Offshore Wind Working Group

October 20, 2017

Delaware Division of ENERGY & CLIMATE

DELAWARE DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENTAL CONTROL

Agenda

9:00	Welcome and opening remarks
9:05	Administrative matters
9:15	Wind power economics
10:00	Supply chain & job opportunities
10:45	Approaches to amending the RPS
11:30	Schedule & agenda going forward
11:40	Public comment
12:00	Adjourn

Administrative matters

- Review of meeting minutes
- Reports, studies referenced in minutes
- Briefings and reference material posted online
- Glossary of acronyms

Offshore wind economics

- MD OREC projects
- OSW economics (Europe and US)
- Renewables and energy markets
- Health, environmental benefits

OSW economics in Europe

"[W]inning bid prices have declined from approximately $200/megawatt-hour for projects with a commercial operation date between 2017 and 2019 down to about $65/megawatt-hour for projects with a 2024/2025 commercial operation date."

Source: 2016 Offshore Wind Technologies Market Report, US DOE, Executive Summary

OSW economics in Massachusetts

Table ES-1. LCOEs for 2,000 MW build-out - 2020 -2030[a]

	Tranche A 400MW COD 2023	**Tranche B 800MW COD 2026**	**Tranche C 800MW COD 2029**
LCOE without transmission (2016¢/kWh)	12.4¢	9.8¢	7.9¢
LCOE with transmission (2016¢/kWh)	16.2¢	12.8¢	10.8¢

[a] Cost reductions reflect market visibility and learning effects.

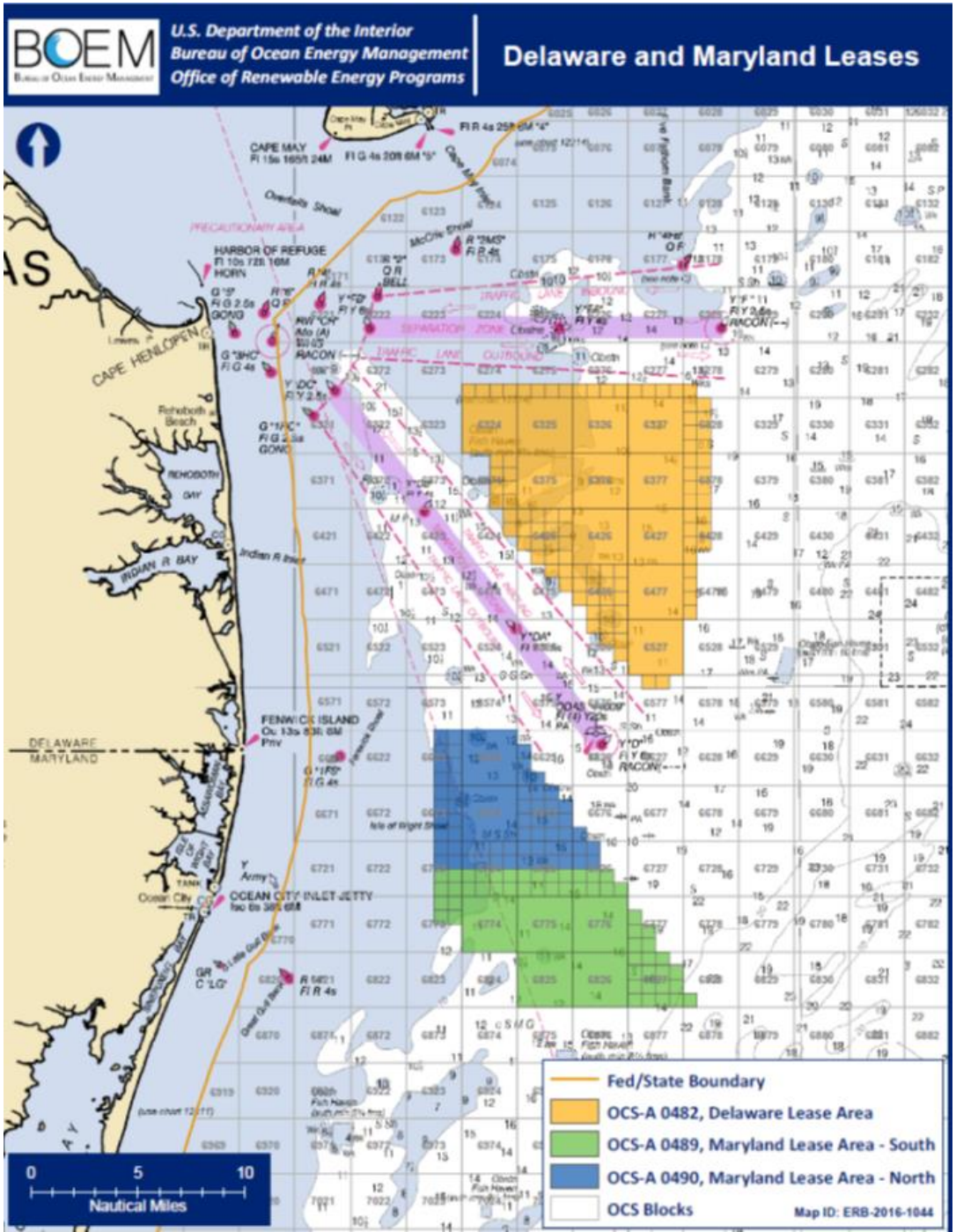
Source: Massachusetts Offshore Wind Future Cost Study, University of Delaware Special Initiative on Offshore Wind, March 2016

