Exhibit No.: _____
Commissioner: Dian Grueneich
Administrative Law Judge: Charlotte TerKeurst
Witnesses: Anjali Sheffrin, Christopher McLean and Mingxia Zhang

BEFORE THE PUBLIC UTILITIES COMMISSION OF THE STATE OF CALIFORNIA

In the Matter of the Application of Southern California Edison Company (U 338-E) for a Certificate of Public Convenience and Necessity Concerning the Devers-Palo Verde No. 2 Transmission Line Project.	Application 05-04-015 (Filed April 11, 2005)
Order Instituting Investigation on the Commission's Own Motion into Methodology for Economic Assessment of Transmission Projects.	Investigation 05-06-041 (Filed June 30, 2005)

REBUTTAL TESTIMONY ON BEHALF OF THE CALIFORNIA INDEPENDENT SYSTEM OPERATOR

Charles Robinson, Vice President and General Counsel
Grant Rosenblum, Regulatory Counsel
California Independent System Operator
151 Blue Ravine Road
Folsom California 95630
Telephone: (916) 351-4400
Facsimile: (916) 608-7296

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I. INTRODUCTION

This rebuttal testimony responds to (1) "policy" issues raised by the Office of Ratepayer Advocates ("ORA") in Volume 1 of its direct testimony and by The Utility Reform Network ("TURN"), (2) limited aspects of ORA's analysis of the Devers-Palo Verde #2 Transmission Line ("DPV2") set forth in Volume 2 of its testimony, (3) the "tipping point" analysis included in Volume 3 of ORA's testimony, and (4) the testimony of Global Energy Decisions ("GED").

II. POLICY ISSUES (ANJALI SHEFFRIN)

Scott Logan, in Volume 1 of ORA's testimony, properly asks the question: What problem is the evaluation of TEAM attempting to solve? He responds to his question by noting that "[i]f the original problem was perceived to be that if the CAISO did not perform integrated planning than nobody would, that certainly is not the problem today." (ORA, Vol. 1 at 5:18-20.) While true that the electricity industry has changed since TEAM germinated, Mr. Logan is not correct that the planning problem has disappeared, and Commissioner Grueneich appears to agree. On December 2, 2005, an Assigned Commissioner's Ruling Regarding Next Steps in Procurement Proceeding was issued in

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151 Blue Ravine Rd
Folsom, CA 95630

Rulemaking 04-04-003 that included a proposed "coordinated infrastructure planning and development" processes involving the CAISO, the Commission and the California Energy Commission. At a December 14, 2005 Commission workshop on the proposed coordinated planning process, President Yakout Mansour of the CAISO noted that one of the reasons for the joint initiative was that "the [participating transmission owners] did not really have all the information they needed from the ISO or from others to actually do what they need to do" to properly perform integrated planning. (See Attachment 16 at 126:19-23.) It is for that reason that the proposed coordinated planning process contemplates using the CAISO's position as system operator to prepare a benchmark transmission plan. That benchmark transmission plan would then, according to the proposed coordinated planning process, guide or facilitate the Commission's determinations in the Long-Term Procurement proceedings for Commission jurisdictional entities.

Two salient points can be extracted from the evolving coordinated planning process. First, the CAISO's transmission plan will remain subject to public scrutiny in a formal Commission proceeding. How, and ultimately if, the CAISO's transmission plan will be integrated into the Commission's procurement proceeding remains subject to continued discussions and attempting to anticipate, in this proceeding, the nature of that integration may not be a valuable exercise. Indeed, a question posed in this proceeding is "how should the Commission evaluate in a certification proceeding whether the CAISO … has followed the guidance provided by the Commission in a reasonable manner." (Administrative Law Judge's Ruling Addressing Phase I Testimony and Evidentiary Hearings (Oct. 28, 2005).) However, as noted whether that evaluation will be made in the certification proceeding or in the long-term procurement proceeding appears to be one of the questions posed by coordinated planning process. The procedures for performing the evaluation may be different depending on the outcome of Commissioner Grueneich's joint efforts.

