



**Response of the California Transmission Planning Group
Technical Steering Committee Study Team**

Re BAMx Comments Re CTPG's draft Phase 2 Study Plan

Comment Received:

CTPG should clarify its transmission selection process. For instance, the CTPG Phase 1 study report does not provide insights into why several transmission upgrades were included in all CTPG cases. The inclusion of projects due to their specification in the 2019 WECC Base (Seed) case does not provide adequate justification for including these projects in the CTPG study cases. The report does not document the approval status for some projects that have received key approvals and/or environmental permits.

CTPG Study Team Response:

The selection of transmission additions included in the CTPG's Phase 1 conceptual transmission plan was based on the following criteria and principles:

- The assessment of every transmission project evaluated by the CTPG studies is based upon a contingency-based performance of the interconnected grid for a specific set of scenarios that transmission planning engineers believe could occur in concert with a substantial increase in renewable resource development. These scenarios include different peak load levels as well as different levels of power flow from the Pacific Northwest into northern California, and between northern and southern California. CTPG's Phase 1 studies do not attach any particular likelihood of occurrence to any of these scenarios.
- Network transmission additions included in the 2019 WECC Heavy Summer power flow "seed case" were selected because these additions either have, or were judged likely to obtain, key regulatory approvals and environmental permits necessary for construction. These additions are shown on Table 7 of CTPG's draft Phase 1 study report. Since the drafting of this report, the California Public Utilities Commission conditionally approved the Colorado River-Devers-Valley #2 project. Also, for purposes of CTPG's Phase 2 studies, the Green Path North project have been removed from the analysis consistent with current conditions and expectations. In the absence of countervailing public information, CTPG believes that a proposed transmission project's inclusion in a WECC-approved power flow case is a reasonable indication that the project will ultimately proceed to construction and operation.
- Some network transmission additions were included on the basis of analysis conducted outside of the CTPG study process. These include the 230-kV Control-Inyokern #1 line and the 230-kV Inyokern-Kramer #1 and #2 lines. Early technical work conducted in connection with the RETI Phase 2A process indicated that, with material amounts of new

renewable resources in the central Nevada, Owens Valley and Inyokern CREZs, new transmission between Control and Kramer substations would mitigate an identified potential for voltage collapse.

- Some network transmission additions were included based on the judgment of transmission planning engineers that the upgrades are needed to support the addition of new renewable resources. These include the reconductoring of the 230-kV Morro Bay-Midway #1 and #2 lines and the reconductoring of the 230-kV Morro Bay-Gates #1 line.
- Some network transmission additions were not studied but were included as part of the assumed connection schemes for certain CREZs, namely the Mountain Pass, Baker, Barstow, and Pisgah CREZs. For Cases A1 and B1 in the CTPG studies, these network additions include the 500-kV Mountain Pass-El Dorado #1 line, the 500-kV Mountain Pass-Baker #1 line, the Mountain Pass 287-kV substation, the 500-kV Baker-Barstow #1 line, the 500-kV Barstow-Lugo #1 line, the 500-kV Pisgah-Barstow #1 line, and the 500-kV Barstow-Kramer #1 line.

Case C1 of the CTPG study, which uses a different peak load level in California than Cases A1 and B1, assumed a different connection scheme for the Mountain Pass, Baker, Barstow and Pisgah CREZs. The results of Case C2 suggest that 100 percent of the modeled output from the Mountain Pass, Baker and Barstow CREZs can be accommodated by the existing transmission network without the need for the network upgrades included in Cases A1 and B1. The Case C2 results suggest that network upgrades or other mitigation will be needed to accommodate 100 percent of the modeled output from the Pisgah CREZ. However, Case C2 did not undertake the analysis necessary to confirm which network upgrades or other measures would be effective in mitigating the reliability criteria violations that limited the modeled output of the Pisgah CREZ to less than 100 percent of the amount indicated by the renewable procurement plans submitted by CTPG members.

- The remaining network transmission additions shown on Tables 40 and 41 of the CTPG's Phase 1 report were identified on the basis of technical analyses confirming the judgment of the transmission planning engineers that the identified additions would be effective in mitigating identified reliability criteria violations. Operating procedures (such as pre-contingency generation redispatch, generator tripping for certain contingencies, and/or controlled load drops for N-2 contingencies) and non-wires alternatives (such as increased energy efficiency, expanded distributed generation, and/or strategically located generation additions) that could potentially mitigate identified reliability criteria violations were not studied.

