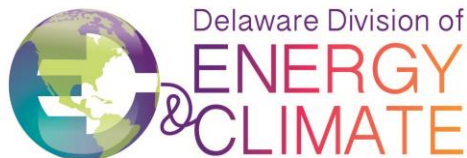


Offshore Wind Working Group

November 15, 2017



Agenda

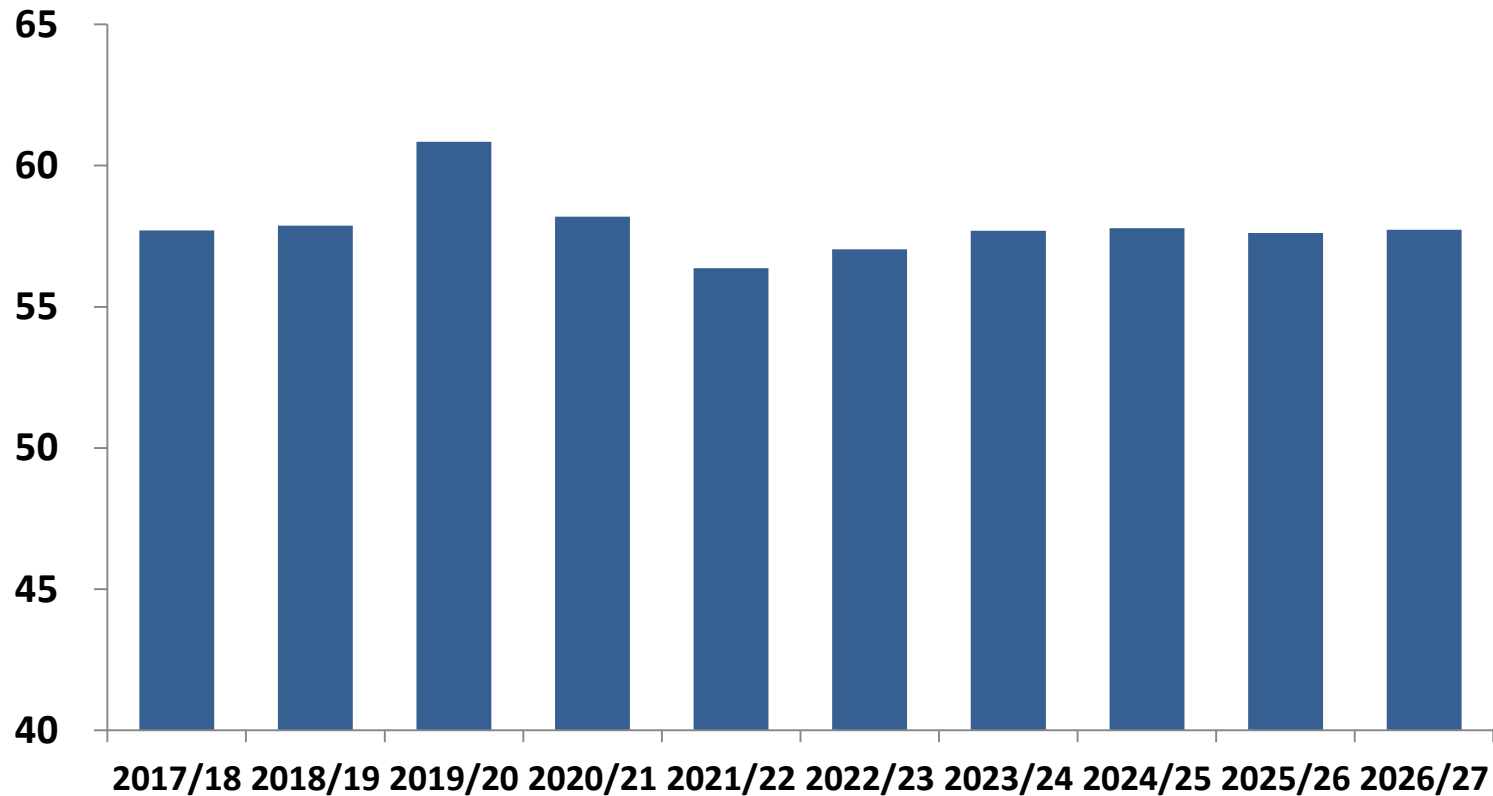
- 1:00 Welcome and opening remarks
- 1:05 Administrative matters
- 1:15 Grid impacts of offshore wind
- 1:40 Delaware's Renewable Portfolio Standards (RPS)
- 1:50 PSC Staff re analysis and concerns
- 2:10 Projecting offshore wind cost impacts
- 2:30 Policy options for the Working Group
- 3:00 Discussion of report structure and outline
- 3:30 Schedule and agenda going forward
- 3:40 Public comment
- 4:00 Adjourn

