

STATE OF NORTH CAROLINA
UTILITIES COMMISSION
RALEIGH

DOCKET NO. E-2, SUB 927
DOCKET NO. E-2, SUB 1287
DOCKET NO. E-7, SUB 1032
DOCKET NO. E-7, SUB 1261

BEFORE THE NORTH CAROLINA UTILITIES COMMISSION

DOCKET NO. E-2, SUB 927)
)
In the Matter of)
Petition by Duke Energy Progress, LLC, for)
Approval of Modifications to Residential)
Service Load Control Rider)

DOCKET NO. E-2, SUB 1287)
)
In the Matter of)
Application of Duke Energy Carolinas, LLC,)
for Approval of PowerPairSM Solar and)
Battery Installation Pilot Program Pursuant)
to Order of the North Carolina Utilities)
Commission)

DOCKET NO. E-7, SUB 1032)
)
In the Matter of)
Petition by Duke Energy Carolinas, LLC,)
for Approval of Modifications to Residential)
Service Load Control Rider)

DOCKET NO. E-7, SUB 1261)
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In the Matter of)
Application of Duke Energy Carolinas, LLC,)
for Approval of PowerPairSM Solar and)
Battery Installation Pilot Program Pursuant)
to Order of the North Carolina Utilities)
Commission)

PUBLIC STAFF'S
CORRECTED INITIAL
COMMENTS

NOW COMES THE PUBLIC STAFF – North Carolina Utilities Commission (Commission), by and through its Executive Director, Christopher J. Ayers, and respectfully submits the following comments.

BACKGROUND

1. On March 23, 2023, the Commission issued its Order Declining to Approve Proposed Smart \$aver Solar Program and Requiring Development of Pilot Program (Smart \$aver Order) in Docket Nos. E-2, Sub 1287, and E-7, Sub 1261 (Smart \$aver Dockets). The Smart \$aver Order denied the applications of Duke Energy Progress, LLC (DEP), and Duke Energy Carolinas, LLC (DEC and, together with DEP, Duke or the Companies), for approval of their proposed Smart \$aver Solar Energy Efficiency Program and instead required that Duke file a pilot program to “evaluate operational impacts to the electric system, if any, of behind the meter residential solar plus energy storage,” with such pilot being “instructive as to the potential role of residential solar plus storage in meeting the carbon reduction requirements established by N.C. Gen. Stat. § 62-110.9 as well as the evolving and complex needs of the electric system.”¹ The Commission further ordered that the pilot “should elucidate not only the potential operational costs and benefits afforded to the electric system by residential solar plus storage but also the cost-effectiveness of achieving any such operational benefits in light of the

¹ Smart \$aver Order at 5.

various provisions of the [Inflation Reduction Act of 2022, H.R. 5376, 117th Congress (August 16, 2022)].”²

2. The Commission required that Duke’s proposed pilot contain the following elements:

- a) the pairing of solar generation with energy storage;
- b) that participants be required to participate in net energy metering (NEM) (and that participants not be required to participate in Duke’s existing residential winter-focused load control demand-side management (DSM) programs) and that there be two cohorts of participants: one in which participants have complete control of the use of the energy storage device, who would be served under the time-of-use (TOU) with critical peak pricing (CPP) rates approved by the Commission in its March 23, 2023 Order Approving Revised Net Metering Tariffs, Investigation of Proposed Net Metering Policy Changes, Docket No. E-100, Sub 180 (NEM Order); and one in which participants must give the utility complete control over the energy storage device, who would be served under the Bridge Rate approved by the Commission in its NEM Order;

² *Id.* at 6.

- c) that participants receive an incentive of \$0.36 per watt toward the customer's cost of installation and a monetary incentive for pairing with energy storage likewise based on the watt capacity of the battery;
- d) that Duke may recover all reasonable and prudent costs of the participant incentives and program administrative costs by amortizing the total program incentives during a calendar year and administrative costs over a 20-year period, including a return component, through the Companies' annual Renewable Energy Portfolio Standard (REPS) riders;
- e) that the pilot be offered only to all-electric residential customers and to customers who use electricity for all purposes other than cooking;
- f) that the pilot be open to enrollment of participants for three years and subject to a maximum annual limit of 10,000 kilowatts (kW)³ of solar generation each year per company, and that participants be required to participate in the program for at least 10 years;

³ Unless otherwise noted, all references to watts, kW, or megawatts (MW) are in alternating current (AC).

g) that Duke's research objectives should include a study of the accessibility of solar plus storage to different residential customer demographics; and

h) that Duke must file annual status reports on the pilot in addition to a final report that includes robust discussion and analysis of the data and information gathered through the pilot.⁴

3. On June 21, 2023, the Companies filed for approval of their solar and battery installation program entitled "PowerPairSM Solar and Battery Installation Pilot Program" in Docket Nos. E-2, Sub 1287, and E-7, Sub 1261 (PowerPair). Included in the Companies' PowerPair applications is a proposal, in accordance with the Smart \$aver Order, that one group of participants give the utility control over their battery storage device. However, Duke proposes that customers who give the utility control over their battery storage device do so via required participation in a DSM program, as described below, despite the Smart \$aver Order's directive otherwise; and that the extent of the utility's control be "significant" rather than the "complete" control directed by the Smart \$aver Order. In their applications, the Companies request that the Commission: (1) allow Duke to deviate from certain requirements contained in the Smart \$aver Order, including that customers not be required to participate in a DSM program and the extent of the utility's control over the customer's battery storage device; (2) approve the PowerPair pilot as outlined in the applications and in each company's respective

⁴ Smart \$aver Order at 6-8.

tariff, effective no earlier than 120 days following Commission approval; and (3) allow Duke to recover all reasonable and prudent costs of the PowerPair incentives and administrative costs by amortizing the total program incentives during a calendar year and administrative costs over a 20-year period, including a return component adjusted for income taxes at the utility's overall weighted average cost of capital established in its most recent general rate case.

