BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF COLORADO

PROCEEDING NO. 19M-0495E

IN THE MATTER OF THE COMMISSION'S IMPLEMENTATION OF §§ 40-2.3-101 AND 102, C.R.S., THE COLORADO TRANSMISSION COORDINATION ACT

INITIAL COMMENTS OF

WESTERN RESOURCE ADVOCATES,

WESTERN GRID GROUP AND

INSTITUTE FOR POLICY INTEGRITY

IN RESPONSE TO INTERIM DECISION NO. C21-0348-I

July 16, 2021

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Western Resource Advocates ("WRA"), Western Grid Group ("WGG") and Institute for Policy Integrity (collectively, "Joint Commenters") hereby submit Initial Comments and Attachment A in Response to Interim Decision No. C21-0348-I of the Colorado Public Utilities Commission ("Commission"), pursuant to the Colorado Transmission Coordination Act ("CTCA").

I. INTRODUCTION

The study, "Colorado Transmission Coordination Act Evaluation of Market Alternatives," prepared for the Commission by Siemens Power Technologies International ("Siemens") dated June 11, 2021 ("Siemens Study") is the first study commissioned by a public utility commission to evaluate the potential benefits to its state from its electric utilities participating in a formally organized market. The study provides valuable information as electric utilities, environmental advocates, consumer groups, other stakeholders, and the Commission, with direction from the General Assembly, chart a course toward an emissions-free electricity sector[1] and a Colorado economy with sharply reduced emissions.[2] Joint Commenters appreciate the Commission's leadership in commissioning the Siemens analysis and its staff's efforts in shaping a meaningful study.

The study demonstrates the potentially large economic benefits resulting from participation in a formally organized electricity market and shows how the potential

[1] HB 19-1261 passed in 2019 sets economy-wide GHG emission reduction targets below 2005 levels of 26% by 2025, 50% by 2030, and 90% by 2050. § 25-7-102(2)(g), C.R.S. All statutory citations are to the 2020 Colorado Revised Statutes.

[2] SB 19-236 passed in 2019 sets electricity-sector emission reduction targets below 2005 levels of 80% by 2030 and 100% by 2050. § 40-2-125.5(3)(a)(I) and § 40-2-125.5(3)(a)(II), C.R.S.

benefits grow with the size of the geographic footprint and the services provided. Significantly, the study shows that of the market types evaluated participation in a large Regional Transmission Organization ("RTO") provides the greatest economic benefits to Colorado, with the potential to reduce the cost of meeting Colorado's emissions reduction goals by $2–2.5 billion over the 20-year planning period. It further suggests that a go-it-alone strategy will be costly to Colorado.

However, the study does not account for greenhouse gas ("GHG") emissions outside of Colorado, nor does it assess the environmental cost of these emissions using the social cost of carbon.[3] Therefore, it does not provide the Commission with the information it needs to understand the environmental consequences of one market structure over another. This is an important shortcoming of the analysis, and Joint Commenters recommend the Commission work with Siemens to address it promptly.

Further, while the study findings support participation in a region-wide RTO and cast doubt on the financial wisdom of a Colorado-only market, the economic results do not provide the Commission with clear direction regarding whether Colorado utilities should look to the West or to the East as they explore opportunities for greater coordination. Both economic and noneconomic factors will be essential to the determination, and Joint Commenters recommend that the Commission carefully consider a range of factors, including impact on total emissions – both within Colorado and external to Colorado, actual ability to optimize the DC ties, potential to achieve

[3] SB 19-236 and HB 21-1266 require the use of the social cost of carbon for specified purposes. § 40-3.2-106 and § 25-7-110.5(4)(f), C.R.S.

capacity savings, established policies regarding GHG accounting, promoting load flexibility and demand-side resources,[4] and RTO governance.[5]

These Comments begin by providing the history of this proceeding and newly relevant information (sections II and III). This is followed by a description of the modeling and our analysis of the quantitative results (section IV). In section V, we discuss issues for Commission consideration. Our recommendations are summarized in section VI. Attachment A is an initial request for additional information and clarification regarding the Siemens modeling and its results.

II. BACKGROUND

In 2019, the Colorado General Assembly passed Senate Bill 236, which included the Colorado Transmission Coordination Act.[6] The CTCA directed the Commission to "evaluate participation in energy imbalance market, regional transmission organization, power pool, or joint tariff."[7] The CTCA set deadlines for four specific Commission actions: (1) by January 1, 2020, open an investigatory proceeding;[8] (2) by July 1, 2021, hold a hearing for public comment;[9] (3) by December 1, 2021, issue a decision determining whether Colorado utility participation in any formally organized market is in the public interest;[10] and (4) by July 1, 2022, if the Commission determines

[4] SB 21-072 identifies factors for determining the public interest including: "established policies regarding GHG accounting," and "promoting load flexibility and demand-side resources." § 40-5-108(2)(a)(II)(B), C.R.S.

