BEFORE THE PENNSYLVANIA PUBLIC UTILITY COMMISSION

Pennsylvania Public Utility Commission	:	Docket Nos. R-2025-3057164, et al.
v.	:	
PPL Electric Utilities Corporation	:	

DIRECT TESTIMONY OF BEN HAVUMAKI
ON BEHALF OF
THE COALITION FOR AFFORDABLE UTILITY SERVICES AND ENERGY EFFICIENCY IN PENNSYLVANIA ("CAUSE-PA")

December 22, 2025

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PREPARED DIRECT TESTIMONY OF BEN HAVUMAKI

I. INTRODUCTION AND BACKGROUND

Q: Please state your name, occupation, and business address?

A: My name is Ben Havumaki. I am a Principal Associate at Synapse Energy Economics (Synapse), located at 485 Massachusetts Avenue #3, Cambridge, MA 02139.

Q: For whom are you testifying in this proceeding?

A: I am testifying on behalf of the Coalition for Affordable Utility Services and Energy Efficiency in Pennsylvania (CAUSE-PA).

Q: What is the purpose of your testimony?

A: CAUSE-PA intervened to ensure that the terms, conditions, and rates for electric service that are proposed by PPL Electric Utilities Corporation (PPL or the Company) are just, reasonable, and affordable for its low-income customers. My testimony focuses on PPL's proposed treatment of new large load customers. I address the Company's proposal to socialize transmission system upgrade costs associated with new large load customers. My testimony considers whether the Company has sufficiently justified socialization of these costs and assesses the risks associated with these new loads. I also respond to other specific elements of PPL's ratemaking proposal. I offer recommendations to maximize benefits to all customers while mitigating risks. In CAUSE-PA Statement No. 1, Patrick Cicero addresses an array of issues concerning the ability of PPL's low income customers to afford to maintain and connect service.

Q: Have you provided testimony before the Pennsylvania Public Utility Commission in any prior cases?

A: Yes. I served as a witness on behalf of POWER Interfaith in the People's Gas 2023 rate case. A full list of proceedings in which I have provided sworn testimony is attached hereto as Appendix A.

Q: What are your qualifications to provide testimony in this case?

A: For more than seven years, my work has focused on electric and gas utility regulatory issues, usually in the context of litigated proceedings. I provide technical analysis, consulting, and expert witness support in general rate cases, where I focus on rate design and cost allocation. I also have expertise in performance-based regulation and grid modernization, and I focus on helping clients navigate the many interactions between these emerging paradigms on the one hand, and enduring utility regulatory principles and priorities on the other.

I have testified before utility regulatory commissions in Georgia, Illinois, New York, Minnesota, Rhode Island, New Hampshire, New Brunswick, Pennsylvania, West Virginia, Nova Scotia, and New Brunswick. I have also drafted comments and contributed to formal reports in numerous other jurisdictions in the United States and Canada. I hold a Bachelor of Arts degree in History from McGill University and a Master of Arts degree in Applied Economics from the University of Massachusetts. My resume is attached as Appendix B.

Q: Have you prepared Exhibits or Appendices to accompany your testimony?

A: Yes. I have prepared four (4) appendices. Appendix A contains the list of proceedings in which I have appeared as a witness. Appendix B is my resume. Appendix

C attaches the interrogatory responses that I have cited to in my testimony. Appendix D contains various labeled exhibits that were prepared by me or under my supervision.

II. OVERVIEW OF PPL'S PROPOSAL FOR NEW LARGE LOADS

Q: How does PPL define large loads?

A: PPL does not provide a formal definition of large load customers, but the Company broadly appears to consider all customers taking service at above 69 kV to be large loads.[1] The Company also indicates that recent and anticipated large load customers (new large loads) have peak demands in excess of 100 MW, will likely necessitate upgrades to the bulk electric system, and have limited distribution system impacts other than metering.[2]

Q: What are PPL's expectations for large load growth in its service territory?

A: PPL expects a substantial increase in its system peak demand as a result of new large loads. The Company projects that it will interconnect approximately 1.9 GW of new large loads by October 1, 2026.[3] The total pipeline of large load projects exceeds the Company's current peak demand of 7.8 GW.[4] The Company proposes to assign these new customers to rate class LP-5, which serves industrial customers taking service at transmission voltage.[5]

[1] PPL Electric St. No. 16 at 17
[2] PPL Response to CAUSE-PA XI-1(a) and XI-3(a), attached hereto at Appendix C.
[3] PPL Response to CAUSE-PA IV-29(a), attached hereto at Appendix C.
[4] PPL Electric St. No. 16 at 15.
[5] Id. at 17.

Q: Do new large load customers differ from the legacy customers already taking service on LP-5?

A: Yes. New large load customers are categorically different because they have much higher peak demand requirements than legacy LP-5 customers.[6] The addition of these large loads to PPL's service territory is also uniquely disruptive to the grid, as these interconnecting customers will require significant upgrades to the transmission system to accommodate their loads.[7] For example, PPL projects the need to make approximately $450 million in data-center-related transmission capital investment through just December 31, 2027.[8] This represents an extraordinary level of investment driven by a small number of customers.

Q: How many new large load customers does PPL project to connect by the end of its Fully Projected Future Test Year (FPFTY)?

A. The Company projects to interconnect 11 new large load customers by the end of the FPFTY, ending June 30, 2027.[9] Based on data provided by PPL in discovery, however, it is clear that at the end of the FPFTY, the LP-5 rate class will still mainly consist of smaller users, as shown in the table below that provides a distribution of expected LP-5 customers by peak demand.

[6] PPL Response to CAUSE-PA XI-3(a), attached hereto at Appendix C.
[7] PPL Electric St. No. 16, at 16-17.
[8] PPL Response to CAUSE-PA IV-29(a), attached hereto at Appendix C.
[9] PPL Electric Exhibit CRS-1.

Table 1: Distribution of LP-5 customers by peak demand

Projected Load	Projected Number of Customers 06/30/27[10]	Projected Number of Customers 06/30/2028[11]
Less than 5 MW	75	76
More than 5 MW but less than 10MW	37	36
More than 10 MW but less than 20MW	30	27
More than 20 MW but less than 50MW	24	17
More than 50 MW but less than 75MW	1	2
More than 75 MW but less than 100MW	0	2
More than 100MW	4	12

Q: What ratemaking and contractual provisions does PPL propose for new large load customers?

A: The Company proposes to socialize the costs of certain transmission system upgrades and then to impose a revenue guarantee to ensure that new large load customers contribute through rate revenues an amount equal to any associated socialized upgrade costs.[12] The Company also includes an 80-percent minimum demand obligation, a five-year initial contract term, and associated security provisions to backstop the revenue guarantee.[13]

Q: Why does the Company propose to socialize certain upgrade costs associated with new large load customers?

A: The Company proposes to socialize the costs of upgrades to the networked bulk power system and certain other upgrades based on its assertion that these investments will enhance reliability and provide other benefits to the wider grid – and not only to the

[10] PPL Response to CAUSE-PA IV-26, Attachment 1, attached hereto at Appendix C.
[11] Id.
[12] PPL Electric St. No. 16 at 17.
[13] Id. at 16-17.

triggering large load customer.[14,15] I will address these putative benefits in more detail later.

Q: Does the Company's proposal to require a revenue guarantee mitigate the impact of cost socialization?

A: It may help to ensure that there are not stranded assets, but it does not address significant concerns about the cost impacts associated with socialization. Even with revenue guarantees and security provisions, placing large-load-driven upgrades into rate base differs materially from requiring these costs to be paid by customers in the form of contributions in aid of construction (CIAC). Costs that are socialized and put into rate base are allowed a return on investment by the utility through either its distribution return authorized by the Public Utility Commission or its transmission equity return through its federally authorized formula rates. On the other hand, dollars paid directly by interconnecting customers in the form of CIAC are excluded from rate base, thereby reducing the utility's investment on which it earns a return.

For its part, PPL may have an incentive to grow its rate base more than would be required if it were instead relying on CIAC, so that it can earn a return on this investment while it recovers the costs. Under PPL's proposal, which could result in significant cost socialization, the Company would earn a return on assets that would not have been constructed but for the large load customer, with cost recovery occurring through the

[14] PPL Response to OCA VIII-9 Attachment 1, attached hereto at Appendix C. Note that the Company does not define the universe of infrastructure qualifying for "case-by-case" evaluation for potential cost socialization.

[15] PPL Response to CAUSE-PA IV-23, attached hereto at Appendix C. PPL Response to CAUSE-PA VIII-10(a), attached hereto at Appendix C. In its response to CAUSE-PA IV-23, the Company suggests that it will evaluate all investments for grid benefits as a condition for socialization and make this determination on a case-by-case basis. This position appears to be inconsistent with the Company's "Policy on Cost Allocation for Large Customer Interconnections," provided in PPL Response to OCA VIII-9 Attachment 1 and reiterated in PPL Response to CAUSE-PA VIII-10(a), attached hereto at Appendix C.

general transmission revenue requirement rather than as a direct offset to utility plant paid for by the customer. That treatment constitutes cost socialization as a matter of regulatory structure, regardless of whether given customer revenues ultimately equal the socialized costs of upgrades triggered by that customer.

The Company cannot credibly claim that its revenue guarantee means that the rate-based investments have not been socialized, because it has made no showing that it plans to utilize these revenue dollars in a dedicated fashion to back these investments out of rate base. As long as any large load customer upgrade remains on the utility's books, it should be considered to have been socialized.

Q: How significant is the return on investment that the Company stands to earn from placing new transmission assets into rate base?

A: Very significant. The return earned by the Company on new assets could easily be equivalent to a large share of the original capital investment, or it could even exceed the value of this original investment. It appears that any revenue guarantee and security provisions implemented by the Company would *not* cover the cumulative return on investment for any socialized asset, only the amount of the asset initially placed in rate base. In other words, the revenue guarantee is only designed to include the initial costs to construct the upgrades. It does not include the Company's return through the FERC formula rate. Thus, the large load customer that has triggered an upgrade is not held responsible for paying revenues that equal the rate of return on socialized upgrade costs, which is paid by all PPL ratepayers.

Q: What claims does PPL make about the benefits of new large loads?

A: PPL claims that the transmission upgrades triggered by these customers will provide broad reliability, resiliency, congestion relief, and capacity benefits and will provide additional operational flexibility.[16] The Company further anticipates that large load customers will place downward pressure on transmission rates for all customers by reducing the Company's FERC Transmission Formula Rate.[17] For example, the Company estimates that for the first gigawatt of data-center demand connected to the system, residential customers could experience approximately $3 per month in bill savings.[18]

Q: Does PPL acknowledge any risks associated with new large loads?

A: Yes. Witness Lookup states that "the Company is mindful not to create stranded asset risk for other customers" regarding investments related to the large load customers that will be placed into the Company's rate base.[19] Witness Lookup also acknowledges "resource adequacy challenges" associated with this load growth.[20]

Q: Has the Commission acknowledged the risks associated with large load customers?

A: Yes. The Commission convened its Large Load Tariff Proceeding in response to a Motion from Chairman Stephen M. DeFrank citing concerns about significant new

[16] PPL Response to CAUSE-PA VIII-10(a), attached hereto at Appendix C. PPL Response to CAUSE-PA IV-23, attached hereto at Appendix C.
[17] For clarity, I refer to these projected rate reduction benefits as "rate reduction benefits" to distinguish them from the wider grid benefits, including reliability, that the Company cites to justify socialization of upgrade costs.
[18] PPL Response to CAUSE-PA IV-29(a), attached hereto at Appendix C.
19 PPL Electric St. No. 16 at 16.
20 Id.

demand from these loads and the need to protect customers from "undue burdens and costs."[21]

Q: Are the Company's expectations of the benefits of new large loads overly optimistic?

A: Yes. The Company does not demonstrate that wider grid benefits, including improvements to reliability and resiliency, will necessarily materialize. Further, there may be new system reliability and operational risks associated with these loads. While the Company also forecasts rate reduction benefits resulting from these new large loads, the rate forecasts are based on myriad assumptions about future transmission costs and allocators. There is no guarantee that they will materialize. It is worth noting that not all utilities in Pennsylvania are similarly optimistic about new large loads.[22]

Q: What are the system reliability and operational risks to which you refer?

A: While it is true that certain system upgrades associated with new large loads could yield wider reliability benefits, the performance characteristics of the new large loads may cut in the other direction by eroding power quality and challenging system reliability. For example, in one notable event in July 2024, almost 1.5 gigawatts of data center load in Northern Virginia went offline, nearly triggering regional grid destabilization.[23] In an "Incident Review" about this event, the North American Electric Reliability Corporation

[21] Motion of Chairman Stephen M. DeFrank. *En Banc* Hearing Concerning Interconnection and Tariffs for Large Load Customers. Public Meeting of March 27, 2025 Agenda No. 3054271-CMR.
[22] For example, in comments filed in conjunction with the Commission's En Banc hearing on large load interconnection and tariffs (Large Load Tariff Proceeding), Duquesne Light articulated doubts about whether the growth of large loads would in fact create downward pressure on rates. See: En Banc Hearing on Interconnection and Tariffs for Large Load Customers, Comments of Duquesne Light Company, Docket No. M-2025-3054271, at 6 (Comments of Duquesne Light dated June 6, 2025).
[23] McLaughlin, Tim. Big Tech's data center boom poses new risk to US grid operators. Reuters. March 19, 2025, available at: https://www.reuters.com/technology/big-techs-data-center-boom-poses-new-risk-us-grid-operators-2025-03-19/. (Accessed: December 12, 2025)

(NERC) noted that "While this disturbance did not cause significant operating issues with the grid at this location and at this time, as data center loads continue to grow rapidly, the risk could quickly increase."[24] Meanwhile, even when large loads remain online, they can erode power quality for all users.[25]

Q: Explain why PPL's expectation of rate reduction benefits may not materialize.

A: The Company states that "customers should see significant reductions in their transmission costs"[26] when large load customers interconnect, because the new load would increase PPL Electric's single coincident system peak, thus reducing PPL's FERC Transmission Formula Rate and, accordingly, the costs charged to PPL Electric in its role as a default service provider.[27] However, the Company itself acknowledges that customer savings "depend on several factors, including the timing of load ramp, the amount of investments required and added to rate base, and the peak load on the system."[28] The assumptions that PPL has made when calculating expected savings are unsubstantiated and should not lead the Company or the Commission to conclude that customers will see significant transmission cost reductions.

[24] North American Electric Reliability Corporation. Incident Review: Considering Simultaneous Voltage-Sensitive Load Reductions at 9, available at: https://www.nerc.com/globalassets/our-work/reports/event-reports/incident_review_large_load_loss.pdf. (Last visited Dec. 18, 2025)
[25] See: Quint, Ryan, et al. Practical Guidance and Considerations for Large Load Interconnections. May 2025 at 16-23, available at: https://gridlab.org/portfolio-item/practical-guidance-and-considerations-for-large-load-interconnections/ (Last visited Dec. 18, 2025)
[26] PPL Electric St. No. 16 at 19.
[27] PPL Response to CAUSE-PA IV-29b, attached hereto at Appendix C.
[28] PPL Response to CAUSE-PA IV-29a, attached hereto at Appendix C.

Q: What unsubstantiated assumptions are you referring to?

