

DOER Request for Stakeholder Comment: Offshore Wind Additional Procurement Study

Section 21 of Chapter 227 of the Acts of 2018 (“2018 Act”), An Act to Advance Clean Energy, requires the Department of Energy Resources (“DOER”) to investigate the necessity, benefits and costs of requiring the electric distribution companies to conduct additional offshore wind (OSW) generation solicitations of up to 1,600MW beyond those already required by 83C of An Act Relative to Green Communities, St. 2008, c. 169, as amended by St. 2016, c. 188, § 12 (“Section 83C”).

DOER is inviting interested stakeholders to provide input into its investigation under the 2018 Act by responding in writing to the following questions. These questions solely pertain to additional procurements above and beyond the 1,600 MW solicitations currently required by Section 83C. Any reference to “additional OSW procurements” refers to solicitations that are incremental to the 1,600 MW of solicitations already authorized under Section 83C.

Please email written responses to eric.steltzer@mass.gov by **Friday March 1, 2019 at 5:00pm**, and where applicable, links to resource materials that may be useful for DOER to review in its investigation. Please note that responses will be considered public information. Thank you.

Respondent Information

1. Please provide the name of your organization and your contact information.

Bill Follett

K2 Management

bfo@k2management.com

2. Please briefly describe your organization and your interest in the Commonwealth’s OSW procurements.

K2 Management is a global team of Engineers and Consultant who operate exclusively in the renewables market. We were founded in 2007 to support clients and their projects in the wind industry and to date, have been directly engaged in 1500+ onshore, 200+ offshore, and 140+ solar PV projects. We have offices on six continents, with our US operations based in Waltham, Massachusetts.

We have a long history in the OSW sector – having worked on over 90% of global OSW projects constructed to date. We started our work in Massachusetts on the Cape Wind project and are actively engaged in the US market. We are currently supporting OSW projects in the UK, the EU, Asia and the US.

Necessity

3. Are additional OSW procurements for long-term Power Purchase Agreements that are above and beyond those authorized by Section 83C necessary to support the development of OSW?
 - a. What are the advantages and disadvantages of longer and shorter term (i.e. 10 years, 25 years) periods for Power Purchase Agreements to developers, ratepayers, or others?

Developers and Ratepayers want predictability that comes with a longer-term PPA, but this security/predictability has a cost and impacts to both developers and consumers.

Structuring the procurement strategically is challenging.

In general it should be expected that pricing for power from a 25-year PPA would be lower than that for a 10-year PPA

Some tools/levers for PPAs could include:

- % of project could participate in merchant market
 - PPA could be structured with a basement price where the wind farm receives a minimum payment for the power it generates– this methodology is employed for commercial PPA’s in the US and has some similarity to the UK CFD scheme.
 - Sharing of upside with wind farm if power prices rise significantly above planned inflation rate.
 - Allowing a project to receive a portion of higher prices during market spikes can be an incentive. This approach could incentivize a project to run and maintain availability ensuring there is a lower cost “moderating” resource on the grid.
 - Negotiate a fixed value for RECs and Capacity payments as part of contract.
 - Options for different terms -, can a project opt of its PPA at some point? Renegotiate/true up prices if power prices change significantly?
 - PPA’s should have a minimum delivery quantity and production-based availability – incentivize the project by paying a higher rate if they deliver more lower cost power to the grid – this could save ratepayers in the long run keeping downward pressure on power pricing.
 - PPA pricing can be structured with bonus rates or tiers to reward local content, adding additional revenue if local content is employed for manufacturing, this potential revenue stream could incentivize local supply chain development. Currently PPA’s and owners have limited incentive to take a risk or invest in the US supply chain. Rock bottom prices for OSW mean components from Asia and the EU.
- b. Are there advantages or disadvantages in soliciting OSW in a stand-alone procurement – or could it compete in a broader renewable or clean energy procurement?

If the goal of a solicitation is to encourage OSW, then it must have significant scale and allow for a staged COD date. OSW will have difficulty bringing down costs if only

small-scale solicitations are offered as smaller scale solicitations do not provide the pipeline/scale for these capital-intensive projects to be successful.

The major issue with mixing OSW with other generation sources is that OSW does not have the competitive advantage of capitalizing on existing infrastructure. Most other generation sources can readily capitalize on the existing, transport, pipeline and transmission system infrastructure. The cost of designing the existing electrical infrastructure to support conventional and nuclear generation has already been socialized in the rate base

Scale of a procurement makes a difference; OSW is not going to successfully compete for a 100MW procurement against solar or land-based wind. The scale of a non-aggregated solar project that can be realistically constructed in New England is generally below 50MW, primarily due to land constraints. Accordingly solar and storage as a combined resource is more suited for distribution system deployment.