[5] The comments of WRA, WGG, and NRDC filed in this proceeding in November and December 2019 address governance at length.

[6] §§ 40-2.3-101 and 102, C.R.S.

[7] § 40-2.3-102, C.R.S.

[8] § 40-2.3-102(1), C.R.S.

[9] § 40-2.3-102(2), C.R.S.

[10] § 40-2.3-102(3), C.R.S.

market participation is in the public interest, "direct utilities to take appropriate actions and conduct such proceedings as the Commission deems appropriate."[11]

On September 11, 2019, the Commission issued Decision No. C19-0756 initiating this proceeding and solicited an initial round of comments.[12] In March 2020, the Commission issued a Request for Proposals for "quantitative modeling and analysis in support of its investigation" and selected Siemens.[13] The resulting report was filed in this proceeding on June 11, 2021.

On June 9, 2021, the Commission issued its Interim Decision and invited comments addressing: (1) Siemens' quantitative modeling and analysis; (2) oral comments provided by stakeholders at the June 24, 2021, public comment hearing; and (3) market activities, developments or newly relevant information since the initial and responsive comments filed in 2019.[14] These comments respond to the Commissions' invitation. Because the "newly relevant information" has implications for the results of the Siemens Study, we begin with a review of recent events.

III. NEWLY RELEVANT INFORMATION

Since the initial round of comments were filed in 2019, several items of significance have transpired. The Southwest Power Pool ("SPP") has further advanced into the Western Interconnection; initial results from the State-Led Market Study were

[11] § 40-2.3-102(4), C.R.S.

[12] WRA, WGG, and NRDC provided initial comments on November 15, 2019 and reply comments on December 16, 2019.

[13] The selection was made in June 2020. Interim Decision No. C21-0348-I of the Colorado Public Utilities Commission in Proceeding No. 19M-0495E, p. 2.

[14] Interim Decision No. C21-0348-I, at 2.

shared in a public presentation; and SB 21-073, requiring electric utilities to join an RTO by January 1, 2030, passed the Colorado General Assembly.

A. Recent Market Developments

On February 1, 2021, SPP began providing an energy imbalance service within the Western Electricity Coordinating Council ("WECC") through a contract with a four-year commitment.[15] Current Western Energy Imbalance Service ("WEIS") participants include Basin Electric Cooperative, Deseret Electric Cooperative, the Municipal Energy Agency of Nebraska, Tri-State Generation and Transmission Association, Western Area Power Administration ("WAPA"), and Wyoming Municipal Power Agency. More recently, Colorado Springs Utilities announced it would withdraw from the Joint Dispatch Agreement ("JDA") operated by Public Service Company of Colorado ("PSCo") and will begin taking energy imbalance services from SPP next April with WAPA as its Balancing Authority ("BA"). As a result, PSCo has put on hold its previous decision to join the Western Energy Imbalance Market ("WEIM") operated by the California Independent System Operator ("CAISO") while it reexamines its decision.[16] The utilities participating in the JDA, including Colorado Springs Utilities, were to have joined the WEIM in April 2022.

These two recent developments, the launching of the WEIS and the Colorado Springs Utilities decision to withdraw from the JDA, have direct implications for the Siemens Study, since the study's reference case assumes WAPA and Tri-State provide their own balancing services and that PSCo provides balancing services for Colorado

[15] The WEIS real-time market operates separately from the eastern SPP RTO market.

[16] Hudson Sangree, "Xcel Delays Joining EIM to Examine Options – Move Comes After Colorado Springs Utilities Switches to SPP, RTO Insider, June 10, 2021 (available at https://www.rtoinsider.com/articles/27966-xcel-delays-joining-eim-to-examine-options).

Springs Utilities through the JDA. While the modeled results will still provide solid information, the reference case is no longer a valid portrayal of the current reality which will alter all modeled results, albeit likely only slightly.

In addition to these shifts in the provision of imbalance energy, several western utilities are working with SPP to evaluate full RTO membership.[17] As proposed, SPP would operate a single market with a western Balancing Authority Area ("BAA") and an eastern BAA linked via the Direct Current ("DC") interties.[18] In addition to day-ahead and real-time market operation, SPP would provide members with other services such as market administration, transmission planning, reliability coordination and more.[19] Utilities interested in RTO membership have until April 2022 to commit, with the transition to an RTO expected in March 2024.[20] Significantly, this April date is three months prior to the CTCA deadline requiring the Commission to provide direction to the utilities. Joint Commenters are not aware of any economic, operational, or non-strategic reasons for SPP's April commitment date. However, this April date may require the Commission take early action, either by working with utilities and SPP to delay the April decision, or by issuing its direction ahead of the April date. This nuance

[17] Basin Electric Power Cooperative, Colorado Springs Utilities, Deseret Power Electric Cooperative, Municipal Energy Agency of Nebraska, Tri-State Generation and Transmission Association, Western Area Power Administration.

