Duke responses to CCEBA's Response to CTPC on MSVT ERIS Scenario – December 3, 2024

As CCEBA notes, the NCUC recently directed Duke to study ERIS as another interconnection option. Specifically, the Commission's Order is:

> 51. That Duke should utilize any information obtained from use of provisional interconnection service and study ERIS as another interconnection option, including how ERIS resources can be connected to Duke's grid without causing reliability issues and how ERIS can comply with the requirement for full deliverability of capacity and energy and utility operational control of solar PPA resources that Duke is procuring under the CPIRP, and provide the results in its next CPIRP;[1]

It is Duke's obligation, not the CTPC, to comply with the Commission's Order. The Commission further directed Duke (not the CTPC) to utilize information obtained from the use of provisional service, and Duke intends to study ERIS as an interconnection option outside of the CTPC MVST study process in compliance with the Commission's Order to ensure the study is completed in time to properly review the results and include the results in the 2025 CPIRP. However, CCEBA incorrectly states that "the CTPC is obligated to follow the NCUC's direction to study ERIS." (Nov 7,2024 Comments from CCEBA). It is Duke's obligation, not the CTPC's.

As a preliminary matter, there are certain aspects of using ERIS as an interconnection option that Duke wants to clarify to ensure transparency with CCEBA.

Energy Resource Interconnection Service (ERIS) is defined in the FERC approved Joint Open Access Transmission Tariff ("Joint OATT") as:

> **Energy Resource Interconnection Service** shall mean an Interconnection Service that allows the Interconnection Customer to connect its Generating Facility to the Transmission Provider's Transmission System to be eligible to deliver the Generating Facility's electric output using the existing firm or non-firm capacity of the Transmission Provider's Transmission System on an as available basis. Energy Resource Interconnection Service in and of itself does not convey transmission service.

Note that ERIS in and of itself "does not convey transmission service" for FERC Generating Facilities requesting this interconnection service. Thus, any off-taker of the energy from the Generating Facility interconnecting to the Transmission Provider's Transmission System through ERIS would need to request transmission service on the Transmission Provider's system to deliver energy from the ERIS Generating Facility to the off-taker's load or neighboring system.

The State Interconnection Procedures do not address ERIS as an interconnection option. However, an important distinction is that State-Jurisdictional Generating Facilities such as H951 third-party solar Generating Facilities are Qualifying Facilities for which Duke must be the off-taker. Since 45% of the H951 solar Generating Facilities are procured from third parties on a least cost basis, the

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[1] ORDER ACCEPTING STIPULATION, GRANTING PARTIAL WAIVER OF COMMISSION RULE R8-60A(D)(4), AND PROVIDING FURTHER DIRECTION FOR FUTURE PLANNING, NCUC DOCKET NO. E-100, SUB 190, page 180

procurement must consider the cost of providing the transmission service necessary to reliably deliver the energy from the third-party solar Generating Facilities to Duke's Native Load. Thus, the same transmission capability would need to be provided by the Transmission Provider's Transmission System and reflected in the cost of the third-party solar Generating Facility participating in the competitive procurement, regardless of whether that is done through studying the third party solar Generating Facility for NRIS interconnection service that would include studying the firm deliverability transmission service, or through studying the third party solar Generating Facility for ERIS interconnection service that would separately study the transmission service necessary to reliably deliver the energy from the third-party solar Generating Facilities to Duke's Native Load.

Responses to other CCEBA assertions:

Reliability Issues with Respect to Ensuring Solar Generation Can Serve Load and Provide Pumping and Charging Energy for Storage

