Philadelphia Solar Energy Association
7821 Flourtown Ave, Wyndmoor, PA 19038 www.phillysolar.org

December 24, 2024

Docket No. M-2024-3051988

PUC Technical Conference on Resource Adequacy

I am Liz Robinson, Executive Director of the Philadelphia Solar Energy Association. I'd like to thank the Commission for hosting an extremely interesting and productive Technical Conference on November 25th and for providing this opportunity to submit testimony to help explore what the PA PUC can do to insure resource adequacy in Pennsylvania, especially in light of PJM's recent capacity auction results. It is critically important for the Commission to take action to mitigate the price increases and to reduce some of the damage that PJM's recent auction will cause to ratepayers and local economies across our state.

As a presenter at the Conference I had the opportunity to attend and hear the perspectives of a wide range of experts and stakeholders. A number of themes and areas of agreement emerged during the day:

- Some of PJM's recent changes in its processes were unnecessary, causing the auction price to be higher than it needs to be.
- The PUC has trusted PJM to handle resource planning since restructuring in the late 90's, and has not required comprehensive planning by the EDCs as a result
- A number of the PUC's current policies date back a decade or even two, to a different time and are now in need of updating and revision, if not an overhaul.
- New gas generating plants will not realistically come on line before 2029 or 2030, due to global competition for the turbines, which are manufactured abroad.
- While PJM's queue reform seems promising, more can and must be done to speed interconnection of new resources.
- Data centers should "bring their own generation".

The presenters were also in agreement that the Commission can take a number of concrete actions to expand low cost, clean energy resources on the distribution grid to put downward pressure on rates while improving reliability.

My comments address both utility scale generation and distributed energy resources, and are primarily focused on actions the Commission can take in the short and medium term to ensure that affordable energy and capacity are available to all Pennsylvanians.

After decades of relatively stable electricity demand and capacity pricing, Pennsylvania and the nation are now experiencing rapidly rising demand due to expansion of data centers, bitcoin operations, and electrification of transportation, buildings and other sectors. Unfortunately, PJM's decision to change its processes in the last capacity auction in July, caused the price of capacity to increase eightfold, by some $10 billion dollars. This increase will be borne by customers across the PJM region. What will those price increases look like? PP&L expects their average residential customer's bill to increase by $15 a month or almost $200 a year. This will come at a very inopportune time, just as many of the same customers are hit with their local utility's latest rate increase. The combination will be very difficult for many residential and commercial customers to manage.

Fortunately there are a number of things that the Public Utility Commission can do in the short, medium and long term to mitigate the harm these cost increases will cause.

Pennsylvania, like the rest of the nation, is in the midst of a transition from a relatively small number of central power stations to a much larger number and variety of generating plants, storage facilities and non-wires alternatives. Technologies are improving and changing at a blistering pace and will continue to do so for the foreseeable future. The policy framework in place in Pennsylvania was created for the central station model, adapted when the state restructured in the late 1990's, and is now outdated and ill-equipped to manage the changes on the ground as well as the accelerating pace of change, not to mention the growing impacts of climate change. The PUC needs to do much more proactive and rigorous planning in order to fulfill its responsibility to provide reliable access to energy at affordable and reasonable rates.

Short and Medium Term Recommendations

The PUC can take a number of near term steps to accelerate interconnection of new resources and ensure sufficient capacity resources through its planning authority.

1. **Integrated Distribution Planning**

Almost four years ago the Office of Consumer Advocate (OCA) filed testimony recommending that the Commission require utilities to conduct Integrated Distribution Planning (IDP) .

> "traditional approaches to utility distribution planning are not equipped to properly evaluate the benefits of non-wires alternatives compared to traditional investment in aging infrastructure. Accordingly, the Commission should consider a more comprehensive planning process, such as IDP. In Pennsylvania, Electric Distribution Companies (EDCs) are required to evaluate the needs of their system to meet federal and state requirements. As the (PUC) Secretarial Letter indicates, one of the ways in which Pennsylvania EDCs meet these requirements is through their Long-Term Infrastructure Improvement Plans (LTIIP), which are evaluated by the Commission every five years. Much of this process, however, is focused on the need to replace, upgrade, or add distribution infrastructure to enhance the safety, reliability, and security of the grid.