[18] Bruce Rew, SPP Senior Vice President of Operations, Presentation to WECC Board of Directors, June 15, 2021 (available at https://www.wecc.org/_layouts/15/WopiFrame.aspx?sourcedoc=/Administrative/June%20Technical%20Session%20Book.pdf&action=default&DefaultItemOpen=1).

[19] SPP Press Release, "Colorado Springs Utilities joins Southwest Power Pool's western market, will evaluate RTO Membership," May 12, 2021 (available at https://spp.org/newsroom/press-releases/colorado-springs-utilities-joins-southwest-power-pool-s-western-market-will-evaluate-rto-membership/).

[20] Bruce Rew, Presentation to WECC Board of Directors, June 15, 2021.

involving the timeline for SPP membership deadline is critical vis-à-vis the study findings and Joint Commenters highlight the implications further in the comments.

B. State-Led Market Study Results

On June 11, 2021, less than one week after the Siemens results were made public, the initial results of the DOE-funded State-Led Market Study were made available.[21]

Along with other market constructs, this study evaluates three RTO market footprints: a West-wide RTO, a West-wide RTO without California, and an RTO with California but without Colorado and the former Mountain West Transmission Group of utilities ("MWTG").[22] All three RTO constructs yield large benefits, but the largest benefits come from the formation of a single West-wide RTO followed by an RTO with California but without Colorado and the MWTG. In summary, the findings conclude:

- $2 billion in annual benefits for the West-wide RTO, which is three times the size of the benefits of a day-ahead market only. The study authors attribute this to the potential for significant capacity savings under an RTO construct.
- Of the two "two-market RTO" footprints considered, the RTO with California but without Colorado produced $381 million more in net benefits than the two-market footprint that included Colorado and the MWTG but excluded California.[23]

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[21] Energy Strategies of Salt Lake City undertook the study, colloquially referred to as the Utah Study.

[22] The MWTG included Basin Electric Power Cooperative, Black Hills Energy, Colorado Springs Utilities, Platte River Power Authority, Tri-State Generation and Transmission Association, and Western Area Power Administration.

[23] Energy Strategies presentation: State-Led Market Study Stakeholder Meeting – Q2 2021: Exploring Western Organized Market Configurations: A Western States' Study of Coordinated Market Options to Advance State Energy Policies (or the "State-Led Market Study") June 17, 2021, at 24.

The final report has yet to be released, but these results appear to underscore the economic value that an RTO that includes California brings to the rest of the West.

C. Passage of SB 21-072

As discussed above, in less than five months, the Commission must issue a decision determining whether participating in an energy imbalance market ("EIM"), RTO, or a joint tariff with a day-ahead power pool ("JTPP") is in the public interest.[24] However, on June 11, 2021, the General Assembly passed Senate Bill 072 requiring all utilities to join an RTO by January 1, 2030.[25] This has the effect of narrowing the Commission's evaluation of the wider range of market options identified in the CTCA to a consideration of which RTO structure is likely to be best for Colorado: a western RTO, which has yet to be formed with an undefined design and unknown governance structure; SPP, which is an existing RTO, but has limited connection through old and often non-functioning DC ties with unknown costs to upgrade or replace; a new RTO serving a Colorado-based footprint, with all the attendant development costs; or some splitting of the options. While the Commission does not necessarily need to determine by December 1, 2021, the best public interest option for Colorado, it will need to provide this guidance by July 1, 2022, less than a year from now.[26] Furthermore, the July date directed by the CTCA falls three months after SPP's declared deadline for the Colorado

[24] As directed by the CTCA, the Commission is to take into consideration "the potential advantages and disadvantages of each market structure including their effect on ten legislatively specified considerations. (§ 40-2.3-102, C.R.S.)

[25] SB 21-072 excludes power authorities and municipal utilities and allows the Commission to waive or delay if there is no viable alternative, or if the Commission determines requiring a utility to join an RTO is not in the public interest "based on appropriate factors, including whether the [RTO] has established policies regarding tracking and report of emissions, promoting load flexibility and demand-side resources, promoting the integration of clean energy resources, and reducing the costs and inefficiencies of transactions between balancing areas and between market constructs." (§ 40-5-108, C.R.S.)

