



# Inside Energy

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## **RE: Concerns with Delaware Raising its RPS Mandate**

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The Delaware legislature may consider a bill to raise the Renewable Portfolio Standard mandate for wind and solar power to 40 percent create a number of concerns:

- 1) There is adequate reserve margin in the PJM Regional Transmission Organization, and more solar, and wind is not needed to meet an anticipated 5 percent increase in electric demand. A PJM study found up to 30% maximum intermittent wind and solar power can be integrated into the electric grid without causing reliability issues, close to the current RPS goal of 25% by 2025.
- 2) It is estimated Delaware currently receives 22 percent of its electricity from net carbon dioxide free sources, and another 73 percent from clean burning, low carbon dioxide natural gas for a total of 95 percent. The additional 5 percent is higher in carbon dioxide emissions, but otherwise meets air quality regulations. This trend to lower emitting generation sources will likely continue. The proposed mandate is not needed.
- 3) The total RPS cost could add 12 percent to electric bills compared to a 3 percent cost cap, impacting the economy and jobs. Higher electric bills, and fewer jobs is a double whammy for the poor and middle class. Willingness-To-Pay surveys show only about 7 percent of residential customers willing to pay the \$207 a year estimated residential premiums, and real life voluntary programs to buy 100 percent wind and solar power see half that participation rate. Since the Maryland 50 percent RPS mandate passed, the market price for Solar Renewable Energy Credits has increased from \$10 to \$60 each<sup>1</sup>.
- 4) About 90 percent of the current RPS mandate has been met by out-of-state wind and solar projects, and this trend is likely to continue sending premium electric payments from Delaware customer's to subsidize jobs for out-of-state projects.
- 5) New solar and wind utility scale systems are competitive with each other, and with other forms of new generation. Only 11% of national wind and solar sales were RPS driven last year according to a recent Woods-Mackenzie study. The free market is working.
- 6) The increase in distributed solar will almost certainly overwhelm some distribution circuits, impacting the ability to control voltage. That can cause damage to customer and distribution system equipment, which can cause injury from stray current and from power feedback, and make it difficult to detect and isolate faults. Engineering solutions are possible but may be costly. These limitations may limit the ability to meet the new Renewable Portfolio Standard (RPS) requirements.

One of the biggest concerns with the mandate is it picks technological winners, and losers, and does so at a time when significant innovations are emerging. Time is needed to allow some of these innovations to mature. While no single form of generation quite competes with existing power plants in all situations, natural gas, solar, and onshore wind generation are the least costly way to add physical capacity if energy credit costs are avoided by not having mandates. There are also low cost, virtual capacity solutions using energy efficiency, demand response, and interruptible rates and rate incentives. Instead of political solutions, it is time to let markets work, and to engage energy experts for ideas that are supportable, cost



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effective, achievable, scalable, and reliable to obtain the most efficient and powerful, lower emissions solutions.

## **The increased mandate is not needed**

Electric demand in Delaware will increase by about 0.6 million megawatt-hours, or 5 percent by 2030 at the 0.5 percent a year expected growth rate from the US Energy Information Agency “Annual Energy Outlook 2019 (AEO 2019)”<sup>2</sup>. The PJM Regional Transmission Organization has a 28.7 percent reserve capacity margin compared to only 16.1 percent required by the Federal Energy Regulatory Commission<sup>3</sup>. Any added solar, and wind capacity mandated by an increased RPS is simply not needed in the PJM system to meet demand.

Counting biomass, and existing wind and solar, Delaware is only meeting 2 percent of its demand with net carbon dioxide free electric power sources from in-state generation. Another 60 percent comes from clean burning, low carbon dioxide natural gas according to the US EIA<sup>4</sup>. Delaware is meeting 48 percent of demand by importing power from other PJM states. The PJM generation fuel mix in 2017 was from 41 percent net carbon dioxide free sources, and 27 percent natural gas<sup>5</sup>. Combining, Delaware and PJM generation, Delaware is already meeting about 22 percent of demand with net carbon dioxide free generation, and another 73 percent with low carbon dioxide natural gas, for a total of 95 percent. The additional 5 percent is higher in carbon dioxide emissions, but otherwise meet air quality regulations. The trend to lower emitting generation sources will continue as seen in Figure 1 below from the AEO 2019, with almost all new generation over the next decade coming from solar, natural gas, or wind power while coal and oil generation retires.

