

February 1, 2012

The Honorable Kimberly D. Bose Secretary Federal Energy Regulatory Commission 888 First Street, NE Washington, D.C. 20426

RE: California Independent System Operator Corporation Docket No. ER11-4580

Dear Secretary Bose:

The California Independent System Operator Corporation ("ISO") submits for filing the attached presentation materials to be presented on February 2, 2012 at the Technical Conference Discussing CAISO's Proposal to Eliminate Convergence Bidding at Intertie Scheduling Points.

Respectfully submitted, **By:** /s/ Anna McKenna

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Technical Conference Discussing CAISO's Proposal to Eliminate Convergence Bidding at Intertie Scheduling Points

Mark Rothleder Executive Director, Market Analysis & Development February 2, 2012





- Under the ISO's current market design, convergence bidding on the interties undermines market efficiency
 - Day-ahead and real-time dispatch price convergence is negatively impacted
 - Efficient day-ahead unit commitment from the integrated forward market is undermined
 - Uplifts increase and price inconsistencies occur
- ISO recognizes convergence bidding on the interties may provide benefits if enhancements made to market design
 - The ISO is working with stakeholders to develop interim solutions for returning convergence bidding



Off Peak and On Peak Price Divergence 2010-2012



PG&E DLAP Peak Hours

	Count of	
	Months	
IFM < RTD & HASP	0	
IFM > RTD & HASP	13	
RTD < IFM < HASP	1	
HASP < IFM < RTD	10	



PG&E DLAP Off Peak Hours

	Count of
	Months
IFM < RTD & HASP	1
IFM > RTD & HASP	8
RTD < IFM < HASP	1
HASP < IFM < RTD	14

Convergence bidding on the interties undermined the market efficiency benefits of convergence bidding design



- 1. RT > DA, WTERNAharinualedereered is expected
- 2. HASP < DA, INTERTIE virtual supply is expected

3. RTD > HASP, 1 and 2 balanced is profitable

DA: Day Ahead RT: Real Time HASP: Hour Ahead Scheduling Process RTD: Real Time Dispatch



Convergence bidding resulting in net virtual supply which decreases day ahead unit commitment



Residual unit commitment (MW)

Convergence Bidding Implemented



Price Expectation and Convergence Bidding Awards not well aligned for Internal Nodes (Peak 10 Day Moving Average)



Price Expectation and Convergence Bidding Awards better aligned for Interties (Peak 10 Day Moving Average)



Balanced Trade: Price Expectation and Convergence Bidding Awards Aligned (Peak 10 Day Moving Average)



Price Expectation and Convergence Bidding Awards for Internal Nodes Improved Alignment Since September (Off Peak 10 Day Moving Average)



Price Expectation and Convergence Bidding Awards for Interties Aligned (Off Peak 10 Day Moving Average)



Balanced Trade: Price Expectation and Convergence Bidding Awards Aligned (Off Peak 10 Day Moving Average)



Real-time Imbalance Energy Offset increase even with lower price HASP/RTD price differences



Drivers of the Real Time Imbalance Energy Offset

- Price differences between HASP and RTD
 - Forecast Error
 - Operating Biasing
 - Insufficient short term ramping
 - Asymmetrical bid cap/floor
- MWh subject to price difference between HASP & RTD
- Hourly settlement of Load and 10 minute settlement of internal generation



Profit from balanced SC convergence bidding positions





Real Time Imbalance Energy Offset since Convergence Bidding Implemented (30-Day Rolling Cumulative)





Volume of offsetting Intertie and Internal Convergence Bids (30-Day Rolling Cumulative)



SC Balanced Virtual

Residual Balanced Virtual across SCs

California ISO Shaping a Renewed Future

Balanced convergence bids increased RTIEO by \$36.8M or by 43%



California ISO

Monthly Impact of Price Inconsistency from Dual Intertie Constraint



- Two intertie scheduling limit constraints
 - 1. Net physical schedules, ignoring the accepted virtual schedules, be within the established scheduling limit for each scheduling point
 - 2. Physical and virtual imports net of physical and virtual exports be within established scheduling limits for that scheduling point
- Currently only constraint #2 is used for pricing