A 2GW + tender would bring a significant block of power to the table that few other technologies can supply.

OSW currently has the best potential to provide a higher capacity factor resource to replace retiring fossil fuel and nuclear generation and resolve the perceived natural gas supply constraint issue.

Land-based wind in Maine could be more competitive than OSW but faces many of the same transmission system-related infrastructure challenges.

If OSW is the direction the region wants to move towards, then putting a plan in place to resolve transmission issues is the bigger game

4. Are the opportunities to participate and earn revenue in the wholesale markets (e.g. Energy, Capacity, and Ancillary Services) and renewable energy certificate payments sufficient to support the development of new OSW projects? Why or why not? Are there recommended changes to the wholesale market structure or renewable energy portfolio standard that would impact your answer?

These mechanisms can't support conventional generation, so it is difficult to see how, in their current configuration, they would work for OSW which has a higher base cost.

Suggest looking at this market differently and offering a PPA structure that incorporates these services in the price paid and capacity requirements, if the developer foregoes direct participation in these markets. This would provide a more consistent revenue stream for projects potentially resulting in a lower overall power price.

5. Are there other forms of financing mechanisms, such as Offshore Renewable Energy Certificates (ORECS), that could support OSW?

ORECs are a market support mechanism for risky markets. The perceived risk for OSW

has reduced significantly over the last 5 years, accordingly there is a significant market for financing OSW projects.

ORECS are problematic, restrictive and artificially inflate power pricing.

ORECS have not incentivized the market in Maryland and similar schemes are phasing out in the EU.

A more effective use of these funds may be in supporting development of infrastructure for transmission systems, supply chain or port facilities – these are big risk/high cost items for developers. Spending ratepayer money on these items directly maybe more beneficial politically as well.

6. What are the costs and benefits of an additional OSW procurement(s) on potential pricing and other impacts on wholesale markets (e.g. Energy, Capacity, and Ancillary Services)? Please be as specific as possible as to which markets you are referring too.
 - a. What, if any, would be the effect on the wholesale markets caused by an additional OSW procurement(s)?

Energy Wholesale Markets

Additional offshore procurements are the only scalable renewable generation options in the region on a transmission level.

Adding in fixed price OSW on a 10 or 25-year PPA will level the wholesale market price – look to Texas if you need proof.

Leave the Capacity market game to conventional assets this could provide a revenue stream to keep them as viable assets when the need arises but limit their overall power generation contribution to the grid.

REC market is already low in New England – if instead a carbon tax is brought in the benefits of the carbon tax could be utilized to fund infrastructure to support the development of renewable resources.

As more OSW comes on line the demand profile for natural gas should reduce, as will the market created constraints on the existing pipeline system- this will make gas more competitive in the generation mix.

Ancillary Services

OSW can participate in this market, but it has to be structured like all renewables as when operating market.

OSW projects could be operated at a lower level and provide the ability to ramp up like a conventional plant, however a more intelligent way to do this for the system is through storage, curtailment or pumped storage which can be located closer to the load centers.

Capacity Market

Renewables have not been successful in most regions in the capacity market, OSW

could play a larger role here if a larger geographically diverse base of projects could be employed as a unit. Individual projects will likely continue to struggle to generate significant revenues from the capacity market.

Blue sky – suggestion - leave the capacity market to entities like Nuclear/Gas and Storage instead provide some bump for OSW PPA's if they forgo these markets.

- b. If there would be any negative effect, are there recommended solutions to mitigate the effect?

Further economic pressure on marginal assets, CT's recent Millstone procurement, Mystic Station price supports

More OSW could potentially increase values on the capacity market for a period as the grid transitions to more renewables.

7. Would additional OSW procurement(s) incremental to procurements under Section 83C have any specific wholesale market impacts on other low/no emission resources?

Yes – OSW wind is already lower cost than nuclear

More OSW will make virtually all nuclear plants noncompetitive.

OSW could impact land-based wind development and would also impact projects like the proposed connection to HQ through Maine.

Depending on how OSW procurements are structured they could impact solar and solar storage projects. However this could be avoided by strategically selecting/structuring procurements for smaller projects that focus on a transmission and distribution system avoided cost model

8. What are the potential pricing and compliance impacts of additional OSW procurement(s) on Renewable Energy Certificate and Clean Energy Certificate markets?

9. Will additional OSW procurement(s) have specific seasonal market impacts?

It would be expected that OSW would flatten winter and summer peaks.