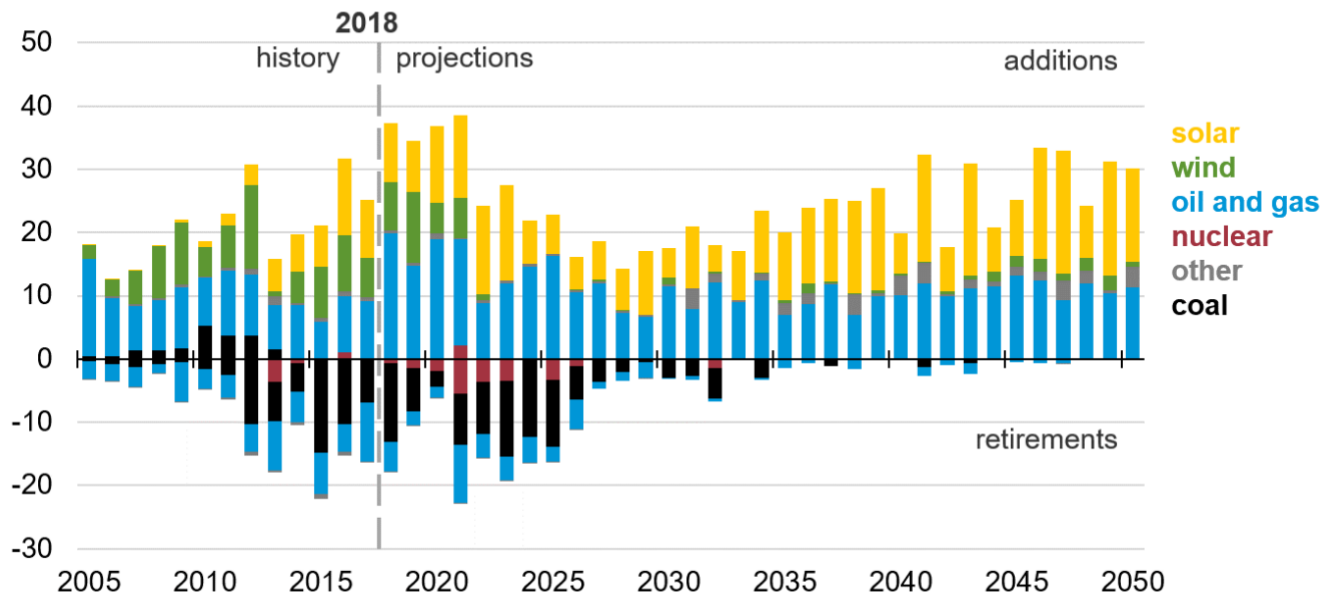


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**Figure 1**

**Annual electricity generating capacity additions and retirements (Reference case)**  
gigawatts



New solar and wind utility scale systems are competitive with each other, and with other forms of new generation, and no longer need state subsidies to compete. Even residential solar generation prices are coming down with Solar City cutting the price by 30%. Also, instead of putting solar panels on homes, it is possible to buy into community solar projects that offer prices below utility supply prices, but regulatory obstacles limit this option in Delaware. Only 11% of national wind and solar sales were RPS driven last year according to a recent Woods-Mackenzie study<sup>6</sup>. The free market is working. A 50 percent clean energy mandate is not needed.

