NRDC ISSUE PAPER

FEBRUARY 2013
IP:13-01-A

Fulfilling the Promise of U.S. Offshore Wind: Targeted State Investment Policies to Put an Abundant Renewable Resource within Reach

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Acknowledgments

Many thanks to Doug Pfeister of the Offshore Wind Development Coalition; Jérôme Guillet of Green Giraffe Energy Bankers; Fraser Johnston of Bloomberg New Energy Finance; Tony Muoser of Rabobank; and Brandi Colander, Kit Kennedy, Cai Steger, George Peridas, and Carlita Salazar of Natural Resources Defense Council for their assistance in preparing this paper. All errors and omissions are my own.

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BACKGROUND AND EXECUTIVE SUMMARY: THE PROMISE AND FAILURE OF U.S. OFFSHORE WIND

Offshore wind holds great promise. An inexhaustible resource lies just off our shores. The U.S. Department of Energy's (DOE) landmark study, *20% Wind Energy by 2030: Increasing Wind Energy's Contribution to U.S. Electricity Supply,* found that the United States could obtain 20 percent of its electricity from wind by 2030, and more than 15 percent of that wind power could come from offshore projects, totaling 54,000 megawatts (MW) of generating capacity.[1]

The benefits are manifold, especially on the East Coast where, from Virginia to Maine, the offshore wind potential is more than 1 million MW,[2] political and popular support for renewable energy is strong (as evidenced by the enactment of renewable portfolio standard (RPS) laws from Maryland to Maine), and electricity prices are highest in the continental United States. The benefits include:

- Electric supply delivered *directly* to the coastal cities, where prices are highest (thereby lowering the cost of any necessary subsidy), demand is greatest, and generation and transmission siting are the most challenging
- Diminished need for onshore long-distance transmission lines
- Lower electricity prices due to displacement of the highest-cost fossil fuel generators
- Improved energy security through diversification of transmission and supply
- Creation of a brand-new industry and substantial supply chain, which can assist in revitalizing manufacturing, growing the economy, and creating jobs[3]
- Satisfaction of state renewable electricity standards
- Health benefits from decreased fossil fuel generation
- Aggressive combat of climate change

Despite these benefits, today, *exactly zero* MW of offshore wind capacity are installed or even under construction in the United States, with only three projects in advanced stages of development: Cape Wind in Nantucket Sound (468 MW), Deepwater Wind off Block Island, Rhode Island (30 MW), and Fishermen's Energy near Atlantic City, New Jersey (25 MW). The first has long-term supply contracts, called Power Purchase Agreements (PPAs), for approximately 75 percent of its energy, the second has a PPA for all of its output, and the third is awaiting a decision from the New Jersey Board of Public Utilities on whether the project should be awarded Offshore Wind Renewable Energy Certificates (ORECs) under New Jersey's centralized procurement program.

Compare this with the rest of the world, particularly in Europe, where offshore wind has been spinning for more than 20 years. According to the European Wind Energy Association, by the end of 2012, Europe had an installed capacity of 4,995 MW distributed among 55 offshore wind farms in 10 countries, including 1,165 MW of capacity installed in 2012 alone.[4] In Asia, China was forecast to have commissioned approximately 295 MW of offshore wind by year end 2012, and Japan has deployed demonstration turbines.[5] In sum, offshore wind is becoming increasingly mainstream and mature in other countries.

So, what is going wrong? Why is investment flowing in other places but not here? Enormous improvements have been made on siting and permitting, such that they are not the main bottlenecks. As discussed in detail in the National Wildlife Federation's recent report on offshore wind, these impediments are being overcome as overlapping governmental entities have begun working together.[6] But there remain fundamental challenges ahead. The underlying limiting factor for offshore wind, a factor not found in places where the sector has advanced, is that the basic economic and financial conditions for offshore wind success are not in place. Without them, investors are not comfortable providing capital for these projects, and the sector inevitably will struggle to get off the ground.

Federal incentives in the form of tax credits and accelerated depreciation are a vital part of creating these conditions, and the recent extension of these benefits by Congress is welcome news.[7] But federal support, while necessary, has so far not been sufficient. For investment to flow to the offshore wind sector, states also must implement policies that ensure that projects have: (1) certainty that they will receive sufficient revenues for the energy, capacity, and other attributes they generate, and (2) sufficient access to affordable debt capital at a time when the capacity of private sector banks to fund large projects is limited.

The good news is that the emerging, state-led U.S. offshore wind policy model contains the building blocks to satisfy these conditions. The United States has a successful track record of deploying massive amounts of capital into onshore wind, cultivated by supportive policies like state renewable portfolio standards and federal tax credits. But we can learn from Germany, which, up until recently, had difficulty attracting offshore wind investment relative to neighbors like Denmark, Belgium, and the United Kingdom.

