

Addendum to October 4, 2002 Report on Analysis of Trading and Scheduling Strategies Described in Enron Memos:

Revised Results for Analysis of Potential Circular Schedules (“Death Star” Scheduling Strategy)

January 17, 2003

Background

On October 4, 2002, the California Independent System Operator (“ISO”) issued a report prepared by the Department of Market Analysis, entitled “Analysis of Trading and Scheduling Strategies Described in Enron Memos”. This report was provided to regulatory and law enforcement agencies on a confidential basis. On January 7, 2003, the ISO released the report publicly and posted it on the ISO’s website.

As noted in the ISO’s report, the purpose of the report was twofold: (1) to indicate the potential magnitude of the extent to which the strategies outlined in the Enron memos may have been employed by Enron and other entities, and (2) to identify specific schedules and transactions that could provide a starting point for further investigation by various regulatory and law enforcement entities involved in review and litigation related to the practices outlined in the Enron memos. Since the analysis was designed to assess the potential magnitude of these strategies and provide a starting point for further analysis based on additional information not available to the ISO, the analysis was intentionally designed to “cast a broad net”, and identify all market activity that could be indicative of the strategies outlined in the Enron memos. As indicated throughout the report and to the regulatory and law enforcement entities, the results of the ISO’s analysis must be combined with additional information in order to identify specific instances in which the scheduling and trading strategies outlined in the Enron memos were employed by Enron or other entities.

Following release of the October 4 Report to regulatory and law enforcement entities, Market Investigations staff have continued to verify and refine the computer programs used to identify market activity that may be reflective of the practices outlined in the Enron memos and quantify the potential financial impact of these practices. As part of this work, several refinements have been made to the program used to calculate congestion revenues earned by import/export schedules that could potentially be indicative of the “Death Star” trading strategy. This addendum provides revised results of Table 2 in the October 4 report (p.11), and provides a more detailed description of the methodology and modifications used in this analysis.¹

Overview of Methodology

¹ None of the refinements leading to revision of results for the “Death Star” strategy are applicable to analysis of two other strategies analysis included in the October 4 report that include the calculation of congestion revenues (“Scheduling of Counterflows on Out-of-Service Lines”, p.24, and “Scheduling Energy to Collect Congestion Charges”, p.30). Calculations for these strategies are significantly less complex, and have been rechecked to ensure accuracy.

The “Death Star” scenario described in the Enron memos is an example of what the ISO refers to as a “circular schedule”, or a series of energy schedules that appear as an import and export through the ISO control area, but actually include additional schedule(s) outside the ISO control area which form a closed “loop” of scheduled energy with no specific physical beginning (source) or end (sink). (See more detailed discussion in October 4 report.) Thus, the type of circular schedule described as the Death Star strategy would appear in ISO scheduling records simply as an import and export from the ISO control area (earning congestion revenues by creating a counterflow), with the “return” portion of the schedule being outside the ISO control area.²

Like the analysis in the October 4 report, the analysis of potential circular scheduling in this report continues to be intentionally designed to “cast a broad net”, and identify all export/import schedules for which additional information may be collected to identify any circular schedules such as those described under the Death Star strategy. The analysis identifies potential circular schedules based on these two basic characteristics of such schedules that may be detected in ISO data: (1) an import and export of approximately the same amount of energy by a Scheduling Coordinator (“SC”) during the same hour, which (2) generate net congestion payments for the SC due to counterflows created on one or more paths. Thus, while all combinations of import/export schedules that earn congestion revenues by creating a counterflow are clearly not circular schedules, these key characteristics may be used to identify export/import schedules that may be part of a circular schedule submitted for purposes of earning congestion revenues.

Provided below is a more detailed description of the algorithm used to perform this analysis:

1. First, for each SC, the program matches import and export schedules for the same operating hour submitted for approximately the same quantity (within a small tolerance for rounding). This matching is done separately for final Day Ahead Schedules and final Hour Ahead Schedules.
2. Congestion payments and charges for each pair of import/export schedules are then calculated based on the scheduled amount of capacity (MW), and the congestion prices and direction on each congestion path the import/export schedules would create a scheduled flow. For example, for a pair of schedules representing an 25 MW import into NP15 over COI and an 25 MW export from SP15 on Palo Verde, congestion charges/payments would be calculated for a 25 MW flow in the north-to-south direction on COI, Path 15, Path 26 and Palo Verde.
3. For each pair of import/export schedules, the total net congestion payments were calculated (taking into account all paths over which a flow would earn or be charged congestion charges). Pairs of import/export schedules resulting in positive net congestion revenues during any hour (due to counterflow payments in excess of any congestion charges on other paths) are identified as those that could represent circular schedules submitted in order to earn congestion revenues.

² In addition, circular schedules may be created by “looping” energy back through the ISO control area under a different SC. However, this particular strategy would typically only be profitable if the energy schedule in the congested direction is scheduled by an SC with Existing Transmission Rights (ETCs), so that no congestion charges are incurred for this “return” portion of the circular schedule.

4. Total congestion revenues earned by the schedules identified in Step 3 are summed up. Results of this revised analysis are presented as in Table 2 (Revised), which includes a comparison of revised results with previously results included in the October 4 report.

The revised analysis summarized in this report incorporates three refinements in the computer program used in the initial analysis submitted in the October 4 report.

- Most importantly, the revised program now identifies schedules that would be covered by rights under Existing Transmission Contracts (ETCs), and accounts for the fact that these schedules would not pay congestion charges or earn congestion revenues for any counterflows provided. This step was not included in the initial analysis due to a lack of information needed to link individual schedules to ETCs. Data on ETCs for 1998 through January 2000 continues to be unavailable. However, summary data for 1998-2000 were set to zero for several entities known to have ETCs for similar schedules during subsequent periods for which data were available.
- In addition, in the initial analysis, Path 15 and Path 26 congestion revenues/charges were inadvertently included for schedules between SP15 to the Northwest on the DC inter-tie (NOB). The model was corrected so that Path 15 and Path 26 congestion revenues/charges are not included in calculations for flows on NOB.
- Additionally, a correction in calculations for congestion in the Hour Ahead Market was made.

