



## SENATE II

### Offshore Wind Farm Development

By Andrew Patterson

#### Introduction

As debates about immigration, health care reform, and the future of the American economy have risen to and fallen from the national spotlight over the past few decades, one issue has maintained a constant presence in news stories and the minds of concerned citizens since the first major shortage of it in the 1970's: energy. As a result of the strain which modern civilization's massive energy demand has placed on the available global fuel supply, energy prices have for many years been subject to major instability and rapid and unexpected increases, tangible effects of anthropogenic climate change are becoming ever more apparent, and the supply of fossil fuels, which provide 85% of the world's energy, is rapidly dwindling. With the added impact of burgeoning economies and energy markets in the **BRIC nations** and elsewhere, the next few decades are sure to place a crippling strain on the current supply of global energy in the absence of substantial preventative action. Furthermore, this growth in demand, if left unchecked, will also severely exacerbate the global energy crisis and inflict severe and possibly irreversible damages onto the Earth's ecosystems as well as human society as a whole.

**BRIC nations**—Brazil, Russia, India, and China; four large nations that are deemed to be at a similar stage of newly advanced economic development.

Although the world's dependence on fossil fuels has been heavily publicized in the news, the negative impacts of fossil fuel combustion are nonetheless so severe that they cannot be overstated. The processing, transportation, and combustion of fossil fuels all contribute to atmospheric carbon dioxide loading, which strengthens the greenhouse effect on Earth and causes the average global temperature to rise. Though the effects of anthropogenic carbon dioxide loading are very hard to accurately predict or model, most climatologists agree that the Earth will experience far more extreme weather patterns over the course of the next century. The rapid melting of glaciers and polar ice caps resulting from higher average temperatures may also raise global sea levels, resulting in severe flooding in coastal regions and inevitably damaging major infrastructure and cities worldwide. Domestically, there are even more issues which the US faces as a result of its current energy policy. As European nations race ahead in the alternative energy field, the United States is left to struggle with its heavy dependence on Middle Eastern oil reserves as a source of energy which, aside from leading to near monopoly-like pricing and highly complicated politics, has directly and indirectly led to armed conflict and the loss of the lives of many American servicemen and innocent civilians of Middle Eastern nations.



Clearly, there is substantial impetus for the US to take actions to protect its political and economic interests in addition to the wellbeing of its citizens.

However, the future of global energy policies is not as entirely bleak as it may seem, and the technology already exists for alternative energy to play a large role in the global energy infrastructure. Offshore wind energy production is one such technology that holds great promise because of its minimal impact on human society and the environment and its reliance on an abundant source of natural power. In fact, many energy experts believe that offshore wind energy will ideally play a large role in the future development of energy infrastructure at both the national and global level.

Offshore wind farms, despite all their promise, have nonetheless been a very controversial proposed solution to energy issues and global climate change in the United States. Wherever serious plans have been proposed for construction of an offshore wind farm in the US, strong opposition, typically from local beachfront property owners, American Indian tribes, and certain environmental groups, has led to the failure of nearly every proposal. However, with the recent approval of Cape Wind in Massachusetts' Nantucket Sound, offshore wind has finally achieved its first major victory, opening the door for further development of offshore wind in the US. At such a pivotal moment in the development of offshore wind as a viable source of energy, Congress has the ability and duty to dictate the future of the United States' energy policy.

## Explanation of the Problem

### *History of the Problem*

#### *Denmark Constructs World's First Offshore Wind Farm in 1991*

Spurred by rising fossil fuel prices as well as a growing concern over the toll which an energy infrastructure based on such sources was taking on the earth's natural systems, the Danish government in the late 1980's approved construction of the Vindeby offshore wind farm in the Baltic Sea, which was the first such energy production facility in the world. Completed in 1991, the Vindeby Wind Farm consists of eleven Siemens *Bonus* wind turbines and can only produce 4.95 megawatts (MW) of power, an output which is dwarfed by that of modern wind farms, contributing only a negligible amount of energy to the Danish **power grid**. However, Vindeby's construction, approval, and overwhelming success in providing reliable, sustainable energy to Denmark established a precedent for the dramatic expansion of the role of offshore wind energy in both the Danish as well as the European power system.

