Collaborative Procurement of Offshore Wind Energy

A Buyers Network: Assessment of Merits and Approaches

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Summary[2]

This report, prepared by Clean Energy States Alliance (CESA) on behalf of the Offshore Wind Accelerator Project (OWAP)[3], examines and evaluates the issues, merits, and approaches relative to aggregated offshore wind energy (OSW) procurement, implemented through a "buyers network." The primary purpose of the report is to assess if, and to what degree, a buyers network that allows creditworthy off-takers to collectively procure large volumes of energy generated from OSW could lower the cost of offshore wind.

With this report, CESA hopes to encourage the use of a collaborative procurement approach to accelerate the deployment of OSW in the United States. To that end, the report addresses (a) the benefits of a buyers network, including its potential effect in reducing the cost of OSW; (b) financial tools that can be used by the network to address OSW financing challenges; (c) potential approaches to implementing such a network; and (d) recommendations for the design of an effective procurement process.

The concept of a buyers network is that collaboration among creditworthy purchasers to collectively procure OSW energy will support economies of scale from a larger project(s) that, in turn, will reduce project capital and transaction costs. Further, a network will result in a strong and diversified portfolio of off-takers to reduce credit risk, increase lender and investor confidence, and lead to a lower cost of capital for a project. These factors will assist in driving down the cost for OSW and encourage more rapid development of the industry in the U.S.

The report confirms the value of a buyers network, finding that a network has the potential to reduce the levelized cost of energy (LCOE) for OSW by approximately $35/MWh. In addition, if a network can access low-cost debt in the form of taxable or tax-exempt bonds, the LCOE for OSW could be further reduced by as much as $20/MWh. That is, the potential effect of a buyers network and use of low-cost financing could achieve reductions in the LCOE for OSW energy of an estimated $55/MWh. Furthermore, the ability to use federal investment tax credits (ITC) could result in an additional $50/MWh reduction in LCOE as compared to use of the production tax credit (PTC). Both tax credits are currently set to expire at the end of 2012, though efforts are underway in Congress to extend them.

In summary, the report confirms the value of aggregated procurement in achieving significant cost reductions for OSW. The analysis indicates that the combination of aggregated procurement, low-cost financing, and use of the ITC could result in an expected LCOE for OSW of $95 MWh (median value–with a range from $85-$120 MWh).[4]

Findings

The major findings of the report are:

1. A buyers network can be organized as a consortium of creditworthy purchasers that enter into long-term contracts (power purchase agreements or PPAs) with a developer for a project's full capacity. Use of a buyers network provides the opportunity to streamline procurement with standardized solicitation documents, a uniform bid review process, and common PPA terms. This approach also allows power purchasers such as governmental entities, municipal and investor-owned utilities and others to limit their exposure to a particular project in their power purchase portfolio. Because the network's solicitation process approach will be competitive, it will allow for government purchasers that are subject to competitive procurement regulations, such as the Department of Defense (DOD), to participate and allow the network to drive contract terms.

2. Aggregation by a buyers network can reduce the LCOE for OSW due to reduction in capital costs from economies of scale; amortization of fixed costs, such as transmission lines over larger wind farms; lower construction costs resulting from efficiencies due to experience; and reduced concentration of risk and a subsequent reduction in capital costs.

3. A probabilistic analysis performed by Pace Global finds that a procurement network could benefit ratepayers over the life of the aggregated projects through a potential reduction in the LCOE of OSW by approximately $35/MWh in comparison to no aggregation (disbursed purchases), and an additional $20/MWh with use of low-cost debt financing (such as bond financing). (See Appendix A for Pace Global's full analysis.) That is, the potential effect of a buyers network and use of low-cost financing could achieve reductions of an estimated $55/MWh.

4. The analysis also finds that the continued availability of ITCs could result in an additional $30-50/MWh reduction in LCOE for OSW as compared to use of the federal production tax credits. This is because OSW, in contrast to onshore wind, has a higher capital cost as compared to its total production, and the ITC therefore provides OSW with a comparatively greater benefit than the PTC.

5. The combination of the use of aggregated procurement, low-cost debt financing, and the ITC could result in an estimated OSW LCOE of $95/MWh (median) (with the probable range estimated from a low of $85/MWh to a high of $120/MWh).

6. A network can take advantage of innovative, effective financing tools that could result in lower-cost debt cost. For example, if the network includes municipal utilities, municipalities that have elected community choice aggregation, and/or state power authorities, those entities can sell tax-exempt bonds and use the proceeds to prepay for their power purchase as a mechanism for financing all or a part of a project.

7. A network will allow for the creation of a diverse procurement portfolio that includes predominantly long-term contracts but may allow some purchasers to use shorter con-tracts (while some purchasers will be able to get internal approval for 20-year contracts, some will not). In particular, for reasons discussed below, this structure may allow the Department of Defense (DOD) (and other federal agencies) to participate in the aggregated procurement effort because it will produce a more competitive price and provide a structure under which the DOD may be able to limit its purchase to a 10-year term. DOD and other governmental entities are beneficial to the network because they are retail rather than wholesale buyers. In general, the use of longer-term purchases will provide lower per-MWh pricing.

8. The Economy Act (31 USC 1355) allows non-DOD federal facilities to piggyback on DOD contracts using this authority, although contract terms for those agencies must be consistent with applicable provisions of the Federal Acquisition Regulations (FAR) and the Defense Federal Acquisition Regulations (DFAR). Therefore, a buyers network that satisfies DOD requirements is likely to work for the General Services Agency (GSA) and other federal agencies. Long-term contracts provide federal agencies with the best opportunity to minimize renewable power price premiums.

9. A network will result in reduction in the transaction costs associated with administration and procurement as compared to individual, dispersed procurement.

10. Off-takers can implement a network through a range of informal to formal structures. For example, a pilot project could be implemented through an informal consortium using an existing agency or organization as the lead entity. Alternatively, a non-profit organization could be formed to conduct procurement and could organize bond financing through existing agencies (for tax-exempt or taxable bonds) or a special purpose issuer for taxable bonds. Furthermore, a multi-state power authority could act both as a financing agency and as a direct power purchaser, but its formation could take several years and state legislation. Therefore, it is recommended that the buyers network start by working through an existing lead agency or forming a non-profit organization to act as a lead agency as an initial approach for aggregation, while at the same time considering the creation of a multiple-state power authority for future aggregated procurement efforts.

11. There are merits to implementing an initial pilot project at medium scale (around 50 MW in capacity) to demonstrate the benefits of aggregated procurement. While full construction economies of scale would not be achieved at this capacity level, this scale should achieve financing efficiencies and will pave the way to larger cost savings for future projects. A pilot project could be a smaller initial phase of a larger aggregated procurement or a separate development.

Representative analysis performed by Pace Global examined the total costs of a pilot project as compared to a full-scale development project, both with and without the benefits of an operational pilot project. The analysis indicates that a pilot project could reduce the LCOE of future, full-scale OSW projects by approximately $20/MWh. These savings opportunities would only be fully realized if the scale of the full project was 200 MW or larger. Additional long-term savings would depend on the scale of future developments—the larger the capacity of the full-scale OSW project ultimately developed, the greater the savings attributable to the pilot project. For example, by applying the $20/MWh savings to future full scale deployments, the estimated savings attributable to the initial pilot project over a 20-year PPA would reach $2.4 billion, with a cumulative capacity of 2000 MW.

Recommendations

Based on the report's analysis, CESA has developed several recommendations for organizing and implementing a collaborative buyers network.

Please Note: CESA's recommendations are preliminary only, not listed in necessary chronological order, and designed to provide a starting point for dialogue in advancing future action in implementing a network initiative. The recommendations also will need to be tailored to the meet the energy needs, goals, and regulatory requirements of interested network participants.[5]

1. Conduct strategically planned outreach and briefing of key leaders and potential participants to explain the economic and business proposition of the network and collaborative procurement concept.

2. Recruit potentially interested state entities and agencies, municipalities, DOD, GSA, and other off-takers to determine interest in an initial pilot project to demonstrate the economic value of a collaborative procurement mechanism.

3. Form a procurement entity to enable coordination among the interested network participants to implement a pilot project. The entity could take the form of a procurement consortium or specially formed non-profit agency that includes investor-owned and publicly owned utilities that procure power, state and federal entities that procure power, and/or major end-user customers.

4. Develop a memorandum of understanding among the consortium participants, or use non-profit organization bylaws, to govern the responsibilities and commitments of the participants and the structure of the consortium.

5. Identify or form a consortium administrator to manage the process and ensure effective participant input early in and throughout the procurement process.

6. In implementing the network, seek a structure that avoids required legislative or regulatory changes in state and federal jurisdictions in which there are entities interested in participating in the network. Alternatively, identify manageable regulatory or legislative changes that could substantially expand participation in the consortium.

7. Work with key federal officials at DOD, Department of Energy (DOE), GSA, Department of Interior (DOI), Office of Management and Budget (OMB), etc. to determine how to make the network consistent with FAR and DFAR.

8. Retain financial and legal advisors to assist in developing recommendations for establishing the most pragmatic procurement entity, procurement process, term sheet, and supporting documents based on the regulatory and energy procurement needs of the consortium participants.

9. Conduct discussions with the financial community and OSW developers to determine their interest in and recommendations for the enterprise.

10. Employ financial measures to allow the consortium (and selected project developers) to access low-cost debt, state financial incentives, and federal incentives.

11. Develop and administer a joint Request for Proposals (RFP) and bid evaluation process that meets all participants' governing procurement rules. The joint RFP should include several elements:

- A request for OSW projects that provide a competitive all-in delivered price
- A request for a detailed explanation of how the OSW project will provide benefits to the region to be served
- Flexibility with regard to terms such as contract length, project location (although deliverability to the initial purchasers should be required), and energy products to be delivered (energy only or renewable energy certificates (RECs), capacity or other ancillary services or environmental attributes). The flexibility would allow for the opportunity to consider a broader range of proposals that can be tailored to the needs and requirements of a larger subset of the buyers network
- A form of PPA.

12. Evaluate and select bids pursuant to the joint RFP evaluation criteria, and finalize contract terms based on the PPA issued with the RFP. Technical analysis of proposals should be performed collectively by the buyers network. Buyers should be allowed to participate in the technical analysis if so desired.

I. Introduction

Offshore wind presents the United States with one of its most significant renewable energy resources, with a near-term potential to transform the energy portfolio of the Atlantic states, create a new industry sector, meet state renewable energy policy goals, and reduce carbon emissions at a significant scale. Offshore wind is a very large resource that is accessible to major U.S. load centers, reducing transmission investment costs. It can be deployed now, poses minimal environmental risk, and has great potential for achieving cost reductions to achieve competitiveness with other energy resources.

The Department of Energy is pursuing a national work plan to deploy 10 gigawatts (GW) of offshore wind capacity by 2020 and 54 GW by 2030. Development at this scale and time-frame would generate investments for significant manufacturing and project deployment. It is estimated that 6.6 GW of OSW capacity would reduce carbon emissions by 16 million tons—equivalent to taking 3 million cars off the road.[6]

Despite this vast potential, the progress to date on OSW development in the U.S. has been slow. Today, several barriers face OSW deployment in the U.S, including fragmented and uncertain demand, high upfront costs, lack of a domestic supply chain, regulatory delays, and high financing costs. As the OSW industry grows through increased demand, deployment at scale, and decreases in equipment costs, the cost of OSW energy will decrease as it has for land-based wind energy and solar PV energy.

To drive down costs in the near-term, the use of aggregated procurement through a buyers network can help to overcome these major barriers and scale up OSW deployment sooner. By organizing interested off-takers, a collaborative network can reduce transaction costs, reduce capital costs, lower the cost of financing, and reduce the LCOE for OSW. By leveraging investments from creditworthy public and private entities, tapping public-sector financing tools and incentives, and reducing procurement transaction costs, all network participants will benefit from reduced OSW costs, while developers will benefit from reduced financing costs and increased economies of scale associated with a maturing domestic supply chain.

This report analyzes and describes (a) the benefits of a buyers network with a focus on its potential effect in reducing the LCOE for OSW, (b) various approaches to implementing such a network, (c) financial tools that could be used by the network to address OSW financing challenges, and (d) recommendations for the design and implementation of an effective procurement process.

Market Demand Challenge

States today are driving the demand for OSW energy. Many of the Atlantic coast states have adopted mandatory renewable portfolio standards (RPS) that create a growing demand for renewable energy. However, these states face the challenge of leveraging the renewable energy demand into regional and local economic development without imposing high costs on ratepayers. Since offshore wind is the largest clean energy resource close to the Atlantic coast states, it makes sense for this region to focus on meeting RPS requirements with offshore wind as it can be deployed at scale within the region and drive local and regional economic development.

However, the RPS market for renewable energy certificates (RECs) alone is insufficient to create an offshore wind industry. The current REC market price is much lower than the REC price that offshore wind project developers need to make projects economically viable. Yet, potential exists for greater levels of support as states adopt Offshore Wind Renewable Energy-specific RPS tiers (OSW set-asides) with associated higher alternative compliance payment levels that will translate into higher Offshore Renewable Energy Certificate (OREC) pricing (states also can use REC multipliers to support OSW).

On the buy-side, utilities seeking to minimize their RPS compliance costs will purchase RECs under a mix of long-, medium- and short-term contract structures, with 2-3 year terms the most common. They often avoid paying the prevailing market or spot price for much of their volume, seeking rather to pay less per REC under forward purchase agreements for the majority of their compliance volume.

In addition, utilities and power marketers selling electricity in competitive markets do not generally take long-term positions (by entering long-term contracts) in the REC market. Instead, utilities and power marketers usually make short- to mid-term overlapping REC purchases with the aim of minimizing compliance-year short positions that would require heavy spot market participation.

The shorter-term perspectives of the utilities and other load serving entities, and the market power they wield regarding REC off-take and current REC pricing, does not match the financing needs of offshore wind projects. To raise project financing, a project developer needs reasonably long-term contracts, covering a substantial proportion of the output of a large-scale offshore wind farm, such that the wind farm's revenues from energy and OREC sales and sales of other ancillary services provide adequate coverage for its debt and operating costs. In sum, the current market for offshore wind energy and RECs does not serve the needs of project financing.

One important solution to this market failure is a "market maker," i.e., an entity that can bridge the gap between purchasers and sellers. A market maker with strong support from a few anchor purchasers can aggregate demand for power and the future OREC needs of a broad spectrum of government, utility, and large-user purchasers to support project financing.

Using a market maker also provides the opportunity to streamline offshore wind procurement with standardized solicitation documents, and a uniform bid review process and PPA terms. The market maker's solicitation also can be competitive to allow government purchasers that are subject to competitive procurement regulations to participate.

An effective approach to creating this market maker is by establishing a "buyers network" (formal or informal) that can undertake collaborative purchases of OSW. Such a network would allow creditworthy purchasers to collectively procure a sufficiently large volume of OSW and RECs to support economies of scale from a larger project that will, in turn, reduce installed capital and transaction costs for the project.

Further, the network can result in a strong and diversified portfolio of off-takers to reduce credit risk, increase lender and investor confidence, and result in a lower cost of capital for a project. These factors combined will assist in driving down the LCOE for OSW and encourage more rapid development of the industry in the United States.

II. Benefits of Collaborative Offshore Wind Energy Procurement

Reduction in Levelized Cost of Energy

Clean Energy States Alliance retained an independent financial consultant, Pace Global, to analyze the economic merits of a buyers network, particularly with regard to its potential effect on the LCOE of OSW. Pace Global performed a probabilistic analysis to quantify the expected range of beneficial cost effects that collaborative procurement might have on OSW. It then quantified the probabilistic range of expected LCOE on OSW, both with and without a buyers network. It further quantified the range of expected LCOE assuming a buyers network and use of low-cost debt financing, such as bonds.

Pace Global also assessed how the LCOE for OSW would be reduced with and without the use of the ITC (in comparison to the use of a PTC), and in conjunction with aggregated procurement and low-cost debt. Finally, Pace Global evaluated the benefits of using a pilot project to test the value of aggregated procurement and, in turn, how this would translate into cost savings for future projects. The following is a detailed summary of the Pace Global analysis and its findings. The full analysis is provided in Appendix A.