Finally, it should be noted that minor "double counting" of some congestion revenues may exist in the revised analysis, since the monitoring algorithm can match one import schedule with multiple exports. Out of 270,000 pairs of import/export schedules matched by program, about 6% represent import schedules matched to more than one export schedule of the same quantity submitted by the same SC. Multiple matches are left in the analysis, since each possible combination of import/export schedules may warrant review as part of further investigation. Due to the large number of total records involved, refinements needed to eliminate this minor double counting in summary results in Revised Table 2 could not be completed at this time due to resource limitations. Since such refinements would have a relatively minor impact on overall results, revised results are being presented in order to provide the best available information at this time.

**Table 2 (Revised). Total Congestion Revenues from Counterflows
Created by Import/Export Schedules (Matched by MW Amount) by SC**

	1998	1999	2000	2001	2002	Total	Initial Results (Oct. 4 Report)	Notes
Coral Power, LLC			\$ 1,301,168	\$ 2,794,278	\$ 2,291,746	\$ 6,387,191	\$ 3,875,484	
ENRON Power Marketing Inc	\$ -	\$ 84,373	\$ 2,014,174	\$ 3,207,580		\$ 5,306,127	\$ 2,797,548	
Sempra Energy Trading Corporation		\$ 88,062	\$ 1,352,285	\$ 226,438	\$ 465,908	\$ 2,132,693	\$ 1,649,422	
British Columbia Power Exchange			\$ 16,866	\$ 322,559	\$ 1,602,780	\$ 1,942,205	\$ 1,084,673	
Mirant Inc.			\$ 105,070	\$ 318,207	\$ 1,497,791	\$ 1,921,068	\$ 496,337	
Cargill Alliant, LLC			\$ -	\$ 14,289	\$ 972,505	\$ 986,794	\$ 893,278	
Williams Energy Marketing and Trading	\$ -	\$ 508,339	\$ 34,884	\$ 10,074	\$ 190,728	\$ 744,025	\$ 966,283	
Automated Power Exchange, Inc-APX1	\$ -			\$ 732,754	\$ 2,662	\$ 735,416	\$ 682,162	
Calpine Energy Services				\$ 205,071	\$ 378,396	\$ 583,466	\$ 132,360	
PacificCorp	\$ 155,461	\$ 13,145		\$ 27,201	\$ 55,404	\$ 251,211	\$ 524,869	[2]
Duke Energy Trading and Marketing	\$ 19,840	\$ 8,822	\$ 134,366	\$ 1,584	\$ 2,585	\$ 167,198	\$ 215,651	[2]
Idaho Power Company			\$ 4,780	\$ 81,640		\$ 86,420	\$ 669,065	[2]
Modesto Irrigation District		\$ 49,265	\$ 14,304	\$ 19,057	\$ 326	\$ 82,953	\$ 79,929	
Aquila Power Corporation			\$ 75,975			\$ 75,975	\$ 6,288	
Morgan Stanley Capital Group, Inc.				\$ 35,618	\$ -	\$ 35,618	\$ 36,614	
American Electric Power Service		\$ -	\$ -	\$ -	\$ 19,877	\$ 19,877	\$ 19,481	
Automated Power Exchange-APX4				\$ 6,678	\$ 8,357	\$ 15,035	\$ 18,727	
Puget Sound Energy			\$ 3,098			\$ 3,098	\$ 1,815	
Arizona Public Service Company	\$ -	\$ -	\$ 1,174	\$ -	\$ 1,389	\$ 2,563	\$ 126,996	[1]
City of Riverside	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 1,501	[1]
City of Anaheim			\$ 0	\$ 0	\$ -	\$ 0	\$ 150,557	[1]
Grand Total	\$ 175,301	\$752,007	\$ 5,058,145	\$ 8,003,028	\$ 7,490,455	\$ 21,478,935	\$ 14,429,041	

NOTES.

Results represent sum of congestion revenues from pairs of import/exports resulting in net positive congestion payment during hour. Thus, results undoubtedly include import/export schedules that do not represent circular schedules or gaming strategies such as "Death Star". For instance, totals would include revenues from a supplier wheeling energy from Southwest to Northwest through ISO control area in the opposite direction of congestion.

Additional information or investigation needed to identify specific schedules that may be circular and/or involve gaming, and to identify any inaccuracies in data and calculations.

Results intended to provide (1) an indication of the upper bound of potential impacts of "Death Star" strategy, and (2) a starting point for further investigation in context of various legal and regulatory activities.

[1] Indicates participants for which change in results are due primarily to inclusion of ETCs in revised results.

[2] Indicates participants for change in revised results are due primarily to correction of payments/charges on NOB.

Other changes due to combination of [2] and refined calculation of Hour Ahead congestion payments/charges.

Data for Existing Transmission Rights (ETCs) is not available for 1998 - January 2000.

Therefore, ETC schedules not receiving congestion payments/charges in 1998-99 estimated based on ETC patterns in other years.

Minor "double counting" of some congestion revenues may occur, since monitoring algorithm can match one import schedule with multiple exports.

Out of 270,000 pairs of import/export schedules matched by program, about 6% represent import schedules matched to more than one export schedule of the same quantity submitted by the same SC. Multiple matches are left in the analysis, since each possible combination of import/export schedules may warrant review as part of further investigation.

Results do not include potential circular schedules which include schedules made under different Schedule Co-ordinator IDs.