4. On the same day, Duke filed requests to modify and expand the Companies' existing residential winter-focused load control DSM programs⁵ – Docket Nos. E-2, Sub 927 (EnergyWise), and E-7, Sub 1032 (Power Manager and, together with EnergyWise, the DSM Programs) – by adding an option to each program for customers to allow the utility to exert control over the customer's battery storage device, as well as the addition of a monthly incentive credit for these customers (Battery Control Option(s)). In the Battery Control Option proposals, Duke requests that the Commission: (1) approve the modifications and associated tariffs, to be effective no earlier than 180 days following approval, and continue as long as the measure is cost-effective or the Commission orders otherwise; (2) find that the DSM Programs – modified as the Companies have requested – continue to meet the requirements of “new” DSM programs consistent with Commission Rule R8-69; (3) find that the costs of the DSM Programs – modified as the Companies have requested – are eligible for recovery through each utility's annual DSM/EE rider in accordance with Commission Rule R8-69(b);

⁵ The Companies originally filed the program modification requests as proposed Energy Efficiency modifications. However, after discussing with the Companies, the Companies and Public Staff agree that these programs are more accurately categorized as DSM programs.

and (4) approve the proposed utility incentives for inclusion in the annual DSM/EE riders in accordance with Commission Rule R8-69.

5. On June 29, 2023, the Commission issued its Order Requesting Comments in the PowerPair dockets, requiring that initial comments be filed by August 7, 2023, and that reply comments be filed by August 28, 2023.

6. On July 12, 2023, the Public Staff filed a motion seeking to extend the deadline by which parties could file initial comments in the PowerPair dockets up to and including August 21, 2023; and to extend the 30-day deadline by which parties could file initial comments in the DSM Program Modification dockets pursuant to Commission Rule R8-68 up to and including August 21, 2023. On July 14, 2023, the Commission granted the Public Staff's extension motion.

7. As of the date of this filing, parties have intervened in the above-captioned dockets as follows:

- a. PowerPair: the Attorney General's Office (AGO); Carolina Industrial Group for Fair Utility Rates II (CIGFUR II) and Carolina Industrial Group for Fair Utility Rates III (CIGFUR III), together; and Carolina Utility Customers Association, Inc. (CUCA); NC WARN; North Carolina Rooftop Solar Installers; North Carolina Sustainable Energy Association (NCSEA); Vote Solar and the Southern Alliance for Clean Energy (SACE), together; and the Solar Energy Industries Association (SEIA);

- b. EnergyWise: AGO; CUCA; the Environmental Defense Fund (EDF); the Natural Resource Defense Council (NRDC); NCSEA; SACE; SEIA; and the Southern Environmental Law Center; and
 - c. Power Manager: AGO; CUCA; CIGFUR III; EDF; NCSEA; NC WARN; Public Service Company of North Carolina, Inc.; SACE, the South Carolina Conservation League, Sierra Club, and NRDC, together; and SEIA.
8. On August 21, 2023, interested parties filed their initial comments.

THE PUBLIC STAFF'S REVIEW

9. The PowerPair and DSM Program Modifications go hand in hand to form the solar plus storage pilot required by the Commission in its Smart Saver Order. As such, the Public Staff is consolidating its comments on each of these filings herein.

10. The Public Staff's investigation included a review of the Companies' applications for approval of the PowerPair pilot; the Battery Control Option requests; relevant General Statutes, Commission Rules, and Commission orders; the submission of data requests to the Companies and review of the Companies' responses; multiple conference calls with the Companies and intervenors; and research into solar plus storage programs in other states.

11. Based on its investigation, the Public Staff generally supports the PowerPair pilot and the Battery Control Options, as each is proposed, and notes

its observations, recommendations, and other items for the Commission's consideration, below.

PowerPair Pilot

a. Participant Structure

12. Pursuant to the Smart \$aver Order, the Companies propose to define the cohort of participants who maintain control over their battery storage device as Cohort A, with these participants taking service under TOU-CPP rates and the Residential Solar Choice Tariff (Rider RSC). The Companies propose to define the cohort of participants who choose to give the utility control over the battery storage devices for demand response purposes as Cohort B, with these customers taking service under the Net Metering Bridge rider (Rider NMB) and being required to participate in the relevant Battery Control Option. For Cohort B only, the Companies propose that participants must agree to allow the utility to either charge or discharge the battery during up to 36 annual "Control Events," spanning 48-hours, in addition to giving the utility the right to interrupt at other times in the event continuity of service is threatened, through participation in the Battery Control Option.

13. The Companies propose to split the cohorts approximately equal and allow customers to choose which cohort they would like to join but note that Duke will close enrollment in a particular cohort if it reaches 24 MW in either company's territory in order to ensure that at least 20% of participants are within in each cohort.