Recently, however, new technologies and non-wires alternatives have emerged to potentially address the reliability and resiliency needs of the distribution system."[1]

The OCA commissioned a detailed report by Rakon Energy LLC, which goes into the recommendation for IDP in some detail.

IDP planning should engage local stakeholders up front, including local governments, community groups, and developers, and it should engage iteratively to answer such questions as: where do communities want resilience hubs and distributed energy resources (DER)? How should we assess the cost-effectiveness of non-wires alternatives (NWA) versus traditional distribution upgrades?

Integrated Distribution Planning statewide will enable the Commission to have a more accurate and holistic understanding of where distributed energy resources are, what forecasted DER growth looks like, the age, reliability, and risks of the distribution system, and the forecasted distribution spending of utilities across the state. This will give the Commission more of the data it needs to make the right decisions about distribution and grid modernization spending, including how to optimize the DER integration to maximize public benefits. I believe that current requirements [2]related to distribution system reliability clearly permit the Commission to initiate IDP planning. IDP will also help make sure that Order 2222, which I will discuss next, is as fully implemented as possible in PA, which cannot happen if EDCs continue to develop and operate their distribution infrastructure in a haphazard, "black box" fashion.

2. Integrated Resource Assessment

Particularly in light of PJM's recent actions and inaction, it is essential for Pennsylvania to improve its resource assessment and planning for both energy and capacity. The PUC should require all EDCs to conduct Integrated Resource Assessments, with a planning horizon of ten years. These need to take into consideration new technologies, such as the new generation of geothermal energy.

3. Require utilities to include long term contracts for zero emission renewable energy in their default supply procurement plans

As Rob Gramlich pointed out in testimony to the House Energy and Environmental Resources (ERE) Committee, one of the flaws many states made in the original process of restructuring back in the late 1990s was failing to require utilities and load serving entities (LSEs) to procure energy and capacity on a long-term basis under Commission oversight. As Gramlich puts it, "Longer term contracting would reduce the price risk (for both consumers and investors) from over-dependence on the central RTO market and reduce the opportunity for market power to

[1] Comments of the OCA , Policy Proceeding – Utilization of Storage Resources as Electric Distribution Assets Docket No. M-2020-3022877, 2-18-2021, p.3.
[2] 52 PA Code, Chapter 57 Section 194.

be exercised there." [3] The PUC can require that a minimum percentage of default supply be procured through long-term contracts for carbon free resources. Doing so could stabilize energy and capacity prices and serve as a hedge against volatility. As a trustee of the Environmental Rights Amendment (ERA), the PUC can require that this amount be met by carbon-free resources to ensure that these long-term contracts are and will continue to be consistent with the public interest.

According to testimony filed in the most recent PECO DSP case[4], procuring long-term solar power purchase agreements (PPA) to meet 7 percent of the residential load last year, could have resulted in savings of at least $67 million dollars.

Pennsylvania law[5] already requires that the mix of contracts through which default providers serve load include long-term contracts. Likewise, the Commission's regulations at 52 PA Code, Subchapter G elaborates the conditions under which default service providers acquire electricity and capacity to serve their customers. The legal and regulatory foundation for procurement of carbon-free resources is in place.

4. **Require Utilities to Incorporate Storage in Default Supply**.

Earlier this year, the Commission decided that utilities are permitted to use storage as a distribution asset.

> " the final Policy Statement recognizes that EDCs may use electricity-storage systems to solve electric distribution system issues and provide grid resiliency." [6]

However, the PUC has yet to require any minimum level of storage despite its obvious advantages. Requiring EDCs to acquire a minimum level of storage as part of their default supply portfolio is reasonable and prudent given the crisis in the capacity market and the increased frequency and severity of climate change related extreme events, and power outages. The Commission should consider requiring utilities and LSEs to utilize storage as a grid asset on the distribution (and/or transmission) networks. Doing so could mitigate near-term grid capacity or power quality investments while providing a capacity and load-serving resource.

5. **Increase Demand Response, among both commercial and residential customers**

Act 129 requires utilities to provide demand response services, yet this provision of the law has not been implemented consistently or fully.