The analysis was performed on the basis of LCOE, and it evaluated how aggregated procurement and use of low-cost debt financing would reduce LCOE for OSW. LCOE is defined as the all-in cost to develop and generate electricity for the defined lifetime of a project. It is expressed in terms of dollars per MWh. This metric quantifies the LCOE without defining the exact size of the project, and also allows for the direct comparison of LCOE between competing generation projects and technologies. For this analysis, the LCOE for OSW included the benefit of tax incentives, but did not include the benefit of renewable energy credits.

The key drivers of LCOE for OSW and the positive effects of a collaborative procurement on LCOE are presented in Exhibit 1. The two prominent drivers that benefit from aggregated procurement are the installed cost of capital expenditure and the cost of capital. Additionally, access to low-cost financing, such as tax-exempt or taxable bonds, can help lower the cost of debt and the overall Weighted Average Cost of Capital (WACC).

Exhibit 1: LCOE Drivers and Aggregated Procurement Impacts

	Assumption	Definition	Aggregated Procurement Implications	Assumption Range for Dispersed Projects	Assumption Range for Aggregated Projects	Assumption Range for Aggregated Projects w/ Low-Cost Debt
Project Cost and Investment Assumptions	**Weighted Average Cost of Capital – WACC** **(%)**	For energy projects, the WACC is driven by the equity return requirements of the strategic and tax investors, the cost of the debt, and the total leverage.	- Good credit rating of off takers - Public entity access to low-cost capital - Revenue profile of project (good wind resource, power and incentives value) Diversified wind resource risk will likely yield a more advantageous combination of lower coverage ratios and higher out-puts recognized for financing.	9% to 12% based on: -pre-tax equity returns: 14-18% - cost of debt: 7-8% - leverage: 50-80%	8% to 9% based on: - pre-tax equity returns: 12%-16% - cost of debt: 6.5%-7.5% - leverage: 70%-80%	5.5% to 6.5% based on: - pre-tax equity returns: 12-16% - cost of debt: 3-4% - leverage: 70-80%
	Installed Cost ($/kW)	Installed cost represents the total cost of equipment, construction, labor and development costs and is based on nameplate capacity of the project.	Larger projects offer economies of scale, including equipment buying power (reduces costs), construction cost efficiencies, and transaction cost efficiencies.	$4,500/kW to $6,500/kW (project size <500MW)	$4,000/kW to $6,000/kW (project size > 1GW)	

	Tax Abatement	Tax incentives available to OSW are expected to include the PTC and Modified Accelerated Cost Recovery System (MACRS) depreciation. LCOE deducts these incentives from total project cost.	There are no direct impacts to the applicability of tax abatement incentives under aggregated procurement; however, sizable tax investor(s) will be required to monetize these benefits.	For the baseline analysis, it is assumed that the PTC will eventually be extended and the ITC for wind will not. Due to the higher capital costs for offshore wind relative to onshore wind, the 30% ITC would be much more advantageous for off shore wind projects. A second analysis was performed that illustrates the impacts that the availability of the ITC would have on LCOE for aggregated OSW projects.	
	Fixed O&M Cost ($/kW-year)	Fixed O&M costs cover routine maintenance and labor.	Allocation of fixed costs for maintenance will benefit from a larger project.	$90-$95/kW	$85-$90/kW
	Net Capacity Factor (%)	Represents the ratio of actual production sent to the grid over the potential production based on nameplate capacity.	The capacity factor of the aggregated system will likely be slightly higher, but the marginal improvements in capacity factor are overshadowed by the overall project uncertainty.	30% to 40%	30% to 40%

Source: Pace Global

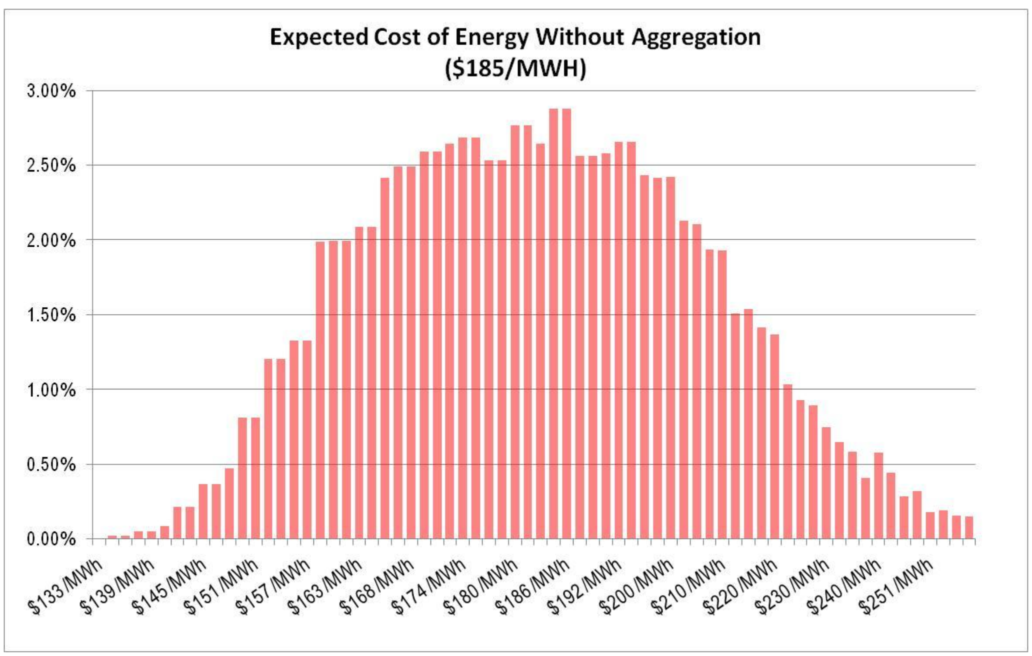
Note: Development costs are included in the installed cost and financing costs are factored into the levelized cost calculations through the WACC assumption.

With aggregation, a number of tangible benefits are realized:

1. Reduction in capital costs from procuring a very large numbers of turbines, procuring large numbers of foundations and electrical gear
2. Amortization of project installation fixed costs over a larger number of turbines
3. Amortization of sub-sea cable installation costs over a larger number of turbines
4. Reduction of capital costs as a result of decreased risk concentration (operational, credit, and, potentially, resource)
5. Reduction in fixed costs of operations

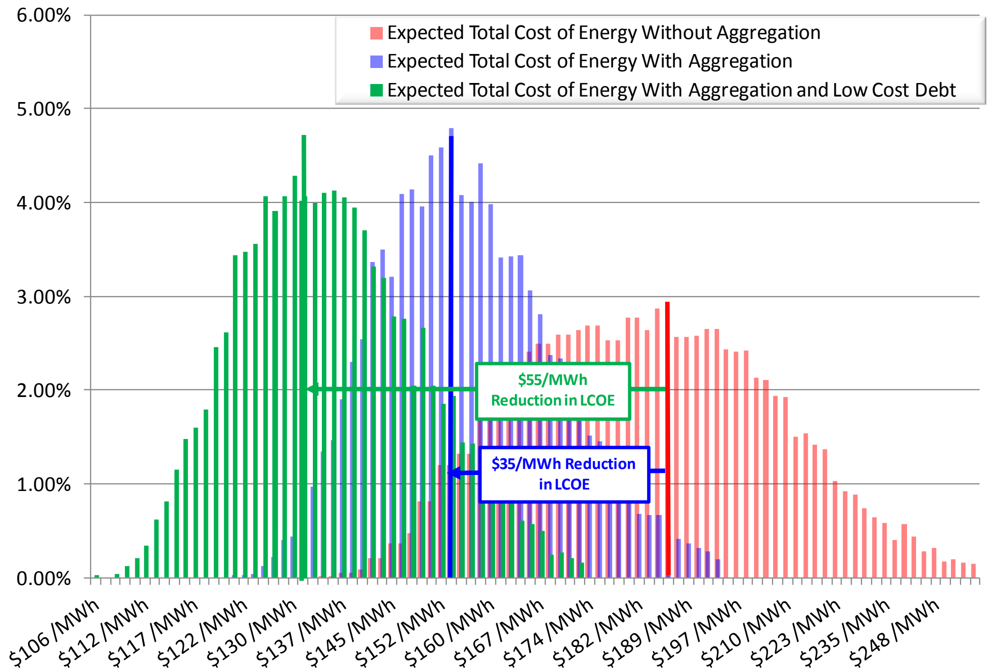
The range of expected LCOEs for a project that has not benefited from aggregation is presented in Exhibit 2. A comparison of the potential LCOEs for aggregated and non-aggregated projects is presented in Exhibit 3, including a scenario in which aggregation is combined with low-cost debt financing.

Exhibit 2: Range of OSW LCOE without Aggregated Procurement Benefits



Source: Pace Global

Exhibit 3: Comparison of OSW LCOE with and without Aggregated Procurement Benefits

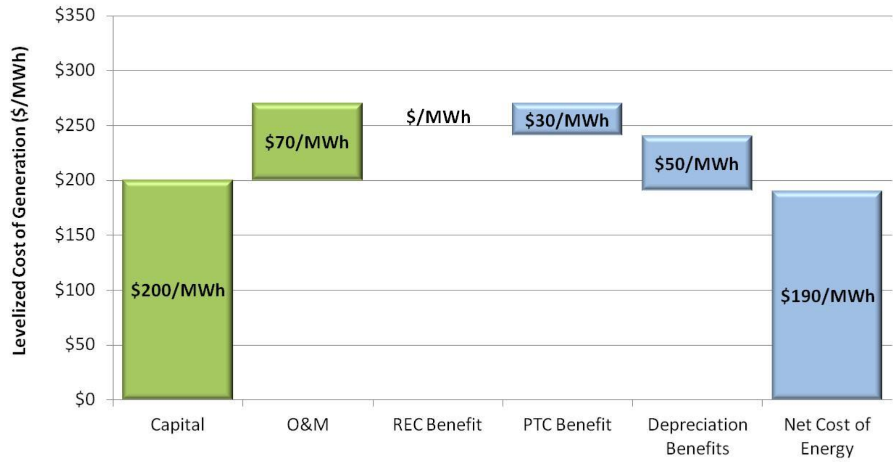


Source: Pace Global

As these exhibits show, a buyers network has the potential to reduce the cost of energy from OSW projects by approximately $35/MWh. In addition, if the network can access low-cost debt in the form of bonds, the cost of energy could be further reduced by approximately $20/MWh. The potential effect of a buyers network and use of low-cost financing could achieve reductions in offshore wind cost of energy of an estimated $55/MWh.

It is important to note the following: while the analysis finds that the benefit to purchasers over the life of the aggregated projects is a significant reduction in the LCOE, how these savings are allocated to the project depends on the required cost of energy for the off-taker. In the example shown in Exhibit 4 below, the net cost of OSW energy is $190/MWh. This total cost of OSW can be apportioned between the energy off-taker and the entity with the REC requirement. In this example, if the value of the energy were $60/MWh, then the value of the REC would need to be $130/MWh. Under the aggregated procurement scenario, the REC price has the potential to drop to less than $90/MWh, and with use of low-cost debt financing, to less than $70/MWh.

Exhibit 4: Breakdown of LCOE of Energy for Offshore Wind Project



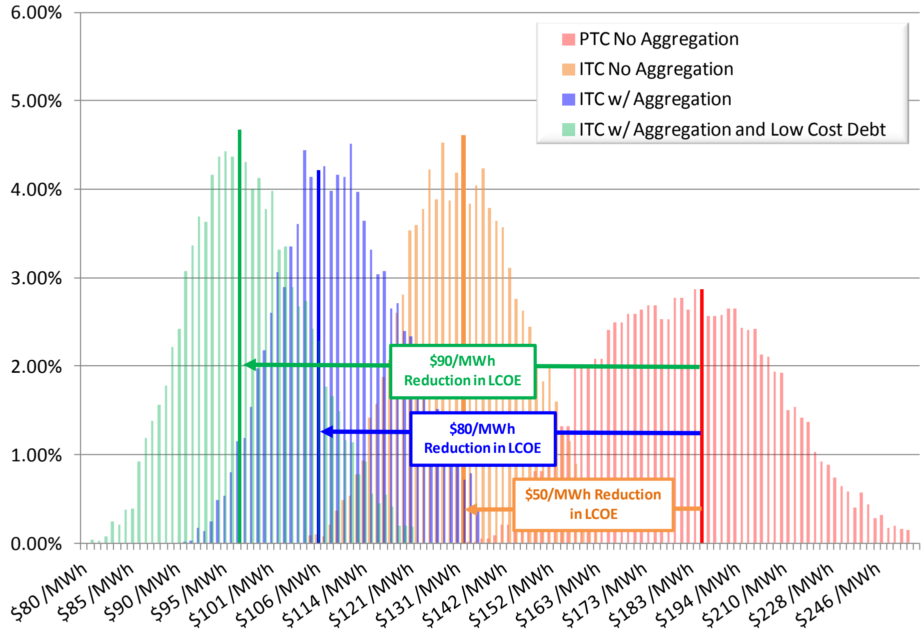
Source: Pace Global

It also should be noted that while other factors, such as RECs, will affect the price of OSW, the aggregated demand approach for OSW is likely to result in lower investment costs that could save $200 million for every 100 MW of OSW installed under a collaborative procurement initiative.

Effect of ITC versus PTC on LCOE

Analysis was also performed to determine how the use of federal tax credits will affect the LCOE, with and without aggregation and use of low-cost debt. Both the PTC and ITC have driven significant growth in renewable energy over the past decade or so. Onshore wind has been eligible for, and generally has realized, greater financial benefits from the use of the PTC. At this time, the PTC and ITC (for wind) are set to expire at the end of 2012; if Congress does not pass legislation to extend the PTC and ITC, wind projects not operational by the end of the year will no longer be eligible for these tax credits. Solar photovoltaic (PV) projects, with comparably higher capital costs, are eligible for and benefit more from the ITC, which is set to expire at the end of 2016 (for solar generation). Although onshore wind has traditionally used the PTC, the cost profile of OSW is much closer to that of solar PV in that it has a higher capital cost as compared to its total production. For this reason, OSW receives more benefit from the ITC as a federal incentive. Specifically, the Pace Global analysis indicates that the ability to use the ITC for OSW could result in an additional $50/MWh reduction in LCOE as illustrated in Exhibit 5.

Exhibit 5: Comparison of Aggregated and Non-Aggregated OSW LCOE with and without ITC Benefits



		No Aggre-gation	w/ Aggre-gation	w/ Aggregation and Low-Cost Debt
PTC	**Median**	$185	$150	$130
	Range	$135-$250	$120-$195	$105-$175
ITC	**Median**	$135	$105	$95
	Range	$110-$160	$95-$135	$85-$120

Source: Pace Global

Summary of Economic Benefits from Aggregation, Low-Cost Debt, and ITC

In conclusion, the Pace Global analysis confirms the value of aggregated procurement in achieving significant cost reductions for OSW. According to its assessment, the combination of aggregated procurement, low-cost financing, and use of the ITC could result in an expected cost of energy for OSW of $95 MWh (median value), with a range estimated from a low of $85/MWh to a high of $120/MWh.

Other Benefits of Aggregated Procurement

In addition to the economic benefits of collaborative procurement on LCOE, there are many other benefits of such collaboration. These include:

1. Deploying a buyers network will create a diverse procurement portfolio that includes predominantly long-term contracts but may allow some purchasers to use shorter contracts (while some buyers will not be able to get internal approval for 20-year contracts, others will). The use of longer-term purchases, in turn, will provide lower per MWh pricing.[7]

2. A buyers network will result in a greater reduction in the transaction costs associated with administration and procurement as compared to individual, dispersed procurement. There are considerable transaction costs involved in conducting competitive bid processes and developing PPAs for renewable energy, and these may be increased somewhat for OSW due to its current status as a newly emerging industry in the U.S. Allocating an individual buyer's internal resources to research and negotiate a fair contract for an offshore wind purchase can be expensive because learning about an unfamiliar technology takes time and effort.