Advantages/Disadvantages of settling interties at RTD

• Pros

- Impact of HASP-RTD price difference removed from Real Time Imbalance Energy Offset
- Internal generation and imports priced at a single market price
- Single load forecast used to settle load, internal generation, imports and exports
- Cons
 - HASP import price certainty replaced with bid cost recovery
 - No price certainty for HASP exports without bid cost recovery
 - Price inconsistency from dual constraint still needs to be resolved



Alternatives to resolve/mitigate structural issues with convergence bidding on the interties (1 of 2)

Alternative	Pros	Cons
Rule to prohibit balanced (internal/external) virtual positions to profit from HASP / RTD price differential	Targets impact to RTIEO	 Enforcement would be out of the market Dual constraint issue remains
Implement settlement rule to clawback SMEC of balanced positions - Internal virtuals and interties virtuals/HASP reductions	 Targets impact to RTIEO Allows arbitrage of congestion between interties and other nodes 	 Does not address independent balanced positions that increase RTIEO Dual constraint issues remain
Align the liquidation of virtuals with binding settlement timing for physicals. Hold internal virtual until RTD market optimization.	Enables CB to converge IFM- HASP-RTD	 HASP is last chance to align ties to reliably manage the full RT market RUC doesn't commit resources if VS = VD. No RUC in RT market. Would require RUC or anther intertie option Dual constraint issue remains
Modify the existing allocation of RTIEO	Broader allocation which includes generation and/or virtual may reduce cost to Load	 Does not address market efficiency issues from offsetting virtual supply/demand Dual constraint issue remains 2009 stakeholder initiative unable to reach consensus due to cost causation of price differences between RTD & HASP



Alternatives to resolve/mitigate structural issues with convergence bidding on the interties (2 of 2)

Alternative	Pros	Cons
Implement NYISO type approach to settle physical intertie transactions in HASP	Addresses two settlement timeframes in real-time	 Implementation timing Dual constraint issue remains Price certainty for imports/exports relative to transactions outside ISO balancing authority
Pay as bid for physical intertie transactions in HASP	 Addresses two settlement timeframes in real-time Price certainty for imports/exports 	 Bidding behavior to anticipate price versus bidding marginal cost Implementation timing Dual constraint issue remains
Pay as bid or better for physical intertie transactions in HASP	 Addresses two settlement timeframes in real-time Price certainty for imports/exports 	 Amendment 66 gaming concerns would need to be addressed Implementation timing Dual constraint issue remains
Modify HASP schedule decline charge design to price declines at RTD price (or worse of)	Directionally improves RTIEO as more MWh settled at RTD price versus HASP price	 Doesn't address convergence bidding market inefficiencies Potential HASP liquidity issues if "worse of" option chosen Benefit to RTIEO uncertain
Implement NYISO/Ontario approach to settle virtual intertie transactions	• Virtual volume will settle at RTD decreasing MWh volume settled HASP price	 "Dirty" hedge when no congestion in HASP



Stakeholder working group established October 2011 to address intertie pricing

- Scope
 - Settlements of imports and exports
 - Negative deviations to HASP
 - Cost allocation of Real Time Imbalance Energy Offset
- Objective
 - Identify options to be included in Issue Paper/Straw Proposal for new market design initiative
- Activities
 - Working group meeting held 11/15/11
 - Working group meeting held 11/29/11
 - Working group teleconference held 01/18/12
 - Working group meeting held 01/25/12
 - Stakeholder initiative meeting scheduled for 02/17/12



Proposal to address price inconsistency of dual constraint Option A – Different LMPs for Physical & Virtual

- Incorporate shadow price of both binding constraints in calculation of price
- Results in different prices only if constraint is binding
- Currently the two shadow prices influence dispatch
- Resolves price inconsistency issue
- Different prices does impact ability to perfectly hedge physical import/export with virtual bid





- The ISO's preference is to bring back convergence bidding on the interties as soon as possible
- The ISO is working with stakeholders to meet the following requirements for returning convergence bidding:
 - Minimize the negative impact on market efficiency arising from the two settlement real-time market design
 - Minimize uplift costs or more accurately allocate those costs
 - Address dual constraint issue that causes price inconsistency





Technical Conference on CAISO's Proposal to Eliminate Convergence Bidding at Intertie Scheduling Points

Eric Hildebrandt, Ph.D. Director, Department of Market Monitoring February 2, 2012



Convergence bidding trends: Interties - October to November 2011

Net virtual supply/demand on interties were generally consistent with hourly price differences in IFM and HASP





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prices.