> *CCEBA's Assertion 1: "First, it should be noted that grid-scale storage systems are unlikely to be charged during congested on-peak periods. As FERC noted in Order 2023, 'electric storage resources can be charged and dispatched on a flexible, as-available basis, and are less likely than synchronous generating facilities to withdraw energy from the transmission system during peak load conditions or discharge during light load conditions' (Paragraph 52). For this reason, among others, FERC stated in Order 2023 that 'we find that electric storage resources (whether standalone, collocated generating facilities, or part of a hybrid generating facility), may be studied under inappropriate operating assumptions (e.g., charging at full capacity during peak load conditions) that result in assigning unnecessary network upgrades and increased costs to interconnection customers' (Paragraph 52). For this reason, it's unlikely that ERIS facilities will be less capable of charging electric storage resources compared to NRIS facilities, especially if ERIS facilities are required to pay for network upgrades to resolve overloads associated with single contingency events."*

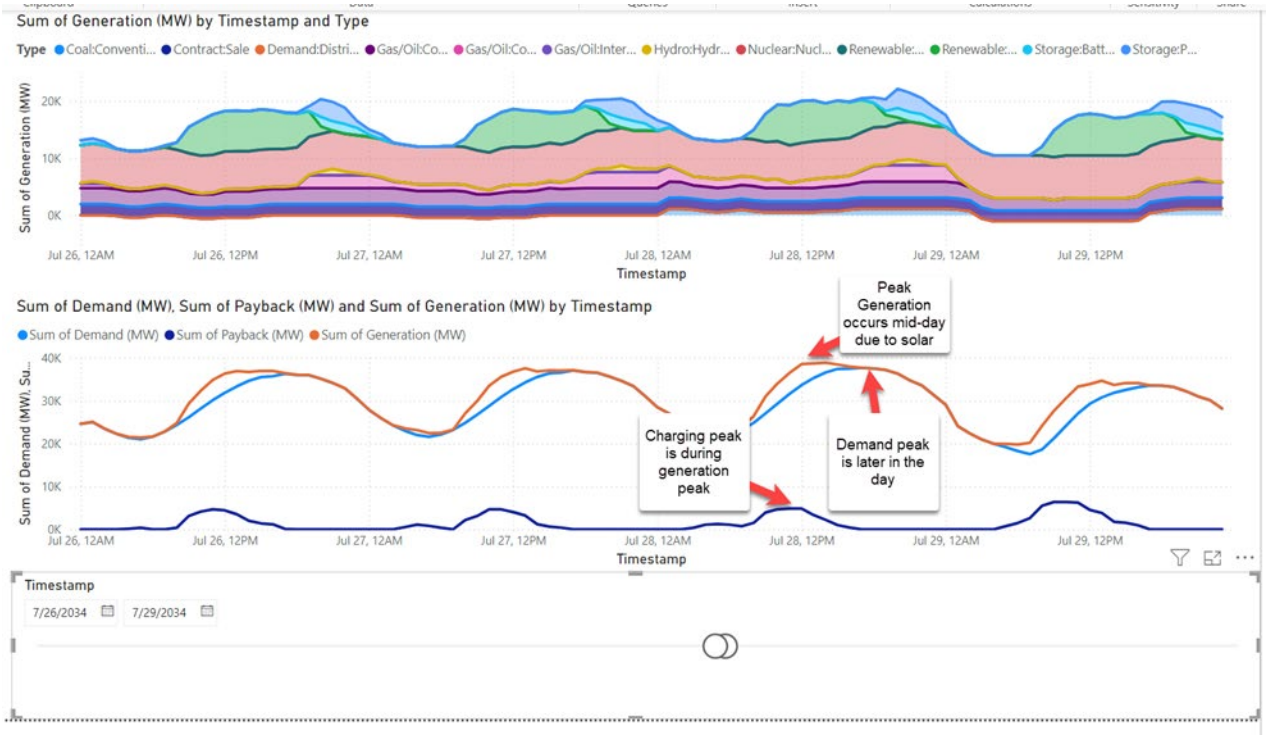
CCEBA's argument fails to acknowledge the increase in Effective Load Carrying Capability (ELCC) capacity value of the synergistic nature of solar and storage in combination versus ELCC when considered separately. "There is synergistic benefit between solar and storage resources because the resources work together to increase their value from a resource adequacy perspective."[2] At higher integration levels of battery storage and solar resources, the referenced study shows the synergistic value of solar and battery storage to provide an incremental 10% - 15% winter capacity value benefit.[3] This benefit is dependent on the ability of solar energy to reliably charge battery storage to provide the winter peaking benefit when needed by the system.