A: First, PPL assumes that 1 GW of data center demand necessitates adding $100M of network upgrades to rate base.[29] The Company has not presented data that supports this assumption about the potential network upgrade costs required for an additional GW of load. Several factors could impact this cost, such as the voltage of existing infrastructure and the proximity of the new load to generation or existing electrical assets. The Company's signed ESAs do not provide a sufficient sample size for determining the upgrade cost associated with incremental load additions.

Second, PPL assumes that 1 GW of new contracted load will increase its 1 CP FERC formula rate allocator by a commensurate 1 GW.[30] However, each of these new large load customers faces only a minimum load guarantee of 80% of contracted load - which incentivizes them to achieve and maintain 80% of their contracted demand but not necessarily all of it - and is also subject to the customer's ramp schedule. Further, individual customer peak may not occur at the same time as PPL's coincident system peak. Taken together, these factors suggest considerable uncertainty about the magnitude of the new large load contribution to PPL's coincident peak. Assumptions about PPL's coincident peak demand have a very meaningful impact on its FERC formula rate, the resulting class revenue requirements, and the ultimate bill impacts and projected savings.

[29] PPL Response to CAUSE-PA IV-29a and PPL Response to CAUSE-PA VIII-9 Attachment 1, tab "Talking Points & Notes", attached hereto at Appendix C.
[30] PPL Response to CAUSE-PA VIII-9 Attachment 1, tab "Summary", attached hereto at Appendix C.

III. PPL SHOULD NOT SOCIALIZE UPGRADE COSTS FOR NEW LARGE LOAD CUSTOMERS

Q: Please outline the Company's proposal to socialize certain costs.

A: As I noted earlier, the Company proposes to socialize the costs of upgrades to the networked bulk power system and certain other upgrades on grounds that these investments will provide benefits to the wider grid and not only to the triggering large load customer.[31,32] Meanwhile, the costs of direct connection facilities that solely serve the customer would continue to be paid by the customer (through CIAC), consistent with PPL's existing tariff practice.[33]

Q: Why don't you support the Company's proposal to socialize upgrade costs?

A: The Company has not substantiated the wider grid benefits, including enhanced reliability and resiliency, congestion relief, expanded capacity, and operational flexibility that serve as the justification for cost socialization of transmission upgrades. This issue is not academic: the Company has already begun signing energy service agreements (ESAs) with large load customers under this cost socialization framework. I therefore recommend that large load customers be required to pay through CIAC for all system upgrades that they trigger, provided that these upgrades would not otherwise have been required absent the new large load.

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[31] PPL Response to OCA VIII-9 Attachment 1, attached hereto at Appendix C. Note that the Company does not define the universe of infrastructure qualifying for "case-by-case" evaluation for potential cost socialization.

[32] PPL Response to CAUSE-PA IV-23, attached hereto at Appendix C. PPL Response to CAUSE-PA VIII-10(a), attached hereto at Appendix C. In its response to CAUSE-PA IV-23, the Company suggests that it will evaluate all investments for grid benefits as a condition for socialization and make this determination on a case-by-case basis. This position appears to be inconsistent with the Company's "Policy on Cost Allocation for Large Customer Interconnections," provided in PPL Response to OCA VIII-9 Attachment 1 and reiterated in PPL Response to CAUSE-PA VIII-10(a), attached hereto at Appendix C.

[33] PPL Response to OCA VIII-9 Attachment 1, attached hereto at Appendix C.

As I will discuss below, even if PPL had demonstrated that such wider grid benefits would result from its proposal, it would be imprudent to socialize upgrade costs based on these alleged benefits without considering whether the benefits are truly worth the costs for PPL's customers.

Q: Why do you conclude that the Company has not substantiated the wider grid benefits from large load customer upgrades?

A: The Company has provided little evidence of these benefits. The Company appears to take the position that upgrades to the networked bulk power system made in connection with LP-5 customer interconnections always provide reliability benefits, and so the Company does not appear to consider measurement or quantification of those benefits to be necessary.[34] Concerning other investments that will be evaluated on a case-by-case basis, the Company alludes to "transmission level power flow studies, topology review, and engineering judgement," and the study of contingencies by PPL's Transmission Planning team.[35] However, as far as I can tell, the Company has not produced any analysis quantifying reliability, resiliency, or other benefits associated with large load driven transmission facility upgrades. Nor has PPL shown that these proposed upgrades are prudent in light of other needed upgrades to PPL's systems which may impact customers' ability to access safe and reliable services.

When specifically asked by Environmental Intervenors through discovery about analysis that the Company has conducted related to enhanced grid reliability from system upgrades associated with new large loads, PPL cited to its "Policy on Cost Allocation for Large Customer Interconnection," which describes the socialization eligibility criteria and

[34] PPL Response to CAUSE-PA VIII-10(a), attached hereto at Appendix C.
[35] PPL Response to CAUSE-PA VIII-10(b), attached hereto at Appendix C.

general approach to evaluating benefits, but does not include project-specific analysis of benefits.[36] That is, PPL pointed to its internal policy as a means of justifying its policy. This circular reasoning is hardly sufficient to reach the conclusion that there will be quantifiable reliability, resiliency, or other benefits associated with large load driven transmission facility upgrades that PPL seeks to socialize.

Q: Please explain your concern about whether broader grid benefits would be worth the costs.

A: Even if benefits were to accrue to the broader grid from certain system upgrades, it is not clear that these benefits would justify the upgrade costs – a key consideration since these investments would not otherwise have been undertaken by the Company but for the large load customer. For many customers, a small amount of incremental reliability benefit may *not* justify the upward rate pressure associated with the socialization of upgrade costs.[37]

Q: Has the Company explained how it will determine whether to socialize costs in conjunction with its "case-by-case" assessment?

A: It is not clear how the Company will make decisions about whether to socialize upgrade costs for those "case-by-case" investments. It is unclear whether the mere existence of *some* reliability benefits associated with substation construction for a new large load customer would warrant cost socialization, for example, or whether the Company intends to apply a threshold or other quantitative standard. PPL's proposal for

[36] PPL Response to EI-PPL-III-1, attached hereto at Appendix C.

[37] Even if the aggregate impact of a new large load customer coming onto the grid is to exert downward pressure on rates, socialization of any associated upgrade costs will result in *upward* rate pressure. Thus, it is important to understand two separate effects: the impact of increased sales associated with a new large load customer (downward rate pressure) and the impact of socialization of associated upgrade costs (upward rate pressure).

a "case-by-case" assessment further obscures whether customers will see tangible benefits as a result of PPL's proposals.

Q: Is the Company's proposed approach to socializing certain upgrade costs for new large loads consistent with its historical practices?

A: No. In the past, LP-5 customers fully funded upgrade costs at the outset.[38] These legacy LP-5 customers were smaller than the new large load customers. PPL argues in response to discovery that upgrades taken on behalf of these smaller LP-5 customers did not result in grid benefits warranting socialization of their costs.[39] However, as discussed above, it is wholly unclear whether, and to what extent, the system upgrades triggered by the larger LP-5 customers would result in benefits which would justify the socialization of the associated costs.

Q: How will your proposal to require large load customers to pay upfront for the cost of any associated upgrades benefit other customers?

A: Requiring large load customers to fund all upgrades via CIAC will prevent any potential upward rate pressure associated with placing upgrades into rate base, helping to ensure that the net effect of new rate revenues from large load customers will be a reduction in the transmission rates that all customers pay.

It is also important to note that the Company has not demonstrated clearly how it will track revenues from large load customers against the costs of socialized upgrades.[40] Requiring large load customers to fund upgrades through CIAC removes any concerns about tracking these revenues against socialized costs.[41]

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[38] PPL Electric St. No. 16 at 17.
[39] PPL Response to CAUSE-PA XI-3(b), attached hereto at Appendix C.
[40] PPL Response to EI-PPL-III-7, attached hereto at Appendix C.
[41] PPL Response to EI-PPL-III-6, attached hereto at Appendix C.

Q: If large load customers pay for upfront costs, would they still pay the incremental costs of the transmission system through ongoing transmission rates?

A: Yes.

Q: Why is it reasonable for large load customers to pay for both the upgrades that they cause and their use of the existing system?

A: Large load customers are not served only by the portions of the grid where any triggered upgrades might occur. Rather, large load customers benefit from the *entire* grid and should therefore be held accountable for both the new costs that they impose on the system and their use of the wider, interconnected electrical system. This means paying embedded system costs through standard transmission rates in addition to CIAC for all incremental upgrade costs.

Q: Does the unique nature of large load customers warrant holding them responsible for both marginal and embedded system costs?

A: Yes. While smaller customers are not generally held individually responsible for any upgrades that they might trigger, such upgrades tend to be more incidental. For new large load customers such as data centers, their peak demands are so high that the grid must be reshaped for their benefit, and they must be held responsible for the costs that they cause.

IV. IF THE COMMISSION IS INCLINED TO PERMIT COST SOCIALIZATION, IT SHOULD INCLUDE KEY PROTECTIONS

Q: What is your recommendation if the Commission is inclined to permit some socialization of upgrade costs?

A: If the Commission is inclined to allow socialization, then I recommend that it maintain the standard that it put forward in its model tariff – permitting socialization only if the interconnecting customer is not expected to receive greater than 50 percent of the benefits of new facility construction.[42] The Commission's 50-percent standard would place the burden on the large load customer to substantiate benefits prior to utility cost socialization. To this end, prior to permitting any socialization of costs, the Commission should direct the Company to establish a clear methodology for evaluating benefits and determining whether socialization of costs is warranted. This methodology should clearly be spelled out in PPL's tariff through a compliance filing submitted in this docket, subject to Commission approval after a comment period by parties to this proceeding and considering the guidance that is developed in its model tariff proceeding.

Furthermore, even if an upgrade were to meet the 50-percent standard and be socialized, the Company should still impose its proposed revenue guarantees and security requirements, also including a revenue guarantee for the Company's return on the rate-based investment.

[42] Interconnection and Tariffs for Large Load Customers, Tentative Order, in Model Large Load Tariff Docket No. M-2025-3054271 at 16 (Tentative Order entered Nov. 6, 2025).

Q: Why is it necessary for the Company to establish a clear methodology for evaluating benefits?

A: The Company identifies a range of possible benefits associated with upgrades, including reliability and resiliency and enhanced capacity. As I already noted, however, the Company has provided no specific evidence substantiating the existence of these benefits. There may be many approaches to measurement and quantification of upgrade benefits; a clear methodology is required to address the approach to measurement and to clarify how different types of benefits, potentially expressed in different units, are to be assessed as part of a comprehensive accounting of benefits. Absent a standardized valuation protocol, implementation of the 50-percent threshold could be administratively and analytically challenging.

Q: What types of benefits and impacts should the Company's methodology address?

A: At a minimum, the methodology should address quantification of reliability, resiliency, capacity, congestion relief, and operational flexibility benefits, consistent with the Company's statements about the potential benefits of upgrades. The Company's methodology should also address the distribution of benefits across customer classes or subgroups of customers, and it should address affordability. Specifically, the methodology should describe how investments will be evaluated for prudence in light of the impacts to customers' monthly bill affordability; this evaluation of affordability should include a distributional affordability analysis and a determination of whether upgrades will alleviate other planned expenditures.

Q: How will the Commission and other stakeholders monitor any cost socialization and recovery?

A: The Commission should require that the Company provide an annual filing detailing any cost socialization, with supporting analyses showing the calculation of benefits, justifying the socialization, and tracking cost recovery from each large load customer still repaying socialized upgrade costs. The Commission should require that these filings and all costs be justified by PPL in its next rate case and any costs that have been improperly allocated should be refunded to customers. Later in my testimony, I recommend that PPL be required to establish a new large load rate class in its next filed rate case with a full cost of service study to justify and allocate costs to this class of customers. In its cost of service study, PPL should be required to clearly demonstrate which categories of costs it allocates directly to interconnecting large load customers and which categories of costs are appropriate for socialization. In addition, PPL should be required to file schedules that show the actual allocation of costs for those large load customers who have interconnected since the effective date of rates in this proceeding showing the allocation of costs and justification for those allocations.

V. PPL'S PROPOSED RATE CLASS TREATMENT FOR NEW LARGE LOADS

Q: Why does PPL assign new large load customers to rate class LP-5?

A: The Company explains that it defines customer classes by service voltage. Since new large load customers will take service at transmission voltage, the Company's position is that they belong in rate class LP-5.[43] According to the Company, assigning

[43] PPL Response to CAUSE-PA XI-1(a), attached hereto at Appendix C.

these large load customers to LP-5 meets the criteria that similarly situated customers should be treated the same, while also avoiding the burden of creating a new class.[44]

Q: Do you agree that large load customers are "similarly situated" to the non-large load customer in rate class LP-5?

A: No, and I would point to the Company's statements to confirm this. In response to a data request, Witness Lookup states:

> Previously, LP-5 customers had lower peak demand requirements, typically less than 100 MW. This resulted in LP-5 customers taking service at 69 kV or 138 kV. The facilities needed to serve these customers only benefited the new customer which is why the customer paid for the system upgrades with CIAC. The newer large load customers have peak demand requirements well in excess of 100 MW. This often requires upgrades to the 230 kV and 500 kV bulk electric system. Upgrades to the bulk electric system create broader reliability benefits to all customers.[45]

It is clear from the Company's statement that the new LP-5 customers exhibit different load characteristics and impose different costs on the system. The fact that these new customers happen to fit within the Company's current LP-5 definition does not mean that the Company could not or should not create a separate class for higher-usage customers.

Q: What are the benefits of a dedicated rate class for large load customers?

A: Assigning large load customers to a dedicated class would permit the Company to separately assign costs to these customers. As I will discuss in the next section, I recommend that the Company directly assign a larger share of Universal Service Rider costs to these customers, in part because large load customers are driving increases in the wholesale market generation capacity prices that affect all of PPL's ratepayers.[46]

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[44] PPL Response to CAUSE-PA XI-1(C), attached hereto at Appendix C.
[45] PPL Response to CAUSE-PA XI-3(a), attached hereto at Appendix C.
[46] See CAUSE-PA Statement No. 1 at 90-94.

Creating a separate rate class for large load customers would also give the Company the option to directly assign transmission costs to the large load class as a whole. While the Company suggests that its FERC formula rate applies to all customers "uniformly," this obscures an important nuance about the extent of the Company's discretion over retail cost recovery for shared transmission facilities.

Q: Have other jurisdictions created separate classes for new large loads?

A: Yes, there are relevant examples within PJM. The Virginia State Corporation Commission recently ordered the creation of a new customer class for Dominion customers with peak demands of 25 MW or greater, effective January 1, 2027.[47] Meanwhile, Maryland has also recently enacted legislation, entitled the "Next Generation Energy Act," that directs the Maryland Public Service Commission to create a new rate class for data centers.[48]

Q: How do you recommend that the Company establish the new large load class?

A: I recommend that the Company establish a new class in its next rate case, with eligibility criteria for this class based upon customer peak load. The Company should assign all customers with peak loads at or above 50 MW to this class, consistent with the Commission's model large load tariff.[49]

[47] Final Order in Application of Virginia Electric and Power Company for a 2025 biennial review of the rates, terms and conditions for the provision of generation, distribution, and transmission services pursuant to § 56-585.1 A of the Code of Virginia,Case No. PUR-2025-00058, at 10 (Nov. 25, 2025)
[48] See MD HB1035, available at: https://legiscan.com/MD/bill/HB1035/2025 (Last visited Dec. 19, 2025).
[49] Tentative Order in Model Large Load Tariff Docket at 6.