---

[3] Rob Gramlich, Grid Strategies, "PJM: Meeting Emerging Electricity Demand" 10-16-24

[4] Energy Justice Advocates Testimony in PECO DSP case 4-2024 p.10

[5] 66 PA C.S. Sec 2807 (e)

[6] Utilization of Storage Resources as Electric Distribution Assets, FinalPolicy Statement Order, 4-2024, p.3

Broadening the incentives currently offered for interruptible power is easily accomplished and will have immediate and very cost-effective benefits to both affordability and reliability.

Expanding the use of off-peak rates, e.g. to promote off-peak electric vehicle (EV) charging is another example. One of the most cost-effective initiatives would be to use the Advanced Metering Infrastructure to incentivize products that contribute to resource adequacy.

6. **Increase certainty and diversity of customers for new generation applications**

According to PJM, 82% of the resources in the PJM queue are solar and storage.[7] One way the PUC could speed up the process of getting those projects approved as well as projects in the interconnection queues of PA utilities, would be to open up opportunities for firm off-takers of this new generation. One such opportunity is to:

- **Enable Community Choice Aggregation**

The Commission should enable Community Choice Aggregation, which is already legal in Pennsylvania for boroughs. [8]

CCA is related to demand response and to the substantial enhancement of distributed energy resources. These projects need customers in order to be funded and they need the community to approve permits for them with some efficiency. If the community is initiating the project, the DER will be where the community wants it and it will be powered by what the community wants. Also, with such an approved community engagement, utilities can work with communities to develop storage (built because it helps a community manage capacity and costs for its residents) that can enhance the ability to accommodate more static resources, e.g. solar, on constrained distribution lines, thus reducing the need to upgrade distribution networks.

7. **Increase the amount of Energy Efficiency savings utilities achieve under Act 129**

In its first phase, Act 129 produced almost 2% reduction in electricity consumption. However that number has steadily declined in each subsequent phase of the program. PA utilities are now saving less than 1% annually! Given the tremendous improvement in appliance efficiency in recent years, EDCs could increase their savings to at least 2% annually with modest changes such as, incorporating higher new efficiency standards for equipment, collaborating with the new HERS and HEARS programs funded through the Inflation Reduction Act (IRA), and

---

[7] Azim Haque, VP, PJM, "Meeting Emerging Electricity Demand" 10-16-24

[8] 8 Pa. C. S. § 24A02. General powers.
(a)Electric plants and projects.--**A borough may**, either singly or jointly, **manufacture or purchase electricity for the use of its inhabitants** and own, construct, acquire by lease, purchase or otherwise gain an interest in, operate and manage or cause to be operated and managed an electric plant or project located within or without this Commonwealth.
66 Pa. C. S. § 2805. Regionalism and reciprocity. (Act 138)

incentivizing residential as well as commercial solar installations. In a large and growing number of states across the country[9], annual energy savings rates regularly exceed 2%.[10] I

In Phase V of Act 129, the Commission should require EDCs to propose a plan that would achieve at least 2% average annual electricity savings through 2031, evaluating the cost effectiveness of the incremental savings proposed, and the capacity benefits anticipated.

8. Distributed Energy Resources (DERS) and DERAs

We commend the Commission for issuing its Order to proactively address the question of DER Aggregations in the PJM Wholesale Market, pursuant to the Federal Energy Regulatory Commission ("FERC") Order No. 2222 issued in September 2020.[11]

There is tremendous potential value in coordinating and utilizing DERs, including energy efficiency and solar plus storage resources already in place across Pennsylvania as well as anticipating and coordinating the rapid increase in these resources that we are now seeing and that will accelerate in coming years with the implementation of the Inflation Reduction Act ("IRA") and the Infrastructure Investment and Jobs Act ("IIJA") and other public policies. Harnessing, coordinating, and deploying these DERs as well as DER Aggregators ("DERAs") can improve resilience, enhance reliability, and relieve pressure on both the transmission and distribution grids, all while putting **downward pressure on rates for all Pennsylvanians**.

In order to harness this important resource for the benefit of all ratepayers, the Commission will need to update and align its practices, policies and regulations in a number of areas including data transfer, exchange and access, customer education and engagement, cybersecurity, interconnection and battery to grid flows. This is a very important crossroads moment for Pennsylvania, at which alignment of both policy and programs is not only possible, but necessary to maximize the benefits of DERs for customers.

