Assuming a project lifetime of twenty years from 2014 to 2033, the estimated market value of the energy is $95 per MWh at the beginning of operation and $147 per MWh at the end.

The positive health and global warming externalities of the project are quantified and compared to alternative scenarios. The health savings from the avoided emissions of the RIWINDS plant are $2.60 per MWh, primarily due to reduced sulfur emissions and the resulting decrease in premature mortality. The global warming impacts are determined in context of the Rhode Island Greenhouse Gas Action Plan (2002), which outlines carbon emission reduction strategies that would meet scientific goals. In this plan, renewable energy was expected to reduce carbon emissions by 140,000 metric tons per year by 2020. The RIWINDS project would reduce carbon emissions by an estimated 180,000 tons each year.