   By using a network, the costs of implementing an effective solicitation and developing a standardized PPA can be reduced significantly for all the parties involved. The collaborative network administrator will save participating buyers significant administrative costs and time. In addition, the network can overcome the informational barriers and limited resource capacity that face individual buyers (especially public agencies) and often prevent the use of innovative financing approaches.[8]

3. Tax credit programs at the federal level are a critical factor for a nascent technology sector like OSW. These programs have a dual impact: reduced capital costs through direct application of the credit and reduced cost of financing because the amount to be financed is lower. The level of available credits authorized currently by Congress reduces LCOE by approximately 35%. As the Pace Global analysis shows, the continuation of the federal ITC is a significant factor in the cost of OSW. The establishment of the network can lend support to federal renewal of an ITC, resulting in substantial price reductions for OSW.

4. A network approach likely will result in more favorable contract terms and associated reduction of risks due to the negotiating leverage of multiple purchasers working together and aided by expert assistance to address financing, regulatory, and other OSW-related issues. The network administrator would review the network's proposed form of PPA with the purchasers, include it in the RFP, and lead negotiations with one or more highly ranked bidders, to achieve more favorable contract terms for the buyers than they would otherwise receive.

5. A network will facilitate increased economic development and supply chain economies of scale benefits. Uncoordinated procurement results in offshore wind development occurring in fits and starts. Boom and bust cycles of demand are inefficient for manufacturers and drive up project costs. However, a network can stage its power procurement solicitations and PPAs to send a steady demand signal and promote the efficient development of a regional offshore wind industry supply chain. Steady, predictable, long-term demand is the key to attracting manufacturers to establish production facilities locally along the Atlantic coast. Research also suggests that industry will respond competitively to serve a predictable demand and, in an effort to save logistics and labor expenses, some manufacturers may move production from Europe to the Atlantic Coast.[9]

6. A network will have better leverage over wind developers' selection of suppliers. The network's bid ranking criteria also may be able to provide a preference to bids that use locally manufactured components and services, as a way to accelerate the formation of a regional offshore wind industry cluster. Such a regional industry cluster will, over time, provide the innovation, economies of scale and logistics savings that will drive down the cost of offshore wind energy.

7. A network is capable of using innovative, effective financing tools that can result in lower costs and more certainty for project developers, with associated benefits to off-takers. These tools are discussed in the next section.

III. Financing Tools

Aggregating long-term PPAs from creditworthy entities for most or all of the output of an offshore wind project(s) will provide a solid basis for financing, allowing for use of a number of financing structures. On the assumption that the PTC and/or ITC will be available to reduce the capital cost of an OSW project, those structures must accommodate a combination of bond debt and equity investment from investors eligible to receive federal tax benefits. At least three types of structures would suit these needs:

- **Traditional project financing**. Traditional project financing typically involves a special purpose entity formed by the developer to borrow the debt portion of the financing, based on the expected revenues from power and OREC sales. The credit strength of the off-takers (along with steps taken to manage typical project risks) determines the effective cost of the debt. The debt could come through the issuance of bonds at rates that currently compare favorably to bank debt. An OSW project is not directly eligible for tax-exempt financing under IRS rules, but could make use of taxable municipal bonds issued through an unregistered offering (such as an offering under Rule 144A under the Securities Act of 1933). The municipal bond market has a long history of providing financing for infrastructure projects undertaken on a public-private partnership basis (using the credit strength of a public off-taker) and should accommodate an offering for an OSW project. Such financing would also incorporate developer equity and equity from tax investors who benefit from the ITC and accelerated depreciation available to the project. The latter investment would be incorporated through one of several typical mechanisms such as a partnership flip, inverted lease, or leveraged lease structure.

- **Traditional taxable utility project**. Traditional utility project finance structures involve a consortium of owners of a project, each of whom owns an undivided interest in the project, takes direct advantage of the tax benefits, and brings its own financing to its portion of the project. The strength of the power purchase agreements makes these projects acceptable to utilities, and they issue their own bonds directly on their own credit. The utility as direct owner is eligible for the ITC and depreciation. Most of the states in New England and the mid-Atlantic regions have deregulated electric generation, and new generation investments would be made by deregulated affiliates, rather than included in the rate base, which may make this option less attractive (in contrast to the Southeast states where OSW project investment by utilities could be rate-based).

- **Tax exempt bond financing**. Municipal utilities, community choice aggregators, and state or regional power authorities that sell power directly or indirectly to the public can issue tax-exempt bonds and use the proceeds of the bonds to prepay for the power output of a project. The issuance of the bonds thus indirectly provides funds for construction. Repayment of these bonds is made directly by the power purchasers and the repayment obligation is independent of project risks. Tax investors invest the balance of funds as equity through structures similar to traditional project financing. In addition, non-governmental power purchasers can use taxable bonds to make equivalent prepayments, although this may or may not achieve less substantial savings than tax-exempt borrowing.

In principle, two or more of these approaches could be combined to fund portions of a single OSW project. For example, a project developer could enter into prepaid power purchases funded with tax-exempt bonds with eligible purchasers for a portion of the output of its project, and separately enter into traditional PPAs and OREC sales agreements with other off-takers. The developer would receive direct prepayments from the former and borrow the proceeds of other taxable bonds, based on project revenues expected from the latter.

In addition to the debt financing mechanisms discussed above, many of the Atlantic Coast states that are likely to participate in the network have established robust state clean energy funds, supported by system benefit charges, RGGI auction revenues, and/or other funding sources (e.g., NYSERDA, Massachusetts Clean Energy Center, Maryland Strategic Energy Investment Fund, Efficiency Maine Trust, etc). These state programs offer significant support for renewable energy in the form of grants, loans, loan guarantees, equity investments, and business support. Today, much of the state-based renewable energy funding is dedicated to solar PV. However, most of the programs have significant autonomy to revise the focus of their program offerings in terms of financial support and technology priorities. Therefore, the network could work with participating states to recommend use of state clean energy fund programs to provide increased support to offshore wind projects selected by the network, in the form of loans, equity investments, loan loss reserves, interest buy-downs, and/or other credit enhancements.

IV. Creating an Effective Buyers Network

An effective procurement network depends on assembling a coalition of power buyers from among a variety of diverse entities, including wholesale buyers such as investor-owned utilities, municipal utilities and power authorities, and large retail customers (such as state and federal agencies and large private commercial and institutional customers).These potential customers face different energy regulatory regimes, different incentives for the use of renewable energy and different procurement requirements. The central task of a buyers network is to run a procurement process that conforms to the requirements imposed on (or by) each of the participants, using documents that have identical core business terms but that fit the regulatory and other requirements of the participants. Accordingly, the primary requirement for a buyers network is to have an effective administrator with a dedicated or collectively underwritten funding source to carry out procurement activities and represent the interests of the buyers in the development and financing of one or more projects.

The power to issue municipal bonds could be a desirable feature of a buyers network entity (but not a necessary feature, since the network entity can take advantage of taxable bond finance—with today's favorable rates—as an alternative to tax-exempt bonds). Such an entity could facilitate a prepayment structure, or, if it had appropriate authority, could act as a conduit lender to a project entity. However, power purchasers eligible to do tax-exempt prepayment are typically able to issue their own bonds, and existing conduit bond issuers, such as state economic development authorities, could also serve to issue taxable bonds. One potentially valuable feature, not typically found in existing agencies, would be the power to issue bonds for projects in multiple jurisdictions.

A buyers network also could be formed as, or include, an agency with the power to purchase and resell power. Governmental entities chartered with this authority, such as power authorities or municipal utilities, may exercise their authority without regulation by the Federal Energy Regulatory Commission (FERC). Any non-governmental entity playing a wholesale purchasing role would need to obtain a wholesale marketer's license from FERC, which would be costly and subject it to substantial reporting and compliance requirements. A procurement network could obtain these services by collaborating or contracting with a governmental entity having such authority or a licensed private entity. The ability to purchase and resell power would allow the buyers network to directly enter into PPAs and redistribute power to wholesale purchasers. If the network developed its own credit strength over time, this could be an advantage.

Being able to buy power at wholesale would also permit the network to resell at retail in states with retail customer choice. Acting as a load serving entity (LSE) typically requires state licensing; this may involve meeting fairly burdensome financial assurance requirements. However, such capability would allow a buyers network to blend OSW power with other power to provide firm retail power to large retail purchasers. While the ability to act as a power marketer or an LSE could enhance the effectiveness of a mature and successful network, none of the procurement or financing structures described above directly requires such powers.

Bearing the needs and potential participants of the network in mind, this section examines a range of procurement mechanism options. Examples of the various models, along with their advantages and legal considerations, are described. The potential approaches examined are:

1. a non-binding consortium in which one member serves as agent,
2. formal coordination using a newly formed private entity as consortium agent, and
3. a centralized approach using a power authority or multi-state compact

Non-binding Consortium

Under a consortium approach, a working group comprised of potential off-takers is formed to develop a model RFP and PPA that would satisfy, or could be readily modified to satisfy, the regulatory requirements and competitive procurement requirements of the customer group.

One type of non-binding model is the approach used by the Silicon Valley Project (SVP) in its successful collaborative procurement of solar PV for a group of California municipalities and agencies. Under the SVP model, a convener identifies potential off-takers to participate. One of the potential purchasers is designated as a "lead agency," with responsibility for drafting the RFP (with input from participants), leading the procurement process on behalf of all participants, and negotiating a contract that can be modified for particular participant circumstances. The SVP collaborative also worked with a technical advisor, funded by participants, to advise on standards and best practices. The SVP project resulted in a savings of 10-15% on energy; reduced transaction and administrative costs for participants by 75%; and yielded highly competitive contract terms.[10]

Of potential procurement structures, the non-binding coordination model involves the least time and effort to establish, and involves little risk or commitment by participants. An existing entity can act as the procurement agent. The private entity can be either one of the purchasers or participants, or a third party agent. (In the Silicon Valley Project for solar PV procurement, for example, the World Resources Institute, a non-profit organization, acted as procurement agent for a group of private companies, while the City of Santa Clara, one of the municipal purchasers, also served as the procurement agent for the group effort.) Further, new laws or regulations are not necessary, and each participant is ultimately responsible for seeking needed regulatory approvals for its PPA. Without a formal arrangement, however, collaborative efforts may suffer from attrition or changed expectations.[11] To achieve the long-term goals of a robust OSW buyers network, it will be desirable to have an organization that persists beyond an individual procurement process.

Formal Coordination

A second procurement option is formal coordination between parties. In a formal coordination arrangement, the initial purchasers, and perhaps other supporting organizations or governmental entities, form a specific entity to administer the procurement activity and rules for participation by member purchasers or supporters, including a permanent basis for funding the program administrator. A non-profit organization (likely a 501(c)(3) or 501(c)(4) organization) would be the typical choice for this purpose. Such an organization can not only take on procurement functions but also promote the long-term goals of developing a mature OSW industry. Forming a procurement organization is fairly straightforward if it is not going to act as a power marketer or directly issue bonds.

For example, a memorandum of understanding (MOU) could be entered among states and/or other off-takers to govern formal coordination of OSW procurement. The MOU could be structured to avoid the need for congressional approval under the Compact Clause of the United States Constitution, which is required for interstate contracts that alter the balance of power of states or encroach on matters of federal concern.[12]

The MOU could preserve states discretion and authority to approve OSW purchases, so it does not upset the state balance of power[13] and addresses only power purchases—that are not regulated under federal law.[14] To the extent that participants are not states, these issues are eliminated. In addition, a useful undertaking might be to adopt conforming OREC legislation in multiple Atlantic coast states. However, while useful, new OREC legislation is not required to make the network viable since establishing an entity to act as agent for a consortium of wholesale and large commercial buyers can take advantage of existing subsidies.

It will be important to create an ongoing administrator to facilitate aggregated procurement for multiple OSW projects. To make this work, a major need is to identify participants who will commit to ongoing organizational funding.

An example of a type of formal coordination is the Offshore Wind Collaborative established by the New York Power Authority (NYPA), the Long Island Power Authority (LIPA), ConEd (a New York utility), and several state agencies, which entered into an MOU to advance development of an offshore wind project. To date, NYPA, on behalf of the collaborative, applied for a lease of Outer Continental Shelf (OCS) lands from the Bureau of Ocean Energy Management (BOEM) in

June 2010. The Collaborative also proposes to develop and issue an RFP and negotiate a PPA for offshore wind power, with NYPA assigning its lease rights to the chosen developer. NYPA, LIPA and ConEd are sharing the costs of these tasks under a cost-sharing mechanism established in the MOU. In this case, the MOU serves in lieu of a full-fledged new organization. Two of the organizations involved are existing power authorities whose role is discussed below. See www.lipower.org/newscenter/pr/2010/060810-gov.html.

Centralized Approach, Public Power Authority

A public authority is a corporate entity created by statute, governed by an appointed board, and responsible for various public service functions. Combining the efficiencies of a private corporation and the privileges of a public authority, often including the power to issue bonds, set rates and charges, and exercise eminent domain, public authorities are a common vehicle for funding and operating large-scale projects.[15]

A power authority is a type of public authority focused on energy-sector activities. There are two types of power authorities: authorities established by a state or the federal government, and those comprised of multiple load-serving entities, such as municipal utilities. Either type of power authority can act as a vehicle for public-private partnerships for developing offshore wind or as a central procurement agent, negotiating long-term PPAs on behalf of aggregated customer load, or purchasing RECs to meet state RPS requirements. They have the ability to buy and sell wholesale power without FERC regulation.

As discussed above, power authorities in New York State are participating in a collaborative structure to advance offshore wind development together with private entities.

The Commonwealth of Virginia also has formed the Virginia Offshore Wind Development Authority (VOWDA) to facilitate offshore wind development (Title 67, Chapter 12, VA Code). VOWDA is empowered to enter into public-private partnerships to collect data on wind resources and interstate agreements to develop offshore wind projects. Unlike many power authorities, the VOWDA does not have authority to issue bonds.

Single State Power Authorities

A power authority can function as a central procurement agent, purchasing power or RECs to serve aggregated customers or meet state-wide needs. For example, the Illinois Power Agency (IPA) represents one example of centralized procurement. Each year, the IPA administers a procurement process to secure adequate supply of energy, including renewable energy, for the utilities' combined retail needs and to achieve RPS compliance. As part of its 2010 procurement, the IPA determined that long-term PPAs were desirable to serve as a hedge against price escalation, and solicited bids on behalf of ComEd and Amergen for 20-year PPAs for wind and solar projects and associated RECs. (IPA 2011 Annual Report). The Illinois PUC has since approved the long-term PPAs. The IPA estimates that its aggregated renewable procurement practices saved ratepayers $188 million in RPS compliance costs between 2009 and 2011, even as RPS requirements increased.

Another public authority, the New York State Energy Research and Development Authority (NYSERDA), is responsible for central procurement of RECs to meet New York's RPS requirements. NYSERDA serves as the procurement agent to purchase the environmental attributes created by the renewable generation, not the electricity, under long-term contracts. The renewable generator provides NYSERDA with all rights to the RPS attributes associated with each MWh of renewable electricity generated and delivered into the New York Control Area that are under an RPS contract.

- *Advantages of a Single State Power Authority*

A power authority is a promising structure for promoting offshore wind development. A power authority can be formed with the ability to issue tax-exempt bonds. As a hybrid public and corporate body, a power authority can work collaboratively with both private and public agencies (as NYPA is doing through the Offshore Wind Collaborative) and could serve as a procurement lead or a network administrator.

A power authority is not a public utility under the Federal Power Act (FPA). Therefore, it can purchase and resell offshore wind power without compliance with federal power marketer requirements. By contrast, a private entity would be limited to acting as agent for off-takers to minimize regulatory oversight.

- *Disadvantages of Single State Power Authority*

Forming a new single-state power authority like NYSERDA or IPA requires enabling legislative action, a potentially time-consuming and uncertain process. For example, Connecticut's proposed Connecticut Electric Authority, a power authority modeled on the IPA, was tabled in the state's Senate. New Jersey is currently exploring the possibility of creating a power authority.

