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Offshore wind power in the US: Regulatory issues and models for regulation

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ABSTRACT

The first offshore wind farm became operational in 1991 in Vindeby, Denmark. By 2008, large offshore wind farms had been built in Denmark, the UK, the Netherlands, Ireland, and Sweden with a total capacity of 1200 MW. Offshore wind farms have the potential to generate a significant fraction of US electrical consumption, but the US currently lacks offshore wind farms and is still developing a regulatory system. At the state level only Texas has a leasing system for offshore wind. Since all offshore land is the property of the state and cannot be legally developed without a lease from the government, these absences have stalled development. We review and compare regulatory and leasing systems developed in Europe and the US to inform a discussion of the major issues associated with the development of an offshore leasing and regulatory system. We focus on the tradeoffs between encouraging a sustainable energy source and ensuring environmental protection and public compensation. We conclude that there are likely multiple effective methods of regulation.

1. Introduction

Onshore wind energy is experiencing rapid growth in the US and around the world (Wiser and Bolinger, 2008) and offshore wind energy development is experiencing rapid growth in Northern Europe, yet despite significant potential, there are currently no offshore wind parks in the waters of the United States or Southern Europe. In part, this is due to the superior winds and shallow waters of the Baltic and North Seas, and the subsidies offered by European governments to offshore wind developers, but the lack of a comprehensive regulatory system in the US and several European countries may also be slowing development.

Several European countries as well as some US coastal states and the US federal government are developing regulations for offshore wind power (Eberhardt, 2006). In US federal waters (between 3 and 200 nautical miles from shore), the Minerals Management Service (MMS) is the lead agency in coordinating offshore wind development. The Energy Policy Act of 2005 gave the MMS authority to lease offshore wind energy on the Outer Continental Shelf (OCS). In December 2007, MMS published its Record of Decision (ROD) in response to the programmatic Environmental Impact Statement (EIS) on alternative energy uses on the OCS (Luthi, 2007), and in July 2008, MMS proposed regulations for an offshore alternative energy program and asked for public comments. In April 2009 MMS released final regulations for an offshore renewable energy program.

The regulatory system most applicable to offshore wind energy may be the regulation of the offshore oil and gas industry since in both cases private developers seek to produce energy, a commodity needed by the public, through the use of public marine resources. However, there are significant differences between these two industries. In the offshore wind industry, developers must take out large loans and spend several years before any revenue is generated. When they do begin generating income, the income will be spread out slowly over many decades, and the risk to revenue stream can come from many sources—environmental, market and regulatory. The difference between the cost and sales price of offshore wind energy is quite low. In contrast, the offshore oil industry, although requiring significant capital, generally produce large amounts of revenue quickly and recoup initial investments within the first few years of production. Additionally, while the price of oil is highly variable, the ratio of sales price to cost is far higher than it is for offshore wind energy. As a result, regulations, especially the production of site specific EISs and lease fees that may have little impact on the oil and gas industry, could cripple the offshore wind industry (Schellestede, 2008).

The major issues regulators will have to address include: (1) lease terms and conditions, including phases of development rights, lease fees, and the length of leases; (2) competition and the approval process, including how to select sites and what criteria to use in permitting leases; (3) environmental impact assessments, including data requirements and alternative methods for National Environmental Policy Act (NEPA) compliance; (4) monitoring operational issues, including safety and environmental compliance; and (5) ensuring decommissioning. A brief synopsis of the ways in which several regulatory authorities have dealt with these regulatory issues is summarized in Table 1.

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Table 1
Major lease terms and components for selected offshore wind regulatory authorities.