**power grid**—a vast, interconnected network for delivering electricity from suppliers to consumers.

### *UK and Northern Europe Follow Suit*

Since 1991, most northern coastal nations of the European Union have followed Denmark's lead and created a substantial offshore wind farm presence in their own energy infrastructures, with the United Kingdom leading the way at 1,370.8 MW per year of offshore wind capacity created since the nation's first wind farm was constructed in 2000.

Spurred by a federal mandate to have 15% of all electricity produced via alternative sources by 2020, the UK has also approved or begun construction on a total of eleven additional wind farms, which will bring the total capacity to over 5,000 MW by 2022. This offshore wind farm supply will, based on current projections of energy demand, be enough to power at least five million homes. Most impressive of all is that the eight largest proposed wind farms (all of which have received at least some of the necessary approval for construction) are UK projects, and if constructed, will bring the percentage of the national power supply provided by offshore wind farms to just over 50%. None of these are set to begin construction before 2014, but the potential for offshore wind energy to play a large role in the global energy supply is clearly substantial, leaving many to wonder why the United States, with its extensive shoreline and great technological advancement, has yet to construct a single offshore wind farm.

### *The United States Continually Rejects Offshore Wind Proposals*

For a variety of reasons, offshore wind energy has been met with heavy resistance in the US for as long as such projects have been proposed. Cape Wind in Nantucket Sound, despite its recent approval, is an illustrative example of the number of barriers a given offshore wind project faces before it becomes a reality. Interest groups ranging from the Kennedy Family to hard-line environmentalists to the **Algonquin tribe** of Martha's Vineyard have protested the construction of a wind farm in this location throughout the approval process for a variety of disparate reasons. The Kennedys own beachfront property in Hyannisport with a sea view which would be obstructed by a wind farm, some environmentalists object to the number of birds and bats which may be killed by the turbines, and the Algonquin tribe claims that the proposed site is an important religious area to their culture which should not be disturbed by construction projects of any kind. As a result of objections from these powerful interest groups and the fact that a project needs approval from fifteen different federal organizations, a full two decades after the world's first operational offshore wind farm opened passed before an offshore wind farm project was finally granted full approval in the US (Cape Wind), with several sound projects from a scientific and engineering perspective being rejected over that same timeframe.

**Algonquin tribe**—an American Indian tribe concentrated largely in the American Northeast and Upper Midwest.

## ***Recent Developments***

### *China Enters the Fold*

After decades of European dominance in the field, China finally opened its first offshore wind farm in early 2010 and has since become a significant presence in the production of offshore wind energy and technology. China's first wind farm consists of 34 turbines off the coast of Shanghai and can generate enough power for 200,000 homes, with four more projects in development which, when completed, will increase this output fivefold within the next decade. Perhaps more significant from the US's perspective, however, is the fact that China very rapidly acquired a 61% **market share** of the \$47 billion offshore wind energy technology market. If the US does not act quickly, it could permanently forfeit the opportunity to be an influential player in the increasingly lucrative market for offshore wind energy and fall far behind China and Europe in energy availability and affordability as fossil fuels become more scarce and expensive every year.

**market share**—the percentage of an economic market accounted for by a specific industry or com-

### *Floating Turbines Revolutionize the Field*

Previously believed to be a technology limited to calm and shallow offshore waters, recent breakthroughs in engineering have dramatically expanded the area where offshore wind could feasibly be harvested. Engineering companies such as SWAY and StatOil Hydro have designed floating turbines that can operate in waters up to 2,300 feet deep, in contrast to the current conventional depth limitation of roughly 300 feet. With these advances, many experts agree that the previously accepted potential global energy yield of offshore energy will increase by many orders of magnitude, and that offshore wind will likely be a major or possibly even majority player in the international energy landscape a few decades from now. Despite these recent advancements and the large potential for capital and energy gains, the US remains extremely far behind its Asian and European rivals in the field.

