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)

COMMENTS OF THE CALIFORNIA INDEPENDENT SYSTEM OPERATOR ON THE PROPOSED OPINION ON METHODOLOGY FOR ECONOMIC ASSESSMENT OF TRANSMISSION PROJECTS

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In accordance with Rules 77.2, 77.3 and 77.4 of the Commission's Rules of Practice and Procedure, the California Independent System Operator Corporation ("CAISO") respectfully submits its comments on Administrative Law Judge ("ALJ") TerKeurst's draft decision entitled "Opinion on Methodology for Economic Assessment of Transmission Projects," mailed June 20, 2006, in the above-referenced proceedings ("Draft Decision").

I. INTRODUCTION

The CAISO commends ALJ TerKeurst for sifting through the complex and, at times, frustrating details that comprise any credible economic assessment of a transmission project. As a result of the ALJ's diligence, many aspects of the Draft Decision are worthy of praise and should be accepted by the Commission. Although not an exhaustive list, the CAISO emphasizes support for the Draft Decision's proposal to:

- Focus on minimum general principles or guidelines of TEAM and analytical tools applicable to economic evaluations of transmission projects.

- Adopt the fundamentals of the CAISO's standardized benefit-cost methodology and benefits framework to measure economic benefits.

- Require any assessment of strategic bidding to include a description of the bidding strategy and steps taken to validate its predicative ability as well cost-basis assessments for comparability purposes.

- Require description of modeling assumptions regarding bilateral contracts and ownership of new generation.

- Adopt the need to assess at least two years several years apart.

- Require a sensitivity analysis addressing the effects of different assumptions for benefits in unsimulated years.

- Adopt uncertainty analysis parameters.

The Draft Decision notes that by adopting the foregoing general principles, the Commission will advance the likely level of consistency of the review process between the CAISO and Commission for economically driven transmission projects. While true in part, the Draft Decision does not go far enough.[1] In fact, the Draft Decision suffers from a fundamental defect by sanctioning the continued application of transportation models to perform economic assessments of large capital projects. This defect will largely defeat the stated core policy objectives of this Investigation to streamline and improve the efficiency of the regulatory review process and enhance the quality of the Commission's CPCN assessments. The practical effect of rejecting a full network

[1] The CAISO appreciates the ALJ's acknowledgment that "in developing its TEAM approach, the CAISO has made substantial contributions to advancing the art of transmission economic analysis." (Draft Decision at 20.) However, the CAISO strongly disagrees with the Draft Decision's statement that the Commission is "not convinced that certain aspects of [TEAM] are sufficiently developed to ensure reliable economic evaluations of proposed transmission projects" and, on that basis, "decline to adopt some of the CAISO's proposed mandatory requirements of TEAM." (Draft Decision at 23.) Other than the network representation requirement, the CAISO is unaware of any "mandatory" element of TEAM that is not being adopted. The CAISO described TEAM as an evolutionary methodology that should not be overly prescriptive and thus advocated that the Commission adopt general principles only. More importantly, the foregoing statement from the Draft Decision implies that elements of TEAM are faulty or less than state of the art. This is incorrect. Even those elements of TEAM that should be the subject of further development, such as the analysis of market power, are "as good as it gets" and there is no basis to state that TEAM will not result in reliable economic evaluations. Nevertheless, the Draft Decision does reach the correct conclusion by recognizing that project proponents should be free to offer an assessment of the project's impact on strategic bidding and will likely do so for projects not "clearly" economic.

representation is to encourage the status quo and the resulting need for the CAISO to perform a separate economic assessment. As such, and contrary to the goals of the Commission, the Draft Decision is unlikely to effectively "reduce[e] duplication efforts, the expense of participating in both at the CAISO and here, and the time required for the two reviews." (Draft Decision at 24.)

The CAISO's strong position on the network representation requirement arises from both its public purpose function and the fact that the CAISO, with the assistance of its independent Market Surveillance Committee ("MSC"), represents the only party to this proceeding that independently, and in an unbiased manner, evaluated alternative models to select optimal performance characteristics.[2] State and federal authority obligates the CAISO to ensure the efficient use of the transmission grid, including new transmission facilities placed under its operational control. In order to properly discharge this duty, the CAISO cannot, and will not, similarly acquiesce in the exclusive use of a transportation model. Experience has taught the CAISO the hard lesson that without an accurate representation of the physical flows on the transmission system, study outcomes are unreliable, at best, and proven incorrect, at worst. Simply put, the primary purported benefit of a transportation model – the ability to perform more robust stochastic analysis – may *compliment* a study using a full network model, but if used exclusively merely provides the decision-maker with an opportunity to review a greater number of cases founded on inaccurate physical flows. In this regard, and as explained below, the Draft Decision errs by downplaying or ignoring the shortcomings of transportation models, misunderstanding the conclusions reached by the MSC, and relying on incorrect or nonexistent purported deficiencies of full network models.