Second, it is clear however that the Commission must have some level of confidence that the CAISO's transmission planning process will produce reasonable outcomes. The CAISO remains committed to TEAM and intends to use it in producing its transmission plan. (Attachment 16 at

171:14-17.) Accordingly, the problem TEAM should be viewed as solving is advancing a framework that ensures that a transmission project approved on the basis of economic efficiency is reasonable and defensible given other resource options. Contrary to Mr. Logan's uncharacteristically disparaging statement, the CAISO has "come through" with developing a robust methodology for conducting a net present value analysis of proposed transmission upgrades that is superior to, and more comprehensive and coherent than any other framework proposed to the Commission.

Another important observation related to the proposed coordinated planning process is that the TEAM approach may be applied to a range of proposed transmission projects. This militates against a highly prescriptive definition of an acceptable economic evaluation methodology that lacks the flexibility to be appropriately tailored to the proposal being examined. In this regard, the CAISO agrees with Mr. Florio of TURN that TEAM should be dynamic, not static. The CAISO's general principles allow the needed flexibility, while ensuring that an appropriate and effective framework is followed.

III. RESPONSES TO ORA'S VOLUME 2 ANALYSIS OF DPV2 (CHRIS MCLEAN)

The CAISO generally commends and agrees with the bulk of the analysis performed by Woodruff Expert Services ("WES") on behalf of ORA. However, the CAISO takes this opportunity to address two aspects of the WES analysis: (1) its application of Benefit-Cost-Ratio ("BCR") criteria, (2) its contention that the CAISO's "Energy Benefits" are overstated.

A. The CAISO Disagrees with the Use of a 1.25 BCR or a Payback Period

WES states that it "believes the Commission should generally only approve transmission projects that have an expected Benefit-Cost-Ratio (BCR) of 1.25 and a Payback Period (Undiscounted) of 15 years of less." (ORA Vol. 2 at 2-6, lines 21-23.) The CAISO has two concerns with WES's recommendation. First, the CAISO does not recommend a minimum BCR of 1.25. The CAISO understands that many potential economic benefits exists that are not currently quantified completely, but that may favor the economic value of the transmission upgrade. An example would be the insurance value for a transmission line, which is currently only partially quantified through

modeling several extreme cases. Also, the decision criteria need to focus on more than BCR. Risk reduction, environmental impacts, state policy considerations, local economic impact, and other considerations should be given weight when making a final recommendation. Thus, the CAISO believes that any transmission project with a BCR greater than 1.0 could be considered with other decision criteria.

Second, the CAISO does not believe that an undiscounted payback period should be used as a criterion. The payback period may be one of many interesting parameters that help to describe the cash flow of the project, but the CAISO believes that the only established payback requirement should be over the entire economic life of the project and involve discounted cash flows (i.e. the BCR).

WES also proposes that "inter-IOU" equity issues need to be considered by evaluating the IOU-specific BCRs and verifying "that ratepayers of each IOU are not expected to suffer a BCR of 0.75." (ORA Vol. 2 at 2-17, lines 14-22.) Although the CAISO agrees in concept with the goal of this secondary criterion proposed by WES, the CAISO does not support a literal interpretation of utility-specific BCR's at this time for two reasons. First, as discussed below, the computation of BCRs for utilities can be challenging, time-consuming, and problematic. The smaller the entity, the more important it is to try to incorporate the impact of contracts. Contracts are difficult to project without biasing the results of the study. Also, the use of contracts requires considerable additional effort that may, or may not, be warranted.

Second, the CAISO does not have sufficient experience in developing BCRs at the utility level to agree to a hard criterion that each utility needs to have a BCR above 0.75. The CAISO recommends that more experience be gained in these types of study before utility BCRs be required, and a rigid criterion enforced.

B. WES' Contention that the CAISO's Benefits Framework Overestimates Consumer Benefits Is Incorrect

WES suggests "the TEAM benefits framework tends to overestimate Consumer Surplus benefits by assuming that all energy is bought and sold at spot market prices." WES makes this assessment by noting that "much of the utilities' energy needs is met by power contracts or 'cost of service' generation whose costs to ratepayers are either partially or entirely insensitive to market

prices." (ORA Vol. 2, at 2-10, lines14-15.) The CAISO does not agree with WES's assessment. The CAISO's methodology for calculating Consumer Surplus is based on the following reasoning.

