

**California Transmission Planning Group (CTPG)
Technical Study Team Response to
Comments by the
Save the Foothill Coalition (STFC)
on CTPG's Final Phase 3 Study Report**

Question 1:

The Final Draft of the Statewide Transmission Plan published on the CTPG website lists the 500-kV Midway-Gregg #1 and #2 lines and the upgrade of Gregg substation with two 500/230-kV transformers, as “medium potential” transmission upgrades. It appears that these upgrades are substantively equivalent to PG&E’s proposed Central California Clean Energy Transmission Project (C3ETP). Exactly how these upgrades came to be designated as “medium potential” is somewhat murky as the Phase 3 study report seems to suggest it was largely judgmentally based.

“While engineering assessment 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. In a general sense, transmission elements that exhibited a high shift factor validated the engineering assessment that these element could be considered more significant and a candidate 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.” (Section 10.4 of the Final Phase 3 Study Report.)

If there is any analytic rigor to the “engineering assessment” it is not evident from the report. Confirm that the referenced “engineering assessment” was an exercise in judgment and was not based on any analysis. If it was based on analysis, provide a description of that analysis.

CTPG Technical Study Team Response:

The “engineering assessment” reflected the judgment of California ISO engineers based on their experience with the results of extensive power flow analyses conducted over the last several years.

Question 2:

The 500-kV Midway-Gregg #1 and #2 lines, and the upgrade of Gregg substation with two 500/230-kV transformers, appear in a number of the scenarios evaluated by CTPG. As noted above, it appears that these upgrades then found their way onto CTPG’s list of “medium potential” transmission upgrades through some sort of judgmental exercise (an “engineering assessment”), subsequently “validated” by “shift factor analysis”.

Exactly why these particular upgrades appear in certain scenarios is unclear. Section 7.2.3 of the Final Phase 3 Study Report states that “Several grid configuration changes were made to the 2019 WECC ‘heavy summer’ power flow case to connect the RETI Best CREZ renewable resource

additions to the grid, to add network transmission necessary that would allow a power flow solution that could otherwise not be obtained.” However Table 7.2.4 of the Final Phase 3 Study Report indicates that the 500-kV Midway-Gregg #1 and #2 lines, and the upgrade of Gregg substation with two 500/230-kV transformers, were added to “Mitigate normal and emergency overloads on Los Banos-Midway and Gates-Midway 500-kV lines (Path 15)” (Table 7.2.4 of the Final Phase 3 Study Report.) Two very different reasons have been provided. Which is the correct reason?

Clarify the technical basis for adding the 500-kV Midway-Gregg #1 and #2 lines, and the upgrade of Gregg substation with two 500/230-kV transformers.

CTPG Technical Study Team Response:

The addition of the 500-kV Tesla-Eastside #1 line, the 500-kV Eastside-Gregg #1 and #2 lines and the two 500/230-kV transformers at Gregg substation allowed the “A2” (post-renewable) case to converge. The 500-kV Midway-Gregg #1 and #2 lines were included in the “A2” power flow case to eliminate thermal overloads that were present in the converged case.

Question 3:

Table 7.2.2 in Final Phase 3 Study Report indicates that the pre-renewable flow on Path 15 (case “A1”) is 5168 megawatts south-to-north, 232 megawatts less than the nominal south-to-north path flow limit of 5400 megawatts.

Explain why – absent the 500-kV Midway-Gregg #1 and #2 lines, and the upgrade of Gregg substation with two 500/230-kV transformers – there were “normal and emergency overloads on Los Banos-Midway and Gates-Midway 500-kV lines (Path 15)” even though the south-to-north flows on Path 15 were less than the nominal path limit.

CTPG Technical Study Team Response:

There were no normal or emergency thermal overloads on the 500-kV Los Banos - Midway line or the 500 -V Gates – Midway line in the pre-renewable case (case “A1”).

Question 4:

Setting the pre-renewable south-to-north flow on Path 15 at a level that is close to the Path 15 flow limit would seem to virtually guarantee that with the addition of renewable resources in southern California and corresponding reductions in fossil-fired generation in northern California, Path 15 would be overloaded (*i.e.*, there would be overloads under “normal” and/or “emergency” conditions) and some form of mitigation required. Pre-renewable path flows can be selected so as to pre-determine reliability criteria violations and, apparently, the mitigation solution for those violations.

