

March 1, 2019

Mr. Eric Steltzer
Deputy Director, Renewables Division
Department of Energy Resources
100 Cambridge St, Suite 1020
Boston, MA 02114

RE: Input to the DOER investigation into the necessity, benefits and cost of requiring the electric distribution companies to conduct additional offshore wind generation solicitations.

Dear Mr. Steltzer,

Equinor Wind US LLC¹ ("Equinor Wind") is pleased to have the opportunity to provide input to the Department of Energy Resources' (DOER) investigation into the necessity, benefits and cost of requiring the electric distribution companies to conduct additional offshore wind generation solicitations of up to 1,600 MW beyond those already required by 83C of An Act Relative to Green Communities.

Respondent Information

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

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

Equinor Wind, together with its affiliates and ultimate parent Equinor ASA, is a global energy producer with nearly five decades of experience in safely developing and operating large-scale offshore assets and infrastructure, including offshore wind resources. The company's existing offshore wind farms power over 1 million homes in the UK and Germany. The company is headquartered in Stavanger, Norway, and is listed on the Oslo and New York stock exchanges.

Equinor Wind won offshore wind lease OCS-A 0520 in the Bureau of Ocean Energy Management's (BOEM) lease sale in December 2018. The lease is located within the Massachusetts Wind Energy Area, 20 miles southwest of Nantucket. As the lease holder, Equinor Wind is looking forward to working

¹ formerly Statoil Wind US LLC, and collectively with its affiliates and ultimate parent company referred to herein as "Equinor")

with the DOER and all regional stakeholders to realize the potential for offshore wind off the coast of Massachusetts.

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?*

Yes. Additional procurements are needed to realize the significant renewable energy production opportunity offshore of Massachusetts. Offshore wind is an energy source in its adolescence in the United States. Significant economic, infrastructure and supply chain hurdles must be overcome in the development of the first generation of such wind farms. Offshore wind farms are capital intensive projects and long-term power purchase agreements are an important risk mitigation tool that can help enable developers to make investment decisions. In addition, state commitment to substantial procurement through legally binding agreements is an essential prerequisite to the development of a local supply industry required to support the offshore wind industry.

More specifically, Massachusetts needs to initiate and maintain such binding commitments to remain competitive with other states in the region that have called for the procurement of offshore wind. Moreover, large amounts of renewable energy will be urgently needed to replace retiring nuclear power stations and to meet the state's obligations under the Global Warming Solutions Act.

- a. *What are the advantages and disadvantages of longer and shorter term (i.e. 10 years, 25 years) periods for Power Purchase*

A longer-term contract provides certainty for a developer that the cost of construction will be fully and profitably recovered over the life of the project. The reduced risk profile established by such a contract minimizes the risk premium a developer must include in a bid price. This lowers the price for the product in a way that is highly beneficial to consumers. Competitive procurements for these contracts result in a price of that power that reflects the least cost that could be paid for the power and its attributes over the life of the contract. The structure furthermore provides transparency and stability for the buyer over the duration of the contract.

By comparison, shorter term contracts have significant disadvantages. Most importantly, shorter term contracts may not provide the risk mitigation that longer-term contracts do. This could result in the construction of fewer wind farms, which could result in reliance on other, less affordable or alternative generation resources.

Equinor Wind therefore believes longer-term contracts will be a key enabler for Massachusetts to realize the vast offshore wind potential off its southern coast in an efficient and cost-effective manner.

- 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?*

Single technology procurements have the advantage of allowing for a clear “apples to apples” comparison of competing bids regarding both price and non-price factors such as economic benefits and environmental impacts. Policymakers and consumers know that the winning bid is going to be the most cost-effective response to meeting the terms and conditions of the request.

A single technology procurement is entirely appropriate to contract for offshore wind projects. These are large, complex projects that are difficult to compare to each other, let alone to other renewable technologies. Other technologies would likely be smaller in scale and/or more distributed, with very different siting and operational characteristics. Evaluation and selection among these different technologies would require much more subjective judgments of the advantages and disadvantages of the competing projects. Policymakers and consumers would have much less assurance that the project(s) chosen were the most cost-effective solution to the request.

