

**Response of the California Transmission Planning Group
Technical Study Team to
Comments of ZGlobal
on the Revised Draft Phase 3 Study Report**

Comment Received

In all the CTPG Phase 2 and Phase 3 studies, CTPG has assumed a certain level of renewable generation, overlaid transmission projects for large generator interconnections, and then identified the reliability violations that resulted from connecting these renewable resources to the transmission grid. In Phase 3, CTPG then tested the submitted independent transmission providers' proposed transmission projects and other alternatives to determine whether those projects or other alternatives performed better in resolving these reliability violations. This process is flawed in many ways. This process is inconsistent with Federal Energy Regulatory Commission policies under Order No. 890 Transmission Planning Principles and incompatible with prudent transmission planning. ZGlobal asks how the CTPG analysis resulted in the most efficient transmission plans to meet California's thirty-three percent (33%) Renewable Portfolio Standard if all the proposed transmission projects are not evaluated equally so the projects that connect the most renewable generation with the least reliability impact are recommended. The CTPG assumptions will not achieve CTPG's goal of "...efficiently [meeting] the state 33% RPS" and ZGlobal asks that CTPG restudy the proposed independent transmission projects on an equal basis. Furthermore, ZGlobal strongly recommends that all proposed projects be evaluated equally to better determine the effectiveness of each proposed project in connecting renewable resources to load centers and resolving overloads. Only approved projects should be modeled in the base case.

CTPG Study Team Response

CTPG disagrees with ZGlobal's assertion that CTPG's study methodology is "inconsistent with FERC policies" or incompatible with "prudent transmission planning." Other than making the mere assertion, ZGlobal does not explain how the CTPG's processes related to the evaluation of transmission alternatives are "inconsistent with FERC policies" or incompatible with "prudent transmission planning." Rather, CTPG believes the evaluation of proposals from independent transmission providers serves several of the key planning principles articulated by the FERC in Order No. 890, most particularly the key principles of openness and transparency.

CTPG disagrees with ZGlobal's assertion that the "most efficient transmission plans" to support achievement of California's Renewable Portfolio Standard goals would include transmission projects that "connect the most renewable generation with the least reliability impact". While any transmission plan must meet the reliability criteria adopted by the North American Electricity Reliability Corporation, the Western Electricity Coordinating Council and the applicable balancing authority, the deciding factor as to whether a transmission plan is "the most efficient" depends on whether the elements of the plan compare favorably – in terms of technical performance and cost-effectiveness – to other wires and non-wires alternatives that would contribute to achieving California's RPS goals. Accordingly, in the view of CTPG, ZGlobal's reference to "least reliability impact" is misplaced. Additionally, as CTPG has repeatedly stated, none of the transmission

upgrades identified through its Phase 1, Phase 2 and Phase 3 studies has been compared to wires or non-wires alternatives, *i.e.*, there may be other solutions to the reliability criteria violations identified by CTPG that would more cost-effectively (“efficiently”) support meeting California’s Renewable Portfolio Standard goals in the Year 2020.

CTPG generally agrees with ZGlobal that only “approved projects” should be included in CTPG’s power flow cases. In some scenarios, however, a power flow solution could not be reached without adding network upgrades to the cases. Also, certain network upgrades included in signed Large Generator Interconnection Agreements between the renewable developer, the California ISO and the Participating Transmission Owner were included in the power flow cases at the request of the California ISO. The California ISO believes that these upgrades have a high probability of being built and should be reflected in the grid configuration used for CTPG’s studies.

Finally, CTPG disputes ZGlobal’s assertion that CTPG has not evaluated transmission alternatives submitted by stakeholders on the same basis that it evaluated the transmission upgrades identified through CTPG’s Phase 1, Phase 2 and Phase 3 studies. CTPG’s contingency-based evaluation methodology was applied in the same way to all potential transmission upgrades. Thus, all transmission projects have been treated “equally” with respect to the study methodology that was used in CTPG’s studies.

Comment Received

Assumptions related to the peak megawatts and gigawatt-hours for the renewable energy zones should be consistent with signed power purchase agreements and should reflect the load-serving entity’s commercial interests. In at least two scenarios, renewable energy zones with signed power purchase agreements were not considered.

CTPG Study Team Response

As the Phase 3 Study Plan fully explains, “commercial interest,” as measured by fully executed power purchase agreements, was a primary indicator used by CTPG to determine where new renewable resources will be developed and the level of development that would occur at various resource locations. Several of the study scenarios used these determinations as a key driver of the analyses that were conducted. However, there are many examples of resources with signed agreements failing or missing project schedules as described in their agreements. Accordingly, CTPG chose to consider renewable resource development portfolios based on other criteria in addition to whether a developer held a power purchase agreement. These criteria are fully described in the Phase 1, Phase 2 and Phase 3 Study Plans and Study Reports. This was done to recognize the considerable work being performed by others with an interest in these matters, including the California Renewable Energy Transmission Initiative, and to otherwise add to the robustness and scope of CTPG’s work and study results.

Comment Received

The analysis for each proposed transmission project, regardless of the project sponsor, should

evaluate the incremental benefits of each alternative. For instance, if a renewable energy zone has a potential of 5,000 megawatts and 750 megawatts was selected to be the level of renewable resource included in the base case, a simple reconductoring may be enough to resolve reliability problems. However, what if an additional 500 megawatts from the same renewable zone were to be interconnected? The preferred reconductoring alternative would quickly become insufficient to mitigate system overloads.

CTPG Study Team Response

As set forth in the CTPG Phase 3 Study Plan, the objective of the CTPG study was to develop a conceptual California statewide transmission plan to meet, by the Year 2020, California's Renewable Portfolio Standard under which thirty-three percent (33%) of all energy delivered to retail loads must be from renewable resources. To achieve this objective, the CTPG evaluated several renewable resource development portfolios, including a procurement plan-based portfolio, a generation interconnection queue-based portfolio, the California Renewable Energy Transmission Initiative "discounted core" ("Heavy In-State") portfolio, and the California Renewable Energy Transmission Initiative "Best CREZ" portfolio. CTPG then identified transmission solutions to mitigate any reliability criteria violations resulting from the addition of these new renewable resources. CTPG did not study the implications of the development of renewable resources at any of the renewable energy zones beyond these levels on the proposed mitigation. For the moment, CTPG's studies are limited to the scenarios described in its preceding study plans, but may in the future include sensitivity analyses to evaluate variations such as the ones described in ZGlobal's comments.

CTPG notes that there are a virtually limitless number of possible renewable resource development outcomes within a given CREZ. In theory, CTPG could develop a transmission plan that would accommodate the maximum estimated development potential within every CREZ. CTPG believes, however, that such a plan would have little value and, in any event, would be impossible to implement since, based on estimates provided by California Renewable Energy Transmission Initiative, the economically feasible renewable resource development potential within the state of California far exceeds California needs. Such a plan would be extremely costly, result in under-utilized transmission assets, and be extraordinarily difficult to justify to regulators and the public on the basis of "need".

Comment Received

There is a wide range of changes in the base case assumptions on tie flows from one scenario to the next. For instance, the Phase 3 Northern California peak scenario has south-to-north flows from California to the Northwest of about 800 megawatts (see page 39 table 7.2.2 of the Revised Draft Phase 3 Study Report). In reality, ZGlobal expected over 5,000 megawatts of imports from the Northern Region on the California-Oregon Intertie and the Pacific DC Intertie. In the Southern California Peak scenario, the flows from the northwest into California were more realistic. The northwest flows from the California-Oregon Intertie were 4,322 megawatts and 3,100 megawatts from the Pacific DC Intertie (Table 7.3.2 of the Revised Draft Phase 3 Study Report). Why would California export to the Northwest under a Northern California peak and export from Southern

California to the Northwest during autumn these large amounts of energy (over 4,700 megawatts at peak (Table 7.7.2))?

CTPG Study Team Response

CTPG appreciates ZGlobal's view that the simulated south-to-north flows on the Pacific AC Intertie in these two scenarios pose unlikely system conditions. These conditions resulted from the pattern of renewable and fossil-fired generation within the Western Interconnection assumed for purposes of CTPG's Phase 3 RETI-BC_Asn scenario and CTPG's Autumn scenario. It is this pattern that gives rise to the south-to-north flows on the Pacific AC Intertie in both scenarios.