Furthermore, for summer periods, Duke's analysis performed as part of the 2023 CPIRP shows that as more solar and storage resources are added to the system, Duke will need to be able to charge storage through HE13:00 in the summer (i.e. when AAR/DLR produced facility ratings for transmission lines are lowest) and be able to discharge storage over the net demand peak later in

[2] Duke Energy Carolinas and Duke Energy Progress Effective Load Carrying Capability (ELCC) Study, (dated 4/25/2022), Attachment II to the 2023 CPIRP, ("2022 ELCC Study") page 7.
[3] 2022 ELCC Study, pages 10,11.

the day. Therefore, CCEBA is incorrect that grid-scale storage systems are unlikely to be charged during congested on-peak periods.

Table 1: 2034 hourly simulation for P3 Portfolio



Load Demand at noon during peak charging is 89% of the summer peak at 5 PM.

> *CCEBA's Assertion 2: "Second, in terms of "reliability issues with respect to ensuring solar generation can serve load," Duke has repeatedly represented to the utility commissions that it expects little if any loss of load during summer peak periods, irrespective of solar resource additions. As such, this concern is inconsistent with the utility's claims on loss of load expectation and solar capacity value. Per the CPIRP, the utility's resource adequacy and capacity expansion plan is premised on meeting winter- concentrated loss of load expectation."*

Duke agrees that it does not expect much, if any, loss of load during summer peak periods from a resource adequacy perspective. However, this is in part due to the assumption (as shown above) that Duke will be able to charge storage through HE13:00 in the summer when solar output is high (i.e. when AAR/DLR produced facility ratings for transmission lines are lowest) and be able to discharge storage to reliably serve the net demand peak later in the day. EPRI's research conducted under the Resource Adequacy Program 173C has shown that entities with higher penetration of solar resources and lower amounts of fossil resources shift their summer resource adequacy risk toward the net demand peak hours when the solar output ramps down. This resource adequacy risk was realized by the CAISO in August 2020 with firm load shed events.

> *CCEBA's Assertion 3: "Finally, CCEBA recognizes that in certain pockets of the transmission network with a "high volume, high density" of solar resources "distant from load centers," it*

is possible that such solar resources may require occasional curtailment due to network congestion. Congestion-related curtailment is a common phenomenon in a wide variety of electricity markets, but it is not associated with resource adequacy or reliability concerns as long as the system has been properly planned or otherwise structured. As the penetration of variable renewable electricity resources continues to grow, congestion is generally expected to increase. Not all congestion is worthwhile to relieve, and whether or not to invest in infrastructure upgrades should be based on careful cost-benefit analysis. While this congestion can initially seem problematic, it also represents a clear signal to system operators about where grid investments are most needed."

This lagging indicator is problematic and a paradox in itself. CCEBA's assertion is that the system operator must realize a reliability event to determine that the transmission system should have been expanded to avoid the reliability event.

If you have a large renewable curtailment event due to transmission congestion such as occurred in ERCOT in September 2023, the resulting resource to load imbalance event can result in a burden to the interconnection with unscheduled power flows and a potential violation of NERC BAL Reliability Standards.

Reliability events are not "learning events", they are meant to be avoided. This requisite is clearly articulated in § 62-110.9(3): "Ensure any generation and resource changes maintain or improve upon the adequacy and reliability of the existing grid."

Conclusion

In conclusion, Duke does not support CCEBA's recommendation for an ERIS Strategic Planning Scenario for reasons previously provided. The NCUC has not ordered the CTPC (over which they do not have jurisdiction) to study ERIS and Duke has concerns over reliability issues posed by ERIS in perpetuity of high-volume, high density renewable resources connected to the transmission system. Duke will comply with the NCUC CPIRP Order and study ERIS as an interconnection option and report on the results of the study in the 2025 CPIRP.