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MID-ATLANTIC SOLAR & STORAGE INDUSTRIES ASSOCIATION
Mid-Atlantic Solar & Storage Industries Association
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September 13, 2019

Energy Master Plan Team
and
Ms. Aida Camacho-Welch
Secretary
New Jersey Board of Public Utilities
44 South Clinton Avenue
3rd Floor, Suite 314
CN 350
Trenton, New Jersey 08625

Via email

Re: Draft 2019 Eneryg Master Plan – MSSIA Comments

Dear Energy Master Plan Team:

The Mid-Atlantic Solar & Storage Industries Association (MSSIA) is pleased to present these comments in regard to the above-referenced matter.

(UPDATE THIS) MSSIA is a trade organization that has represented solar energy companies in New Jersey, Pennsylvania, and Delaware since 1997. During that 22-year period, the organization has spearheaded efforts in the Mid-Atlantic region to make solar energy a major contributor to the region's energy future.

During these 20 years, MSSIA has adopted and followed three fundamental policy principles, which in short can be stated as: (1) Grow solar energy in our states as quickly as practicable; (2) do so at the lowest possible cost to ratepayers, while delivering the greatest possible benefit as a public good; and (3) preserve diversity in the market, including opportunity for Jersey companies to grow and create local jobs (see MSEIA's fundamental policy principles at https://mseia.net/fundamental-principles/).

We believe that it is imperative that the second principle, delivering solar energy at the lowest cost to ratepayers, is very important to consider in designing the grid of the future, and the generation and load characteristics that drive infrastructure design.

MSSIA agrees with the Draft Energy Master Plan statement that the 2019 EMP a shift of this magnitude has not been seen since the 1990s, and we believe arguably since the early 1900s. A shift of this magnitude can be expected to be extremely challenging, and will not come without cost. However, the necessity of the shift is profound, and is increasingly recognized throughout the world.

MSSIA's comments are in the following areas:

1. Cost to consumers of all clean energy and transportation programs

2. Grid Infrastructure (Question 19 and Question 20)
- Outdated interconnection standards unnecessarily choking off solar interconnection
- Cheap, short-term solutions to enable greater renewable penetration of the grid
- Change to the regulatory structure and utility role required for continued interconnection of distributed renewables
- The role of storage
- Storage isn't the only thing – finding the optimum (least expensive) pathway to 100% renewables

3. Lowering the cost of capital for solar energy programs (and thus lowering the cost of solar energy) (Question 10)

1. Cost to consumers of all clean energy and transportation programs

MSSIA has conducted and analysis of the cost of the clean energy programs and electric vehicle programs that have been discussed in the Draft EMP and recent BPU regulatory proceedings. The analysis is currently in draft form and will be published and submitted to the EMP team when complete. The analysis included estimates of the cost of the following clean energy and transportation programs:

a. The continuing cost of the legacy solar energy program (SREC program)
b. The Solar Transition program
c. The Solar Successor program
d. The cost of the Offshore Wind program
e. The cost of out-of-state renewables (Class I RECs)
f. The cost of the nuclear ZEC program
g. Utility storm hardening programs
e. Energy efficiency and new demand-side management programs
f. Battery infrastructure programs
g. Electric vehicle infrastructure
h. Upgrades to the electric grid as necessary to accommodate large amounts of solar and wind.

The analysis runs through 2050, and calculates year-by-year escalation in utility rates that will be attributable to these programs, as well as the average escalation between now and 2050.

The analysis is necessarily approximate, since it looks at changes that will take place 31 years into the future, including technological changes that will incorporate new technologies and new methodologies.

MSSIA's draft analysis concludes that the raw cost of these programs, before considering electric market benefits and direct consumer bill savings, will result in an ***average escalation in electric rates of 0.16% between now and 2050.***

This modest contribution to electric rate escalation is not evenly distributed in time. On the one hand, with the startup of several new programs by 2020, high escalation will be seen in that year. On the other hand, there will be year in which programs end or decline, so that some years will see negative escalation as a result.