Comment Received:

BAMx is concerned with the compressed timing of the CTPG study process. It appears that decisions are being made for the Phase 2 studies before comments are received from

Stakeholders on the Phase 1 studies. This particular issue appears critical given the fact that there was no Stakeholder involvement in the initial study plan for Phase 1. The next steps as described in the Phase 1 report include testing a reasonable range of renewable net short estimates that may be defined by RETI. Meanwhile, the stakeholders are asked to comment on the Phase 2 study plan, which does not include any of these alternative renewable net short estimates.”

CTPG Study Team Response:

CTPG agrees that the compressed timing for CTPG’s Phase 2 studies has precluded assessments of multiple renewable net short estimates. CTPG’s Phase 2 studies are, however, using the RETI Stakeholder Steering Committee’s most recently adopted renewable net short forecast.¹ As CTPG proceeds with its work, we intend to provide greater opportunities and longer lead-times for stakeholders to review and provide input to the CTPG process.

Comment Received:

Another next step as described by CTPG includes testing other fossil-fired generation dispatch patterns that would accommodate the increase in renewable generation. However, the Phase 2 plan does not seem to reflect this approach. BAMx is concerned that absent the appropriate fossil-fired generation dispatch, the Phase 2 study approach will not adequately address minimizing the economic and environmental impact of the renewables-related transmission. As an example of the need to adjust generation, the Phase 1 study report concludes that under certain cases, significant upgrades will be required to both Path 26 and Path 15 to accommodate the expected high north-bound flows. This is a significant finding but CTPG needs to determine whether adjusting fossil generation can eliminate the problem. BAMx suggests that CTPG develop a transmission plan that entails the least cost method to interconnect renewables. So as far as the Phase 1, 2 & 3 load flow studies are concerned, the planners should assume that they can adjust the generation to relieve any reliability concerns. It may very well be that more transmission should be built to reduce congestion, but that should be justified by a separate economic study.

CTPG Study Team Response:

As stated in CTPG’s draft final Phase 2 study plan:

“CTPG will not be performing an alternative analysis for mitigating the need for a new or upgraded transmission line with protection control systems in the 2010 study plan. This alternative analysis will be completed by the entity responsible for each particular proposed transmission improvement utilizing its own analysis, assumptions, and mitigation policies and practices. The CTPG may perform this type of analysis in future studies.”

¹ See pages 15 to 17 of the CTPG final study plan for Phase 2, available at http://www.ctpg.us/public/images/stories/2010-03-03__CTPG Phase 2_Final_Study_Plan.pdf.

The potential to redispatch fossil-fired generation to minimize the economic and environmental impacts of transmission infrastructure additions that would otherwise be needed in the absence of such redispatch is beyond the scope of CTPG's Phase 2 work but, as indicated, may be considered in future CTPG studies.

Comment Received:

CTPG should perform significant additional study work, including market simulation studies to identify a robust set of transmission elements that could be declared "needed". It is however unclear to us that the required study work will be accomplished in time to delineate a "No Regrets" set of transmission projects by the end of 2010 as indicated in the CTPG project schedule.

CTPG Study Team Response:

The CTPG Phase 2 study plan notes that: "The CTPG will use this planning information and stakeholder input to conduct the analysis of a number of scenarios to enable the completion of a state-wide conceptual transmission plan that will provide a basis for 'least regrets' decisions in the subsequent planning phases by CTPG members." CTPG will thus not seek to demonstrate that its initial studies validate a final least regrets transmission plan, but will rather seek to provide the basis for subsequent work (including by CTPG) to achieve this objective.

Comment Received:

What was the rationale behind CTPG using the California Energy Commission's forecast of rooftop solar photovoltaic penetration for the year 2020 (3,218 GWh), which is significantly lower than RETI estimate for rooftop solar (7,358 GWh)?

CTPG Study Team Response:

CTPG believes the California Energy Commission's assessment of the likely impact of the California Solar Initiative is valid. However, CTPG agrees that other outcomes are possible and for the purposes of its Phase 2 studies will use RETI's higher estimate.

Comment Received:

The CTPG Phase 1 report states that rooftop solar photovoltaics and other distribution-level generation were considered as a reduction to load. BAMx would argue that if the distributed generation is on the utility-side of the meter, it should not be considered as load reduction but as a renewable resource.