VI. UNIVERSAL SERVICE RIDER COST ALLOCATION

Q: What is the purpose of this section of your testimony?

A: I analyze approaches for assigning the costs of PPL's Universal Service and Energy Conservation programs across PPL's various customer classes. These programs help low-income households remain connected to service. As CAUSE-PA witness Patrick M. Cicero describes,[50] PPL's universal service rider (USR) currently collects costs only from residential customers. Witness Cicero challenges PPL's rationale and decision to assess these broad public purpose costs only to ratepayers taking service under Rate RS or at residential rates and instead recommends assigning the costs to all customers.[51] The Commission, too, has previously endorsed holding non-residential classes responsible for universal service obligations.[52]

Q: How does Witness Cicero recommend assigning universal service costs among customer classes?

A: Witness Cicero recommends modifying the allocation approach originally put forward by PPL and recommends that these costs be assigned to all rate classes.[53] When asked in discovery what the per KWh cost would be at current USR costs to apply the USR Rider to all rate classes, PPL provided information that allowed for the assignment of costs to the customer classes based on their respective distribution revenue

[50] CAUSE-PA St. No. 1 at 83-88.
[51] Id.
[52] 2019 Amendments to Policy Statement on Customer Assistance Program, 52 Pa. Code §§ 69.261—69.267, Resolution: Amend Section 69.265(1)—Program funding; see also Section 69.266(b)—Cost recovery. "Utilities and stakeholders are advised to be prepared to address CAP cost recovery in utility-specific rate cases consistent with the understanding that the Commission will no longer routinely exempt non-residential classes from universal service obligations."
[53] CAUSE-PA St. No. 1 at 89.

requirements per the Company's cost of service study (COSS) filed in the current case.[54] That allocation approach assigns a very small portion of costs to large primary C&I and large transmission C&I customers because they take service at higher distribution or transmission voltages, which means that the Company's COSS assigns them a fraction of the distribution revenue requirement. Assigning universal service costs based only on distribution revenues fails to account for the fact that universal service costs are not incurred just to help low-income customers pay for distribution service but also serve to provide assistance with the total bill, which includes transmission and generation services.

As a result, Witness Cicero recommends modifying the Company's allocation by first directly assigning $10 million of universal service expenses to the LP-5 rate class, before then using the distribution-revenue-based allocation.[55] I support this approach and have prepared an exhibit showing what that allocation would look like at proposed rates. This is attached to my testimony as Appendix D, Havumaki Exhibit D-1. Consistent with the recommendation of Mr. Cicero, my allocation backs out the $1.4 million in wage and labor costs that PPL had originally included. Per Mr. Cicero, it is CAUSE-PA's position that those costs should continue to be included in base rates.[56]

Q: Could PPL instead assign universal service costs based on energy usage?

A: Yes, it would be reasonable to assign universal service costs among PPL's customer classes based on energy usage, particularly given that assignment based on distribution revenue does not account for the full scope of universal service costs and

[54] PPL Response to CAUSE-PA VII-1, attached hereto at Appendix C.
[55] CAUSE-PA St. No. 1 at 94-95.
[56] Id. at 95-96.

cost causation. A volumetric charge is appropriate because electricity consumption is a reasonable proxy for a customer's contribution to system energy demand and peak-driven costs. Large energy users, including data centers, materially influence wholesale energy prices, capacity procurement costs, and transmission investments as outlined more fully by Mr. Cicero. A volumetric charge ensures that customers contributing most to those system cost drivers contribute proportionally to mitigating their impacts. However, an energy allocator would assign far more universal service costs to large users compared to Witness Cicero's recommended assignment. Table 2, below, compares USR charges when allocating universal service costs based on energy consumption[57] versus using Witness Cicero's modification to the Company's distribution revenue-based assignment.[58]

Table 2: Universal Service Rider ($/kWh) under different allocation approaches

	RES	SCI	LP-4	LP-5
Energy-based kWh Allocation	$0.0036	$0.0036	$0.0035	$0.0033
Cicero Distribution Revenue Allocation	$0.0071	$0.0032	$0.0010	$0.0009

Mr. Cicero's approach reasonably assigns costs across all customer classes without shifting more costs than may be warranted onto non-residential customers, particularly those large load customers taking service at LP-5 rate class.

VII. SUMMARY OF RECOMMENDATIONS

Q: Please summarize your recommendations set forth throughout your direct testimony.

A: As described in detail above, I recommend as follows:

[57] See Appendix D, Havumaki Exhibit D-2.
[58] Appendix D, Havumaki Exhibit D-1.

- Large load customers should be required to pay for all system upgrades that they trigger through CIAC.

- However, if the Commission is inclined to permit socialization of certain upgrade costs associated with large load customers, then it should establish the following requirements:

    - Socialization of upgrade costs should only be permitted if the interconnecting customer is expected to receive less than 50 percent of the benefits of new facility construction, consistent with the standard that the Commission put forward in its model tariff.

    - The revenue guarantee and security provisions should apply to any socialized costs and should cover both the value of any rate-based investment and the cumulative return on investment that the Company will collect over the investment's life.

    - The Company should develop a clear methodology for evaluating benefits and determining whether socialization of costs is warranted, to be submitted to the Commission for review as a compliance filing. This standard should be applied alongside the Company's proposed revenue guarantees and security requirements.

    - PPL should provide an annual filing detailing any cost socialization, with supporting analyses showing the calculation of benefits, justifying the socialization, and tracking cost recovery from each large load customer still repaying socialized upgrade costs.

- PPL should define a new large load class, and the eligibility criteria for this class should be based upon customer peak demand. Consistent with the Commission's model large load tariff, customers with peak demands of at least 50 MW should be assigned to this new class.

- PPL should directly assign a larger share of Universal Service Rider costs to large load customers

Q: Does this conclude your direct testimony?

A: Yes.

CAUSE-PA Statement 2, Havumaki

Appendix A

List of Proceedings – Ben Havumaki

Testimony

Nova Scotia Energy and Review Board (NSEB M12179): Expert Evidence of Ben Havumaki on behalf of Counsel to Nova Scotia Energy Board. May 29, 2025.

Public Utilities Commission of New Hampshire (Docket No. DE 24-070): Direct Testimony of Ben Havumaki. On behalf of the Office of the Consumer Advocate. January 23, 2025.

New York Public Service Commission (Cases 24-E-0322 and 24-G-0323): Direct Testimony of UIU Rate Panel. September 26, 2024.

Pennsylvania Public Utility Commission (Docket No. R-2023-3037933): Direct Testimony of Ben Havumaki on behalf of Power Interfaith. May 31, 2023.

Nova Scotia Utility and Review Board (NSEB M11199): Expert Evidence of Ben Havumaki on behalf of Counsel to Nova Scotia Energy Board. August 28, 2023.

New Brunswick Energy and Utilities Board (Matter 529): Expert Evidence of Synapse Energy Economics, Inc. On behalf of the New Brunswick Energy and Utilities Board. April 25, 2023.

Minnesota Public Utilities Commission (Docket No. E-002/GR-21-630): Direct and Surrebuttal Testimony of Ben Havumaki regarding Xcel Energy's application to increase rates. On behalf of the Division of Energy Resources of the Minnesota Department of Commerce. December 6, 2022, and October 3, 2022.

Public Utilities Commission of New Hampshire (Docket No. DE 20-161): Direct Testimony of Tim Woolf and Ben Havumaki regarding Eversource's 2020 least-cost integrated resource plan. On behalf of the Office of the Consumer Advocate. August 19, 2022.

Public Service Commission of West Virginia (Case No. 21-0857-E-CN): Direct Testimony of Ben Havumaki regarding the petition of Monongahela Power Company and the Potomac Edison Company for the issuance of a certificate of public convenience and necessity for environmental compliance and modernization, upgrade, and improvement program and related surcharge for coal-fired boilers at electric power plants. On behalf of Appalachian Mountain Associates. July 20, 2022.

Illinois Commerce Commission (Docket No. 22-0067): Direct and Rebuttal Testimony of Melissa Whited and Ben Havumaki regarding the performance incentive mechanisms and tracking metrics proposed by Commonwealth Edison Company and Ameren Illinois Company. On behalf of the State of Illinois. April 6, 2022.

Public Utilities Commission of New Hampshire (Docket DG 21-104): Direct Testimony of Ben Havumaki and Courtney Lane Regarding Northern Utilities' Proposed Rate Increase for the

Residential Class and Multi-Year Rate Plan. On behalf of New Hampshire Office of the Consumer Advocate. April 1, 2022.

Illinois Commerce Commission (Docket No. 22-0063): Direct Testimony of Melissa Whited and Ben Havumaki regarding performance incentive mechanisms and tracking metrics proposed by Ameren Illinois Company. On behalf of the State of Illinois. March 30, 2022 and May 25, 2022.

Public Utilities Commission of New Hampshire (Docket DG 21-104): Direct Testimony of Courtney Lane and Ben Havumaki regarding Northern Utilities Inc.'s proposed multi-year rate plan, which includes a proposed residential customer charge, the company's reliance on the minimum-system method for classifying distribution mains costs and its implication for rate design and class cost allocation. On behalf of the Office of the Consumer Advocate. April 1, 2022.

Public Utilities Commission of New Hampshire (Docket No. DE 21-030): Direct testimony of Melissa Whited and Ben Havumaki regarding Until Energy Systems' multi-year rate plan, grid modernization proposal, overall rate increases for the residential class, allocation of costs among rate classes, increase to the residential customer charge, and revenue decoupling mechanism. November 23, 2021.

Rhode Island Division of Public Utilities & Carriers (Docket No. 5189): Direct Testimony of Tim Woolf and Ben Havumaki. November 17, 2021.

Hawaii Public Utilities Commission (Docket No. 2018-0088): Panel testimony by Ben Havumaki regarding performance incentive mechanisms. On behalf of the Division of Consumer Advocacy, Department of Commerce and Consumer Affairs. September 21, 2020.

Georgia Public Service Commission (Docket No. 42516): Direct Testimony of Melissa Whited and Ben Havumaki. On behalf of Sierra Club. October 17, 2019.

CAUSE-PA Statement 2, Havumaki

Appendix B

Resume – Ben Havumaki

Ben Havumaki, Principal Associate

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bhavumaki@synapse-energy.com

PROFESSIONAL EXPERIENCE

Synapse Energy Economics, Inc., Cambridge, MA. *Principal Associate,* April 2024 – Present; *Senior Associate,* June 2021 – April 2024; *Associate,* July 2018 – June 2021.

- Provides research, analysis, and consulting services, frequently in the context of regulated proceedings, with expertise in the following topic areas:
    - Rate design and performance-based regulation: Evaluates utility proposals and formulates new recommendations based on best practices and informed by innovative emerging models. Evaluates rate designs for consistency with policy goals using quantitative modeling and jurisdictional data. Provides expert testimony and other formal input in the context of regulated proceedings.
    - Benefit-cost analysis: Evaluates utility BCAs with reference to best practices, including emerging standards for grid modernization and distributed energy resources. Engaged in the development of new BCA practices in the arenas of grid modernization and resilience.
    - Macroeconomic analysis: Uses the IMPLAN model in conjunction with primary research and analysis and core economic principles to evaluate the GDP, job, and income implications of major grid changes.
- Contributing author to reports covering a range of topics including plant decommissioning, transportation electrification, and distributed energy resources (DER) growth.

University of Massachusetts Boston, MA. *Graduate Teaching and Research Assistant,* 2017 – 2018

- Led ecosystem-valuation workshops for EPA-funded initiative to shape resilience policymaking in the Great Bay region of New Hampshire.
- Served as a teaching assistant in graduate econometrics course and undergraduate macroeconomics and urban economics courses.

Notre Dame Education Center and Jewish Vocational Service Boston, MA. *Math Instructor*, 2012 – 2017

- Taught foundational math to adult learners and standard high school math curriculum to students in non-traditional school program.

The City of New York New York, NY. *Senior Investigator*, 2007 – 2010

- Investigated complaints against officers of the New York City Police Department and issued disciplinary recommendations in formal reports to the agency board.

EDUCATION

University of Massachusetts, **Boston,** Boston, MA
Master of Arts in Applied Economics, 2018
Recipient of the Arthur MacEwan Award for Excellence in Political Economy

McGill University, Montreal, Quebec
Bachelor of Arts in History, 2007

PUBLICATIONS

Goldenberg, C., B. Havumaki, C. Lane, M. Whited, G. Wilson. *Fixing Multiyear Rate Plans: Building a firm foundation for cost control.* 2025. Rocky Mountain Institute and Synapse Energy Economics.

Havumaki, B., A. Fuzaylov, M. Whited. *Optimizing Incentives for Effective PIMs: Coordinating PIMs with Authorized ROE for Efficient and Effective Regulation*. 2025. Synapse Energy Economics for Clean Virginia.

Takahashi, K., A. Glaser Schoff, S. Sharaf, B. Havumaki. *Evidence Regarding Nova Scotia Power's 2025 Load Forecast: Evidence RE: M12349.* 2025. Synapse Energy Economics for the Nova Scotia Utility and Review Board.

Glaser Schoff, A., B. Havumaki, E. Borden, T. Nguyen. 2024. *Community Solar Garden Study, 2024.* Synapse Energy Economics with Great Plains Institute and the National Association of State Energy Offices for the Minnesota Commerce Department.

Havumaki, B., K. Takahashi, A. Glaser Schoff. 2024. *Evidence Regarding Nova Scotia Power's 2024 Load Forecast*. Prepared for the Nova Scotia Utility and Review Board.

Borden, E., B. Havumaki, A. Lawton, M. Whited. 2023. *Establishing Income Based Fixed Charges in California: A review of economic theory, policy tradeoffs, and practical considerations for fixed charge reform.* Synapse Energy Economics for The Utility Reform Network and Natural Resources Defense Council.

Knight, P., J. Frost, T. Fitch, E. Sinclair, J. Tabernero, O. Griot, B. Havumaki, J. Smith, L. Metz, S. Chavin. 2023. *TVA's Clean Energy Future: Charting a course to decarbonization in the Tennessee Valley.* Synapse Energy Economics for GridLab and Center for Biological Diversity.

Bhandari, D., A. Napoleon, B. Havumaki. 2022. *Reply Comments on the Grid Modernization Proposals in Xcel's 2021 IDP: Analysis of the proposals for Distributed Intelligence and the Resilient Minneapolis Program and recommendations on certification.* Synapse Energy Economics for Minnesota Department of Commerce.

D. Bhandari, A. Napoleon, B. Havumaki. 2022. *Comments on the Grid Modernization Proposals in Xcel's 2021 IDP: Analysis of the proposals for Distributed Intelligence and the Resilient Minneapolis Program and Recommendations on Certification.* Synapse Energy Economics for Minnesota Department of Commerce.

Havumaki, B., C. Lane, D. Bhandari. 2022. *Comments on AGIS Related Scoping & Procedures: In Response to the Notice of Comment in Docket No. E-002/M-21-814*. Synapse Energy Economics for Minnesota Department of Commerce.

