

California Transmission Planning Group (CTPG)  
Technical Study Team's  
Response to November 2, 2010 Comments of the  
Bay Area Municipal Transmission Group (BAMx) on the  
Draft CTPG Phase 4 Study Plan

***BAMx Comment:***

In our prior comments we had asked the CTPG to provide additional information on the *shift factor* analysis that was undertaken in Phase 3. In particular, we had requested the details on the tool, the data, the methodology, and the process that was implemented to conduct the shift factor analysis. However, this information was neither included in the Final Phase 3 report nor was it provided in any separate response. We are aware that the Phase 4 Study Plan envisions performing additional power flow studies to determine whether the current list of "high potential" and "medium potential" transmission upgrades should be revised. We believe that the stakeholders should have access to all the data regarding the Phase 3 analysis that identified these "high" and "medium" potential transmission projects including the shift factor analysis, which received very little stakeholder input.

***CTPG Technical Study Team's Response:***

The CTPG provided additional information on the shift factor analysis at the August 4, 2010, stakeholder meeting in San Diego as well as in the final Phase 3 Study Report. To the extent further information is needed by BAMx, the following explanation may be useful.

The tool used to develop the shift factors was the GEPSLF model. The data that were used in developing the shift factors are from the WECC 2019 Heavy Summer seed case grid configuration as modified to include the transmission upgrades identified in the CTPG's Phase 1, Phase 2 and Phase 3 study work. The shift factor methodology can be described as injecting one megawatt of power at a given location, withdrawing this one megawatt at specified locations, and then measuring the amount of power flow that flows on each element of the interconnected transmission grid. The effective impedance of each element of the grid determines how much of the injected power flows on each element. This process is repeated for each injection point, *i.e.*, for each CREZ/renewable resource development area. For purposes of the CTPG's shift factor analysis, the withdrawal locations were assumed to be all existing generating units in California, *i.e.*, the one megawatt of injected power was assumed to reduce the output of each of these generating units by a fractional amount.<sup>1</sup> The output of these generation units were determined by allocating the one megawatt across all generation locations in proportion to the dispatch level of each unit in a power flow case.

Measuring the amount of power flowing on each of the transmission upgrades identified in the CTPG's Phase 1, Phase 2 and Phase 3 study work in relationship to the injected power at each CREZ/renewable resource development area provides a matrix that shows the relative level of power flow on a given element in relation to each CREZ/renewable resource development area (*i.e.*, "shift factor"). Considering only the

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<sup>1</sup> Note that reducing generation has the effect of *withdrawing* power and ensures that the one megawatt of injected power is balanced by an offsetting amount of withdrawal.

shift factors applicable to the “highest ranking” CREZs, the CTPG identified those transmission upgrades identified in the CTPG’s Phase 1, 2 and 3 work that had the highest shift factor values. While engineering assessments of the study results yielded a technical delineation between high and medium potential transmission upgrades, a shift factor “analysis” was also employed to validate the engineering results. Generally, transmission elements that exhibited a high shift factor validated the engineering assessment that these elements could be considered more significant and were candidates for the set of “high potential” transmission upgrades. Correspondingly, those transmission elements that exhibited a low shift factor validated the engineering assessment that these elements could be considered less significant and a candidate for the set of “medium potential” transmission elements.

Workpapers used to verify the “high potential” and “medium potential” transmission upgrades are posted on the CTPG website. They can also be accessed via the links below:

[http://www.ctpg.us/public/images/stories/downloads/CAISO\\_gsf\\_06-23\\_v2\\_high\\_ranked\\_crez.xls](http://www.ctpg.us/public/images/stories/downloads/CAISO_gsf_06-23_v2_high_ranked_crez.xls)

[http://www.ctpg.us/public/images/stories/downloads/CAISO\\_Ranking5\\_to\\_ctpg\\_UH.xls](http://www.ctpg.us/public/images/stories/downloads/CAISO_Ranking5_to_ctpg_UH.xls)

***BAMx Comment:***

In our last comments dated October 7, 2010, BAMx had stated the following:

“It is our understanding that CTPG will model this case using the same ‘seed’ (Base) case that they used in the earlier scenarios that model certain transmission upgrades with key approvals and environmental permits. Please confirm that the Southwest Scenario will not include any of the ‘High’ and ‘Medium’ potential transmission projects identified by CTPG in Phase 3.”