14. Regarding the proposal to allow customers to switch cohorts, the Public Staff believes this may encourage participation, but is concerned it may also impact the research objectives. For instance, some customers may be hesitant to commit to a particular structure for a ten-year period. Given that the Companies propose to pay the same upfront incentives to both cohorts, this is less problematic than it may have been if the Companies had proposed different upfront incentives. In addition, the Companies have committed to proposing new cohorts in the future, such as a cohort for customers with medical devices. Allowing customers to switch cohorts will naturally create new cohorts as well; for example, a customer in Cohort A may decide to voluntarily participate in the Battery Control Option, and would therefore not fit neatly into Cohort A or Cohort B.⁶ Both new cohorts and allowing participants to switch cohorts will complicate the overall research objectives, which will make it more difficult to ensure that the assessment of each cohort is appropriate to the continuation and expansion of any cohort. For purposes of the research objectives, the Public Staff recommends that participants be required to remain in their initial cohort for at least three years and that, after that initial term, switching cohorts should be permitted no more than twice in the 10-year enrollment timeframe. In addition, for the initial three-year period, customers in Cohort A should not be permitted to participate in their utility's respective Battery Control Option. The Public Staff believes this strikes an appropriate balance between allowing customers flexibility while still achieving the research objectives.

⁶ In discovery, Duke noted that if the annual participation limits for Cohort B have been reached, customers in Cohort A would not be able to switch to Cohort B.

15. The Companies propose to limit participation in the PowerPair pilot to customers who own their homes, stating that home ownership is consistent with the Smart \$aver Order's objective to have participants be in the program for at least ten years. However, the Companies propose to allow both owned and leased solar and storage equipment, suggesting that this will increase the applicant pool to further the pilot's research objectives. While the Public Staff does not object to these requirements for the period of the pilot, equipment ownership should be considered when planning initiatives and programs that have influence on long-term planning. The ability to lease equipment, as opposed to owning the equipment, has not historically been a practice utilized in the DSM/EE portfolio of programs, although the Battery Control Option is unique in the magnitude of the cost of the equipment being installed and controlled by the Companies. To address potential risks associated with upfront incentives paid to customers who have leased equipment, the Companies should include a discussion of participation rates between customers who own and customers who lease their system in their final report.

b. Deviations from the Smart \$aver Order

16. The Companies request that the Commission approve several deviations from the Smart \$aver Order, which include: (1) authorizing a requirement for Cohort B participants to join the respective company's DSM Program, as modified by the proposed Battery Control Option, thereby giving the utility "significant" – but not complete – control over the battery storage device; (2) permitting participation from customers with electric or gas heating systems; (3)

allowing the Companies to immediately open the PowerPair pilot to a maximum limit of 30 MW of solar capacity each; and (4) proposing a battery storage incentive per kilowatt-hour (kWh) capacity.

17. Concerning the lack of “complete control” over the battery in Cohort B and its required participation in the Battery Control Option, the Public Staff notes that the limited amount of utility control over the battery storage device through the Battery Control Option stretches the plain meaning of “complete control.” The Public Staff’s understanding of “complete control” is similar to how the utility would dispatch utility-scale energy storage procured as part of the Carbon Plan, where the utility would directly dispatch the energy storage at all times from its control center to maximize system benefits. The Companies interpret the Commission’s Smart Saver Order to mean that Cohort B “must give the utility significant demand response control over the Battery storage device, while not eliminating the value underlying the customer’s investment in the device.”⁷ If each event were to last the maximum of 48 hours, the 36 annual events would comprise 1,728 hours annually, or approximately 20% of the total hours in each year, which the Public Staff considers significant.

18. However, giving the utility complete control over the battery storage device, as interpreted by the Public Staff, raises difficult technical and economic questions. For example, Duke does not currently have the ability to remotely dispatch behind-the-meter resources from its control centers. Although the

⁷ PowerPair Applications at 11.

planned DER Dispatch Tool (proposed in both DEC's and DEP's ongoing multi-year rate plan proceedings) will provide control over utility-scale solar and energy storage, extending this control to behind-the-meter energy storage devices would likely require a significant investment in information technology infrastructure. In addition, many customers may choose to invest in energy storage to provide resiliency to their homes or to shift usage to off-peak hours to lessen the strain on the grid. If that value proposition is lost by permitting the utility to completely control the battery, some customers may elect not to make the incremental investment and participation in the Battery Control Options might suffer. The Public Staff's review of similar programs and incentives in other states also did not find any programs that provided the utility with complete control over the customer's battery storage device. Therefore, the Public Staff recommends that the Commission approve this deviation from the Smart \$aver Order and permit the Companies to exercise control over participating customers' energy storage devices through the proposed Battery Control Options.

19. The Companies request to extend the pilot envisioned by the Commission to include customers with electric or natural gas heating systems. Duke explains that this has been suggested by stakeholders, and that the Companies' original Smart \$aver applications only proposed an electric heat limitation because that program required installation of an electrical smart thermostat, which is not a component of this pilot. As such, according to Duke, an electrical heat limitation would unnecessarily restrict and limit the participant pool and therefore the research data from this pilot. The Public Staff does not object to

this deviation and recommends that the Companies distinguish and track the impacts between all-electric and electric/natural gas customers.

20. Also based on stakeholder feedback, the Companies request to open the pilot to all 30MW of solar rebate eligibility in the first year in each service territory, compared to 10MW blocks over the course of the three-year pilot period envisioned in the Smart \$aver Order. The Companies explain that this will avoid stops and starts in the market and more quickly boost and expand participation, thereby allowing for more research data to be collected. The Public Staff agrees that opening the pilot immediately to all 30 MW in each service territory will expand the pool of participants as quickly as possible, which will likely lead to more robust data over the course of the three-year pilot period. This will improve the ability of the Companies to discern impacts across both cohorts and develop recommendations regarding continuation or expansion of the pilot.