Joint Power Authorities

Power authorities also may be comprised of multiple entities. Several states have adopted "joint powers acts," which allow a public body to exercise its powers "jointly" with one or more local, state or even federal entities through a "joint authority" that is established by agreement between the parties. Like a traditional single-unit power authority, a joint power authority is an independent entity governed by a Board and has the power to enter into contracts, acquire property, develop projects, issue tax-exempt bonds and carry out any other functions as provided by the parties to the organizational agreement.

Joint power authorities are often used by municipal utilities to achieve the benefits of aggregation, such as spreading the risk of large-scale project development and increasing bargaining power, without sacrificing autonomy over their respective resource portfolios. Typically, joint powers authorities comprised of municipal utilities are structured so that members may pick and choose whether to participate in project development or PPA purchases pursued by the authority. Non-participating members are further insulated from adverse financial impacts of an unsuccessful venture, since bonds issued by the authority are ordinarily backed by the collective credit of participating members only. Once a member opts to participate in a project, safeguards kick in to prevent the member from modifying its obligations to the detriment of other participants. For example, both the Southern California Public Power Authority (SCPPA) and Utah Association of Municipal Power Systems (UAMPS) require project participants to accept a take-or-pay contract for their proportionate share and are not permitted to terminate or modify these contracts in a way that would adversely affect bondholders. With the ability to pool demand and issue bonds, joint powers authorities can engineer innovative project finance arrangements to reduce participants' costs.[16]

- *Advantages of Joint Power Authorities*

The joint power authority structure, like SCPPA or UAMPS, provides a successful aggregation model with the relative ease of formation (if a joint powers act is in place, parties can form an agency by contract) and flexibility (members may pick and choose whether to subscribe to a transaction).

- *Disadvantages of Joint Power Authorities*

Not all states have joint powers legislation. Some states specifically authorize formation of power authorities by municipal utilities but not by state agencies. In addition, to the extent state agencies are involved, interstate contracts formed under joint powers acts must still comply with the Compact Clause and require congressional approval if the contracts increase state power or interfere with federal regulation. (Since SCPPA and UAMPS are comprised of municipal entities, the Compact Clause did not apply). Therefore, an interstate agreement under a joint powers act should be structured to preserve each state's independent regulatory power and allowing withdrawal.

Interstate Compact

Another option for a regional authority is through formation of an interstate power authority based on an interstate compact.[17]An interstate compact is a formal agreement or contract between two or more states that allows them to resolve disputes or pursue a common agenda. To form a compact, two or more states negotiate an agreement or MOU. The agreement must be adopted by the state legislature and signed into law before a state can join the compact. Federal agencies may also participate in an interstate compact.

Compacts designed to facilitate interstate communication or promote cooperative studies do not usually require congressional consent, but those that impose more substantive obligations do. In some instances, Congress may grant advance congressional consent for a compact, as it did in Section 216 of the Federal Power Act, which allows states to create a compact to administer transmission siting in three or more contiguous states.[18]

- *Advantages of Interstate Compact*

Interstate compacts are powerful, durable, and flexible tools to promote and ensure cooperation among states. Compacts are binding on states and supercede any conflicting state law; therefore, they are not vulnerable to changes in a state's political climate. An entity created under an interstate compact offers many of the same benefits as a power authority: the ability to issue bonds, finance long-term purchases, and procure power on behalf of a buyers network. An interstate authority also can engage in regional planning and development of offshore wind projects.

- *Disadvantages of Interstate Compact*

Creation of an interstate compact requires extensive effort to plan and draft an agreement, and then obtain state legislative and Congressional approval. The National Council on Interstate Compacts (NCIC) reports that compacts driven by state consensus require an average of 2-3 years to implement. One potential option to expedite the process could be to explore whether creation of a regional authority might be consolidated with ongoing work taking place to develop a compact for regional transmission siting under Section 216 of the Federal Power Act.

Multi-State Authority Formed by a Single State

A final alternative for establishing a power authority is for a single state to enact legislation authorizing the formation of a multi-state authority. The authority would be given the power to issue bonds for projects or other permitted purposes (such as prepayments for energy) in multiple states and to purchase and sell energy at wholesale. As an example, the state of Wisconsin has established the Wisconsin Public Finance Authority with the ability to issue bonds for projects anywhere in the country. Such an authority could allow for supporting organizations in many states to play a role in its governance, or it could work in tandem with a non-profit procurement organization. Participation in any project or procurement would be voluntary for state agencies.

Recommendation on Network Structure

Without knowing the composition of the initial pool of procurement participants, it is difficult to recommend an appropriate mechanism or entity for implementation of a buyers network—with any degree of finality. A power authority capable of serving multiple states probably offers the best long-term solution in terms of broad powers and regional planning. And, as discussed, there are some early examples of power authorities venturing in to offshore wind in partnership with private utilities such as the NYPA/LIPA/ConEd collaboration. However, formation of such a power authority could take several years.

The fastest, least expensive solution would be to implement the buyers network as a "pilot" project, using informal coordination with a strong existing lead agency, possibly an existing power authority. An intermediate solution, both in time and cost, but with greater ability to pursue a long-term procurement agenda, would be a network managed by an existing or newly incorporated non-profit organization. Such an organization could be folded into or contracted with a multi-state power authority in the future.

V. The Role of Federal Agency Participation

Federal agencies represent an important potential purchasing participant in any OSW collaborative procurement network because of their significant energy needs and responsibilities to procure renewable energy. To facilitate federal agency participation in a collaborative procurement effort, the network should be structured in a way that is conducive to addressing federal renewable energy goals, acquisition barriers, and the environment within which federal agencies consider renewable energy procurement. This section reviews the major issues that will affect the ability and interest of federal agencies, most notably the Department of Defense, to participate in an OSW buyers network.

The report finds that an OSW buyers network can be designed in a way that provides solutions to the challenges federal agencies face in purchasing renewable power to meet their renewable energy objectives.

Federal Renewable Goals and Requirements

The requirements of the Energy Policy Act of 2005 and Executive Order 13423 represent the primary drivers of federal agency renewable energy demand today. EPACT 2005 requires, in part, that the President, acting through the Secretary of Energy, shall seek to ensure that, to the extent economically feasible and technically practicable, of the total amount of electric energy the federal government consumes during any fiscal year, the following amounts shall be renewable energy:

a. Not less than 5% in fiscal years 2010 through 2012

b. Not less than 7.5% in fiscal year 2013 and each fiscal year thereafter[19]

Executive Order 13423 further requires that agencies ensure that (a) at least half of the statutorily required renewable energy consumed by the agency in a fiscal year comes from new renewable sources, and (b) to the extent feasible, the agency implements renewable energy generation projects on agency property for agency use.

For purposes of EPACT 2005 and EO 13423, purchases of RECS are treated the same as renewable energy purchases.

DOE’s Federal Energy Management Program (FEMP) specifies the conditions for agencies to meet the EO and EPACT 2005 requirements.[20] Current FEMP guidance allows these requirements to be satisfied through on-site projects, renewable power purchases, or purchase of RECs. For retail power purchases, however, federal entities are only able to purchase renewable power directly from the producer if they are in a deregulated state; if the producer is the serving utility; or if there is another applicable state law exemption. It should be noted that this requirement does not represent a major limitation for federal involvement in an OSW buyers network in the Northeast and Mid-Atlantic regions as most of states in those regions are deregulated. However, some of the states require a single retail power provider to serve a customer's entire load, and it may be necessary for the buyers network to be licensed, as discussed above, or to collaborate with a licensed LSE to make a combined sale of OSW.

Federal agencies also are free to purchase RECs from renewable energy projects located anywhere. However, RECs may not provide a federal agency with the price stability and budget certainty that a longer-term PPA can provide.

Section 203(c) of EPACT also provides federal agencies with a bonus equivalent to doubling the amount of renewable energy used or purchased if (a) the renewable energy is produced and used on-site at a federal facility, (b) the renewable energy is produced on federal lands and used at a federal facility, or (c) the renewable energy is produced on Indian land and used at a federal facility. Under this provision, federal agency use or purchase of offshore wind energy would qualify for the 2x multiplier, provided the OSW project is located on the Outer Continental Shelf and the power is used on-site. **Note**: under current DOD policies, military bases that purchase RECs offsite would be required to purchase at lowest cost through a central auction.

Federal Procurement Regulation Limitations on Long-Term Contacts

Long-term contracts provide federal agencies with the best opportunity to minimize renewable power price premiums**.** Unfortunately, federal procurement authorities governing federal purchase of renewable energy—the Federal Acquisition Regulations (FAR, 48 CFR 1) and Defense Federal Acquisition Regulations (DFAR, 48 CFR 2)—significantly hinder the ability of federal agencies to use longer-term contracts. Specifically, the regulations limit contract terms for commodity power to five years, and utility service contracts for power delivery to ten years. These limitations make it difficult for federal agencies to obtain renewable energy supply offers with lower price premiums because of the inability to enter longer-term PPAs of 20 to 30 years, which can result in lower power costs.[21]

However, there are important exceptions to the FAR and DFAR contract-term limitations applicable to DOD, allowing DOD (and other "piggybacking" federal agencies) to take advantage of longer-term contracts and resulting lower power costs. Notably, a buyers network for OSW can serve as a valuable mechanism for DOD and other federal agencies to take advantage of these acquisition authority exceptions, obtain favorable renewable energy pricing, and meet their federal renewable requirements in an efficient, timely manner.

First, DOD may enter into multi-year contracts for electricity from renewable energy sources for a period up to ten years.[22] However, contracting for a period greater than five years (but not longer than ten) must be justified by a business case analysis demonstrating that:

> (1) The proposed purchase of electricity under such contract is cost effective; and (2) It would not be possible to purchase electricity from the source in an economical manner without the use of a contract for a period in excess of five years.[23]

Second, DOD may enter an energy contract for a period of as long as 30 years under 10 USC 2922a. Such a contract would be difficult to structure for OSW procurement, however, because the law requires that the energy facility must be on real property under the jurisdiction of the Secretary of a branch of the armed services. This condition, however, could be met by withdrawing the federal submerged lands from the jurisdiction of the DOI and placing them under DOD jurisdiction (or possibly by DOI providing DOD with a leasehold interest in the lands). However, the delay and complexity likely associated with this approach may make this unattractive.

Under either exception, the most effective way for the DOD to enter into a cost effective contract for renewable energy such as offshore wind energy is through competitive procurement from large-scale projects. Competitive procurement is generally required by 10 USC 2304. Given this procurement context, a buyers network would be of significant value to DOD and conducive to the Department's participation in the offshore wind energy marketplace because a network would produce a more competitive price and provide a structure under which the DOD could limit its purchase to a 10-year term. As an example, a buyers network could enter a 20-year PPA with an offshore wind developer, sell part of the output to the DOD under a 10-year agreement, and sell the output of years 11-20 to a non-federal buyer that has greater procurement flexibility.

Furthermore, the Economy Act (31 USC 1355) allows non-DOD federal facilities to piggyback on DOD contracts using this authority, although contract terms for those agencies must be consistent with applicable provisions of the FAR.[24] Therefore, a buyers network that satisfies DOD needs is also likely to work for the GSA and other federal agencies.

VI. Role of State Policy

The need for state law revisions to implement a buyers network for OSW will vary with the network's structure, including the extent of collaboration that takes place in the network. A straight-forward, non-binding agreement among several states to cooperate in procuring offshore wind (MOU-approach) is unlikely to require any changes in state law to authorize participation since no state entity is relinquishing its authority to a larger, regional purchasing entity.

However, revisions to state law may be desirable even for this "less coordinated" model. An aggregated purchase that is primarily composed of long-term PPAs will be necessary to permit financing. Therefore, state laws and regulatory policies that direct off-takers to enter into long-term renewable contracts (such as in Massachusetts under the Green Communities Act), or that encourage long-term commitments by utilities by assuring cost recovery, will increase the benefits achieved even under a less coordinated model.

If, however, the network takes the form of a regional power authority that purchases power on behalf of several participating states, changes to state law would be needed. Reasonably uniform state enabling legislation would be necessary to ensure that a regional power authority, if used for collaborative procurement, can recover its offshore wind energy costs under PPAs from the LSEs in each participating state. This would help to ensure that the authority has high credit quality. Various states have formed power authorities and some have passed legislation to promote offshore wind, which could inform the process of preparing model legislation. For example, the Texas legislature created the Lower Colorado River Authority (LCRA) to deliver electricity, manage water supply, and support community and economic development in central Texas. (Lower Colorado River Authority, October 19, 2009).

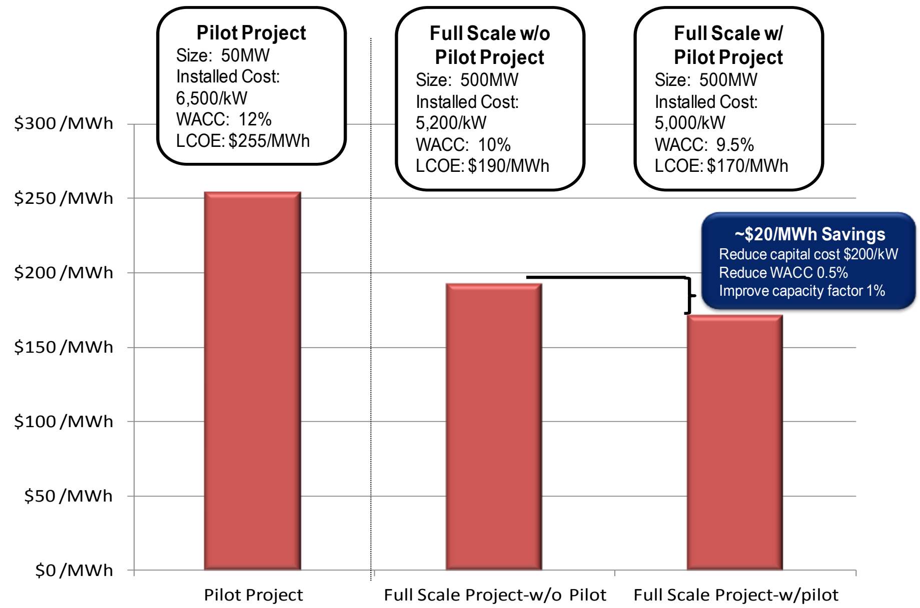
In the OSW context, New Jersey's Offshore Wind Development Act is an effective approach that demonstrates how OREC purchase requirements can be imposed on LSEs to recover the cost of offshore wind PPAs.[25] Another approach is represented by the Delaware RPS law that sets a 3.5x multiplier towards the RPS obligation for ORECs purchased by Delaware LSEs to reduce the impact on ratepayers of meeting the RPS with offshore wind energy.[26]

VII. Value of a Pilot Project

Pilot projects help to reduce the development and construction costs for subsequent projects as well as reduce the cost uncertainty associated with new applications of technologies. Such savings result because a pilot project provides clarity with regard to the true costs associated with developing a project of this type as well as OSW energy feasibility. Even at pilot scale, the bond financing strategies discussed above could be effectively deployed. Further, having a project operational would provide certainty and comfort to the lending community, in turn reducing the cost of capital for future projects. A pilot project could be a smaller initial phase of a larger aggregated procurement or a separate development. Analysis performed by Pace Global examined the total costs of a pilot project as compared to a full-scale development project, both with and without the benefits of an operational pilot project. In terms of the scale of a pilot project necessary to demonstrate the economic and financing aggregation concept, the first project would likely need to be on the order of at least 50 MW. Assuming conservative benefits that directly result from a pilot project, including lower cost of capital and decreased installed cost, and keeping all other assumptions constant, the Pace Global analysis determined that a pilot project could reduce the LCOE of future, full-scale OSW projects by $20/MWh. However, these savings opportunities would only be fully realized if the scale of the full project was 200 MW or greater. See Exhibit 6.

