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PJM Comments on

2017 INVENTORY OF RENEWABLE ENERGY GENERATORS ELIGIBLE FOR THE MARYLAND

RENEWABLE ENERGY PORTFOLIO STANDARD

PRELIMINARY DRAFT dated March 2018

General Comment

1. The fundamental concern is that the report states that PJM is already short 55%, which simply isn't the case. Below is an excerpt from the Executive Summary. Also reference Table VII-1 on page VII-1. The report clearly states that it makes conservative assumptions, but maybe some of the assumptions are too conservative. There is little doubt though that REC supplies will tighten as RPS requirements ramp up and the wind project pipeline dries up due to the PTC phase-out.

   "Available data indicate that if all PJM states with RPSs, including the voluntary goals established in Indiana and Virginia, were to meet their RPS requirements with PJM resources, PJM would experience a nearly 31,000 gigawatt-hour (GWh) deficit (i.e., 55 percent) in 2017 non-carve-out Tier 1 generation. Relying on those same parameters, non-carve-out Tier 1 generation will need to grow at approximately 46 percent annually beginning in 2017 to meet future PJM (inclusive of Maryland) RPS requirements out to 2020 if all PJM states, including Maryland, rely only on PJM renewable resources to meet RPS requirements."

Generation Requirement

2. Figure IV-1 on page IV-3 and Table VII-1 on page VII-1 show that Tier 1 Non-carve-out generation in was **31,000 GWh** less than the Requirement in 2017. The Tier 1 Non-carve-out generation requirement for 2017 is calculated to be 56,645 GWh in 2017 (see Table III-3 on page III-6). The generation requirement (demand) is overstated, and below are some reasons why:

   a. "Total Consumption" in Table III-1 (page III-2) overstates the amount of load that is subject to the RPS. The authors did a good job accounting for some of the adjustments that are applicable in Maryland, such as the 1.9% downward adjustment for exempt industrial process load sales. Most other states have similar exemptions for industrial customers, exempt public power organizations (e.g., cooperatives), or calculate the RPS requirement using something other than current year sales. Many of these can be dismissed in order to be conservative, but two examples stand out as too large to ignore.

i. Illinois – The portion of electric supply estimated as sourced from the PJM region is based on the ratio of population in the counties served by PJM to the state's total population. For Illinois the proportion supplied by PJM is estimated to be 104,595 GWhs. The actual amount of electricity delivered in the 2016-2017 delivery year to all Retail Customers (MWh) in ComEd was 88,075.281 GWh (from the Illinois Power Agency Illinois Zero Emission Credit Procurement). The IL RPS requirement for this year was 11.5%, which results in an RPS requirement of 10,129 GWh, a reduction of 3,468 GWh.

ii. Virginia - requirement is a percentage of 2007 base year sales, excluding nuclear generation, and only applies to utilities. The correct figure to use to calculate the VA RPS demand is 57,772 GWhs of base year sales. The resulting RPS requirement in Table III-3 is about half of what is shown, a reduction of 3,830 GWh.

b. Incorrect RPS Percentages in Table III-2 (page III-4).

i. Maryland – MD requirements appear to be overstated in Table III-2 (reference Table I-2). For example, the non-carve-out Tier 1 requirement for 2017 should be 11.95%, and for 2018 it should be 14.3%. The MD non-carve-out Tier 1 requirement for 2017 (Table III-3) would then be 7,264 GWh, which compares favorably with the actual number of non-solar Tier 1 RECs retired in GATS for 2017 (7,011,137).

ii. Four PJM states (DE, IL, NJ, and PA) determine RPS requirements on an energy-year basis. For PA and NJ the RPS Requirements shown in Table III-2 for a given Year YYYY are for the year ending May YYYY. Shouldn't DE and IL be consistent? For example, DE's 2017 requirement should be changed from 14.50 to 13.25%, and Illinois 2017 should be changed from 13.00 to 11.50%.

Generation Supply

3. While the report overstates the generation requirement (demand) to a degree (as stated above), the bigger impact is due to assumptions on the generation supply side. The authors clearly point out a major assumption on page IV-2: "The analysis was restrictive in terms of generation estimates, *including only those resources that are Maryland-Certified under Maryland's non-carve-out Tier 1 requirements*" (emphasis added).

   There are many resources that are not MD-certified, and it is OK to ignore them if you are only looking at MD. However, the report should not use MD-certified capacity alone to estimate generation for non-carve-out Tier 1 in all of PJM. This assumption will of course indicate there is a serious shortfall in PJM, which is not the case. All of the PJM states are achieving their non-solar targets and Tier 1 prices are low.

   A few points of reference:

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a. The report uses capacity factors to estimate non-carve-out Tier 1 generation at 25,625 GWh of energy in 2017 (page IV-2).

b. The GATS public report of RPS Eligible Certificates by Status shows nearly 27,500 GWh of MD-eligible non-carve-out Tier 1 generation in 2017.

c. The table below from the PJM System Mix report shows renewable generation in 2017 totaled nearly 40,000 GWh, from just those resources that participate in the PJM wholesale market. Note that this report does not include facilities in PJM that do not sell into the PJM market.

