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VIA EMAIL: rich.wodyka@gmail.com

RE: Comments of SELC, NCSEA, SACE, and Sierra Club on MVST Study Selection Criteria and Benefits Methodology

Dear Rich,

The Southern Environmental Law Center, North Carolina Sustainable Energy Association, Southern Alliance for Clean Energy, and Sierra Club submit these comments in response to the Carolinas Transmission Planning Collaborative's (CTPC) Multi-Value Strategic Transmission (MVST) Study Needs Results, draft Selection Criteria, and draft *Benefits Whitepaper*, as presented during the March 20, 2025 Transmission Advisory Group (TAG) meeting and sent via email on March 21, 2025.

We appreciate the opportunity to provide feedback on the draft Selection Criteria and draft *Benefits Whitepaper*. We also continue to share the CTPC's desire to plan large-scale, multi-value transmission expansion in a proactive and cost-effective manner. A comprehensive evaluation of long-term and near-term transmission solutions is urgently needed. The 2023 Public Policy Study identified overloads on existing paths, but limited its solution set to reconductoring or rebuilding on existing rights-of-way. In doing so, it missed out on the economies of scale that long-term higher-voltage solutions provide and ignored the suitability of near-term solutions like Grid Enhancing Technologies, High Performance Conductors, and strategically-sited battery storage to economically resolve those constraints in the interim.

In order to achieve the goal of proactive and cost-effective transmission expansion, the CTPC should adopt a top-down iterative approach to designing solutions that meet identified needs. This approach should focus on producing the portfolio of projects that maximizes net benefits for the system.

It is critical that the CTPC conduct this first MVST cycle in this manner. A firm foundation, like this top-down iterative approach, will help ensure durable results and avoid the need to revisit past cycles or change course every two years. More importantly, this first MVST cycle will identify the transmission upgrades needed to meet the unprecedented load growth Duke

Energy projects over the next 10 years. As such, the choices made in this cycle and the grid investment that follows will be borne by ratepayers for decades to come. We acknowledge that shifting the CTPC's approach in this manner could delay the results of the first MVST study, but it is far more important that the MVST process and methodology established in this first cycle is executed well than quickly.

To that end, we propose the CTPC implement two main changes to the selection criteria and benefit methodology.

1. The CTPC should shift to selection criteria that identify clusters of violations. New selection criteria could be based on either a specific geographic proximity (i.e., all violations within a 20-mile radius) or a specific electric grouping. Once those clusters have been identified, potential solutions or portfolios of solutions can be identified and then compared based on their effectiveness at solving a larger share of the violations in those clusters. The CTPC's current proposal to initially screen out some violations would prevent such a comparison among potential solutions. These draft selection criteria would be best used to narrow the scope of the clusters, by identifying specific violations that only come up in a few sensitivities, rather than establishing the study's starting point.

2. For the benefits methodology whitepaper, the CTPC must establish a counterfactual/alternative case for comparison purposes in the benefits analysis.
    a. We propose that the CTPC adopt a counterfactual/alternative case that assumes the same resource mix/locations as modeled in MVST scenarios but develops upgrades on piecemeal basis through reconductoring and rebuilds based on the interconnection queue and reliability studies.

In addition, we commend the CTPC for amending the study scope to document the benefit methodology and allowing TAG participants to review and comment. We also appreciate the CTPC's suggestion that it will leverage nodal production cost modeling and continue to strongly urge the CTPC to utilize such modeling in calculating the proposed benefits. We further recommend that the CTPC preserve flexibility to consider other relevant benefits that may arise for identified solutions, such as operational benefits.

Comments

1. **Selection Criteria**

    a. **Identifying clusters of violations for solutions development**

The CTPC has proposed a draft set of selection criteria which were applied to the identified MVST study needs and distributed via email on March 21, 2025. The CTPC has proposed that, given the significant number of violations, selection criteria should be used to screen violations and target the highest priority needs.

Instead, we recommend that the CTPC use the MVST study needs analysis to identify clusters of violations and use those clusters to develop transmission solutions. The CTPC could identify clusters of violations in multiple ways. For example, the CTPC could screen needs based on geographic proximity (i.e., all violations within a 20-mile radius) or screen based on a specific electric grouping (i.e., all violations on a specific stretch of lines or groupings of parallel lines).

Using these clusters of violations, the CTPC could then develop a draft solutions plan and evaluate how many violations a project/portfolio solves. The CTPC could then iterate on the draft plan in collaboration with stakeholders to solve as many violations as possible while also maximizing the net benefits of the portfolio. By contrast, the CTPC's current proposal to screen out some violations at the outset would impede its ability to compare solutions based on the number of violations they solve.