[26] These are CTCA deadlines.

utilities to commit to SPP membership, unless that deadline is delayed. So, Commission action before April 2022 could be necessary if the Commission is unconvinced that linking Colorado's electricity market with SPP's best aligns with Colorado's objectives in passing aggressive emissions reductions legislation.

IV. SIEMENS QUANTITATIVE MODELING AND RESULTS

In June 2020, the Commission selected Siemens to conduct quantitative modeling and analysis in support of its investigation into the "potential costs and benefits to electric utilities, other generators, and Colorado electric utility customers that would arise from electric utilities participation in any energy imbalance markets, regional transmission organizations, power pools, or joint tariffs" as specified by the CTCA.[27]

Siemens evaluated the CTCA-defined market constructs in the context of achieving Colorado's emission reduction targets and provided the Commission with modeling results for each market type covering a range of metrics, including day-ahead and real-time operating costs; wholesale power prices; imports into and exports from Colorado; capacity expansion resource portfolios and costs, both within Colorado and within WECC and SPP; the effective load-carrying capability of renewable resources across time; the planning reserve margin within Colorado; renewable curtailments within Colorado; and CO2 emissions within Colorado. For the RTO cases, Siemens modeled a transmission sensitivity and a natural gas price sensitivity.

While the Siemens Study generated a great deal of information, the cost results are similar across market categories, and many of the results are repetitive. The

[27] § 40-2.3-102, C.R.S.

results demonstrate that all modeled resource portfolios meet Colorado's emissions reductions goals and maintain reliability. However, the focus on Colorado's emissions may have obscured potentially significant differences in environmental considerations among market alternatives.

Siemens modeled eight market structures: a reference case, three EIM footprints, three RTO footprints and a joint tariff with a day-ahead power pool. The historical Colorado market structure for day-ahead generation and real-time imbalance generation served as the reference.[28] The three EIM markets and the three RTO markets were assumed to have common footprints: (1) Colorado utilities with the U.S. portion of WECC, (2) Colorado utilities with SPP, and (3) Colorado utilities split between the two. The JTPP footprint includes Colorado utilities and the former MWTG; it covers Colorado, a large part of Wyoming, and small pieces of several adjoining states.

In modeling the WECC EIM, Siemens assumes day-ahead energy determination is unchanged from the historical determination of day-ahead energy. However, in the WEIS case, Siemens assumes that two DC ties (410 MW total) are optimized in the day-ahead unit commitment.[29] The remaining capacity is then modeled as available to the WEIS in real time.[30] In the split EIM case, Siemens assumes that both DC ties are optimized in the day-ahead, but the remaining capacity on only the 200 MW line

[28] Prior to February 1, 2021 when the WEIS began operation.

[29] Optimizing the DC ties references determining a least-cost dispatch of resources located on both sides of the ties such that electricity flows west to east or east to west depending on conditions. Total capacity may or may not be used in the day-ahead unit commitment. If it is not used, capacity is available for real-time balancing.

[30] This differs from the actual operation of the WEIS which is a Western Interconnection market only. This modeling assumption would have the effect of increasing the WEIS benefit over reality.

connecting northern Colorado to SPP North is made available for WEIS participants in real time.[31] Long-run capacity needs are assumed unchanged by the operation of imbalance market.[32]

In the case of the JTPP, day-ahead energy needs are determined jointly with a common dispatch in real time, but long-run capacity needs are similarly assumed unchanged from the reference.

In the RTO cases, a centralized independent system operator is assumed to determine day-ahead unit commitment based on merit-order and to dispatch energy in real time. In the case of the WECC RTO, the entire WECC footprint is modeled in the day-ahead and in real time. In modeling the SPP RTO, two DC interties (410 MW) are assumed optimized such that flows across the lines can move west to east and east to west in a manner that minimizes operating costs. In modeling the RTO split, only the 200 MW tie connecting northern Colorado to SPP North is assumed to be optimized. Unlike other market types evaluated, Colorado's long-run capacity expansion and retirement decisions are influenced by RTO participation.[33]

Benefits are measured as a reduction in cost from the reference case and are displayed in the three tables below. The study results reinforce contemporary industry evidence in that:

- Participation in any market structure reduces costs;
- The differences in benefits between EIM cases and between RTO cases are relatively small;

[31] Same comment as in the footnote immediately above.
[32] Siemens Study, at 27-28.
[33] Siemens Study, at 26-27.

- RTO benefits swamp the economic benefits of other markets primarily by reducing Colorado utilities' needs to build battery storage to support the renewable buildout necessary to meet Colorado's carbon emission reduction goals; and
- A Colorado-only market is not in Colorado's best interest; despite optimizing day-ahead unit commitment and dispatch, the benefits of the JTPP are limited.

