

**Facilities Committee Meeting
June 1, 2016**

**Follow Up Informational Briefing re:
Increasing Bidding Capability in the CAISO
Real-Time Market**

Multi-Step OE Bidding Capability for the Collierville Hydro Resource

Objectives:

- Discuss market settlements and Metered Sub-System (MSS) compliance results from recent tests for Bidding into the CAISO real time market;
- Lessons Learned, and
- Next steps

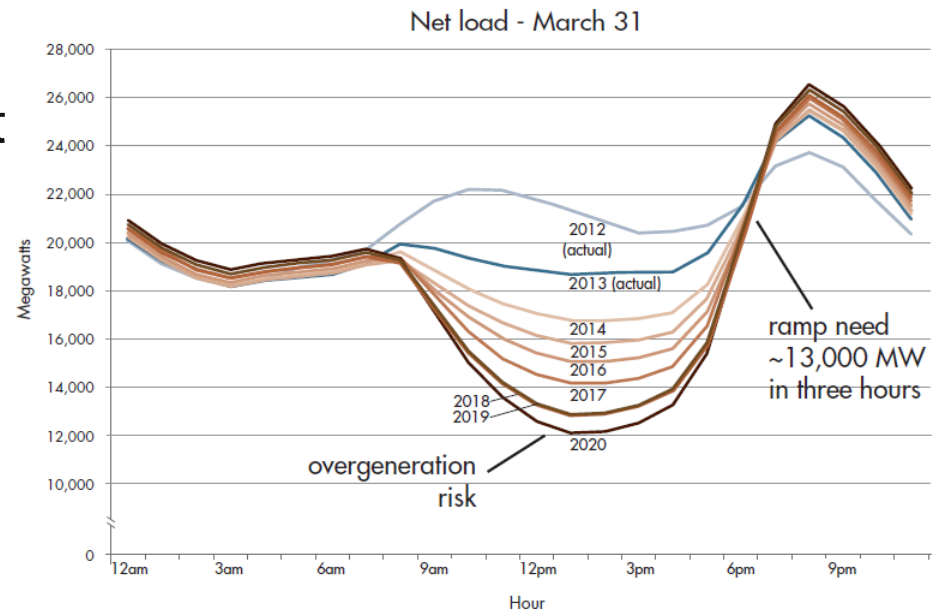
Increased Demand for Bidding into CAISO RTM

Drivers for increased Operating Entity bidding activity:

- The expanding belly of the “Duck” is presenting opportunities to:
 - Improve water management strategies
 - Maximize economic value of Collierville

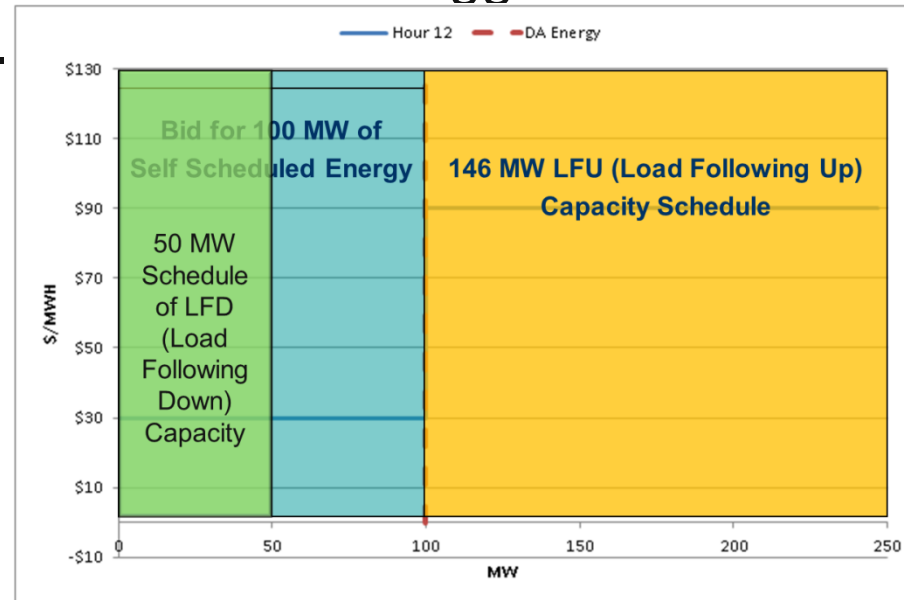
Opposing Forces

- Risk exposure to MSSA
- Compliance Deviation penalties with existing scheduling rules;
- Increased complexity in energy allocation due to independent Operating Entity bid strategies
 - i.e. One OE wants to buy at higher price while another OE wishes to sell at lower price