Shifting to a planning process that identifies clusters of needs would align the MVST solutions identification and expansion plan development with other long-term planning processes that rely on a more iterative and top-down solutions development process.

As an example, in MISO's Long Range Transmission Planning (LRTP), MISO develops future scenarios, similar to the MVST process, and then identifies both reliability and economic needs. For reliability needs, MISO goes beyond thermal loading violations and also conducts steady-state and stability studies that add potential needs based on voltage or frequency issues. MISO also adds an economic analysis that identifies potential needs due to congestion, curtailment, or significant price separation.[1]

[1] At 14-35, https://cdn.misoenergy.org/MTEP24%20Chapter%202%20-%20Regional%20Long%20Range%20Transmission%20Planning658124.pdf.

Figure 1. Progression of MISO's LRTP Tranche 2.1 portfolio development[2]

Based on the identified reliability and economic needs, MISO then enters an iterative solutions development process with stakeholders. To start, MISO develops a conceptual map of proposed transmission solutions to start conversations with stakeholders and identify questions for further analysis. Using the conceptual map of solutions and questions that arise, MISO conducts further analysis, including evaluating the number of violations that each solution solves, and developing an initial draft portfolio of projects. Based on this portfolio, stakeholders can submit alternatives, and MISO then conducts robustness testing of its draft solutions. Once evaluation of alternatives and robustness testing is complete, MISO then releases the final portfolio.[3]

In the March 20 TAG meeting, CTPC representatives stated that transmission solutions that could resolve economic needs would not be considered. We recommend that economic needs be considered when developing solutions for the 2024-25 MVST study and also be included as needs in future MVST study cycles in order to derive the most cost-effective portfolio of transmission upgrades.

b. Specific solutions for consideration in the CTPC portfolio development or to consider as alternatives

In our initial MVST scenario proposals submitted to the CTPC in June 2024, we identified several potential transmission projects for consideration in the MVST portfolio development. These include:

- Complete integration of DEC and DEP systems under a "Consolidated System Operations" model and, if needed, the transmission required to optimize flows between the two systems.
    - For the CPIRP process Duke assumes consolidation of DEC and DEP where the NERC Balancing Authority ("BA"), Transmission Service Provider and Transmission Operator functions are combined. Duke notes in its CPIRP filing that a "consolidated approach allows for economically dispatching the system, and

[2] At 8, https://cdn.misoenergy.org/MTEP24%20Chapter%202%20-%20Regional%20Long%20Range%20Transmission%20Planning658124.pdf.
[3] At 35-125, https://cdn.misoenergy.org/MTEP24%20Chapter%202%20-%20Regional%20Long%20Range%20Transmission%20Planning658124.pdf.

furthermore, allows for optimization of meeting operating services requirements, such as balancing and regulating reserves."[4]
    - Duke's 2022 Carbon Plan also proposed closing the hole between the DEC and DEP systems on the northeastern end of Duke's 500-kV network. This could be achieved by building the long-discussed Durham - Parkwood 500-kV line, or other potential upgrades in the Durham area and between Roxboro and Sadler, North Carolina.
- Evaluate transmission expansion for offshore wind resources at two different points of interconnection, including a 500 kV loop from Wake (existing 500 kV substation) to New Bern/Havelock area to Jacksonville/Castle Hayne/Folkstone area and then to Cumberland (existing 500 kV sub that is currently directly connected to Wake at 500 kV).

If none of the specific projects listed above arises out of the MVST solutions development process, we recommend these projects be considered as potential alternatives solutions and tested for robustness within the MVST portfolio.

Additionally, we reiterate our support for identification of holistic transmission solutions that address both short-term and longer-term system needs. For any selection criteria that the CTPC uses, we recommend the following considerations when developing solutions:

- Greenfield high-voltage transmission expansion, within Duke's footprint and with neighboring Balancing Authorities**.**
- Moving to higher-voltage transmission along existing corridors.
- To meet shorter-term needs in the interim:
    - Grid-enhancing technologies including dynamic line ratings, topology optimization, and power flow control devices;
    - Reconductoring or rebuilding transmission lines using High Performance Carbon Fiber or Composite Core Conductors or Superconductors on existing right-of-way and upgrading terminal equipment (which was included as a sensitivity in the *Benefits Whitepaper*); and
    - Strategically siting batteries to defer the need for transmission upgrades congestion by using the batteries to alleviate identified transmission constraints and voltage and stability concerns.