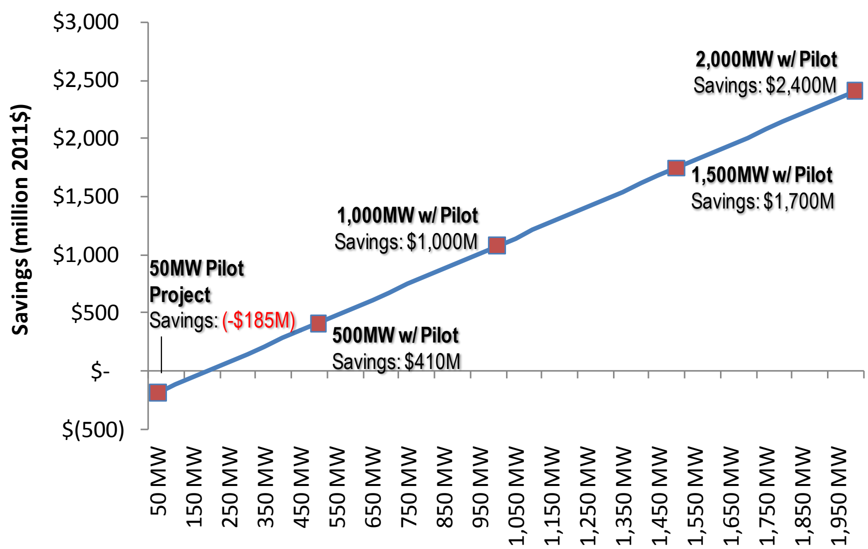
Furthermore, the larger the capacity of the full-scale OSW project ultimately developed, the greater the savings attributable to the pilot project. Simplistically, applying the $20/MWh savings to future full-scale deployments, the estimated savings attributable to the initial pilot project over a 20-year power purchase agreement for OSW could reach $2.4B with a cumulative capacity of 2,000 MW, as shown in Exhibit 7.

Exhibit 6: Comparison of LCOE with and without Pilot Project Benefits



Source: Pace Global

Exhibit 7: Savings Attributed to Pilot Project Realized by Capacity of Future Full Scale OSW



Note: Represents savings over a 20-year power purchase agreement term

Source: Pace Global

VIII. Recommendations for Implementing a Collaborative Procurement Effort

Based on the report's analysis, CESA has identified several recommendations for the organization and implementation of a collaborative buyers network.

Please Note: CESA's recommendations are preliminary only, not listed in necessary chronological order, and designed to provide a starting point for dialogue in advancing future action in implementing a network initiative. The recommendations also will need to be tailored to the meet the energy needs, goals, and regulatory requirements of interested network participants.

Recommendations

1. Conduct strategically planned outreach and briefing of key leaders and potential participants to explain the economic and business proposition of the network and collaborative procurement concept.
2. Recruit potentially interested state entities and agencies, municipalities, DOD, GSA, and other off-takers to determine interest in an initial pilot project to demonstrate the economic value of a collaborative procurement mechanism.
3. Form a procurement entity to enable coordination among the interested network participants to implement a pilot (or large-scale) project. The entity could take the form of a procurement consortium or specially formed non-profit agency that includes investor-owned and publicly owned utilities that procure power, state and federal entities that procure power, and/or major end-user customers.
4. Develop a memorandum of understanding among the consortium participants, or use non-profit organization bylaws, to govern the responsibilities and commitments of the participants and the structure of the consortium.
5. Identify or form a consortium administrator to manage the process and ensure effective participant input early in and throughout the procurement process.
6. In implementing the network, seek a structure that avoids required legislative or regulatory changes in state and federal jurisdictions in which there are entities interested in participating in the network. Alternatively, identify manageable regulatory or legislative changes that could substantially expand participation in the consortium.
7. Work with key federal officials at Department of Defense, Department of Energy, GSA, Department of Interior, Office of Management and Budget, etc. to determine how to make the network consistent with FAR and DFAR.

8. Retain financial and legal advisors to assist in developing recommendations for establishing the most pragmatic procurement entity, procurement process, term sheet, and supporting documents based on the regulatory and energy procurement needs of the consortium participants.

9. Conduct discussions with the financial community and OSW developers to determine their interest in and recommendations for the enterprise.

10. Employ financial measures to allow the consortium (and selected project developer) to access low-cost debt, state financial incentives, and federal incentives.

11. Develop and administer a joint Request for Proposals and bid evaluation process that meets all participants' governing procurement rules. The joint RFP should include several elements:

- A request for OSW projects that provide a competitive all-in delivered price
- A request for a detailed explanation of how the OSW project will provide benefits to the region to be served
- Flexibility with regard to terms such as contract length, project location (although deliverability to the initial purchasers should be required), and energy products to be delivered (energy only or renewable energy certificates, capacity or other ancillary services or environmental attributes). The flexibility would allow for the opportunity to consider a broader range of proposals that can be tailored to the needs and requirements of a larger subset of the buyers network
- A form of PPA.

12. Evaluate and select bids pursuant to the joint RFP evaluation criteria, and finalize contract terms based on the PPA issued with the RFP. Technical analysis of proposals will be performed collectively by the buyers network. Buyers should be allowed to participate in the technical analysis if so desired.

ENDNOTES

[1] This report was prepared by Clean Energy States Alliance, with analysis and contributions by Mark Sinclair and Ross Tyler, Clean Energy States Alliance; Melissa Haugh and Tim Heinle, Pace Global; Baird Brown of Drinker Biddle & Reath LLP; and Carolyn Elefant of the Law Offices of Carolyn Elefant.

[2] The authors would like to recognize Markian Melnyk of Atlantic Wind Connection, Rob Sanders, Willet Kempton, Sunil Subbakrishna, Lou Munden, Stephanie McClellan, and Heather Hunt for substantial contributions and valuable insights.

[3] The Offshore Wind Accelerator Project (OWAP) is an active collaborative of state and federal officials, industry representatives, and non-governmental organizations working together to tackle the major barriers to offshore wind deployment in the U.S. OWAP involves a network of stakeholders committed to realizing the potential of offshore wind for transforming the Atlantic coast's energy sector and creating a new industry supply chain.

[4] It is important to note that actual LCOE values cited in this report represent the levelized cost *after* tax incentives (in contrast to discussion of *reductions* in LCOE).

[5] The recommendations are informed, in part, by the analysis and work of the New England States Committee on Electricity (NESCOE). *See* NESCOE, Report to the New England Governors on Coordinated Renewable Procurement (2010). The recommendations also are informed by the Best Practices Guide to Collaborative Solar Procurement, development by the World Resources Institute. *See* WRI, Purchasing Power: Best Practices Guide to Collaborative Solar Procurement (2011).

[6] DOE, A National Offshore Wind Strategy: Creating an Offshore Wind Energy Industry in the United States (February 2011).

[7] According to the World Resources Institute's evaluation of past PPA pricing over differing terms for renewable energy, 20-year PPA prices were 10-15% cheaper than 15-year contracts, while 15-year PPA prices were 15-30% cheaper than 10-year contracts. WRI, Purchasing Power: Best Practices Guide to Collaborative Solar Procurement (2011).

[8] An indication of the potential scale of these transaction savings is provided by the Silicon Valley Collaborative Renewable Energy Project, a large-scale initiative launched in 2008, to serve as a replicable, scalable model of regional collaboration to procure solar power by public agencies. According to the project's case study, participating agencies saved 75-90% in administrative costs and time compared to an individual procurement. (The project involved nine participating public agencies leading to over 20 MW of solar procurement). *Id.*

[9] The Virginia Coastal Energy Research Consortium (VCERC) reports that "The greatest upside opportunity for reducing the cost of offshore wind energy... is to attract major

elements of a Mid-Atlantic offshore wind supply chain to the state … If the turbine and tower package were manufactured in Virginia, we estimate the project capital cost would decrease by $480 per kilowatt." VCERC, Virginia Offshore Wind Studies, 2007-2010 (2010).

[10] WRI, Purchasing Power: Best Practices Guide to Collaborative Solar Procurement (2011).

[11] A report by the Solar Electric Power Association (SEPA) released in 2008 found that utility collaborations stand the best chance of success when a legal framework such as a joint power agreement or professional association exists between the parties. SEPA, Utility Procurement Study: Solar Electricity in the Utility Market.

[12] The Compact Clause, Article I, Section 10, Clause 3, of the U.S. Constitution, states, "No State shall, without the consent of Congress … enter into any Agreement or Compact with another State." Taken literally, the compact clause would require congressional consent for any agreement between states, but the Supreme Court holds that congressional consent applies only to interstate agreements that increase a state's political power and encroach on federal powers. *Virginia v. Tennessee*, 148 U.S. 503 (1893).

[13] *US Steel Corp. v. Multistate Tax Commission*, 434 U.S. 452 (1978) (holding that interstate agreement to enforce tax laws is not a compact requiring congressional approval where states may withdraw at any time and are not required to cede individual authority).

[14] The RGGI model provides an approach for the structure of an OSW formal coordination approach to a buyers network at the state level that would allow for compliance with the Compact Clause without the need to obtain congressional approval. However, some commenters disagree. *See* R. Kundis Craig, Constitutional Contours for Design and Implementation of MultiState Renewable Programs, online at http://ssrn.com/abstract=1482611 (arguing that RGGI is vulnerable on Compact Clause grounds since EPA has authority to regulate emissions).

[15] *See* A. Dhanju, J. Firestone, W. Kempton, *Potential Role of Power Authorities in Offshore Wind Power, Energy Policy* 39 (2011) 7025-7035.

[16] In 2009, the Southern California Public Power Authority (SCPPA), a joint powers authority formed by agreement between ten municipalities and one irrigation district under California's Joint Powers Act for the purpose of developing generation and transmission assets, participated in a unique financing arrangement for a 262 MW wind project in Washington State to supply power to SCPPA members. The project's capital costs were covered through a combination of federal stimulus funding and a pre-payment by SCPPA of over $500 million for a 20-year block of project power. SCPPA issued long-term, tax-exempt bonds, backed by the credit of participating members, to finance the pre-payment. (SCPPA Annual Report 2009-2010). The Utah Association of Municipal Power Systems (UAMPS), a joint public agency comprised of 45 municipal power utilities located in Utah and five surrounding states organized under the Utah Interlocal Cooperation Act, followed a similar path to acquire wind resources for members. In 2011, UAMPS participated in a public/private venture to finance Intermountain West's construction of the Horse Butte Wind farm, a $143 million 58 MW project in Idaho.

Through a combination of pre-payment for project output financed by UAMPS-issued bonds and private equity investment, project costs were reportedly lowered by 15 percent. Utah Business Journal, online at www.utahbusiness.com/issues/articles/10387/2010/11/termsofuse.

[17] *See* Dhanju et. al, Energy Policy 39 (2011 at 7033).

[18] For additional information on advanced consent, reference can be made to the National Center for Interstate Compacts, online at http://knowledgecenter.csg.org/drupal/content/interstate-compacts-policy-option-enhance-electric-transmission-line-siting-process.

[19] EPACT 2005, section 203(a) (42 USC 15852a).

[20] FEMP, Renewable Energy Requirement Guidance for EPACT 2005 and Executive Order 13423 (2008).

[21] According to the analysis of the Pacific Northwest National Laboratory, "long-term contracts (15 to 30 years) provide Federal customers with the best opportunity to minimize renewable power premiums, if any." Warwick, Purchasing Renewable Power for the Federal Sector: Basics, Barriers, and Possible Options (April 2008).

[22] *See* 10 USC 2304 and DFAR 217.174.

[23] DFAR 217.174.

[24] However, this authority is restricted under 40 USC 591 to transactions that are consistent with state utility regulations. In other words, it cannot be used to bypass service provided by regulated utilities unless state law allows retail choice.

[25] New Jersey Offshore Wind Economic Development Act (2010).

[26] DE State Senate Bill 328 (2008).

For More Information

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Acknowledgements

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About CESA

Clean Energy States Alliance (CESA) is a national nonprofit organization that works with state leaders, federal agencies, industry players, and other stakeholders to promote renewable energy and energy efficiency. CESA's mission is to support state and local leadership to promote the use of existing and emerging clean energy technologies.

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About the Offshore Wind Accelerator Project

The ***Offshore Wind Accelerator Project*** (OWAP) is a collaborative initiative among state and federal officials, developers, non-governmental organizations, and other key stakeholders to accelerate the creation of an offshore wind industry in the United States. OWAP is facilitated and managed by the Clean Energy States Alliance (CESA). The initiative's specific objectives are to address the key challenges facing offshore wind deployment in five topic areas:

1. Ensure ongoing cooperation and communication among stakeholders and government leaders on priority problem-solving;
2. Address siting and regulatory needs to assist existing state and federal agency efforts;
3. Advance investment through power procurement cooperation by state and federal agencies and through new financing mechanisms;
4. Identify supply chain needs and identify cooperative opportunities to build the industry infrastructure; and
5. Develop a communication effort to ensure public and stakeholder access to objective, reliable information on offshore wind issues.

www.cleanenergystates.org/projects/accelerating-offshore-wind/

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APPENDIX A:
PACE GLOBAL ASSESSMENT

Assessment of Offshore Wind Economics Under an Aggregated Procurement Network

Prepared for:

Clean Energy States Alliance

June 12, 2012

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EXHIBITS

INTRODUCTION

In support of its work to promote U.S. offshore wind (OSW) development, Clean Energy States Alliance (CESA) engaged Pace Global to assess the merits of establishing an aggregated procurement network. Specifically, Pace Global examined the issue of whether, and to what degree, an aggregated procurement network—which would allow creditworthy off-takers to collectively procure large volumes of energy generated from OSW—could lower the levelized cost of energy (LCOE). According to this concept, the economies of scale of a large project would reduce project capital and transaction costs. Further, a strong and diversified portfolio of off-takers would reduce credit risk, thereby increasing lender and investor confidence, ultimately resulting in a lower cost of capital for the project. Both of these factors would help to drive down the cost and encourage significant OSW development in the U.S.

This report conveys the results of our assessment along with context for the broader issue of U.S. OSW development. As we discuss in the study results and conclusions sections of this document, Pace Global found that an aggregated off-take network has the potential to reduce the cost of energy from offshore wind projects by approximately $35/MWh. In addition, if the network could access low cost debt in the form of public or private activity bonds, the cost of energy could be further reduced by approximately $20/MWh. That is, the potential effect of an aggregated network and use of low cost financing could achieve reductions in offshore wind cost of energy of an estimated $55/MWh.

BACKGROUND AND CONTEXT

The U.S. Department of Energy (DOE) had estimated wind resources along American lakes and coastlines could provide 900,000 megawatts (MW) of electric generating capacity, a figure which came very close to then-current U.S. total generation capacity. In addition, according to a December 2011 report by *Platts,* The European Wind Energy Association stated more than 1,200 turbines had been installed at 49 wind farms across nine European countries, generating approximately 3,300MW of capacity. An additional 141,000MW of capacity was also reported to be in various planning states.[1] Despite this potential, and the demonstrated success of OSW across the Atlantic, there are no operational U.S. projects to date.

Successful construction of projects in the U.S. has been limited by a number of factors.[2] First, demand for OSW and the policy environment for renewable generation have been uncertain. While the Obama administration is attempting to facilitate the development of a project pipeline for OSW—for example by streamlining environmental reviews of offshore wind leases—much of the burden for creating demand has been left to state-initiated mandates and incentives that target producers of offshore wind.[3]

And policy uncertainty is not the only challenge facing the industry. Historically, the costs associated with OSW development, specifically equipment, construction, and capital costs, as well as a lack of domestic manufacturing capacity and committed off-takers, have been the largest impediments for an OSW pipeline. For example, with regard to financing, *Platts* reported in December 2011 that Cape Wind had lost the opportunity for a loan guarantee from the Energy Department, and only had a power purchase agreement in place for 50 percent of the 420MW that it hopes to generate (however, recently, as a result of a merger settlement, Northeast Utilities has agreed to purchase another 27.5% of Cape Wind's energy). And according to a January 2012 article from *The Baltimore Sun,* NRG Energy had pulled the plug on its Bluewater Wind project after Delmarva Power's hefty agreement to buy capacity was not sufficient to inspire lender confidence in the project. Finally, as industry experts have pointed out, for an OSW proposal to be economically viable, a substantial subsidy from ratepayers must occur; in addition, delays and cost overruns are common when pylons and turbines are built, making the development of OSW projects a risky pursuit at best.