Comment Received

Although ZGlobal found the records of California ISO and Public Utilities Commission approvals for the Sunrise Powerlink and Tehachapi Transmission Projects, the approval of the Colorado River–Devers–Valley project is conditional on the level of generation being interconnected. The California ISO approved the Palo Verde-Devers No. 2 Project, however, ZGlobal is unable to confirm that the California ISO has in fact approved the Colorado River–Devers-Valley line as previously mentioned. ZGlobal believes that only projects approved by the California ISO (for the investor-owned utilities) should be modeled in the base case.

CTPG Study Team Response

In a letter dated June 19, 2009, submitted to the California Public Utilities Commission regarding the "Conditions for ISO Agreement to Construction of California Portion of Devers-Palo Verde No. 2 Transmission Project", the California ISO expressed its conditional agreement specifically to the *construction* of the California portion of Devers-Palo Verde No. 2 (henceforth, Colorado River-Devers No. 2 and Devers-Valley No. 2). The California ISO stated the California portion of this project is needed as a generation interconnection facility. The California ISO agreed that construction of the California portion of the project may commence once large generator interconnection agreements that include the Colorado River-Devers No. 2 line are executed in the amount of at least 1,030 megawatts. The certificate of public convenience and necessity issued by the California Public Utilities Commission is also conditional on meeting this California ISO requirement.

Comment Received

Table 2.1 of the Revised Draft Phase 3 Study Report lists the upgrades "Without regulatory approval". ZGlobal believes that the Colorado River-Devers-Valley Line upgrade should not be modeled in the base case. Modeling these projects in the base case defeats the CTPG-stated objective "to develop a state-wide transmission plan that identifies the transmission infrastructure needed to reliability and efficiently meet the state's 33% RPS goal." By including this project in the base case, it is not being accurately weighed against alternative projects. Modeling specific projects in the base case that have not received regulatory approval may undermine the CTPG goals and place other transmission proposals at a disadvantage and at the same time give

preferential treatment to the projects of the investor-owned utilities.

CTPG Study Team Response

As noted in a previous response, the California portion of the Colorado River-Devers-Valley No. 2 Project has received conditional approvals from both the California ISO and the California Public Utilities Commission. Based on these approvals, CTPG believes it is likely that the Colorado River-Devers-Valley No. 2 Project will be built. It is therefore appropriately included in the CTPG base case.

Comment Received

Utilizing the “Best CREZ” resource portfolio is unrealistic since the investor-owned utilities have executed several power purchase agreements and the California ISO and utilities have executed several interconnection agreements in renewable zones that are not listed in the Northern and Southern Summer peak cases under renewable assumptions in Tables 7.2.4 and 7.3.4 of the Revised Draft Phase 3 Study Report. For example, the Kramer area has 344 megawatts of commercial interest (Table 4.3) but the value used in the two scenarios was 3,256 megawatts. Riverside East commercial interest (Table 4.3) of 1,562 megawatts but zero megawatts was used in the two scenarios. ZGlobal recommends that signed power purchase agreements and interconnection agreements be considered first and renewable resource portfolios consistent with these attributes be used for all scenarios.

CTPG Study Team Response

As noted previously, the Phase 3 Study Plan fully explains that “commercial interest,” as measured by fully executed power purchase agreements, was a primary indicator used by CTPG to determine where new renewable resources will be developed and the amounts of this development. Several of the study scenarios used these determinations as a key driver of the analyses that were conducted. Again, there are many examples of resources with signed agreements failing or missing project schedules as described in their agreements. Accordingly, CTPG also chose to consider renewable resource development portfolios based on other criteria. With respect to the use of the California Renewable Energy Transmission Initiative “Best CREZ” assumptions, their use in the CTPG studies recognizes the considerable work being performed by others with an interest in these matters, including the California Renewable Energy Transmission Initiative, and to otherwise add to the robustness and scope of CTPG’s work and study results.

Comment Received

ZGlobal was unable to determine how the 3,256 megawatts of generation interconnections in the San Bernardino area was determined.

CTPG Study Team Response

The San Bernardino resource figure of 3,256 megawatts represents the amount of installed generation capacity assigned to the Kramer CREZ in the California Renewable Energy Transmission Initiative “Best CREZ” renewable resource development portfolio. Questions regarding the development of the specific number should be directed to RETI. Contact Rich Ferguson, the RETI coordinator, at Rich@CEERT.org.

Comment Received

How is CTPG dealing with the Federal Energy Regulatory Commission’s recent March 2010 order prohibiting load dropping for N-1 contingencies?

CTPG Study Team Response

The reliability criteria that CTPG used for its Phase 1, Phase 2 and Phase 3 technical studies do not permit the use of load dropping for N-1 contingencies.

Comment Received:

The California-Oregon Intertie and Pacific DC Intertie flows seem to be unrealistic. For instance, the California-Oregon south-to-north flows into the Northwest during Northern California Peak conditions are 135 megawatts south-to-north under the A1 case (no renewable dispatch) and 778 megawatts south-to-north with renewable dispatch under the A2 case. Given the signed power purchase agreements with resource developers in the Northwest, what are the bases for such low flows?

CTPG Study Team Response

CTPG appreciates ZGlobal’s view that the simulated south-to-north flows on the Pacific AC Intertie in these two scenarios pose unlikely system conditions. These conditions resulted from the pattern of renewable and fossil-fired generation within the Western Interconnection assumed for purposes of CTPG’s Phase 3 studies. It is this pattern that gives rise to the south-to-north flows on the Pacific AC Intertie in both scenarios. Additionally, CTPG notes that several of the renewable resource development portfolios studied by CTPG reflect signed power purchase agreements with renewable resource developers in the Pacific Northwest. For example, the resource portfolio used by CTPG for its Phase 1 studies was based on member procurement portfolios which include signed power purchase agreements with renewable resources in the Pacific Northwest. Also, the California Renewable Energy Transmission Initiative “Heavy In-State” renewable resource development portfolio used in certain of CTPG’s Phase 2 studies is based upon a “discounted core” of renewable resources. This discounted core consists of projects having power purchase agreements approved by an appropriate regulatory entity. Some of these projects are located in the Pacific Northwest.

Comment Received

In Table 7.2.2 of the Revised Draft Phase 3 Study Report (“Major Intertie Flows”), the Path 15 flow in the A2 case exceeds the line rating (flow of 7,325 megawatts on a line rated at 5,400 megawatts). Please explain.

CTPG Study Team Response

This A2 study scenario was intentionally designed to evaluate the transmission upgrades that would mitigate reliability criteria violations arising under high south-to-north flows on Path 15. At the simulated south-to-north flow levels, a power flow solution could not be obtained without including transmission upgrades in the case. In particular, a new 500-kV Gregg substation, new 500-kV Midway-Gregg No. 1 and No. 2 lines, new Eastside 500-kV substation, 500-kV Gregg-Eastside No. 1 and No. 2 lines, a 500-kV Eastside-Tesla No. 1 and 500-kV Eastside-Tracy No. 1 line were added to the case to achieve a power flow solution. The addition of these transmission upgrades would allow an increase in the existing 5,400-megawatt south-to-north path rating for Path 15.

Comment Received

The CREZ assumptions in Table 7.2.4 of the Revised Draft Phase 3 Study Report do not support enough generation to be connected to the Sunrise Powerlink (344 megawatts). Why is this the case?

CTPG Study Team Response

The planned Sunrise Powerlink transmission project was the subject of extensive analysis and review by the California ISO and the California Public Utilities Commission. Both of these entities determined that the net benefits that the proposed project would provide to consumers within the California ISO balancing authority area exceeded that of any other alternative considered. None of CTPG’s Phase 1, Phase 2 or Phase 3 studies suggest otherwise.

Comment Received

Given that the Colorado River-Devers line has a conditional approval subject to adequate generation interconnection, why would the line be modeled in the “Best CREZ” Southern California peak scenario where Riverside East renewable generation was assumed to be zero megawatts?