Major issue	UK	Denmark	BLM (onshore)	Texas	MMS (proposed)
Lease terms: leasing fees and royalties, phased access	Developers pay application fee of £2500 and one time lease fee of up to £500,000 depending on size of site. Developers are eligible for capital grants; exempt from climate change levy (4.3 p/kWh), can sell renewable obligation credits (5 p/kWh; Toke, 2007)	Price of electricity agreed upon in tender. Recent tender price 13.2 c/kWh. No phased access. Lessees have three years from lease to construct wind farm	Phased access system granting data collection and competitive exclusion rights. Fee for commercial development $2365 per MW of capacity	Phased access in which developer has right to terminate lease. $20,000 phase 1 fee and 3.5–5.5% royalty during operation	First five years of lease used for assessment. Royalty rates and bonus bids vary competitively
Term limit	40 or 50 years with a renegotiation after 20 or 25 years	25 years	None	30 years	30 years
Competitive process	Government selects sites with input from developers. Process has preceded in rounds, not unlike MMS five year plans	Set lease areas and hold competitive bidding	First come-first served basis. Competing applicants encouraged to form cooperative agreement	Set lease areas and hold competitive bidding	Competitive auction for sites with competitive interest. Use highest bonus bid or royalty rate
Approval criteria	Feasibility of development plan	Lowest feed in price per kWh		Highest bidder	Highest bidder
Environmental analyses	BERR completed SEA for areas to be leased. Developers complete EIS for sites	Developer conducts site specific EIS after competition. Exceptions may be made by DEA	Use CX's for data monitoring and EA for commercial development. Occasional use of EIS	Has to comply with COE NEPA requirements. Has to conduct avian and bat studies if EIS is not required	Multiple opportunities for environmental analysis. Site specific EIS usually required
Operational issues: environmental and compliance monitoring, safety	Developers conduct monitoring and submit reports	Each developer submits operational plans and conducts their own environmental monitoring	Little discussion of operational issues	Monitoring conducted by lessee with reports issued to state	Developers conduct monitoring according to approved plan and issue reports. MMS conducts inspections
Decommissioning	Surety bonds or other financial instrument required. Allow for repowering or reuse of facilities	Developer must submit approved financial guarantee to DEA	Bonds are required; amount of bond determined on site specific basis	Surety bonds, cash deposit or letter of credit required	Surety bond or other guarantee required. Detailed decommissioning plan does not need to be submitted until two years before end of lease

The purpose of this paper is to discuss the ways in which regulators could encourage the development of an offshore wind power industry that is economically viable and that considers the ecological costs and ensures public benefits. This paper does not deal with the various laws with which a regulatory system would have to comply; for these issues we direct the reader to Santora et al. (2004) or Firestone et al. (2004). While it will be a challenge for regulators and developers to negotiate this complex milieu of already existing laws and regulations, we focus on the leases for offshore wind and their regulations.

When establishing a regulatory system it is often difficult to quantify the costs and benefits involved and to create a system that is comprehensive, yet flexible and robust to future uncertainty. All regulations are a series of tradeoffs in which regulators must balance conflicting policy goals. In the case of offshore wind, regulators must balance encouraging a low carbon, renewable energy technology with damage to local ecosystems and viewsheds and potential conflict with other offshore users (Bisbee, 2004). Each regulatory decision will either encourage or discourage offshore wind development and could affect the rate of development and its eventual scale.

We first discuss the relevant European regulatory and lease frameworks for offshore wind power and then describe three relevant leasing systems in the US. We use these descriptions to discuss issues and tradeoffs involved in the development of an alternative energy leasing policy. We do not intend this paper to offer support for any particular regulatory scheme, only to offer a review of the regulatory options and their potential impacts.

2. Regulatory systems in Europe

Many European nations have either no method for regulating offshore wind farms or have little successful experience in promoting their development. The UK and Denmark are two exceptions. They both have several large operational offshore wind farms and have several others under construction. In this section we review the regulatory regimes of these two nations along with two other nations, Germany and the Netherlands. Both Germany and the Netherlands have less formalized offshore wind regulations that allow developers more freedom but which have so far resulted in fewer operational wind farms.

2.1. United Kingdom

The submerged land of the United Kingdom's territorial sea is the property of the Crown Estate[1] (Scott, 2006). As a result, the Crown Estate must grant a lease for offshore wind development within the UK's territorial sea. Beyond the territorial sea, the Crown Estate must still grant a license for development. While the Crown Estate is the landowner, the Department of Business and Regulatory Reform (BERR), formerly Department of Trade and Industry, is the lead government agency involved in offshore permitting (Peloso, 2006).

The Crown Estate has thus far conducted two "rounds" of leasing. The first round took place in April 2001 and resulted in 18

[1] The Crown Estate is the land once considered the property of the monarch (i.e. public lands) and the name of the organization that governs those lands.