2. Benefit Methodology

In the March 20 TAG meeting, the CTPC introduced a draft *Benefits Whitepaper* outlining the methodology for the six transmission benefits the CTPC plans to quantify for the MVST

[4] Pg 17, https://www.duke-energy.com/-/media/pdfs/our-company/carolinas-resource-plan/chapter-2-methodology-and-key-assumptions.pdf?rev=44036eb8cc98429c92e7ac00bea5f445.

portfolio. We appreciate that the CTPC has afforded TAG participants the opportunity to review and comment on the proposed methodology.

However, the *Benefits Whitepaper* fails to address the counterfactual or a "but-for" case that the CTPC must necessarily develop to compare the benefits of the MVST portfolio. Once the CTPC develops this counterfactual case, it should be used to quantify as many of the transmission benefits outlined in the *Benefits Whitepaper* as are applicable to the solutions scenario and the counterfactual.

Accordingly, we propose that the CTPC adopt a counterfactual/alternative case that assumes the same resource mix/locations as modeled in MVST scenarios but develops upgrades on a piecemeal basis through reconductoring and rebuilds based on the generation additions from the interconnection queue.

After reviewing the *Benefits Whitepaper* and listening to the presentation at the March 20 TAG meeting, it appears the CTPC intends only to quantify the benefits/savings for the avoided costs of projects that appear in the CTPC Base Reliability Plan. However, based on our proposed counterfactual/alternative scenario, the benefit quantification would also include savings from the avoided network upgrade costs of adding resources on a piecemeal basis through the interconnection study process. This would provide a more accurate depiction of the actual savings created by the MVST portfolio of projects.

a. Specific comments and questions on the benefit methodology

In addition to this broader concern with the CTPC's approach to comparing benefits, we have specific questions regarding the methodologies the CTPC is proposing to use to quantify specific benefits.

While we reiterate our appreciation for the ability to review and comment on the *Benefits Whitepaper*, we hope that this will not be the final chance for the TAG to comment on benefit methodologies. The CTPC's approach to quantifying benefits is still in its early stages, and we would appreciate the ability to review and comment on any updated methodology before it is finalized or submit reply comments in response to our questions.

Specifically, in the presentation to the March 20 TAG meeting, the CTPC presented its proposed benefits by roughly mapping Order No. 1920's required benefits. However, those two sets of benefits do not appear to cleanly overlap. We would appreciate a clarification as to how the CTPC believes its proposed benefits align or do not align with those in Order No. 1920.

Below are some additional questions, comments, and clarifications related to the individual proposed benefits.

1. **Avoided Generation Capacity Costs**
    a. Our understanding is this benefit is intended to reflect Order No. 1920 Benefit 2b "Reduced Planning Reserve Margin." Is that assumption, correct?
    b. CTPC's proposed methodology leverages Astrape SERVM cases. Will the generator forced outage profiles and transmission constraints (assumed to be contingencies) be available for review by stakeholders?
    c. Additionally, it is unclear from the proposed methodology for this benefit whether it is intended to capture benefits within Balancing Authorities (BA) or between BAs. Will the CTPC consider regional or interregional solutions to identified MVST needs or does the CTPC believe the MVST portfolio may have regional or interregional impacts. Would either of these outcomes be outside the scope of the MVST study?

2. **Generation Capacity savings from reduced losses**
    a. Our understanding is this benefit is intended to reflect Order No. 1920 Benefit 7 "Capacity Cost Benefits from Reduced Peak Energy Losses." Is that assumption, correct?
    b. No additional comments.

3. **Congestion and Fuel Savings**
    a. Our understanding is this benefit is intended to reflect Order No. 1920 Benefit 3 "Production Cost Savings." Is that assumption, correct?
    b. We continue to support the use of nodal production cost modeling for quantifying these benefits. See further discussion in the next section on the benefits of the use of a nodal model.

4. **Energy Savings from Reduced Losses**
    a. Our understanding is this benefit is intended to reflect Order No. 1920 Benefit 4 "Reduced Transmission Energy Losses." Is that assumption, correct?
    b. Does the Encompass methodology for energy savings from reduced losses distinguish the benefit from the congestion and fuel savings benefit described above. Depending on how this benefit is calculated there may be some overlap between the two benefits.

