

ECONOMIES OF SCALE AND NATURAL MONOPOLY IN THE COASTAL VIRGINIA OFFSHORE WIND ENERGY: THEORETICAL AND EMPIRICAL ANALYSES

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ABSTRACT:

The authors discuss theoretically the basis for establishing the Coastal Virginia Offshore Wind (CVOW) as a public utility monopoly and provide some empirical evidence using data from fixed-bottom offshore wind farms already installed around the world over the past 20 years. They argue that there are benefits associated with natural monopoly because of the presence of economies of scale in offshore wind energy and the vertical integration in the production, transmission, and distribution of electricity. Although, a regulated public electric utility is under the control of the government over monopoly pricing, the competitive market system may not be the best alternative in the case of offshore wind energy because of the complex nature of marine ecosystems as well as the high initial investment costs involved in the construction and operation of a typical offshore wind farm.

Keywords: Offshore Wind Energy, Natural Monopoly, Regulatory Alternatives, Economies of Scale, Learning Curve.

1. INTRODUCTION

Due to the growing concern for climate change associated with fossil fuel-based energy, in 2017, the Assembly of the Commonwealth of Virginia approved \$2,000,000 from the general fund to be distributed to the Virginia Coastal Energy Consortium (VCERC) for research and development of Virginia's marine renewable energy resources, with an initial focus on offshore winds, waves, and marine biomass.

As a member of VCERC, Norfolk State University (NSU) contributed to this research project by (1) analyzing the potential offshore wind energy application, and (2) estimating the economic benefits and identification of workforce training and entrepreneurial development needs to support a marine renewable energy industry in the Tidewater region, using the REMI Policy Insight input-output software program (Sissoko, 2010).

Dominion Energy is currently building, about 27 miles off the coast of Virginia Beach, the largest offshore wind energy farm in the U.S., called Coastal Virginia Offshore Wind (CVOW), which is expected to be fully operational by 2026 with 176 turbines spread over 113,000 acres, at the cost of \$9.8 billion, including the cost of employing over 750 Virginia-based workers. Upon completion, CVOW is expected to produce 2,600 megawatts, supplying over 660,000 homes in Virginia or almost 25% residential customers (PEW, January 8, 2024), and to generate more than 1,000 full-time jobs.

The selection of Dominion Energy, as the lease operator of CVOW, by the Virginia Department of Energy and approved by the Virginia State Commission and the Bureau of Ocean Energy Management (BOEM) raises some regulatory issues associated with monopoly. For instance, the lack of competition in the electric utility industry has been a long-standing debate among economists and lawmakers. The existence of economies of scale in natural monopolies is often used as a justification for allowing a single company such as Dominion Energy to operate this wind farm and produce energy for the entire regional market, rather than two or more firms. This paper analyzes theoretically and empirically the existence of economies of scale in the CVOW energy farm, and the choices for regulation of a natural monopoly to protect the welfare benefits of consumers. Marine ecosystems represent, not only, the habitat for the sea wildlife, but also, the sources of many socio-economic benefits to humans. Therefore, using offshore wind as a source