***CTPG Technical Study Team Response:***

The starting point for the “West of River Stress” scenario will only include those “high potential” or “medium potential” transmission upgrades that are described on Table 2.1 of the final Phase 3 Study Report. In addition, certain transmission upgrades identified in California ISO generator interconnection studies were added at the California ISO’s request. Depending on system performance under contingency conditions, the CTPG may include other “high potential” or “medium potential” transmission upgrades in order to obtain a power flow solution. The CTPG will document the inclusion of these upgrades in the Phase 4 Study Report.

***BAMx Comment:***

The CTPG states the following at the bottom of Page 6 of the Revised Phase 4 Study Plan:

“The sum of the renewable energy in the discounted core (20,907 gigawatt-hours) and the “additional southwest out-of-state import” category (21,106 gigawatt-hours) is less than the renewable net short requirement of (52,764 gigawatt-hours). The remaining amount of renewable energy (10,751 gigawatt-hours) for the “West of the River Stress” scenario consists of in-state

energy resources evaluated by RETI in their Phase 2B Report as having the best estimated economic and environmental ranked scores.”

In the Draft Phase 4 Study Plan, CTPG has not elaborated on its rationale for choosing the RETI Phase 2B CREZs. The RETI Best CREZs are based on economic and environmental criteria only. They are not selected based on any “commercial interest” potential of the renewable projects. Please explain how the use of RETI California Best CREZs to “fill-in” the remaining amount of net short renewable energy is more reasonable and realistic assumption than utilizing the CREZs related to existing and approved transmission projects for this scenario.

***CTPG Technical Study Team Response:***

In order to take advantage of the work that has been done to date by RETI and to facilitate its own work, the CTPG is using the information supplied by RETI. The CTPG has made no determination of its own as to whether using RETI’s “Best CREZ” portfolio to fill-in the remaining net short amount is, or is not, “more reasonable and realistic” than using renewable resource potential in any other CREZs or renewable resource development areas. The CTPG Technical Study Team suggests that BAMx discuss its comments with RETI. (RETI can be contacted through Rich Ferguson, the RETI coordinator, at [rich@ceert.org](mailto:rich@ceert.org).) The CTPG notes that, because the WECC transmission grid is configured as a network, there is no unique way to relate CREZs to “existing and approved transmission projects;” *i.e.*, some power from every CREZ/renewable resource development area will flow on every element of the WECC grid.

***BAMx Comment:***

In Table A below we have compiled (only) the *In-State* Discounted Core renewable projects data from the California Public Utilities Commission and the renewable projects data from the CTPG *West of the River Stress* scenario for each CREZ to calculate the RETI Best CREZ renewable project amounts. For instance, under the proposed CTPG approach, the *Kramer* CREZ has only 548 gigawatt-hours of renewable generation in the *Discounted Core* as shown in Table A below. In order to fill the “net short” CTPG has accounted for nearly 2,577 gigawatt-hours of additional renewable projects under the RETI Best CREZ criterion from *Kramer* rather than relying on additional potential resources within CREZs such as, Westlands, San Diego South, Pisgah, Tehachapi, or Palm Springs, which are already selected by CTPG under the *Discounted Core* criterion for the *West of the River Stress* scenario. Each of these CREZs has additional renewable resources under the generation interconnection queue that exceed the *Discounted Core* amounts.<sup>2</sup> Furthermore, please explain, for instance, why the renewable projects from the Tehachapi CREZ were restricted to 9,455 gigawatt-hours while the RETI Best CREZ approach indicated that Tehachapi CREZ was ranked higher than Kramer CREZ based on both, the economic and environmental scores.<sup>3</sup>

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<sup>2</sup> See *Table 10.1: High Ranked CREZs by Commercial Potential and RETI Environmental Score* in the 2010 Final CTPG Study Phase 3 Report dated September 10, 2010.