Fuel Type	**PJM 2017 Generation (MWh)**
Wind	21,025,373
Water	9,018,092
Solid Waste	3,736,178
Methane	2,608,911
Wood	1,762,670
Solar	1,467,762
Biomass	6,944
Total	**39,625,930**

d. To estimate the PJM total generation for non-carve-out Tier 1, a good proxy is generation that is eligible for the Virginia RPS, from the RPS Eligible Certificates by Status report for VA in 2017 (excluding Solar PV, Solar Thermal, and Renewable Cogeneration Thermal certificates). This results in an estimate for 2017 that is 16,000 GWh (63%) higher than what is assumed in the report. This estimate is conservative in that it does not include resources that are external to PJM and eligible to be used in some PJM states, including MD (if energy is delivered into PJM).

Fuel Type	**VA-Eligible 2017 Generation (MWh)**
WND	21,335,906
WAT	8,166,301
MSW	3,787,077
LFG	3,456,141
WDS	2,338,227
BLQ	2,278,588
OBG	170,789
WH	161,811

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TDF	54,781
SLW	6,956
GEO	1,906
AB	691
Grand Total	**41,759,174**

Projected Future Renewable Generation

4. Table VI-2 (page VI-2) - Wind generation is expected grow by just 1% (76 MWs) annually through 2030. It is unclear how this figure was determined and it seems to be very low by almost every standard. For 2009-2017, PJM added 6,650 MWs of wind, or 739 MWs/year on average. For the last two years, ~600 MWs of wind came online each year (see table below), and PJM expects about the same in 2018. There is a significant incentive for wind projects to start construction and go into service before the federal production tax is phased out entirely. As another point of reference, in the PJM generation interconnection queue there are over 18,000MW's of wind projects proposed with in-service dates through 2021, although admittedly only a fraction of these will be completed.

Plant Name	ORISPL (Plant Code)	GATS Unit ID	State	County	Nameplate	Date Online	Primary Fuel Type	Queue
AEP PAULDING 3 WF	57611	79032803	OH	Paulding	100.8	11/2016	WND	T131
COM KELLY CREEK 1 WF	60587	86522801	IL	Kankakee	184	11/2016	WND	S37
VP DESERT 1 WF	59968	96642801	NC	Perquimans	208	11/2016	WND	W1-029
VP NEW CREEK 1 WF	60132	96612801	WV	Grant	103	11/2016	WND	T157
PN RINGER HILL 1 WF	60329	53092801	PA	Somerset	39.9	12/2016	WND	Y1-033
AEP MEADOW LAKE 5 WF	57628	89592805	IN	White	100	7/2017	WND	T127
AEP BLUFF POINT 2 WF	61303	89962802	IN	Jay	119.7	9/2017	WND	S71
COM RADFORDS RUN 1 WF	59061	86582801	IL	Macon	305.8	10/2017	WND	W4-005
AEP HOG CREEK 1 WF	61330	79102801	OH	Paulding	66	12/2017	WND	U1-059, W1-056
				Total	**1227.2**			

5. Another conservative assumption is the 26% capacity factor for wind generation. On page B-8 it is pointed out that "The NREL OpenEI Transparent Cost Database uses a nationwide capacity factor range of 26 percent to 52 percent for onshore wind generators with a median value of 38 percent. This study assumes a 26 percent capacity factor for land-based wind generators consistent with NREL lower bound estimates." However, nearly two-thirds of all PJM wind capacity is located in Illinois and Indiana, so a better assumption would be 30-33%.

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Does a Shortfall Exist?

Even after making these suggested adjustments to RPS demand (minus 9,000 GWh) and supply (plus 16,000 GWh), there would still appear to be a shortfall on the order of approximately 6,000 GWh. Below are some reasons why states have been able to achieve RPS targets to date.

1. Illinois Alternative Retail Electricity Suppliers (ARES) were required in previous years to satisfy at least *half* of the RPS requirement using ACP's. This requirement is eliminated in energy year 2018. ARES's can also use RECs from resources located anywhere in PJM or MISO. Both of these provisions are changing though as the compliance obligation is transitioned to Illinois utilities effective June 2019. This will increase the competition for non-carve-out Tier 1 RECs.

2. Indiana - is a voluntary goal and none of the utilities have opted to participate.

3. North Carolina gives credit for energy efficiency measures and accepts RECs from any U.S. registry. The NC market is oversupplied. RECs from generators registered in GATS are not being used for compliance with the NC RPS because they are worth more in PJM states.

4. Virginia awards credits for renewable energy research investments, has multipliers for wind and solar, and accepts credits from Renewable Cogeneration Thermal energy, a non-traditional renewable energy resource.

5. As stated in the report, some states allow resources outside of PJM to be counted, and they are intentionally excluded from the inventory. For example, DC accepts Tier 1 credits from resources located in states adjacent to PJM, and Ohio allows resources in the non-PJM portion of adjacent states.