Havumaki, B., T. Woolf, C. Lane, E. Sinclair, C. Roberto, P. Alvarez. 2022. *Review and Assessment of Grid Modernization Plans: Guidance for Regulators, Utilities, and Other Stakeholders*. Synapse Energy Economics for Minnesota Department of Commerce.

Knight, P., B. Havumaki, A. Takasugi, J. Frost. 2022. *Transforming Transportation in Michigan: A Roadmap to the State's 2050 Climate Target*. Synapse Energy Economics for Sierra Club.

Takahashi, K., T. Woolf, B. Havumaki, D. White, D. Goldberg, S. Kwok, A. Takasugi. 2021. *Missed Opportunities: The Impacts of Recent Policies on Energy Efficiency Programs in Midwestern States.* Synapse Energy Economics for the Midwest Energy Efficiency Alliance.

Kallay, J., A. Napoleon, J. Hall, B. Havumaki, A. Hopkins, M. Whited, T. Woolf, J. Stevenson, R. Broderick, R. Jeffers, B. Garcia. 2021. *Regulatory Mechanisms to Enable Investments in Electric Utility Resilience.* Synapse Energy Economics for Sandia National Laboratories.

Kallay, J., S. Letendre, T. Woolf, B. Havumaki, S. Kwok, A. Hopkins, R. Broderick, R. Jeffers, K. Jones, M. DeMenno. 2021. *Application of a Standard Approach to Benefit-Cost Analysis for Electric Grid Resilience Investments*. Synapse Energy Economics for Sandia National Laboratories.

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Impact. Prepared by Synapse Energy Economics and Slipstream for Iowa Economic Development Authority.

Camp, E., B. Havumaki, T. Vitolo, M. Whited. 2020. *Future of Solar PV in the District of Columbia: Feasibility, Projections, and Rate Impacts of the District's Expanded RPS.* Synapse Energy Economics for the District of Columbia Office of the People's Counsel.

Whited, M., J. Frost, B. Havumaki. 2020. *Best Practices for Commercial and Industrial EV Rates*. A guide prepared by Synapse Energy Economics for Natural Resources Defense Council.

Knight, P., E. Camp, D. Bhandari, J. Hall, M. Whited, B. Havumaki, A. Allison, N. Peluso, T. Woolf. 2019. *Making Electric Vehicles Work for Utility Customers: A Policy Handbook for Consumer Advocates.* Synapse Energy Economics for the Energy Foundation.

Camp, E., A. Hopkins, D. Bhandari, N. Garner, A. Allison, N. Peluso, B. Havumaki, D. Glick. 2019. *The Future of Energy Storage in Colorado: Opportunities, Barriers, Analysis, and Policy Recommendations.* Synapse Energy Office for the Colorado Energy Office.

Napoleon, A., B. Havumaki, D. Bhandari, T. Woolf. 2019. *Review of New Brunswick Power's Application for Approval of an Advanced Metering Infrastructure Capital Project: In the Matter of the New Brunswick Power Corporation and Section 107 of the Electricity Act; Matter No. 452.* Synapse Energy Economics for the New Brunswick Energy and Utilities Board Staff.

Whited, M., B. Havumaki. 2019. *GD2019 04 M: DC DOEE Comments Responding to Notice of Inquiry.* Synapse Energy Economics for the District of Columbia Department of Energy and Environment.

Timmons, D., A.Z. Dhunny, K. Elahee, B. Havumaki, M. Howells, A. Khoodaruth, A.K. Lema-Driscoll, M.R. Lollchund, Y.K. Ramgolam, S.D.D.V. Rughooputh, D. Surroop. 2019. *Cost Minimization for Fully Renewable Electricity Systems: A Mauritius Case Study.* Energy Policy. 133, 110895.

Napoleon, A., T. Woolf, K. Takahashi, J. Kallay, B. Havumaki. 2019. *Comments in the New York Public Service Commission Case 18-M-0084: In the Matter of a Comprehensive Energy Efficiency Initiative.* Comments related to NY Utilities report regarding energy efficiency budgets and targets, collaboration, heat pump technology, and low- and moderate-income customers and requests for approval. Synapse Energy Economics on behalf of Natural Resources Defense Council.

Havumaki, B., E. Camp, B. Fagan, D. Bhandari. 2019. *Planning for the Future at the CTGS Site: Report on the Decommissioning Proposal of Maritime Electric*. Synapse Energy Economics for Carr, Stevenson, and MacKay.

Havumaki, B., J. Kallay, K. Takahashi, T. Woolf. 2019. *All-Electric Solid Oxide Fuel Cells as an Energy Efficiency Measure.* Synapse Energy Economics for Bloom Energy.

Takahashi, K., B. Havumaki, J. Kallay, T. Woolf. 2019. *Bloom Fuel Cells: A Cost-Effectiveness Brief.* Synapse Energy Economics for Bloom Energy.

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Havumaki, B., G. Mavrommati, C. Makriyannis. 2018. *World Bank Water Management, Sanitation, and Conservation Projects in Developing Countries: A Guide to Cost-Benefit Analysis.* Report for the World Bank.

PRESENTATIONS

Woolf, T. B Havumaki. 2022. "Economic Assessment of Grid Modernization Plans." Presentation at the NASUCA 2022 Mid-Year Meeting.

CAUSE-PA Statement 2, Havumaki
Appendix C

Interrogatories of CAUSE-PA to PPL

PPL Response to CAUSE-PA IV-23

PPL Response to CAUSE-PA IV-24

PPL Response to CAUSE-PA IV-26, Attachment 1

PPL Response to CAUSE-PA IV-29 (a-b)

PPL Response to CAUSE-PA VII-1

PPL Response to CAUSE-PA VII-9, Attachment 1, “Talking Points”; “Summary”

PPL Response to CAUSE-PA VIII-10 (a-b)

PPL Response to CAUSE-PA XI-1 (a, c)

PPL Response to CAUSE-PA XI-3 (a, b)

Interrogatories of OCA to PPL

PPL Response to OCA VIII-9, Attachment 1

Interrogatories of EI to PPL

PPL Response to EI-PPL-III-1

PPL Response to EI-PPL-III-6

PPL Response to EI-PPL-III-7

WITNESS: Joseph Lookup

PPL Electric Utilities Corporation
Response to the Set IV Data Requests of the
Coalition for Affordable Utility Services and Energy Efficiency in Pennsylvania
(CAUSE-PA)
Dated October 22, 2025
Docket No. R-2025-3057164

CAUSE-PA IV-23 Refer to PPL Elec. Utilities St. No. 14 (Olsen) at 9-10. What factors will the Company use to determine whether certain line extensions for LP-5 customers "…will provide reliability or other benefits to the Company's transmission system"?

PPL Electric Response

PPL Electric serves customers taking service at 69 kV and above at its LP-5 rate class. LP-5 customers are required to pay for the costs of the upgrades necessary to serve their load under the existing Rule 4(C)(4) of the Company's retail electric tariff. However, certain upgrades benefit other PPL Electric customers and/or the transmission grid. The costs of these upgrades may be excluded from the interconnecting customer's obligation and added to PPL Electric's transmission rate base.

At a minimum, the customer's direct connection cost is the sole responsibility of the connecting customer. More specifically, the transmission lines sourced from PPL Electric's substation/switchyard that terminate into the customer's substation is the customer's responsibility. All other upgrades, including PPL Electric substations/switchyards, will be evaluated on a case-by-case basis to determine if they provide benefits to other customers and/or the transmission grid. Examples of benefits to other customers that would cause an upgrade to be included in transmission rates includes, but is not limited to:

- Added system reliability;
- Increased capacity/lower congestion;
- Improved asset condition of existing facilities;
- Service to multiple transmission customers and/or retail feeders;
- Increased resiliency and operational flexibility; or

Expanded capacity for new generation flow and interconnections.

WITNESS: Joseph Lookup
Lisa Norden

PPL Electric Utilities Corporation
Response to the Set IV Data Requests of the
Coalition for Affordable Utility Services and Energy Efficiency in Pennsylvania
(CAUSE-PA)
Dated October 22, 2025
Docket No. R-2025-3057164

CAUSE-PA IV-24 Will PPL be able to separately identify existing and/or new data center load from other class LP-5 customers?

PPL Electric Response Yes, the Company may be able to separately identify data center customers in its Rate Schedule LP-5 using a Standard Industrial Classification (SIC) code. However, customers self-report their SIC code to the Company, and PPL Electric does not verify the accuracy of the submissions.

Additionally, there will be some new large load customers who are required to provide additional customer protections in their Electrical Service Agreement, including a minimum load guarantee, because a portion of their system upgrades are being socialized in transmission rates.

WITNESS: Charles R. Schram

PPL Electric Utilities Corporation
Response to the Set IV Data Requests of the
Coalition for Affordable Utility Services and Energy Efficiency in Pennsylvania
(CAUSE-PA)
Dated October 22, 2025
Docket No. R-2025-3057164

CAUSE-PA IV-26

For each of the customers identified in response to each of the subparts of CAUSE-PA 4-25, please identify the number of class LP-5 customers with a peak load of:

a) Less than 5 MW;
b) More than 5 MW but less than 10MW;
c) More than 10 MW but less than 20MW;
d) More than 20 MW but less than 50MW;
e) More than 50MW but less than 75MW;
f) More than 75 MW but less than 100MW;
g) More than 100MW.

Please provide this data in a live Excel spreadsheet.

PPL Electric Response

See CAUSE-PA IV-26 Attachment 1.

CAUSE-PA IV-26

	Year	Month	LP5 Customers
CAUSE-PA IV-25. a)	2025	6	**162**
a) Less than 5 MW			80
b) More than 5 MW but less than 10MW			37
c) More than 10 MW but less than 20MW			27
d) More than 20 MW but less than 50MW			16
e) More than 50 MW but less than 75MW			1
f) More than 75 MW but less than 100MW			0
g) More than 100MW			1
CAUSE-PA IV-25. b)	2026	6	**162**
a) Less than 5 MW			75
b) More than 5 MW but less than 10MW			38
c) More than 10 MW but less than 20MW			27
d) More than 20 MW but less than 50MW			20
e) More than 50 MW but less than 75MW			1
f) More than 75 MW but less than 100MW			0
g) More than 100MW			1
CAUSE-PA IV-25. c)	2027	6	**171**
a) Less than 5 MW			75
b) More than 5 MW but less than 10MW			37
c) More than 10 MW but less than 20MW			30
d) More than 20 MW but less than 50MW			24
e) More than 50 MW but less than 75MW			1
f) More than 75 MW but less than 100MW			0
g) More than 100MW			4
CAUSE-PA IV-25. d)	2028	6	**172**
a) Less than 5 MW			76
b) More than 5 MW but less than 10MW			36
c) More than 10 MW but less than 20MW			27
d) More than 20 MW but less than 50MW			17
e) More than 50 MW but less than 75MW			2
f) More than 75 MW but less than 100MW			2
g) More than 100MW			12

WITNESS: Joseph Lookup

PPL Electric Utilities Corporation
Response to the Set IV Data Requests of the
Coalition for Affordable Utility Services and Energy Efficiency in Pennsylvania
(CAUSE-PA)
Dated October 22, 2025
Docket No. R-2025-3057164

CAUSE-PA IV-29

Refer to PPL Elec. Utilities St. No. 16 (Lookup) at 19:15-20. Please answer the following questions:

a) What is the dollar amount on a monthly basis of the "…significant reductions in their transmission costs" that PPL anticipates customers will see as a result of the large load additions that PPL anticipates to be in place before the end of the FPFTY?

b) When does PPL reasonably anticipate these reductions to flow through to customers' bills?

PPL Electric Response

It should be noted that PPL Electric's transmission cost recovery is through its FERC Transmission Formula Rate and PPL Electric's provision of transmission service recovered through its Transmission Service Charge, as part of the Company's obligation as a Default Service Provider, does not effect and is not claimed to effect the Company's distribution service revenue requirement claim, or resulting distribution rates in the instant proceeding.

a) PPL Electric's single coincident system peak, FERC Transmission Formula Rate, and Transmission Service Charge are not on the same period as the FPFTY. The Company anticipates approximately 1.9 GW of load to be connected by October 1, 2026, and data center only related capital investment of approximately $450 million through December 31, 2027, resulting in a PPL Zone Network Integration Service Charge ("NITS") of $265.10/MWD for the period January 1, 2027, through December 31, 2027, all else equal as current. This is less than the PPL Zone NITS rate of $307.87/MWD effective January 1, 2026, through December 31, 2026. This equates to approximately $59 dollars/year for a PPL Electric Default Service residential customer using 1,000 kWh.

As of December 31, 2024, the Company estimated that for the first 1 GW of data center demand connected to the grid, residential customers may save nearly 10% on the transmission portion of their bill, assuming $100M of network upgrades added to rate base. In dollars this would equate to approximately $3 per month of savings for an average residential customer. The percentage and amount of customer savings year-over-year will depend on several factors, including the timing of load ramp, the amount of investments required and added to rate base, and the peak load on the system.

b) Once load increases PPL Electric's single system coincident peak ("1 CP") used in its FERC Transmission Formula Rate, all else equal, it would reduce the FERC Transmission Formula Rate, thus reducing the costs charged to Load Serving Entities ("LSE"), including PPL Electric in its role as a default service provider. It is anticipated that the new load will increase PPL Electric's 1 CP at a faster rate than the Company's transmission rate base will grow, thus putting downward pressure on transmission rates.

PPL Electric's FERC Transmission Formula Rate uses the 1 CP from the prior year in setting the current year's transmission rates. For example: Note – the year is used for illustrative purposes only.

- The 1 CP Period of – November 1, 2024, through October 31, 2025, will be used for the FERC Transmission Formula Rate Period of – January 1, 2026, through December 31, 2026.

WITNESS: Lisa Norden
Katelyn Arnold

PPL Electric Utilities Corporation
Response to the Set VII Data Requests of the
Coalition for Affordable Utility Services and Energy Efficiency in Pennsylvania
(CAUSE-PA)
Dated November 10, 2025
Docket No. R-2025-3057164

CAUSE-PA VII-1 At the overall USR costs projected as of the end of the FPFTY, if PPL were to apply the USR Rider to all rate classes, what would be the applicable charge per kWh/ kW for each rate class?

PPL Electric Response As previously explained in the response to CAUSE-PA IV-9, in order to complete this analysis, the Company must have a means to allocate the Universal Service Rider (USR) costs across customer classes. Because such a method does not exist, the Company has utilized the results of its cost of service study as provided on page 15 of PPL Electric Exhibit BR-1 to allocate USR costs across the customer classes for illustrative purposes. It is the Company's position that this method for allocating costs is inappropriate because it does not reflect cost causation principles.

See CAUSE-PA VII-1 Attachment 1. Note that the value for USR costs includes USR salaries and wages as proposed in PPL Electric St. No. 18 and PPL Electric Exhibit Fully Projected Future 1 Schedule D-11. Additionally, the SC&I customer class provided in the attachment includes rate schedules GS-1, GS-3, BL, SA, SM(R), SHS, SLE, and SE.

