



California ISO
Your Link to Power

California Independent
System Operator Corporation

Marginal Loss Surplus Allocation Study

Farrokh Rahimi
Principal Market Engineer

Market Surveillance Committee Meeting
November 13, 2006



Overview

- February 9, 2006 filing Reply Comments:
 - CAISO committed to undertake a study to compare distributional impact of allocating Marginal Loss Surplus (MLS) to Demand on a “regional” vs “system-wide” basis
- Market Initiatives Stakeholder Meeting of July 19:
 - CAISO white paper on proposed MLS study methodology
 - Stakeholders agreed on proposed methodology, but with no consensus as to what to do based on the results (impact thresholds)
- Study Progress Report of August 17:
 - Doing the study as specified in July 19 white paper required more time than initially anticipated
 - Made short cuts and simplifications to get initial indications of the level of impact
 - Had only 5 months of LMP results (May through Sep. 2004) with LMP decomposition based on distributed slack
 - Posted interim results and presented at July 17 stakeholder meeting
- FERC September 21 Order:
 - FERC accepted MLS allocation to Measured Demand system-wide
 - PG&E filed for hearing on the allocation method and requested completion of the study

Agreed-Upon Scope of the Study

- Determine the impact of regional vs system-wide allocation of MLS to Measured Demand.
- Stated differently: While maintaining MLS allocation to Demand within a region based on Measured Demand, compare the impact of regional allocation of MLS based on
 - Regional Demand Ratio Share
 - Regional MWh Loss Ratio share
- Only two Regions will be considered in the study: Northern Region (NP15 plus ZP26) and Southern Region (SP26)

Accounting for Impact of Path 26 Flow in Loss Ratio Share Regional Allocation

- To address uncertainty regarding cause of losses in each region for each hour:
 - If Path 26 flow is N-S, allocate Path 26 losses and marginal losses and a fraction (P26 NS Factor) of Northern Region losses and marginal losses to the Southern Region
$$\text{P26 NS Factor} = (\text{Path 26 Flow}) / (\text{NR Demand} + \text{Path 26 Flow})$$
 - If Path 26 flow is S-N, allocate Path 26 losses and marginal losses and a fraction (P26 SN Factor) of Southern Region losses and marginal losses to the Northern Region
$$\text{P26 SN Factor} = (\text{Path 26 Flow}) / (\text{SR Demand} + \text{Path 26 Flow})$$
- Use two bookends for P26 Factors: One bookend as above; the other bookend 0.

Agreed Upon Study Framework

- For each hour of the year use the LMP study results to:
 - Determine marginal cost of losses to serve the demand in each region (two bookends).
 - Determine the actual cost of the losses (MWh) to serve the demand in each region (two bookends).
 - Compute the hourly MLS for each region as the difference of the above (two bookends).
 - Compute the “Demand” in each region
- Compute average annual regional MLS rebate rate (for the Loss Ratio Share method) as follows:
 - Compute the annual MLS for each region by adding hourly MLS for that region (two bookends).
 - Compute the annual Demand for each region by adding hourly Demand for that region
 - Compute a MLS rebate rate (\$/MWh) for each region by dividing the annual MLS by the annual Demand for the region (two bookends).

Study Framework (Cont'd)

- For each hour of the year use the LMP study results to:
 - Determine marginal cost of losses to serve the Demand system-wide.
 - Determine the actual cost of the losses (MWh) to serve the Demand system-wide.
 - Compute the hourly MLS system-wide as the difference of the above.
 - Compute the system-wide Demand. [Note: This is the sum of the regional Demands for the hour]
- Compute average annual system-wide (=Regional Demand Ratio Share) MLS rebate rate as follows:
 - Compute the annual MLS system-wide by adding hourly system-wide MLS
 - Compute the annual Demand system-wide by adding hourly system-wide Demand [Note: This is the sum of the annual regional Demands]
 - Compute a system-wide MLS rebate rate (\$/MWh) by dividing the annual system-wide MLS by the annual system-wide Demand.