10. Is an additional 1600MW of solicitation(s) the appropriate target? Why or why not?

1600 MW is too small - recommend instead a minimum procurement for the state of 5000 MW or regionally at double or triple over a 10-year period

To put 1600 MW in context – in the next 5 to 8 years this will be approximately 100 WTGs. This level will not be enough of a market driver to provide supply chain development benefits for the region.

A larger scale procurement provides certainty to developers, allows time for investments to be

made in supply chain, and allows time to resolve transmission related issues and get infrastructure in place to support the build out. This level of commitment should be caveated by some requirement/bonus for local content to incentivize manufacturing if that is the goal.

Transmission

11. What are the advantages and disadvantages of requiring a coordinated OSW transmission network?

a. If there are advantages, what would be required to accomplish this?

The current model of developers racing for a connection point and taking whatever capacity is available is not the best use of the system and causes significant challenges for the ISO.

The current system is designed around small-scale additions and large conventional generation plants; accordingly the system is not designed to manage development or a transition to new generation sources.

A plan and commitment from the region that moving the transmission system upgrades to support offshore wind is critical to success. If developers know where and how they can interconnect, it saves a significant amount of effort and time on public outreach, permitting, and interconnection related processes.

If transmission system focused developers are allowed to participate they could reduce the work load of the ISO and provide a more holistic system plan that would better serve the region and provide redundancy to the system. The current “free for all” race to available interconnection points is costly to all parties involved.

Examples of successful transmission system approaches include:

- Texas CREZ line – this could be the single best example of how a planned transmission system expansion can change the electrical market.
- The German model for buildout of the electrical grid.
- Several grid connection development projects are ongoing in the EU

b. Are there changes to the solicitation process that could accomplish this?

Allowing for the participation of third-party grid developers or potentially requiring offshore wind projects to sell their transmission connection like the OFGEM model in the UK could be a tool.

c. Could state or regional support for a transmission system to support further offshore wind development be sufficient to finance further offshore wind development?

Yes, if there is a plan to develop a regional transmission solution. The current “every benefit must go to my state” approach is ineffective and is one of the single largest hurdles for any OSW project. No project can be successful if they don’t have a transmission path.

Some model based on the German grid expansion model may be more successful and could then provide the certainty for the development of an offshore transmission system that could efficiently deliver power to existing major interconnection points.

Other Factors that Impact Cost and Price

12. What, if any, impact will the expiration of the federal Investment Tax Credit have on future pricing for additional OSW procurement(s)?

13. What is the potential for advancement of technological improvements in offshore wind sector to affect pricing for any additional OSW procurement(s)?

As WTGs get larger, Capex on a /MW basis decreases.

Floating WTGs will likely become more economical in the next 10 years providing an opportunity for further development – possibly in the deeper waters North of Cape Cod.

14. What restrictions on price shall there be on any additional OSW procurements, if any? Should each successional procurement be required to reflect a price decrease?

Prices should be expected to decrease; examples:

- The UK and EU OSW markets
- The US onshore wind market brings in generation prices that are below \$0.02/kwh (PTC not include)
- Price reduction in solar market are another significant example.

If a secure pipeline of projects is provided, then a maximum price the state/region is willing to pay can be set. If there are incentives for local content, then these could be added on top of the price.

15. With pending retirements in New England should there be a particular focus on specific development areas and/or transmission interconnection points to relieve future reliability constraints?

Yes

There is not money or willpower to reinvent the grid, accordingly there should be a focus on a REGIONAL transmission system with transmission connections to load through existing corridors. This is the most achievable solution and in the long run likely to be the most cost-effective solution to allow renewables to replace conventional generation sources.

Providing a transmission system path from OSW to existing coastal grid connection points at existing/retiring generating assets is the “easiest” way to tap into the system.

Well identified examples include, Pilgrim, Seabrook, Millstone, Shoreham. Brayton Point, Bridgeport CT, New Haven CT, Montville CT, Manchester St Station Providence, Mystic Station Boston.

As all parties know, permitting a new transmission line, gas pipeline or other major infrastructure project is challenging; trying to accomplish it in a greenfield site adds significant additional complexity.

To capitalize on the existing transmission infrastructure, construction of an offshore grid backbone connecting to strategic points in the existing grid is potentially the most cost effective and “easily” permitted solution. An offshore transmission system does not have to be solely for offshore wind and, if designed properly, can provide redundancy to the existing grid allowing for delivery of power from the larger system to constrained areas in times of higher demand.

Economic Development and Supply Chain

16. Will requiring the Distribution Companies to undertake an additional OSW solicitation of up to 1600 MW impact the development of offshore wind supply chain services in the Commonwealth?

