Stakeholder Comment on the CETA Transmission Capacity Expansion Study

RMI

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Introduction

RMI is excited by the CETA, Gridworks, Energy Strategies, TransCo Energy, and Montara team's ("the CETA team") progress on the Colorado transmission capacity expansion study and looks forward to the final reference case results and scenario development. In these comments, we focus on two aspects of the study, 1. suggestions for the three proposed scenarios, and 2. the Western slopes wind picked by the capacity expansion model.

Proposed Scenarios

We are excited that the CETA team intends to model *High Demand, Regional Integration,* and *Extreme Weather* scenarios. We believe that all three scenarios are key to understanding the transmission gaps in Colorado and the benefits of increased transmission capacity.

High Demand

In our previous comments from March 5, 2024, we encouraged the CETA team to evaluate how new transmission might enable Colorado to bring new, energy-intensive (and job-intensive) industries and to include an additional aggressive load scenario for the 2035 study year. We still believe both suggestions would be valuable for the CETA team to take up.

In addition, **we suggest that the *High Demand scenario* should use the National Renewable Energy Laboratory's (NREL) high electrification scenario for Colorado from the Cambium 2023 dataset[1] or an equivalent aggressive load forecast that is aligned with Colorado's targets to decarbonize the entire economy.**[2] The NREL scenario assumes a 2.9% annual growth rate from today to 2050 and is aligned with economy-wide decarbonization.

However, **we believe that Colorado might see even more significant load growth as it attracts new industries and continues to be a leader in decarbonization policies**. The CETA team should work with the Colorado State Energy Office to identify new incremental electric loads from economy-wide

[1] Gagnon, Pieter, Pedro Andres Sanchez Perez, Kodi Obika, Marty Schwarz, James Morris, Jianli Gu, and Jordan Eisenman, "Cambium 2023 Data", NREL 2023, scenarioviewer.nrel.gov;

[2] Energy innovation has also produced a load forecast for Colorado aligned with the state's national determined contributions according to the Paris Accords. That forecast estimates a 4.0% annual growth rate between today and 2050. However, the load forecast only includes total annual electric load and does not include an 8,760 hourly load profile needed for the CETA team's modeling effort. Energy Innovation, "Energy Policy Simulator – version 3.4.8," www.energypolicy.solutions.

decarbonization pathways from the Colorado GHG Pollution Reduction Roadmap 2.0.[3] For example, where Colorado might plan hydrogen hubs in the state. Furthermore, other entities be helpful to identify other potential large new point loads such as sustainable aviation fuel facilities, hydrogen hubs, truck depots, or battery factories.

Under this scenario, we would expect the CETA team to rerun the capacity expansion model to meet the higher generation requirements that would need to be met with higher demand.

Regional Integration

During the stakeholder meeting, it was suggested that the CETA team would be able to model neighboring regions with some more "coarse" modeling than the highly granular modeling done within Colorado. We believe that "coarse" capacity expansion modeling of neighboring regions together with the reliability and deliverability cases outlined in the study methodology has the potential to illuminate how increased integration to our Western neighbors to the North, West, and South or to the Southwest Power Pool's grid would benefit Colorado.

Both the reliability and deliverability cases outlined in the study methodology appear to have great value in illuminating increased integration with Colorado neighbors. **We hope that both the import and export capabilities and benefits will be explored in this analysis.** For example, we would like to see the deliverability case assess both Colorado's ability to transmit generation out of Colorado's Lamar region to neighboring states such as New Mexico but also test New Mexico's ability to transmit generation to the Denver metro area.

In addition, part of the discussion during the stakeholder meeting was whether to model the Western interconnect neighbors or cross the interconnection seam and model SPP. **We believe that both regions could provide significant benefits to Colorado and would appreciate the CETA team's best efforts to model both**. However, there might be more value in modeling the Western interconnect given the time and resource constraints of the CETA team. Our hypothesis is that the Western interconnect would provide access to a larger range of diverse intermittent resources (more dispersed and diverse load, solar, and wind regions than SPP) and more export opportunities (larger total load than SPP).

Under this scenario, we would expect the CETA team to rerun the capacity expansion model as the resource set in Colorado is likely to change with greater reliance on its Western and SPP neighbors

Extreme Weather

During the stakeholder meeting, the difficulties of modeling extreme weather were discussed and various options to model weather scenarios were brought up including traditional winter storms and heat waves, forest fire, and climate change induced extremes beyond todays normal. **Our hypothesis is that this scenario has the potential to illuminate transmission gaps beyond the reference case and identify critical corridors during these stressed periods.** Given that the CETA team is planning on modeling a single extreme weather event, we believe that they can take one of two broad avenues for assessing transmission gaps during these events:

- Increased load: Weather events such as winter storms and heat waves have the potential to increase load beyond typical annual peak loads. Furthermore, the future extremes in 2045 will likely be magnified beyond today's extremes given the impacts of climate change and the expected electrification of both heating and cooling in Colorado. Under this avenue, extreme load

[3] Colorado Energy Office, "GHG Pollution Reduction Roadmap 2.0", https://energyoffice.colorado.gov/climate-energy/ghg-pollution-reduction-roadmap-20

events should be tested as a proxy for winter storms and heat waves beyond the reference case load profile.

- Loss of infrastructure: Weather events such as forest fires and icing events have the potential to take out transmission and generation infrastructure in localized areas. We suggest working with transmission owners in Colorado to identify corridors and lines with the highest forest fire and icing risk. Under this avenue, outage events should be tested with transmission and/or generation outages in Colorado's system with the reference case load profile.

Under either avenue, this scenario should differ from the other two scenarios by keeping the reference case resource set unchanged.

Western Slopes' Wind

Similarly to others on the stakeholder call, we were initially surprised to see the capacity expansion model pick wind resources on the Western slopes of Colorado. However, after re-considering the results this finding aligns with similar clean energy modeling that evaluates a high penetration of clean and renewable energy. When the model reaches high penetrations of wind and solar resources, the model tends to pick resources with greater generation diversity than the existing resource set even if those resources are low performing from a capacity factor standpoint. Our hypothesis is the Western slopes wind has a noticeably different profile when compared to the existing, planned, and conceptual wind that is assumed into the study, which tends to be located in the Eastern plains of Colorado. In turn, the Western slopes wind provides significantly more marginal benefits to the Colorado system than the Eastern plains wind.

Our main takeaway based on this assessment and hypothesis is that **we believe that simply moving the Western slopes wind to the Eastern plains will not be a sufficient solution to the lowest cost and sufficiently reliable system.** This is because the Colorado system will lose generation diversity by moving the Western slopes wind and likely need more expensive or more carbon emitting resources such as new firm resources or gas.

However, we also do not believe that Western slopes wind is the most economic and practical solution either given the likelihood of needing significant transmission infrastructure over or around the Rocky Mountains of Colorado. **This highlights the need for the *regional integration scenario* to evaluate cost savings from regional diversification.** It is likely that wind from neighboring states such as Wyoming and New Mexico could provide similar or improved generation diversity benefits at a lower total cost (transmission and generation costs) with a more practical transmission solution (one that doesn`t go over or around the Rocky Mountains).