

**California Transmission Planning Group (CTPG)
Technical Study Team Response to the
June 2, 2011, Comments of Vote Solar Initiative (“the Group”) on
CTPG’s Proposed 2011 Study Work¹**

Comment:

One of the most formidable challenges for the CTPG’s planning efforts was summarized in the Study Results section of the Final 2010 CTPG California Statewide Transmission Plan,

“The challenge before the CTPG is to develop the proposed state-wide plan given considerable uncertainty about possible resource portfolios.”

This same renewable-generation development uncertainty highlights the need to develop comprehensive “bookend” scenarios around the level of renewable energy imports. Results from these scenarios will help ensure there is sufficient lead time to permit, design and develop any required network upgrades so that California consumers can take good advantage of the significant amounts of high quality renewable resource potential that are available from outside the state.

Furthermore, considering the significant efforts to develop transmission projects terminating at or near major California import points combined with the extensive renewable resource development potential from adjacent and more distant States as identified in the Renewable Energy Transmission Initiative (RETI) 2b, the Group believes the supplemental Southwest Import Scenarios can provide additional significance to the Statewide California Transmission Plan.

Objectives and Benefits

The objective of the scenarios proposed by the Group is to determine how high levels of renewable energy imports delivered to Southern California from the east will impact the California transmission system. This study request, if accepted, will help facilitate and inform discussions among states about how to create regional markets for renewable energy.

Supplemental Southwest Import Scenario Request

The Group requests consideration for three specific study scenarios that test the impact of varying levels of injections at key import hubs. For each scenario, the Group would like the CTPG to examine three typical system conditions: heavy summer, heavy autumn and heavy winter cases. If the CTPG requires specific dates and times, the Group suggests using July 14th at 5:00 p.m., September 14th at 5:00 p.m., and January 15, 2021, at 5:00 p.m. Since the Group is still discussing the likely mix of renewable resources that would be imported in each scenario,

¹ On June 21, 2011 CTPG received from the Group a second set of comments on CTPG’s proposed 2011 work plan. Where the June 21, 2011 comments address the same matters as the Group’s June 2, 2011 comments, the CTPG Technical Study Team assumes that the Group’s June 2, 2011 comments are superseded.

for the time being the Group suggests assuming full injection output (assuming a conservative 20-percent capacity factor) during all requested study scenarios, and that those injections displace fossil-fired generation inside California based on (economic) merit order dispatch. The Group has not had time to discuss how the injections should be split among technology types (wind, geothermal, solar PV, solar thermal, solar thermal with storage), but will work with the CTPG to fill in this data over the next couple of weeks. As with West of River Stress Scenario from 2010, the Group proposes a 40-percent southwest import level as the basis for Scenarios 1 and 2.

Study Request Scenario #1- Southwest Simultaneous Import at Major California Southwest Import Points

- 33.3% of Southwest Out-of-State Imports injected at North Gila 500 kV
- 33.3% of Southwest Out-of-State Imports injected at El Dorado 500 kV
- 33.3% of Southwest Out-of-State Imports injected at Palo Verde 500 kV

Study Request Scenario #2- Southwest Non-Simultaneous Import at Major California Southwest Import Points

Three specific separate study cases:

- Study Case 1 - 100% of Southwest Out-of-State Imports injected at North Gila 500 kV
- Study Case 2 - 100% of Southwest Out-of-State Imports injected at Palo Verde 500 kV
- Study Case 3 - 100% of Southwest Out-of-State Imports injected at El Dorado 500 kV

Study Request Scenario #3- Full California RES Southwest Simultaneous Import at Major California Southwest Import Points

- 33.3% of Full California RES injected at North Gila 500 kV
- 33.3% of Full California RES injected at El Dorado 500 kV
- 33.3% Full California RES injected at Palo Verde 500 kV
- Evaluate Sonoran-Mojave Renewables Transmission Project² network recommendations if transmission reliability or congestion issues are identified

CTPG Technical Study Team Response:

The CTPG appreciates the effort the Group has made in defining specific scenarios that the Group requests the CTPG to evaluate in its 2011 study work. Based on the CTPG Technical Study Team's understanding of the Group's proposal, fifteen different scenarios would need to be created and analyzed (*i.e.*, three different hours for Scenario #1, three different hours for each of the three Study Cases in Scenario #2, and three different hours for Scenario #3). The study of fifteen different scenarios is considerably beyond the number of scenarios the CTPG is currently contemplating for evaluation in connection with its 2011 study work.