Pennsylvania has significant experience in providing energy efficiency programs at scale, statewide, through Act 129, the Weatherization Assistance Program and other low income programs. Certain regions of the state have extensive experience providing distributed solar at scale through Solarize and other programs. There are more than 66,000 solar PV

[9] ACEEE, "States Step up Climate Efforts by Requiring Utilities to Increase Energy Efficiency" March 2020

[10] Minnesota: Energy Conservation and Optimization program requires at least 1.75% annual energy savings; public utilities almost always exceed 2-2.5% annual savings.

[11] Federal Energy Regulatory Commission, Order No. 2222, Final Rulemaking, Participation of Distributed Energy Resource Aggregations in Markets Operated by Regional Transmission Organizations and Independent System Operators, Docket No. RM18-9-000, September 17, 2020, "Order No. 2222".

systems in place statewide.[12] Energy efficiency and solar programs are now rapidly expanding. These programs can be aligned with the Commission's DERs regulations in order to maximize ratepayer and system benefit.

At least a dozen states have already adopted DERs and DERA programs, Virtual Power Plants ("VPPs"), and other non-wires alternatives, either through legislation or regulation and there is a growing body of experience from which Pennsylvania can benefit. A set of best practices is rapidly emerging nationally, including interoperability standardization. We strongly recommend that the Commission identify and adopt best practices in this field in order to maximize benefits to ratepayers while minimizing costs. States to look to include Texas, New York, Virginia, North Carolina, Maryland, Massachusetts, Minnesota, California and others.[13]

Coordination among Departments of State Government

It is essential that all the departments and agents of state government that are playing a role in the implementation of the IRA and IIJA – *i.e.,* the Pennsylvania Energy Development Authority (PEDA), Department of Environmental Protection (DEP), Department of Community and Economic Development (DCED), the Commission, and the PA electric utilities – closely coordinate the efficiency and operational standards of appliances and other technologies they will require and incentivize in the programs they are administering. Standardization will enable the utilities and aggregators to ensure that these technologies can in fact function as DERs, their value as DERs can be maximized, and administrative costs can be minimized.

Through PA Act 129 many DERs have already been implemented across PA. A number of these (*e.g.,* programmable NEST thermostats) can easily be tapped and coordinated to produce significant benefit to reduce peak load. To a great extent, electric utilities already know which customers have installed these devices. As the market for heat pumps, heat pump water heaters and other decarbonization technologies rapidly develops and more and more customers install these devices and appliances, standardization and protocols can be developed and implemented to maximize the benefits such technologies can provide in energy affordability, carbon reduction, energy conservation, demand reduction, enhanced resilience and improved reliability.

Act 129 needs to be revised and modernized to promote DER adoption and decarbonization. This process needs to be consistent with and coordinated closely with the standards utilized in the implementation of the IRA's Home Efficiency Rebates (HERs) and Home Electrification and Appliance Rebates (HEARs) programs. Through these federal programs thousands of additional high efficiency electric heating and water heating appliances

[12] PA PUC https://portal.pennaeps.com/app/publiccontroller/displayNewMap

[13] See DSIRE Insight, What are States Doing to Make Virtual Power Plants a Reality?, April 26, 2024 available at https://www.dsireinsight.com/blog/2024/4/26/making-virtual-power-plants-a-reality.

will be installed in the next few years, both in single-family and multi-family homes, and across economic strata as well.

The United States is transforming from a fossil fuel based energy economy to a clean energy economy. Decarbonization and electrification of transportation, heating, water heating, and other end uses is now accelerating and will continue to do so. The Commission must anticipate rapid technological change, increasing levels of efficiency and electrification, and will need to develop a DER policy and program that builds in on-going evaluation, opportunity for revision, and constant integration of new technologies and systems.

An example of this is the rapid adoption of electric vehicles ("EVs"). EVs were 8% of the new cars sold in the U.S. last year, providing significant potential to harness the energy stored in every one of these vehicles.[14] Commercial fleets, such as school buses, Amazon, SEPTA (Southeastern Pennsylvania Transportation Authority), and the Postal Service are rapidly transitioning to EVs as well, providing new opportunities for resilience planning. The infrastructure upgrades required to keep up with a rapidly growing electrified transportation sector exemplifies the need for swift, forward-looking policy adoption by the Commission. The Commission should enable Vehicle to Grid (V2G) implementation statewide.