Among the renewable technologies, the one most similar to offshore wind and therefore most comparable would be on-shore wind. Yet, even here, the scale of projects is likely to be vastly different. Offshore wind projects of 800 MW or more would be competing with onshore wind projects in the range of 50 to 100 MW. Rooftop solar or other distributed technologies would present even greater problems of comparison. Renewable technologies have been able to mature and have shown rapid cost reduction when they were given the opportunity to compete in single-technology procurements. (See the graph in Attachment 1) Offshore wind will demonstrate similar cost reductions if given the same competitive opportunity. Equinor Wind strongly supports single technology procurements for renewable technologies.

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?*

No, not in the near term. Offshore wind projects are still subject to considerable development risk. The availability of long-term power supply contracts helps mitigate some of this risk, which in turn leads to a lower cost of capital versus a merchant risk asset. For the time being, the design of the wholesale and REC markets would need to change dramatically to enable development without long term contracts. Changes to wholesale markets would inevitably impact other participants as well, such as thermal generators and LSEs. Maintaining the existing mechanism helps to minimize disruption to existing market structures and participants.

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

Based on our experience in other jurisdictions, Equinor believes a PPA represents the best option for procurement of offshore wind because it both provides maximum certainty to developers and minimizes overall cost to consumers. A PPA establishes the revenue that a project will receive for its output and significantly reduces commercial risk. As a consequence, the cost of capital should be significantly lower than alternative procurement mechanisms, which in turn could lead to not only a low risk solution for

developers but also the lowest possible cost option for the Massachusetts ratepayers.

Whilst Equinor and other developers may be capable and willing to take on the additional risks posed by alternative mechanisms in other states, this is inevitably reflected in the cost of the project.

Massachusetts currently leads the way in providing a low risk solution for developers and we would strongly recommend a continuation of this strategy.

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)?*

All else being equal, average wholesale market clearing prices for energy would be generally lower than they would otherwise be as a result of the inclusion of power purchased under long-term contracts from renewables. This is because renewable power supplied under a long-term contract, given that it has a set buyer and no fuel expense can offer its power in the wholesale market at a null price. The energy bid in by renewables then lowers the overall average clearing price of all energy in the market for the duration of the contract. Offshore wind specifically has the added benefit of being able to deliver energy directly into the larger load zones on the coast, thereby relieving congestion costs derived from inland deliveries. Thermal generation will see average energy prices lower but will have the opportunity to regain incomes from other sources and from differing modes of operation.

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

Equinor has no comment to this question.

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

Additional OSW procurements beyond those mandated by 83C are likely to magnify the impact on wholesale market prices described in the answer to Question 6(a). This will impact all resources without a long-term contract for its output. The impact on resources with a different production profile from offshore wind will be somewhat mitigated. As indicated by the Massachusetts Clean Energy Centre's (MassCEC) Metocean Data Initiative, production from offshore wind farms in the waters south of Massachusetts are expected to increase in the afternoon and night, when production from solar systems is dropping off or nonexistent.

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

Additional OSW procurements will increase the supply of power available to be used for compliance with the RPS compliance obligations of utilities. Absent an increase in demand, this added supply would cause the value of renewable energy credits to fall. Legislation passed in 2018 increased the rate of

growth in demand for RPS compliant power from 1% to 2% per year for the decade from 2020 to 2029. That will maintain demand for the additional supply from the first 1,600 MW of wind purchased under 83C. Subsequent procurements will put additional downward pressure on renewable credit prices. Without a corresponding increase in demand for those credits, the price for renewable credits will fall. That downward pressure on renewable credit prices can be mitigated by additional increases in demand, that is, by increases in the obligation of utilities to purchase those credits that corresponds to the increase in supply of them created by additional OSW procurements.