In an energy market where market information is available, transparent, and accurate, resource scheduling decisions are based on market prices and not contracts. For example, if a generator has the responsibility to deliver 100 MW per hour to a purchasing utility at a specific location, and if it is less costly to purchase that power instead of generate it, the generator will do so. Thus, it is the market price of power that determines resource scheduling, whether for a single utility or the entire WECC.

For regional market simulation purposes, resource commitment and dispatch decisions (i.e. resource scheduling) are determined solely on the basis of market prices and underlying generator costs and bids. This is the situation for both zonal and nodal simulations. Resource scheduling is determined based on market prices and not contract prices.

The impact of contracts is correctly considered after the market simulation as part of the settlement process. The contracts do not impact the resource scheduling. Nor do the contracts impact the societal benefits of a proposed transmission upgrade. Contracts can, however, have a significant impact on the cash flow for the various participants and their respective benefits. The CAISO initially attempted to include the impact of contracts in its evaluation of DPV2. This process proved to be problematic at best, and masking or changing economic conclusions at worst.

There are several reasons contributing to this problem. First, a transmission project is generally assumed to have roughly a 50-year economic life. The economic analysis should try to make some assessment that would prove to be valid and reasonable over the entire economic life. If a transmission line is online in 2010 and retired in 2059, information regarding existing contracts is only available for the first 2-3 years of the economic life. Therefore, assumptions must be made for the remaining 47-48 years. The second problem is that these contract assumptions can drive the participant results. The CAISO found that the participant benefits were highly sensitive to the contract assumptions, and that these assumptions could legitimately vary significantly. For example, are the CAISO ratepayers able to purchase power at expected spot prices before the DPV2 expansion is built? Is there a bid / ask spread that should be incorporated? What about after the line is built? There should be more supply competition after the line is built, so should it be assumed that CAISO

ratepayers are able to purchase power with a more advantageous bid / ask spread? These are typical questions that arise when trying to develop contract assumptions. And it turns out that the assumed answers to these questions can have a large impact on the participant results. Accordingly, in the interest of time and transparency, the CAISO decided to perform the DPV2 analysis without contracts (except for the development of bid strategies, where the impact of contracts was incorporated). The CAISO concluded that this would be a valid perspective from which to evaluate the economics of the proposed DPV2 upgrade because of the projected use of LMPs, and the expectation that future contracts generally track long-term spot price projections.

In summary, the CAISO picked a valid perspective for evaluating the DPV2 upgrade (a LMP-world without contracts). Contracts were not included for the following reasons:

- There were no meaningful data on the potential terms and conditions of contracts for 90 percent or more of the DPV2 economic life.
- Contract assumptions do not change the total or societal Consumer Benefit. The total Consumer Benefit is equal to the Cost-of-Load (CTL) before and after the expansion.

  $$CB = \sum CTL \text{ (before)} - \sum CTL \text{ (after)}$$

  The CTL calculation is based on LMP's and not contract prices.
- Contract assumptions did drive the conclusions and masked the underlying economics for the participants.
- The observation that contracts are intended to track market prices, which is the specific intended goal of simulations.

For these reasons, the CAISO believes that TEAM does not overstate the Consumer Benefits. The total Consumer Benefits are identical when modeling with, and without, contracts, but the distribution changes in a way that may bias the study. At this point, the CAISO contends that the participant benefits are best predicted when assuming that the societal benefits will be distributed in an equitable manner that tracks actual market prices.

IV. THE CAISO'S UNCERTAINTY ANALYSIS IS DIFFERENT AND SUPERIOR TO THAT OFFERED BY ORA (MINGXIA ZHANG)

The CAISO believes it is helpful to the Administrative Law Judge and the Commission to

identify where the analysis offered by ORA may materially differ from the TEAM methodology. WES's Chapter 4 on addressing uncertainty is such an area.