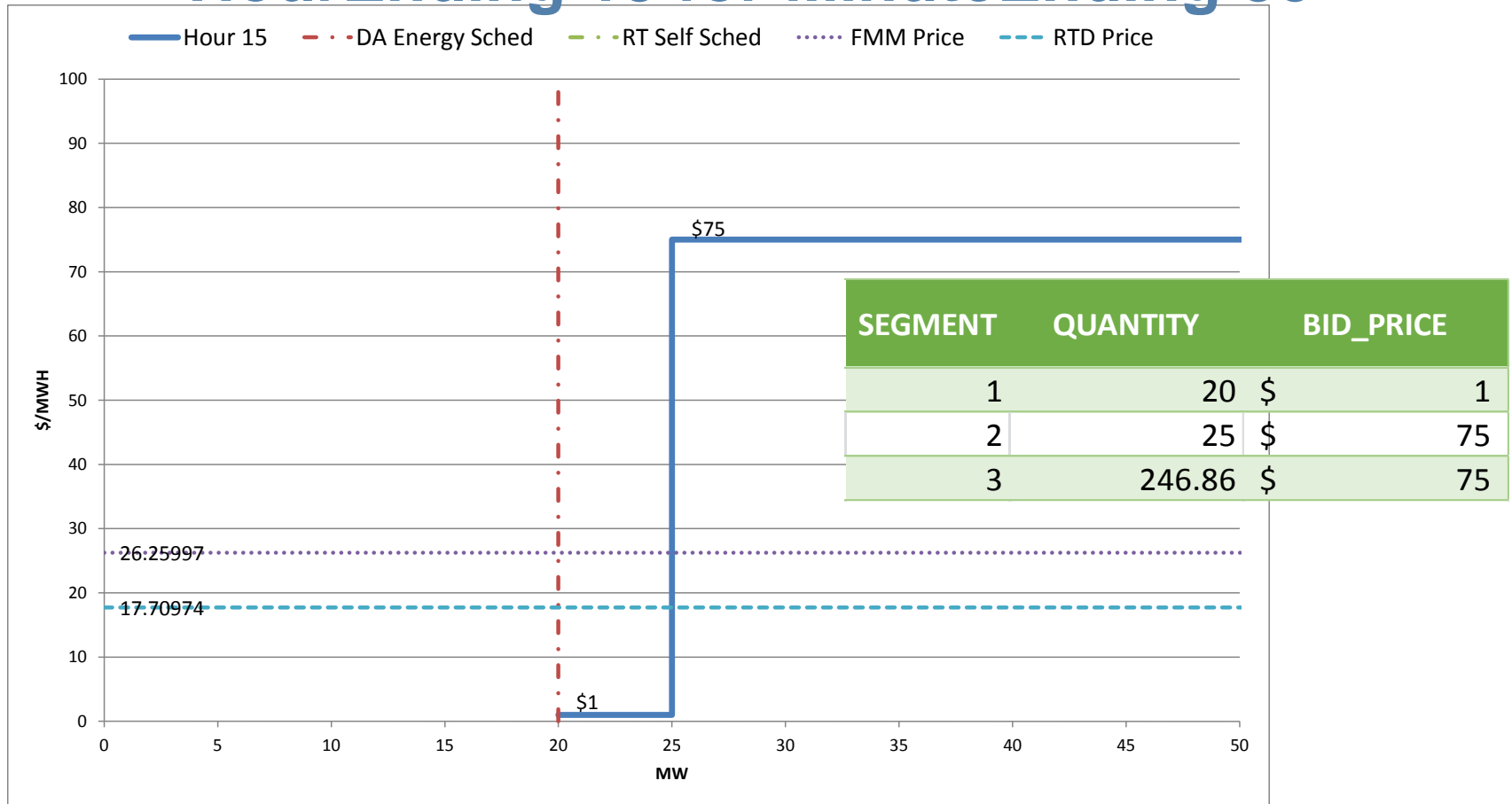
Goals and Objectives with Day Ahead and Real Time Bid Experimentation