21. Concerning the Companies' proposal to set the battery storage upfront incentive at \$240 per kWh, which is not based on the kW capacity as directed in the Smart \$aver Order, the Public Staff does not object to this deviation, as energy storage commercially available to residential customers is often advertised in kWh. As such, the Public Staff recommends the Commission approve this deviation as reasonable and in the best interests of the pilot program.

c. Incentive Structure

22. The Companies claim that, after factoring in the proposed upfront PowerPair incentives and federal incentives, the total system cost for customers

“is likely almost halved.” This is based upon the Companies’ estimated system cost of \$30,000 for a 10 kW solar system coupled with a 13.5 kWh battery system, which Duke explained was illustrative. The Public Staff believes the Companies’ estimate may not reflect realistic system costs and estimates the total system cost to be approximately ~~\$52,600~~\$52,400, thereby diminishing the impact of the proposed incentives on the overall cost to the customer as described below.

23. For the solar component of a participating customer’s system, in compliance with the Smart Saver Order, the Companies propose to provide a monetary incentive of \$0.36 per watt (W) for the first 10 kW of the total solar capacity, which equates to a maximum of \$3,600 per residence. According to EnergySage, which compiles cost estimates based on quotes submitted by installers to its marketplace, the Lawrence Berkeley National Laboratory’s (LBNL) 2022 Tracking the Sun Report (LBNL Report),⁸ the median-average cost of a residential solar system installed in 2021 in August 2023 in North Carolina was \$4.452.93 per W-DC,⁹ or about \$3.713.52 per W-AC assuming an inverter loading ratio (ILR) of 1.2. Based on these figures, it appears that the solar incentive proposed by the Companies would cover approximately 10% of the cost of the solar system.

24. The Companies propose to provide a monetary incentive of \$240 per kWh as an upfront incentive to participants for the energy storage portion for the

⁸ Tracking the Sun — Pricing and Design Trends for Distributed Photovoltaic Systems in the United States — 2022 Edition. LBNL (September 2022). Contract No. DE-AC02-05CH11231. Accessible at <https://emp.lbl.gov/tracking-the-sun>.

⁹ See <https://www.energysage.com/local-data/solar-panel-cost/nc/>.

first 13.5 kWh of energy storage installed, which equates to a maximum incentive of \$3,240. Notably, the customer can install more than 13.5 kWh of energy storage, but they will not receive an incentive for excess capacity. According to ~~EnergySage, the LBNL Report,~~ the national median average cost of energy storage coupled with solar PV in North Carolina is approximately ~~\$4,149~~\$1,273 per kWh,¹⁰ which suggests that the Companies' proposed incentive would cover approximately ~~24~~19% of the cost of the battery system.

25. The Public Staff reviewed upfront incentives for similar programs in other states as a benchmark to evaluate the Companies' proposed storage incentive, which was not set by the Smart Saver Order.

26. Eversource in Connecticut operates an Energy Storage Solutions program, which provides an upfront incentive to residential customers who allow the utility to control their battery of up to 50% of the battery system cost, capped at \$7,500.¹¹ The customer must consent to participate in demand response programs, called "active events," for which an additional incentive is paid based upon the amount of capacity contributed by the customer's battery during peak load events. Eversource also offers a Connected Solutions Demand Response program, which does not provide an upfront incentive but requires participants to allow utility control of their battery at all times (referred to as "passive events" and

¹⁰ ~~The LBNL Report does not break out storage costs by state.~~ See <https://www.energysage.com/local-data/energy-storage-cost/nc/>.

¹¹ The Energy Storage Solutions program details are accessible at: <https://www.eversource.com/content/residential/save-money-energy/clean-energy-options/home-battery-storage>.

“active events”), with incentives paid based upon the capacity contributed by the battery.

27. Green Mountain PowFer in Vermont offers up to \$850 per kW for 3-hour storage and \$950 per kW for 4-hour storage, each capped at a maximum of 10 kW, for a maximum upfront incentive of \$8,500 or \$9,500, respectively.¹² An additional \$100 per kW incentive (up to \$1,000) is available if the battery is installed in a constrained area of the grid. Customers must consent to allow the utility to control their battery during peak load events, which are anticipated to occur 5 to 8 times a month and between 3 and 6 hours per event.

28. Xcel Energy in Colorado offers \$500 per kW up to 50% of the cost of the system, and \$800 per kW for income-qualified customers up to 75% of the cost of the system.¹³ Customers must allow the utility to control their battery during peak load events, which provides additional participation incentives of \$100 annually.

29. NV Energy in Nevada offers \$190 per kWh for customers on a TOU rate, capped at the lesser of 50% of the equipment cost or \$3,000, and \$95 per kWh for customers not on a TOU rate, capped at the lesser of 50% of the equipment cost or \$1,500.¹⁴ However, NV Energy’s incentive program does not

¹² The Bring Your Own Device (Backup Only) program details are accessible at: <https://greenmountainpower.com/wp-content/uploads/2020/11/BYOD-Customer-Agreement-11-2-20.pdf>.

¹³ The Renewable Battery Connect program details are accessible at: <https://co.my.xcelenergy.com/s/renewable/battery-connect>.

¹⁴ The Residential Energy Storage Incentives program details are accessible at: <https://www.nvenergy.com/cleanenergy/energy-storage/residential-storage>.

require participation in any demand response programs nor does it require that the utility control the customer's battery.