<sup>3</sup> See *Figure 7-13. CREZ Economic and Environmental Scores Phase 2B, Bubble Chart*, in the RETI Phase 2B Final Report dated May 2010.

**Table A: In-State Annual Renewable Resource Energy (GWh) Assumed in the CTPG West of River Stress Scenario**

CREZ	In-State Discounted Core*	CTPG West of River Stress Scenario**	Imputed RETI Best CREZ
	GWh	GWh	GWh
Carrizo South	1,859	1,859	(0)
Round Mountain-A	-	445	445
Round Mountain-B	206	206	-
Solano	100	100	0
Westlands	-	110	110
San Diego South	92	319	227
Pisgah	1,095	1,095	-
San Bernardino - Lucerne	110	110	(0)
Tehachapi	5,024	9,455	4,431
Palm Springs	202	202	(0)
Riverside East	2,282	2,282	0
Imperial South	1,064	1,064	-
Santa Barbara	217	217	-
San Diego (Border substation)	110	92	(18)
Sylmar	44	44	-
Stockton	197	197	-
McFarland	193	193	-
Petaluma	22	22	-
Hanford	9	9	-
Blue Lake	48	48	-
Fairmont	504	1,724	1,220
Imperial North-A	-	1,759	1,759
Iron Mountain	329	329	-
Kramer	548	3,124	2,577
Mountain Pass	898	898	0
<b>Total</b>	<b>15,153</b>	<b>25,903</b>	<b>10,750</b>
* Source: The discounted core data from the CPUC (Anne Gillette Mill) distributed by RETI dated October 11, 2010.			
** Source: Table 4.5: West of River Stress Scenario in CTPG Revised Draft Phase 4 Report Dated October 14, 2010.			

***CTPG Technical Study Team Response:***

The composition of the renewable resource development portfolio for the “West of River Stress” scenario was developed by RETI and supplied to the CTPG. The CTPG does not intend to modify this portfolio

based on RETI's determination that one CREZ may have higher economic and environmental scores than another CREZ. Once again, the CTPG Technical Study team recommends that BAMx discuss this comment with RETI.

***BAMx Comment:***

The CTPG's Revised Phase 4 study plan proposes to utilize the arbitrary 70/30 in-state/out-of-state generation re-dispatch approach. We urge CTPG to reconsider this assumption. As we have indicated in our earlier comments, deploying an "out-of-state" re-dispatch method in Phase 4 similar to the one CTPG implemented in a couple of scenarios (A-Q and B-Q) in Phase 3 would be more appropriate. Such a method would assume a WECC-wide carbon-based dispatch permitting the decrement of fossil generation across WECC based on minimizing carbon footprint for electricity production. We encourage CTPG to take full advantage of the recent work of the CEC in determining how to decrement fossil generation in all their base cases.<sup>4</sup> We also encourage CTPG to have a detailed stakeholder discussion on this issue before finalizing the dispatch assumptions.

**CTPG Technical Study Team Response:**

The CTPG Technical Study Team agrees that different approaches for determining which fossil-fired generators should be decremented in order to accommodate increased renewable generation could be used. The CTPG Technical Study Team will take BAMx's suggestion to redispatch fossil-fired generation on the basis of minimizing carbon emissions (*i.e.*, backing down coal generation) under advisement. However, as the CTPG has stated before, the carbon taxes that would be necessary to make continued coal generation uneconomic have yet to be considered or implemented. Accordingly, the fossil-fired generation redispatch pattern appropriate for use in determining what transmission upgrades are needed to support California's Renewable Portfolio Standard in year 2020 remains highly uncertain at this time.

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<sup>4</sup> A Presentation by California Energy Commission (Al Alvarado/Angela Tanghetti) on the "California Electricity Generation Issues" presentation made during the RETI Stakeholder Meeting on October 7, 2010.