PPL ELECTRIC UTILITIES CORPORATION
PROPOSED FPFTY UNIVERSAL SERVICE RIDER RATE
For The Computation Period July 1, 2026 to June 30, 2027

Line No.		Total	RES	SCI [3]	LP-4	LP-5
1	Budgeted Distribution Revenues (Including GRT)	$ 1,005,236,577	$ 730,211,578	$ 234,061,971	$ 38,982,979	$ 1,980,048
2	Budgeted Distribution Revenues (Excluding GRT)	$ 945,927,619	$ 687,129,095	$ 220,252,315	$ 36,682,984	$ 1,863,225
3	Budgeted OnTrack/WRAP Expenses[1]	$ 144,084,939	$ 104,605,666	$ 32,995,451	$ 6,267,695	$ 201,718.91
4	Over/(Under) Collection Including Interest	$ -	$ -	$ -	$ -	$ -
5	Total Expenses to be Recovered in FPFTY (Including GRT) (Line 3 less Line 4)/0.941	$ 153,118,958	$ 111,164,363	$ 35,064,241	$ 6,660,675	$ 214,367
6	Budgeted Distribution Kwh Billed	43,151,963,115	$ 14,451,452,318	$ 10,199,746,315	$ 6,032,236,558	$ 12,468,527,924
7	Universal Service Rider $/Kwh for FPFTY (Line 5/Line 6)		$ 0.00769	$ 0.00344	$ 0.00110	$ 0.00002

	RES	SCI	LCI-P	LCI-T
Allocation (%)[2]	72.60%	22.90%	4.35%	0.14%

[1] Includes USR salaries and wages as proposed in PPL Electric Exhibit Fully Future 1 Schedule D-11
[2] From PPL Electric Exhibit BR-1, page 15
[3] Includes the following rate classes: GS-1, GS-3, BL, SA, SM(R), SHS, SLE, SE

	Jul-2026	Aug-2026	Sep-2026	Oct-2026	Nov-2026	Dec-2026	Jan-2027	Feb-2027	Mar-2027	Apr-2027	May-2027	Jun-2027	TOTAL
RS (Cust)	18,299,113	18,312,422	18,301,614	18,303,334	18,291,934	18,295,979	18,296,411	18,293,563	18,343,394	18,355,052	18,382,804	18,375,211	
RS (Usage)	41,328,789	42,832,263	39,401,467	31,891,457	33,307,198	46,410,403	56,733,746	53,824,628	49,032,226	40,609,413	32,323,128	34,696,239	
RTS (Cust)	208,389	208,067	208,016	208,008	207,937	208,112	208,044	207,802	208,028	208,163	207,855	207,935	
RTS (Usage)	359,329	358,311	342,354	304,447	347,110	552,482	728,331	719,710	618,690	467,412	348,292	326,964	
RES Total	60,195,620	61,711,063	58,253,451	50,707,246	52,154,179	65,466,977	75,966,533	73,045,703	68,202,338	59,640,040	51,262,079	53,606,349	730,211,578
GS-1 (Cust)	3,241,040	3,241,216	3,241,414	3,241,634	3,241,876	3,242,162	3,242,448	3,242,756	3,243,064	3,243,394	3,243,724	3,244,054	
GS-1 (Usage)	3,385,675	3,418,431	3,386,003	3,247,371	3,249,285	3,285,298	3,326,675	3,340,474	3,330,164	3,281,317	3,265,177	3,338,424	
GS-3 (Cust)	2,383,380	2,384,700	2,385,960	2,387,280	2,388,540	2,389,800	2,391,000	2,392,260	2,393,520	2,394,720	2,395,920	2,397,180	
GS-3 (Usage)	8,867,275	8,961,050	9,043,188	8,460,681	8,068,135	7,921,000	8,000,509	8,032,656	8,103,525	8,100,349	8,278,311	8,664,737	
GH-2 (Cust)	32,648	32,626	32,626	32,604	32,604	32,582	32,516	32,450	32,384	32,340	32,296	32,274	
GH-2 (Usage)	62,252	61,504	59,602	63,937	75,303	86,013	92,132	93,793	92,444	85,958	77,253	66,452	
BL (Cust)	-	-	-	-	-	-	-	-	-	-	-	-	
BL (Usage)	24,980	25,406	25,032	25,808	28,696	32,935	36,341	35,352	32,851	29,799	26,407	25,204	
StrLt (Cust)	-	-	-	-	-	-	-	-	-	-	-	-	
StrLt (Usage)	909,926	987,024	1,114,713	1,232,392	1,355,501	1,566,415	1,678,909	1,583,565	1,410,784	1,264,210	1,102,257	1,014,795	
SLE (Cust)	-	-	-	-	-	-	-	-	-	-	-	-	
SLE (Usage)	604,737	643,698	685,661	750,210	798,364	891,523	924,591	922,773	847,948	763,791	709,708	694,320	
SCI Total	19,511,913	19,755,655	19,974,198	19,441,916	19,238,303	19,447,728	19,725,121	19,676,079	19,486,686	19,195,879	19,131,054	19,477,439	234,061,971
LP-4 (Cust)	209,703	209,703	209,703	209,873	209,873	210,043	210,043	210,043	210,212	210,212	210,212	210,212	
LP-4 (Usage)	3,196,457	3,216,186	3,220,567	3,051,978	2,938,209	2,965,184	2,987,606	2,953,150	2,965,159	2,981,612	2,914,407	3,072,632	
LP-4 Total	3,406,160	3,425,889	3,430,270	3,261,851	3,148,082	3,175,227	3,197,648	3,163,192	3,175,371	3,191,825	3,124,620	3,282,844	38,982,979
LP-5 (Cust)	160,034	160,034	160,034	160,034	160,034	160,034	169,974	169,974	169,974	169,974	169,974	169,974	
LP-5 (Usage)	-	-	-	-	-	-	-	-	-	-	-	-	
LP-5 Total	160,034	160,034	160,034	160,034	160,034	160,034	169,974	169,974	169,974	169,974	169,974	169,974	1,980,048
SCI less StrLt and SLE	17,997,250	18,124,933	18,173,824	17,459,314	17,084,439	16,989,791	17,121,622	17,169,740	17,227,953	17,167,877	17,319,089	17,768,325	209,604,156

Source: Rev_Forecast_2025 June update 7-18-25

	Jul-2026	Aug-2026	Sep-2026	Oct-2026	Nov-2026	Dec-2026	Jan-2027	Feb-2027	Mar-2027	Apr-2027	May-2027	Jun-2027	TOTAL
RS (kWh) - CM	1,255,733,617	1,163,465,332	918,671,823	902,448,435	1,127,866,458	1,504,311,682	1,664,210,164	1,425,246,940	1,298,274,462	966,869,574	933,208,371	1,059,930,641	
RTS (kWh) - CM	15,159,257	14,800,697	13,662,891	13,763,357	19,002,803	27,055,630	30,588,118	28,272,087	22,942,600	17,230,765	14,263,974	14,472,639	
RES Total	1,270,892,874	1,178,266,029	932,334,714	916,211,792	1,146,869,261	1,531,367,312	1,694,798,283	1,453,519,027	1,321,217,062	984,100,339	947,472,345	1,074,403,280	###########
GS-1 (kWh) - CM	164,345,790	165,045,291	147,834,224	132,263,155	142,211,437	166,130,876	176,282,452	169,640,082	154,051,879	136,729,855	136,661,133	151,858,594	1,843,054,768
GS-3 (kWh) - CM	747,435,937	757,175,115	711,659,420	640,983,618	638,603,356	691,978,171	709,545,449	685,698,423	659,362,662	634,593,498	652,146,102	711,545,190	8,240,726,941
GH-2 - CM	2.400.589	2.332.403	2.096.087	2.054.281	2.734.496	3.946.907	4.578.838	4.367.567	3.631.080	2.725.456	2.204.687	2.205.177	35.277.568
BL - CM	525,401	525,939	530,130	568,338	642,655	722,378	747,578	711,188	653,292	586,097	538,176	524,081	7,275,253
StrLt - CM	3,639,722	4,032,651	4,503,445	4,965,449	5,606,346	6,226,876	6,259,783	5,745,327	5,132,574	4,540,596	4,062,036	3,658,107	58,372,912
SLE (kWh) - CM	1,014,791	1,080,569	1,167,146	1,258,757	1,373,624	1,476,227	1,501,629	1,439,331	1,310,101	1,197,733	1,141,264	1,077,701	15,038,873
SCI Total	919,362,230	930,191,968	867,790,452	782,093,598	791,171,914	870,481,435	898,915,729	867,601,918	824,141,588	780,373,235	796,753,398	870,868,850	###########
LP-4 (kWh) - CM	545,042,982	547,971,004	527,338,652	491,925,565	480,985,892	487,090,417	485,510,876	482,631,186	486,124,542	479,708,497	491,034,720	526,872,225	6,032,236,558
LP-5 (kWh) - CM	739,958,887	797,336,470	860,882,333	861,153,424	924,702,424	992,136,374	965,491,465	1,086,844,468	1,220,718,810	1,221,001,743	1,338,464,911	1,459,836,615	###########
SCI less StrLt and SLE	914,707,717	925,078,748	862,119,861	775,869,392	784,191,944	862,778,332	891,154,317	860,417,260	817,698,913	774,634,906	791,550,098	866,133,042	###########

Source: Rev Forecast 2025 June update 7-18-25

WITNESS: Joseph Lookup

PPL Electric Utilities Corporation
Response to the Set VIII Data Requests of the
Coalition for Affordable Utility Services and Energy Efficiency in Pennsylvania
(CAUSE-PA)
Dated November 10, 2025
Docket No. R-2025-3057164

CAUSE-PA VIII-9	Refer to Lookup Direct Testimony p.19 stating "customers should see significant reductions in their transmission costs." In live, unlocked Excel file format with all links and formulas intact, provide all analysis that the Company has conducted demonstrating that "customers should see significant reductions in their transmission costs."
PPL Electric Response	See CAUSE-PA VIII-9 Attachments 1 through 3 and the response to CAUSE-PA IV-29.

Data Center – TSC Analysis Talking Points – Q3 Earnings call/notes
Developed 2024-10-25

Assumptions/Changes/Notes:
Q2 Analysis used data assuming that data center load would be default service
Current analysis assumes that data center load will be shopping
Assumes all load & cost scenarios are instantaneous (not phased in over time)
$100M Plant-in-service results in ~$12M revenue requirement
Assumes ALL else equal
Uses pricing in effect as of July 1, 2024
FERC Formula Rate changes on January 1
Price-To-Compare changes on December 1 and June 1

Talking Points
In its most recent analysis, the Company has assumed that any data center load would be in front of the meter as a shopping customer.

Investor Talking Point:

Compared to the Company's current average bill amounts, $100M to $1B, assuming 1GW per $100M, of additional transmission investment results in a Transmission Service Charge reduction of ~10% [note: 8.95% rounded to 10%] to ~45% [Note: 42% rounded to 45%] resulting in a total bill decrease ranging from ~$3 [Note: $2.87 rounded to$3] to ~$15/month[Note: $13.56 rounded to $15] or ~$36 to ~$180/annually. Impact will vary as PPL Electric's rates and PJM 1CP vary.

FERC Formula Rate and Transmission Service Charge Trend

Yellow Highlighted Numbers were used for Q2 2025 earnings call

@$100M Plant-In-Service & 1GW Increments, assuming additional load is shopping

Capital Investment	Current Rate As of June 1, 2025	$100M Capital Investment + 1 GW Increase	$200M Capital Investment + 2 GW Increase	$400M Capital Investment + 4 GW Increase	$600M Capital Investment + 6 GW Increase	$800M Capital Investment + 8 GW Increase	$1B Capital Investment + 10 GW Increase	$1,100M Capital Investment + 11 GW Increase	$1,300M Capital Investment + 13 GW Increase	$1,500M Capital Investment + 15 GW Increase	$1,700M Capital Investment + 17 GW Increase	$600M, 8GW	$700M, 8GW	$700M & 7 GW Variance to Current
FFR Impact														
Revenue Requirement	$ 797,094,549	$ 808,894,404	$ 820,694,259	$ 844,293,969	$ 867,893,679	$ 891,493,389	$ 915,093,099	$ 926,892,954	$ 950,492,664	$ 974,092,374	$ 997,692,084	$ 867,893,679	$ 879,693,534	16%
1 CP Peak	7,460	8,460	9,460	11,460	13,460	15,460	17,460	18,460	20,460	22,460	24,460	15,460	15,083	147%
Rate ($/MW-Year)	$ 106,855	$ 95,619	$ 86,758	$ 73,676	$ 64,481	$ 57,666	$ 52,412	$ 50,212	$ 46,457	$ 43,371	$ 40,789	$ 56,139	$ 58,325	-53%
Incremental % Change in Rate vs Current														

*The peak (denominator) is doubling, decreasing the rate. This is partially offset by the plant additions which translates to $12M for every $100M investment.
*$12 million equals Rate Base additions times ROR plus taxes and depreciation expense.
*Compared to the current rate, the new rate using $636.45M investment and 14,393 Peak is just under 50%.