CTPG Study Team Response

Consistent with the Phase 3 Study Plan, CTPG’s analyses are premised on the assumption that the transmission lines included in the Western Electricity Coordinating Council’s 2019 “Heavy Summer” power flow case represent a reasonable baseline assumption for the configuration of the WECC grid in the Year 2020. The proposed 500-kV Colorado River-to-Devers No. 2 line is included in WECC’s 2019 “Heavy Summer” power flow case and is therefore represented in the system configuration used by CTPG in its analyses.

With respect to the absence of renewable generation in the Riverside East CREZ (the RETI “Heavy In-State” and RETI “Best CREZ” renewable resource development portfolios) and the conditional approvals of the proposed 500-kV Colorado River-Devers No. 2 line, the line could have been removed from the baseline grid configuration used to evaluate the five scenarios that contained no renewable generation in the Riverside East CREZ (out of the twenty-four scenarios evaluated in the CTPG studies). These five scenarios are the “A-RETI,” “Asn-RETI,” “B-RETI,” “A-RETI_BC” and “B-RETI_BC” scenarios. However, even if the proposed 500-kV Colorado River-to-Devers Valley No. 2 line were not included only in the baseline grid configuration used to evaluate the five scenarios that included the RETI “Heavy In-State” and RETI “Best CREZ” renewable resource development portfolios, the proposed line might nevertheless have been identified in those studies as a transmission infrastructure addition that mitigated identified reliability criteria violations.

Given the time frame within which CTPG plans to finalize its Phase 3 Study Report, it will not be possible to remove the proposed 500-kV Colorado River-Devers-Valley No. 2 line from only the baseline grid configuration used to evaluate the five scenarios that included the RETI “Heavy In-State” and RETI “Best CREZ” renewable resource development portfolios and rerun those studies. However, Z-Global’s comment here could be reflected, as applicable, in CTPG’s work beyond Phase 3, unless the regulatory condition precedents are met and the Colorado River-to-Devers Valley No. 2 line project begins construction.

Comment Received

Please provide the major tie flows under the A1 case. Although the load in the In-State Scenario (see Section 7.4 of the Revised Draft Phase 3 Study Report) is the same for the Northern California Case, the renewable dispatch is 12,152 megawatts.

CTPG Study Team Response

There is no Phase 3 A1 case (CO₂ dispatch). The A2 case (CO₂ dispatch) was prepared directly from the A2 (A-Q) case used in Phase 2 CTPG Study. (See CTPG’s Phase 2 Study Report at page 44; the report can be accessed at the following address: http://www.ctpg.us/public/images/stories/downloads/2010-05-07_final_phase_2_ctpg_study_report.pdf). In turn, the A2 (A-Q) case was built from the B2 (B-Q) case. The B2 (B-Q) case was developed from a B1 case and its major tie flows are provided in Table 7.4.1 on page 56 of the Phase 2 Study Report.

Comment Received

Why is the tie flow under the Heavy In-State Southern California Peak B-Q scenarios (Table 7.5.2 of the Revised Draft Phase 3 Study Report) different from the Southern California scenario – “Best CREZ” (Table 7.3.2)? ZGlobal understands that the B-Q scenarios are aimed at testing the Heavy In-State scenario with CO₂ redispatch for out-of-state resources, however, the results showed a west-to-east flow on the east-of-river lines. Is it possible to have a west-to-east flow on the east-of-river system and east-to west flows on the west-of-river system? If we anticipate this scenario, do

we assume that some of the 500-kV line that California is building will be used to export energy? Is it realistic to assume the coal plants in the region can be cycled with solar and wind to the extent modeled?

CTPG Study Team Response

Tie flows in the BQ-CO₂ and B-RETI_BC scenarios are different for two reasons: (1) the location and mix of renewable resources in the two scenarios are different; and (2) the fossil-fired generation decrements necessary to accommodate the renewable generation additions are different.

Depending on the location of new renewable resources and the location of fossil-fired generation that is decremented to accommodate these resources, it is possible that east-of-river flows will be in a west-to-east direction at the same time that west-of-river flows are in an east-to-west direction.

West-to-east flows on the east-of-river path indicate that California would, under certain system conditions, be exporting energy into the neighboring desert states. ZGlobal asks if this means that “some of the 500-kV lines that California is building will be used to export energy;” however, ZGlobal does not identify which lines it is referencing. None of CTPG’s Phase 1, Phase 2 or Phase 3 work has identified new 500-kV lines that cross into southern Nevada or into western Arizona.

CTPG’s analyses do not assume that coal-fired generation in the region will be cycled *per se*. Rather, CTPG’s studies are based on single point-in-time snapshots that decrement the level of fossil-fired generation meeting California energy requirements to accommodate energy delivered from renewable resources; i.e., CTPG has not examined the hour-to-hour ramping patterns of any fossil-fired generators. CTPG has not conducted any analyses of the extent to which coal plants would be ramped up and down in order to accommodate increased renewable resource development, or whether contractual commitments would prevent any redispatch of energy from coal-fired units. Whether it is coal- or gas-fired plants that would be cycled will depend on future federal and/or state laws governing carbon production and a host of other factors.

Comment Received

The swing in east-of-river and west-of-river flows between the autumn and summer peak cases is quite large. Is it practical to see such a large swing when it can lead to cycling of coal plants in the southwest? What was a CTPG assumption for coal-generation energy deliveries into California?

CTPG Study Team Response:

CTPG has made no assumptions regarding coal-generation energy deliveries into California. CTPG’s CO₂ reduction scenarios (B-CO₂, AQ-CO₂ and BQ-CO₂) simply decrement coal generation in merit-order in order to accommodate increased renewable generation. The resulting power flows are subjected to contingency analyses to determine whether there are any resulting reliability criteria violations. CTPG then identifies transmission infrastructure additions that will mitigate those violations. Determining whether electricity generated from coal-fired power plants will serve California loads is beyond the scope of CTPG’s work.

Comment Received

Please provide the major tie flow for the Autumn scenario F1 case under Table 7.7.2 of the Revised Draft Phase 3 Study Report.

CTPG Study Team Response

Major tie flows for the F1 case used in the Autumn scenario evaluation are provided on the table below.

Major Intertie Path Flows

Path No.	Path Name	Path Flow (MW)		
		F1 Case	Limit [N-S]	Limit [S-N]
15	MIDWAY-LOS BANOS	5,121	4,800	-5,400
24	PG&E-SPP	0	160	-160
25	PACIFICORP/PG&E 115 KV INTERCON.	53	80	-30
26	Path 26	-2,258	4,000	-3,000
27	IPP DC LINE	1,734	1,920	-1,400
46	WOR	10,276	11,823	
49	EOR	8,849	9,300	
65	PDCI	-1,000	3,100	-3,100
66	COI	-2,748	4,800	-3,675
500	SCIT	9,235		

Comment Received

What was the import level assumed at Palo Verde? With Riverside East generation at 2,528 megawatts and imports from Palo Verde (assuring full deliverability), what are the N-0, N-1 and N-2 outage results for East and West of Devers? The comments of the Metropolitan Water District to the California Renewable Energy Transmission Initiative indicates their reluctance to reconductor their 230-kV line.

CTPG Study Team Response:

With respect to the requested outage results, CTPG cannot respond without a more specific identification of the study scenarios to which ZGlobal's inquiry is directed. Further, CTPG's analyses do not employ the California ISO's "deliverability" study methodology for interconnecting generators electing the "full capacity" study option in their interconnection requests. Accordingly, CTPG's analyses are not designed to "assur[e] full deliverability" as the term is used in the context of California ISO generator interconnection requests. For several reasons, CTPG believes it would be inappropriate, for purposes of developing a statewide transmission plan that will support

California's ability to serve thirty-three percent (33%) of its retail load with renewable energy by the Year 2020, to use the California ISO's generator interconnection study methodology:

First, CTPG represents the interests of all transmission owning utilities within California, not just those within the California ISO balancing authority area. Other balancing authorities do not use the California ISO's deliverability study methodology for evaluating interconnecting generators;

Second, the California ISO's deliverability study methodology for interconnecting generators does not apply to interconnecting generators selecting the "Energy Only" study option in their interconnection requests;

Third, applying the California ISO's deliverability study methodology for interconnecting generators to all of the resources in the renewable resource development portfolios used by CTPG would result in an overbuilt transmission grid. With certain exceptions, the California ISO's deliverability study methodology requires prior to taking contingencies that all generation (both existing and new) in the study area be operated at full capacity prior to and imports into the study area are assumed to be at historically high levels. These assumptions are unrealistic from the perspective of developing a statewide transmission plan because (i) it is unlikely that all generation in a given area will simultaneously be operating at full capacity, (ii) the output of existing fossil-fired generation in the study area will likely be *reduced* or *shut down* as the amount of new renewable generation increases, (iii) imports into the study area are unlikely to be at historically high levels because increased renewable generation will tend to reduce fossil-fired generation outside the study areas and therefore imports into the study areas, and (iv) it is a certainty that on a statewide basis not all renewable generation will be simultaneously operating at full capacity (which is the effective result if the California ISO's deliverability study methodology for interconnecting generators were applied to all of the resources in the CTPG's renewable resource development portfolios);

Fourth, the network upgrades that would result from applying the California ISO's deliverability study methodology for interconnecting generators would, in aggregate, be massive in scope, extreme in cost and generally utilized at a low level.