Meeting the additional demand for electricity with new generation will be far more costly than meeting it through energy efficiency and distributed energy resources. Given the threat of climate change, it is essential that load growth be met through carbon free energy resources, ideally a combination of new renewable energy, energy efficiency and DERs.

9. **Improve the PUC's Interconnection Regulations**

The PUC's Interconnection Regulations date back almost 20 years to 2006 in the early days of solar in PA, and are now in need of significant improvement to dramatically reduce the average time and cost that solar developers routinely incur getting projects approved by the EDCs. The PUC should also investigate new tools, such as Grid Unity software to improve the review process, reducing cost for utilities and time for developers.

A number of solar developers in PA helped to develop this summary of the changes needed. Virtually all of these issues were presented to the PUC over two years ago, and although some improvements have been made since, a majority of these are still problematic.

[14] See Cox Automotive and Kelley Blue Book, A Record 1.2 Million EVs Were Sold in the U.S. in 2023, According to Estimates from Kelley Blue Book, January 9, 2024, available at https://www.coxautoinc.com/market-insights/q42023-ev-sales/.

Overall, it is strongly recommended that the PUC convene a working group between a select group of solar installers and the EDCs in early 2025, to streamline the interconnection application process.

Some of these issues are as follows:

- **Tighten and Introduce Additional Timelines**

There need to be tight timelines at every step of the interconnection process for both utilities and generators.

A common practice among PA EDCs when they encounter issues that need to be resolved in an interconnection application is to "restart the clock" multiple times. Instead, the EDC should press the pause button. This would cut months of delay out of a very large number of applications and make the PUC's Net Metering and Interconnection Reports more accurate. While this problem has improved marginally over the last two years, problems still persist. Engineering studies also need tight timelines.

Penalties for an EDC's repeated failure to meet timelines need to be put in place.

Timelines need to be established for field verification review, feasibility, system impact or engineering, and facilities studies, as none currently exist. Many times these studies go on for months, significantly delaying the installation of a solar facility.

The Net Metering and Interconnection Reports need to be published on the PUC website on a quarterly basis. They also need to include the number of formal complaints made against each of the EDCs and the average time to completion for interconnection applications.

- **Online payment process for interconnection applications** –

In response to the frequency of confusion and lost payments etc. the PUC has encouraged the EDCs to implement an online payment process for interconnection applications at least three years ago, but none of the EDCs have this in place. As a result, the application payment getting lost or delayed in the mail is continually a problem.

- **Interconnection equipment upgrade process and costs**

The upgrade process is unnecessarily complex and needs to be streamlined and standardized statewide. These costs continually change over the course of the application process. The intertie protection relaying (IPR) package cost mechanism needs to be streamlined to minimize the fluctuation of cost changes during the process. It was recommended that these costs, along with other upgrade costs, such as for transformers, reclosures, capacitors, etc., should be documented, categorized and reported in the PUC Net Metering and Interconnection report. Upgrade costs need to be standardized across utilities and cost caps need to be set. Currently the PUC does not collect this cost information. In addition, the PUC should also collect and

report the interconnection application costs for studies: feasibility, system impact (engineering), facilities, etc.

- **New Construction**

There are numerous problems and extremely long delays caused by lack of clarity and lack of standardization across most of the utilities.

- **Effective Grounding**

PECO seems to be the only utility in the state, if not in the country, that requires effective grounding for solar PV system installations greater than 50 kW. The need for effective ground requirement for solar PV applications using inverters should be eliminated given that to our knowledge no other utility in the nation requires effective grounding, and there have been no documented problems as a result at other locations.

All solar PV systems and electrical systems require mechanical grounding, and many times, system grounding. Effective grounding basically requires a minimum impedance (resistance) on both sides of a transformer, and it may be more of a concern for rotary generators, but it is not the same issue for static electronic inverters. Furthermore, there is no clear IEEE standard for sizing an effective grounding system for inverters, which results in inconsistent and poor guidance from PECO with how to comply with their own requirement. A few years ago, PECO finally relaxed their effective grounding requirement with General Service (GS) account customers using PECO's wye-wye transformers. However it can still be an issue with High Tension (HT) customers owning their transformer, or if the PECO or customer owned transformer topology is delta-wye.

