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## **CAISO Draft Workpapers** **Response to Questions – Set #1**

Question 1a -- It is my understanding that this analysis used the Plexos model for a large number of hours per year. It is my further understanding that this is a "network" analysis.

CAISO Response -- We solve for 8760 chronological hours per year, for the years 2008 and 2013. This is a full network analysis of WECC. (Respondent: A. Geevarghese)

Question 1b -- Does the analysis use PTDFs (Power Transmission Distribution Factors) or is there a full network calculation for every hour?

CAISO Response -- PLEXOS contains both options of modeling. The "Standard Method", which we are not using for our analysis, calculates the PTDFs every hour irrespective of the change in the network. The other option is the "Large Scale Method" which calculates PTDF only once with deviations as needed. The user has an option of choosing the solution technique desired. In our analysis, given the size of the WECC network that we are solving, the "Large Scale Method" was used. For further information, see <http://www.plexos.info/kb5/>. Search for OPF, for sections Standard OPF and Large Scale OPF. (Respondent: A. Geevarghese).

Question 1c -- If the analysis uses PTDFs, are there different PTDFs calculated for every hour, or are PTDFs calculated for only one hour and used for all hours? (or something in-between?)

CAISO Response -- Please refer to response above. (Respondent: A. Geevarghese)

Question 1d -- If the analysis uses PTDFs, are the PTDFs developed from an AC load flow analysis or a DC analysis? (or some other method?)

CAISO Response -- The PTDFs are calculated from a DC analysis. (Respondent: A. Geevarghese)

Question 1e -- If the analysis uses PTDFs, does Plexos itself develop the PTDFs or does some other program calculate the PTDFs? Which other program?

CAISO Response -- PLEXOS itself develops the PTDFs. (Respondent: A. Geevarghese)

Question 3a -- What are the major factors causing the difference in benefits between the results presented at STEP last spring and the current results?

CAISO Response – At the May 14, 2004 STEP meeting, Mohamed Awad, from the CAISO Grid Planning Group, presented results from his studies indicating that the societal value (WECC-wide) of the PVD2 upgrade is \$10 million in 2008. At the January 14, 2005, Stakeholder Meeting, the expected societal value for 2008 was estimated to be approximately \$43 million. Although we are not able to review the May 2004 results in detail at this time, I believe the following factors contribute significantly to the difference in results:

- *Southwest Reserve Margin* -- The CAISO May, 2004 study relied on the SSG-WI data. SSG-WI forecast a reserve margin of about 14 percent for 2008 for the Southwest area (Arizona, New Mexico, S. Nevada)<sup>1</sup>. The CAISO January, 2005 study updated the planning reserve margins based on the December, 2003 WECC 10-year forecast.<sup>2</sup> For the January study, the Southwest planning reserve margin in 2008 is forecast to be 21 percent, about 50 percent higher than SSG-WI.
- *Natural Gas Price Differential* – Based on my limited research, I believe the Spring, 2004 studies used a gas differential in 2008 between Southern California and Arizona of \$0.11/mmbtu or less. The January, 2005 study updated this differential to \$0.37/mmbtu, more than three times as much as previously.
- *Single Case vs. Expected Value* – The Spring, 2004 study was based on a single case. This is a cast-based case without any consideration of market prices. The January, 2005 value is the expected value of multiple cases. All of these cases include market pricing. (Respondent: E. Toolson)

Question 3b – What is the basis for the \$0.37/mmbtu differential between S. California and Arizona natural gas prices?

CAISO Response – It is our understanding that the majority of the generation in the Southern California area incurs a \$0.37/mmbtu natural gas distribution charge to transport the gas from the pipeline to the plant. It is also our understanding that the new combined cycle facilities built in the Palo Verde region of Arizona, connect directly with the pipeline and thus avoid this variable charge. (Respondent: E. Toolson)

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<sup>1</sup> See website: [http://www.ssg-wi.com/documents/317-FERC\\_Filing\\_103103\\_FINAL\\_Appx\\_D1\\_FINAL\\_103103.pdf](http://www.ssg-wi.com/documents/317-FERC_Filing_103103_FINAL_Appx_D1_FINAL_103103.pdf), "Position by Region of Plant Location", p. 19.

<sup>2</sup> See website: <http://www.wecc.biz/documents/library/publications/10year/tenyr03.pdf>, Table 24 "Arizona-New Mexico-So. Nevada Power Area Estimated Peak Demands, Resources, and Reserves 2003-2012", p. 44.

Question 4 -- Can you provide an explanation of the bid adders before and after the new line, and how much of the annual benefit is due to this effect?

CAISO Response – We adopted a dynamic bid adder approach where bid adders are estimated based on system supply/demand conditions and market competitiveness. Therefore bid adders with, and without the new line, will be different because system conditions and market competitiveness could be improved due to new line addition. For more detailed discussion on the dynamic bidding model, please refer to Chapter 4 of our TEAM report at <http://www1.caiso.com/docs/2004/06/03/2004060313241622985.pdf>.

Annual benefit to the WECC region due to this effect could be one, or several times higher than the cost-based benefit estimation. The significance of the effect really depends on the scenarios selected for demand, gas price, and other factors. More severe system conditions (e.g., very high demand or very dry hydro) may manifest a higher benefit due to new line addition. Annual benefit to the CAISO ratepayers due to this effect could be even more significant due to the fact that the CAISO control area is predominantly a net importer in the region and the new line addition can greatly improve the supply shortage situation and thus lead to more profound impact on CAISO ratepayers. (Respondent: M. Zhang)

Question 5 – Did you use a “social” or “traditional” discount rate in your economic analysis of PVD2?

CAISO Response – We used what is frequently referred to as a traditional discount rate which represents the weighted cost of capital. In nominal terms, this discount rate is composed of debt, preferred stock, and common equity. The nominal discount rate or weighted cost of capital for this analysis is calculated to be 10 percent. In real terms, we exclude the impact of inflation, and the real discount rate is 7.2 percent.<sup>3</sup>

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<sup>3</sup> The inflation rate used to convert the nominal discount rate to the real discount rate is 2.65 percent. Since the cost of capital has been provided to us by SCE, for consistency purposes, we used their inflation estimate of 2.65 percent instead of the CAISO rate of 2 percent.