For these reasons, CTPG believes that a statewide transmission plan developed by applying the California ISO's deliverability study methodology would be extraordinarily difficult to justify to regulators and the public.

Comment Received

Given that the Colorado River-Devers project has a conditional approval, why is this line modeled in the CTPG study? The line was modeled in the base case and in all scenarios including the case where the independent transmission providers' proposals were studied and it was modeled in the Northern and Southern California scenarios (sections 7.2 and 7.4 of the Revised Draft Phase 3 Study Report) where Riverside East renewable were assumed to be at zero megawatts.

CTPG Study Team Response

As noted in a previous response, the California portion of the Colorado River-Devers-Valley No. 2 line has received conditional approvals from both the California ISO and the California Public Utilities Commission. Based on these approvals, CTPG believes it is likely that the Colorado River-Devers-Valley No. 2 project will be built. With respect to the study scenarios in which the Riverside East renewable generation is zero megawatts, see the CTPG study team's response to ZGlobal's thirteenth comment above.

Comment Received

The CTPG alternative lists a reconductor project of the Metropolitan Water District's Julian Hinds-Mirage 230-kV line. Is this a feasible alternative and has the District been contacted with regard to reconductoring their line?

CTPG Study Team Response

The Julian Hinds-Mirage 230-kV line is a Southern California Edison-owned line. However, the Eagle Mountain-Julian Hinds 230-kV line is owned by the District and mentioned in the Green Energy Express Transmission Project alternative analysis. Conceptually, the reconductoring of this line would require upgrading the District's portion of the Julian Hinds bus. However, as addressed in the CTPG response to the comments of the District, the alternative is not needed with the recent approval of the Blythe Energy Remedial Action Scheme.

Comment Received

CTPG is proposing a Special Protection Scheme to trip one Blythe Combustion turbine for an N-1 contingency on the Julian Hinds-Mirage line. The California ISO Planning Standards (ISO G5, Page 6) outlines Special Protection Scheme guidelines and states that a Special Protection Scheme designed against single contingency outages cannot cascade outages beyond the outage of the facility that the Special Protection Scheme is intended to protect – even in the event that the Special Protection Scheme fails to operate. This is not the case for a Special Protection Scheme that is designed against a double contingency, as the probability of an N-2 event is much lower. The standards go further to say that, if the Special Protection Scheme failed to operate, then the resultant overload on the protected element cannot trip on overload protection. The magnitude of the post-contingency overload is substantial enough to assume that the Julian Hinds-Mirage line would trip on overload protection. Have you concluded that the CTPG assumption is within California ISO Special Protection Scheme guidelines to list this as a feasible solution?

CTPG Study Team Response:

Yes; the Blythe Energy Remedial Action Scheme was recently approved by the California ISO.

Comment Received

The Green Energy Express Transmission Project alternative includes a new fast-acting phase shifter that will respond in the event of a disturbance to resolve overloads on the 230-kV system near Eagle Mountain. The percentage loading table in Section 8.9.1.5 of the Revised Draft Phase 3 Study Report indicates that an outage of the Eagle Mountain-Iron Mountain 230-kV line will overload Julian Hinds-Mirage, Eagle Mountain-Julian Hinds and the Julian Hinds Sectionalizing Breaker during an outage of the Eagle Mountain-Iron Mountain 230-kV line. The Green Energy Express phase shifter will adjust and resolve overloads on the 230-kV system. With the addition of a phase-shifting transformer, the flow on the 230-kV line can be redirected to the 500-kV system, thus reducing the line loading on the Eagle Mountain–Julian Hinds–Mirage 230-kV line. The double-circuit structure will also provide a solid 500-kV backbone with a 2,000-megawatt capacity and a parallel path to the existing Palo Verde-Devers 500-kV line, enhancing the reliability of the existing 230-kV line from Eagle Mountain to Devers. However, it appears that the phase shifter was static or locked for the CTPG analysis. The post-contingency flows were the same with and without the Green Energy Express Transmission Project. However, if the phase shifter was acting properly, this would not be the case. Can CTPG please confirm if the phase shifter was locked and, if so, what would the result be if the phase shifter was unlocked?

CTPG Study Team Response

As ZGlobal was informed during a telephone discussion, the representation chosen by ZGlobal of the Green Energy Express Transmission Project for the alternative analysis performed by CTPG did not include any phase-shifting transformers.

Comment Received

The east- and west-of-river flow assumptions seem very low. East- and west-of-river flows during on-peak hours are typically within 500 megawatts of each other. In addition, east-of-river flows typically approach their rating during on peak conditions. On Page 100 of the Revised Draft Phase 3 Study Report, CTPG lists the east-of-river flows at 4,621 megawatts (line rating of 9,300 megawatts). This assumption is very low and almost half the size of the west-of-river flows. What was the rationale behind these flows?

CTPG Study Team Response

The difference between east- and west-of-river path flows is attributed to two elements. The first is the absence of the Hassayampa-North Gila No. 2 line in the east-of-river definition. The second element affecting the difference between west- and east-of-river flows is the queue generation modeled within the Mountain Pass CREZ, as being connected to El Dorado substation in southern Nevada and as being connected to the Colorado River substation. With these two factors in mind, the difference in flow is consistent with the assumption stated above. CTPG also notes that with a large increase in new renewable generation, and the accompanying reduction in fossil-fired generation, “typical” east-of-river flows under historical conditions may no longer be the norm in the future.

Comment Received

The Riverside East renewable generation is listed at 2,528 megawatts, however, CTPG indicates that only one new line is required between Colorado River and Devers substations. The approximate rating on this line is 1,200 megawatts. CTPG must have assumed a reduction in Palo Verde imports in order to accommodate the additional 2,528 megawatts of generation plus imports from Palo Verde. The reduction in Palo Verde flows should take into account contracts that California ISO participants hold for firm imports at Palo Verde and also renewable generation that is slated to be imported from out of state. Please confirm this information.

CTPG Study Team Response

While the installed capacity of new renewable resource additions in the generator interconnection queue portfolio for the Riverside East CREZ is 2,528 megawatts, the expected simultaneous output of these generators at the time of the adverse summer peak (4:00 p.m. in mid-July 2020) is 1,644 megawatts. This is the amount of renewable generation output that was modeled in CTPG's technical studies.

The referenced "1,200-megawatt" line rating is the approved increase to the simultaneous west-of-river path flow as a result of adding the Colorado River-Devers No. 2 line. This does not preclude the Colorado River-Devers No. 2 line from operating up to its thermal rating of 3,420 MVA under all-lines-in-service conditions and 4,615 MVA under contingency conditions.

As stated in the Phase 3 Study Plan, nuclear units were not decremented to integrate renewable resources. However, depending on the study scenario, fossil-generation in the Palo Verde area may be decremented. CTPG does not believe the presence of "contracts" for "firm imports" at Palo Verde is relevant to the technical work CTPG has undertaken to date. While contractual terms may vary, it would be unusual for a California load-serving entity to schedule energy into the California ISO balancing authority area at Palo Verde under an existing "firm import" contract when the market clearing prices for energy at Palo Verde are less than the variable costs of the generator supplying that energy. In other words, it is CTPG's expectation that, as the amount of renewable energy production increases, it is likely that market clearing prices for energy will decrease and fossil-fired generation throughout the WECC will decrease, including—regardless of the presence of firm import contracts—fossil-fired generation in the Palo Verde area.