RPS for DPL

- ▶ Bloom Energy > 50% of RPS costs
- ▶ Rate impacts peak in 2019 to 2021 even as RPS requirements increase
 - ▶ Total costs
 - ▶ Residential bill impacts

DPL RPS cost projections

Total annual RPS costs (millions of \$)



Source: DPL 2016 Integrated Resource Plan

DPL RPS cost projections

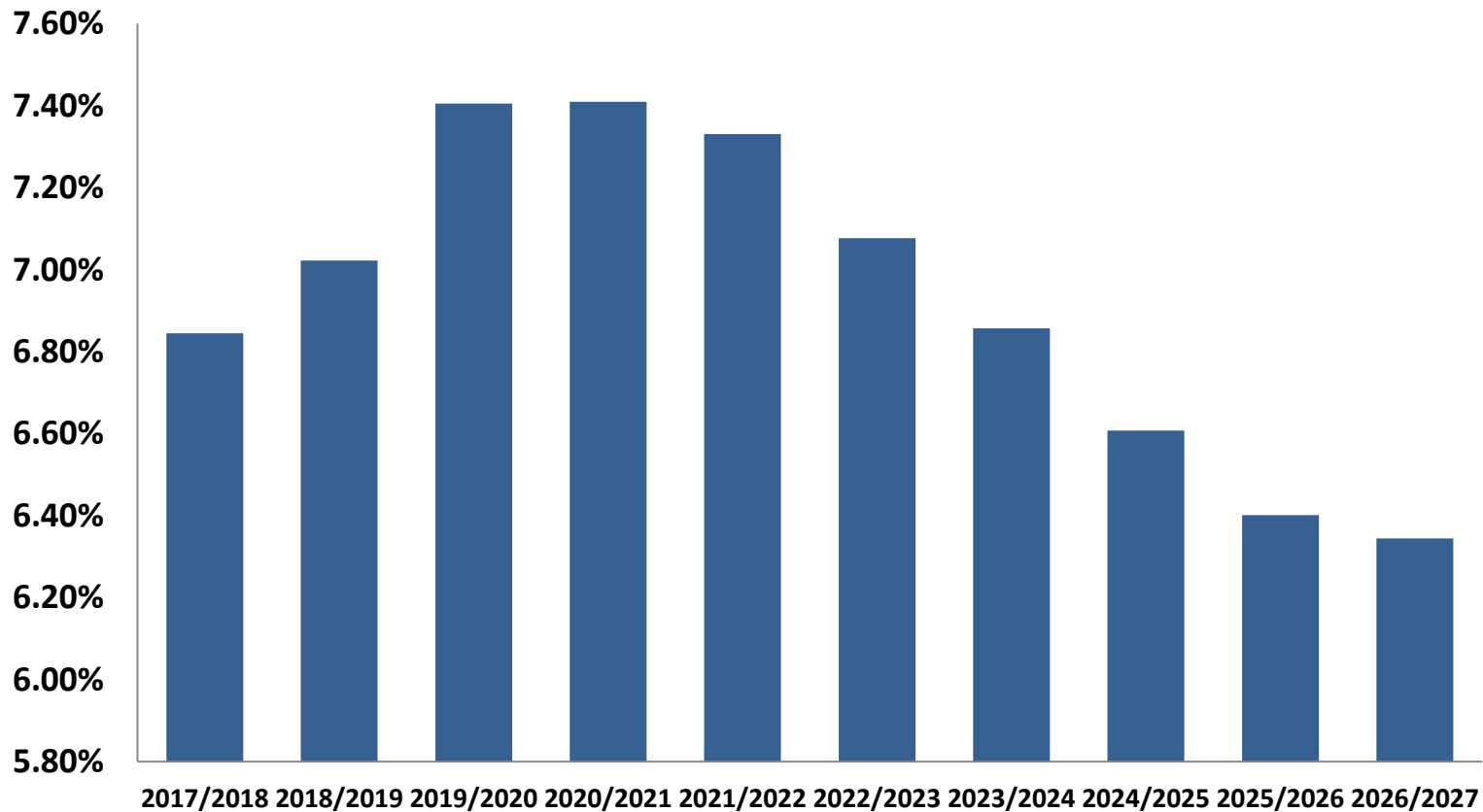
Projection of the Total Cost to Comply with the RPS Requirement