Frustrated by the lack of completed projects, yet convinced of the potential of offshore wind, Germany tweaked its initially unsuccessful offshore wind investment policies in the recent past and investment started to flow. The United States can do the same. Germany successfully addressed the revenue problem by revising its rules to ensure that any qualifying offshore wind project is entitled to a long-term tariff that is sufficient to attract investment, but it did so in a way that also ensures that the public (ratepayers and taxpayers) get maximum value for their money. Germany also reduced the cost and increased the availability of debt capital by creating an innovative program whereby a public bank will match the debt provided by private banks, ensuring that projects will go forward and lowering the overall financing costs.

Why should we feel confident that this strategy will work in the United States? States routinely benefit from the experience of other states and countries that have faced similar challenges about what does and does not work in attracting investment to new sectors, such as the offshore wind sector. While it is true that every policy must be adapted to local conditions, it is also true that investors do not substantively change their investment requirements when they invest in a new jurisdiction. On the contrary, investors look for places to make investments that have policy conditions that are as close as possible to those where they have successfully invested in the past. So, whatever the differences in form among different countries or states, successful offshore wind policies *must be similar in function to attract similar types and levels of private investment.*

The polices that Germany put in place to unlock offshore wind are instructive to U.S. states because they are designed to attract—and are attracting—the same investors that the states want to attract: commercial banks and project developers. It is these investors that finance, build, own and/or operate power plants in coastal states, so policies must be designed to fit requirements of this market while minimizing impacts on ratepayers. The German story is not a fairy tale, however. After perfecting its investment policies to stimulate an unprecedented level of domestic offshore wind financing in 2011, major failures in transmission policy resulted in a lackluster 2012. This paper focuses on the German policy successes and the lessons they present for the United States and also briefly examines the very unsuccessful German approach to transmission as a cautionary tale that should not be replicated in the United States.

In sum, the United States can quickly tap into this unparalleled resource if we take the lead by: (1) ensuring revenue certainty through strategically refining the innovative Offshore Wind Renewable Energy Certificate (OREC) programs, such as those adopted in New Jersey, and under consideration in Maryland, and (2) leveraging the resources of commercial banks to make available sufficient levels of low-cost debt available through co-lending programs. Supportive federal policy such as the investment tax credit and accelerated depreciation also play a vital role. However, a solid state-level framework that supports financing is a necessary condition to truly launch the sector.

PART I. REVENUE CERTAINTY

PHOTO: DANISHWINDINDUSTRYASSOCIATION/FLICKR

A. The German Program: Flexible Tariffs that Combine Revenue Certainty with Consumer Price Protection

In 2000, under the Renewable Energy Sources Act (RESA), Germany put in place a feed-in tariff for renewable energy technologies.[8] In the years that followed, despite the fact that feed-in tariffs are popular with investors due to their simplicity and revenue certainty, Germany was still lagging behind the United Kingdom (UK), Denmark, and the Netherlands in offshore wind deployment. With only 200 MW installed by the end of 2010, Germany had also failed to meet the targets set by the German government in 2002: 500 MW by 2006 and between 2,000 and 3,000 MW by 2010.[9] Projects were being developed, but many were not able to cross the finish line. According to market participants, some of this was due to a lack of experience of project developers who underestimated some of the challenges these complex projects present, but there were also clear policy shortfalls.

In 2008, Germany amended the RESA in an effort to stimulate the sector. Under the 2008 law, if a project was approved by the German Federal Maritime Agency, and commissioned prior to January 1, 2016, it would be entitled to receive a uniform tariff of €150 per megawatt hour (MWh) for the first 12 years and with market pricing for a further eight years.[10] The tariff price is based on the government's analysis of the all-in costs for offshore wind with adjustments for water depth and distance. There are many good things about the original 2008 RESA framework. Since the tariff was established by law, there is the maximum legal certainty. Demand for energy from offshore winds projects is also guaranteed by the law's requirement that grid operators purchase all of an offshore wind farm's output, except in limited circumstances.[11] Since the law authorizes grid operators to ultimately recover their costs from the retail customers, the risk of nonpayment, or "credit risk," is low.[12]

Despite these strengths, in 2010, offshore wind market participants reported that the 2008 German feed-in tariff did not provide sufficient revenue certainty.[13] To address this issue, Germany adjusted the RESA in 2010 to provide an option for developers to increase equity rates of return by accepting front-loaded payments. Instead of 150 €/MWh for the first 12 years (with extensions for distance and depth), projects can now opt for the "compression model" which pays a tariff of 190 €/MWh for the first eight years (with extensions for distance and depth).[14] Under both options, the feed-in tariff is phased out at the end of the initial period and projects are entitled to receive the market price for energy for the remainder of the 20-year term. From a consumer protection perspective, the 2010 RESA improves upon its predecessor by including a provision that regularly ratchets down the payments by 7 percent per year beginning in 2018 for projects commissioned that year or later.[15] This is necessary to avoid over-rewarding developers, since as more projects are deployed, the cost of each additional project tends to decline, all other things being equal.