Renewable resources from out-of-state studied by CTPG are outlined in each of the renewable resource development portfolios. Please see the Phase 1, Phase 2 and Phase 3 study plans and study reports for the details related to these portfolios.

Comment Received

What is the rationale for using CTPG's Phase 2 studies and not the Southern California scenario outlined in the Phase 3 studies? What are the differences?

CTPG Study Team Response:

The objective of the alternative analyses of Phase 3 was to compare stakeholder project alternatives as mitigation to the needs identified in the Phase 2 studies. The Phase 2 studies were used because these results were available to the planning engineers at the time the stakeholder-submitted transmission alternatives were being evaluated. This is outlined in the Phase 3 Study Plan. With regard to the Green Energy Express Transmission Project alternative analysis and meeting the East of Palm Springs area needs, the difference that would result from following ZGlobal's suggestion is negligible.

Comment Received

The maximum installed capacity studied by CTPG for the Riverside East CREZ/Renewable Development Area is 2,528 megawatts. This is significantly lower than the generation identified in the California ISO generation interconnection queue shown in Table 1 of the Revised Draft Phase 3 Study Report. As of May 28th, 2010, the California ISO queue has a total of 5,944.5 megawatts of installed capacity and more than double the generation that was considered in the CTPG studies. Furthermore, Tables 1 to 3 show the following for East Riverside County:

1. Total Generation in the California ISO queue requesting interconnection in Riverside County is 8,151.5 megawatts (Table 2);
2. Out of the 8,151.5 megawatts, a total of 5,944.5 megawatts had requested interconnection in the East of Riverside (Table 2) area where the Green Energy Express Transmission project is located. In addition, there are 1,996 megawatts requesting interconnection at Devers or West of Devers where the MRE project is proposed;
3. For the East Riverside, the 5,994.5 megawatts represent 3,205 megawatts of installed capacity identified at Colorado River and Midpoint Substations alone, with an additional 2,739.5 megawatts at the Red Bluff and Eagle Mountain areas;
4. Table 2 shows 3,737 megawatts have either signed an Interconnection Agreement or are in the process of executing an Interconnection Agreement. In addition, there are 2,199.5 megawatts that have completed a System Impact Study and have decided to move to the next and final step of Facility Study. This brings a total of over 5,900 megawatts of generation that are in an advanced stage of the process and over 2,200 megawatts of generation that are in initial stage of the process; and,
5. The California Renewable Energy Transmission Initiative Phase 2B Final Report (May 2010) lists the Riverside East Capacity Estimate at 10,550 megawatts.

Based on these facts, CTPG's assumption that 2,528 megawatts of renewable in east Riverside County is a very conservative assumption and ZGlobal would request CTPG run a sensitivity for the Green Energy Express Transmission and Metro Renewable Express Projects with the following assumptions and under full deliverability:

- a. 2,200 megawatts connecting at Colorado River/Midpoint;
- b. 2,000 megawatts connecting at Eagle Mountain/Red Bluff; and,
- c. 850 megawatts connected at Devers Substation.

CTPG Study Team Response

CTPG is no longer conducting studies for Phase 3. However, CTPG strongly encourages stakeholders to continue working with CTPG to propose renewable resource development portfolios to be studied as further CTPG activities are designed. This include alternative resource portfolios and other study assumptions such as “full deliverability” as that term may be defined by stakeholders. As noted earlier in these responses, the term “full deliverability” is a concept somewhat unique to the California ISO balancing authority area and may not be appropriate for use by CTPG in developing a state-wide transmission plan.

Comment Received

The objective of the Green Energy Express Transmission Project is not to resolve N-1 or N-2 overloads. The evaluation of the Green Energy Express Transmission Project under Section 8.9 of the Revised Draft Phase 3 Study Report is focused on whether that project or the alternative (reconductoring the existing line) will reduce the existing N-1 and N-2 thermal overload. ZGlobal would not propose a 500-kV line to resolve an overload on the 230-kV system. The CTPG study uses the same generation and load levels under both cases (with and without Green Energy Express Transmission). Connecting no generation to the project is not its objective, however, the CTPG study shows that the project has no adverse reliability impacts. Please confirm what configuration of Green Energy Express Transmission Project was used to derive the results in Table 8.9.1.5 of the Revised Draft Phase 3 Study Report. Also please confirm why a planning study is only adding facilities to solve the reliability concerns and ignores the effects on the system of the generation scheduled to be delivered as shown in the queue.

CTPG Study Team Response

The configuration of the Green Energy Express Transmission Project used in the analysis of alternative projects in the Phase 3 study is outlined in the Revised Draft Phase 3 Study Report as a new Eagle Mountain 500-kV substation, a 500-kV transmission line from the new Eagle Mountain substation to Devers substation, and a 500-kV transmission line from Eagle Mountain to Red Bluff to Devers substations.

As explained in the Phase 3 Study Plan, the objective of the Phase 3 analysis of alternative projects was to analyze the extent to which an alternative transmission project proposed by a stakeholder satisfied “transmission needs” identified in the CTPG Phase 2 studies. CTPG recognizes that many of the stakeholder projects submitted were not designed to meet the specific “needs” identified by CTPG and that the potential benefit of these projects may very well only be demonstrated through assumptions other than what CTPG had assumed for its Phase 2 studies.

Finally, CTPG notes that, if all generation included in utility interconnection queues were included in CTPG’s studies, there would be far more renewable generation than required by California’s Renewable Portfolio Standard goals. Studying transmission needs for levels of renewable resource development above the resource requirements necessary to meet these goals may be considered for future CTPG studies. ZGlobal is encouraged to provide CTPG with its views on whether such scenarios should be considered for future work, the usefulness of studying these scenarios, the basis for ZGlobal’s views, and what renewable resource development portfolios

should be used (i.e., the quantities, technologies, and locations of new renewable resources) and the year (or years) in these future studies.

Comment Received

The Table in Section 8.9.1.5 of the Revised Draft Phase 3 Study Report shows several thermal overloads under N-1 conditions. For instance, upon the loss of the Julian Hinds–Mirage 230-kV line, the Eagle Mountain–Julian Hinds line will overload to 143.4 percent without mitigation and, therefore, it appears that the base case has N-1 and N-2 violations. Please confirm this information.

CTPG Study Team Response

As described in the Phase 3 Study Plan, the analysis of alternative transmission projects uses the Phase 2 study case (B2-Q) as its base case. The Phase 2 report included potential solutions for mitigation of the transmission needs identified in the Phase 2 study cases. The Phase 3 analyses were intended to compare stakeholder-provided alternative solutions to the transmission needs identified in the Phase 2 studies. This means that the base case (or start case) for the Phase 3 analyses must have shown criteria violations without mitigation to be valuable in the Phase 3 analyses.

Comment Received

ZGlobal understands that the existing Julian Hinds Special Protection Scheme is designed to drop Metropolitan Water District pumps or generation to resolve overloads. It appears that the Special Protection Scheme, if it exists, is able to prevent the overload under N-1 conditions. The Green Energy Express Transmission Project is not designed to solve an existing reliability problem and the focus should be on whether the project can connect more renewable generation without exacerbating the overloads that CTPG outlined in Table 8.9.1.5 on page 113 under the title, “Without Mitigation” in the Revised Draft Phase 3 Study Report. Can CTPG confirm the base case with no renewable interconnection does not show any overload facilities under N-1 and N-2 conditions with and without the Special Protection Scheme?

CTPG Study Team Response

The “existing” Special Protection Scheme (or formerly approved Julian Hinds SPS) did not consider Blythe I as a potential mitigation. The Phase 2 mitigation refers to a revised Special Protection Scheme (as noted above, this revised scheme was recently approved by the California ISO) to mitigate new overloads. Again, it is recognized that Green Energy Express Transmission Project is not designed to meet the specific needs identified by the Phase 2 studies.

Comment Received

Green Energy Express Transmission submitted several configurations, among them a 500-kV line

from Red Bluff to Devers. Was this configuration considered?

CTPG Study Team Response

CTPG had requested that ZGlobal choose one configuration of the Green Energy Express Transmission Project to be analyzed during the Phase 3 studies. The configuration chosen by ZGlobal is outlined in the Revised Draft Phase 3 Study Report and includes the loop-in of the second 500-kV line into Red Bluff.