- In post day ahead timeframe, decreasing the LFD capacity is how NCPA offered energy buyback or incremental energy sales in the real time market.
- CAISO, in contrast, interpreted as an obligation.
 - As a result, changing the LFD in real-time has triggered compliance deviation penalties.
- As a test, NCPA omitted the use of LFD capacity as a way to prevent compliance deviation penalties.



Bid Test Scenario #1 – 4/18/2016

HourEnding 15 for MinuteEnding 35



- Goal: Omit LFD Capacity Schedule in DA and RT markets. Offer 5 MW RT Supp @ \$1/MW and 30 MW @ \$75/MW

Real Time Bid Test Scenario #2 Results – HE 15 on 4/18/2016

CAISO Real Time Market Settlements for COLVIL

Opr Date	Hour End	Minute	MW	RT Price	Amount
4/18/2016	15	35	5	\$26.3	-\$10.94

NCPA Compliance Instructed Imbalance Energy Qty

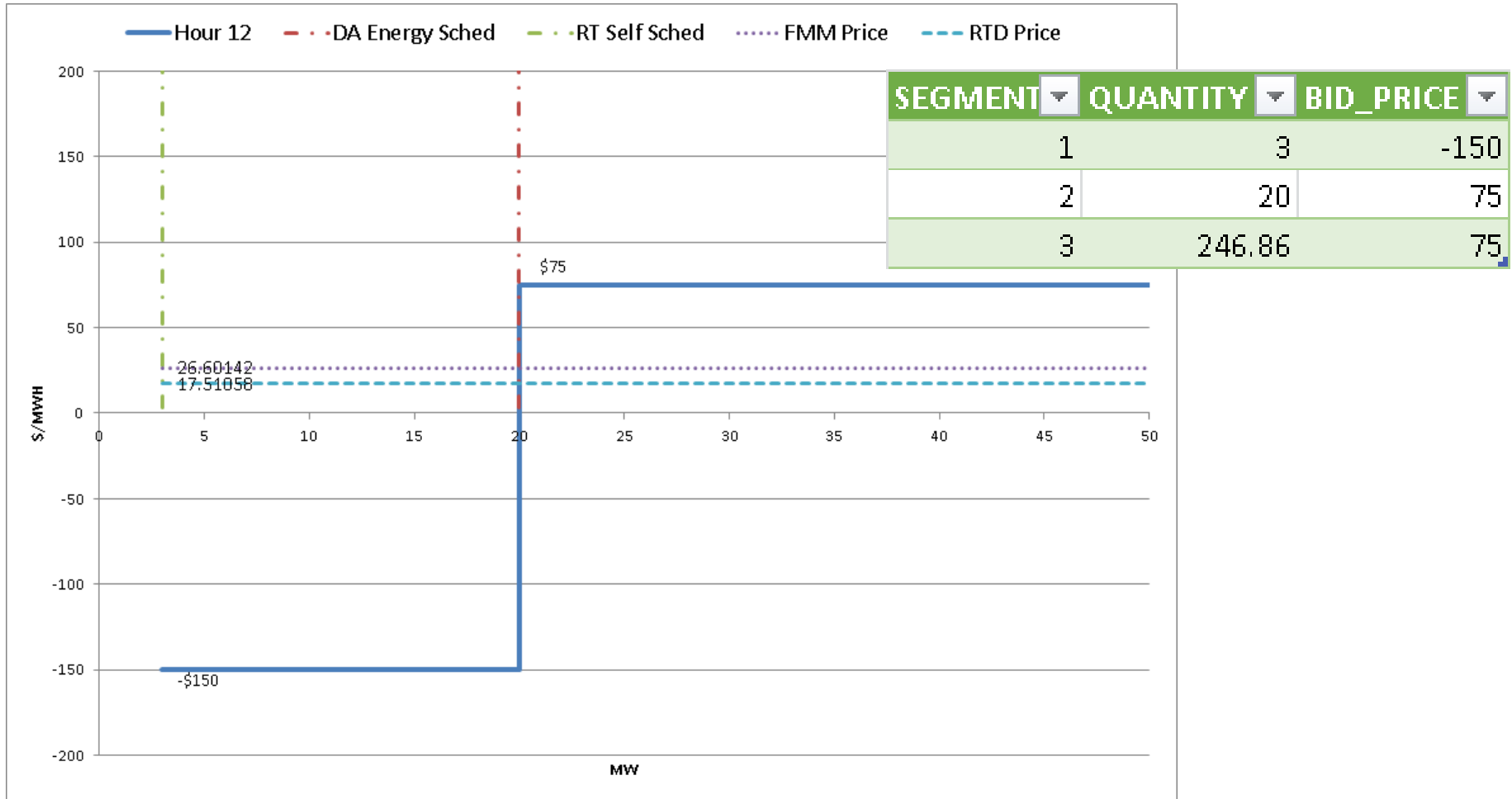
Opr Date	Hour End	Minute	Compliance IIE Qty
4/18/2016	15	35	5