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

As illustrated by the data gathered as part of the MassCEC's Metocean Data Initiative, offshore wind farms in the waters south of Massachusetts are expected to have a somewhat higher average production during the winter months. Any impact on the energy market will thus likely be pronounced during this period.

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

While an additional 1,600 MW is the limit currently set by statute, it is low for an additional target. Long-term certainty that there will be regular procurements for amounts of OSW beyond this limit would be more effective at building the OSW industry in this region and be more likely to grow the necessary supply chain, with its consonant increase in jobs and wider economic benefits.

Transmission

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

Equinor strongly believes it is both most efficient and cost effective, and thus to the benefit of the Massachusetts rate-payer, for the offshore wind farm developers to retain the responsibility for the necessary transmission and interconnection (T&I) facilities.

In order to manage the timelines and risks of construction of offshore wind projects, developers themselves need to be in control of the construction of tie-in lines. Through extensive experience developing large, complex, offshore projects, offshore wind developers have gained the competence required for the construction of such infrastructure in a timely, efficient, cost-effective and safe manner. Fossil-fuel power plants, onshore wind projects, and solar power projects all connect into the electric grid using tie-in lines. These lines bring the power generated at the power plant/project to market and are a crucial element of any generation project. Equinor stresses that tie-in lines are not a separate element from the generation project itself.

In addition, it is important to recognize that the development of offshore T&I facilities poses unique risks and challenges that are distinct from those associated with the construction of traditional onshore T&I facilities. Equinor and other offshore wind developers have extensive experience designing and constructing the facilities necessary to interconnect their facilities, which allows us to do so efficiently and on a least-cost basis. Requiring these developers to coordinate the interconnection of their facilities with a third party—particularly a transmission developer that may have little experience with offshore T&I

facilities—will only serve to unnecessarily increase the complexity of project development without any associated increase in efficiency or cost savings.

Bifurcating the ownership of offshore wind projects and the T&I facilities used to interconnect these projects is likely to be highly inefficient, increase uncertainty, and drive up project costs. As a practical matter, adopting an independently-owned model would increase costs by requiring the developer of an offshore wind facility to coordinate with the owner of the T&I facilities on a range of complex matters, including project timing, design, engineering, procurement, and construction. Rather than allowing the offshore wind developer to construct facilities that meet its needs and on a timeline that allows it to timely achieve commercial operation, an independently-owned model would force a project developer to rely on a third party to construct and operate the facilities necessary to market the output and environmental attributes of the project. Because the developer of an offshore wind facility is likely to have little recourse in the event that the developer of the T&I facilities fails to meet applicable deadlines or operate its facilities reliably, any decision to adopt an independently-owned model would significantly increase uncertainty and create a powerful incentive for developers to sell the output and environmental attributes of their projects in adjacent states and markets. As such, Equinor continues to strongly advocate for the developer-owned model for T&I facilities.

Equinor believes that the real bottleneck, and by extension the area where improvements will have a significant positive effect on future pricing, is related to the connection of significant volume of offshore wind to the existing onshore grid. Equinor therefore encourages the DOER to work with ISO-NE and other regional stakeholders in exploring ways in which the grid could be prepared for such a transition.

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

Please see our response to question 11 above.

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

Please see our response to question 11 above.

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

Please see our response to question 11 above.

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)?

The federal Investment Tax Credit (ITC) has been a contributing factor to the USD/MWh level achieved in recent offshore wind procurements both in Massachusetts and the wider region. The expiration of the tax credit is thus likely to result in a slower than otherwise expected cost reduction for offshore wind procurements.

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

The global offshore wind industry has in recent years experienced a tremendous cost reduction through improved technology and efficiencies. The most prominent example of this trend is the development in turbine size. Equinor expects this trend to continue, as exemplified by announcements in January 2019 of both testing details of GE's 12 MW turbine and Siemens Gamesa's first 10 MW turbine model. Bigger turbines help increase efficiency and lowers unit costs. The US offshore wind industry furthermore remains in relatively early phase development and will benefit from the emergence of a cost-effective local supply chain. In particular, construction of domestic installation vessels and further development of staging port facilities may help developers improve project execution efficiencies and thus reduce cost.