The CTPG Technical Study Team requests that the Group clarify certain aspects of its proposed scenarios. In the "West of River Stress" scenario conducted by the CTPG in its 2010 study work, the CTPG modeled 22,869 gWh per year of injections at out-of-state buses in the desert Southwest. This is approximately 43 percent of the entire renewable net short amount (52,764

² <http://www.wapa.gov/recovery/planning.htm>

gWh).³ The CTPG Technical Study Team asks the Group confirm that its reference to a “40-percent southwest import level” corresponds with the 43-percent figure used by the CTPG for the “West of River Stress” scenario.

The Group suggests that CTPG assume “full injection output (assuming a conservative 20-percent capacity factor)” for all of the study scenarios. The CTPG Technical Study Team is unclear as to what the Group means by “full injection output” and the parenthetical reference to “20-percent capacity factor.” Specifically, is the Group suggesting that renewable resources be modeled in all three simulated hours as producing energy at 100 percent of the resource’s installed capacity level, but that the annual energy production from the resource would be assumed to be equal to a 20-percent annual capacity factor?

If this is what the Group is suggesting, the CTPG Technical Study Team would note that, given the three different hours proposed for study (July 14, 2020, at 5:00 p.m., September 14, 5:00 p.m., and January 15, 2021, at 5:00 p.m.), it is very unlikely that all modeled resources in the desert Southwest would be simultaneously producing power at a level equal to 100 percent of each resource’s installed capacity. Typical renewable output data indicates that neither wind nor solar resources are likely to be operating at full nameplate capability during these hours. In fact, without on-site storage or a solar collection system that is over-sized relative to the generator, solar resources would be physically incapable of producing 100 percent of nameplate output during these hours.

In addition, if all modeled resources in the desert Southwest were assumed to be simultaneously producing power at a level equal to 100 percent of each resource’s installed capacity, what assumptions is the Group proposing for the simultaneous output of other renewable resources outside the desert Southwest region? Even if these other resources were modeled at their expected output level corresponding to the simulated hour and month of the year, the CTPG Technical Study Team questions whether such an improbable profile of simultaneous renewable energy output would be meaningful and worthwhile from a study standpoint.

The Group proposes that the modeled output of renewable resources be assumed to “displace fossil-fired generation inside California based on (economic) merit order dispatch.” As a threshold matter, the CTPG Technical Study Team requests that the Group provide an explanation of how they would propose to define “(economic) merit order.” For example, what types of costs should be considered in determining “(economic) merit order” and how would these costs be calculated.

The CTPG Technical Study Team does not believe it is realistic to assume all decrements of fossil-fired generation will be “inside California.” California is part of the larger WECC electric network and buyers and sellers of electricity in the WECC are economically connected through a variety of centralized markets and decentralized bilateral markets. This means that the economic impacts of adding renewable generation at virtually any location on the grid—i.e., a reduction in the market clearing prices for energy and a corresponding reduction in the amount of fossil-fired

³ See columns R through V on the worksheet labeled “Summary_model_connections” in the Excel spreadsheet named “CTPG_WOR_scenario_Sept9am.xls” which is posted on the CTPG website at www.ctpg.us/public/images/stories/downloads/ctpg_wor_scenario_sept9am.xls.

generation which would be economical to operate—are felt throughout the WECC. The extent to which these impacts are felt is limited only by congestion and, in some instances, by bilateral contracts which require fossil-fired generators to run regardless of whether lower cost sources of power are available.

Given the above, there is little basis for assuming the addition of renewable resources to achieve California’s 33 percent Renewable Portfolio Standard (RPS) requirement will not result in fossil-fired generation decrements outside of California. Stated differently, and setting aside any local generation requirements, there is no logical basis for assuming that comparatively efficient fossil-fired generation “inside California” would be decremented before comparatively less efficient fossil-fired generation outside of California. In other words, all fossil-fired generation in the WECC will be decremented in economic merit order as renewable generation is added, and there is no rational basis for assuming these decrements will be limited to California.