CAISO Compliance Instructed Imbalance Energy Qty

Opr Date	Hour End	Minute	Compliance IIE Qty
4/18/2016	15	35	0



RT Bid Test Scenario #2 – HE 16 4/18/2016



- Goal: Reduce Day Ahead Energy Schedule to minimum output level without DEC instruction. Offer to reduce DA schedule if Price < -\$150.

Real Time Bid Test Scenario #2 Results – HE 16 on 4/18/2016

CAISO Real Time Market Settlements for COLVIL

Opr Date	Hour End	Minute	MW	RT Price	Amount
4/18/2016	16	35	0	\$26.6	\$0

NCPA Compliance Instructed Imbalance Energy Qty

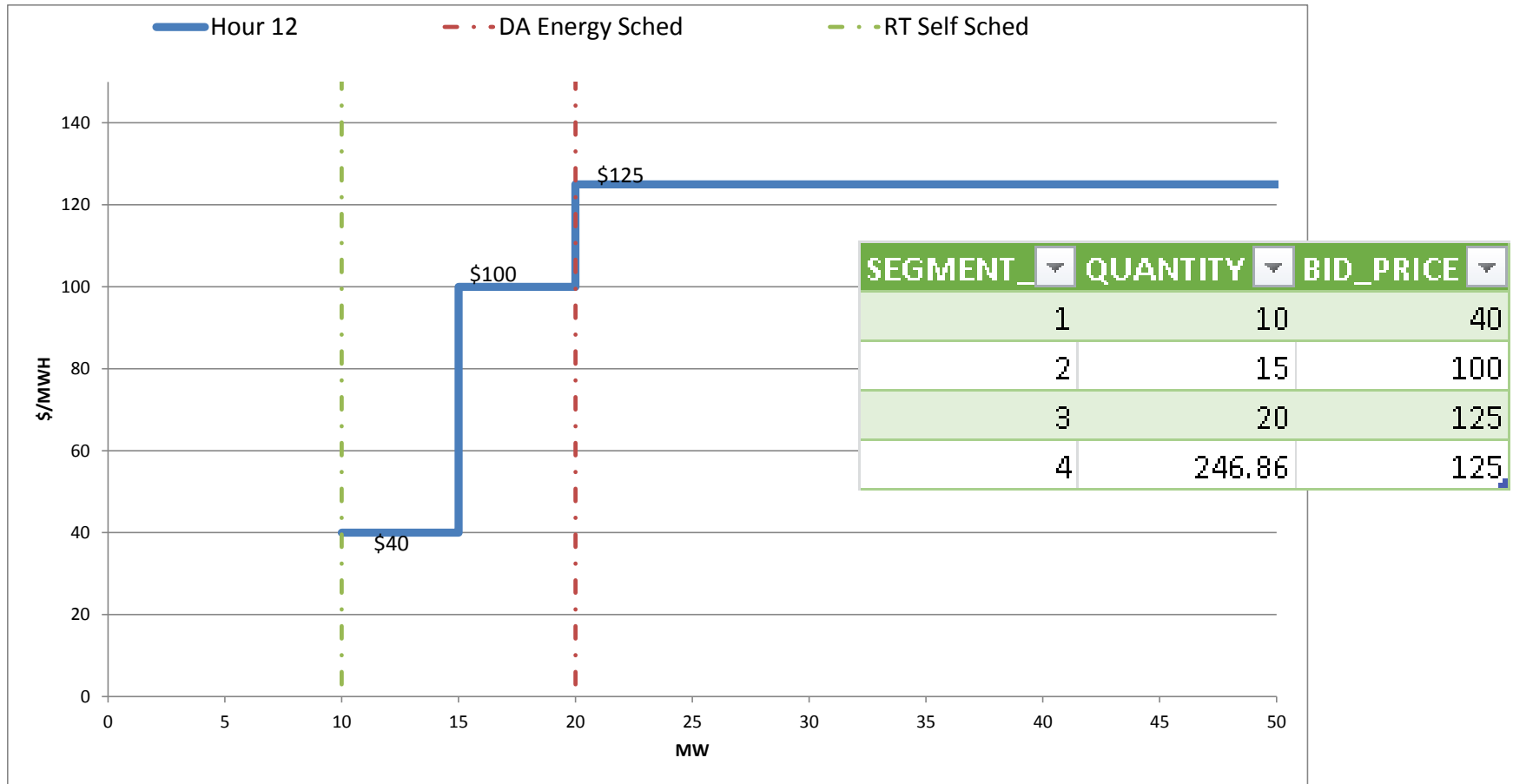
Opr Date	Hour End	Minute	Compliance IIE Qty
4/18/2016	16	35	0