Not clear on the market mechanism here but would requiring distribution companies to focus more on solutions that relied on managing local transmission and distribution system constraint issues – avoided cost approach. These may be more effective then having them solicit OSW?

If so, what potential economic benefits to the Commonwealth may result if OSW supply chain services are located in MA?

The benefits remain the same as for procurement on a larger statewide or regional basis.

17. Are there certain services or products in the OSW supply chain that are more likely to locate in the Commonwealth than others?

Manufacturing Facilities for OSW could locate in Mass with components manufactured in Mass and transported to another staging port for installation.

Mass does not have a specific advantage over other areas with its current infrastructure.

18. Are there actions, outside of additional OSW procurement(s), that the Commonwealth should consider to secure OSW supply chain services are located in MA? Please explain.

Investing in infrastructure to support manufacturing

- New Bedford, while a great example of this effort, is not enough and was built to support earlier offshore wind designs. Developing a manufacturing area that can support OSW is a much more long-term strategic decision. In addition, a well-

designed manufacturing facility with heavy pier and laydown facilities can serve multiple purposes.

- It is impossible for private developers to execute this level of infrastructure improvement on the balance sheet of a project.

Develop a large-scale transmission system plan for the region

Regional Coordination

19. Should Massachusetts coordinate with other states in any future solicitations of OSW?

Yes – in the long run OSW price reductions will not be achieved unless this model is followed. No single state can supply enough OSW capacity to attract the US based manufacturing to bring the cost of OSW down.

A regional/ISO approach is a more logical way to bring a larger block of power to the market. It will:

- Lower costs to consumers
- Provides a larger pipeline/predictability for developers and manufacturers to make investments.
- A more regional approach garners more political support
- Allows for strategic development of supply chain
- Allows for the strategic development of the grid

Massachusetts will gain more from OSW than any other state in the region even when cooperating in a regional framework, through long term service and maintenance jobs and the stabilization of power prices.

20. What are the advantages or disadvantages to coordinating?

A regional approach is best, especially when it is considered that the entire region will likely bear the costs of any system upgrades and will see the cost impacts of OSW as well.

Massachusetts does not have the viable port facilities required to support large scale OSW construction activities. Permitting of these port facilities will be time consuming and costly. Even with significant upgrades, Mass will not have the bridge free access required for large scale OSW development.

A more diverse regionally based supply chain brings cooperation and support from neighboring states for legislation and cost burden.

A regional supply chain will allow for the location of OSW manufacturing and construction ports where it makes the most sense. This will result in costs for ratepayers.

Developers and manufacturers only have so much money to spend and cannot afford to develop a supply chain in each state. Promoting the most efficient development of the supply chain puzzle that capitalizes on existing infrastructure is the best way to lower costs

The onshore wind supply chain is a prime example of why the “my state” only model does not work – onshore wind is a significantly larger market than offshore wind and continues to grow while becoming cheaper to build. This is due to the market driving the decision of where to

locate manufacturing facilities. Texas the biggest single wind market in the US and does not have a nacelle manufacturing facility and only two tower manufacturing facilities, these facilities can not come close to meeting the demand for WTGs in Texas.

It should be noted however that Mass will likely accrue significant benefit from the long-term operations jobs required to operate, repair and support the projects.

Maintaining the current state-based approach to OSW and power procurement in general drives up the cost of electricity for rate payers throughout the region. This approach also stunts the development of the supply chain. status quo of the “my state” only approach is that OSW will be more expensive, and the development of the manufacturing supply chain will be slow and not as efficient.

Disadvantages to regional coordination

The primary risk is political – cooperation and regionalization will inevitably drive down costs and build a broader base of public support.

Other

21. Please provide any other comments pertain to the necessity, benefits and cost of additional OSW procurement(s).

In our role working with and advising both investors and developers the following consistent primary comments are:

- The state-by-state approach while helpful to drive the market is critical, the associated notion/requirement that each state is going to land all the manufacturing jobs in their state is unrealistic and counter productive to the development of the industry.
- A regionalized approach that provided a larger purchase/pipeline of OSW would support investments by OSW suppliers in the US East Coast Market. With a larger buying block and pipeline the region could “require/incentivize” manufacturers to locate in the region.
- States and the region have not invested in the infrastructure required to support offshore construction activities. Developers do not have the time horizon or funding to invest in these infrastructure projects that are critical to execute OSW projects. A planned regionalized approach will better support intelligent development of these assets.
- There are numerous investors who are willing to commit to OSW in the US – the technology of OSW is not the primary risk, certainty regarding power purchases, permitting and grid connection are the biggest risks.