TSC Impact														
NITS Rate ($/MWD)	$ 297.59	$ 266.89	$ 242.68	$ 206.94	$ 181.82	$ 163.20	$ 148.84	$ 142.83	$ 132.57	$ 124.14	$ 117.08	$ 159.02	$ 165.00	-52%
TSC Rate - *Assuming that additonal load is shopping*														
NITS Cost Allocated to Customer Groups														
Res	$ 227,399,460	$ 203,941,107	$ 185,441,244	$ 158,128,840	$ 138,931,656	$ 124,703,401	$ 113,734,178	$ 109,141,051	$ 101,301,418	$ 94,858,514	$ 89,467,853	$ 121,515,353	$ 126,079,251	48%
SC&I	44,714,687	40,101,955	36,464,234	31,093,660	27,318,823	24,521,050	22,364,117	21,460,948	19,919,402	18,652,502	17,592,509	23,894,168	24,791,590	48%
LC&I-P	5,871,361	5,265,676	4,788,017	4,082,822	3,587,158	3,219,791	2,936,570	2,817,977	2,615,561	2,449,208	2,310,023	3,137,477	3,255,315	48%
LC&I-T	629,074	564,180	513,002	437,445	384,338	344,978	314,632	301,926	280,239	262,415	247,502	336,158	348,784	48%
Total	$ 278,614,582	$ 249,872,917	$ 227,206,497	$ 193,742,767	$ 170,221,976	$ 152,789,219	$ 139,349,498	$ 133,721,903	$ 124,116,620	$ 116,222,638	$ 109,617,888	$ 148,883,157	$ 154,474,940	
Allocation of Demand Costs(including NITS)														
Res	80.50%	80.50%	80.50%	80.50%	80.50%	80.50%	80.50%	80.50%	80.50%	80.50%	80.50%	80.50%	80.50%	
SC&I	17.02%	17.02%	17.02%	17.02%	17.02%	17.02%	17.02%	17.02%	17.02%	17.02%	17.02%	17.02%	17.02%	
LC&I-P	2.24%	2.24%	2.24%	2.24%	2.24%	2.24%	2.24%	2.24%	2.24%	2.24%	2.24%	2.24%	2.24%	
LC&I-T	0.24%	0.24%	0.24%	0.24%	0.24%	0.24%	0.24%	0.24%	0.24%	0.24%	0.24%	0.24%	0.24%	
Total	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	
Other Expenses														
Res	$ 13,150,483	$ 13,150,483	$ 13,150,483	$ 13,150,483	$ 13,150,483	$ 13,150,483	$ 13,150,483	$ 13,150,483	$ 13,150,483	$ 13,150,483	$ 13,150,483	$ 42,607,020	$ 42,607,020	
SC&I	9,262,481	9,262,481	9,262,481	9,262,481	9,262,481	9,262,481	9,262,481	9,262,481	9,262,481	9,262,481	9,262,481	7,560,234	7,560,234	
LC&I-P	6,121,757	6,121,757	6,121,757	6,121,757	6,121,757	6,121,757	6,121,757	6,121,757	6,121,757	6,121,757	6,121,757	1,448,065	1,448,065	
LC&I-T	3,125,290	3,125,290	3,125,290	3,125,290	3,125,290	3,125,290	3,125,290	3,125,290	3,125,290	3,125,290	3,125,290	2,826,073	2,826,073	
Total	$ 31,660,012	$ 31,660,012	$ 31,660,012	$ 31,660,012	$ 31,660,012	$ 31,660,012	$ 31,660,012	$ 31,660,012	$ 31,660,012	$ 31,660,012	$ 31,660,012	$ 54,441,392	$ 54,441,392	
Total TSC Revenue Requirement														
Res	$ 240,549,943	$ 217,091,590	$ 198,591,727	$ 171,279,323	$ 152,082,139	$ 137,853,884	$ 126,884,661	$ 122,291,534	$ 114,451,901	$ 108,008,997	$ 102,618,336	$ 164,122,373	$ 168,686,271	
SC&I	$ 53,977,168	$ 49,364,436	$ 45,726,716	$ 40,356,142	$ 36,581,304	$ 33,783,531	$ 31,626,599	$ 30,723,429	$ 29,181,883	$ 27,914,983	$ 26,854,990	$ 31,454,402	$ 32,351,824	
LC&I-P	$ 11,993,118	$ 11,387,433	$ 10,909,774	$ 10,204,579	$ 9,708,916	$ 9,341,548	$ 9,058,327	$ 8,939,734	$ 8,737,318	$ 8,570,965	$ 8,431,781	$ 4,585,542	$ 4,703,380	
LC&I-T	$ 3,754,365	$ 3,689,470	$ 3,638,292	$ 3,562,735	$ 3,509,629	$ 3,470,268	$ 3,439,923	$ 3,427,216	$ 3,405,529	$ 3,387,705	$ 3,372,793	$ 3,162,231	$ 3,174,857	
Total	$ 310,274,594	$ 281,532,929	$ 258,866,509	$ 225,402,779	$ 201,881,988	$ 184,449,231	$ 171,009,510	$ 165,381,914	$ 155,776,632	$ 147,882,650	$ 141,277,899	$ 203,324,548	$ 208,916,332	
Billing Determinant														
Res (kWh)	7,707,936,402	7,707,936,402	7,707,936,402	7,707,936,402	7,707,936,402	7,707,936,402	7,707,936,402	7,707,936,402	7,707,936,402	7,707,936,402	7,707,936,402	7,707,936,402	7,707,936,402	
SC&I (kWh)	1,820,182,652	1,820,182,652	1,820,182,652	1,820,182,652	1,820,182,652	1,820,182,652	1,820,182,652	1,820,182,652	1,820,182,652	1,820,182,652	1,820,182,652	1,820,182,652	1,820,182,652	
LC&I-P (Billing Demand kW)	597,748	597,748	597,748	597,748	597,748	597,748	597,748	597,748	597,748	597,748	597,748	597,748	597,748	
LC&I-T (PLC MW)	70.8	70.8	70.8	70.8	70.8	70.8	70.8	70.8	70.8	70.8	70.8	71	71	
Rate														
Res	$ 0.03324	$ 0.02993	$ 0.02738	$ 0.02361	$ 0.02097	$ 0.01901	$ 0.01749	$ 0.01686	$ 0.01578	$ 0.01489	$ 0.01415	$ 0.02263	$ 0.02326	
SC&I	$ 0.03151	$ 0.02882	$ 0.02670	$ 0.02356	$ 0.02136	$ 0.01972	$ 0.01846	$ 0.01794	$ 0.01704	$ 0.01630	$ 0.01568	$ 0.01836	$ 0.01889	
LC&I-P	$ 21.322	$ 20.245	$ 19.396	$ 18.142	$ 17.261	$ 16.608	$ 16.104	$ 15.893	$ 15.534	$ 15.238	$ 14.990	$ 8.152	$ 8.362	
LC&I-T	$ 56.353	$ 55.378	$ 54.610	$ 53.476	$ 52.679	$ 52.088	$ 51.633	$ 51.442	$ 51.117	$ 50.849	$ 50.625	$ 47.465	$ 47.654	
Residential Customer Bill Impact (Variances vs Oct 1, 2024 Pricing)														
Res TSC Bill	$ 33.24	$ 29.93	$ 27.38	$ 23.61	$ 20.97	$ 19.01	$ 17.49	$ 16.86	$ 15.78	$ 14.89	$ 14.15	$ 22.63	$ 23.26	
Generation Component	$ 91.67	$ 91.67	$ 91.67	$ 91.67	$ 91.67	$ 91.67	$ 91.67	$ 91.67	$ 91.67	$ 91.67	$ 91.67	$ 91.67	$ 91.67	
STAS E&T	$ 0.00	$ 0.00	$ 0.00	$ 0.00	$ 0.00	$ 0.00	$ 0.00	$ 0.00	$ 0.00	$ 0.00	$ 0.00	$ 0.00	$ 0.00	
Price To Compare Total	$ 124.91	$ 121.60	$ 119.05	$ 115.28	$ 112.64	$ 110.68	$ 109.16	$ 108.53	$ 107.45	$ 106.56	$ 105.82	$ 114.30	$ 114.93	
Distribution Portion of Bill	$ 66.72	$ 66.72	$ 66.72	$ 66.72	$ 66.72	$ 66.72	$ 66.72	$ 66.72	$ 66.72	$ 66.72	$ 66.72	$ 66.72	$ 66.72	
Total Bill	$ 191.63	$ 188.32	$ 185.77	$ 182.00	$ 179.36	$ 177.40	$ 175.88	$ 175.25	$ 174.17	$ 173.28	$ 172.54	$ 181.02	$ 181.65	
% Difference vs Current		-1.73%	-3.06%	-5.03%	-6.40%	-7.43%	-8.22%	-8.55%	-9.11%	-9.58%	-9.96%	-5.54%	-5.21%	
$ Difference vs Current		$ (3.31)	$ (5.86)	$ (9.63)	$ (12.27)	$ (14.23)	$ (15.75)	$ (16.38)	$ (17.46)	$ (18.35)	$ (19.09)	$ (10.61)	$ (9.98)	
TSC Decrease %		-9.96%	-17.63%	-28.97%	-36.91%	-42.81%	-47.38%	-49.28%	-52.53%	-55.20%	-57.43%	-31.92%	-30.02%	
TSC Decrease $		$ (3.31)	$ (5.86)	$ (9.63)	$ (12.27)	$ (14.23)	$ (15.75)	$ (16.38)	$ (17.46)	$ (18.35)	$ (19.09)	$ (10.61)	$ (9.98)	
PTC Decrease %		-2.65%	-4.69%	-7.71%	-9.82%	-11.39%	-12.61%	-13.11%	-13.98%	-14.69%	-15.28%	-8.49%	-7.99%	
PTC Decrease $		$ (3.31)	$ (5.86)	$ (9.63)	$ (12.27)	$ (14.23)	$ (15.75)	$ (16.38)	$ (17.46)	$ (18.35)	$ (19.09)	$ (10.61)	$ (9.98)	

Round Numbers:												
Revenue Requirement	$ 797,000,000	$ 809,000,000	$ 821,000,000	$ 844,000,000	$ 868,000,000	$ 891,000,000	$ 915,000,000	$ 927,000,000	$ 950,000,000	$ 974,000,000	$ 998,000,000	
Load	7,000	8,000	9,000	11,000	13,000	15,000	17,000	18,000	20,000	22,000	24,000	
Rate	$ 113,857	$ 101,125	$ 91,222	$ 76,727	$ 66,769	$ 59,400	$ 53,824	$ 51,500	$ 47,500	$ 44,273	$ 41,583	
Variance vs Current												
Increase in Revenue Requirement		1.5%	3.0%	5.9%	8.9%	11.8%	14.8%	16.3%	19.2%	22.2%	25.2%	
Increase in Load		14.3%	28.6%	57.1%	85.7%	114.3%	142.9%	157.1%	185.7%	214.3%	242.9%	
Decrease in Rate		-11.2%	-19.9%	-32.6%	-41.4%	-47.8%	-52.7%	-54.8%	-58.3%	-61.1%	-63.5%	
% Rate Variance to Prior		-11.2%	-9.8%	-15.9%	-13.0%	-11.0%	-9.4%	-4.3%	-7.8%	-6.8%	-6.1%	

A rate is a function of 2 components. In order for the rate to result in a specific % decrease, both the revenue requirement (numerator) and the load (denominator) must move at different amounts.
Your revenue requirement does not increase at the same rate as your load. By the time you have doubled your load at 15GW, you've only increased you're revenue requirement by 11%.
In order to get a 10% increase for every increment, the revenue requirement must decrease until ultimately, there is no revenue to recover, resulting in a 100% decrease.
As long as there are costs to recover, there will be a revenue requirement.

Round Numbers:												
Revenue Requirement	$ 725,000,000	$ 736,000,000	$ 745,717,022	$ 725,150,435	$ 683,557,097	$ 621,297,501	$ 538,559,582	$ 434,999,344	$ 310,736,509	$ 165,760,887	$ (110,052)	
Load	7,000.00	8,000	9,000	10,000	11,000	12,000	13,000	14,000	15,000	16,000	17,000	
Rate	$ 103,571.00	$ 92,000.00	$ 82,857.00	$ 72,515.00	$ 62,142.00	$ 51,775.00	$ 41,428.00	$ 31,071.00	$ 20,716.00	$ 10,360.00	$ (6.00)	
Variance vs Current												
Increase in Revenue Requirement		2%	3%	0%	-6%	-14%	-26%	-40%	-57%	-77%	-100%	
Increase in Load		14%	29%	43%	57%	71%	86%	100%	114%	129%	143%	
Decrease in Rate		-19%	-27%	-36%	-45%	-55%	-64%	-73%	-82%	-91%	-100%	

Variance vs Current:

$100M	$200M	$300M	$400M	$500M	$600M	$700M	$800M	$900M	$1B
$ 11,799,855	$ 23,599,710	$ 47,199,420	$ 70,799,130	$ 94,398,840	$ 117,998,550	$ 129,798,405	$ 153,398,114	$ 176,997,824	$ 200,597,534
1,000	2,000	4,000	6,000	8,000	10,000	11,000	13,000	15,000	17,000
$ (11,236)	$ (20,097)	$ (33,179)	$ (42,373)	$ (49,189)	$ (54,443)	$ (56,643)	$ (60,398)	$ (63,484)	$ (66,065)
-10.52%	-18.81%	-31.05%	-39.66%	-46.03%	-50.95%	-53.01%	-56.52%	-59.41%	-61.83%
$ (30.70)	$ (24.21)	$ (35.74)	$ (25.12)	$ (18.62)	$ (14.36)	$ (6.01)	$ (10.26)	$ (8.43)	$ (7.05)
-10.32%	-9.07%	-14.73%	-12.14%	-10.24%	-8.80%	-4.04%	-7.18%	-6.36%	-5.68%
-10.32%	-9.07%	-14.73%	-12.14%	-10.24%	-8.80%	-4.04%	-7.18%	-6.36%	-5.68%
-10.32%	-9.07%	-14.73%	-12.14%	-10.24%	-8.80%	-4.04%	-7.18%	-6.36%	-5.68%
-10.32%	-9.07%	-14.73%	-12.14%	-10.24%	-8.80%	-4.04%	-7.18%	-6.36%	-5.68%
-10.32%	-9.07%	-14.73%	-12.14%	-10.24%	-8.80%	-4.04%	-7.18%	-6.36%	-5.68%
0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
$ (23,458,353)	$ (18,499,863)	$ (27,312,404)	$ (19,197,184)	$ (14,228,255)	$ (10,969,223)	$ (4,593,127)	$ (7,839,633)	$ (6,442,905)	$ (5,390,661)
$ (4,612,733)	$ (3,637,720)	$ (5,370,574)	$ (3,774,838)	$ (2,797,773)	$ (2,156,933)	$ (903,169)	$ (1,541,546)	$ (1,266,900)	$ (1,059,992)
$ (605,685)	$ (477,659)	$ (705,195)	$ (495,663)	$ (367,368)	$ (283,221)	$ (118,593)	$ (202,416)	$ (166,353)	$ (139,185)
$ (64,895)	$ (51,178)	$ (75,557)	$ (53,107)	$ (39,361)	$ (30,345)	$ (12,706)	$ (21,687)	$ (17,824)	$ (14,913)
$ (28,741,665)	$ (22,666,420)	$ (33,463,730)	$ (23,520,791)	$ (17,432,756)	$ (13,439,721)	$ (5,627,596)	$ (9,605,282)	$ (7,893,982)	$ (6,604,751)
-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-
	-9.96%	-17.63%	-28.97%	-36.91%	-42.81%	-47.38%	-49.28%	-52.53%	-55.20%
	-13.30%	-19.68%	-29.12%	-35.74%	-40.67%	-44.46%	-46.03%	-48.74%	-50.96%
	60806%	58251%	54479%	51828%	49864%	48348%	47713%	46633%	45742%
	166500%	164190%	160778%	158381%	156603%	155234%	154659%	153682%	152875%
	-7.67%	-11.34%	-7.94%	-5.90%	-4.57%				

WITNESS: Joseph Lookup

PPL Electric Utilities Corporation
Response to the Set VIII Data Requests of the
Coalition for Affordable Utility Services and Energy Efficiency in Pennsylvania
(CAUSE-PA)
Dated November 10, 2025
Docket No. R-2025-3057164

CAUSE-PA VIII-10 Refer to Exhibit GEO-1 p.98 of 662.

a. Explain why any upgrades to the 230 kV and 500 kV networked bulk electric system may be presumed to provide reliability benefits to the Company's transmission system.
b. For each of the following, explain in detail how the Company will determine that a line extension for service under LP-5 would provide the benefit: increased capacity, lower system congestion, service to multiple customers, increased resiliency and operational flexibility, and expanded capacity for new generation and interconnections.
c. How will the Company determine the "amount of all line extension costs that were not directly charged to the customer" for which the customer shall provide a revenue guarantee?
d. Explain how the Company chose an initial term length of five years.

PPL Electric Response

a. It is PPL Electric's policy that upgrades to the networked bulk electric system made in connection with LP-5 customer interconnections will generally be excluded from the customer's obligation and included in transmission rate base. This policy is informed by FERC policy, which generally favors charging network customers for the costs of network facilities without an individualized benefit calculation:

> "[D]ue to the integrated nature of the transmission network, network facilities benefit all network users," even if "the facilities were installed to meet a particular customer's request for service." "[T]here is

> no need to identify further actual benefits in order to include the costs of network transmission facilities in transmission rates."