Accordingly, the CAISO urges the Commission to reject Section V.B.1.b of the Draft Decision and instead require that all future proponents of economically driven transmission projects

[2] The CAISO is not endorsing the PLEXOS model. There are many commercially available production cost modeling tools that utilize a full network representation.

support their CPCN applications with assessments that utilize a full network representation of the transmission grid.

II. THE DRAFT DECISION ERRS BY FAILING TO REQUIRE USE OF A FULL NETWORK MODEL TO PERFORM THE ECONOMIC ANALYSIS

The Draft Decision's conclusion regarding system modeling requirements seems to rest on the related notions that the relative advantages and disadvantages to the transportation model and the full network/DC-OPF models *are somehow equivalent* and that the "bias" exhibited by transportation models can be tested without employing a full network model, i.e. duplication. Both of these foundational premises are false.

The Draft Decision quotes from the June 1, 2004, MSC opinion for the alleged proposition that "transportation models have certain advantages and their use may be acceptable under certain conditions." (Draft Decision at 41.) The Draft Decision misunderstands the MSC. Contrary to the impression created by the Draft Decision, the MSC is far from agnostic on the existence of a preferred system modeling approach. The June 1, 2004 MSC opinion relied upon by the Draft Decision, as well as the "Comments on 'Opinion of Methodology for Economic Assessment of Transmission Projects,'" submitted on behalf of the MSC by its Chairman, Dr. Frank A. Wolak, and attached hereto, strongly advocate support for the use of a full network model over a transportation model:

> Because the major driver of the benefits of a proposed transmission upgrade is the difference in electricity prices across locations in the transmission network, the market simulation algorithm used to set the locational prices in the transmission benefits assessment methodology must represent as accurately as possible the actual market prices that would result from the assumed system conditions and bids submitted by market participants.

The MSC unambiguously reinforces the conclusion reached by the CAISO and PG&E[3] that modeling advantages are not all created equal in the context of an economic assessment of a transmission project. Rather, the most important characteristic of the modeling requirement is the ability to accurately represent the physical flows on the transmission system.

Similarly, the CAISO and MSC have consistently identified the shortcomings of the transportation model that potentially create the risk of significant deviations from the actual outcomes of market and system operation. The MSC listed the potential difficulties with simplified transportation models as including:[4]

- Disregard of Kirchoff's law thereby allowing power flows to be directed along preferred paths so that they bypass constraints that otherwise would be binding.
- By excluding nomograms and parallel flow restrictions, transshipment (transportation) models artificially increase the feasible region of flows.
- Derating capacities in an attempt to correct for the exclusion of nomograms and parallel flow can lead to too small a feasible region for injections, thereby artificially inflating production costs.
- The process of aggregation can distort the production costs and prices in a networked system.
- There is no guarantee that a zonal price calculated by an aggregated model will closely approximate the load-weighted average locational price that would be derived by a full network model.

The Draft Decision necessarily accepts in the existence of these shortcomings, but downplays their importance by remaining "unconvinced that benchmarking efforts cannot be sufficient to allow reliance on the results of transportation models." (Draft Decision at 43.) However, the Draft Decision again appears to misinterpret the MSC's view regarding the nature of the "benchmarking efforts" required to dismiss the existence of bias and allow the use of a transportation model.

[3] PG&E observed that "[i]n the real world, electric system costs and benefits are influenced by transmission congestion. The economic benefit of a transmission project is due to its ability to reduce transmission congestion. Therefore, to reasonably estimate the benefits of an economic transmission project, the methodology needs to appropriately consider transmission constraints." (PG&E Opening Brief at 6.)

[4] Exhibit 13, Attachment 17 at 6.