It is important to note that this estimated escalation does not include the beneficial effects on consumer bills that will be generated by the clean energy programs. These include:

a. Depression of the wholesale cost of energy resulting in wind power, and especially, solar power. A recent study by U.S.D.O.E. looked at the effects of achieving 40+% solar and wind in the neighboring NYISO zone by 2030, and concluded that the wholesale cost of power would drop by 39%. This would, of course, result in a bill savings.
b. The energy efficiency measures will cause a reduction in the volume of KWH on consumer bills, generating further savings.

A chart from the U.S.D.O.E. study is shown below:

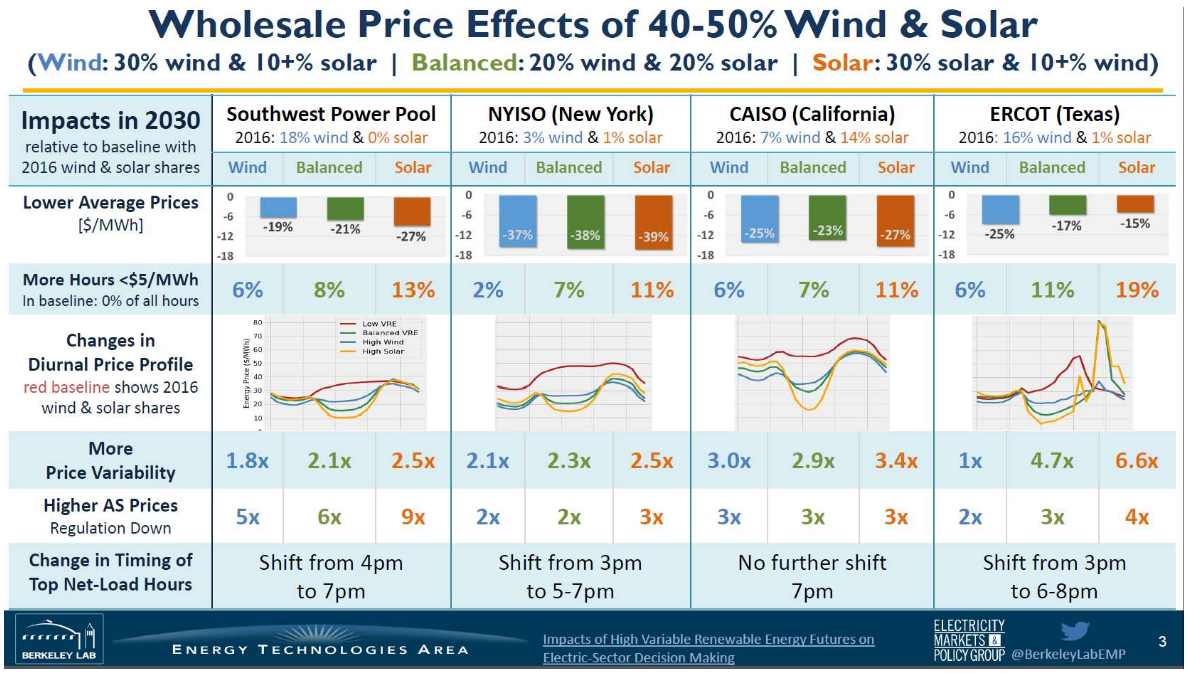


Fig. 1: Chart from "Impacts of High Variable Renewable Energy Futures on Wholesale Electricity Prices"

MSSIA believes that once the benefits above are included, the clean energy programs will result in a net savings for electric consumers, especially when inflation is also taken into account. This shows that New Jersey can be a leader in combatting global warming and creating a clean, sustainable future, while at the same time making the state a more affordable place to live.

2. Grid Infrastructure (Question 19 and Question 20)

A list of medium to long-term infrastructure issues will be presented below, but first there are fairly immediate issues that must be addressed. A problem that is already holding back further solar development is the closure of circuits to further interconnection of solar projects, or severe restriction of them. For instance, below is a screen shot of closed or severely restricted circuits in Atlantic City Electric territory, followed by a screenshot of a town in ACE territory that is almost completely closed to further solar development.