The CTPG Technical Study Team does not understand the Group’s reference to “non-simultaneous import” at the desert Southwest buses listed in Scenario #2. The CTPG’s 2011 study work will utilize power flow modeling which, by definition, reflects “simultaneous” system conditions. The CTPG Technical Study Team requests that the Group explain what they mean by the reference to “non-simultaneous import.”

The Group’s Scenario 2 appears to envision that all of the renewable energy injections in the desert Southwest regions outside of California would take place at a single bus. If 40 percent of the renewable net short were injected at a single bus, and assuming a 20% annual average capacity factor applies to the renewable net short, the installed capacity associated with the renewable energy injected at this single bus would be 12,047 megawatts $[(52,764 \text{ gWh} \times 0.40)/(8760 \text{ hours} \times 0.20)]$. The CTPG Technical Study Team believes it is unlikely that this much new renewable generating capacity would be connected to a single substation.

The Group’s Scenario 3 appears to reference the injection the “full California RES [Renewable Energy Standard],” spread equally across three different desert Southwest buses located outside the state of California. Assuming the renewable net short used in the CTPG’s 2010 studies, and assuming that a 20-percent annual average capacity factor applied to this renewable net short, the installed capacity associated with the renewable energy injected at each of these three substations would be 10,039 megawatts $[(52,764 \text{ gWh}/(8760 \text{ hours} \times 0.20))/3]$. The Group is requested to confirm that the CTPG Technical Study Team’s understanding is correct. Assuming the CTPG Technical Study Team’s understanding is correct, the CTPG Technical Study Team advises the Group that it does not believe this scenario is realistic or even plausible. That a substantial portion of California’s renewable net short will be developed and interconnected to the existing grid *within* California, is a virtual certainty.

The Group’s Scenario 3 references the Sonoran-Mojave Renewables Transmission Project (SMRT). This project includes significant transmission upgrades within the CTPG’s study footprint as well as other upgrades that would be within the study footprint of other sub-regional planning organizations.

The CTPG Technical Study Team advises stakeholders that it expects to undertake technical studies in connection with the CTPG's 2011 work that would identify reliability criteria violations on transmission facilities that are either within California or that connect California to the Pacific Northwest, northwestern Nevada, central Nevada, southern Nevada, central Utah, or western Arizona. Other than for these facilities, the CTPG Technical Study Team does not expect to undertake technical studies to identify reliability criteria violations that may be associated with the addition of renewable resources. The CTPG's resources and expertise permit a thorough examination of reliability impacts within California and adjacent areas, but are not currently well-suited to examining reliability impacts outside of these areas.

Accordingly, the CTPG Technical Study Team recommends that the project sponsors for proposed interregional transmission projects that are intended to support the development of renewable resources in regions *outside* of the regions that are physically connected to the facilities described above (*e.g.*, in regions such as Wyoming, New Mexico, eastern Arizona, *etc.*) contact the subregional transmission planning groups that typically evaluate transmission in the area of the proposed interregional transmission project. For example the WestConnect and Southwest Area Transmission (SWAT) transmission planning groups typically evaluate proposed transmission projects in the southern Nevada and western Arizona areas. These regional organizations would therefore be the logical planning groups to examine the technical merits of the SMRT project as this project relates to the transmission systems in the southern Nevada-western Arizona area. The CTPG Technical Study Team believes it is important that the sponsors of interregional transmission projects located within the footprint(s) of pertinent subregional planning organization(s) demonstrate, through technical analysis conducted by those sub-regional transmission planning organizations, that any reliability criteria violations associated with the sponsor's proposed project can be adequately mitigated.

Within the CTPG study footprint, transmission infrastructure additions such as the SMRT project, are candidates for mitigating reliability criteria violations that may arise in connection with the renewable resource portfolios that are assumed to be developed in order to meet California's 33-percent Renewable Portfolio Standard (RPS).

The Group suggests that the CTPG evaluate the SMRT project in the event the CTPG identifies "congestion issues." Other than the single snapshot power flow analysis to be conducted by the CTPG in Phase 2 of its 2011 study work, the CTPG will not conduct any analysis that would estimate the frequency with which congestion could arise, the locations of such congestion, or the potential economic impact of such congestion.

Upon receipt of the clarifications requested above, the CTPG Technical Study Team will take under advisement the Group's request that the CTPG develop and analyze the scenarios described above.