Comment Received

On page 115, under Section 8.9.1.6 of the Revised Draft Phase 3 Study Report, CTPG concluded that 2,528 megawatts can be connected to the Colorado River and Red Bluff substations as long as: (1) the Colorado River-Red Bluff-Devers-Valley 500-kV line is in place, (2) the 230-kV line is reconducted, and (3) a Special Protection Scheme is installed. Furthermore, CTPG Table 8.9.1.5 shows the loading on the 230-kV system with "CTPG Phase 2 Mitigation". If this is the case, why build a Red Bluff substation and why not connect the renewable on the Eagle Mountain or the Julian 230-kV line?

CTPG Study Team Response

Red Bluff substation is a necessary interconnection facility to connect renewable resources in the Riverside East CREZ. Colorado River-Red Bluff-Devers-Valley No. 2 is a critical line for receiving and delivering energy from these resources. Connecting resources at Eagle Mountain or Julian Hinds would create new potential criteria violations without any upgrades to that part of the system. This should not be confused with the additional transmission needs and associated mitigation (230-kV reconductor and the Special Protection Scheme) identified in the Phase 2 studies after renewable generation has been integrated.

Comment Received

It appears that CTPG analysis does not assure full deliverability of the 2,528 megawatts of renewables connecting to Red Bluff and Colorado River? Please confirm this information.

On page 116 of the Revised Draft Phase 3 Study Report, CTPG identified an N-2 violation on Devers-Red Bluff No. 1 and No. 2 500-kV lines. Is the Devers-Red Bluff No. 1 line part of Palo Verde-Devers No. 1? Is the Devers-Red Bluff No. 2 line part of the Colorado River-Red Bluff-Devers-Valley line?

CTPG Study Team Response

As discussed earlier in these responses, CTPG's studies do not employ the California ISO's deliverability study methodology for interconnecting generators electing the "Full Capacity" study option in their interconnection requests. As noted in the Phase 3 Study Plan, conducting

“deliverability” studies for interconnecting generators is the responsibility of the individual balancing authorities. The Devers-Red Bluff No 1 and No. 2 lines are correctly characterized in the comment.

Comment Received

Please provide the N-0, N-1 and N-2 flows under the conditions with no renewable generation outlined in the Table on page 8.9.1.5 of the Revised Draft Phase 3 Study Report?

CTPG Study Team Response

Because no studies were performed for the cases with no renewable generation, the requested data is not available.

Comment Received

Table 2.1 of the Revised Draft Phase 3 Study Report outlines the transmission upgrades added or removed from the Seed Case in order to produce the CTPG cases. In the first column titled “Upgrades with Key Regulatory Approvals and Environmental Permits”, CTPG lists the following upgrades around Devers:

- a. New Colorado River (“Midpoint”) 500-kV Substation looping in existing Palo Verde-Devers No. 1 line;
- b. 500-kV Colorado River-Devers No. 2 line; and,
- c. 500-kV Devers-Valley No. 2 line.

Please confirm that the configuration in Figure 2 represents the CTPG base case. Also, ZGlobal’s analysis shows that the Green Energy Express Transmission Project with one line from Eagle–Red Bluff–Devers and the second circuit from Eagle to Devers results in higher reliability than the Red Bluff-Devers 500-kv line modeled in the base case. This Green Energy Express Transmission configuration provides incremental benefits of interconnecting higher number of renewable with minimum incremental cost. Please analyze a scenario that represents the Green Energy Express Transmission configuration in the base case instead of the Red Bluff–Devers to examine which alternative provides a superior reliability.

CTPG Study Team Response

Figure 2 of the Revised Draft Phase 3 Study Report accurately portrays the relative order of substations along Devers-Palo Verde No. 1 and Devers-Colorado River No. 2. CTPG will not be doing any additional analyses as part of its Phase 3 studies, so additional scenarios including the Green Energy Express Transmission Project in the base case cannot be performed. In any event, the proposed scenario may not be useful given the approval status of the Colorado River-Devers-Valley No. 2 line and the likelihood that this line will be built.

Comment Received

Under the Phase 3 Study, what would be the purpose of modeling Red Bluff and Colorado River in the Northern and Southern California Peak scenario while the Riverside East renewable is zero?

CTPG Study Team Response

As noted earlier in these responses and consistent with the Phase 3 Study Plan, CTPG's analyses are premised on the assumption that the transmission lines included in the Western Electricity Coordinating Council's 2019 "Heavy Summer" power flow case represent a reasonable baseline assumption for the configuration of the WECC grid in the Year 2020. The proposed 500-kV Colorado River-to-Devers No. 2 line is included in WECC's 2019 "Heavy Summer" power flow case and is therefore represented in the system configuration used by CTPG in its analyses.

Again, with respect to the absence of renewable generation in the Riverside East CREZ (the RETI "Heavy In-State" and RETI "Best CREZ" renewable resource development portfolios) and the conditional approvals of the proposed 500-kV Colorado River-Devers No. 2 line, the line could have been removed from the baseline grid configuration used to evaluate the five scenarios that contained no renewable generation in the Riverside East CREZ (out of the twenty-four scenarios evaluated in the CTPG studies). These five scenarios are the "A-RETI," "Asn-RETI," "B-RETI," "A-RETI_BC" and "B-RETI_BC" scenarios. However, even if the proposed 500-kV Colorado River-to-Devers Valley No. 2 line was not included only in the baseline grid configuration used to evaluate the five scenarios that included the RETI "Heavy In-State" and RETI "Best CREZ" renewable resource development portfolios, the proposed line might nevertheless have been identified in those studies as a transmission infrastructure addition that mitigated identified reliability criteria violations. (See the CTPG study team's response to ZGlobal's thirteenth question above.)

Comment Received

Under the Phase 2 study, Table 7.10.3, the Riverside East renewable is set at 3,767 megawatts. The rating of the new Colorado River-Devers line is 1200 megawatts. How could the 3,767 megawatts be interconnected to the new line and ensure deliverability?

CTPG Study Team Response

As noted earlier in these responses, the referenced "1,200-megawatt" line rating is the approved increase to the simultaneous west-of-river path flow as a result of adding the Colorado River-Devers No. 2 line. This does not preclude the Colorado River-Devers No. 2 line from operating up to its thermal rating of 3,420 MVA under all-lines-in-service conditions and 4,615 MVA under contingency conditions. CTPG's studies modeled resources at their expected output level during the time of an adverse summer peak load condition (*i.e.*, at 4:00 pm in mid-July, 2020). Also, the Phase 2 B-SW scenario actually included 2,017 megawatts of installed capacity in the Riverside East CREZ and 1,750 megawatts of installed capacity at Palo Verde. For study purposes, this installed capacity was modeled as producing 1,312 megawatts in the Riverside East CREZ and 1,139 megawatts at Palo Verde.

Comment Received

In the scenarios where the Riverside East installed capacity was 2,528 megawatts, how much was placed at the Red Bluff, Colorado River, and Eagle Mountain? What was the distribution? How was the distribution computed?

CTPG Study Team Response

Approximately one-third of this capacity was dispatched at Devers, Red Bluff, and Colorado River. The locations were based on interconnection facilities identified in the respective interconnection studies.

Comment Received

The primary objective of the Metro Renewable Express is not just to resolve N-1 or N-2 reliability problems but to provide additional transmission capacity to transport low-cost energy to load. The Metro Renewable Express has a rating of 2,000 megawatts, injected into the Mira Loma station load pocket. The evaluation of the Metro Renewable Express Project under Section 8.7 of the Revised Draft Phase 3 Study Report is focused on whether Metro Renewable Express or the alternative (reconductoring the existing lines) will reduce N-1 and N-2 thermal overloads in the “West of Devers” area. ZGlobal would not propose an underground 2,000-megawatt DC line to simply resolve an overload on the 230-kV system.

CTPG Study Team Response

The study objectives and methodology laid out by the Phase 3 Study Plan specifically indicated that CTPG would analyze stakeholder alternatives and, more specifically, the ability of those alternatives to mitigate the identified needs from the Phase 2 studies. CTPG understands and recognizes that stakeholder alternatives are not designed to meet the objectives of the CTPG studies nor are their potential benefits maximized under the methodologies used in the CTPG Phase 2 studies.