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?*

There should be no additional restrictions on price for OSW procurements. Existing restrictions, namely the requirement that each subsequent procurement be less expensive than the preceding one, should be eliminated. Policymakers should let competition among developers in fair and open procurements determine the price for the power delivered. There are now multiple holders of OSW leases off the coast of Massachusetts. All of them are competent, experienced offshore wind developers. Thus, there will be vigorous competition in future procurements. These will set the appropriate price. A requirement to be cheaper than the previous round is an untenable restriction given the differences between the procurements in terms such as access to ITC, increasing distance to shore, greater water depths, and limited and more expensive grid connections.

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?*

Equinor recognizes the benefit in utilizing specific development areas and/or transmission interconnection points to relieve future reliability constraints and would welcome the DOER's active involvement in identifying such areas and points. However, we believe a requirement tied to such areas or interconnection points, or indeed providing direct benefits for projects that utilize such areas or interconnection points will skew competition in future solicitations. As noted, there are now multiple OSW lease holders off the coast of Massachusetts. All of them are competent, experienced developers that will seek the most efficient and cost-effective solutions for their respective lease areas. This is to the benefit of the Massachusetts rate payer.

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

Certainty on a higher longer-term procurement target, as well on a pipeline of regular and sizeable procurements will encourage supply companies to establish a local presence in Massachusetts. The development of a local supply industry will both be beneficial in realizing lower pricing for developments, but also in bringing additional economic benefits, including jobs, to Massachusetts.

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

Other stakeholders are better placed to answer this question.

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.*

The benefits of the Commonwealth's early actions readying infrastructure for offshore wind are now starting to emerge. A continuation of thoughtful, forward thinking investments in areas such as infrastructure, education and training, and research will help secure the Commonwealth's leadership position in the US OSW supply chain, as well as preparing it for industrial developments and technological advancements over the coming decades. Equinor encourages the Commonwealth to continue its investment in port facilities, which will be an important factor in attracting suppliers within logistics, installation and ultimately manufacturing of major components.

Regional Coordination

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

Yes, coordination among the New England states on OSW procurements has the potential to create greater demand for OSW in any single procurement. Greater demand will give rise to more competition and result in more and larger projects. That expanded scale of development should produce lower prices for consumers and faster growth in both the supply chain and its economic benefits.

Given the size of demand in Massachusetts, its procurements can be a catalyst for procurements by other states. If coordination produces lower overall prices and faster growth in the regional supply chain, it will be a great benefit for Massachusetts, potentially greater than benefits it could achieve operating on its own.

20. *What are the advantages or disadvantages to coordinating?*

Advantages:

- Phased procurements can help avoid "boom and bust" cycles of OSW development;
- It can foster more efficient use of infrastructure (ports, vessels, etc.);
- It can foster standardization of bid documents, project evaluation criteria, etc.

Disadvantages:

- If the procurement process becomes too complex it will result in delays, uncertainty and increased risk premiums in bidding to provide OSW development.

Other

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

The world needs affordable and reliable energy to supply growing demand. At the same time, it needs to reduce greenhouse gas emissions.

For the Commonwealth of Massachusetts, the offshore wind potential off its coastline offers a unique opportunity to develop a vast in-region renewable resource, which in turn will both enable the Commonwealth to significantly reduce the carbon emissions from its electricity generation and secure direct in-region economic benefits. As the region gradually electrifies to meet its obligations under the Global Warming Solutions Act, the need to secure this renewable source of electricity will only intensify.

The certainty offered by higher procurement targets, to be realized through regular solicitations for cost effective levels of offshore wind developments, will continue to attract experienced developers and entice the supply industry to settle locally, ultimately realizing the benefits of the vast source of renewable energy at the best possible rate for the Massachusetts rate payer.

Sincerely,

Equinor Wind US LLC

Attachment 1