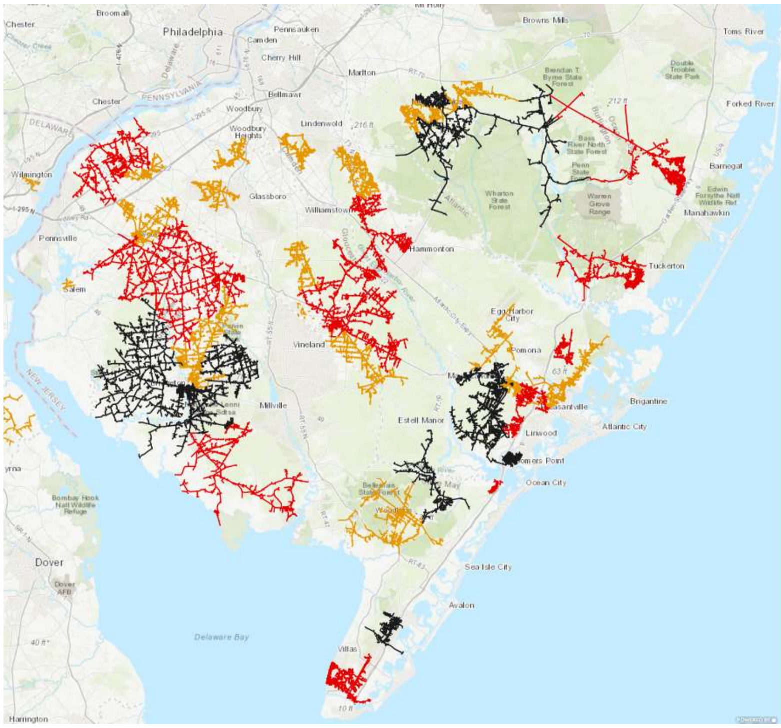


Fig. 2: Atlantic City Electric map of closed and restricted circuits

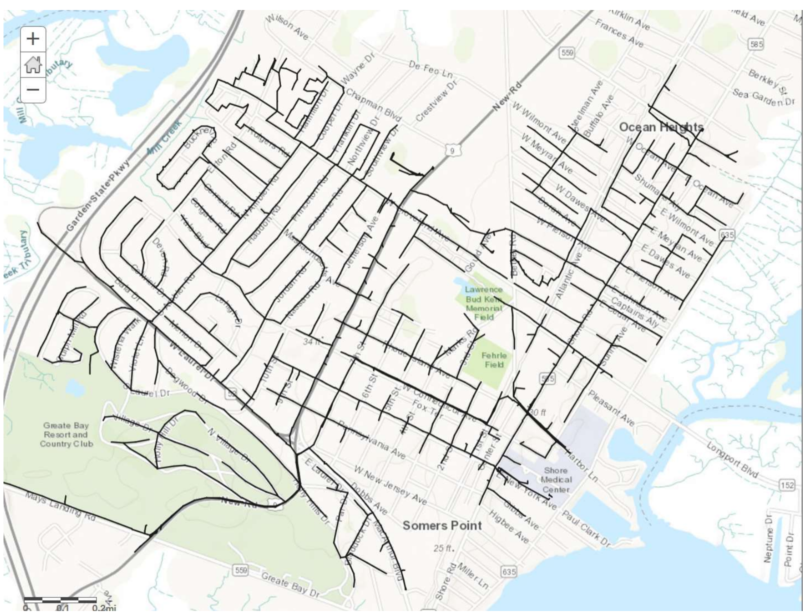


Fig. 3: Map of closed circuits covering all circuits in a town in ACE territory

Such circuit closures are based on an antiquated set of standards dating to the very beginning of solar development in New Jersey. In order to continue solar development in this and other regions of the state, it will be necessary to change these standards and allow higher penetration of solar – a foundational need for a renewable future. For instance, very soon it will be necessary to enable solar power to back-feed through substations. This happens all the time in

California, where solar penetration is slightly ahead of New Jersey's. Some substation control changes may be necessary to enable this.

Voltage control issues can be addressed using control technology that is already built in to all commercial (3-phase) inverters. Commercial inverters can deploy dynamic power factor capability to effect volt-VAR control. The cumulative capacity for this type of control is large, and con be effective in controlling voltage (in some cases even when solar power is not operating).