What is the basis for setting the pre-renewable flow on Path 15 (case “A1”) at 5168 megawatts south-to-north? On an historic basis, how often have south-to-north flows on Path 15 actually reached or exceeded the 5168-megawatt level?

CTPG Technical Study Team Response:

NERC Standards require that system performance must meet requirements over “all demand levels,”¹ and prohibit operating at levels which have not been studied. The CTPG’s work is structured to comply with these NERC standards. The CTPG Technical Study Team determined that compliance is achieved by studying cases in which WECC paths are stressed prior to the addition of renewable resources.

It is anticipated that Phase 2 of CTPG’s 2011 study work will include a set of power flows cases where selected paths are stressed prior to the addition of renewable resources. The CTPG Technical Study Team also expects to develop a parallel set of cases for Phase 2 in which flows on a selected path(s) is set at an historically-based flow level prior to the addition of renewable resources.

STFC can use the attached historical Path 15 power flows for the period January 1, 2006, through March 31, 2011, to assess the frequency with which “south-to-north flows on Path 15 actually reached or exceeded the 5168-megawatt level.”² Note that these flow data reflect the instantaneous flow at the “top” of each hour; it does not reflect any intra-hour flows. Recognize also that the actual Path 15 flow limit that corresponds with each of these historical hours may be less than the nominal south-to-north rating for Path 15. These reductions are a function of the actual system conditions that exist during each hour (e.g., lines out-of-service, Midway area generation that is off-line, etc.).

Question 5:

When a reliability criteria violation is found, the CTPG identifies a transmission infrastructure addition that will mitigate the violation. As noted above the 500-kV Midway-Gregg #1 and #2 lines, and the upgrade of Gregg substation with two 500/230-kV transformers, were added to achieve a power flow solution and/or to mitigate overloads. The Final Phase 3 Study Report does not indicate what other alternatives may have been evaluated in determining that these upgrades would be effective in addressing the identified reliability issues.

What, if any, alternative wires- or non-wires-solutions were tested by CTPG in its effort to address the identified reliability concern? Specifically, did CTPG evaluate and determine that the following

¹ In practice, transmission planners run cases for those representative demand levels where the most severe problems are expected to occur and use engineering judgment for the rest of the demand levels. The intent is that the system will be reliable under all foreseeable conditions. This practice complies with NERC Standards and Measurements, wherein the Standard states that system performance must be met under “all demand levels” and the Measurement by which this Standard is met shall include “System performance assessments based on simulation testing for selected demand levels over the range of forecast system demands.” FERC Order 693 requires that “critical system conditions and study years be determined by conducting sensitivity studies with due consideration of the range of factors ...”

² See Excel [spreadsheet](#) named “Path15_2006_2007_2008_2009_2010_03-31-2011.xls.”

alternatives would not address the identified reliability concern? If not, why did CTPG not perform such an evaluation? (Provide a response for each of the items listed below.)

Wires-Solutions

- Other transmission infrastructure additions.
- Expand existing or implement new Special Protection Schemes (SPS)/Remedial Action Schemes (RAS) to:
 - Cross-trip generation for N-1 and/or N-2 contingencies
 - Cross-trip generation and/or load for N-2 contingencies
 - Cross-trip transmission elements for N-1 and/or N-2 contingencies
 - Insert or remove electrical devices (series capacitors, reactors, etc.) upon contingencies

Non-Wires Solutions

- Redispatch fossil-fired generation on either side of Path 15 pre-contingency so as to avoid overloads that would otherwise occur with the contingency.
- Increased incremental energy efficiency impacts above the level included in CTPG's net short projection.
- Increased demand response program impacts above the level assumed in CTPG's power flow analysis.
- Increased distributed generation above the level included in CTPG's net short projection.
- Selective addition of new generation in critical locations.
- Different pattern of generation retirements/refurbishments than included in CTPG's power flow analysis.
- Some combination of above alternatives."

CTPG Technical Study Team Response:

The only mitigation solution applied for the referenced reliability criteria violations was the addition of the 500-kV Midway-Gregg #1 and #2 lines, and the upgrade of Gregg substation with two 500/230-kV transformers.

The CTPG Technical Study Team did not evaluate any other potential wires- or non-wires alternatives. The CTPG is leaving the responsibility for considering such alternatives to the Balancing Authorities which are responsible for approving the proposed projects.