The compression model should be of interest to U.S. states looking to optimize their support for offshore wind since it boosts returns for developers and increases the ability of projects to access debt finance (a concept commonly known as "bankability") while simultaneously reducing costs to consumers. This is effective first because front-loading payments give investors more income sooner, which translates into an increase in their internal rates of return—Bloomberg New Energy Finance estimates increases of 200 basis points (2 percent) or more.[16] Second, if the compression model is structured like the RESA to include a smaller *total* payment than the standard tariff, it saves consumers money because less cash is paid out over the project's lifetime.[17] Third, front-loaded revenues mean that projects will be able to repay project finance loans more quickly, which should increase the willingness of banks to lend.[18]

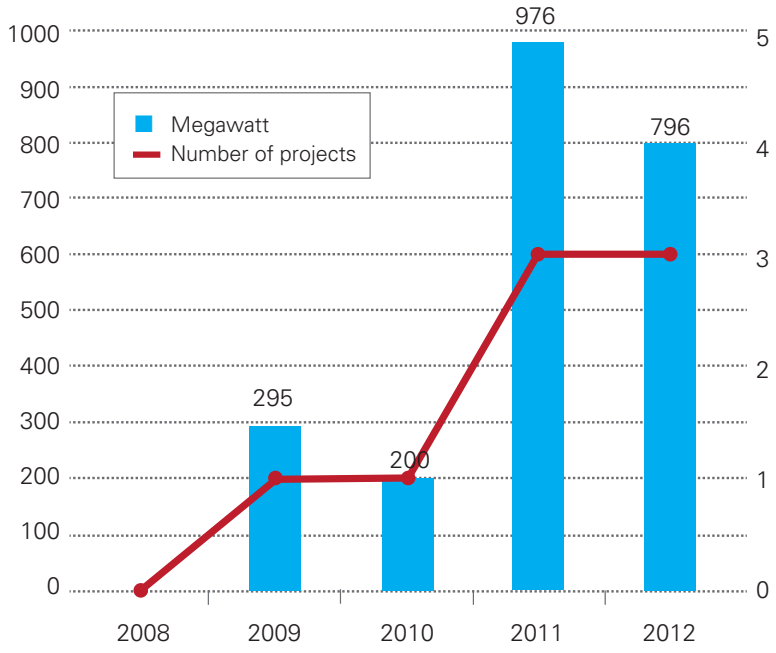
By mid 2011, the tariff was in place, and the German offshore wind sector began to take off with 976 MW of new offshore wind construction being financed in 2011 and 796 MW in 2012, up from 488 MW in 2010 and 0 MW in 2008 (see figure 1).[19]

Lessons learned from the German approach to revenue certainty

We can derive multiple lessons for the United States from the German approach ensuring sufficient revenue certainty:

- Enact laws creating long-term tariffs for maximum regulatory certainty, but with a clear path to cost control for projects of later vintages since costs will likely decline in future years.
- Account for varying degrees of difficulty, such as depth and distance from shore, when setting the tariff, since these factors increase project costs.
- Optimize the price paid for energy by offering different tariff payment schedules to meet the needs of diverse equity investors and the preferences of lenders, thereby maximizing available financing and minimizing financing costs.

Figure 1. German Offshore Wind Farms Financed: 2008 to 2012*



Source: Bloomberg New Energy Finance

*Figures combine wind farms financed "on balance sheet" and "project financed." For projects disaggregated by type of financing, see figure 2 below.

Transmission: The Achilles' Heel of the German System

The RESA places the obligation to build and finance transmission on grid operators, a policy which is designed to reduce capital costs by up to 20 percent. However, in practice this policy has become the major bottleneck in the system[a]

The RESA reduces the capital requirements of offshore wind projects by shifting the obligation to build and finance transmission required to connect projects to the grid to grid operators. Unfortunately, under this structure, connecting projects has proven to be the major bottleneck in deploying offshore wind farms in Germany with year-plus delays expected.[b] Utilities have blamed delays on sluggish permitting and problems in acquiring cables and transformer stations.[c] Grid operators have complained that they have difficulty financing the required investments because the return on the investment is recovered from ratepayers over several decades. Market participants with whom we have spoken also indicate that, beyond the finger-pointing, engineering firms in fact underestimated the technical challenges with trying to build multiple grid connections in a short time while grid operators underestimated the costs. Both utilities and grid operators are seeking changes in the law, and the uncertainty has caused the German offshore wind sector to lose the momentum it gained in 2011 because even though projects can be financed, without transmission, it is impossible to know when they will be built and this has the effect of deterring investment. In late November 2012, the Bundestag passed a new law that seeks to address the issues causing delays and industry analysts were optimistic that it would work.[d] Overall, the situation is a cautionary tale—it shows that even with the right economic and financing policies in place, the offshore wind sector can be stymied by the wrong polices on transmission.