[1] According to the European Wind Energy Association in its report, ***Wind in Our Sails: The coming of Europe's offshore wind energy industry***, 141GW (141,000MW) of offshore wind is either operational, under construction, consented to or in the consenting phase, or proposed by project developers or government-proposed development zones.

[2] It should be noted that a few organizations have projects currently in the proposal stage. Some examples include Fisherman's Energy, which has developed a 25-MW project off the Atlantic City coast to serve as a test case for meeting New Jersey's 1100-MW OSW goal. A second example is Cape Wind's groundbreaking project, which gained approval to construct a utility-scale wind farm in federal waters and hopes to begin construction by the end of 2012. According to a December 2011 article by *Platts*, 11 companies have claimed to be interested in offshore leases in New Jersey, 10 have expressed interest in Massachusetts, and both Maryland and Rhode Island have eight companies potentially seeking offshore leases.

[3] Today's regulatory environment invites a cautiously optimistic perspective regarding the OSW pipeline, as several states, including New Jersey, Maryland, Massachusetts, and Rhode Island have or are developing mandates.

CESA'S VISION

To combat these challenges, particularly with regard to cost and lack of innovative financing options, CESA proposed the concept of an aggregated procurement network The goal of the network mechanism is to accelerate the growth of the OSW industry, which, in turn, will ultimately bring down associated costs through increased demand, deployment at scale, and decreases in construction costs. CESA also hopes an aggregated procurement network will attract domestic manufacturing capacity as has been the case with land-based wind energy and solar photovoltaic technology. CESA believes that the use of collaborative, aggregated purchasing could well reduce transmission costs, achieve economies of scale, induce capital savings from some U.S. manufacturing, attract higher competition, lower the cost of capital, and reduce price.

Under the concept of an aggregated procurement network, purchasers can collectively leverage investments by credit-worthy public and private entities, tap public sector financing tools and incentives, and reduce procurement transaction costs, allowing them to benefit from reduced renewable energy costs, while the industry benefits from reduced finance costs and increased economies of scale as the domestic supply chain matures. Also, according to CESA, because offshore wind projects are often financed by bank debt on a non- or limited-recourse basis, a portfolio of off-takers for OSW project generation will be more desirable because it will reduce the risk of financing providing the credit rating of each off-taker serves to reduce overall risk perception. In addition, if the aggregated procurement network (or some of its participants) can utilize low-cost debt, (e.g. Private Activity Bonds) as a result of partnering with a utility, municipality, public finance authority or other bond issuing authority, the reduction of the cost of offshore energy would be significant.

Another benefit of this approach is that, because a network has multiple participants, a diverse procurement portfolio could be constructed, which could including long-term contracts for energy and environmental attributes as some off-takers would be able to get internal approval for 20-year contracts. CESA believes is that the use of longer-term purchases would, in turn, provide lower per-kWh pricing and allow the network to request various bid options for different power purchase agreement (PPA) lengths, thereby capitalizing on potential price reductions.[4]

As stated above, Pace Global independently assessed the merits of an aggregated procurement network, particularly with regard to its potential effect on the Levelized Cost of Energy (LCOE) of OSW. The results of our assessment are presented in the following sections.

[4] CESA reports that according to the World Resource Institute's evaluation of past PPA pricing over differing terms for renewable energy, 20-year PPA prices were 10-15 percent cheaper than for 15-year contracts. 15-year PPA prices were 15-30 percent cheaper than for 10-year contracts.

STUDY METHDOLOGY AND RESULTS

Pace Global performed a probabilistic analysis[5] to quantify the expected range of beneficial cost impacts that an aggregated procurement might have on OSW. The analysis was performed on the basis of LCOE. We reviewed the major drivers of LCOE for OSW. We then quantified the probabilistic range of expected LCOE for OSW, both with and without assuming an aggregated procurement network. We further quantified the range of expected LCOE assuming an aggregated procurement network and use of low debt financing, such as private activity bonds. A network, if composed of participants with access to, or authority to issue bonds, for example, could be in a better position to take advantage of low cost debt to drive down the LCOE for projects than an individual buyer.

Definition of LCOE

The levelized cost of energy represents the all-in cost to develop and generate electricity for the lifetime of a project or a defined period of time over the total net generation for the same time period. It is expressed in terms of dollars per MWh. This metric quantifies the cost of energy without defining the exact size of the project, and also allows for the direct comparison of energy cost between competing generation projects and technologies. For this analysis, the LCOE of the project included the benefit of tax incentives, but did not include the benefit of renewable energy credits (RECs).

The key drivers of levelized cost of OSW and the impacts of aggregated procurement are presented in Exhibit 1. The two prominent drivers that benefit from aggregated procurement are the installed cost of capital expenditure and the cost of capital. Additionally, access top low cost financing, for example through municipal bonds or private activity bonds can help lower the cost of debt and overall WACC to the project. A Third case is presented that would represent an aggregated OSW project that has access to low cost debt.

[5] The probabilistic analysis utilized Monte Carlo methods that rely on repeated random sampling of numbers that are input into the LCOE equations. The distribution of the numbers can be modified to represent a high level of uncertainty (e.g. uniform distribution) or can represent an actual distribution found in nature (e.g. Weibull distribution for wind speed)

Exhibit 1: LCOE Drivers and Aggregated Procurement Impacts

	Assumption	Definition	Aggregated Procurement Implications	Assumption Range for Disbursed Projects	Assumption Range for Aggregated Projects	Assumption Range for Aggregated Projects w/ Low Cost Debt
Project Cost and Investment Assumptions	Weighted Average Cost of Capital – WACC (%)	For energy projects, the WACC is driven by the equity return requirements of the strategic and tax investors, the cost of the debt, and the total leverage	- Good credit rating of off takers -Public entity access to low cost capital -Revenue profile of project (good wind resource, power and incentives value) Diversified wind resource risk will likely yield a more advantageous combination of lower coverage ratios and higher outputs recognized for financing	9% to 12% based on: -pre-tax equity returns: 14-18% -cost of debt: 7-8% -leverage: 50-80%	8% to 9% based on: -pre-tax equity returns: 12%-16% -cost of debt: 6.5%-7.5% -leverage: 70%-80%	5.5% to 6.5% based on: -pre-tax equity returns: 12-16% -cost of debt: 3-4% -leverage: 70-80%
	Installed Cost ($/kW)	Installed cost represents the total cost of equipment, construction, labor and development costs and is based on nameplate capacity of the project	Larger projects offer economies of scale including; equipment buying power (reduces costs), construction cost efficiencies, and transaction cost efficiencies	$4,500/kW to $6,500/kW (project size <500MW)	$4,000/kW to $6,000/kW (project size > 1GW)	
	Tax Abatement	Tax incentives available to OSW are expected to include the production tax credit (PTC) and Modified Accelerated Cost Recovery System (MACRS) depreciation. LCOE deducts these incentives from total project cost.	There are no direct impacts to the applicability of tax abatement incentives under aggregated procurement; however, sizable tax investor(s) will be required to monetize these benefits.	For the baseline analysis, it is assumed that the PTC will eventually be extended and the investment tax credit (ITC) for wind will not. Due to the higher capital costs for offshore wind relative to onshore wind, the 30% ITC would be much more advantageous for off shore wind projects. A second analysis was performed that illustrates the impacts that the availability of the ITC would have on LCOE for aggregated OSW projects.		

Assumption	Definition	Aggregated Procurement Implications	Assumption Range for Disbursed Projects	Assumption Range for Aggregated Projects	Assumption Range for Aggregated Projects w/ Low Cost Debt
Fixed O&M Cost ($/kW-year)	Fixed O&M costs cover routine maintenance and labor.	Allocation of fixed costs for maintenance will benefit from a larger project.	$90-$95/kW	$85-$90/kW	
Net Capacity Factor (%)	Represents the ratio of actual production sent to the grid over the potential production based on nameplate capacity.	The capacity factor of the aggregated system will likely be slightly higher, but the marginal improvements in capacity factor are overshadowed by the overall project uncertainty.	30% to 40%	30% to 40%	

Source: Pace Global

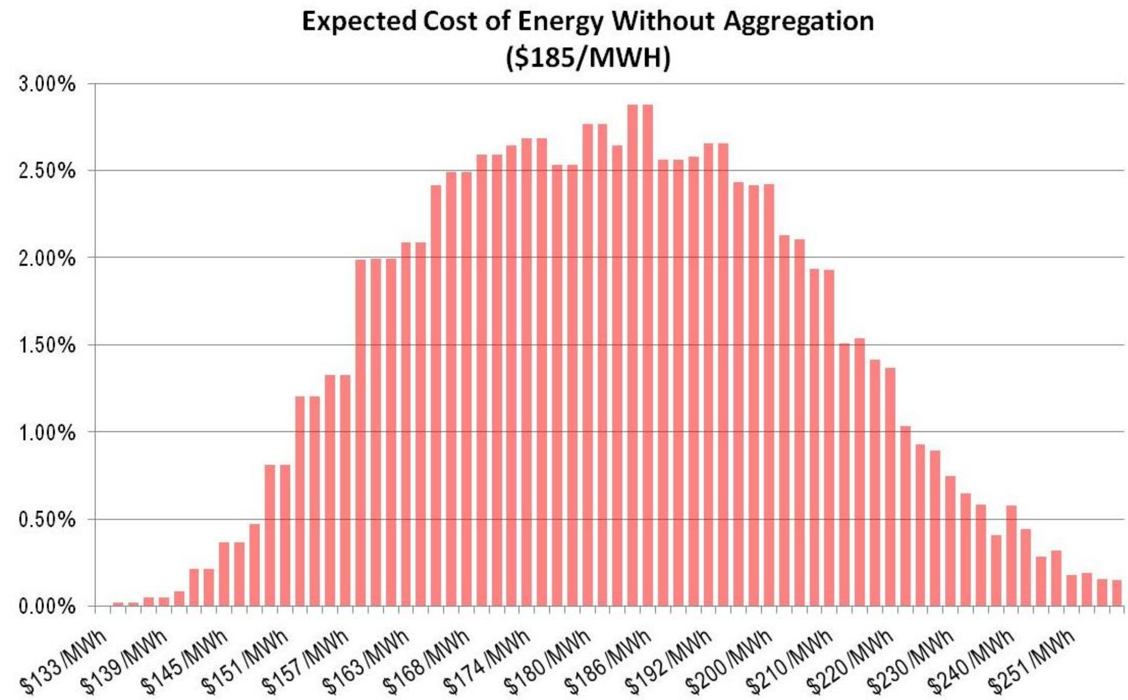
LCOE Quantification with Aggregated Procurement Benefits

With aggregation, a number of tangible benefits are realized by the offshore wind project(s). They include:

- Reduction in capital costs from procuring very large numbers of turbines, procuring large numbers of foundations and electrical gear
- Amortization of project installation fixed costs over a larger number of turbines
- Amortization of sub-sea-cable installation over a larger number of turbines
- Reduction of capital costs as a result of decreased risk concentration (operational, credit, and, potentially, resource)
- Reduction in fixed costs of operations

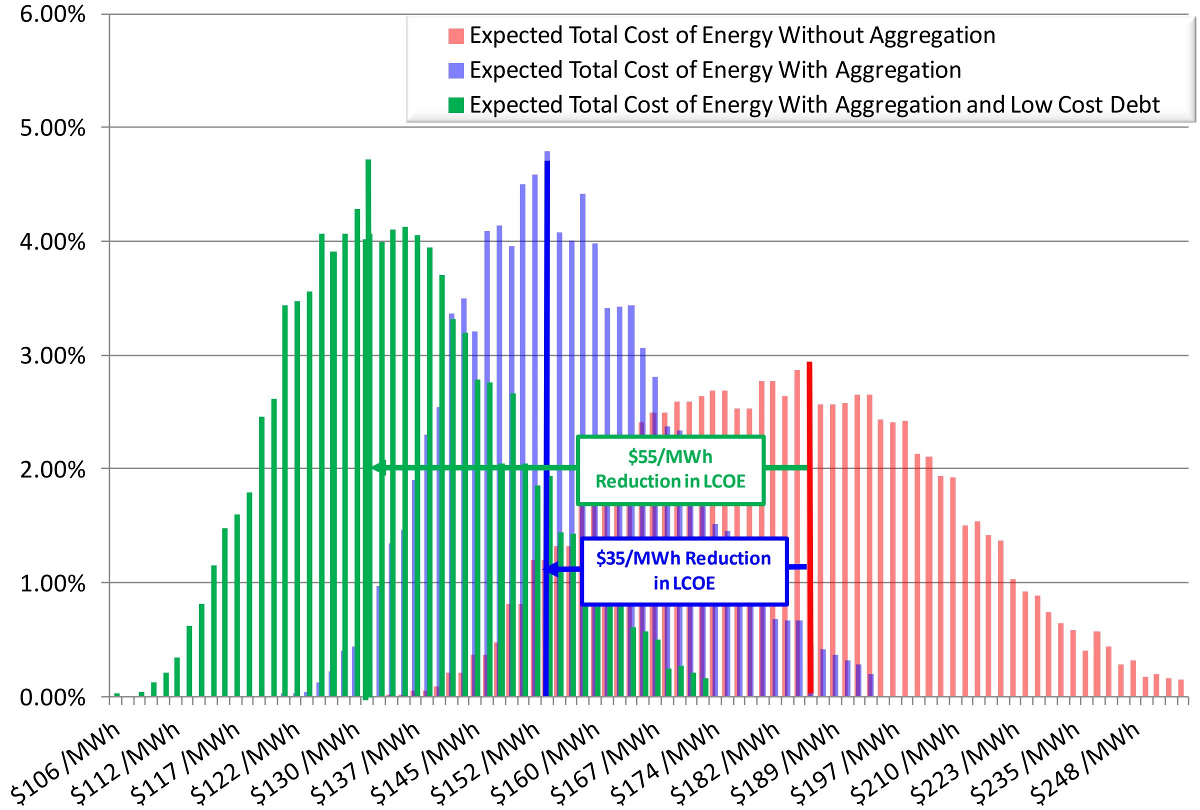
For your reference, the ranges of expected LCOEs for a project that has not benefited from aggregation are presented in Exhibit 2. A comparison of the potential LCOEs for aggregated and non-aggregated projects is presented in Exhibit 3, including a scenario in which aggregation is combined with low debt financing.

Exhibit 2: Range of OSW LCOE without Aggregated Procurement Benefits



Source: Pace Global.

Exhibit 3: Comparison of OSW LCOE with and without Aggregated Procurement Benefits



Source: Pace Global.

CONCLUSION

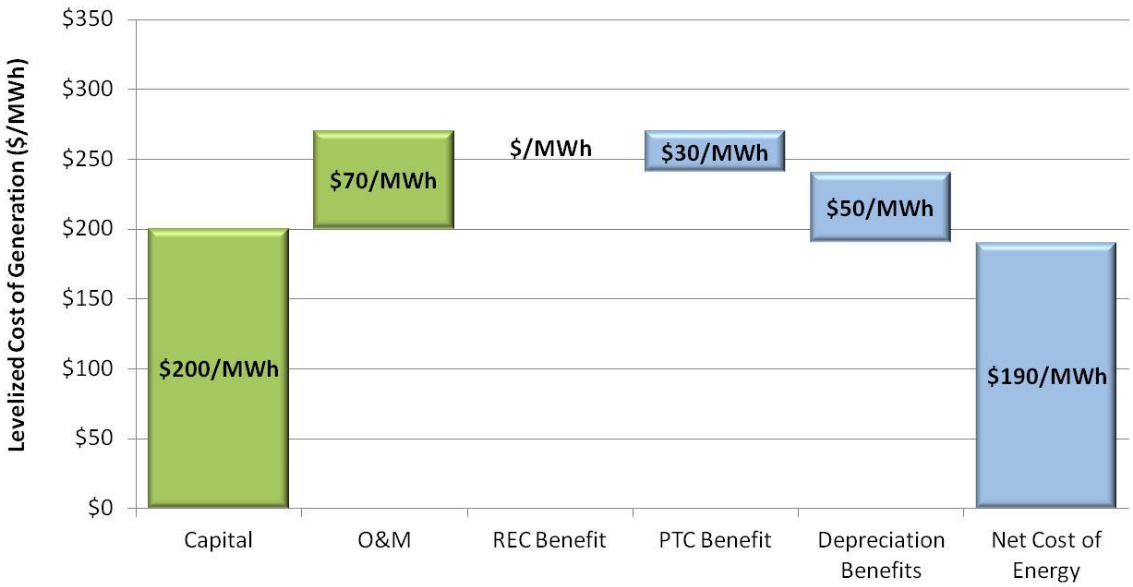
Examples of the benefits of aggregation are fairly common in different industry sectors, and have benefitted the parties involved like co-ops, non-profit energy procurement consortiums, etc. These types of organizations can typically negotiate from a stronger position with a single counterparty. The analysis within this report reinforces and attempts to quantify the conventional wisdom that aggregated procurement yields cost reductions.