City of Anaheim, Cal., 113 FERC ¶ 61,091, at P 58 (2005), *reh'g denied*, 114 FERC ¶ 61,311 (2006).

b. PPL Electric leverages transmission level power flow studies, topology review, and engineering judgment to evaluate whether a new 230 kV or 500 kV asset will increase the overall capacity of the network, reduce congestion, improve efficiency, or reduce the risk of overload during peak conditions. Power flow study results will indicate the line loading, and if new assets show a decrease in line loading, more capacity is available.

   Additionally, PPL Electric's Transmission Planning team studies contingencies based on NERC TPL 001 to ensure the system can withstand the loss of one or more elements without service interruption. Additional lines provide flexibility for maintenance outages and fault isolation, improving overall system resiliency.

c. See OCA VIII-9 Attachment 1.

d. PPL Electric determined that this time frame would enable it to receive transmission revenues from new large load customers in an amount to cover the socialized upgrade costs.

WITNESS: Joseph Lookup

PPL Electric Utilities Corporation
Response to the Set XI Data Requests of the
Coalition for Affordable Utility Services and Energy Efficiency in Pennsylvania
(CAUSE-PA)
Dated November 21, 2025
Docket No. R-2025-3057164

CAUSE-PA XI-1

Refer to Martin Direct Testimony p. 7 indicating that new data center customers would take service on Rate Schedule LP-5.

a) Did the Company consider separate rate class treatment for new large loads? If so, please explain how it determined to place them in LP-5 rather than create a new rate class. If not, then why not?

b) In the Company's view, what if any would be the potential benefits to creating a separate rate class for new large load customers? Please explain in detail and please specifically address any potential benefits in achieving more accurate allocation of system costs to these large load customers.

c) In the Company's view, what are the potential benefits to serving new large load customers on LP-5? Please explain in detail and please specifically address any potential benefits in achieving more accurate allocation of system costs to these large load customers.

PPL Electric Response

a) No, PPL Electric did not consider serving new large loads under a rate schedule other than LP-5. The Company's distribution rate schedules are distinguished by service voltage levels. New large load customers typically take service at 69 kV and above which appropriately puts them in the LP-5 rate schedule. Additionally, PPL Electric recovers the costs of operating its transmission system through its FERC Transmission Formula Rate ("Formula Rate"). The Company defines its transmission system as facilities at or above 69 kV. LP-5 customers only use the transmission system, which is why they only have a small customer charge in distribution rates to cover certain fixed costs. The Formula Rate is allocated to all customers uniformly based on the customer's contribution to the PPL Electric system peak.

Therefore, there is no benefit to creating a separate distribution rate schedule for new large load customers.

b) See response to Part a. There is no benefit to creating a separate rate schedule for new large load customers.

c) The benefits to serving new large load customers under Rate Schedule LP-5 is that it treats similarly situated customers the same without creating new distribution rate classes. Moreover, the Formula Rate allocates transmission system costs uniformly across all customer classes. Creating a new distribution rate schedule would have no impact on how transmission costs are allocated under the Formula Rate.

PPL Electric Utilities Corporation
Response to the Set XI Data Requests of the
Coalition for Affordable Utility Services and Energy Efficiency in Pennsylvania
(CAUSE-PA)
Dated November 21, 2025
Docket No. R-2025-3057164

CAUSE-PA XI-3

Refer to Lookup Direct p. 17 about the retail tariff for Rate Schedule LP-5 stating that the tariff "generally requires the customer to pay for all interconnection costs. Historically, this approach has worked well, as the system upgrade facilities needed to interconnect the LP-5 customer only benefited the interconnecting customer, justifying the customer covering the cost."

a) Please explain the categorical difference between system upgrades made for LP-5 customers in the past, and those that will be made for new large load customers. How has the Company determined that historical upgrades provided no broader system benefits?

b) Did the Company consider requiring new large load customers to pay for full upgrade costs upfront? Please explain why the Company does not consider this to be a viable option, given that the Company is proposing to include a revenue guarantee provision that will ultimately result in every new large load customer paying the full costs of any upgrade.

PPL Electric Response

a) Previously LP-5 customers had lower peak demand requirements, typically less than 100 MW. This resulted in LP-5 customers taking service at 69 kV or 138 kV. The facilities needed to serve these customers only benefited the new customer which is why the customer paid for the system upgrades with CIAC. The newer large load customers have peak demand requirements well in excess of 100 MW. This often requires upgrades to the 230 kV and 500 kV bulk electric system. Upgrades to the bulk electric system create broader reliability benefits to all customers.

b) No, the Company did not consider having the new large load customer pay the entire cost of upgrades that benefit the

entire system. The Company's policy is consistent with FERC cost allocation principles. See OCA VIII-9 Attachment 1.

WITNESS: Joseph Lookup

PPL Electric Utilities Corporation
Response to the Set VIII Data Requests of the
Office of Consumer Advocate (OCA)
Dated October 28, 2025
Docket No. R-2025-3057164

OCA VIII-9	Please provide the utilities policies, procedures, and analyses related to the assignment of large load interconnection costs to the interconnection load versus other ratepayers.
PPL Electric Response	See OCA VIII-9 Attachment 1.

PPL Electric Utilities Corporation – Policy on Cost Allocation for Large Customer Interconnections

PPL Electric serves customers taking service at 69 kV and above at its LP-5 rate class. LP-5 customers are required to pay for the costs of the upgrades necessary to serve their load. PPL Electric Retail Tariff, Rule 4 – (C).4. However, certain upgrades benefit other PPL customers and/or the transmission grid. The costs of these upgrades may be excluded from the interconnecting customer's obligation and added to PPL Electric's transmission rate base.

It is PPL Electric's policy that upgrades to the networked bulk electric system made in connection with LP-5 customer interconnections will generally be excluded from the customer's obligation and included in transmission rate base. This policy is informed by FERC policy, which generally favors charging network customers for the costs of network facilities without an individualized benefit calculation:

> "[D]ue to the integrated nature of the transmission network, network facilities benefit all network users," even if "the facilities were installed to meet a particular customer's request for service." "[T]here is no need to identify further actual benefits in order to include the costs of network transmission facilities in transmission rates."

City of Anaheim, Cal., 113 FERC ¶ 61,091, at P 58 (2005), *reh'g denied*, 114 FERC ¶ 61,311 (2006).

At a minimum, the customer's direct connection cost is the sole responsibility of the connecting customer, more specifically, the transmission lines sourced from PPL Electric's substation/switchyard that terminate into the customers substation.

All other upgrades, including PPL Electric substations/switchyards will be evaluated on a case-by-case basis to determine if they provide benefits to other customers and/or the transmission grid. Examples of benefits to other customers that would cause an upgrade to be included in transmission rates includes, but is not limited to:

- Added system reliability;
- Increased capacity/lower congestion;
- Improved asset condition of existing facilities;
- Service to multiple transmission customers and/or retail feeders;
- Increased resiliency and operational flexibility;
- Expanded capacity for new generation flow and interconnections

If the customer's interconnection results in upgrades that will be included in transmission rate base, the Company reserves the right to include revenue guarantee provisions in the customer's Electric Service Agreement.

PPL Electric Utilities Corporation – Cost Allocation Review and Methodology for Large Customer Interconnections

Cost Allocation Review Process:

The Interconnection Affairs PM will pull together the following groups within Transmission Asset Management to review each project for their functional area:

- Interconnection Affairs – Rapid Response (RR) to interconnection request, Project Feasibility Report (PFR), Electrical Service Agreements (ESA), Construction Service Agreement (CSA), and confirmation of project costs.
- Planning – Line and sub equipment review and determination of dedicated vs network benefit.
- Project Development – Lead the development of deliverables for project scope, schedule and budget. Includes but not limited to project cost estimating, construction feasibility, confirmation of CSA scope and one-line, and financial budget.
- VP Planning and Asset Management – Provides approval for final cost allocation decision.

Cost Allocation Methodology is as follows for Direct Connect Transmission Line:

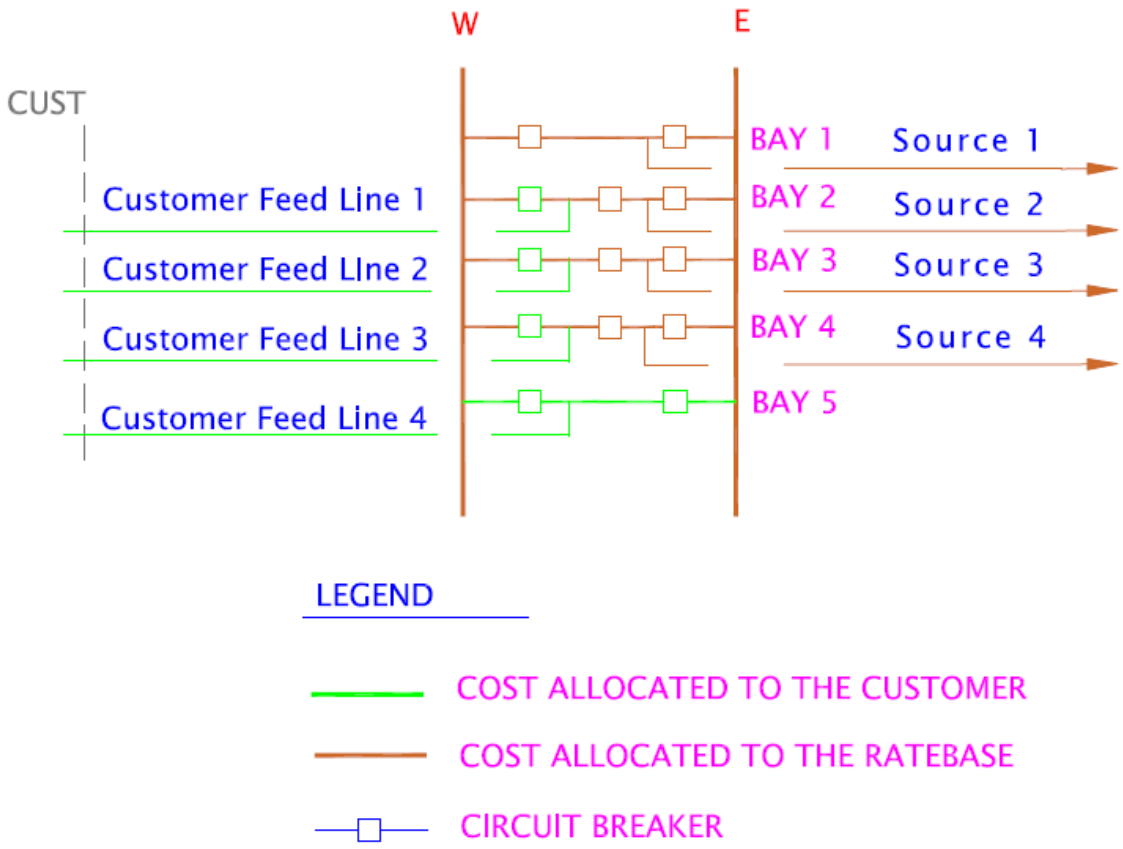
- All direct connection transmission lines that supplies customer substation. Below are typical assets but are not limited to:
    - Transmission Structures
    - Transmission conductor
    - Associated insulation and line hardware
    - Sectionalizing devices (i.e. switches, power circuit breakers, reclosers)
    - Grounding cable and hardware
    - Right of way easements and fee owned land

Cost Allocation Methodology is as follows for Substation equipment reviews:

The determining factor for cost allocation will be illustrated with the circuit breaker assets shown on Examples 1, 2, and 3 for ease of understanding at the highest level.

Interconnection Affairs will keep documented proof of each project site that is reviewed. A one-line will be color coded to denote direct customer costs vs network costs along with a cost spreadsheet.

Responsibility of Asset Matrix for Breaker and a Half (BAAH) Example 1:



Customer Responsible:

- Bay 1: No assets
- Bay 2:
  - Line: Customer Line 1
  - Sub: 2W down-lead and dead-end structure
  - Sub: CB 2W
  - Sub: Two switches: 2WW & 2WE
  - Sub: Three associated CCVT's
  - Sub: Three associated surge arrestors
- Bay 3:
  - Line: Customer Line 2
  - Sub: 3W down-lead and dead-end structure
  - Sub: CB 3W
  - Sub: Two switches: 3WW & 3WE
  - Sub: Three associated CCVT's

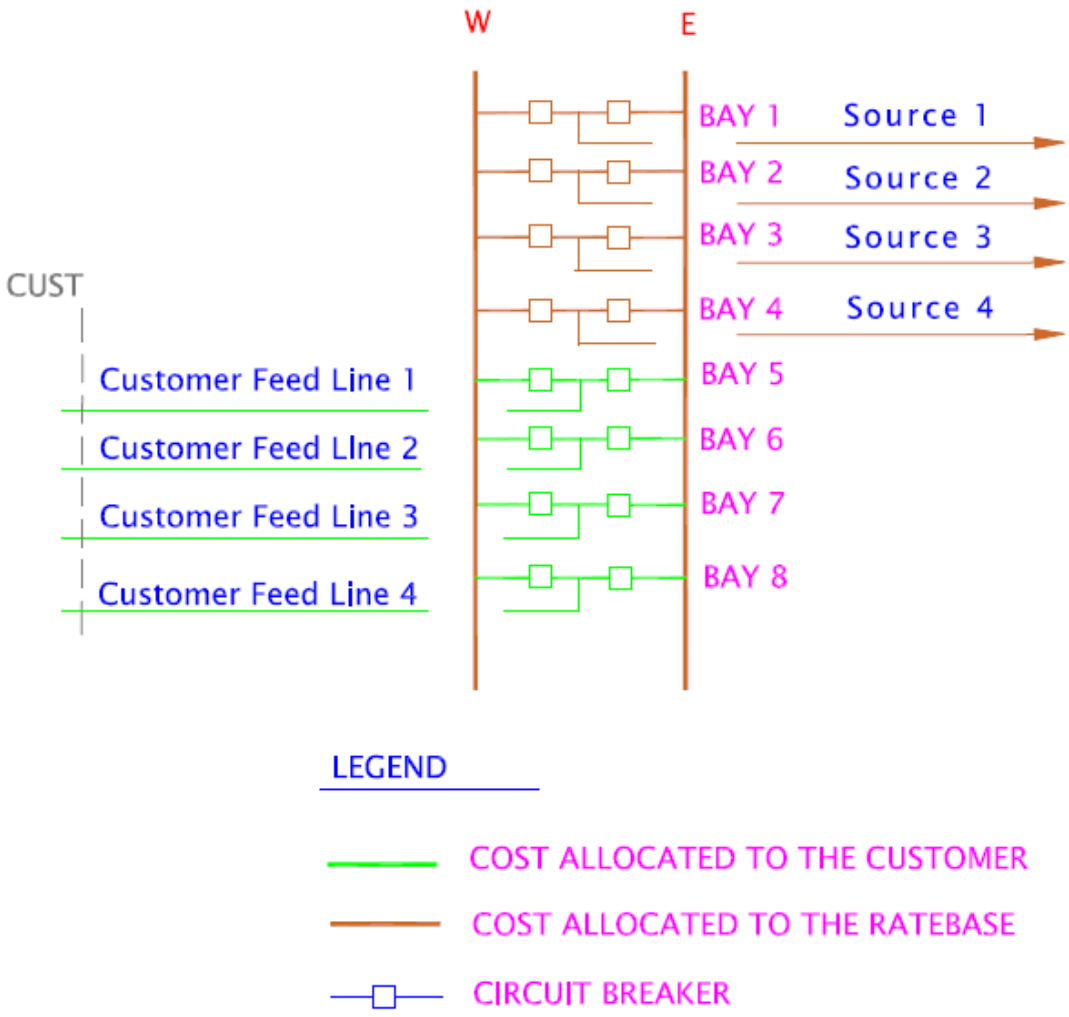
    - Sub: Three associated surge arrestors
- Bay 4:
    - Line: Customer Line 3
    - Sub: 4W down-lead and dead-end structure
    - Sub: CB 4W
    - Sub: Two switches: 4WW & 4WE
    - Sub: Three associated CCVT's
    - Sub: Three associated surge arrestors
- Bay 5:
    - Line: Customer Line 4
    - Sub: 5W down-lead, dead-end structure, bay conductor, and bay structures
    - Sub: CBs 5W & 5E
    - Sub: Four switches: 5WW, 5WE, 5TW, & 5EE
    - Sub: Three associated CCVT's
    - Sub: Three associated surge arrestors

All associated wiring, conduit, relays and other minor assets associated with the above equipment.