Below are nine key areas of infrastructure development that are shown by various studies and real-world experience to be effective in enabling high-penetration renewables. They show, among other things, that

1. **Generation mix** – The right mix of solar, wind, and biomass will be synergistic, providing an improved match between renewable generation and load.

2. **Geographic mixing/HV transmission** – The more numerous and the more widely dispersed the solar and wind generation sources are, the more their individual intermittencies cancel each other out. They are then able to match load better. This means building long-distance transmission assets such as HVDC transmission lines. Eventually, this will include the need for an "electron superhighway" from Denver to New York, crossing two time zones.

3. **Load shaping/demand management** – large amounts of solar power will create low pricing in the middle of the day, the opposite of the case now. These changes along with renewable intermittency will create the need for much greater investment in load shaping (grid-responsive pricing and incentives) and demand side management.

4. **Curtailment of renewable generators –** Solar and wind cannot be curtailed without economic loss, but as their cost drops and the amount they generate grows larger than the load at times, they will need to be curtailed.

5. **Stationary electric energy storage** – To the extent that the first four measures are not enough to match up generation and load, electric energy storage will be needed.

6. **Vehicle-to-grid (V2G) storage –** With electric vehicle technology advancing rapidly and EV adoption in the market accelerating, the cumulative electric energy storage capacity in EV's will soon far surpass stationary electric storage. Accessing this huge reservoir of storage to stabilize the distribution and transmission systems will require EV charging infrastructure with two-way power flow, and sophisticated communication and control. MSEIA calculations indicate that if one-third of vehicles switch to electric, the total storage capacity in the form of vehicle batteries will be roughly 183,000 MWH – dwarfing the 2,000 MW of batteries required by 2030 in the Clean Energy law.

7. **Reinforcing local circuits and substations –** high-penetration renewables will require enough reverse flow in local circuits and substations that the above measures will not be sufficient. Many local circuits and subs will need to be modified and/or enlarged to handle the flow and prevent flicker.

8. **More complex control of the grid & transactions** – All of the above measures require controlling and balancing of sources and loads in a more complex fashion than yesterday's grid, while transactions are far more numerous and complex.

9. **State-of-the-art, fast-ramp, efficient natural gas plants as a bridge** - It is important **not** to build more new fossil plants than is necessary, but what *is* built or modified should be compatible with a growing share of renewables.

MSSIA believes that it is vital that the state undertake a comprehensive study of the optimum pathways for achieving its 100% renewable energy goals by 2050. An outstanding example of such an optimization study is found in the Minnesota Solar Pathways study.

3. Lowering the cost of capital for solar energy programs (and thus lowering the cost of solar energy) (Question 10)

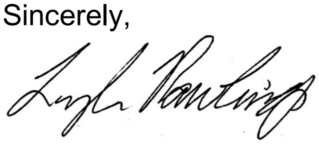
There is a fundamental principal governing the availability of the lowest cost capital for solar projects, one that has been proven in practice in many jurisdictions having large solar programs, and most dramatically in New Jersey. That principal is often stated as "Risk = Cost". Any investor or lender, when risk associated with an investment, will apply a higher cost of capital, or discount the revenue associated with that risk, or both. This issue has been the overwhelming cause of the high costs the legacy SREC program has experienced over the past 15 years or so. In the case of the Offshore Wind program, great effort was expended over several years, in an environment of cooperation among the offshore wind industry, the BPU, and the legislature, to ensure that the revenue associated with the program was as secure as possible. That effort paid off when the first OREC solicitation produced robust participation and surprisingly low prices.

If the same determined effort, and the same environment of cooperation, can be followed in the case of the solar Transition Program and the solar Successor Program, then similar cost-reducing results can be achieved.

Over nearly fifteen years of effort trying to do just that, MSSIA and others in the solar industry, as well as the BPU, legislature, and successive administrations, have found it very difficult to devise a structure and funding mechanism that would accomplish the goal. Recently MSSIA, in cooperation with other solar industry entities, has put forward a proposal that it believes constitute the most low-cost, efficient, and do-able structure and mechanism that has been proposed to date. MSSIA recommends that that proposal be given serious considertation.

We thank you for considering these comments, and look forward to exploring these matters further.

Sincerely,



Lyle K. Rawlings, P.E.
President