Maryland OSW projects

Table 1. Summary of proposed offshore wind projects per Levitan report

Component	US Wind	Skipjack
Project size (MW)	248	120
Number of turbines	62	15
Turbine capacity (MW)	4 (or 6)	8
Commercial operation date	Jan-20	Nov-22
Project cost ($M 2016$)	$1,375	$720
Project cost ($/kW 2016$)	$5,544	$6,000
Approved OREC price ($/MWh 2012$)	$131.93	$131.93
Net OREC cost ($/MWh 2012$)	$77.22	$70.18
Projected annual generation (MWh)	913,845	455,482
Projected capacity factor	42.10%	43.30%
Distance from Maryland shoreline (miles)	17	20-24
Landing point (DPL substation)	Indian River	138th Street or Ocean Bay

Source: Chang, M. 2017. "Direct testimony on the applications of US Wind and Skipjack Wind for the development of offshore wind projects pursuant to the Maryland Offshore Wind Energy Act of 2013." Maryland Public Service Commission Docket No. 9431. On behalf of Maryland Office of People's Counsel. February 15, 2017. Levitan and Associates Updated Tables, March 27, 2017 ML 214210.


BOEM
U.S. Department of the Interior
Bureau of Ocean Energy Management
Office of Renewable Energy Programs
Delaware and Maryland Leases
CAPE MAY
HARBOR OF REFUGE
CAPE HENLOPEN
Rehoboth Beach
REHOBOTH BAY
INDIAN R BAY
FENWICK ISLAND
DELAWARE
MARYLAND
OCEAN CITY INLET JETTY
Fed/State Boundary
OCS-A 0482, Delaware Lease Area
OCS-A 0489, Maryland Lease Area - South
OCS-A 0490, Maryland Lease Area - North
OCS Blocks
Map ID: ERB-2016-1044
0
5
10
Nautical Miles

Renewable energy & PJM emissions

"The results indicate that SOx and NOx emissions decline as renewable penetration increases, but increased cycling causes the reduction to be somewhat smaller than would be calculated by simply considering a constant emission rate per MMBtu of energy consumed at gas and coal generation facilities."