The Emerging U.S. Transmission Model has Advantages over Germany's

Most projects in development in the United States are expected to pay the costs of transmission themselves. This increases the amount of capital that developers must raise, but because there is a single point of responsibility for both the wind farm and the related transmission, the United States should avoid the problems being experienced in Germany. A possible alternative in the medium term is the prospect of the build-out of the Atlantic Wind Connection (AWC), an undersea high voltage transmission line that would be able to connect offshore projects from Virginia to New York. The AWC is being developed as an independent project and has been granted the ability to recover its costs from ratepayers.[e] The AWC also will potentially streamline the transmission infrastructure and minimize the environmental footprint when compared to projects simply "going their own way."

[a] A.C. Levitt et al. "Pricing offshore wind power." *Energy Policy.* http://www.ceoe.udel.edu/windpower/resources/Levitt,etal-Pricingoffshorewind.PDF

[b] Blau, John. "TenneT Unable to Complete German Offshore Transmission Project Under Current Regulations, Requests Extension." *Renewable Energy World.* http://www.renewableenergyworld.com/rea/news/article/2011/11/tennet-unable-to-complete-german-offshore-transmission-project-under-current-regulations-requests-extension

[c] Nicola, Stephan. "German Offshore Wind-Energy Delays Threaten Energy Overhaul." *Bloomberg.* http://www.bloomberg.com/news/2012-02-20/german-offshore-wind-energy-delays-threaten-energy-plan-overhaul.html

[d] Sophia von Waldow. "Will Germany's new offshore wind liability law end its costly transmission delays?" *Bloomberg New Energy Finance.* http://www.bnef.com

[e] For information on the AWC from its developers, see http://atlanticwindconnection.com

B. Revenue Certainty American-Style: Refining the Emerging Offshore Wind Renewable Energy Certificate (OREC) Programs

European-style feed-in tariffs can provide investors with revenue certainty but have never gained wide acceptance in the United States. Most states have adopted RPS laws, which require utilities to acquire a certain percentage of renewable energy represented by "green attributes" but do not specify a price for renewable energy or attributes, leaving it to negotiation by the parties on a case-by-case basis.[20] New Jersey and Maryland are pursuing an approach to attracting offshore wind that tries to create revenue certainty by building on the classic RPS approach. Governor Chris Christie of New Jersey signed the Offshore Wind Economic Development Act in 2010, and in 2012, the Maryland House of Delegates passed Governor Martin O'Malley's Offshore Wind Energy Act of 2012, but the state's Senate Finance Committee failed to bring it to a vote.[21]

As noted, the states' respective RPS laws require that a specific percentage of electricity sales come from renewable energy. The new offshore wind programs make offshore wind technology a "carve out" or "set-aside" from the general RPS obligation—meaning that a specified portion of RPS renewable energy purchases must come from offshore wind. The attributes of this energy are represented by Offshore Renewable Energy Certificates called "ORECs." This provision guarantees a minimum offshore wind market size.

Unlike offshore wind initiatives in other states such as Massachusetts and Rhode Island, the OREC approach does not require utilities to directly procure renewable energy from offshore wind projects through PPAs. This process, while it has achieved some success in Massachusetts and Rhode Island, typically results in protracted negotiations around a single project. Instead, the innovative OREC programs use centralized procurement through the state's energy regulating agency—in New Jersey, the Board of Public Utilities (BPU), and in Maryland, the Public Service Commission (PSC). By making ORECs available to qualified offshore wind projects, multiple projects can be procured simultaneously or in close proximity. States like New York and countries like Brazil have successfully utilized centralized procurement of renewable energy and it has been cost effective when compared with decentralized programs.[22] Crucially, this should permit these states to build out pipelines of offshore wind projects, more easily than with PPAs with separate buyers. This distinction is an important one as the high levels of job creation, domestic manufacturing, and economic development—in other words, the real American offshore wind industry that all policy leaders are seeking—will only materialize when a number of OREC commitments are made, both in the present and in the years going forward.

Projects wishing to qualify for the program must submit a proposed OREC price and all project details, including the project's internal rate of return, to the agency. The agency, after completing its review, including a detailed cost-benefit

analysis, can accept the proposed OREC price or offer a new one, which the project may accept or reject. The Maryland bill includes a cap to the cost of the program as an additional ratepayer protection.[23]

Once a project is operating, each MWh of electricity it generates is represented by an OREC, which the project must sell to a clearinghouse established by the state energy regulator to facilitate transactions between offshore wind projects and RPS-regulated electric suppliers. On the one hand, the clearinghouse buys ORECs from offshore wind projects with cash paid in by suppliers through customer bill charges. On the other, it sells the ORECs generated by the projects to the suppliers, thereby enabling them to meet their offshore wind RPS obligations. Offshore wind projects must pay to the clearinghouse all market revenue for the energy, capacity, and other attributes they generate. If the market price is higher than the OREC price, the laws require that any excess revenue be refunded to ratepayers. This mechanism allows offshore wind projects to obtain revenue certainty while guaranteeing that any excess economic benefits are returned to the public as a rebate.