The MSC stated that a transportation model may be used if "computational experiments under a representative range of cost and demand conditions show that little bias results from using a simpler transshipment model." This "results comparison" does not refer simply to verifying transportation models with power flow models as suggested by SCE. (Draft Decision at 39.) Transportation models simulate "economic" and not "physical" flows. A power flow model evaluates the feasibility of "physical" and not "economic" flows. Evaluating the feasibility of economic flows which do not occur in reality with a detail power flow model provides a false sense of security by mixing proverbial apples and oranges. Instead, a full comparison must be made between the full network model and the transportation model and the resulting prices (nodal and zonal), cost-to-load, generator revenue and costs, and congestion costs, as well as the societal and CAISO Ratepayer and Participant benefits. As such, the bias referred to by the MSC is not just the transmission flows, but the economic results including societal benefits, CAISO benefits, and Consumer, Generator, and Transmission Owner Benefits. Since a transportation model uses congestion costs for the transmission revenue (only a wheeling rate), it is highly unlikely that the two approaches would result in "little bias" for many scenarios, particularly with respect to Consumer and Transmission Owner benefits. In short, the "results" the CAISO, the Commission and any other decision-maker should be most interested in are the economic results, not the loop flow or similar constraints.

Given this reality, the admitted computational or stochastic advantages noted by the MSC *arise only after* application of a full network model to test the results of the transportation model. As the CAISO has noted, regardless of the greater robustness of stochastics permitted by use of a transportation model, the greater number of cases will not enhance the quality of the study if the underlying physical transmission system and resulting economic outcomes are not modeled accurately. A transportation model can potentially complement, but cannot substitute for, the required full network analysis using a

DC-OPF (with fixed or variable shift factors). Thus, it follows that even under the Draft Decision's confidence in benchmarking, the requirement should be use of a full network model with optional use of the a transportation model to enhance scenario analysis.

Finally, the Draft Decision in an apparent attempt to equalize the relative merits of a full network representation and a transportation model lists purported disadvantages of the former. However, the Draft Decision is incorrect regarding these purported deficiencies. First, the Draft Decision is erroneous that "network models typically contain a somewhat simplified treatment of generators and their operating constraints, compared to the more detailed treatment of generators contained in transportation models" (Draft Decision at 38.) Models capable of performing both transportation and DC-OPF analyses use the same generation optimization engine with the same level of detail. There is no loss of generation optimization and accuracy with these types of transportation / network models, including PLEXOS and MARKETSYM. Second, the Draft Decision notes that a network model has problems modeling the interface between the CAISO and non-LMP areas. (Draft Decision at 43.) This criticism can be equally leveled against transportation models. No model can accurately and simultaneously model economic and physical paradigms. However, the CAISO and MSC has concluded that accurately modeling the physical transmission system must take precedence if the quality of economic assessments of transmission projects in California is to be advanced.

The CAISO urges the Commission to take a more critical evaluation of the relative advantages and disadvantages of the respective modeling options. Such an evaluation will reveal that the interests of the Commission in streamlining the project review process and in enhancing the quality of such review militate in favor of establishing a clear requirement that project proponents use a software tool that can accurately forecast physical flows and nodal prices on the WECC transmission network. To meet this requirement, the production cost program must, at a minimum, (1) use a network model

derived from a WECC power flow case and (2) perform a DC-OPF (using fixed or variable shift factors) or AC-OPF that models the physical power flows on transmission facilities for each hourly load and generation pattern.[5]

III. IF THE COMMISSION IS TO RELY ON D.03-02-069 REGARDING THE MIGUEL-MISSION UPGRADE, THE CAISO REQUESTS ADDITIONAL EVIDENCE BE ALLOWED

Rule 84 of the Commission's Rules of Practice and Procedure allows a party prior to issuance of decision to seek to set aside the submission and reopen the proceeding for the taking of additional evidence. Pursuant to this rule, if the Commission intends to rely on D.03-02-069, which considered the use of a transportation model to assess the economic benefits of the Miguel-Mission and Imperial Valley upgrades, the CAISO encourages the Commission to reopen the record to evaluate the accuracy of that modeling effort to actual results. D.03-02-069 came up for the first time in this proceeding during the cross-examination of witness Mr. Richard Lauckhart at hearing on behalf of Global Energy Decisions.