5. **Avoided Customer Outages**
    a. Our understanding is less clear as to which Order No. 1920 benefit this proposed benefit is intended to reflect. The methodology seems to reflect Order No. 1920 Benefit 2a "Reduced Loss of Load Probability," but the benefit captured might better reflect Order No. 1920 Benefit 1 "Avoided or Deferred Reliability Transmission Facilities and Aging Transmission Infrastructure Replacement." Can the CTPC please clarify?
    b. Either way, the proposed methodology significantly underestimates the benefit because it only quantifies the value of replacing aging infrastructure. This approach would miss significant additional value for consumers. Instead, the CTPC should apply the value of lost load to measure the total increased system reliability including quantifying the value of lost load from avoiding load shedding during extreme weather events, which would require the CTPC to develop a stress case for review and is not currently accounted for in the methodologies of any of the proposed benefits.

6. **Avoided Transmission Investment**
    a. Our understanding is less clear as to which Order No. 1920 benefit this proposed benefit is intended to reflect. The description of the benefit appears to align with Order No. 1920 Benefit 1 "Avoided or Deferred Reliability Transmission Facilities and Aging Transmission Infrastructure Replacement," but the proposed methodology includes an analysis of contingencies which may capture Order No. 1920 Benefit 1 "Avoided or Deferred Reliability Transmission Facilities and Aging Transmission Infrastructure Replacement" along with Order No. 1920 Benefit 5 "Reduced Congestion Due to Transmission Outages." Can the CTPC please clarify?
    b. As discussed above, this benefit will likely underestimate the value to ratepayers, at least as the methodology is written. The proposed methodology appears to quantify only the savings for the avoided costs of projects that appear in the CTPC Base Reliability Plan. However, the benefit quantification should also include savings from the avoided network upgrade costs of adding resources on a piecemeal basis through the interconnection study process, as proposed in our alternative production cost model case.
    c. In addition, this benefit appears to be the only one that includes a contingency analysis as a part of the methodology. Can the CTPC clarify whether the modeled transmission constraints proposed in the "Avoided Generation Capacity Costs" benefit methodology is different from a

contingency analysis as proposed in the "Avoided Transmission Investment" methodology.

d. Lastly, if the CTPC continues to move forward with the Selection Criteria, Criterion 4 appears to exclude violations that are addressed by existing planned projects, but may be avoided by a larger MVST solution, which would underestimate the total benefit to ratepayers and potentially lead to a more inefficient transmission plan.

7. Assumptions

a. We appreciate the inclusion of a sensitivity evaluating benefits across low, medium, and high natural gas prices. Does the CTPC have a specific forecast it plans to use for this sensitivity?

b. The proposed 7% discount rate is reasonable and aligned with discount rates used in other benefits analysis for long-term transmission plans. However, some plans also include a lower discount rate. MISO uses a social discount rate (3%) which better reflects the return a ratepayer could expect to receive on a risk-adjusted investment.[5] The use of a low and high discount rate helps to develop a range of expected benefits for the portfolio.

b. Production Cost Modeling

We appreciate the CTPC's suggestion during the March 20 TAG meeting that it will use nodal production cost modeling for benefit quantification. We continue to strongly urge the CTPC to conduct such modeling for the proposed benefits. We also recommend the CTPC preserve flexibility to consider other relevant benefits that may arise for identified solutions, such as operational benefits.

In our August 2024 comments, we recommend the use of nodal production cost modeling as necessary to properly quantify transmission benefits. As we discussed in those comments, zonal production cost simulation models lack the necessary granularity to accurately reflect the operation of Duke's transmission system, the dispatch of the generation resources, and how both will change with the addition of the proposed transmission solutions. Zonal production cost models will only capture the impacts of upgrades between the zones defined by the CTPC, such that any solutions proposed within a zone will result in zero congestion and fuel savings benefits. In addition, zonal models tend not to accurately reflect the amount of available

[5] At 126, https://cdn.misoenergy.org/MTEP24%20Chapter%202%20-%20Regional%20Long%20Range%20Transmission%20Planning658124.pdf.

transfer capability between zones or the dynamics between flows across multiple zones that are captured in a nodal production cost simulation model.

Nodal modeling represents a widely used, well-supported, and prudent utility practice commensurate with the complex, multi-billion-dollar scale of investments to be evaluated in the CTPC's MVST study. Nodal modeling is essential for calculating the full costs and benefits of new transmission elements and operations throughout the transmission system. The comparative imprecision of zonal modeling is one reason why all proactive economic or multi-driver transmission planning processes occurring across the U.S. (including MISO, SPP, ERCOT, CAISO, NYISO, and PJM) utilize a nodal production cost model to estimate production cost savings and other benefits of new upgrades, such as reduced emissions and reduced energy losses.

* * *

We hope these comments will aid the CTPC in identifying a proactive and cost-effective portfolio of transmission as it conducts its first MVST study cycle. We would be happy to discuss any of the comments or questions contained herein in a follow-up call.

Sincerely,

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