Table 1. (Source: Exhibit 2, Exhibit 237, Exhibit 238)

Total Cost	Total Cost (2019 $ millions)	Savings (2019 $ millions)	% Savings
Reference	26,564	0	0.0%
WEIM	25,901	-663	2.5%
WEIS	26,076	-488	1.8%
EIM Split	26,064	-500	1.9%
JTPP	26,099	-465	1.8%
WECC RTO	24,337	-2,227	8.4%
SPP RTO	24,095	-2,469	9.3%
RTO split	24,637	-1,927	7.3%

Table 2. (Source: Exhibit 3, and Exhibit 238)

VARIABLE COST	Variable Cost (2019 $ millions)	Savings (2019 $ millions)	% Savings
Reference	9,342	0	0.0%
WEIM	8,678	-664	7.1%
WEIS	8,853	-489	5.2%
EIM Split	8,841	-501	5.4%
JTPP	8,876	-466	5.0%
WECC RTO	8,492	-850	9.1%
SPP RTO	7,958	-1,384	14.8%
RTO split	8,685	-657	7.0%

Table 3. (Source: Exhibit 3, and Exhibit 238)

FIXED & CAPITAL COST	Fixed & Capital Cost (2019 $ millions)	Savings (2019 $ millions)	% Savings
Reference	17,222	0	0.0%
WEIM	17,222	0	0.0%
WEIS	17,222	0	0.0%
EIM Split	17,222	0	0.0%
JTPP	17,222	0	0.0%
WECC RTO	15,845	-1,377	8.0%
SPP RTO	16,136	-1,086	6.3%
RTO split	15,953	-1,269	7.4%

Table 1 displays the total cost savings by market type as a percentage of the reference case. Of the non-RTO market structures, Colorado participating in a West-wide EIM provides the greatest savings. Of the RTO options, the greatest economic benefits result from Colorado joining SPP.

As shown in Table 2, SPP's apparent advantage in reducing total costs arises from an advantage in reducing variable costs.[34] As can be seen in Table 3, this advantage is offset by the WECC RTO's advantage in reducing fixed and capital costs.[35]

Siemens also modeled day-ahead costs and imbalance costs. Savings are displayed in Tables 4 and 5. As can be seen in Table 4, operation of the SPP RTO reduces day-ahead costs by 8.8% vs. 6.5% for the WECC RTO. In the case of real-time imbalance costs, the SPP RTO reduces balancing costs by 58% vs. 26% for the WECC RTO.

Table 4. (Source: Exhibit 4)

Day-Ahead	Day-Ahead (2019 $ million)	Savings (2019 $ millions)	% Savings
Reference	24,402	22,240	0.0%
WEIM	24,402	22,240	0.0%
WEIS	24,402	22,240	0.0%
EIM Split	24,402	22,240	0.0%
JTPP	24,189	22,027	0.9%
WECC RTO	22,823	20,661	6.5%
SPP RTO	22,250	20,088	8.8%
RTO split	23,032	20,870	5.6%

[34] Under an SPP RTO construct, variable costs decline by close to 15% versus just over 9% for the WECC RTO.

[35] Under a WECC RTO construct, fixed and capital costs decline by 8% vs. 6.3% for the SPP RTO. Battery storage needs are reduced by 1800 MW with a WECC RTO (p. 67) and by 1700 MW with an SPP RTO (p. 90).

Table 5. (Source: Exhibit 4)

IMBALANCE	Imbalance Cost (2019 $ million)	Savings (2019 $ millions)	% Savings
Reference	2,162	0	0.0%
WEIM	1,499	-663	30.7%
WEIS	1,674	-488	22.6%
EIM Split	1,661	-501	23.2%
JTPP	1,845	-317	14.7%
WECC RTO	1,605	-557	25.8%
SPP RTO	909	-1,253	58.0%
RTO split	1,514	-648	30.0%

However, significantly and counterintuitively, the outcome is reversed in the EIM context. A WECC EIM reduces balancing costs from day-ahead forecasts by 30.7% vs. 22.6% for the WEIS.

These seemingly contradictory results appear to underscore the significance of the assumptions regarding the DC intertie optimization to the modeled results. In modeling the SPP RTO construct, Siemens assumes both DC ties are fully optimized in the day-ahead and real-time. In modeling the WEIS, only the capacity remaining after optimizing the ties in the day-ahead is available to be used, so the DC intertie capacity is significantly less. [36]

[36] Notably, the actual WEIS service is strictly a Western Interconnection balancing service without DC tie optimization.