As the Commission is aware, SDG&E installed the Miguel-Mission #2 line in 2004. SDG&E used a transportation model to evaluate the need for the line. When the CAISO performed a subsequent analysis using a network model, it showed far more flow from the South and the line ended up reducing the impedence of the system into San Diego. Thus, the CAISO experienced an actual reduction in transfer capability, rather than an increase as anticipated by the contract flow transport model. The transport model did not estimate the flows that overloaded the 500 KV Imperial Valley-Miguel line and Miguel transformers. As a result, additional upgrades were required to obtain the benefits from the new Miguel Mission line. The CAISO believes that the issues raised in this Investigation should be resolved based on analysis, not advocacy. Accordingly, the CAISO requests would request that it be allowed

[5] The CAISO submits that this sentence could be inserted on page 1 of Attachment A to the Draft Decision under "Energy Benefits" to reflect this requirement.

offer this information to the Commission should D.03-02-069 constitute a justification for to the continued acceptance of transportation models.

IV. CONCLUSION

Based on the foregoing, the CAISO urges the Commission to revise Section V.B.1 of the Draft Decision by adopting the CAISO's position and language set forth in "Key Principle 2: Network Representation" of its Opening Brief that the use of a network model is a requirement for the economic evaluation of transmission projects in CPCN proceedings.

July 10, 2006

Respectfully Submitted:

By:_____
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Attorney for
California Independent System Operator

Attachment 1

Comments on "Opinion on Methodology for Economic Assessment of Transmission Projects"

by
Frank A. Wolak, Chairman
Market Surveillance Committee of the California ISO

July 7, 2006

The proposed decision of Administrative Law Judge (ALJ) Charlotte TerKeurst filed June 20, 2006 contains a quote from the June 1, 2004 Market Surveillance Committee (MSC) opinion on the California Independent System Operator's (ISO) Transmission Expansion Assessment Methodology (TEAM). This quote is preceded by a statement in ALJ TerKeurst's opinion that the MSC recognizes "…that transportation models have certain advantages and their use may be acceptable under certain conditions." The purpose of this memo is to clarify that the MSC strongly supports to use of a full network model in the assessment of the benefits of transmission network expansions. The only circumstances that the MSC would not object to the use of transportation models are when it can be shown that the pricing and dispatch errors introduced by their use are small. This position is consistent with quote cited in ALJ TerKeurst's proposed decision.

The quote from the June 1, 2004 MSC opinion taken from page 41 of ALJ TerKeurst's decision is reproduced below:

> [W]e believe that any estimation of transmission benefits should rely upon a full network model, unless computational experiments under a representative range of cost and demand conditions show that little bias results from using a simpler transshipment model. If indeed there is little such bias, then a transshipment model may have significant computational advantages, allowing consideration of a more complete range of fuel price, demand, hydrological, and equipment outage scenarios. However, in the absence of a demonstration that insignificant bias results from network simplification, a full network model based upon, at a minimum, a linearized DC load flow should be adopted.[1]

This paragraph in the June 1, 2004 MSC opinion is preceded by a detailed discussion of the many shortcomings of the use transportation models to assess the benefits of transmission upgrades in a wholesale market the use locational marginal pricing. The MSC opinion also contains 5-page technical appendix which illustrates that significant pricing and dispatch errors can result from the use of transshipment models.

[1] "Comments on the California ISO's Transmission Expansion Assessment Methodology (TEAM)" MSC Opinion, June 1, 2004 (available at http://www.caiso.com/docs/2004/06/01/200406011457422435.pdf).

The logic behind that MSC's strong support for the use of a full network model in the TEAM methodology is stated in the opening paragraph of the section entitled "Network Representation" in the June 1, 2004 MSC opinion.

> Because the major driver of the benefits of a proposed transmission upgrade is the difference in electricity prices across locations in the transmission network, the market simulation algorithm used to set the locational prices in the transmission benefits assessment methodology must represent as accurately as possible the actual market prices that would result from the assumed system conditions and bids submitted by market participants.

This section of the MSC opinion and the appendix attached to opinion demonstrate the many ways that the prices and dispatch quantities that result from transshipment models differ significantly from those that result from actual market and system operation using a full network model. These differences can result in substantial errors in the process used to assess the benefits of many potential transmission expansions.

The MSC opinion goes on to emphasize that because the California ISO will use a locational marginal pricing in all short-term markets under the Market Redesign and Technology Upgrade (MRTU), the methodology used to assess the benefits of transmission expansions, should attempt to replicate the full-network model used to set locational marginal prices (LMPs) under MRTU. The use of transshipment models that ignore Kirchoff's current and voltage laws can introduce significant errors into a benefits assessment for many important transmission upgrades, particularly those near major load centers where these constraints exert a major influence on locational prices and the optimal dispatch of generation units in a wholesale market that uses locational marginal prices, such as the California MRTU market.