30. Based on the Public Staff's review of comparable programs in other states, the Companies' proposed incentive for energy storage that must be controlled by the utility at least during peak load events is less than incentives offered in Connecticut, Vermont, and Colorado. While these other utilities may have distinguishable grid characteristics from Duke's systems, with varying costs for capacity and energy, the Companies' upfront proposed incentive stands out as significantly less than other states. For a residential system with a 10 kW solar and 10 kW / 13.5 kWh battery, the customer would receive approximately \$6,840, which would cover approximately 13% of the total estimated system cost (based on data from ~~the LBNL Report~~EnergySage).

31. A summary of the estimated costs and incentives associated with Cohort A and Cohort B, including impacts from the IRA, is presented below. The IRA provides a 30% tax credit to residential solar and storage installations, and the energy storage eligibility for the tax credit is no longer dependent upon whether the battery charges from the solar resource or from the grid. This estimate of savings differs from the Companies' estimates, largely due to the difference between the Companies' illustrative estimated system cost of \$30,000 and the Public Staff's estimate of ~~\$52,642~~\$52,386.

Summary for 10 kW Solar + 10 kW / 13.5 kWh Battery	Cohort A	Cohort B
System Cost [1]	\$52,612	\$52,612
Solar Upfront Incentive	\$3,600	\$3,600
Storage Upfront Incentive	\$3,240	\$3,240
IRA Tax Credit [2]	\$13,731	\$13,731
DSM Payments over 10 Years [3]	\$0	\$3,976
Net System Cost [4]	\$32,040	\$28,064
Net Savings	\$20,571	\$24,547
Cost Reduction	39%	47%
Cost Reduction from Duke Credits	13%	21%

Notes

[1] System cost is estimated using 2022 LBNL Tracking the Sun data: \$3.71 per W for solar and \$1,149 per kWh for energy storage. These estimates include financing costs.

[2] IRA Tax Credit is 30%, applied after upfront incentives. Customer's ability to secure this amount depends on tax liability.

[3] DSM Payments are based on no change to the incentive amount or battery capability factor over the ten year period. This value reflects the net present value with a 6.5% discount rate. This value also reflects the corrected battery capability factor of 70.9%, as discussed later in these comments.

[4] Net System Cost is prior to any energy shifting savings realized by customers on TOU rates.

Summary for 10 kW Solar + 10 kW / 13.5 kWh Battery	Cohort A	Cohort B
System Cost [1]	\$52,386	\$52,386
Solar Upfront Incentive	\$3,600	\$3,600
Storage Upfront Incentive	\$3,240	\$3,240
IRA Tax Credit [2]	\$13,664	\$13,664
DSM Payments over 10 Years [3]	\$0	\$3,976
Net System Cost [4]	\$31,882	\$27,906
Net Savings	\$20,504	\$24,479
Cost Reduction	39%	47%
Cost Reduction from Duke Credits	13%	21%

Notes

[1] System cost is estimated using EnergySage data: \$3.52 per W for solar and \$1,273 per kWh for energy storage. These estimates do not include financing costs.

[2] IRA Tax Credit is 30%, applied after upfront incentives. Customer's ability to secure this amount depends on tax liability.

[3] DSM Payments are based on no change to the incentive amount or battery capability factor over the ten year period. This value reflects the net present value with a 6.5% discount rate. This value also reflects the corrected battery capability factor of 70.9%, as discussed later in these comments.

[4] Net System Cost is prior to any energy shifting savings realized by customers on TOU rates.

32. As detailed in the table above, and in comparison to other states, the Public Staff believes that the energy storage incentive is too conservative to truly incentivize the deployment of customer-sited energy storage eligible for participation in the pilot program. Based on its analysis of other states, the Public Staff recommends the battery incentive be increased to \$500 per kWh, up to a maximum of 13.5 kWh. This results in a maximum battery incentive of \$6,750, which would cover approximately ~~44~~³⁹% of the total cost of the energy storage system, as estimated using data from ~~the LBNL Report~~EnergySage. For a residential system with a 10 kW solar and 10 kW / 13.5 kWh battery, the customer would receive approximately \$10,350, which would cover approximately 20% of the total estimated system cost based on data from ~~the LBNL Report~~EnergySage.

33. The Public Staff also considered whether Cohort A and Cohort B should receive varying upfront incentives. Because Cohort B customers must be willing to cede some control of their battery to the Companies, Cohort A may be more attractive to participants that do not wish to do so. This might imply that a larger upfront incentive for Cohort B participants would be necessary to equalize participation. However, given that participants who give the utility control through participation in the Battery Control Options receive an additional incentive, this may not be necessary at this time. However, if participation in the PowerPair pilot skews towards Cohort A, future iterations of the program may consider differing incentives.

d. *Educational Opportunities for Developers*

34. The Companies state that Duke will hold educational sessions for installers on battery safety and permitting issues, the costs for which will be included in the Program's administrative costs. In response to discovery, Duke explained that the Companies anticipate holding these sessions on a quarterly basis and across multiple regions to maximize engagement. These events may include information on how to become a Duke-approved installer, program details, qualifying equipment, best practices for installation, safety, and general connectivity, technology trends, and IRA opportunities and tax credits. The costs in the first year are anticipated to be \$5,600 for DEP and \$6,000 for DEC. The Public Staff supports these educational sessions as necessary to facilitate full enrollment and to achieve the research objectives.

e. *Cost of the PowerPair Pilot*

35. The Companies estimate that across both of their service territories, the PowerPair pilot, as they have proposed, will cost approximately \$46.8 million, which includes the incentive payments, labor costs, and administrative costs. The costs of the incentives comprise approximately 93% of the total program costs. Pursuant to the Smart Saver Order, the total program costs that were reasonably and prudently incurred, including a return component adjusted for income taxes at the utility's weighted average cost of capital, will be amortized over a 20-year period and recovered through the Companies' respective REPS riders. The Public Staff requests that Duke provide an updated cost analysis, including an updated

cost-effectiveness calculation, taking into account the increased incentives recommended in these comments, in its reply comments.