Aggregation's benefits for OSW under this model are more pronounced because of the multiple paths to LCOE reduction. These include:

- Reduction in capital costs from economies of scale
- Amortization of fixed costs, such as transmission lines over larger wind farms
- Lower construction costs resulting from efficiencies due to experience (pilot to utility scale or increased size of utility scale)
- Reduced concentration of risk and a subsequent reduction in capital costs

The benefit to ratepayers over the life of the aggregated projects is the potential reduction in the LCOE by up to $35/MWh (and up to $55/MWh with aggregation and use of low debt financing). How this savings is allocated to the project depends on the required cost of energy for the off taker. In the example shown in exhibit 4 the net cost of energy is $190/MWh. This total cost of energy can be apportioned between the energy off taker and the entity with the REC requirement. In this example, if the value of the energy were $60/MWh then the value of the REC would need to be $130/MWh. Under the aggregated program, that REC price has the potential to drop to less than $90/MWh, and with use of low debt financing, to less than $70/MWh.

Exhibit 4: Breakdown of LCOE of Energy for Offshore Wind Project



Source: Pace Global.

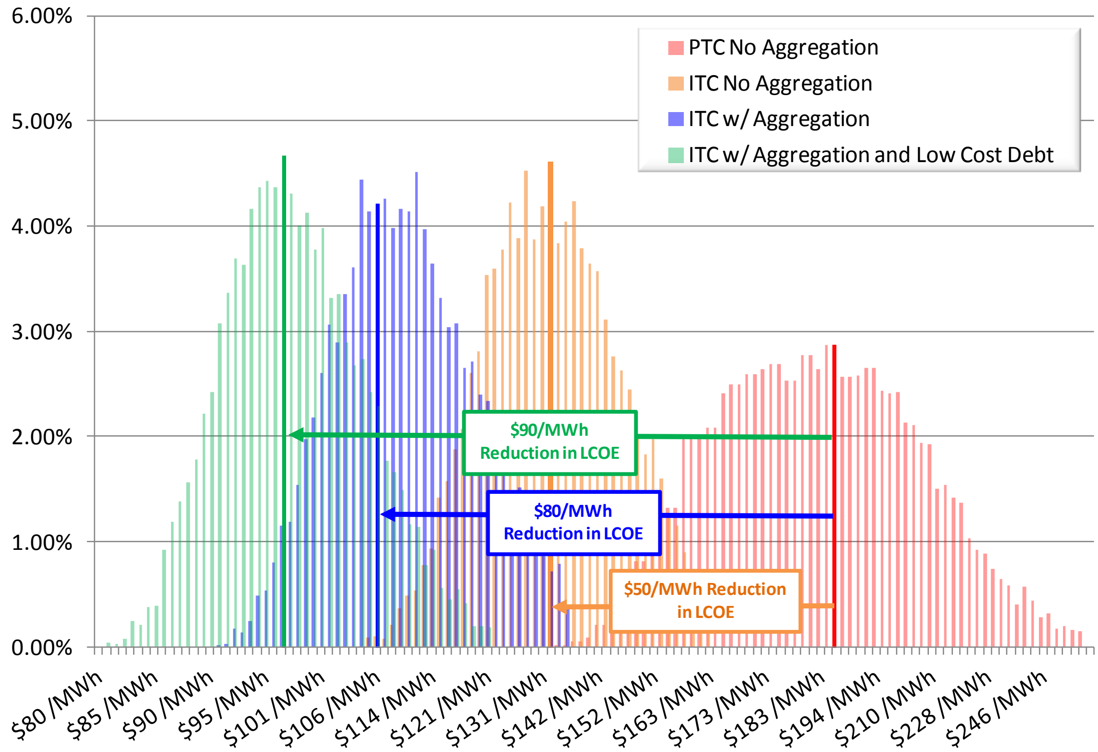
It should be remembered that other factors, such as RECs, will affect the price of electricity, but the aggregated demand approach for offshore wind is likely to result in lower investment costs that could save $200M for every 100MW of OSW installed under an aggregated procurement program.

OTHER OSW CONSIDERATIONS

Federal Incentives for OSW - PTC vs. ITC

U.S. federal tax credits have driven significant growth in renewable energy over the past decade or so, including both the PTC and the ITC. Onshore wind has been eligible for—and generally— has realized greater financial benefits from the use of the PTC. At this time, the PTC is set to expire at the end of 2012, meaning that if Congress does not pass legislation to extend the PTC, wind projects that are not operational by the end of the year will no longer be eligible for these tax credits. Solar projects, with comparably higher capital costs, are eligible for and benefit more from the ITC, which is set to expire at the end of 2016. Although onshore wind has traditionally used the PTC, the cost profile of OSW is much closer to that of solar in that it has a much higher capital cost as compared to its total production. For this reason, OSW would receive more benefit from the ITC as a federal incentive. From our analysis, the ability to use the ITC for OSW could result in an additional $50/MWh reduction in LCOE as illustrated in Exhibit 5.

Exhibit 5: Comparison of Aggregated OSW LCOE with and without ITC Benefits



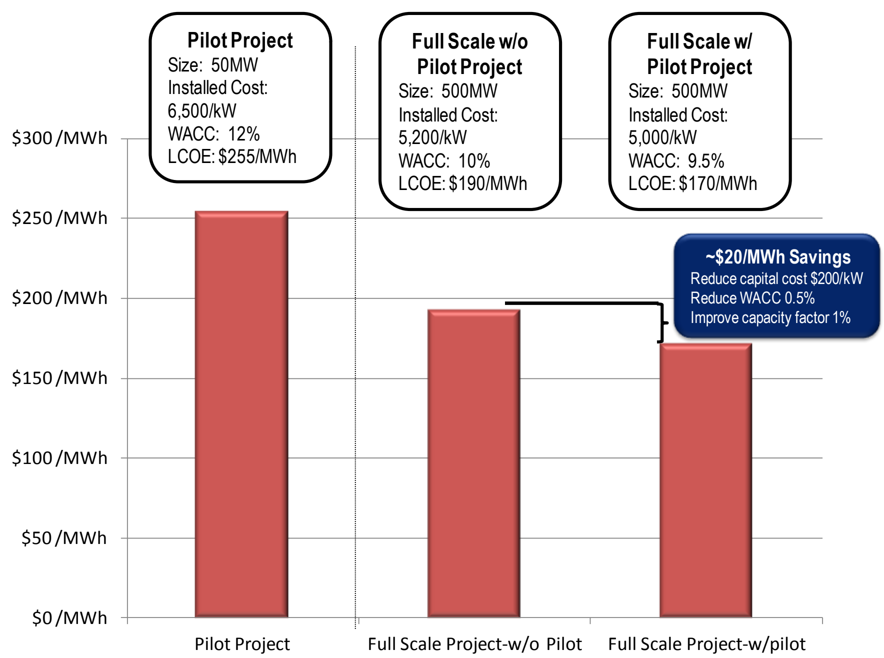
		No Aggregation	w/ Aggregation	w/ Aggregation and Low Cost Debt
PTC	Median	$185	$150	$130
	Range	$135-$250	$120-$195	$105-$175
ITC	Median	$135	$105	$95
	Range	$110-$160	$95-$135	$85-$120

Source: Pace Global

Start Small – Pilot Project Can Offer Benefits

Because first-of-a-kind technology in a region will face more uncertainty and scrutiny than existing technology until lenders, regulators and permitting officials become comfortable with its capabilities, there may be benefits to starting small. An initial pilot project could help set a precedent to optimize construction costs and the permitting process, and increase lender confidence in OSW's reliability and performance. All of these factors can also help to reduce the range of cost uncertainties and lower overall cost of project development. Whether a pilot project is a smaller initial phase of a larger aggregated procurement or a separate development, it can benefit larger-scale OSW development in the longer term. In terms of a project to demonstrate the economic and financing aggregation concept, first project would likely need to be on the order of at least 50MW. Assuming conservative improvements that directly resulted from a pilot project including lower cost of capital and decreased installed cost, and keeping all other assumptions constant, it was determined that a pilot project could reduce the LCOE of future, full-scale OSW projects by $20/MWh (Exhibit 6).

Exhibit 6: Comparison of LCOE with and without Pilot Project Benefits



Source: Pace Global

State OSW Mandates

In addition to federal incentives, individual states can incentivize OSW through modifications to existing renewable mandates that (1) define a set amount of energy sold in the state to come from OSW and (2) create a structure to financially incentivize OSW, noting the cost structure of the technology. New Jersey set a precedent for this with the passage of its Offshore Wind Economic Development Act (OWEDA) in 2010.[6]

All of the Eastern Seaboard states from Maine to North Carolina either have a voluntary or legislated mandatory requirement for renewable energy. However, it is lower-cost renewable energy technologies, like onshore wind, that are largely relied upon to meet these targets. OSW's LCOE in most cases need provisions to become more cost competitive with these lower-cost renewable technologies. Some states, like New Jersey and Maryland, are proposing separate provisions with instate renewable mandates to truly create demand and a means for OSW to be used as a renewable technology to meet state RPS requirements.

[6] OWEDA calls for the development of a minimum of 1,100MW of OSW to serve New Jersey as a means to diversify and increase renewable energy supply and drive economic development in the state. A separate technology carve-out for OSW was incorporated in New Jersey's existing Renewable Portfolio Standard (RPS) as well as a separate market for OSW RECs–referred to as ORECS–that will compensate projects based on the economic needs of OSW.

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MEMO TO: CLEAN ENERGY STATES ALLIANCE

FROM: PACE GLOBAL

DATE: JUNE 7, 2012

SUBJECT: PILOTING OFFSHORE WIND: A SCALED APPROACH

INTRODUCTION

In support of its work to promote U.S. offshore wind (OSW) development, Clean Energy States Alliance (CESA) engaged Pace Global to assess the merits of different approaches to reducing the high costs associated with OSW projects. For example, the concept of an aggregated procurement network, whereby creditworthy off-takers collectively procure large volumes of energy generated from OSW as a strategy to lower the levelized cost of energy (LCOE), was one such approach already examined.

During the course of that analysis, it came to light that the development of a pilot-scale project could offer significant benefits to its developer and could, therefore, be a more effective strategy to lower the cost associated with OSW development. This memo elaborates on these benefits of starting small.

CONTEXT: THE VALUE AND CHALLENGES OF OSW DEVELOPMENT

OSW is a resource that offers tremendous potential. The U.S. Department of Energy (DOE) has estimated wind resources along American lakes and coastlines could provide 900,000 megawatts (MW) of electric generating capacity, a figure which came very close to then-current U.S. total generation capacity. In Europe, according to The European Wind Energy Association as quoted in a December 2011 report by *Platts,* more than 1,200 turbines have been installed at 49 wind farms across nine European countries, generating approximately 3,300MW of capacity. An additional 141,000MW of capacity was also reported to be in various planning states.[1] However, despite this potential, and the demonstrated success of OSW across the Atlantic, there are no operational U.S. projects to date.

Successful construction of projects in the U.S. has been limited by a number of factors.[2] First, demand for OSW and the policy environment for renewable generation have been uncertain. While the Obama administration is attempting to facilitate the development of a project pipeline for OSW—for example by streamlining environmental reviews of offshore wind leases—much of the burden for creating demand has been left to state-initiated mandates and incentives that target producers of offshore wind.[3]

And policy uncertainty is not the only challenge facing the industry. Historically, the costs associated with OSW development, specifically equipment, construction, and capital costs, as well as a lack of domestic manufacturing capacity and committed off-takers, have been the largest impediments for an OSW

[1] According to the European Wind Energy Association in its report, *Wind in Our Sails: The coming of Europe's offshore wind energy industry*, 141GW (141,000MW) of offshore wind is either operational, under construction, consented to or in the consenting phase, or proposed by project developers or government-proposed development zones.

[2] It should be noted that a few organizations have projects currently in the proposal stage. Some examples include Fisherman's Energy, which has developed a 25-MW project off the Atlantic City coast to serve as a test case for meeting New Jersey's 1100-MW OSW goal. A second example is Cape Wind, which gained approval to construct a groundbreaking utility-scale wind farm in federal waters and hopes to begin construction by the end of 2012. According to a December 2011 article by Platts, 11 companies have claimed to be interested in offshore leases in New Jersey, 10 have expressed interest in Massachusetts, and both Maryland and Rhode Island have eight companies potentially seeking offshore leases.

[3] Today's regulatory environment invites a cautiously optimistic perspective regarding the OSW pipeline, as several states, including New Jersey, Maryland, Massachusetts, and Rhode Island have or are developing mandates.

pipeline.[4] Finally, as industry experts have pointed out, for an OSW proposal to be economically viable, a substantial subsidy from ratepayers must occur; in addition, delays and cost overruns are common when pylons and turbines are built, making the development of OSW projects a risky pursuit at best.

THE PILOT PROJECT CONCEPT

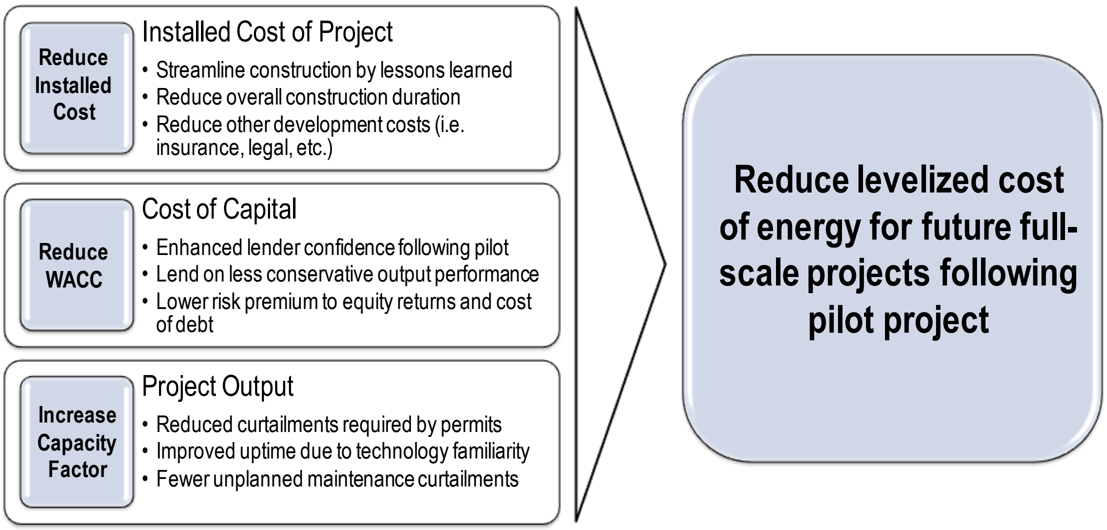
Because first-of-a-kind technology in a region will face more uncertainty and scrutiny than existing technology until lenders, regulators and permitting officials become comfortable with its capabilities, there may be longer term cost savings benefits to starting small. An initial pilot project could help set a precedent to optimize construction costs and the permitting process, and increase lender confidence in OSW's reliability and performance. All of these factors can also help to reduce the range of cost uncertainties and lower overall cost of project development for future projects.