This innovative framework is potentially very powerful, but it has not yet been implemented in an actual project in any state. New Jersey pioneered the idea and garnered positive reaction from the industry and supporters of offshore wind in 2010 when it enacted its Offshore Wind Economic Development Act. However, at the date of this publication, the BPU has yet to release final regulations, so the program has not sparked development. As discussed earlier, the Maryland legislation received positive reviews from industry and environmental groups but has not yet been brought to a vote by the state Senate Finance Committee. At the date of this publication, Senate President Thomas V. Mike Miller was optimistic about bringing the bill to a vote during the first 2013 session.[24]

PHOTO: NHD-INFO/FLICKR

C. Stacking the OREC Program Up Against the German Approach to Revenue Certainty

While it is critical to flesh out the details, the OREC approach has the potential to approximate most of the positive aspects of the German model and even improve on it in the area of cost control:

- ***Revenue certainty:*** An OREC program achieves revenue certainty and price stability comparable to a feed-in tariff by including specific statutory provisions in the law requiring that the tariff is valid for a term of years and at a level sufficient to support equity returns on investment and bank finance.
- ***Creditworthiness:*** To approximate the low credit risk of a feed-in tariff, OREC programs must design OREC clearinghouses to have sufficient security to support bank financing. To be "bankable" the clearinghouse must be structured so that in the event of a payment default by a regulated electric supplier (because of bankruptcy or otherwise) there is a clear way for the offshore wind project and its lenders to recover any missed payments and not lose future income. The clearinghouse must also be protected from the state diverting the OREC funds to other purposes.[25] A possible solution to the first problem is the inclusion of a cash cushion in the form of a reserve account that would pay offshore wind projects in the event of a payment default. The initial proposal in New Jersey—to have the clearinghouse hold funds sufficient to pay two months' worth of aggregate OREC purchases—is a good start. Alternatively, in the event of a shortfall, offshore wind projects could be allowed to retain the revenue earned in the marketplace of the regional transmission operator, such as the PJM Interconnection. Ensuring that the clearinghouse structure is fully integrated into PJM credit, clearing, settlement, and dispute resolution procedures could be another, since the PJM system is well understood by market participants and banks.
- ***Consumer protection:*** The OREC system has the merit of having a mechanism that refunds money to ratepayers if the market value of the energy produced by the offshore wind farm exceeds the OREC price. No such mechanism exists in the German system and this is a considerable strength of the OREC model.
- ***Tariff optimization:*** In terms of flexibility to customize the tariff to account for depth, distance from shore, and the risk preferences of different investors, the OREC approach could be superior to the German approach. Because OREC prices are unique to a project, the tariff is never one-size-fits-all, even for projects of the same vintage. The states should also consider permitting a "compressed" tariff similar to the German program, since it would attract additional developers whose equity investors require shorter payback periods, and permit more rapid repayment of loans, thereby facilitating bank lending and saving the ratepayers money if offered at a discount.

Bundling Leases with Revenues: How to Simplify and Streamline Offshore Wind Development

The German system ensures a revenue stream for a fully permitted offshore wind farm. In the United States, however, there is a risk that one developer could win a federal lease auction and secure the necessary permits for an offshore wind farm, while another developer with designs on the same physical location could win a revenue award from a state, thereby splitting the bundle of rights necessary to execute a project. This is a significant stumbling block. But New York State may have found a way to ensure this does not happen through a unique partnership among the Long Island Power Authority (LIPA), the New York Power Authority (NYPA) and the utility Consolidated Edison of New York (Con Ed) called the Long Island-New York City Offshore Wind Collaborative (the Collaborative). The Collaborative was formed to apply for and secure a federal lease and then issue a Request for Proposals (RFP) that puts together the federal lease with a long-term stream of energy payments from the Collaborative, both of which would be awarded to the winning bidder. By ensuring that the lease and the stream of payments go the same entity, bidders face much less uncertainty regarding the possible success or failure of their bid. When uncertainty is reduced, projects become less risky, which translates into lower bidding prices and, ultimately, lower costs to consumers. In September 2011, the Collaborative applied to the Bureau of Ocean Energy Management (BOEM) for a lease, competition for which is unlikely because the Collaborative has signaled the above process. In January 2013, BOEM issued a request to determine whether there is in fact competitive interest, so the actual market test could be forthcoming.[a]

[a] "USA: BOEM to Determine Interest in Wind Energy Development Offshore New York." *Offshore Wind Biz.* http://www.offshorewind.biz/2013/01/04/usa-boem-to-determine-interest-in-wind-energy-development-offshore-new-york/?utm_source=Offshore+Wind.biz&utm_medium=email&utm_campaign=5a57f599ba-RSS_EMAIL_CAMPAIGN.