Comment Received

ZGlobal’s analysis shows that the Metro Renewable Express Project with two cables, each rated at 1,000 megawatts, shows higher reliability than the Devers–Valley 500-kv line that was modeled in the base case. This Metro Renewable Express configuration provides incremental benefits of interconnecting higher amounts of renewable resources with minimum incremental cost. Could CTPG analyze a scenario that represents the Metro Renewable Express configuration in the base case instead of the Devers–Valley 500-kV to examine which alternative provides a superior reliability?

CTPG Study Team Response

As noted previously in these responses, CTPG will not be performing any additional studies for Phase 3. Regarding the 500-kV Devers-Valley No. 2 line, the proposed scenario may not be useful given the approval status of the Colorado River-Devers-Valley No. 2 project and the likelihood that this project will be built.

Comment Received

The Table in Section 8.9.1.5 of the Revised Draft Phase 3 Study Report shows several thermal overloads under N-1 conditions without the Metro Renewable Express alternative or the reconductoring project. Under each of the five contingencies listed, many facilities show thermal overloads. For instance, upon the loss of the 230-kV line, the Eagle Mountain–Julian Hinds line will overload to 143.4 percent without mitigation. It appears that the base case has N-1 and N-2 violations. Please confirm these interpretations.

CTPG Study Team Response

As discussed with ZGlobal during a telephone discussion, this comment was included in error and does not require response.

Comment Received

Under current operating conditions, it appears that the loss of the Devers–Valley 500-kV line will result in an overload of the 230-kV West of Devers line during off-peak conditions with high inertia flow. ZGlobal’s analysis shows that the stressed case for the Devers area is during off-peak and autumn. Under these conditions, ZGlobal observed an overload of the West of Devers 230-kV system when one or both of the Devers–Valley 500-kV lines are out.

In fact, the West of Devers 230-kV rebuild was outlined to the California ISO in 2008 by Southern California Edison studies which showed the following reliability issues: 110-116 percent overload under base case conditions, up to 164 percent overload under various N-1 conditions, up to 173 percent overloads under various N-2 conditions. Southern California Edison requested California ISO approval to reductor the 230-kV West of Devers line. It appears that West of Devers overloads are an existing reliability issue without the addition of renewable resources. Please explain this information.

CTPG Study Team Response

The Southern California Edison studies referenced included renewable generation as part of their assumptions. As an additional comment, the studies performed for Southern California Edison’s 2008 Annual Transmission Reliability Assessment and Compliance Plan for 2009-2018 are not the same as CTPG’s Phase 1, 2, and 3 studies. Materials distributed at the Phase 3 Study Report stakeholder meeting held on August 4, 2010, and posted to the CTPG website outline some of the differences in assumptions used by the different studies (see Slide 11 of the handout materials).

Comment Received

ZGlobal understands that Southern California Edison has installed a Special Protection Scheme to protect against the 230-kV overload on the West of Devers line. Would the Special Protection Scheme be modified under any of the scenarios studied? Can CTPG confirm that, in the autumn case and off-peak case during high west-of-river/east-of-river flow conditions, N-1 and N-2 conditions will overload the West of Devers facilities?

CTPG Study Team Response

The West of Devers Remedial Action Scheme is a temporary solution until transmission mitigation is in place. The cases studied would not change the Remedial Action Scheme nor the transmission needs identified in the Phase 1, 2 and 3 studies. The Phase 3 Autumn scenario identifies the West of Devers 230-kV lines as an area of transmission need for accommodating renewable generation.

Comment Received

Under the CTPG's Draft Phase 2 Study Report presentation to the California Renewable Energy Transmission Initiative Transmission Working Group dated June 17, 2010, the CTPG report concludes that the results of the proposed Devers–Mira Loma line "Mitigates the West of the Devers Overloads". With the injection of 500 MVAR to 1,000 MVAR into Mira Loma from the Voltage Source Converter, ZGlobal sees additional voltage and transient stability benefits. Is CTPG planning to perform a voltage and transient stability study? Also, please provide the assumptions for the Once-Through Cooling (OTC) dispatch.

CTPG Study Team Response

Voltage- and transient-stability studies were not performed for Phases 2 and 3 of the CTPG studies. Currently, a special task force has been given the responsibility of transient stability studies for CTPG. No update is available yet on the status of this work.

Assumptions regarding the retirement of, or decrementing of, once-through-cooling generators are evident from the power flow cases used in CTPG's various scenarios. If ZGlobal has not yet done so, ZGlobal is encouraged to request the specific power flow cases of interest to ZGlobal. Non-disclosure agreements may be required of ZGlobal prior to the provision of any requested power flow cases.

Comment Received

Section 8.7 of the Revised Draft Phase 3 Study Report outlines studies that were conducted for the West of Devers Area. The Metro Renewables Express alternative was described in this section and points out that Metro Renewable Express resolves all overloads. Has CTPG evaluated the impact of Metro Renewable Express on increasing the South of Lugo path ratio and impact on

once-through cooling scenario results? For the Power flow results on page 104 of the Revised Draft Phase 3 Study Report, what are the renewables assumptions?

CTPG Study Team Response

The alternative analysis performed on the West of Devers area did not evaluate the impact on the “South of Lugo path ratio” or the impact on once-through cooling scenario results.

The installed renewable generation capacities assumed are listed in Table 8.7.3 of the Revised Draft Phase 3 Study Report. The generation dispatched follows the resource profiles (based on location and resource type) and matches the Net Short in terms of annual energy.

Comment Received

The percentage loading Table in Section 8.7.1.5 of the Revised Draft Phase 3 Study Report is highly dependent on the pre- and post-contingency flows on the DC alternative project. It is crucial to assume maximum flow on the DC in the base case. DC schedules that are too low would be an inefficient use of the DC line and will result in higher post-contingency flows on the limiting elements. What was the Metro Renewable Express DC schedule in the base case?

CTPG Study Team Response

The Metro Renewable Express HVDC line was scheduled at 2,000 megawatts as indicated by the alternative proposal submitted.

Comment Received

Please provide the N-0 flow conditions on the Metro Renewable Express and on the system connecting to Devers.

CTPG Study Team Response:

The Metro Renewable Express HVDC line was scheduled at 2,000 megawatts as indicated by the alternative proposal submitted. Below are the nearby line loadings with Metro Renewable Express in-service.

Facilities	Rating (amps)	Base Case Flow (amps)	Base Case Loading (%)
Devers-El Casco 230-kV	1149.7	734	64
Devers-San Bernardino 230-kV	795.7	318	40
Devers-Vista 230-kV	1240	433	35
Valley-Alberhill 500-kV	3000	309	10
Alberhill-Serrano 500-kV	3000	271	9

Devers-Valley 500-kV No. 1 or No. 2	3000	556	19
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Comment Received

Was the West of Devers Special Protection Scheme modeled in the analysis of the Metro Renewable Express alternative project?

CTPG Study Team Response

The West of Devers Remedial Action Scheme was not modeled during the analysis of the Metro Renewable Express alternative. The construction of the West of Devers area Phase 2 mitigation or Metro Renewable Express would disable the Remedial Action Scheme as outlined in its protocol.

Comment Received

Can CTPG provide transmission line loadings under N-0 conditions for the Green Energy Express Transmission and Metro Renewable Express alternatives for lines west and east of Devers?

CTPG did not provide any consideration for off-peak conditions where curtailment is historically the highest. It is important to include an off-peak base case. During off peak conditions the load at San Bernardino, Vista and Etiwanda are low. The lower the load, the less the off-take on the 230-kV system will be and the higher the flows on the lines out of San Bernardino. An off-peak case may show that reconductoring alone will not resolve thermal overloads.

CTPG Study Team Response

The requested line loadings under N-0 conditions are provided in the following tables.