V. ISSUES FOR COMMISSION CONSIDERATION

Joint Commenters identify the following for further Commission investigation and consideration.

A. DC Tie Optimization & Net Benefits

The Colorado Coordinated Planning Group East-West task force is studying the use of the existing DC interties between Colorado and SPP as well as evaluating their potential expansion. Joint Commenters understand from the task force that there has been little actual real-time energy transfer across the ties over a considerable time-period as they are old, don't work well, and have been out of operation for months at a time. So, without significant transmission investment, achieving actual savings anywhere near modeled results is unlikely. Further, the allocation of these transmission costs remains a contentious topic that has yet to be resolved, and without this knowledge, the potential benefits to utilities interested in SPP membership will remain unknown.

Without the ability to fully use the capacity of the ties to flow power east and/or west in an optimal manner, the actual benefits of joining SPP will be significantly smaller than modeled, potentially shrinking to those of the JTPP. Information regarding the DC intertie operation, costs, and ability or inability to be optimized is therefore essential to the Commission's current investigation and should be well understood ahead of any utility commitments being made. *Joint Commenters recommend the Commission seek additional information regarding the capabilities, costs, and cost allocation of the interties from those best suited to provide answers.*

B. Capacity Savings Benefits

Because the primary modeled benefits of an RTO over alternative market structures result from capacity savings. *Joint Commenters ask the Commission to consider which RTO configuration has the greatest potential to realize capacity savings for Colorado utilities and ratepayers.* In the case of SPP, the capabilities and costs of upgrading or expanding the DC ties, or both, are critical elements. In the case of a WECC RTO, developing an acceptable governance structure will be necessary.

C. Governance for a Western RTO

The potential benefits of a WECC RTO construct hinge on developing a governance proposal that western entities both inside and outside of California can support, and it appears that such a proposal may be coming later this summer. On June 23, 2021, as part of the Federal Energy Regulatory Commission ("FERC") "Technical Conference to Discuss the Resource Adequacy Developments in the Western Interconnection,"[37] Elliott Mainzer, CEO and President of CAISO, alerted FERC that he expects to bring a governance proposal to the CAISO Board of Governors in late August. He explained that CAISO has been working behind the scenes to develop a proposal that key utilities can support, and he expressed CAISO's interest in maintaining momentum in developing a day-ahead market – the Extended Day-Ahead Market ("EDAM"). CAISO is moving forward despite the setbacks that arose from last August's heat event that resulted in rolling blackouts in California. As a result of the heat event, CAISO had shifted its focus from EDAM development to an evaluation of

[37] https://www.ferc.gov/news-events/events/technical-conference-discuss-resource-adequacy-developments-western

the scarcity event and the tariff changes it thought necessary to meet this summer's power demand. FERC recently approved these tariff changes.

Joint Commenters are encouraged to learn that the western governance initiative may soon resume. *We encourage the Commission to remain engaged in the stakeholder development process and to urge Colorado utilities to support rapid development of a western governance structure so that Colorado can have in place two viable market options ahead of the 2030 RTO participation date.*

D. State-Level Environmental Policy

Siemens provides information pertaining to the renewable and climate policies of U.S. states and its modeling of those policies in Appendices D.2 – D.4. State-level renewable mandates and goals are provided in Exhibit 224. State-level GHG emissions reduction goals are displayed in Exhibit 225, and energy storage goals are shown in Exhibit 226.

Significantly, western states lead the nation in state-level renewable and climate policies. Of the sixteen states with a Renewable Portfolio Standard ("RPS") in place, more than half are states in the Western Interconnection, and the states with the most aggressive RPSs are western states. Of the seven states with emissions reduction goals, six are in the western U.S. In fact, a substantial portion of western load is covered by emissions reductions goals including all the cities on the West Coast from Seattle to San Diego, as well as Las Vegas, Reno, and Denver. Finally, of the three states with energy storage goals, all are in the Western Interconnection. With regard to the SPP footprint, Kansas has a 20% RPS by 2020, and Missouri has a 15% RPS by 2021. No state in the SPP footprint has in place emissions reduction goals.

As part of its evaluation, Joint Commenters recommend the Commission consider aligned environmental policies of other states in an RTO footprint with Colorado's to be a significant factor in determining the public interest of market participation.