CTPG Study Team Response:

For the purposes of performing the power flow analyses described in the CTPG study plans, there would be little difference between modeling distribution-level generation as a reduction in load or as generation. Neither would it make a difference whether the resource was placed on the customer-side of the utility meter or on the utility's distribution system. This is because the distribution system is radial to the transmission system – impacts on the transmission grid are captured by modeling the distribution system as load connected directly to transmission substations. The CTPG Study Team does not believe that BAMx's suggestion would have any material impact on the transmission studies being performed in its Phase 2 studies, although the suggestion may be appropriate in other contexts.

Comment Received:

CTPG's presentations to the stakeholders dated January 20, 2010, indicated that each utility provided renewable procurement plans reflecting installed capacity and, in some cases, the expected renewable dispatch at time of peak. In other cases, CTPG used generic factors to relate nameplate capacity to expected renewable dispatch for the hour of study (e.g., peak hour, off-peak hour). Please elaborate how the renewable resource additions were computed in these cases by giving specific examples.

CTPG Study Team Response:

The data used to reflect the capacity of renewable resources has been posted to the CTPG website. See the document posted on the website under the tab "Phase 1 Renewable Generation by Technology", in the column labeled "Fraction of Installed Capacity Producing Power for Hour Studied".

Comment Received:

CTPG lists several transmission upgrades included in the WECC 2019 "Heavy Summer" Seed Case that were assumed in all the study cases; these upgrades fall in two categories: One with projects that have received key approvals and/or environmental permits, such as the Tehachapi Segments 1-11 and Sunrise Powerlink project; and the other with projects that haven't received such approvals or permits, such as the 500-kV Colorado River-Devers #2 line, the expansion of the Barren Ridge 230-kV substation, etc. First, please identify the approval stage associated with each of these projects in the first category. Second, please explain the criteria used to select the new projects modeled in the 2019 "Heavy Summer" Seed Case.

CTPG Study Team Response:

CTPG used, unaltered, the WECC 2019 "Heavy Summer" power flow case as the "seed case" for all of CTPG's Phase 1 study work. This seed case was then modified for load levels (cases A0,

B0, and C0) and for CREZ connection schemes (A1, B1 and C1). The basis for the network additions included in the A1, B1 and C1 cases is described in CTPG's response at the beginning of this document. Requests for additional information pertaining to the "approval stage" for each the projects listed on Table 7 of the draft Phase 1 study report should be directed to the project sponsors for each of those projects.

Comment Received:

BAMx would generally expect the California-Oregon Intertie (N-S) flows to decline as the in-state renewable dispatch goes up. This generally seems to be the case as depicted in Figure 4 (Case C Interface Flows) in the Phase 1 study report. However, as renewable dispatch goes up from 1,000 megawatts to 2,000 megawatts, the California-Oregon Intertie flows seem to only increase a little. Please explain this anomaly."

CTPG Study Team Response:

The reason that flows across the California-Oregon Intertie increase at lower increments of renewable dispatch and decrease at higher increments is related to the incremental dispatch methodology used in Case C2. Initially, renewable generation in all CREZs and renewable resource development locations, both within and outside of California, are dispatched up by the same amount of megawatts. Because the CTPG members' renewable procurement plans contain renewable resources located in the Pacific Northwest, and because 70 percent of the corresponding fossil-fired generation decrements are inside California, the increase in generation from renewables in the Pacific Northwest increases flows on the California-Oregon Intertie.

Since the amount of identified renewable resource additions in the Pacific Northwest is much smaller than inside California, renewable resources dispatched in the Pacific Northwest reach their identified maximums long before the CREZs inside California are fully dispatched. After about 2000 megawatts of total renewable dispatch, the capability of the Pacific Northwest renewable resource areas are fully dispatched and successive increments of renewable generation take place only within California. Under these conditions, as the amount of total dispatched renewable generation increases beyond the 2000-megawatt level, and considering that 30 percent of the corresponding fossil-fired decremental dispatch is occurring outside of California, flows on California-Oregon Intertie level off and start to decline as the amount of total dispatched renewable generation increases.

Comment Received:

One of the next steps in the report includes continuing the once-through cooling studies and updating the CTPG's conceptual transmission plan as appropriate, which gives an impression that CTPG has already explored some level of once-through cooling retirement studies. If so, please provide information related to this work.

CTPG Study Team Response:

This information is provided in CTPG's Phase 2 study plan, at pages 9 to 10.²

Comment Received:

Table 11 (Cases A1 and B1 - Grid Configuration Changes to enable CREZ Network Connection) provides renewable resource connection or grid configuration schemes for each area/CREZ. However, the reasons for including certain transmission projects in certain cases are not adequately described. Please provide more details that would help the stakeholders to understand the process involved in including/excluding each of these transmission projects. Providing further details on elements of these transmission projects would also be helpful. You may wish to appoint a contact person(s) to answer questions about the envisioned/assumed projects.