While the initial cost of a pilot project would be proportionately greater than that of a larger utility-scale OSW project because of its smaller size, a pilot project could ultimately lead to cost savings for future projects. Such savings would stem from the fact that a pilot project would provide better clarity with regard to the true costs associated with developing a project of this type as well as OSW energy feasibility. Specifically, pilot projects help to reduce the development and construction costs for new builds as well as reduce the cost uncertainty associated with new applications of technologies. Further, having a project operational would provide certainty and comfort to the lending community, in turn reducing the cost of capital for future projects. The lessons learned with regard to feasibility and capital efficiencies would translate into cost savings for future projects in the associated state and, ultimately, for rate payers.

As illustrated in Exhibit 1, the major cost drivers components that we expect to directly improve following a successful pilot project are (1) reduced capital cost due to construction efficiencies, (2) reduced financing costs represented as the weighted average cost of capital (WACC) due to increased lender confidence and (3) improved operational performance due to reduced curtailments.

4 For example, with regard to financing, *Platts* reported in December 2011 that Cape Wind had lost the opportunity for a loan guarantee from the Energy Department, and only had a power purchase agreement in place for 50 percent of the 420MW that it hopes to generate. Recently, however, as a result of a merger settlement, Northeast Utilities has agreed to purchase another 27.5 percent of Cape Wind's energy. Further, according to a January 2012 article from *The Baltimore Sun,* NRG Energy pulled the plug on its Bluewater Wind project after Delmarva Power's hefty agreement to buy capacity was not sufficient to inspire lender confidence in the project.

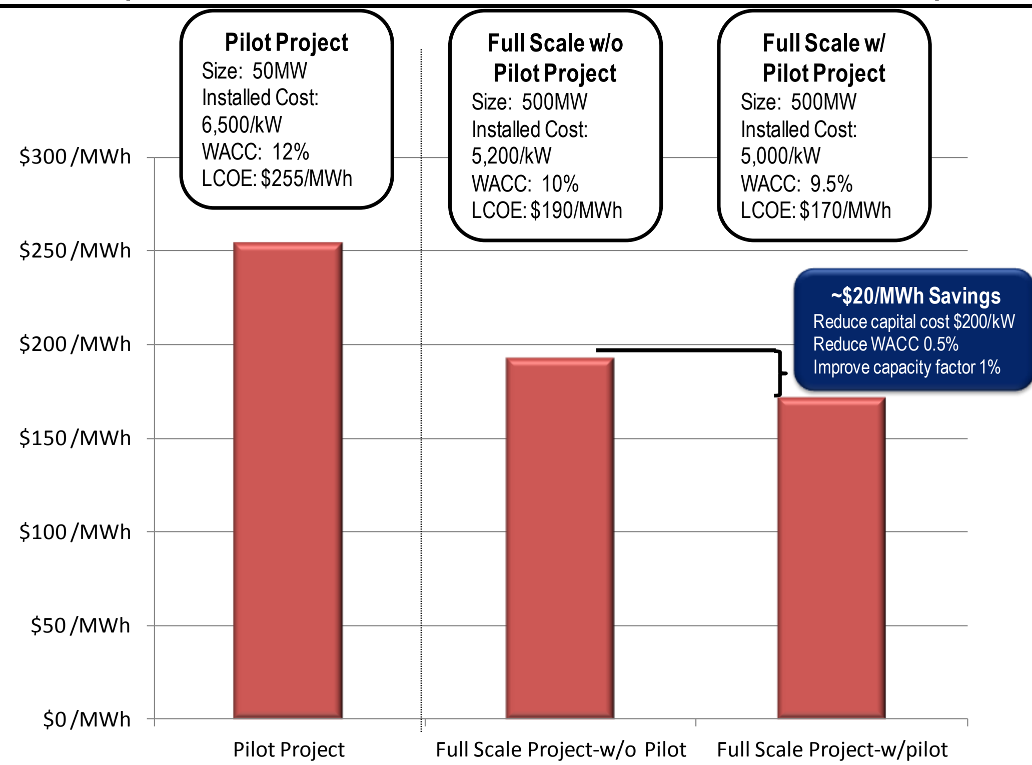
Exhibit 1: Pilot Project Cost Reductions for Future Full Scale OSW Projects



EXAMPLE OF PILOT PROJECT SAVINGS

To quantify this bit of conventional wisdom, Pace Global performed a representative analysis of the total costs of a pilot project as compared to a full scale development OSW project both with and without the benefits of an operational pilot project. Assuming conservative improvements that directly resulted from a pilot project and keeping all other assumptions constant, it was determined that a pilot project could reduce the LCOE of future, full-scale OSW projects by $20/MWh as detailed in Exhibit 2.

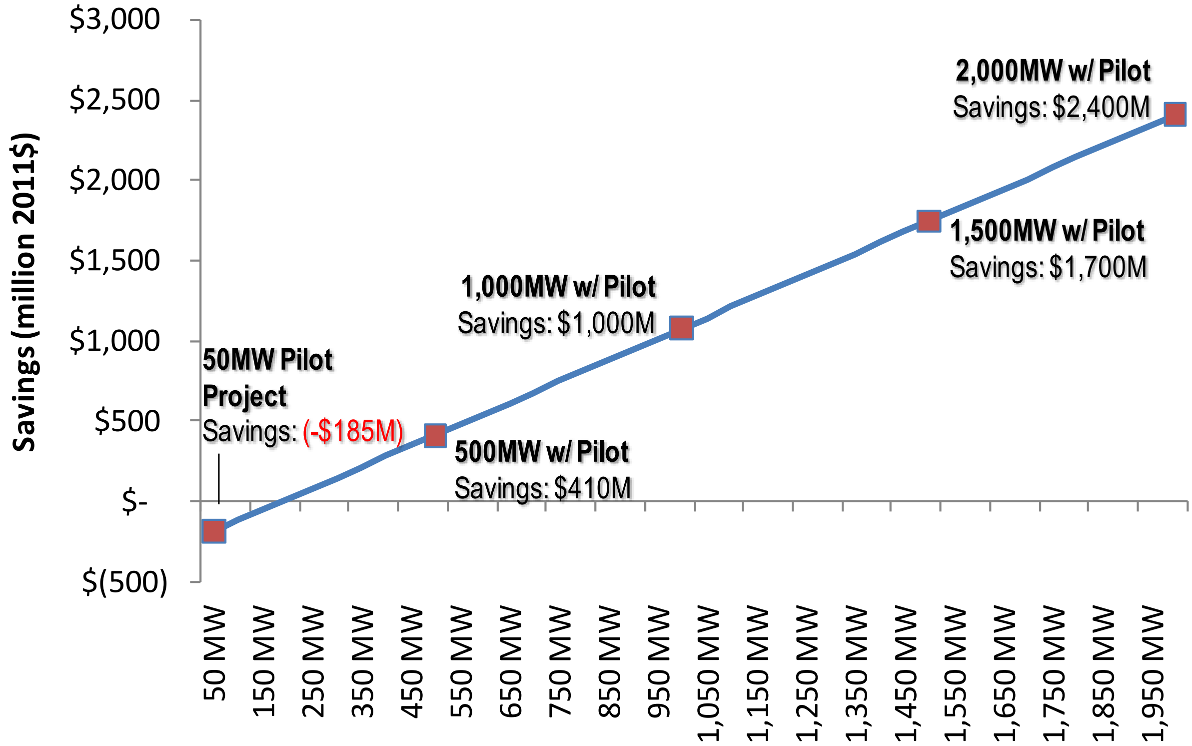
Exhibit 2: Representative LCOE of Offshore Wind Pilot and Full Scale Developments*



* Represents LCOE after tax and depreciation incentives
Source: Pace Global

Savings opportunities following the pilot project would only be realized in future full scale deployments. To make up for the above market costs of the pilot project and begin to realize savings based on the example above, it is estimated that at least one full scale development of around 200MW would be needed. Furthermore, the larger the capacity base of full scale OSW projects ultimately developed the greater the savings attributable to the pilot project would be. Simplistically applying the $20/MWh savings to future full scale deployments, the estimated savings attributable to the initial pilot project over a 20-year power purchase agreement for OSW could reach $2.4B with a cumulative capacity of 2,000MW, as shown in Exhibit 3.

Exhibit 3: Savings Attributed to Pilot Project Realized by Capacity of Future Full Scale OSW



Note: Represents savings over a 20-year power purchase agreement term
Source: Pace Global

CONCLUSION

Because first-of-a-kind technology in a region will face more uncertainty and scrutiny than existing technology until lenders, regulators, and permitting officials become comfortable with its capabilities, there are benefits to starting small.

Pace Global determined that developing an initial pilot project could help set a precedent to optimize construction costs and the permitting process. Pace Global also determined that there is merit in the belief that a pilot project could increase lender confidence in OSW's reliability and performance. All of these factors can reduce the range of cost uncertainties and lower the overall cost of development for a given project. The long-term savings that could result would depend on (1) the magnitude of above-market cost spent on the pilot project and (2) the scale of future developments that would ultimately realize these cost savings.

Appendix B

Design Elements of an Effective Buyers Network for Aggregated Procurement of Offshore Wind Energy

The following recommendations are offered to inform the design of an effective aggregated procurement process for offshore wind energy.[1]

a. Use of Request for Information To Inform Potential Off-Takers of Network Value

As an initial step, regardless of the structure, the buyers network administrator should issue a Request for Information (RFI) to address the fact that not enough is known, at the current time, regarding how developers will view the network concept, what terms to expect (pricing), and whether the terms would be attractive given the prices that participating buyers are paying for renewable energy under renewable portfolio standards (RPS) or other supporting policies. RFI responses would provide potential network participants with needed information in order to commit to a set of power purchase agreement (PPA) terms that they jointly expect to be attractive and feasible. The RFI also would be undertaken to obtain developer feedback on how to shape an eventual Request for Proposals (RFP). RFI responses will help to indicate whether the network actually will drive meaningful cost savings and transaction costs associated with OSW procurement.

b. Aggregating Buyers and Negotiating a PPA

Each member of the network will have a unique view of its demand for offshore wind energy. One buyer may want a 10 year term for up to 50 MW for example, while another may want 20 years of supply for 100 MW. Some buyers may prefer lower near-term prices in exchange for higher prices in the future, and others may prefer a fixed-price arrangement for the term of the supply contract. The network administrator would aggregate these various expressions of interest and develop a joint RFP for the aggregate quantity on behalf of the participants.

After RFP responses are evaluated with the help of the network's administrator, the administrator should conduct contract negotiations with wind developers that have submitted the leading

[1] The recommendations are informed by the World Resources Institute's "Purchasing Power: Best Practice Guide to Collaborative Solar Procurement" (2011).

proposals. Centralized negotiation is more cost effective and should drive better contract terms and conditions.

Much of the PPA language can be standardized, but some buyers may have differing contracting processes, legal requirements and perceptions of risk. Therefore, while the network can select projects through a public solicitations process that is jointly implemented, there may need to be some level of individual negotiation between some buyers and the generator and creation of individual PPAs for buyers that cannot agree to the terms of the standard PPA.

To the extent needed or desired by the buyers, the network administrator also may wish to coordinate other services that help improve the value of the supply acquired under the PPA. For example, these services may include energy balancing to turn a variable supply into a firm supply.

c. Development of Standard Solicitation

Once participants have obtained internal approval to use the joint procurement process (1) based on their understanding of the likely terms of expected bids (from the RFI) and (2) subject to final procurement approval by the individual participant's specific regulatory bodies under governing laws, the participants should be allowed the opportunity to provide input to the network administrator on the final design of the procurement process, model contract terms, and RFP timeline.

The network administrator, in collaboration with the participants, would then develop a model RFP for OSW procurement based on terms and conditions that are mutually agreeable to the major purchasers and that requires bidders to provide a competitive all-in delivered price ("a procurement bundle"). The RFP should be developed, to the extent practicable, to reflect flexible provisions for areas such as contract term, location, and pricing structures to meet procuring entities' differing needs.

The RFP should be adapted to the specific "bundle" characteristics so that solicitation responses can be compared and evaluated accurately. The participants should be asked to approve the final collaborative contract terms, process, and RFP documents, acknowledging approval through a memorandum of understanding or other statement of intent. The administrator would then finalize bundle aggregation and alter the final RFP documents for the specific needs of participants. If the total pool of participants and demand has changed as a result, the administrator would reassess and possibly adjust the bundle accordingly.

The RFP could include (or be preceded by) a bidder pre-qualification process. Bidder pre-qualification may streamline the selection process, ensures that participants are contracting with high quality developers, and facilitates federal participation.[2] Pre-qualification may also be necessary for purposes of establishing the project's REC-eligibility. For example, New Jersey requires project developers to file an application showing that the project will yield positive environmental and environmental benefits for the state to qualify for ORECs (offshore renewable energy credits) (Special Adopted New Rules: N.J.A.C. 14:8-6.).

Subject to participant approval, it is recommended that proposals be evaluated on "best value" rather than "lowest cost" basis. While cost-competitiveness should be a primary criterion, multiple criteria could be used to evaluate proposals, including developer capabilities and experience, past performance, financial information, how the developer intends to use available incentives and other financing tools, use of industry best practices, long-term maintenance costs, etc. Participants should provide input on weights to be ascribed to each criterion (votes on weighting could be averaged as an equitable way to agree on each criterion's weight).

It also may be useful for the network administrator to engage an independent expert advisor(s) with resources and experience to support the procurement process. The advisor's role would be to assist network participants, incorporate developer input into the bidding process and timeline, support the procurement and evaluation processes, and evaluate and recommend use of effective financing mechanisms in association with group procurement to further reduce OSW costs. The advisor should be selected to ensure his/her independence of any purchasing party, potential bidders and industry representatives.

d. Proposals Evaluation Process

After the RFP deadline, the network administrator and technical advisor(s) should score bids based on the pre-agreed criteria and weighting specified in the RFP. The network administrator also could use an evaluation committee composed of participant representatives if participants decide this is necessary, effective and useful to ensure support and confidence of key decision-makers. The expert advisor team would respond to questions of the evaluation committee, create detailed analysis of performance and pricing, and provide recommendations and guidance on PPA negotiations. A key evaluation criterion should be adherence to the terms and conditions that participants agreed to in the RFP to ensure the support of key decision-makers who have previously, although tentatively, approved the terms under which contracting will be acceptable. The network administrator should then determine the winning bidder(s) with the evaluation committee and brief all participants.

[2] Lessons Learned from Net Zero Energy Assessments and Renewable Energy Projects at Military Installations, NREL/TP-7A40-51598 (September 2011) (recommending creation of a list of pre-qualified renewable energy developers to streamline renewable procurement at military bases).

e. Negotiations and Awards

Once bidders have been selected, the participants would be able to collectively complete the negotiations process with an end goal of individual participant approval and final contract execution. Participants should be required to update internal and jurisdictional decision-makers during negotiations to ensure management of timelines and to resolve concerns identified during negotiations.

Although the network procurement documents will include foundational contract language, there should be opportunity for limited negotiation. Specifically, network participants should be allowed to refine contract documents for any specific jurisdictional and regulatory requirements applicable to their internal, external and/or state contract approval process. However, participants should be required to use best efforts to submit final documents to decision-makers for approval and seek final contract approvals as soon as practicable, and within specified, accelerated timelines (with waivers available for good cause).

To assist and facilitate final negotiations, the network administrator and expert advisors should review final contract terms and conditions, pricing and production estimates, and other documents to ensure that final agreements are aligned with the original intent and that favorable pricing has been captured. The network administrator and expert advisors also should be made available to provide testimony, support, and analysis to participant decision-makers and regulatory authorities, as requested, to explain and inform required contract approvals by authorities.

PPA contracts should be executed by each participating off-taker. Individual purchasers would be asked to use best efforts to use the template PPA documents developed by the network administrator in order to reduce transaction costs of all participants and winning bidders. However, again, each jurisdiction may make minor modifications to the PPA template as necessary to meet jurisdictional or organizational requirements for final approval by relevant authorities.