E. Colorado Exports: WECC RTO versus SPP RTO

The study authors compare the opportunities for Colorado utilities to export excess power to a WECC RTO vs. SPP and conclude that SPP offers the opportunity for day-ahead energy spot market sales that do not dissipate with time as they appear to in the WECC RTO construct. The authors suggest that this may be due to the difference between adding a relatively small region to an existing RTO vs. forming an RTO in which all new participants compete for sales.[38]

However, differences in state policies between regions provide at least as sound an explanation and have significant implications when considering whether to join a WECC RTO or SPP. As discussed above, aggressive renewable and emission reduction mandates apply to a significant percentage of western load as compared with SPP, which has only two weak RPSs in place. In the capacity expansion plans, the aggressive western mandates drive greater renewable energy and battery storage growth in the WECC region than in SPP, which is forecast to experience growth in fossil fuel over the 20-year period.[39] Because the capacity expansion plans for a WECC RTO and Colorado are similar, there could be less opportunity for Colorado to export to WECC than to export to SPP which can reduce its fossil generation to accept Colorado's excess renewables.

[38] Siemens Study, at 7.
[39] Compare Exhibit 80 at 71 with Exhibit 121 at 93.

However, this discussion assumes minimal federal climate action and no state-level activity in the SPP region. If the federal government and/or the states in the SPP footprint impose emissions reduction targets, the resource mix in SPP could become more renewable heavy than currently projected, but the overall diversity of the footprint may not. SPP is significantly smaller than the WECC region and doesn't have the same diversity of weather, loads, length of time between when the sun rises and when it sets, etc.

A single market operator dispatching a diversity of renewable resources with differing profiles driven by difference in time and weather across a large geographical region will be essential to maintaining bulk power system reliability in a future decarbonized system. *Joint Commenters recommend that the Commission consider which market could provide the greatest potential diversity.*

F. Modeling of Leakage

To model emissions reduction policies, Siemens imposes "annual mass-based CO2 limits on the set of generators in the affected areas."[40] To address leakage in states with emissions reductions goals, it appears that Siemens develops a CO2 emission rate for each state based on modeled results and then applies this rate to imports into states with an emissions reduction goal in place. It provides the example of imports into Colorado from Wyoming. If the "emission rate in 2025 for generation in Wyoming is 1,100 lbs/MWh, then imports from Wyoming to Colorado would be assumed to have a 1,100 lbs/MWh emission rate. The CO2 emission rate from imports will be used to perform dispatch decisions and meet the GHG emissions targets. "[41]

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[40] Siemens Study, at 161.
[41] Siemens Study, at 162.

Our primary concern is that leakage won't be fully accounted for.[42] Let's take the case of Wyoming proffered by the study authors. In 2025, Wyoming will have a mix of wind and coal, and its emissions rate will reflect this mix. However, much of the generation in Wyoming is owned and operated by PacifiCorp, a multi-state utility. PacifiCorp serves customers in Washington, Oregon, California, Idaho, Utah and Wyoming, and its wind generation is used to meet the RPSs in the west-coast states, plus Utah. Each state or utility that claims Wyoming wind generation to meet its RPS will presumably be required to acquire and retire the corresponding RECs representing the environmental benefits of that renewable energy. Assuming the wind RECs are claimed and retired to meet RPS requirements in the PacifiCorp states, the emissions profile for the remaining energy available to export to Colorado should be defined by the fossil fuel generation mix in Wyoming. Simply applying an average emission rate that includes the wind resources will undercount the actual fossil fuel intensity of the energy imports.

Joint Commenters encourage the Commission to work with Siemens to develop results that don't double count the environmental attributes of renewable resources. This can be done by using the fossil-fuel intensity of production.

G. Emissions Reporting

Emissions reporting is a significant shortcoming of the Siemens Study. While the study demonstrates that Colorado's GHG emissions reduction targets are met for all markets evaluated, the study does not report greenhouse gas emissions **outside** of

[42] How Siemens modeled state RPSs is less clear. If Siemens took the same approach to RPS as it explains it did to model emissions reductions goal, the potential distortion in WECC-wide emissions would be even greater.

Colorado. Nowhere in the report are the total emissions for each market that was evaluated provided, so there is no way to understand how participation in one market over another affects its total emissions.

As we understand it, for each fossil-fuel resource, AURORA should have built into it emission rates, and, therefore, it should be feasible to calculate total emissions for each market case.[43] The emission differences between cases would provide a measure of the total emissions impact of Colorado utilities' participating in a given market.

Joint Commenters encourage the Commission to work with Siemens to provide total market-level emissions data and to consider the difference in total emissions between each market construct as an essential metric for its overall market investigation. We further recommend that the social cost of carbon be applied to evaluate these emission cost differences.

H. Use of the Social Cost of Carbon

In developing the long-run capacity expansion plans in the reference and RTO cases, Siemens assumes a moderate federal carbon price that is considerably below the current social cost of carbon at the 3% discount rate of $51 per metric ton ($46/short ton). [44] The value established by Colorado law in 2021 uses the 2.5% discount rate, currently $76 per metric ton ($69/short ton).[45] The carbon price used for the study

[43] Ideally the emission rate would vary with heat rate, but an average emission rate would be acceptable.