Metro Renewable Express Case

Facilities	Rating (amps)	Base Case Flow (amps)	Base Case Loading (%)
Devers-El Casco 230-kV	1149.7	734	64
Devers-San Bernardino 230-kV	795.7	318	40
Devers-Vista 230-kV	1240	433	35
Devers-Valley 500-kV No. 1 or No. 2	3000	556	19
Devers-Mirage 230-kV No. 1 or No. 2	1240	820	66
Devers-Red Bluff 500-kV No. 1 or No. 2	3950	1357	34

Green Energy Express Case

Facilities	Rating (amps)	Base Case Flow (amps)	Base Case Loading (%)
Devers-El Casco 230-kV	1149.7	1048	91
Devers-San Bernardino 230-kV	795.7	615	77
Devers-Vista 230-kV	1240	773	62
Devers-Valley 500-kV No. 1 or No. 2	3000	1146	38
Devers-Mirage 230-kV No. 1 or No. 2	1240	680	55
Devers-Red Bluff 500-kV No. 1 or No. 2	3950	693	18
Devers-Eagle Mountain 500-kV	3950	473	12
Devers-Red Bluff 500-kV No. 3	3950	641	16

As explained in the Phase 2 and 3 Study Plans, the off-peak condition described has been simulated in the Light Autumn scenario used in the Phase 3 studies.

Comment Received

The east- and west-of-river flow assumptions are low. The east- and west-of-river flows on peak are typically within 500 megawatts of each other. In addition, east-of-river flows typically approach their rating during off-peak conditions. On page 100 of the Revised Draft Phase 3 Study Report, CTPG lists the east-of-river flows at 4,621 megawatts (line rating of 9,300 megawatts). This assumption is very low and almost half the size of the west-of-river flows. What was the rationale behind the flow assumptions on the east- and west-of-river paths?

CTPG Study Team Response

As explained in the Phase 3 Study Plan, the assumptions for the west- and east-of-river path flows are based on the dispatch in the WECC 2019 Heavy Summer base case. Flow was then modified based on the heat rate decrement methodology following a 70/30 split for in-state versus out-of-state generation. Renewable resources modeled within the Mountain Pass CREZ, as being connected to El Dorado substation in southern Nevada and to the Colorado River substation increased west-of-river flow without increasing east-of-river flow. Lastly, Hassayampa-North Gila No. 2 is modeled in the WECC 2019 Heavy Summer base case but is not officially part of the east-of-river path definition. These factors explain the presumably “atypical” east-to-west of river relationship. CTPG also notes that with a large increase in new renewable generation, and the accompanying reduction in fossil-fired generation, “typical” east- and west-of-river flow relationships that may have existed historically may no longer be the norm in the future.

Comment Received

Section 8.9 of the Revised Draft Phase 3 Study Report outlines studies that were conducted for the East Palm Springs area. The Green Energy Express Transmission alternative was described in this section. The concerns listed above about the Riverside East renewable assumptions would have a large effect on the results of this section.

CTPG Study Team Response

CTPG agrees that changing renewable resource assumptions will change the results.

Comment Received

On page 94 of the Revised Draft Phase 3 Study Report, CTPG found that an N-2 condition on the Los Banos-Tesla 500-kV lines will overload the Los Banos bank to 110 percent of its rating and the existing Los Banos–Westley line by 120 percent of its rating with the proposed second 230-kV Los Banos-Westley line. ZGlobal interprets these results to indicate that there overloads that are observed with the proposed second 230-kV line in place and the existing Los Banos–Westley line in place (no reconductoring). Please confirm this interpretation.

CTPG Study Team Response

The overloads cited are associated with the project alternative proposal to install a second Los Banos–Westley 230-kV line between the Los Banos and Westley Substations. The second line is assumed to be identical to the first line and would be built in parallel to it. These overloads were mitigated with the project alternative proposal to reconductor the existing Los Banos-Westley 230-kV line. The existing line is composed of two circuits on common towers that are shunted together at the Los Banos and Westley Substations such that it acts as one circuit. This alternative includes rebuilding the existing line by splitting the existing line back into two circuits on the existing towers along with reconductoring them with 1113 ACSS conductor. This is explained within the section “Divergent Cases” on page 95 of the Revised Draft Phase 3 Study Report.

Comment Received

The proposed Los Banos–Westley 230-kV No. 2 line consist of separate structure with a new Los Banos 500/230-kV transformer (1122 MVA) with a rating of 400 megawatts and a capability to have a single bundled line, if needed, with a rating of 800 megawatts or two lines with 400 megawatts each. Please confirm the rating CTPG used on the proposed Los Banos–Westley line and whether a higher rating will mitigate the overload.

CTPG Study Team Response

The project alternative proposal to add a second Los Banos-Westley 230-kV line was modeled with a normal condition rating of 591 MVA and emergency condition rating of 677 MVA. The proposed project alternative to rebuild and reconductor the Los Banos-Westley into two lines have normal and emergency condition ratings of 754 MVA. A higher rating for both the proposed second Los Banos-Westley 230-kV and the existing line would mitigate the overload.

Comment Received

Under the scenario where the existing line is reconductored, CTPG findings show that the reconductored line mitigates the overload under N-2 conditions. Please verify this information since under both scenarios (the reconductoring scenario and the new line) the power will have to flow through the single 500/230-kV bank at Los Banos. ZGlobal is surprised that under the reconductoring alternative, no bank overload is found even though, as CTPG also observed, under the reconductor alternative the flow across the bank may result in a higher flow due to lower impedance, versus the alternative scenario (new line). Please provide N-0, N-1 and N-2 condition loadings for the two scenarios (reconductor): with 400-megawatt and 800-megawatt ratings on the new line and with and without the new proposed bank with a 1,122-MVA rating?

CTPG Study Team Response

The power flow model representing a second Los Banos-Westley 230-kV line, in addition to the existing line, includes one Los Banos 500/230-kV transformer bank rated at 1,122 MVA. The rebuilt Los Banos-Westley 230-kV line (split into two 230-kV lines and reconductored) has a higher impedance between Los Banos and Westley than the alternative of adding a second 230-kV line. Therefore, the alternative with a second line on a normal system basis has about 258 megawatts (970 megawatts as compared to 712 megawatts) more flowing between Los Banos and Westley and therefore more flowing across the Los Banos 500/230-kV transformer bank, where adding a second bank can alleviate overloading the existing bank under transmission line outage conditions. Building the proposed second line to have a higher rating as well as reconductoring the existing line likewise would alleviate overloading these lines as well. A good understanding of this can be seen in the associated power flow cases previously provided to ZGlobal.

Comment Received

It is very difficult to provide any feedback on the Pony Express since we do not have the N-0, N-1 and N-2 condition loadings with and without the project. Please provide the N-0, N-1 and N-2 condition loadings.

CTPG Study Team Response

No power flow simulations were performed for the Pony Express alternative. The details related to the treatment of the Pony Express alternative are provided in Section 8.8 of the Revised Draft Phase 3 Study Report.

Comment Received

Several transmission lines are planned to bring cheap energy into the Eldorado Valley. TransWest, TransCanada and the SWIP project are examples of these planned lines. From a regional planning perspective, would it be prudent to evaluate these projects versus some of the large generator interconnection projects in the CTPG base case? In addition, the proposed Pony

Express Project utilizes existing designated transmission corridors directly south of Eldorado and avoids the Eldorado–Marketplace-Mead– Lugo corridor. ZGlobal requests that CTPG run a sensitivity analysis with 1,200 megawatts of imports from Eldorado to Devers.

CTPG Study Team Response

As noted previously in these comments, CTPG will not be performing any additional studies for Phase 3. CTPG encourages stakeholders to continue working with CTPG in developing future study work. As a reminder, Phase 2 studies included two “Southwest Import” scenarios that modeled an installed capacity of 1,750 megawatts connecting to Eldorado substation (approximately 1,300 megawatts were dispatched given expected conditions at 4:00 p.m. in mid-July, 2020).

Comment Received

Throughout the Revised Draft Phase 3 Study Report, ZGlobal was listed as the stakeholder; however ZGlobal is a consultant to the stakeholder. Please update all references to ZGlobal to reflect:

- a. Los Banos-Westley No. 2 Line – Stakeholder: Clear Path Energy LLC
- b. The Eldorado–Devers 500-kV, AC line – Stakeholder: Pony Express LLC
- c. Metro Renewable Express – Stakeholder: Metro Renewable Express LLC
- d. Green Energy Express Transmission Line – Stakeholder: 21st Century Transmission

CTPG Study Team Response

CTPG will reflect these changes in its final Phase 3 Study Report.