### *Cape Wind*

In early 2011, after nearly a decade of highly contentious debate and twenty years of failed advancements in the field of offshore wind energy, the Cape Wind Project was finally granted in rapid succession the necessary approvals from the US Army Corps of Engineers, US Environmental Protection Agency (EPA), and the Bureau of Ocean Energy Management, Regulation, and Enforcement to allow it begin construction in Massachusetts' Nantucket Sound within the next few years. This will be the first US offshore wind farm and will provide an average of 170 megawatts of electric power, which is equivalent to 75% of the total power demand of Cape Cod and the islands of Nantucket and Martha's Vineyard. Though relatively small in capacity, the approval of this pro-

ject serves as an important milestone in the future of offshore wind farms in America because of the huge number and diversity of legislative problems and roadblocks that it overcame on its way to approval. Though it may have opened the door for similar projects to be granted approval, these barriers remain strong and abundant, so congressional or executive assistance is still necessary if such projects are to be approved on a broad scale in America.

## Congressional Action

Nearly all approved federal legislation regarding offshore wind energy to date has been concerned with subsidies and other financial issues, so the door is open for this session of Congress to create legislation that more directly affects the development of this crucial alternative energy technology.

### *Energy Policy Act of 1992*

Congress' most significant contribution to the development of offshore wind energy was included in the Energy Policy Act of 1992. This act allocated substantial federal **Production Tax Credits** to wind power, both on land and at sea. These credits have been utilized heavily in the production of wind power facilities on land, but thus far the only offshore wind project for which they have been approved is Cape Wind. Though these credits have been extended multiple times, they are very likely to expire in 2012, before any offshore wind farms will be under construction in America. The expiration of these credits would be a potentially devastating blow to offshore wind power at a critical time in its development.

**Production Tax Credits**—federal tax credits granted to certain infrastructure projects deemed important to some aspect of US or global development, such as sustainable energy.

### *Renewable Electricity Standard*

In 2009, the US House of Representatives passed a federal mandate that 20% of all US electricity production must come from renewable sources by 2020. However, given that similar legislation has yet to be passed in the Senate, this standard does not yet have the force of law. Though it does not directly address offshore wind energy, many experts believe that this technology has the capacity to fulfill far more than 20% of the United States' future energy needs, and so passage of such a mandate in the Senate could certainly help spur development in this relatively new field.

### *American Recovery and Reinvestment Act of 2009*

Though primarily designed to help mitigate the effects of the 2008 recession in the US, the American Recovery and Reinvestment Act (ARRA) still allocated roughly \$100 million specifically to offshore wind research and development facilities. Funding was included for this

particular field with the hope that it would help kickstart the field and thus create a new, possibly lucrative sector of the American economy as well as thousands of new green engineering jobs.

## Focus of the Debate

### *Conservative View*

Conservatives typically do not support environmental legislation that they believe carries even slightly intrusive or disruptive side effects for citizens, businesses, or for society in general, and the issue of offshore wind farm development is no exception. They typically take up the cause of (often wealthy) shorefront property owners and object to the presence of tall wind turbines in formerly beautiful coastal areas without the permission of said property owners. Additionally, conservatives raise concerns over the re-routing of commercial and recreational shipping routes resulting from wind farm placement and construction and in general do not believe that the benefits of clean wind energy outweigh these aforementioned **externalities**.

### *Liberal View*

As a rule of thumb, liberals generally believe it is important to protect the environment and thus support alternative energy as a lasting way of helping limit humanity's negative impact on the environment, despite the great challenge of managing massive infrastructure construction, limiting the environmental impact of such projects, and other associated difficulties. Consequently, most liberals support offshore wind farm development, though there are some notable exceptions such as the Kennedy family, which owns property in Hyannisport, Massachusetts that looks out over Nantucket Sound near the site of Cape Wind.

### *Presidential View*

Because offshore wind farms are relatively new to the US political landscape, President Obama does not have a long electoral history with offshore wind farm development. However, his opinion typically falls in line with that of liberals, and he is strongly in favor of protecting the environment and promoting sources of alternative energy. As such, he would likely support a large expansion of the role of offshore wind in the US energy picture, especially considering that much of Europe is currently racing ahead in the alternative energy race.