PART II: ACCESS TO AFFORDABLE DEBT CAPITAL

A. Germany Keeps the Supply of Financing Up and the Costs of Financing Down with a Co-Lending Program

The availability of bank financing is critical to the development of the offshore wind business in Germany and the United States. This is in contrast to the United Kingdom, where the majority of existing offshore wind farms has been financed by the utilities that own them.[26] Utilities have the ability to raise low-cost capital "on balance sheet" (i.e. based the value of a portfolio of their assets) and generally do not need to use more expensive and inflexible "project finance." In a project financing, lenders agree to lend generally 60 to 80 percent of total capital costs directly to a special purpose company specifically created to build, own, and operate the offshore wind farm and to only seek repayment from the cash flows that the project itself generates, not from cash flows generated by a broader portfolio of assets. If the project for any reason cannot pay its debts, the lenders in a project financing generally do not have recourse to the project's owners and only enforce their collateral and sell or operate the project.

In Germany and other leading offshore wind countries, such as Belgium and Denmark, project finance has been critical and it is expected to play a larger role all over Europe (including the United Kingdom) in the future, with Bloomberg reporting over €1 billion in offshore wind project finance debt having closed during the first half of 2012, compared with zero balance sheet financing during the same period.[27] In the United States, project financing will also be the dominant means of financing offshore wind because most utilities on the East Coast do not own generation assets but purchase the bulk of their energy under contracts with independent power producers (IPPs) that typically use project finance. All of the advanced stage offshore wind projects in the United States are being developed by IPPs, presumably on a project-finance basis.

Yet project financing can be a problem. In 2010, KPMG surveyed market participants on key obstacles to the implementation of offshore wind in Germany and 76 percent cited the availability of debt financing as the main barrier.[28] Since the same banks are financing wind on both sides of the Atlantic, this problem will be exacerbated by U.S. projects entering the financing market. Countries and sectors compete with each other for scarce bank financing and, according to a recent paper by Bloomberg New Energy Finance, since the 2008 financial crisis only one financed offshore wind project has gone forward in Europe without the participation of one or more of the government-owned lenders that typically provide or guarantee at least half of the debt.[29] For example, in the two project financings that closed in Europe in 2011, lenders owned by governments provided 50 percent or more of the total debt.[30]

The European banking crisis has become the "new normal" and directly restricts lending, including project finance lending.[31] As a result, banks may limit their exposure per transaction and to the offshore wind sector generally to €100 to €150 million per year in one to three offshore wind deals, or approximately €50 million per project.[32] Banking regulatory changes known as "Basel III" are expected to further reduce the availability of project finance in the future.[33] Leading financial advisory firm Green Giraffe Energy Bankers (GGEB) estimates that 20 to 30 banks are "currently open" to financing offshore wind today, although only about 12 are experienced and active, for a total of €2 billion in commitments from commercial banks per year.[34] According to GGEB, debt funding is available among the existing government and private lenders in Europe for four to six industrial-size (400 MW) projects per year. A hypothetical 400 MW project with costs of US$5,500 per kW (€4,150) has total project costs in excess of US$2.2 billion. Assuming 70 percent of the cost of a project is financed by debt from ten commercial lenders, the project might only be able to source $657 million (the equivalent of €500 million) or about 43 percent of the debt portion, leaving a significant senior debt shortfall. Or, alternatively, even if some of the marginal banks are willing to lend the project additional money, the lack of alternative sources of financing enable such banks to impose onerous and expensive terms. At best, these terms make the energy the hypothetical project sells more expensive. At worst, they may make the project uneconomical and unable to go forward.

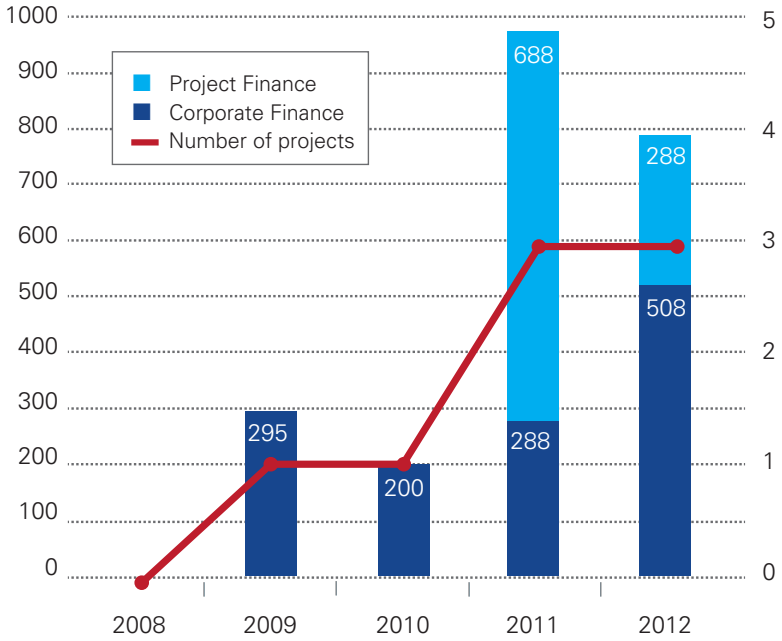
Germany recognized this dynamic and in 2011 it created the KfW Offshore Wind Energy Program. It is a "co-lending" program in which the government lends alongside commercial banks, supplementing and leveraging and not replacing private lending activity. Its main features are as follows:

- Government-owned lender KfW (Kreditanstalt für Wiederaufbau) provides debt capital to up to 10 offshore wind projects on a first-come, first-served basis.[35]
- The funds are only available with a match from commercial banks—KfW can lend up to 50 percent of the total debt portion, and total debt can equal up to 70 perecnt of the total financing. Under another option in the program, KfW indirectly finances a project by providing a low-cost loan to one or more commercial banks which then on-lend the funds to the offshore wind project.[36]
- KfW does not lend on preferential terms, but on the same terms as commercial banks (e.g., same interest rates and repayment periods).
- The program has been a success. In 2011, its first full year, the program lent a total of $753.4 million (€522.8 million) to the two projects that were project financed that year.[37] More generally, project financed projects are a critical component of Germany's deployment of offshore wind, comprising 52 percent of the offshore wind capacity financed in Germany during the period from 2009 through 2012 (see figure 2).

Lessons learned from the KfW program:

- ***Debt capacity is the name of the game:*** Revenue certainty is not enough in the face of stressed and changing project finance lending markets. To get deals done, government-owned lenders must partner with commercial banks.
- ***No government guarantees required:*** With a co-lending program, offshore wind projects can be financed without government loan guarantees, which means that taxpayers are not required to assume risks for commercial banks to get deals done.
- ***A rising tide lifts all boats***: Leveraging the private debt markets benefits borrowers, banks, and consumers. The co-lending model does not distort the bank market by "crowding out" private lenders but increases its capacity. By allowing more projects to be built, co-lending stretches the limited funds available in the commercial bank market, provides diversification opportunities for the most active banks, and encourages developers to increase their development pipeline, all of which advance renewable energy policy goals.
- ***Public infrastructure banks are profitable and self-sustaining:*** Under the offshore wind program, KfW is not permitted to take any terms less favorable than those given the banks, including the interest rate. A similar program in a U.S. state could follow this model or offer better terms for its portion of the loan which will further lower energy costs. Since a government-owned lender will have lower costs of borrowing than commercial banks, it can expect to earn profits even when charging

Figure 2. German Offshore Wind Farms Financed, 2008 to 2012



Source: Bloomberg New Energy Finance

a lower interest rate, which benefits taxpayers while lowering costs for ratepayers. This is true in the United States as well as in Germany: the U.S. infrastructure lender Overseas Private Investment Corporation (OPIC) has been profitable every year since its founding in 1969.[38]

B. The United States Must Ensure Access to Sufficient Amounts of Affordable Debt Capital if Offshore Wind is to Deploy at Scale

All of the advanced stage offshore wind projects in the United States are being developed by IPPs, presumably on a project-finance basis. European banks have been the main source of project finance in the United States, so the banking crisis and the regulatory changes directly impact project finance capacity here.[39] Since most U.S. banks do not participate in the project-finance market, it is unlikely that the commercial bank capital pool will materially increase for U.S. offshore wind projects.

A public co-lending program is necessary to the fill the gap. Given the political vulnerabilities of the loan guarantee program of the U.S. Department of Energy (DOE), no large public renewable energy lender exists in the United States. Some of the most important European government-owned lenders, such as the European Investment Bank (EIB), are not authorized to lend in the United States. Others are able to lend here but only to pay for equipment manufactured in the lender's country of origin. Such lenders, like Danish export credit agency EKF, are eager to lend (or provide loan guarantees) to finance turbines manufactured by national champions such as Siemens or Vestas to increase Danish exports in accordance with EKF's charter. However, to qualify for such funding would mean that the lion's share of turbine manufacturing would have to be done outside of the United States, which will undermine the economic development potential from a domestic supply chain and therefore also political support.

C. Facilitating Offshore Wind Financing through State Green Banks

A KfW-like program is necessary, desirable, and feasible here, but what form should it take? A new federal green bank—like the Clean Energy Deployment Administration (CEDA), proposed in the U.S. Congress in 2010—could play the role of a KfW but that would require federal legislation and in all likelihood, additional federal spending, an unlikely outcome in the current and near-term political climate.[40] Another option would be to expand the mandate of an Export-Import Bank of the United States (Eximbank) or the Overseas Private Investment Corporation (OPIC) to play this role—each has a proven record of profitable and successful lending to the energy sector, and it takes no leap of logic to see that supporting offshore wind domestically will make exports possible. However, legislative changes would likely be required, and even such a "win-win" economic development and renewable energy proposition faces significant hurdles in Washington, D.C.; an easier path may lie in comprehensive programs at the state level.