Convergence bidding trends: Internal ISO - October to November 2011

Net virtual supply/demand within the ISO were also generally consistent with hourly price differences in IFM and RTD



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Convergence bidding trends: Net system level - October to November 2011

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Due to virtual supply on interties, total net virtual supply/demand in dayahead market was were often inconsistent with hourly average price differences in IFM and RTD markets.



Convergence bidding trends: December 2011

During the first month without virtual bidding on interties, bidders took some time to adjust to new trend of real-time prices lower than day-ahead



Convergence bidding trends: January 2012

By January, net virtuals within ISO became very consistent with hourly average price differences between IFM and RTD markets.



Has convergence bidding been used to hedge delivery risk on intertie scheduling points?

- Review of data shows no evidence of this.
- How would this work?
 - Physical import in day-ahead
 - Virtual <u>export</u> to hedge potential need to buy back import at high price in HASP is import unavailable.
- Is this equivalent to a generator within ISO using virtual demand to hedge an outage? Not really
 - HASP prices not nearly as high and volatile as real-time prices.
 - If planned source of import is unavailable, importer is free to arrange and substitute another source of supply.



Are convergence bids on interties used to facilitate imports of variable renewable energy sources?

- Convergence bidding would allow supplier to:
 - 1. Earn day-ahead price by:
 - Submitting virtual supply bids for expected output of variable energy source in day-ahead.
 - Submit physical supply schedule for revised forecast of output in hour-ahead
 - 2. Wait and only buy transmission for revised forecast of physical supply shortly before or after HASP.
 - 3. Profit from if final HASP schedule < day-ahead schedule <u>and</u> HASP price < day-ahead price.

Review by DMM indicates such use of virtual bidding was minimal or non-existent.



Are convergence bids on interties used to facilitate imports of variable renewable energy sources? (continued)

- Without virtual bidding, importers can do all of this through physical scheduling, <u>except</u>:
 - Cannot <u>profit</u> from buy-backs of day-ahead schedules in hourahead unless they procure transmission and e-tag prior to HASP.
- Not explicitly scheduling renewables in day-ahead and relying on last minute procurement of transmission may create additional uncertainty for CAISO and other balancing areas
- CAISO already working with other balancing areas on ways to ensure system reliability with increased reliance on renewables:
 - Dynamic transfers
 - Inter-hour scheduling



Has convergence bidding been used to "hedge congestion" on intertie scheduling points?

- Unclear what this means to DMM.
- At internal nodes, convergence bidding can be used to "convert" day-ahead CRRs into CRR settled based on realtime prices.
 - CRR holder submits virtual supply at CRR source and virtual demand at CRR sink.
 - Net payment to CRR = difference in real-time LMPs at CRR source/sink.
- This cannot be done with CRRs with source/sink at intertie coupled with source/sink at internal node since:
 - Virtual bid at inter-tie settles at HASP price.
 - Virtual bid at node within ISO settles at real-time price.



Has implicit virtual bidding caused problems?

- Overall buy-back of imports has been very low.
 - 6.2% of day-ahead imports in Dec 2011
 - 6.6 % of day-ahead imports in Jan 2012
- Buy-backs of imports from "zeroing out" of day-ahead schedules also very low.
 - ~2.3% of day-ahead imports in Dec 2011
 - ~2.8% of day-ahead imports in Jan 2012
- Imports clearing HASP that are not delivered in real-time (not e-tagged) also remains very low.

- <1% in Dec 2011 and Jan 2012</p>



Buy-back and delivery rates for imports by month



California ISO Shoping a Renewed Future

CERTIFICATE OF SERVICE

I hereby certify that I have served the foregoing document upon the parties listed on the official service lists in the above-referenced proceedings, in accordance with the requirements of Rule 2010 of the Commission's Rules of Practice and Procedure (18 C.F.R. § 385.2010).

Dated at Folsom, California this 1st day of February, 2012.

<u>Isl Anna Pascuzzo</u>

Anna Pascuzzo