**externality**—a cost or benefit, not transmitted through prices, incurred by a party who did not agree to the action causing the cost or benefit.

## Interest Group Perspectives

### *Greenpeace*

As an environmental activist group, Greenpeace generally sup-

ports any legislation or policy which helps protect the environment or counteracts the effects of global warming. However, this position is complicated by the fact that they also are generally against what are perceived to be environmentally invasive actions, which some members of the organization claim includes offshore wind farm development. Thus, Greenpeace would likely support the increased presence of offshore wind farms in the US if it can be definitively proven that the effect of the wind farms on reducing fossil fuel consumption significantly outweighs any negative environmental impacts, which most scientists agree it does.

#### *Cato Institute*

As a libertarian think tank, the Cato Institute has a long history of opposing perceived intrusions of the government and industry on individual liberties and, to a lesser extent, of advocating for corporate freedom against government action. Thus, the Cato institute would likely oppose any legislation supporting the expanded presence of offshore wind farms in the United States, citing claims made by beachfront property owners that offshore wind farms would ruin their sea view without their consent. There are additional claims made by companies in the shipping industry that offshore wind farms would force them to reroute their shipping routes and thus increase operating costs because of government action, which is a grievance that the Cato Institute would likely throw their support behind.

#### *Sierra Club*

An environmental activist group with a more generally practical view of environmental issues than Greenpeace, the Sierra Club strongly advocates government investment in and legislation supporting alternative and sustainable energy initiatives of all types. As such, the Sierra Club would likely support any legislation that promotes offshore wind farm development in the US, especially since most of the possible environmental drawbacks associated with the technology have proven to be overblown or non-existent altogether.

## **Possible Solutions**

#### *Increased Subsidies to Offshore Wind Projects*

By electing to increase federal funding to offshore wind farm projects, Congress would do much to help offshore wind energy develop into a major contributor to the United States' domestic energy supply. A significant recurring problem in the history of offshore wind energy thus far has been funding, as it is still a nascent technology in the US, and so few **venture capitalist** firms are willing to devote the financial resources necessary to support such projects. However, a successful

**venture capitalist**—  
*someone who provides financial capital to early-stage, high-potential, growth startup companies.*

project funded and made possible by the government could establish offshore wind energy as a viable capital investment, inspiring private firms to support such projects going forward. This would help reduce American dependence on foreign oil and simultaneously reduce the amount of carbon dioxide that is annually pumped into the atmosphere and minimize related environmental damages associated with fossil fuel consumption. The drawback of this plan is that increased government spending on an unproven technology would likely be highly unpopular in the current economic climate, especially considering that the US is currently dealing with a ballooning government deficit.

#### *Minimize Legal Barriers to Offshore Wind Farm Development*

Certainly the most significant hindrance to offshore wind farm development thus far has been various legal barriers to project approvals. Currently, any proposed offshore wind project has to get approval from fifteen distinct federal organizations, all within a complicated bureaucratic process. However, Congress could specifically dictate a smaller number of organizations from which an offshore wind project must receive approval, such as the US Army Corps of Engineers and the EPA. Doing this would streamline the entire application process, and would remove much of the ambiguity surrounding the approval of such projects, making it much easier for proposals to be accepted.

#### *Outlaw Offshore Wind Farms in America*

Conversely, Congress could decide to side with waterfront landowners and shipping industry leaders in the US by imposing a **moratorium** on future construction of offshore wind farms. Already a very restricted practice, this strategy is essentially the next step towards limiting further offshore wind farm construction, and would likely be very contentious. Any concerns about oceanfront views or shipping lanes being obstructed by wind farms would be completely alleviated. However, the United States would eliminate an environmentally clean and potentially very large part of its future energy picture and thus would be forced to find other sources of clean energy to make up for this deficit in the future.

**moratorium**—a temporary prohibition of an activity or policy.

### **Questions a Bill Should Address**

A successful bill will unambiguously dictate the role that the United States Congress thinks the energy obtained from offshore wind farms should play in the United States' energy future. Important questions include: With such long shorelines in the United States, how large a role can and should offshore wind farms play in energy production moving forward? Should the US use European wind farms as a model in developing its own wind farm policy? Do the energy and environ-

mental benefits of offshore wind outweigh the negative aesthetic consequences and inconveniences to the shipping industry? Are there substantial environmental risks and damages associated with the technology, and if so, do they offset any environmental damage averted by the decreased use of fossil fuels as a source of energy?