### Premium Cost Estimates

PJM forecasts no increase in average electric rates over the next decade in AEO 2019<sup>2</sup>, and as already stated, reliability is assured with existing capacity. With no clean energy mandates, a stable decade could be expected for the regional electric grid. However, with a mandate utilities must turn in energy credits to prove they have met the mandate. Delaware may require an increase of 21 percent of electric demand in the RPS mandate. Table 1 below shows how many energy credits will be needed to meet the requirement, the cost per credit, and the potential total cost impact of \$12 million in 2018 dollars. The AEO 2019 expects 0.5 percent per year increase in electric demand between 2020 and 2030, so total electric demand will increase from 11.6 million megawatt-hours to 12.2. Industrial customers account for 19 percent of demand, and are generally excluded from paying energy credits, so the increased mandate costs are only spread over 9.9 million megawatt-hours for a cost increase of \$7.27 per megawatt-hour.



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**Table 1: Energy Credit requirements and cost to meet the 50% RPS Mandate<sup>7</sup>**

Energy Credit Type	Expected Price	% Mandate	MWhs mandated in 2030	Total Cost \$ million
Solar SREC	\$50.00	10	1,220,000	61
Wind REC	\$6.00	15	1,830,000	11
Total Cost		25		72

Residential customers use about one megawatt-hour a month, so their monthly bill will rise by \$7.27 on top of about \$10 per month already added to Delmarva Power bills for the RPS, or to over 12 percent on an average \$140 a month bill. There is a cost cap of 3 percent. Numerous customer Willingness-To-Pay surveys tend to agree with a recent survey from the University of Michigan<sup>8</sup> that only about 7 percent of electric customers are willing to pay as much as the \$207 a year Delaware residential customers are being asked to pay. In fact, 80 percent are only willing to pay between \$0 and \$100 a year for renewable energy. According to the National Renewable Energy Laboratory<sup>9</sup>, supplier based premium priced, voluntary green energy programs around the country show only about 3% of customers are willing to pay anything extra for wind and solar power. Only 354 Delawareans signed up for such a program as of 2017, showing very little real support for green programs.

Besides the direct cost associated with energy credits, there are hidden costs to wind and solar projects. Large wind and solar utility scale projects are far from existing transmission lines and sub-stations requiring significant infrastructure investment. That investment is not captured in Requests for Proposals. Some examples are the \$6 billion Texas invested in a transmission backbone from the panhandle that had good wind resources to Dallas and Houston where the population is. Michigan spent almost \$600 million on a transmission backbone to add more wind farms to the Saginaw Bay area near Lake Huron only to have so much local resistance to more windfarms the transmission line hasn't been used. There will likely be extra costs for added transmission lines, and inefficiencies caused by the frequent cycling of dispatchable power plants to fill in for the intermittency of wind and solar power. See the Manhattan Institute study, "The New Energy Economy an Exercise in Magical Thinking", for more information on these hidden costs<sup>10</sup>. A recent study from the University of Chicago, "Do Renewable Portfolio Standards Deliver", shows the typical reduction cost for a ton of carbon dioxide from wind and solar projects is at least thirty times higher than Delaware's current average tax on carbon dioxide emissions (\$130/ton vs. \$4/ton)<sup>11</sup>.

These higher electricity costs related to the 50 percent mandate will likely leave Delaware in a diminished competitive situation. Twenty-seven states either have no RPS mandate, or have met their targets, thirteen have about a 20 percent mandate, and those forty states will have competitive advantage<sup>12</sup>. Seven of the states, and the District of Columbia with high RPS mandates are also in the top twelve states for the highest residential electric rates. Delaware is 18<sup>th</sup>.



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## **Most new wind and solar projects will be built out-of-state**

It is likely most of Delaware's new RPS requirement will be met by out-of-state wind and solar projects. The RPS is met with Renewable Energy Credits (RECs), and Solar Renewable Energy Credits (SRECs), not by actual local generation. In 2018, the RPS mandate required 19 percent of electric demand be met with renewable power. However, in-state generation of solar, wind, and biomass was only 2 percent<sup>4</sup>. Biomass fuel cells, using conventional natural gas, and out-of-state wind and solar farms account for 17 percentage points. So, 90 percent of the mandate has been met, with a billion dollars in subsidies from Delaware electric customers, to mostly support out-of-state, and non-green jobs. This trend is likely to continue.