CAISO Compliance Instructed Imbalance Energy Qty

Opr Date	Hour End	Minute	Compliance IIE Qty
4/18/2016	16	35	14



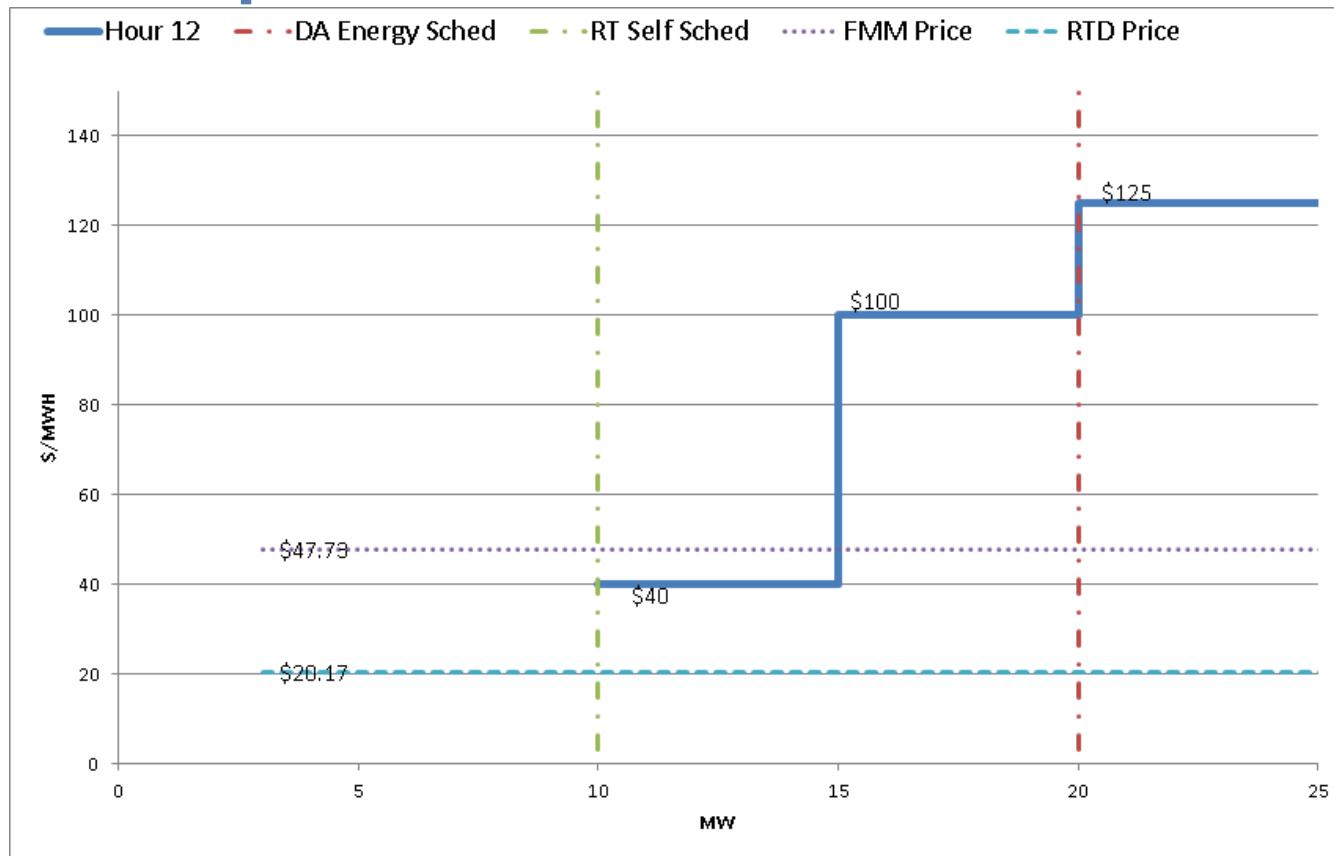
RT Bid Test Scenario #3 – HE 12 4/21/2016



