California Transmission Planning Group (CTPG)
Technical Study Team Response to
Comments of Arizona Public Service Company (APS) on
CTPG's Draft Phase 4 Study Report

Comment:

The Draft CTPG Phase 4 Study Report assumes the renewable energy contribution at the Eldorado station is 50 percent, Palo Verde is 37.5 percent and North Gila station is 12.5 percent. APS suggests performing some sensitivity analysis around the percentage of renewable energy contributed by each state that could have a bearing on the Delaney-Colorado River 500-kV project as well. The CTPG recognizes in the report that uncertainty of location of renewable resources is a major challenge in the development of a definitive transmission plan and sensitivity analysis could help in identifying optimum transmission solution.

CTPG Technical Study Team Response:

The CTPG appreciates APS's comments on the Draft Phase 4 Study Report and points out that, as noted in the Draft Study Report, the above assumptions related to renewable energy contributions were provided by stakeholders participating in the CTPG process. With respect to the proposed 500-kV Delaney-Colorado River project, sensitivity analysis with differing amounts of renewable energy development in various states could produce scenarios in which it would be effective in mitigating reliability criteria violations that arise in those scenarios. The scenarios evaluated by CTPG to date, have not found such violations.

APS's comment raises the more fundamental question of how to bring the results of disparate scenarios and interconnection/deliverability studies done by numerous parties (both within and outside of California) together to make productive and efficient transmission investment decisions. Section 8.1.2 of the CTPG's draft statewide transmission plan (posted at www.ctpg.us) states that the "CTPG needs to develop a single baseline study scenario with a limited number of sensitivities designed to explore uncertainties in key assumptions embedded in the baseline study scenario." The CTPG believes that progress in developing the transmission infrastructure necessary to support renewable resource goals both within and outside of California requires a narrowing of the plausible renewable resource development scenarios, *i.e.*, a focus on those renewable resource development scenarios that are most likely to occur over time. APS's suggestions as to what those scenarios are, and APS's underlying rationale, would be useful input for the CTPG's future study work.

Comment:

The Arizona and New Mexico queues include a large number of renewable projects. The capacity in queue of the following entities is provided:

- APS: 11,120 megawatts;
- Salt River Project (in Arizona): 3,400 megawatts;

- WAPA, Desert Southwest Region, sells power in Arizona, southern California and wholesale customers in portions of Southwest: 4,840 megawatts;
- Public Service of New Mexico: 15,940 megawatts; and,
- NV Energy: 3,293 megawatts.

The large amount of renewable resources in queues in Arizona and New Mexico, compared to Nevada, support the need to study potential congestion between the Palo Verde Hub and the Blythe area and include consideration of a Delany–Colorado River project.

CTPG Technical Study Team Response:

As noted in the Draft Phase 4 Study Report, the CTPG did assess the amounts of generation in the queues of the parties listed above (and numerous other parties) and used this information, along with other pertinent information, to develop the three "high potential" transmission corridors (Pacific Northwest, Northwest Nevada, and Southwest) discussed in the Draft Report. The CTPG also suggested that these high potential transmission corridors will be the subject of further analysis in 2011. The proposed Delaney-Colorado River 500-kV line could well be a component that will be considered when the proposed analysis for the Southwest Corridor is conducted.

Comment:

In Phase 4, CTPG has identified "high potential" transmission corridors as opposed to "high potential" transmission elements as identified in Phase 3. The CTPG does not believe the transmission upgrades associated with significant renewable energy imports from out-of-state should be designated as high potential transmission projects based on lack of commercial interest demonstrated by California load-serving entities in out-of-state renewable energy resources. However, that could be attributed to the fact that the California load-serving entities consider transmission as a hurdle to procure out-of-state renewable energy. With the announcement of high potential out-of-state transmission, the interest levels could very well change. Additionally, another point to note is that if the in-state renewable zones do not develop as planned then California will have to look for resources outside the state to meet their Renewable Portfolio Standard requirements by 2020, which might becoming a daunting task with no out-of-state transmission planned in advance.

CTPG Technical Study Team Response:

As noted above, the identification of "high potential" transmission corridors is simply the first step in determining whether upgrades and/or additions within these corridors make sense considering (a) the likely pattern of renewable resource development throughout the WECC and (b) the expected outcome of various regulatory initiatives and rulemakings which affect California load-serving entities' ability to rely on out-of-state sources of renewable energy for meeting RPS goals and emission-reduction requirements. The CTPG expects that its future work will take the next step of assessing the likely result of ongoing regulatory initiatives and rulemakings affecting out-of-state renewable resource development and reflect these results in an

evaluation of potential transmission upgrades and/or additions within the identified high potential transmission corridors.