[44] https://www.scientificamerican.com/article/cost-of-carbon-pollution-pegged-at-51-a-ton/

[45] HB 21-1266 requires economic impact analysis to use a social cost of carbon with a discount rate of no higher than 2.5%. This equates to a price of $76/ton. § 25-7-110.5(4)(f), C.R.S.

starts at less than $5.00 per short ton and increases to less than $25 per short ton in 2040.[46]

How use of the social cost of carbon would have changed the capacity expansion plans and market dispatches is important information that this study misses. If Siemens had implemented modeling runs using the social cost of carbon, the capacity expansion portfolios may have had less natural gas and more battery storage,[47] and the fossil fuel dispatch would have been more limited. Such differences could shift the modeled relative cost of operating in SPP vs. WECC.

Colorado statute requires consideration of the social cost of carbon in a number of important proceedings including resource acquisitions and retirements.[48] Although this is not a proceeding as specified in statute, it does provide important information as Colorado assesses which RTO to join, and the Commission's further action in this case will have an impact on the state's future ability to achieve its emissions reductions targets. *Joint Commenters urge the Commission to work with Siemens to, at the very least, undertake a sensitivity for the RTO cases that uses the social cost of carbon as well as assessing the emission differences between alternative markets using the social cost of carbon as recommended above.*

I. Public Interest Considerations

SB 21-072 that requires utilities to join an RTO by January 1, 2030, identifies factors that should be considered in determining whether joining an RTO is in the public interest including: established procedures for emissions tracking; promoting load

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[46] Siemens Study (see Exhibit 227, at 163).
[47] Depending on which was the binding constraint: GHG emission limits or social cost of carbon.
[48] § 40-3.2-106, C.R.S.

flexibility and demand-side resources; promoting integration of clean energy resources; and reducing the costs and inefficiencies of transactions between balancing areas and market constructs.[49]

Joint Commenters recommend the Commission hold a Technical Conference or workshop to develop a common understanding of how CAISO and SPP currently address these public interest concerns and how they might evolve.

VI. CONCLUSION AND RECOMMENDATIONS

Joint Commenters reiterate the following recommendations.

- Recommend that the Commission work with SPP and utilities exploring membership in SPP to delay the April 2022 membership commitment until after the Commission has issued its direction by July 1, 2022, consistent the with legislative intent of CTCA.
- Recommend that the Commission seek additional information regarding the capabilities, costs, and cost allocation of the interties from entities best suited to provide additional answers and perspective.
- Recommend that the Commission consider which RTO configuration has the greatest potential to realize capacity savings for Colorado utilities and customers.
- Encourage the Commission to remain engaged in the western governance stakeholder development process and to urge Colorado utilities to support rapid development of a western governance structure so that Colorado can have in place two viable market options ahead of the 2030 RTO participation date.[50]

[49] § 40-5-108(2)(a)(II)(B), C.R.S.
[50] WRA, WGG and NRDC's comments filed in this proceeding in November and December 2019 address governance in more detail.

- Recommend that the Commission consider the alignment of the environmental policies of other states in an RTO footprint with Colorado's to be a significant factor in determining the public interest of market participation.
- Recommend that the Commission consider which RTO could provide the greatest potential diversity.
- Encourage the Commission to work with Siemens to develop results that don't double count the environmental attributes of renewable resources; this can be achieved by using the fossil-fuel intensity of generation.
- Encourage the Commission to work with Siemens to provide market-level emissions data and to consider the difference in total emissions between market constructs to be an essential metric to its overall market investigation.
- Urge the Commission to work with Siemens to undertake an RTO sensitivity that uses the social cost of carbon, as well as assessing the emission differences between alternative markets using the social cost of carbon.
- Recommend the Commission hold a technical conference or workshop to develop a common understanding of how CAISO and SPP currently address these public interest concerns and how they might evolve.

We further recommend that the Commission provide a series of technical conferences and/or workshops, the first to include the Commission, Siemens, and interested stakeholders in a setting where stakeholders can ask questions directly of the study authors. Ahead of that workshop, an opportunity should be provided to the public to provide questions in advance. Questions pertaining to the modeling and results are appended to these Comments as Attachment A.

In addition to a technical conference or workshop addressing the Siemens Study and the legislatively identified public interest consideration, other technical conferences or workshops could address the capabilities of the DC ties and the costs to expand or upgrade; SPP's western market proposal and governance; and, as it becomes available, a western governance proposal.

Joint Commenters appreciate the opportunity to provide input in this important investigation.

Dated this 16th day of July 2021.

Respectfully submitted,

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