Battery Control Options

a. Control Events

36. The Companies state that Control Events will follow the same process that Duke applies to all of its DSM programs. The Companies propose to initiate up to 36 Control Events annually (18 in the winter, 9 in the summer, and 9 in the shoulder seasons), as well as maintaining the right to call additional Control Events in the event continuity of service is threatened, with Control Events being called up to 48 hours before the forecasted need. This will provide the Companies the ability to charge and maintain the participant's battery to a higher state of charge in preparation for the upcoming need. During Control Events, Duke proposes that the participant will not have control over the charging and discharging patterns of their battery system. Outside of Control Events, the participant can use the battery system for any reason of their choosing. The Companies explain that the customer will receive the benefit of any energy discharged to the grid during a control event under the applicable net metering tariff.¹⁵ The Companies state that a customer's battery will not be discharged below

¹⁵ The Companies clarified in discovery the proposed tariff language stating that "None of the energy used in charging or discharging during a Control Event shall be considered eligible for resale to the Company, and any value associated with the charging or discharging energy shall be considered to be compensated for as part of the participant's incentive." This language is not intended to preclude the customer from benefitting from energy discharged during a control event, but rather is intended to clarify that the monthly incentive paid to a participant is the full compensation to be paid for all control of the participant's battery, including charging and discharging.

a 20% state of charge, and that the Companies will ensure that this minimum threshold is maintained through its control platform.

37. The Companies will work with a third-party aggregator to facilitate the Control Events, similar to how the thermostat control programs operate. The Companies will have the ability to communicate control signals to the aggregator, and the aggregator will send the appropriate signals to individual battery systems. Duke states that the aggregator will also collect and report pertinent energy storage data to the Companies, such as state of charge, charge and discharge power, charge and discharge time, and grid connectivity status.

38. In discovery, the Companies stated that each utility will target 36 events each year but cannot guarantee that each event will be completed. Duke explained that, depending on weather and load conditions, system operators may need to keep additional capability from the Battery Control Options in reserve as an emergency resource. Duke also stated that, due to the scale of the program, the aggregated capacity would not be built into the Companies' unit commitment and dispatch models. The Public Staff notes that the proposed Battery Control Option tariffs provide the Companies with the "right for interruption outside of these parameters" in the event continuity of service is threatened" (System Emergency Clause). Therefore, for the purposes of the PowerPair pilot and achieving the Commission's research objectives, as well as maximizing the Battery Control Options' system benefit, the Public Staff recommends that Duke be required to utilize a minimum of 30 Control Events each year.

39. In addition, the Public Staff recommends that the System Emergency Clause be modified to be more clearly defined.¹⁶ As written, it is not clear what an “interruption” consists of or whether participants may opt out of these interruptions in the manner they are permitted to do so during a Control Event, and the Public Staff is concerned that the open-ended nature of the clause may deter participants who wish to install battery storage for reliability purposes and are concerned that the Companies may discharge their battery just prior to a major storm or load shed event, leaving them without sufficient energy to power their homes in the event of an outage. The Public Staff therefore recommends that the System Emergency Clause be modified in each utility’s tariff as follows: “The Company reserves the right to prevent the Customer’s Battery from charging from the grid if continuity of service is threatened, or to disconnect the customer’s load entirely if the operation of the Customer’s Battery threatens the reliability or safety of the Company’s system. The Company’s exercising of this right does not constitute a Control Event, and the Company will not discharge or charge the Customer’s Battery during such an event.”

b. Charging of the Battery

40. The Companies state that the objectives of the Battery Control Options are to leverage behind the meter resources that are able to dispatch capacity to the system (which Duke contends is especially beneficial to winter

¹⁶ This clause appears to be the identical language used in DEC’s Cooling Load and Heating Load program and DEP’s HVAC Control program in the existing EnergyWise and Power Manager tariffs.

capability, storing solar produced in the winter afternoons to be discharged during peak mornings before solar is widely available on the grid), and to meet ongoing actions the Companies are taking to meet carbon-free goals year-round. However, during discovery, the Companies stated that customers will be allowed to charge their battery as they choose, outside of the 48-hour Control Events, and that customers with solar panels may choose to charge their battery with solar panels, through grid imports, or a combination of both. Duke cannot guarantee, nor have they shown how the Companies could determine, that the stored energy used during peak times will originate from a carbon-free resource.

41. The Companies also stated in discovery that if the battery is charged from the grid during a control event, the customer will be billed for any imported energy. For customers on a TOU or TOU-CPP rate schedule, imports during on-peak periods may result in higher-than-expected bills. Duke indicated that the Companies will attempt to avoid charging during on-peak periods, as the Companies are attempting to shift load away from peak periods. However, for some rate schedules, there may be a disconnect between the residential on-peak period and the utility's highest cost periods, as shown in the figure below. Of particular concern is the very broad on-peak periods for DEP's legacy TOU with demand charge (TOU-D) rate schedule. While this schedule is closed to new customers (as is DEC's TOU rate schedule), customers currently taking service under DEP's TOU-D are eligible to participate in the Battery Control Option and are at the greatest risk of higher-than-expected bills due to charging during on-peak periods. At this time, the Public Staff is not recommending the Companies

implement operational control schemes to prevent charging customer batteries during on-peak periods; however, the Public Staff recommends that the Companies minimize charging during on-peak periods to the greatest extent possible.