- Goal: Trigger DEC instruction by reducing Day Ahead Schedule from 20 MW to 10 MW through use of energy self schedule. Offer to buy back 5 MW < \$100 & > \$40; and another 5MWh < \$40

Experiment Scenario #4 – HE 12 4/21/2016

Dispatch and Settlement Outcomes



MINUTEEND	FMM MWh	RTD MWh	FMM Price	RTD Price	FMM Amt	RTD Amt
35	0.000	-0.4100		\$ 20.17	\$ -	\$ 8.27
35	-0.423	0.0000	\$ 47.73		\$ 20.21	\$ -

Real Time Bid Test Scenario #2 Results – HE 12 on 4/21/2016

CAISO Real Time Market Settlements for COLVIL

Opr Date	Hour End	Minute	MW	Mkt Type	RT Price	Amount
4/21/2016	12	35	-5.1	FMM	\$47.73	\$20.21
4/21/2016	12	35	-4.9	RTD	\$20.17	\$8.27

NCPA Compliance Instructed Imbalance Energy Qty

Opr Date	Hour End	Minute	Compliance IIE Qty
4/21/2016	12	35	-10

CAISO Compliance Instructed Imbalance Energy Qty

Opr Date	Hour End	Minute	Compliance IIE Qty
4/21/2016	12	35	0



Lessons Learned from Real Time Bidding Test Results

- Omitting Load Following Down (LFD) Capacity Schedules caused unintended, negative settlement results
 - Worse off results compared to using LFD Capacity Schedules
- For time being, better to use LFD for incremental real time SUPP energy bidding.
 - Continue to suspend Dec energy bidding
- Need to address with the CAISO to change compliance formulae to enable MSSA to fully participate in real-time energy markets.

Next Steps and Potential Agenda Items

Set Up a Series of Meetings to Discuss:

- Current scheduling mechanics – SCPA Appendix C, Power Scheduling Guide
- Scheduling Strategy – Amended and Restated Facilities Agreement, Schedule 7
- Settlements – SCPA Appendix B, CAISO Settlement Summary
- Modifications to the SCPA and any of its schedules pursuant to Section 12
- Modifications to the FA and any of its schedules pursuant to sections 3, 4 and 5
- Does solving the complexity of real-time bidding lend itself to a single Operating Entity for the Calaveras Project?