There are six distinctive characteristics of the TEAM methodology's approach to uncertainty analysis:

1. Uncertainty in net benefits is to be characterized by calculating the benefits under a wide range of *scenarios*, and assigning *probabilities* to those scenarios.
2. The scenarios are defined based on uncertainties in *fundamental drivers*, among them natural gas prices, electricity demand, hydrology, and level of market power.
3. To the extent possible, characterization of the possible values and probabilities of the drivers is based on *comparisons of past forecasts with actually realized values*.
4. *Explicit market simulation* models translate scenarios for the fundamental drivers into a scenario of next benefits.
5. The effect of *alternative probabilities* for the scenarios should be considered.
6. *There is no predetermined rule* for combining information on the uncertainties with other information into a decision as to whether a project is economically justified. Such judgments should be based on careful consideration of both the upside and downside risks of a project to California ratepayers, as well as the expected (probability weighted average) ratepayer benefits, as well as benefits to other stakeholders.

The WES methodology is different on all counts. In particular, the WES methodology is less defensible than the TEAM methodology for two primary reasons. First, WES categorizes uncertainties as common cause and specific cause variations. WES did not, however, provide a methodology on how to analyze the impact of specific cause variations (such as in gas price forecast and demand growth forecast) on transmission expansion benefits. The TEAM methodology, in contrast, includes explicit scenarios that provide reviewers with an understanding of how uncertainties can unfold over time. Explicit scenarios may result in distributions that are highly nonnormal because of nonlinear and synergistic interactions among drivers. Further, TEAM's explicit consideration of how fundamental drivers affect benefits, and of probability distributions for those drivers provides insight as to the causes of uncertainties in project net benefits. As such, it is then possible to undertake sensitivity analyses by making alternative assumptions regarding the distributions of drivers and their inter-correlation. Again, the WES analysis does not appear to provide a methodology on how fundamental drivers may affect benefits nor consider these linkages explicitly.

The WES methodology is also constrained to the random walk assumption. WES's random walk assumption may be applicable to common cause variables, but it is not applicable to all variables.

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151 Blue Ravine Rd
Folsom, CA 95630

It is easy to verify, for example, that historically CEC's demand forecast error (defined as the difference between forecast load and actual load over actual load) increases more years out, and is not a constant fraction of the actual or forecast load for each year. Another example is CEC's forecast error of gas price. The TEAM methodology allows explicit consideration of alternative assumptions based on past experience. TEAM's use of a market simulation model allows explicit linkage of drivers with market outcomes in a consistent manner, recognizing how market mechanisms in the West are evolving. Alternative assumptions concerning drivers are logically linked in TEAM to changes in distributions of model output (benefits). The WES method appears to lack this capability.

Most importantly, the TEAM methodology does not prejudge what level of risk is acceptable, nor does it assume that downside risks (lower than expected project benefits) are the only ones of concern to the Commission or ratepayers. The TEAM methodology considers both upside risks (scenarios in which the project may be much more beneficial than in the base case), including extreme cases in which the project might act as a type of insurance. The WES methodology assumes that the Commission and ratepayers are strongly risk-averse, and are only concerned with downside risks. No justification is presented for this general assumption, nor for the specific criterion for acceptable risk (positive net benefits with a 98% probability assuming a 25% reduction in benefits). Such a hard-and-fast criterion is unnecessary; it is more appropriate for the Commission and stakeholders to explicitly balance the various benefits and risks in making a judgment about the economics of a proposed project.

Second, ORA characterized common cause uncertainties by a year-by-year standard deviation of benefits, whose variance grows linearly over time consistent with a random walk process. (See, ORA Vol. 2 at. 4-2.) The distribution of benefits is assumed to be normal. ORA does not specify how the year-by-year standard deviations are derived, or why a random walk process is an appropriate assumption for forecast errors. The uncertainty in benefits is derived directly from assumptions concerning the year-by-year standard deviation in benefits, rather than from market models that link drivers to market outcomes. Finally, under ORA's methodology, the risk associated with a project is judged acceptable if the present value of net benefits has a 98% probability ("two sigmas") of being greater than zero, if it is assumed that benefits are 25% lower than the assumed values. Thus, as noted

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151 Blue Ravine Rd
Folsom, CA 95630

above, only downside risks of a project are considered (*Id.* at 4-2.)