## **Reliability, Resiliency, System Operation and Safety**

We depend on reliable electric power. A short power outage is an inconvenience for most residential customers, but is unacceptable for hospitals, commercial, and industrial enterprises. We remember all day blackouts as historical events. Solar photovoltaic panels generate most of their power over about five hours a day, and wind farms operate about seven hours a day on average. On a partly cloudy day solar panels can go from full production to zero in eight seconds. Dispatchable generation sources must pick up the slack.

The current generation of lithium ion batteries used in cell phones and electric vehicles do not store enough energy to be practical for electric grid back up, and power stored in them costs five times as much as current wholesale electricity prices. Global battery production of 1,594 gigawatt-hours would power 32 minutes of global power demand (26,700,000 gigawatt-hours<sup>13</sup>). We need reliable power.

PJM estimates a maximum acceptable percentage of intermittent power in its electric grid might be 30 percent<sup>14</sup>. While the latest mandate significantly exceeds 30 percent, grid reliability will not be directly impacted as the mandate will be met from out-of-state wind and solar resources that will spread resources over several states. However, the danger is Delaware cannot control what happens in the thirteen states, and District of Columbia, that comprise the PJM network. Maryland, New Jersey, and DC have already instituted 50 percent mandates. Other states might join, or freeze their renewable energy mandates concentrating the impacts in a small area ultimately exceeding PJM's ability to deal with too much intermittent power.

While utility scale solar may be built out-of-state, perhaps 10 to 20 percent will be built as distributed roof top installations in-state. Electric utilities have found adding more than 5 percent distributed solar power to an individual feeder line can cause:

- Voltage problems, added wear, and damage on voltage regulation equipment.
- Harmonic Transients may have an impact on power quality. While these issues are addressed by IEEE regulations, realistically, there can be voltage flicker which can cause damage to the distribution system, and customer's equipment.
- Excess distributed generation becomes a public safety concern. Abnormal operations can damage power regulation and protective equipment resulting in voltage deficiencies, stray current and





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possible power feedback into the system that can cause injury. Engineering solutions are possible but may be costly.

- Distribution systems are designed to stop power flow during a short circuit condition, but distributed generation can create challenges in detecting and isolating faults, and can cause faulty operation of protective devices.<sup>15</sup>

## The RPS is not a jobs program

Most local green jobs involve installing small solar power systems. Solar industry reports<sup>16</sup> show labor costs on small systems, including installation, sales, marketing, and administration might total \$3,400. However, subsidies redirect \$5,700 in higher electricity prices to cover Delaware Green Energy Fund grants, and 20 year Solar Renewable Energy Credit contracts (at net present value), and another \$6,000 in federal tax credits. The money spent on higher cost electricity and taxes would have been spent elsewhere creating many more jobs.

## Conclusion

One of the biggest concerns with the mandate is it picks technological winners, and losers, and does so at a time when significant innovations are emerging. Time is needed to allow some of these innovations to mature. While no single form of generation quite competes with existing power plants in all situations, natural gas, solar, and onshore wind generation are the least costly way to add physical capacity if energy credit costs are avoided by not having mandates. There are also low cost, virtual capacity solutions using energy efficiency, demand response, and interruptible rates and rate incentives. Instead of political solutions, it is time to let markets work, and to engage energy experts for ideas that are supportable, cost effective, achievable, scalable, and reliable to obtain the most efficient and powerful, lower emissions solutions.

## Recommendations:

- 1) Don't extend or expand the RPS program.
- 2) End carve outs for specific technologies, and let utilities pick the lowest cost option to the RPS.
- 3) To support low cost community solar changes are needed:
  - a) Remove the requirement that the entire project must be subscribed to start the project.
  - b) Remove the requirement all customers must be on a single feeder line.
  - c) Increase allowed system size from 2 megawatts to 5 megawatts.
- 4) Encourage in-state clean energy generation. Allow utilities to count in-state generation with a 10% bonus in meeting the RPS requirement.

## Notes:

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