CTPG Study Team Response:

The basis for the network additions included in Cases A1, B1 and C1 cases is described in responses provided above.

Comment Received:

The CTPG Phase 2 Queue Portfolio (Table 3) included in the Phase 2 study plan provides little information for the Renewable Generation Portfolio relative to those included in the Phase 1 study report and those assumed by RETI, which makes it extremely difficult for the stakeholders to provide any meaningful comments on the Phase 2 study plan. Please allow the stakeholders to submit another set of comments once CTPG meets with RETI and provides a more complete Renewable Generation Portfolio.

CTPG Study Team Response:

CTPG has completed Table 4.3 in its Phase 2 study plan: "Comparison of Renewable Generation Portfolio for CTPG Phase 1, RETI Phase 2A, CTPG Phase 2-Generation Queue and RETI Heavy In-State." Table 4.3 includes the two renewable energy resource portfolios that will be used in Phase 2. As requested by stakeholders, one of the portfolios is based on the CTPG members' generator interconnection queues and includes projects considered to be well along in their respective approval processes. The second portfolio was submitted by RETI and is an updated version of their prior scenario, but tailored to achieve 33-percent renewable energy goal in 2020

² Available at http://www.ctpg.us/public/images/stories/2010-03-03_CTPG_Phase2_Final_Study_Plan.pdf.

Comment Received:

BAMx appreciates the two additional *Northwest* and *Southwest* scenarios as proposed by CTPG under the Phase 2 study plan. BAMx considers them as a step in the right direction, but these two scenarios might not be sufficient in demonstrating how to minimize the level of “needed” transmission. Moreover, the Phase 2 study plan lists the In-state resources that would be decremented in the two scenarios. Please elaborate on how this determination was made.

CTPG Study Team Response:

The premise of the *Northwest* and *Southwest* scenarios is that more renewable generation may be developed outside of California than is suggested by the “Generation Interconnection Queue-based Portfolio.” Accordingly, in-state renewable generation will be reduced megawatt-hour for megawatt-hour to recognize the additional out-of-state generation assumed in the *Northwest* and *Southwest* scenarios. The selection of exactly which in-state renewable generators would be reduced was random.

Comment Received:

The CTPG should develop additional scenarios that use assumptions of renewable resource locations and development that would make efficient use of existing transmission facilities and minimize new transmission costs and environmental impacts. These assumptions should incorporate, but not be limited to the following criteria:

- a. Select CREZs that have minimal new transmission requirements;
- b. Look at the full range of opportunities/market for out-of-state renewables;
- c. Assume higher levels of distributed renewables to discover at what levels this assumption would cause significant reductions in transmission investment, thereby giving stakeholders an indication of the economic and environmental benefits in spending more effort in developing these technologies;
- d. Assume more reliance on renewable energy credits that captures how the flexible use of these credits could reduce the cost and environmental impact of new transmission; and,
- e. Account for the ability of fossil-fired generation dispatch that can relieve criteria violations.

CTPG Study Team Response:

CTPG believes all of BAMx’s suggestions are valid. However, as indicated in CTPG’s responses above, CTPG’s Phase 2 studies will not undertake an evaluation of alternatives to the infrastructure additions identified in the Phase 2 studies. Accordingly, the Phase 2 studies will not reveal which CREZs require minimal new transmission requirements, the point at which the expanded use of distributed generation would cause “significant reductions in transmission investment,” or the extent to which fossil-fired redispatch could be an economic alternative to transmission infrastructure additions.



CTPG notes that, while additional studies are needed, the Phase 1 study work suggests that it may be possible to connect a number of areas with renewable resource development potential to the existing transmission grid with minimal new network upgrades (beyond those included in the WECC 2019 “Heavy Summer” power flow case). These include the Washington, Montana, Idaho, Oregon, Round Mountain-B, Lassen North, Humboldt, Solano, Mountain Pass, Baker, Barstow, Fairmont, Imperial South, Imperial East, San Diego and Santa Barbara areas.

Finally, with respect to renewable energy credits, CTPG’s Phase 2 *Northwest* and *Southwest* scenarios should be useful in gauging the extent to which greater reliance on out-of-state generation (i.e., using renewable energy credits) could reduce the cost and environmental impact of new transmission.