On-Peak Hours			Hour Ending																							
BA	Tariff	Season	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
DEC	TOU*	Winter																								
		Summer																								
	TOU-CPP	Winter																								
		Summer																								
DEP	TOU	Winter																								
		Summer																								
	TOU-CPP	Winter																								
		Summer																								
	TOU-D*	Winter																								
		Summer																								

c. Incentive Structure

42. The Companies state that participants in the Battery Control Option will be given a monthly incentive of \$6.50/kW. In response to discovery, the Companies stated that the \$6.50/kW aligned with the incentive amount approved for the Ford Vehicle to Grid pilot filed in Docket No. E-7, Sub 1275. The Companies propose to calculate the monthly incentive by the following formula:

*(Eligible Battery Nameplate Continuous kW output rating as defined in a Company-provided table for eligible battery models) * (\$6.50/kW) * 56.7% (Battery Capability Factor)*

43. The battery capability factor of 56.7% is proposed by the Companies to reduce the incentive payment based upon assumptions regarding how much battery capacity will be available to the Companies during Control Events. Rather

than paying individual incentives based upon the actual capacity discharged during Control Events, the Companies instead made several assumptions regarding the capacity available for dispatch (80%), compliance with Duke interconnection standards (95%), event participation (85%), battery connectivity reliability and response rate (90%), and battery inverter functionality rates (97.5%). The product of these individual factors yields the estimated battery capability factor of 56.7%.

44. However, in discovery, the Companies conceded that the 80% “capacity available for dispatch” factor was not necessary. Removing this factor yields a revised battery capability factor of 70.9%. Duke has agreed that the Companies will apply the corrected battery capability factor at the time of program approval.

45. Based upon a 10-kW battery system and the originally filed 56.7% battery capability factor, the typical monthly incentive would be approximately \$37, or \$442 per year. Based upon the revised 70.9% battery capability factor, the typical monthly incentive would be approximately \$46, or \$553 per year.

46. The change in battery capability factor results in an updated cost-effectiveness projection of the following:

DEC		DEP	
UCT	1.83	UCT	1.67
TRC	5.81	TRC	5.34
RIM	1.83	RIM	1.67

47. As discussed previously, the Public Staff reviewed battery storage incentive and demand response programs in Connecticut, Vermont, and Colorado.

48. Eversource in Connecticut, which provides up to \$7,500 as an upfront incentive under its Energy Storage Solutions program, offers an additional \$200 per average kW contributed during summer events, and \$25 per kW contributed during winter events. In addition, this program includes both “active events,” where the utility can call between 31 and 65 events per year, lasting one to three hours per event; and “passive events,” in which the utility exerts daily control in five-hour blocks during all non-holiday weekdays in the summer. The ConnectedSolutions Demand Response program, which has no upfront incentive, pays \$225 per kW contributed during summer “active events” and no incentive during winter events. There are no “passive events” for this program.

49. Green Mountain Power in Vermont does not offer an additional incentive for participation in demand response; the entire incentive is factored into its upfront incentive, which ranges from \$8,500 to \$9,500. Peak events under this program are anticipated to occur five to eight times per month for an average of three to six hours at a time.

50. Xcel Energy in Colorado offers up to \$100 per year for participation in “most” control events. This program allows up to 60 control events per year that consist of a 24-hour charging period and a three-hour discharging period, and the utility will not discharge the battery below a 40% state of charge.

51. The Public Staff is concerned that the demand response incentive for battery storage does not properly value the capacity provided by the battery. For one, the incentive is significantly less than Duke’s avoided capacity and

transmission and distribution (T&D) costs of approximately [BEGIN
CONFIDENTIAL] [REDACTED]

[END CONFIDENTIAL], which are based on rates and methodologies approved in Docket No. E-100, Sub 175, and avoided T&D costs based on an avoided T&D study performed by Duke in 2021. The fact that Duke did not perform any analysis supporting its proposed incentive, instead simply using the same incentive approved for an electric vehicle pilot program, suggests to the Public Staff that it is likely that the capacity contribution from stationary battery storage dispatched by the utility does not fully capture the avoided capacity benefits that will be realized. Based on this analysis, the Public Staff recommends that the Companies increase their proposed Battery Control Option incentive to \$10 per kW per month, which equates to \$120 per kW per year. In addition, rather than utilize the proposed battery capability factor, the Public Staff recommends that the incentive paid per month be based on the sum of the actual amount of power discharged from the battery during each control event each month,¹⁷ as this information will be readily available through data collected from the third-party aggregator.

d. EM&V

52. The Companies stated in discovery that Duke had not contracted with an evaluator to perform the impact evaluation for the Battery Control Option.

¹⁷ For example, if a month only has one control event and the utility discharges the customer's battery for four hours at 2.5 kW, for that month the customer would receive \$10 per kW multiplied by 2.5 kW, or \$25. If a month has two control events and the Companies discharge the customer's battery for four hours at 2.5 kW during the first event and for two hours at 5 kW for the second event, for that month the customer would receive \$25 for the first control event and \$50 for the second control event, for a total monthly incentive of \$75.

However, after approval, the Companies will develop a plan to select an evaluator that will select the analytical methodologies, sample design, and the appropriate baseline, observed, and predicted load changes and battery dispatch to isolate the impacts of the Battery Control Option.