The CAISO believes that the WES methodology is constrained by a normal distribution for common cause variations. WES' approach uses this overly simplified assumption and could lead to under or over-estimate of transmission expansion benefit. The TEAM methodology, in the contrast, can be extended to include all relevant specific cause variations. Possible disagreements over the future distributions of forecast error and generation capacity location are considered in TEAM through systematic sensitivity analyses (the linear programming method). No alternative probability distributions are considered in the WES methodology. The two-sigma adjustment of net benefits (after lowering benefits by 25%) can provide insight as one index of robustness, and therefore is potentially useful. But it should not be used as the *only* index of project risk. Both upside and downside risks should be considered.[1]

V. ORA'S "TIPPING POINT" ANALYSIS CAN BE A VALUABLE ADDITIONAL TOOL (CHRIS MCLEAN)

The CAISO believes that ORA's suggestion of a "tipping point" analysis, as described in ORA's volume 3, can be a valuable addition to the economic study. This analysis would generally allow the study to be better understood by the general public and decision-makers. However, the CAISO does not believe that the tipping point analysis should be a requirement, but rather that the analysis is simply encouraged or recommended.

The reason for the CAISO's position is that the tipping point analysis cannot be done effectively until an acceptable base or reference case, as well as multiple sensitivity cases, are developed, tested, and approved. At this point, the analyst is in the position to determine those variables that cause the most sensitivity to the economic results. The exact computation of the tipping point analysis may be fairly time consuming since the transmission upgrade benefits are not linear or totally predictable. An exact tipping point analysis may require some trial-and-error investigation, which is time consuming, but may not be the best use of resources. Additional sensitivity cases or

[1] In addition, it should be noted that the discussion of the economic benefits of transmission on p. 4-12 omits generation capacity benefits. One such benefit is that load and outage diversity lowers the required reserve margins in interconnected areas. Another is that capacity construction might be less expensive in the exporting region than in the importing region. This would be reflected in short-run markets (the focus of the discussion on p. 4-12) as follows: the importing region would run out of low variable cost capacity more quickly than exporting regions. But the discussion does not recognize how this comes about, and what the benefits are.

contingencies may be a higher priority. Nor may the tipping point analysis be required for all types of projects. Thus, the CAISO supports the idea of some type of tipping-point analysis, but the CAISO does not agree that it should be a requirement, or that the tipping point projection needs to be exact to be of value to the decision maker.

VI. GED'S TESTIMONY MISUNDERSTANDS THE CAISO'S POSITION (CHRIS MCLEAN)

GED's direct testimony contests the purported position of the CAISO that the Commission rely "exclusively" on the SSG-WI database for its economic analysis of proposed transmission lines. GED misunderstands the CAISO's recommendation with respect to the SSG-WI database. Rather than advocate the exclusive use of SSG-WI data, the CAISO recommends the use of the SSG-WI data for a cost-based reference case. The purpose of the SSG-WI reference case would be to assist in comparisons between alternatives models and approaches. Having a single reference case using identical data will help illustrate the difference in software model algorithms as opposed to data differences. However, beyond the cost-based reference case, the CAISO is not recommending a particular data source. From a planning perspective, it may be beneficial for study participants to employ different models, data, and techniques to understand if the economic conclusions for a proposed transmission upgrade are robust. As such, the CAISO is not opposed to using alternative databases for the majority of cases analyzed. The CAISO intends on using the SSG-WI database and updating and supplementing it as appropriate as a cost-based reference case.

As noted, the CAISO does not prescribe a particular model, but GED's suggestion that the Commission reject any limitation on appropriate models is unwarranted. The CAISO believes that the software model must be able to model transmission flows accurately. The CAISO believes that an AC OPF, DC OPF, or PTDF (Power Transmission Distribution Factors) approach on a nodal basis is adequate, but a transportation model is not. Attached hereto as Attachment 17 is a true and correct copy of "Comments on the California ISO's Transmission Expansion Assessment Methodology" by the CAISO's Market Surveillance Committed, dated June 1, 2004. That document includes in Section 2.2 and as an Appendix a discussion and comparison of transshipment and linearized DC load flow models.

ATTACHMENT 16

ATTACHMENT 17