Planning Year	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26	2026/27
Projected RECs by Source										
Solar Supply	99,838	116,172	132,450	148,772	165,139	181,379	197,485	213,735	229,574	228,846
Wind Contracts	450,755	450,755	562,883	562,883	562,883	562,883	675,011	675,011	619,896	542,735
QFCP Offsets	453,000	453,000	453,000	453,000	453,000	453,000	453,000	453,000	453,000	453,000
Spot-REC	63,313	162,243	129,168	175,513	222,713	269,366	203,330	250,683	350,827	423,449
Total RECs	1,066,906	1,182,170	1,277,501	1,340,167	1,403,735	1,466,628	1,528,825	1,592,429	1,653,297	1,648,030
REC Costs (k\$)										
Solar Supply	\$7,351	\$7,717	\$8,099	\$8,489	\$8,927	\$9,218	\$9,253	\$9,122	\$9,097	\$8,905
Wind Contract RECs	\$13,853	\$13,287	\$14,743	\$12,463	\$12,065	\$11,748	\$14,584	\$14,246	\$13,167	\$11,562
Wind Contract Net Energy Cost	\$3,296	\$3,035	\$2,468	\$1,234	-\$1,046	-\$1,444	-\$1,761	-\$1,616	-\$1,954	-\$1,711
QFCP Offsets	\$32,488	\$31,656	\$33,462	\$32,780	\$31,919	\$32,036	\$31,911	\$32,082	\$32,745	\$34,592
Spot-REC	\$712	\$2,173	\$2,069	\$3,227	\$4,499	\$5,473	\$3,701	\$3,943	\$4,556	\$4,383
Total RPS Compliance Costs (k\$)	\$57,700	\$57,868	\$60,841	\$58,192	\$56,363	\$57,031	\$57,688	\$57,777	\$57,611	\$57,731

Source: DPL 2016 Integrated Resource Plan

DPL RPS costs, residential customers

Projected RPS costs, residential customers, % of total bills



Source: DPL 2016 Integrated Resource Plan

Analysis of DPL rate impacts

- ▶ Use of public data:
 - ▶ DPL Integrated Resource Plan (IRP)
 - ▶ MD PSC Order 88192
 - ▶ Levitan report on MD OSW
- ▶ Simplifying assumptions:
 - ▶ No change in DPL's 2016 RPS projections
 - ▶ No change in REPSA (including exempt customers)
- ▶ Analysis focuses on residential customers

Hypothetical OSW project

- ▶ Skipjack (Deepwater Wind)
- ▶ Starting in 2022
- ▶ MD levelized net OREC cost = \$76.79
- ▶ MD first year net OREC cost = \$85.28
- ▶ Assumes same net terms as MD PSC order (net investment, job commitments)

Delaware Offshore Wind Customer Impact

Input	Value	Source	Formula Notes
MD OREC levelized (2012\$) (\$/MWh)	\$131.93	MD PSC Order 88192	[a]
Year One OREC (2016\$) \$/MWh	\$145.26	Levitan March 27th Update Table 44	[b]
Year One Net OREC (2016\$) \$/MWh	\$85.28	Levitan March 27th Update Table 44	[c]
DPL Exposed Load average (22/23 and 23/24) (GWh)	6,471	DPL 2016 IRP Table 8	[d]
Project Size (MW)	32	Input	[e]
Capacity Factor	43.3%	Levitan Report ES-28	[f]
Monthly Consumption(kWh)	1,000	Input	[g]