- **Permission to Operate (PTO)**

The EDCs should issue PTOs if the installation is compliant with the regulations and electrical inspection, even if the bi-directional meters aren't yet installed. There should be a timeline for PTO, no longer than 5 days after compliance, for the bi-directional meter to be installed.

PECO does not issue a permission to operate (PTO) until the meters are installed, which means the fully installed system is not allowed to operate, sometimes for months due to supply chain issues. This also delays final customer payment to the solar contractors.

- **Assigned contact person**

Several of the EDCs have taken steps toward online interconnection applications, which is going in the right direction, but that has come at the cost of the installer not having an EDC contact throughout the application process, which they may have had before. There needs to be an assigned contact person from the EDC throughout the application process, as it seems that the online communication portal is not working for the installers when problems arise, where their messages are often left unanswered or inadequately answered with useless auto-reply responses. PECO and PPL have, for the most part, addressed this issue, but First Energy EDCs

are still problematic with having little to no assigned contact personnel for the solar contractors during the interconnection application process.

- **Dispute resolution process**

The original interconnection regulation specifically had a section on the dispute resolution process, where a third party technical master would step in and help resolve technical issues between the EDC and the solar industry engineer. Unfortunately, this section was removed in the last clarification of the AEPS regulation several years ago.

The dispute resolution process mechanism should be reinstated in the interconnection regulation, as it would benefit both parties, including the PUC (e.g., Bureau of Technical Utility Services).

- **Virtual meter aggregation (VMA)**

Virtual meter aggregation communication and billing needs to be standardized across utilities.

One possible model is how virtual net metering billing works in Maryland

Billing information to Pennsylvania customers is incomplete and confusing. In PECO's case this has recently gotten much worse with the adoption of their new billing system. Virtually no information is provided to the VMA customer.

There is also inconsistency across the utilities in how VMA is communicated publicly on utility websites, ranging from almost nothing at all, to incomplete and confusing, to PECO's information which is quite good.

10. Hosting Capacity Maps

The EDCs should develop and provide access for solar developers to hosting capacity maps of their distribution networks. Many states have this resource available to the DER industry. This would greatly assist the solar companies with assessing the potential application of an installation, as well as getting a better understanding of the equipment upgrade costs. PECO does have an online *DER Interconnection Viability Map*, but developers find that it is not very reliable with regard to providing preliminary feasibility potential for interconnection. Although this is definitely not a hosting capacity map, no other EDC in Pennsylvania has this basic mapping tool.

Two internet examples of hosting capacity maps include, **Excel Energy** (https://www.xcelenergy.com/hosting_capacity_map) and **Joint utilities of New York** (https://jointutilitiesofny.org/utility-specific-pages/hosting-capacity).

11. **Streamlining state permitting**

To the extent of its authority, the PUC should work to streamline state permitting of new clean energy generation by encouraging generation owners to re-power closing facilities with renewable energy (RE) plus storage, or encouraging generation owners to add "surplus" storage to make wind/solar into hybrid facilities, or by adding solar at a wind facility, wind at a gas peaker, etc. The Commission should also advocate to PJM to develop a fast "surplus" and "replacement" interconnection process to facilitate this.

12. **Adjust the capacity market to facilitate entry of renewable resources**

The PUC should work with PJM to adjust their capacity market rules, specifically the Reliability Pricing Model to accurately recognize and account for the capacity value of solar, storage, wind and other renewable resources. Renewable resources represent 97.8% of the PJM queue, but it is currently much more difficult for these resources to participate in the capacity market than for thermal resources to do so. PJM's rules penalize renewable resources for not delivering power during periods (such as nighttime) when they are inherently unable to do so.

During the Technical Conference in November, a number of the presenters recommended a change in this rule, to remove the bias toward fossil fuel and nuclear resources, and to insure fairness in the marketplace. There are essentially two basic solutions: PJM could adopt a seasonal approach, which considers each season independently, or an hourly approach.

The PUC should advocate for change in this rule to increase the resources that are available to qualify in the capacity market, thus reducing bias, saving money for consumers, and increasing overall reliability.