Comment:

In the Phase 4 studies involving the southwest corridor, the CTPG identified reliability issues in southern California if significant renewable resources were procured by California through the state's interconnections with the desert southwest (Nevada and Arizona). The Delaney-Colorado River 500-kV project could alleviate some of these reliability concerns.

CTPG Technical Study Team Response:

The following table summarizes information on the "new" impacts noted in the West-of-River Stress studies.

Impacted Line	Possible Mitigation[1]	Noted in Case			
		A2	B2	F2	F2_ 6700
Lugo-Victorville 500-kV line	• Upgrade terminal equipment at Victorville and raise some line towers, or, • Increase series comp in parallel 500-kV lines, or, • Build a second line	X	X	X	
Eldorado-Pisgah 500-kV line (series caps)	Upgrade series capacitors	X		X	
Pisgah-Lugo 230-kV line	Loop Mohave-Lugo 500-kV line into Pisgah	X	X	X	X
North Gila IV 500-kV line (series caps)	Upgrade series capacitors or bypass SC's during critical outage	X	X		
Fairmont-Rindaldi 500-kV line	Upgrade terminal equipment at Rinaldi			X	X
Lugo-Llano #1 & #2 500-kV lines and Llano-Vincent #1 & #2 500-kV lines	Upgrade wave traps in lines and drop Kramer area generation			X	

It is possible that the 500-kV Delaney-Colorado River project could mitigate the identified reliability criteria

[1] It is noted that other options might exist to mitigate the noted overloads.

violations on one or more of the impacted lines; the degree to which such would be the case would have to be assessed via technical studies. However, the CTPG notes that the possible mitigation measures shown on the above table are, for the most part, relatively low in cost. In addition, most would have comparatively minimal environmental impacts.

Comment:

In its Phase 3 studies, the CTPG identified "high potential" and "medium potential" transmission elements to be considered for inclusion in CTPG's statewide transmission plan. Results of Phase 3 analysis (stated explicitly in the report) suggest that the initial set of "high potential" transmission elements will provide transmission capacity to prevent reliability criteria violations when deliveries of renewable energy reaches twenty-two to twenty-four percent of retail energy deliveries in the year 2020. These "high potential" transmission projects do not provide adequate transfer capability to allow all California load-serving entities to meet their 33-percent Renewable Portfolio Standard goals without potential reliability violations under the assumed renewable injection points and fossil-generation redispatch scenario. It is unclear if perhaps the high potential transmission elements in conjunction with the medium potential transmission elements will resolve all the reliability issues or in fact there is a need for some additional transmission elements to maintain system reliability that has still to be identified.

CTPG Technical Study Team Response:

The CTPG Technical Study Team agrees that it is unknown whether the combination of the high potential and medium potential transmission elements “will resolve all the reliability issues.” The CTPG Technical Study Team also agrees that it is unknown whether there is a need for some additional transmission elements to maintain system reliability. The answer depends significantly on which renewable resources are actually developed and which fossil-fired generation redispatch pattern is implemented, as well as the practicality and cost of alternatives—such as the redispatch of gas-fired generation—that may be effective in maintaining system reliability.

Comment:

The proposed Delaney-Colorado River project can be a critical piece of the Southwest High Potential Transmission Corridor contemplated to be studied in the 2011 CTPG study. Given the potential near-term benefits to California, it is recommended that the CTPG study this transmission upgrade in studies planned in 2011 and recommend this project for incorporation into the California ISO planning process based on economic and policy drivers with significant residual reliability benefits. The project is a low-cost solution (high level estimate at approximately $220 million) relative to the anticipated benefits. The relatively low cost of the Delaney-Colorado River project, coupled with anticipated lower prices for renewable energy in Western Arizona and the lower cost of ancillary services and firming energy from the Arizona market, will be attractive to the California ISO which ultimately will be attempting to minimize the production cost to meet its demand requirements.

CTPG Technical Study Team Response:

As noted above, the proposed Delaney-Colorado River 500-kV line could well be a component that will be considered when the proposed analysis for the Southwest Corridor is conducted during 2011. So as to provide additional information that could be used in future analyses, the CTPG Technical Study Team requests that APS provide a quantification, if available, of (i) the "anticipated lower prices for renewable energy in Western Arizona," (ii) the "lower cost of ancillary services…from the Arizona market," and (iii) the "lower cost of…firming energy from the Arizona market." In providing this information, the CTPG Technical Study Team requests that APS describe the reference point/case/scenario which APS used to draw its comparative conclusions that the Delaney-Colorado River project will provide "lower" prices and costs. The CTPG also asks that APS provide a description of the methodology it used to quantify these lower prices and costs.

