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Feasibility of Offshore Wind Power in the South Atlantic Bight

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Abstract

The Southeastern U.S. is widely considered to have no significant wind resources for the production of competitive wind power. However, this study shows that data available from instrumented Navy platforms (at 50 meters above the ocean surface) off the Georgia coast as well as data from the National Data Buoy Center indicate that there is a better wind resource in the South Atlantic Bight region than previously thought. In addition, this region has a 140 km wide continental shelf providing shallow water over a vast area offshore [1]. This shelf allows conventional wind turbine platform technologies to be used while placing wind turbines over the horizon and out of land sight, overcoming viewscape issues from the shore if necessary.

The current study investigates preliminary design information for a wind farm located in the South Atlantic Bight region based on work done in a partnership between an academic institution and an electric utility. Electrical power output, project costs, turbine selection, landfall options, power integration, environmental impacts, and siting issues are being reviewed. The results of this study show that wind energy resources and offshore conditions could make this region a potential area for development of offshore wind power.

Introduction

The current study grew out of collaboration developed and supported by the National Science Foundation (NSF) Partnerships for Innovation (PFI) Program. As part of this three-year program entitled *InfiniteEnergy: A Coastal Georgia Partnership for Innovation*, Georgia Tech has searched for alternative energy options to stimulate economic opportunities for the Coastal Georgia region. A critical component of the PFI grant was performing strategic technology assessments on alternative energy options to determine the potential for implementation. Upon preliminary analysis of wind data obtained for the region offshore of Georgia, it was determined that the wind resource merited further research on the

conceptual design of locating an offshore wind farm in the area. This paper covers steps taken to do a detailed analysis of potential offshore wind power sites in the South Atlantic Bight.

South Atlantic Bight Overview

A bight is defined as a long, gradual bend or recess in the coastline that forms a large, open bay. This loosely describes the coastal ocean between South Carolina and Florida. The region has many features that distinguish it from neighboring regions; most importantly it has up to a 140 km wide continental shelf [1].

Twenty meters is currently the depth limit of conventional wind turbine platform construction techniques. Off the Georgia coast, there are 8,000 square km of open water less than 20 meters deep within which these wind turbines could be placed (160 km coastline X 50 km out from shore); while the area that encompasses 30 m or shallower water spans 12,800 square km, extending 80 km from shore along the Georgia coast. Beyond approximately 30 km these tall structures are no longer visible from shore. This unique topographical formation offers significant opportunity for development of offshore wind energy facilities in terms of conventional platform placement with minimal visual impact from shore.

South Atlantic Bight Wind Resource

Skidaway Institute of Oceanography (SKIO), a research unit of the University System of Georgia located near Savannah, has been recording meteorological data off the coast of Georgia since June 1999. There are eight platforms spanning the Georgia coast (see Figure 1), between 65 and 120 km offshore, covering a 115 km x 50 km area from the middle to the outer continental shelf, an area of roughly 6000 square km. Originally, these platforms were built by the Navy to monitor tactical aircrew training. In 1999 Skidaway received funding from the National Oceanographic Partnership Program (NOPP) to implement the South Atlantic Bight Synoptic Offshore Observational Network (SABSOON) using the network of existing fixed platforms [2].

One tower of interest is located approximately 60km offshore from the Georgia coast and takes wind data measurements at 50 m above the ocean surface. The ocean depth in this location is approximately 27 m. The equipment on this tower consists of an RM Young 05106 (marine) wind speed/direction sensor with an accuracy of +/- 0.3 m/s, as well as an RM Young 26725 wind speed/direction module with an accuracy of +/- 3 degrees. This equipment provides 6 minute