Source: PJM Renewable Integration Study, Executive Summary Report, Revision 05, March 31, 2014, p. 34

Renewable energy & PJM emissions

"We find that offshore wind in the Mid-Atlantic is capable of producing health and climate benefits of between $54 and $120 per MWh of generation…"

Source: Buonocore et al., Health and climate benefits of offshore wind facilities in the Mid-Atlantic United States, July 14, 2016

Supply chain & job opportunities

- Projected OSW jobs per Governors' Coalition
- MD PSC order specifies economic development investments and supply chain
- Delaware's location and the OSW industry
- Opportunities for Delaware

Jobs estimates

Job Estimates for Offshore Wind Support in the United States

	2020		2030	
Region	**MW**	**Jobs**	**MW**	**Jobs**
Mid Atlantic	1,912	8,380	7,832	31,630
Great Lakes	500	1,590	2,000	4,840
Gulf of Mexico	400	5,620	4,000	22,450
Southeast	252	4,638	4,027	26,800
California	0	1,370	1,500	4,640
Totals	**3,064**	**21,598**	**19,359**	**90,360**
Wind Vision	3,000	25,000	22,000	75,000-85,000

Source: Report to the Governors' Wind & Solar Energy Coalition, March 23, 2017, p. 2

Supply chain

US Wind commitments	Source
Utilize skilled labor for the construction and manufacturing of components	US Wind Application; page 12
Develop workforce diversity metrics to foster the use of Minority Business Enterprises (MBE)	Order 88192; Appendix A, paragraph 5
$51 million investment in steel fabrication plant	Order 88192; page 63
$26.4 million in upgrades at Sparrows Point shipyard in Baltimore	Order 88192; page 63
Investment of $6 million into the Maryland Offshore Wind Business Development Fund over a two-year period	Order 88192; Appendix B, paragraph 12
Spend at least 19 percent of capital expenditures on direct in-state expenditures	Order 88192; Appendix A, paragraph 13

Supply chain

Skipjack (Deepwater Wind) commitments	Source
Invest at least $13.2 million in upgrades at the Sparrows Point shipyard	Order 88192; Appendix B, paragraph 20
Develop workforce diversity metrics to foster the use MBEs	Order 88192; Appendix B, paragraph 5
Investment of $6 million into the Maryland Offshore Wind Business Development Fund over a two-year period	Order 88192; Appendix B, paragraph 13
Spend at least 34 percent of capital expenditures on direct in-state expenditures	Order 88192; Appendix B, paragraph 14

Amending the RPS

- REPSA (Renewable Energy Portfolio Standards Act)
  - 25 percent by 2025, 3.5 percent solar PV
  - “Comparable plans” for DEC and DEMEC
- Two approaches to promote OSW
  - ORECs
  - REC multipliers

REPSA: *26 Del.C.* § 351 (b)

The General Assembly finds and declares that the benefits of electricity from renewable energy resources accrue to the public at large... These benefits include improved regional and local air quality, improved public health, increased electric supply diversity, increased protection against price volatility and supply disruption, improved transmission and distribution performance, and new economic development opportunities.

REPSA

Compliance Year (beginning June 1st)	Minimum Cumulative Percentage from Eligible Energy Resources	Minimum Cumulative Percentage from Solar Photovoltaics*
2010	5.00%	0.018%
2011	7.00%	0.20%
2012	8.50%	0.40%
2013	10.00%	0.60%
2014	11.50%	0.80%
2015	13.00%	1.00%
2016	14.50%	1.25%
2017	16.00%	1.50%
2018	17.50%	1.75%
2019	19.00%	2.00%
2020	20.00%	2.25%
2021	21.00%	2.50%
2022	22.00%	2.75%
2023	23.00%	3.00%
2024	24.00%	3.25%
2025	25.00%	3.50%

Approaches to amending REPSA

- ORECs
  - Set aside for OSW (like solar set aside)
  - Price limits (max. OREC price, customer impact)
  - Other MD requirements
  - ORECs more expensive than RECs
- REC multipliers
  - Example: 1 MWh = 3.5 RECs
  - Reduces net REC unit cost
  - Net reduction of RPS percentage

Schedule

- Future Working Group meetings
  - November 1, 9 a.m. to noon
  - November 15, 1 to 4 p.m.
  - November 29, 9 a.m. to noon
  - December 11, 1 to 4 p.m.
- Two public comment sessions
  - To be scheduled

Public comments

- At Working Group meetings
- In writing in between meetings
- At public comment sessions
- Public comments posted at: http://dnrec.alpha.delaware.gov/energy-climate/renewable/offshore-wind-working-group/

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