Study Framework (Cont'd)

- No stakeholder agreement on thresholds:
 - The difference between the two bookend annual MLS rates for each region (with or without Path 26 flow adjustment) represents the uncertainty in the regional MLS rebate rate (based on MWh loss ratios).
 - If the two loss-based allocation rates fall on opposite sides of the system-wide rate, then the differences between the system-wide and regional allocations may be ignored.
 - Otherwise, there was no agreement on an annual threshold (\$x/MWh) to use the Path 26 bookend as a tie-breaker
 - The Path 26 adjustment was proposed for the study, but is not an implementation candidate:
 - Requires tracking of MW trajectory to assign regional loss responsibility
 - Non-trivial software requirement to implement for two Regions
 - No obvious way how to implement beyond two regions (complexity may increase exponentially)



Simplifications for Interim Study

- Used 5 months of historical data instead of a year
 - LMPs with distributed load reference available only for May-September 2004
 - Need time and effort to supplement with another 7 months, since LMP references for previous 7 months are different from distributed slack
- Used “Load” instead of “Demand”:
 - Used “net import” per region (with plus minus sign as relevant)
 - Identification of and accounting for exports by tie and corresponding adjustments requires more effort
- Back computed Path 26 Flows and used Path 26 Flow (with plus or minus sign) to adjust Inter-regional loss allocation
 - Using directly computed Path 26 Flow and adjusting inter-regional loss allocation based on the source Region would improve results, but needs more time
- Ignored impact of inter-regional marginal loss shifts based on Path 26 Flow direction

Interim Results

**Table 1A - Summary Marginal Loss Surplus (MLS) Amounts (\$) for May-Sep. 2004
(Preliminary Results with Simplifications)**

Month	System Wide MLS	System Load Ratio Method (Filed Methodology)		No Path 26 Adjustment Bookend		Path 26 Adjustment Bookend	
		NP15 Allocation of Total MLS Based on Ratio of Load	SP15 Allocation of Total MLS Based on Ratio of Load	NP15 Regional MLS with No Path 26 Adjustment	SP15 Regional MLS with No Path 26 Adjustment	NP15 Regional MLS with Path 26 Adjustment	SP15 Regional MLS with Path 26 Adjustment
May 04	\$22.2 M	\$9.9 M	\$12.3 M	\$11.2 M	\$11.0 M	\$10.0 M	\$12.2 M
June 04	\$25.4 M	\$11.8 M	\$13.6 M	\$14.7 M	\$10.7 M	\$12.7 M	\$12.7 M
July 04	\$29.6 M	\$13.6 M	\$16.0 M	\$17.8 M	\$11.8 M	\$14.9 M	\$14.7 M
Aug. 04	\$28.8 M	\$13.3 M	\$15.5 M	\$17.1 M	\$11.7 M	\$14.6 M	\$14.2 M
Sept. 04	\$22.7 M	\$10.2 M	\$12.5 M	\$12.4 M	\$10.3 M	\$9.6 M	\$13.1 M
Total	\$128.7 M	\$58.8 M	\$69.9 M	\$73.2 M	\$55.5 M	\$61.8 M	\$66.9 M

Interim Results

**Table 1B - Summary Marginal Loss Surplus (MLS) Rebate Rates (\$/MWh Load)
(Preliminary Results with Simplifications)**

Month	System Wide MLS	System Load Ratio Method (Filed Methodology)		No Path 26 Adjustment Bookend		Path 26 Adjustment Bookend	
		NP15 Allocation of Total MLS Based on Ratio of Load	SP15 Allocation of Total MLS Based on Ratio of Load	NP15 Regional MLS with No Path 26 Adjustment	SP15 Regional MLS with No Path 26 Adjustment	NP15 Regional MLS with Path 26 Adjustment	SP15 Regional MLS with Path 26 Adjustment
May 04	\$1.13	\$1.13	\$1.14	\$1.27	\$1.02	\$1.14	\$1.13
June 04	\$1.26	\$1.26	\$1.26	\$1.58	\$0.99	\$1.36	\$1.18
July 04	\$1.31	\$1.30	\$1.31	\$1.71	\$0.97	\$1.43	\$1.21
Aug. 04	\$1.29	\$1.29	\$1.29	\$1.65	\$0.98	\$1.41	\$1.18
Sept. 04	\$1.07	\$1.07	\$1.07	\$1.30	\$0.88	\$1.01	\$1.12
Total	\$1.22	\$1.21	\$1.22	\$1.51	\$0.97	\$1.28	\$1.16

Next Steps

- Perform further data analysis for all 12 months of LMP data to extract/compute inputs needed for detailed MLS analysis as initially planned in the July 19 White Paper
- Complete 12 months of MLS allocation based on the current methodology and the two bookends without the simplifications made in the interim study
- Questions: What to do if
 - (Scenario 1): The results of the filed method fall in between the two bookends for the 12 month period:
 - No further action; stay with the filed method?
 - Incorporate Release 1 features to allow continued analysis after MRTU market start with actual LMP data
 - Or ... (Does MSC have a recommendation?)
 - (Scenario 2): Both bookends show impacts in the same direction:
 - Incorporate Release 1 features to allow continued analysis after MRTU market start with actual LMP data
 - Or... (Does MSC have a recommendation?)