## Summary and Conclusion

After just over two decades of resounding success in Europe and other regions around the globe, offshore wind energy is at a critical juncture in the United States. The potential for energy production from this technology is enormous in the truest sense of the word, as the US possesses far more miles of available coastline than all of Europe combined. However, even with the recent approval of the nation's first offshore wind farm in Nantucket Sound, the technology still faces significant legislative, legal, and financial barriers to a broader implementation. By enacting legislation to eliminate many of the barriers the red tape that have stunted wind farm development to this point or by increasing funding and government support of wind farm technology research, Congress could go a long way to helping ensure a sustainable energy future for America. Alternatively, Congress could protect the numerous interest groups that have so vehemently opposed offshore wind farms and erect prohibitive legislation to future projects. Either way, America's energy future is to a large extent in the hands of the United States Congress.

## Bibliography

Alok, Jha. "UK overtakes Denmark as world's biggest offshore wind generator," October 21, 2008, *The Guardian*, accessed July 21<sup>st</sup>, 2011. <<http://www.guardian.co.uk/environment/2008/oct/21/windpower-renewableenergy1>>.

Baker, David R., "Offshore windmills hold clean-energy promise," August 3, 2009, *San Francisco Chronicle*, accessed August 3<sup>rd</sup>, 2011, <[http://www.principlepowerinc.com/news/articles/sfChronicle\\_090803.pdf](http://www.principlepowerinc.com/news/articles/sfChronicle_090803.pdf)>.

Environmental and Energy Study Institute, "Offshore Wind Energy," October 2010, accessed July 21, 2011. <[http://www.eesi.org/files/offshore\\_wind\\_101310.pdf](http://www.eesi.org/files/offshore_wind_101310.pdf)>.

"How Wind Turbines Work." Cape Wind: America's First Offshore Wind Farm, accessed July 27, 2011, <<http://www.capewind.org/>>

[article19.htm](#)>.

Power-Gen Worldwide, “China powers up first offshore wind farm,” June 8, 2010, accessed July 29<sup>th</sup>, 2011, <[http://www.powergenworldwide.com/index/display/articledisplay/9522709653/articles/powergenworldwide/renewables/wind/2010/07/china-powers\\_up\\_first.html](http://www.powergenworldwide.com/index/display/articledisplay/9522709653/articles/powergenworldwide/renewables/wind/2010/07/china-powers_up_first.html)>.

RenewableUK, “Offshore Wind Farms,” accessed July 23, 2011, <<http://www.bwea.com/ukwed/offshore.asp>>.

The British Wind Energy Association, “Offshore Wind,” 2005, accessed August 4, 2011, <<http://www.bwea.com/pdf/briefings/offshore-2005.pdf>>.

U.S. Department of Energy, “Creating an Offshore Wind Industry in the United States: A Strategic Work Plan for the United States Department of Energy, Fiscal Years 2011-2015,” September 2, 2010, Office of Energy Efficiency and Renewable Energy, Wind & Water Power Program, accessed July 24, 2011, <[http://www.windpoweringamerica.gov/pdfs/offshore/offshore\\_wind\\_strategic\\_plan.pdf](http://www.windpoweringamerica.gov/pdfs/offshore/offshore_wind_strategic_plan.pdf)>.

U.S. Department of Energy, “20% Wind Energy by 2030: Increasing Wind Energy’s Contribution to U.S. Electricity Supply.” July 2008. pp. 16 and 49. <[http://www1.eere.energy.gov/windandhydro/wind\\_2030.html](http://www1.eere.energy.gov/windandhydro/wind_2030.html) (accessed August 2, 2011)>.

U.S. Offshore Wind Collaborative, “U.S. Offshore Wind: A Path Forward,” October 2009, accessed July 24, 2011, <<http://www.usowc.org/pdfs/PathForwardfinal.pdf>>.