Comment:

In addition to up front reliability and economic benefits, the proposed Delaney-Colorado River project would provide additional access to a significant fleet of existing generating units and future planned resources in the Palo Verde Hub area which could be available for various ancillary services including:

- Generation reserves;
- Load following and regulation;
- Firming of variable generation resources such as wind and solar inside California; and,
- Voltage and inertial support which will increase the reliability of generation interconnections in California on the Colorado River to Devers transmission line.

Regardless of where the renewable resources to enable California to meet the renewable energy requirements are developed, it will be extremely challenging for the California ISO to integrate these resources into the grid. The Delany-Colorado River would allow access to an abundance of resources that could provide these much needed ancillary services to allow for this integration.

CTPG Technical Study Team Response:

The CTPG Technical Study Team requests that APS explain how the Delaney-Colorado River project would "allow access to…resources" that are otherwise not accessible by the existing transmission grid. Any analysis that APS has conducted to demonstrate the amount and location of resources that are not accessible by the existing grid would be useful for future CTPG studies.

Comment:

The Delaney-Colorado River project has substantial planning support to date, including studies by the CAISO, WECC, WestConnect, U.S. Department of Energy, among others. The project has already gone through significant permitting and siting review and much of the routing, etc. may be able to be used to expedite the

process and bring near term benefits to California. The project is anticipated to bring both near-term and long-term benefits:

- Interconnection to the Palo Verde hub will result in immediate market and reliability benefits to California;
- This project is not dependent on additional non-CAISO transmission projects under open season or other non-CAISO tariff mechanism which would put the need for the project at risk;
- This project will provide increasing reliability benefits to generation interconnections along the Interstate 10 corridor and in the Blythe area in California; and,
- This project will provide a low-cost platform which will increase options and competition for generation interconnection to California lowering costs to customers.

CTPG Technical Study Team Response:

The CTPG Technical Study Team requests that APS provide an explanation of the "reliability benefits" that would be provided to California by the Delaney-Colorado River project. In particular, the CTPG would appreciate receiving any studies that indicate that the Delaney-Colorado River project would mitigate a reliability criteria violation that would exist without the project.

Comment:

The configuration of the proposed Delaney-Colorado River project would provide an import path for the southwest out-of-state renewable resources and existing low-carbon resources under evaluation by the CTPG (*i.e.*, Palo Verde, North Gila) as well as interconnect with the High Potential Transmission Upgrades in earlier phases of the study (*i.e.*, Colorado River-Devers #2 line). The project is located in the same vicinity as a potential major renewable resource zone, thus requiring fewer additional upgrades to connect and deliver resources, versus more remote areas such as Nevada and other states further north and west. In determining specific projects within the Southwest Corridor, the CTPG should consider the total scale and cost of the facilities needed to access and deliver resources from the different import areas. The proposed project would increase access for California customers to the liquid Palo Verde hub and mitigate congestion on the Arizona-California interface. Residually, this would significantly increase the reliability and economic viability of renewable resources located east of the Colorado River where favorable siting for renewable energy exists.

CTPG Technical Study Team Response:

The CTPG Technical Study Team requests that APS provide any data and/or studies indicating the historical and/or projected frequency of "congestion on the Arizona-California interface" and the historical and/or projected economic consequence of such congestion.

Comment:

Two major transmission owners/developers - APS and Electric Transmission America ("ETA") - have submitted the project to the California ISO for economic-study consideration. Arizona Public Service brings a long history of transmission development and operating experience in the Southwest. APS owns and operates over 5,200 miles of transmission circuits and is a part owner and the operator of the bulk of the 500-kV system in Arizona. Much of the Arizona 500-kV transmission system is partly owned by California utilities and utilized to transmit resources within Arizona and New Mexico that California utilities own. APS is a leader in WECC involvement and regional and sub-regional transmission planning. Electric Transmission America, through its affiliates American Electric Power and MidAmerican Energy Holdings Company, brings the expertise and support of the owners of the first and fifth largest transmission systems (measured in lines miles per the Edison Electric Institute) in support of this project, and has significant experience with 500-kV and higher voltage system operation and design.

CTPG Technical Study Team Response:

The CTPG Technical Study Team will be interested in seeing the results of the California ISO's economic analysis of the Delaney-Colorado River transmission project.