A state or state instrumentality could fund an offshore wind program by issuing bonds, repurposing existing funds, or both to help finance a limited amount of initial projects, just as the KfW program does. This could be done under the auspices of a public private financing institution that focuses on clean energy, colloquially called a "green bank." Because of their low cost of capital, these entities can work creatively in partnership with private banks to deliver lower blended cost loans and increase the overall capital pool, allowing lenders to diversify across projects and more deals to be done. In 2011, Connecticut launched the first green bank and several other states have similar entities under active consideration.[41] In January 2013, New York's Governor Cuomo announced a new, potentially game-changing green bank in New York that will have an initial capitalization of US$1 billion.[42] *It would be a powerful market precedent if the New York Collaborative mentioned earlier—LIPA, NYPA, and Con Ed—were able to bundle New York green bank anchor financing together with lease and power purchase agreements and then competitively bid the entire package. This combination of revenue certainty, site control, and anchor financing would likely produce very competitive bids and low costs of delivered energy.*

The co-lending model minimizes political, technological, and economic risks. First, there are no losses from the subsidy, since the government's lower cost of capital means it can lend at a lower cost than private banks and still make a profit. Second, the repaid principal fees and interest earned by the green bank can be recycled and lent out again in a virtuous cycle. Third, the program is insulated from critics who insist that private lenders are not at risk since no government guarantees are given and private lenders have "skin in the game." Finally, the commercial banks' stringent due diligence and structuring requirements mitigate the technology and other risks.

A lower interest rate and a longer tenor provided by a green bank co-lending program will have the impact of reducing the cost of energy generated by an offshore wind farm. However, it is important to note that even if a co-lending program were to lend on the same terms as the commercial banks (as is the case in the KfW program), the total financing costs would likely be lower than if the green bank financing were provided by commercial banks. This is because in the absence of the program and assuming, realistically, that there is a limited amount of private capital available at a given price, the hypothetical offshore wind borrower would have to pay more to entice additional private banks to enter the deal. Once the borrower makes such concessions to new lenders, it is obliged to extend the same deal to the existing ones, increasing overall costs. By contrast, with a government-owned bank providing matching funds as an anchor, the borrower has increased bargaining power vis-à-vis the banks, which lowers overall financing costs.

CONCLUSION AND TAKE-AWAYS

More than 20 years after Europe started building offshore wind farms, the United States is on the verge of getting serious about implementing policies that will exploit this vast renewable resource at its doorstep. Germany is an example of a country that has taken those steps with a feed-in tariff achieving revenue certainty and KfW program for improving access to debt financing. In the United States, states should craft functionally similar solutions that unleash the American offshore wind energy potential and deliver transformative environmental and economic benefits.

The way forward for U.S. states seeking to reap the benefits of offshore wind is clear: put in place targeted investment polices that provide the revenue certainty and debt capacity necessary to make projects viable and attractive to the equity and debt investors that comprise the sector.

First, ensure revenue certainty by building on the demonstrated success of RPS programs with OREC programs that:

- **Create secure revenue streams** (consisting of environmental attribute payments plus compensation for energy or other products) without market risk during a period long enough to support debt and equity investment (15 to 20 years, optimally, but 12 years minimum).
- **Protect consumers** by creating a mechanism that refunds money to ratepayers if the market value of the energy produced by the offshore wind farm exceeds the OREC price.
- **Adjust each offshore project's OREC payment to account for varying degrees of complexity** as measured by depth and distance from shore, since these factors are the main drivers in project costs. A one-size-fits-all approach risks underpaying some projects and overpaying others.
- **Optimize the price paid for energy** by offering different OREC disbursement schedules to meet the needs of diverse equity investors and the preferences of lenders, thereby maximizing available financing and minimizing financing costs. For example, some investors may accept smaller total amounts if payments are made over a shorter period.
- **Make OREC clearinghouse structures "bankable"** by endowing them with sufficient collateral to support their obligations to pay for the ORECs that they purchase from projects and ensuring that collateral and other funds of the clearinghouse are permanently segregated from general funds.

Second, ensure the sufficiency of affordable debt capital by building on the demonstrated success in Europe in financing offshore wind by creating co-lending programs, possibly through state "green banks" that:

- **Offer debt capital to a specified number of offshore wind projects** to provide evidence that the state is making a commitment to ensuring projects are completed.
- **Create effective partnerships with commercial banks** in which the banks are not "crowded out" but take the lead in structuring the financing and share the risks equally with the green bank.
- **Use the government's low cost of borrowing as an anchor of the debt financing** which will reduce the financing costs of a project and, ultimately, the delivered cost of electricity.

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