Calculations	Value	Calculation Notes	Formula Notes
Gross OREC Impact to Net OREC Impact	58.7%	[c]/[b]	[h]
Annual Production (MWh)	121,379	[e]x[f]x8760	[i]
Annual Gross OREC Cost (2016\$)	\$17,631,450	[b]x[i]	[j]
Net OREC Cost (2016\$)	\$10,351,164	[c]x[i]	[k]
Gross Impact on Residential Rates Year One (2016\$/MWh)	\$2.72	[j]/([d]*1000)	[l]
Net Impact on Residential Rates Year One (2016\$/MWh)	\$1.60	[k]/([d]*1000)	[m]
Rate impact year one per \$1MM spent	0.15	[l]/([j]/10^6)	[n]
Gross Monthly Bill Impact for Year One OREC	\$2.72	[l]x[g]/1000	[o]
Net Monthly Bill Impact for Year One OREC (2016\$)	\$1.60	[m]x[g]/1000	[p]
Annual Gross Bill Multiplier per million Year One OREC	0.15	[o]/([j]/10^6)	[q]
Annual Net Bill Multiplier per million Year One OREC	0.15	[p]/([k]/10^6)	[r]

Sources

MD PSC Order 88192

Levitan March 27th Update Tables for MD PSC (ML 214210)

DPL 2016 IRP

DPL bill impacts

Project Size	Gross Monthly Rate Impact	Net Monthly Rate Impact	Gross Monthly Bill Impact	Net Monthly Bill Impact
(MW)	\$/MWh	\$/MWh	\$	\$
8	\$0.68	\$0.40	\$0.68	\$0.40
16	\$1.36	\$0.80	\$1.36	\$0.80
32	\$2.72	\$1.60	\$2.72	\$1.60
64	\$5.45	\$3.20	\$5.45	\$3.20
128	\$10.90	\$6.40	\$10.90	\$6.40

Assuming monthly usage of 1000 kWh

Questions for the Working Group

- ▶ Size/scale of purchase
 - ▶ 10s of MW or 100s of MW?
- ▶ Timing of purchase[s]
 - ▶ One large purchase?
 - ▶ Incremental approach?
- ▶ Which utilities?
 - ▶ DPL, DEC, DEMEC
- ▶ Look at NJ, VA wind areas?

Questions for the Working Group

- ▶ Pursue port development?
- ▶ Strategy to promote port:
 - ▶ Leverage wind power purchase?
 - ▶ Promote locational advantages?
- ▶ Investment sources?

Report outline

1. Executive summary
2. Offshore Wind Working Group (EO 13)
3. Delaware and offshore wind
4. Offshore wind in MD
5. RPS overview and REC projections
6. Overview of benefits and costs
7. Supply chain and job opportunities
8. Possible paths forward
9. Recommendations
10. Appendices (including public comments)

Schedule

- ▶ Future Working Group meetings
 - ▶ November 29, 9 a.m. to noon, PSC
 - ▶ December 11, 1 to 4 p.m., PSC
- ▶ Public comment workshops
 - ▶ Monday, November 27, 6:00 p.m. at the Appoquinimink Training Center, 118 South Sixth Street, Odessa
 - ▶ Tuesday, December 5, 6:00 p.m. at the Lewes Public Library, 111 Adams Avenue, Lewes

Public comments

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



Offshore Wind Working Group

Energy and Climate Menu

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The Offshore Wind Working Group was established by Governor Carney to study opportunities for Delaware to participate in developing offshore wind.



On August 28, 2017, Governor John Carney signed [Executive Order 13](#), establishing the Offshore Wind Power Working Group.

The Working Group will:

- Study how Delaware can participate in developing offshore wind
- Identify ways Delaware can benefit economically and environmentally from offshore wind power

Contact

Meetings

Meetings of the Offshore Wind Working Group are [posted](#)