53. The Public Staff also recommends that the EM&V reports that support the Companies collect sufficient data during the initial three-year period to evaluate the benefits and cost-effectiveness of the PowerPair pilot and the Battery Control Option. This report will necessarily go beyond the traditional EM&V study that the Companies perform for other DSM programs. The EM&V study should present this information along with recommendations as to whether the program should be continued, modified, or discontinued, and should base this recommendation on an evaluation of the costs and benefits of the PowerPair pilot and the Battery Control Option relative to the costs and benefits of utility-scale solar and energy storage resources procured pursuant to the Carbon Plan. Pursuant to the Smart \$aver Order, the Public Staff is particularly interested in understanding whether solar and energy storage incentivized and controlled through the PowerPair pilot and the Battery Control Option should play a continuing role in achieving the carbon reduction targets set forth in N.C.G.S. § 62-110.9. The Public Staff recommends that the Commission direct the Companies to file a plan for collecting and analyzing the data from the pilot in support of this research objective as soon as it has been developed.

e. *Other Matters*

54. The Public Staff notes that, at this time, the PowerPair pilot and associated Battery Control Option are only available to residential customers.¹⁸ In the future, the Public Staff believes that a similar program designed for non-residential customers may yield additional system benefits and aid in achieving the Carbon Plan's least-cost emission reductions.

55. Taking into consideration the comments above, the Public Staff is satisfied with the following parameters of the Battery Control Option:

- a. That Duke's calculations indicate that the Battery Control Options will be cost-effective under the Total Resource Cost test, the Utility Cost test, and the Ratepayer Impact Measure test;
- b. That the Companies will include the projected demand and energy savings from the Battery Control Option in future integrated resource plans and carbon plan proceedings;
- c. That the Battery Control Options, as proposed, have the potential to encourage DSM/EE, is consistent with the Companies' integrated resource plan, is in the public interest, and should be approved as "new" DSM programs pursuant to Commission Rule R8-68;

¹⁸ Additionally, although Duke has proposed that PowerPair participants must own their home, the Companies stated in discovery that participation in the Battery Control Options is not limited to customers that own their home (or to PowerPair Cohort B participants). Eligible participants may either own their home and occupy the residence or occupy and provide the respective company with the owner's consent.

- d. That the Battery Control Options appear to contain the information required by Commission Rule R8-68I and appear to be consistent with N.C.G.S. § 62-133.9, Commission Rule R8-68(c), and the currently approved DSM/EE cost recovery mechanism; and
- e. The Public Staff discovered no information suggesting that the Battery Control Options would affect a customer's decision to install natural gas or electric service.

THE PUBLIC STAFF'S RECOMMENDATIONS

56. Based upon the foregoing, the Public Staff recommends that the Commission:

PowerPair Pilot

- a. Require participants to remain in their initial cohort for a period of three years, after which customers may switch cohorts twice within the 10-year enrollment period, subject to the 20% minimum cohort participation rate and limits on Rider NMB enrollment;
- b. Prohibit customers in Cohort A from participating in the Battery Control Options for the initial three-year period;
- c. Direct the Companies to include a discussion of participation rates between customers who own their system and customers who lease their system in their final report;

- d. Approve the deviations requested by Duke from certain requirements contained in the Smart \$aver Order, with the modifications proposed by the Public Staff as described herein;
- e. Direct the Companies to distinguish and track any differences in system impacts between all-electric and gas heating customers in each cohort;
- f. Direct the Companies to increase the upfront incentive for energy storage to \$500 per kWh, capped at 13.5 kWh, which results in a maximum storage incentive of \$6,750;
- g. Approve, with the exception of the items noted above, the PowerPair pilot as outlined in the applications and in each company's respective tariff, effective no earlier than 120 days following Commission approval; and
- h. Allow Duke to recover all reasonable and prudent costs of the PowerPair incentives and administrative costs by amortizing the total program incentives during a calendar year and administrative costs over a 20-year period, including a return component adjusted for income taxes at the utility's overall weighted average cost of capital established in its most recent general rate case.

Battery Control Options

- a. Direct the Companies to utilize a minimum of 30 Control Events each year;

- b. Direct the Companies to adopt the Public Staff's recommended System Emergency Clause;
- c. Direct the Companies to minimize, to the greatest extent possible, charging customer batteries during on-peak periods.
- d. Increase the Battery Control Options' incentive from the proposed \$6.50 per kW to \$10 per kW, and use the average amount of power discharged from the customer's battery during discharge events as the basis for the incentive, rather than the estimated battery capability factor;
- e. Approve, with the exception of the items noted above, the requested addition of the proposed Battery Control Options to the Companies' DSM Programs, effective no earlier than 180 days following Commission approval; and
- f. Direct the Companies to file, in the above-captioned dockets, Duke's plan for collecting and analyzing data in support of the research objectives enumerated in the Smart \$aver Order as soon as it is available;
- g. Approve the Battery Control Options, as further modified herein, as eligible for consideration in the DSM/EE rider; and
- h. Determine the appropriate recovery of costs, net lost revenues, and performance incentives associated with the Battery Control Options in

the annual DSM/EE rider proceedings, consistent with N.C.G.S. § 62-133.9 and Commission Rule R8-69.

Respectfully submitted, this the 21st day of August, 2023.

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CERTIFICATE OF SERVICE

I certify that I have served a copy of the foregoing on all parties of record in accordance with Commission Rule R1-39, by United States mail, postage prepaid, first class; by hand delivery; or by means of facsimile or electronic delivery upon agreement of the receiving party.

This the 21st day of August, 2023.

Electronically submitted
/s/ Anne M. Keyworth