PPL Responsible:

- All other equipment and associated minor assets.

Responsibility of Asset Matrix for Double Breaker Double Buss (DBDB) Example 2:



Customer Responsible:

- Bay 1-4: No assets
- Bay 5:
  - Line: Customer Line 1
  - Sub: Bay 5 downleads, dead-end structure, bay conductor, and bay structures
  - Sub: CBs 5W &5E
  - Sub: Four switches: 5WW, 5WE, 5EW & 5EE
  - Sub: Three associated CCVT's
  - Sub: Three associated surge arrestors

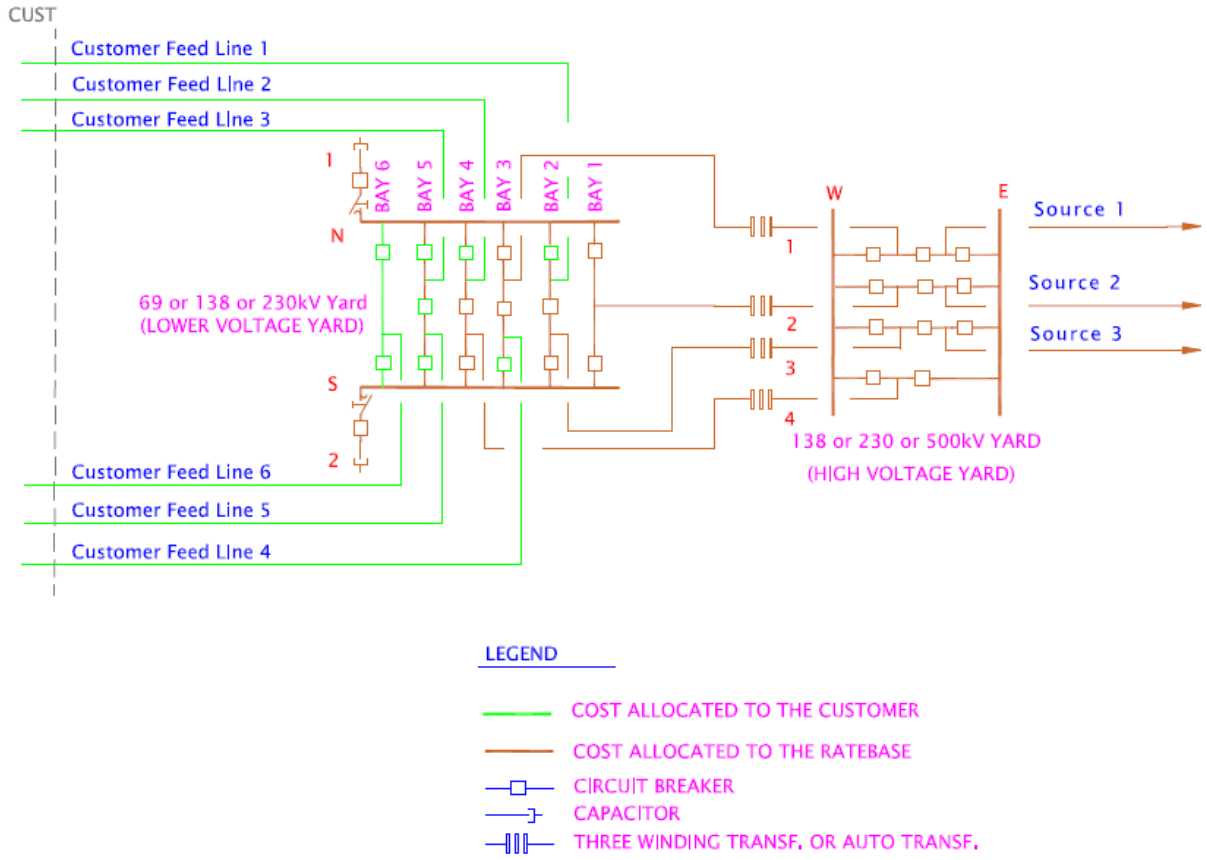
- Bay 6:
    - Line: Customer Line 2
    - Sub: Bay 6 downleads, dead-end structure, bay conductor, and bay structures
    - Sub: CBs 6W & 6E
    - Sub: Four switches: 6WW, 6WE, 6EW & 6EE
    - Sub: Three associated CCVT's
    - Sub: Three associated surge arrestors
- Bay 7:
    - Line: Customer Line 3
    - Sub: Bay 7 downleads, dead-end structure, bay conductor, and bay structures
    - Sub: CBs 7W & 7E
    - Sub: Four switches: 7WW, 7WE, 7EW & 7EE
    - Sub: Three associated CCVT's
    - Sub: Three associated surge arrestors
- Bay 8:
    - Line: Customer Line 4
    - Sub: Bay 8 downleads, dead-end structure, bay conductor, and bay structures
    - Sub: CBs 8W & 8E
    - Sub: Four switches: 8WW, 8WE, 8EW & 8EE
    - Sub: Three associated CCVT's
    - Sub: Three associated surge arrestors

All associated wiring, conduit, relays and other minor assets associated with the above equipment.

PPL Responsible:

- All other equipment.

Responsibility of Asset Matrix for Step Down Substation Example 3:



Customer Responsible:

- Higher voltage yard:
  - No assets

- Lower voltage yard:
- Bay 1: No assets
- Bay 2:
  - Line: Customer Line 1
  - Sub: 2N downleads and dead-end structure
  - Sub: CB 1N

    - Sub: Two switches: 2NN & 2NS
    - Sub: Three associated CCVT's
    - Sub: Three associated surge arrestors
- Bay 3:
    - Line: Customer Line 4
    - Sub: 3S downleads and dead-end structure
    - Sub: CB 3S
    - Sub: Four switches: 3SS & 3SN
    - Sub: Three associated CCVT's
    - Sub: Three associated surge arrestors
- Bay 4:
    - Line: Customer Line 2
    - Sub: 4N downleads and dead-end structure
    - Sub: CB 4N
    - Sub: Two switches: 4NN & 4NS
    - Sub: Three associated CCVT's
    - Sub: Three associated surge arrestors
- Bay 5:
    - Line: Customer Line 3 & 5
    - Sub: 5N & 5S downleads, dead-end structures, bay conductors, and bay structures
    - Sub: CBs 5N, 5T, & 5S
    - Sub: Six switches: 5NN, 5NS, 5TN, 5TS, 5SN, & 5SS
    - Sub: Six associated CCVT's
    - Sub: Six associated surge arrestors
- Bay 6:
    - Line: Customer Line 6
    - Sub: 6S downleads, dead-end structure, bay conductors, and bay structures
    - Sub: CBs 6N & 6S
    - Sub: Four switches: 6NN, 6TS, 6SN, & 6SS
    - Sub: Three associated CCVT's
    - Sub: Three associated surge arrestors

All associated wiring, conduit, relays and other minor assets associated with the above equipment.

<u>PPL Responsible:</u>

All other equipment.

WITNESS: Joseph Lookup

PPL Electric Utilities Corporation
Response to the Set III Data Requests of the
Environmental Defense Fund, Natural Resources Defense Council, and Citizens for Pennsylvania's Future, collectively "Environmental Intervenors" (EI)
Dated November 25, 2025
Docket No. R-2025-3057164

EI-PPL-III-1

Reference PPL St. No. 16, Direct Testimony of Joseph Lookup, page15, stating "It drives down costs, improves grid reliability, and helps ensure that households and communities reap the rewards of robust infrastructure while supporting economic revitalization and job creation across the region." Provide all analysis the Company conducted on each of the claims made within this statement. Where applicable, provide the response in a live, unlocked Excel spreadsheet with all links and formulas intact.

PPL Electric Response

See response to CAUSE-PA VIII-9 regarding the Company's analysis that large load growth drives down transmission rates. See OCA VIII-9 Attachment 1 regarding the Company's policy on analyzing reliability benefits of new large load interconnections. The Company does not have any specific analysis regarding the economic benefits of large load growth.

WITNESS: Joseph Lookup

PPL Electric Utilities Corporation
Response to the Set III Data Requests of the
Environmental Defense Fund, Natural Resources Defense Council, and Citizens for Pennsylvania's Future, collectively "Environmental Intervenors" (EI)
Dated November 25, 2025
Docket No. R-2025-3057164

EI-PPL-III-6

Reference PPL's response to EI-PPL-I-9. Provide all analysis the Company has conducted on the minimum contract period for both the 1 and 5 year terms including, but not limited to, revenue and rate analysis on break even periods for investments. Where applicable, provide the response in a live, unlocked Excel spreadsheet with all links and formulas intact.

PPL Electric Response

PPL Electric has not conducted any specific analyses on minimum contract periods. With respect to the standard 1-year minimum contract term for LP-5 customers, all investments are paid for by the customer through CIAC, and there is no revenue, rate impact, or break-even period. With respect to the 5-year minimum term for large load customers which require network upgrades that will be socialized in rates, the Company has informally analyzed the transmission rates to be paid by these customers, and in all circumstances these customers pay transmission rates to cover the socialized upgrade costs prior to the expiration of the initial 5-year term.

WITNESS: Joseph Lookup

PPL Electric Utilities Corporation
Response to the Set III Data Requests of the
Environmental Defense Fund, Natural Resources Defense Council, and Citizens for Pennsylvania's Future, collectively "Environmental Intervenors" (EI)
Dated November 25, 2025
Docket No. R-2025-3057164

EI-PPL-III-7

Reference PPL St. No. 16, Direct Testimony of Joseph Lookup, at page 18, lines 1-4. Provide any supporting analysis that is used to determine whether the customer "will pay electric service rates equal to the upgrade costs that are socialized through transmission rates." Where applicable, provide the response in a live, unlocked Excel spreadsheet with all links and formulas intact.

PPL Electric Response

The Company will monitor large load customer's usage and the amount the customer pays in transmission rates to determine if the customer has satisfied its obligation to pay electric service rates equal to the upgrade costs that are socialized through transmission rates. Transmission rates are allocated based on a customer's contribution to the PPL Electric system peak. The Company can estimate the transmission revenue it will receive from a new large load customer's load ramp schedule. Additionally, the new large load customer agrees to pay transmission rates at a minimum of 80% of the requested load ramp schedule regardless of actual usage. There is no specific analysis responsive to this request; rather, the Company will administer Electric Service Agreements with new large load customers to ensure compliance with the terms and conditions.

CAUSE-PA Statement 2, Havumaki

Appendix D

Exhibits:

Exhibit D-1; Exhibit D-2

PPL ELECTRIC UTILITIES CORPORATION
PROPOSED FPFTY UNIVERSAL SERVICE RIDER RATE
For The Computation Period July 1, 2026 to June 30, 2027

Line No.		Total	RES	SCI [3]	LP-4	LP-5
1	Budgeted Distribution Revenues (Including GRT)	$ 1,005,236,577	$ 730,211,578	$ 234,061,971	$ 38,982,979	$ 1,980,048
2	Budgeted Distribution Revenues (Excluding GRT)	$ 945,927,619	$ 687,129,095	$ 220,252,315	$ 36,682,984	$ 1,863,225
3	Budgeted OnTrack/WRAP Expenses[1]	$ 142,684,939	$ 96,318,359	$ 30,381,411	$ 5,771,141	$ 10,199,759
4	Over/(Under) Collection Including Interest	$ -	$ -	$ -	$ -	$ -
5	Total Expenses to be Recovered in FPFTY (Including GRT) (Line 3 less Line 4)/0.941	$ 151,631,179	$ 102,357,449	$ 32,286,303	$ 6,132,988	$ 10,839,276
6	Budgeted Distribution Kwh Billed	43,151,963,115	$ 14,451,452,318	$ 10,199,746,315	$ 6,032,236,558	$ 12,468,527,924
7	Universal Service Rider $/Kwh for FPFTY (Line 5/Line 6)		$ 0.0071	$ 0.0032	$ 0.0010	$ 0.0009

	72.71%	22.93%	4.36%		
	0.726	0.229	0.0435		0.9985
	RES	**SCI**	**LCI-P**	**LCI-T**	
Allocation (%)[2]	72.60%	22.90%	4.35%	0.14%	

[1] Excludes USR salaries and wages as proposed in PPL Electric Exhibit Fully Future 1 Schedule D-11

[2] From PPL Electric Exhibit BR-1, page 15

[3] Includes the following rate classes: GS-1, GS-3, BL, SA, SM(R), SHS, SLE, SE

PPL ELECTRIC UTILITIES CORPORATION
PROPOSED FPFTY UNIVERSAL SERVICE RIDER RATE
For The Computation Period July 1, 2026 to June 30, 2027

Line No.		Total	RES	SCI [3]	LP-4	LP-5
1	Budgeted Distribution Revenues (Including GRT)	$ 1,005,236,577	$ 730,211,578	$ 234,061,971	$ 38,982,979	$ 1,980,048
2	Budgeted Distribution Revenues (Excluding GRT)	$ 945,927,619	$ 687,129,095	$ 220,252,315	$ 36,682,984	$ 1,863,225
3	Budgeted OnTrack/WRAP Expenses[1]	$ 142,684,939	$ 49,050,483	$ 34,618,715	$ 19,971,852	$ 39,043,889.72
4	Over/(Under) Collection Including Interest	$ -	$ -	$ -	$ -	$ -
5	Total Expenses to be Recovered in FPFTY (Including GRT) (Line 3 less Line 4)/0.941	$ 151,631,179	$ 52,125,912	$ 36,789,282	$ 21,224,072	$ 41,491,913
6	Budgeted Distribution Kwh Billed	43,151,963,115	$ 14,451,452,318	$ 10,199,746,315	$ 6,032,236,558	$ 12,468,527,924
7	Universal Service Rider $/Kwh for FPFTY (Line 5/Line 6)		$ 0.00361	$ 0.00361	$ 0.00352	$ 0.00333

	RES	SCI	LCI-P	LCI-T
Allocation (%)[2]	34.38%	24.26%	14.00%	27.36%

[1] Excludes USR salaries and wages as proposed in PPL Electric Exhibit Fully Future 1 Schedule D-11
[2] From PPL Electric Exhibit BR-1, page 94
[3] Includes the following rate classes: GS-1, GS-3, BL, SA, SM(R), SHS, SLE, SE