Price Performance in the CAISO's Energy Markets

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Objective

Provide an update on the progress of the analysis for price performance

- All metrics are subject to change
- This reflects a partial update in different areas of the scope
- This is not a Policy initiative

Background

- The CAISO committed to start a more formal analysis effort with input from stakeholders and MSC regarding Price Performance.

- CAISO posted a proposal on April 3 for the scope and schedule of this analysis

- A conference call was held on April 10 to discuss the proposal

- Stakeholders comments were expected by April 17

Stakeholders' comments

- The ISO received 12 sets of comments
- Generally stakeholders support the scope and schedule
- Stakeholders suggestions
  - Expand the period of analysis beyond 2018
    - Yes, Period has been expanded to 2017-2019
  - Run counter-factual scenarios
    - Yes, the current scope includes this approach
  - Analyze specific days in addition to overall trends
    - Yes, the current scope includes this approach

Stakeholders' comments

- Analyze intertie price performance
  - Yes, this item is in scope
- Analyze flexible ramp performance
  - Yes, this item is in Scope
- Compare price performance among ISOs
  - The ISO will search for readily available metrics
- Rerun markets with actual conditions
  - CAISO market is ex-ante and currently we have no IT capabilities to run a perfect dispatch

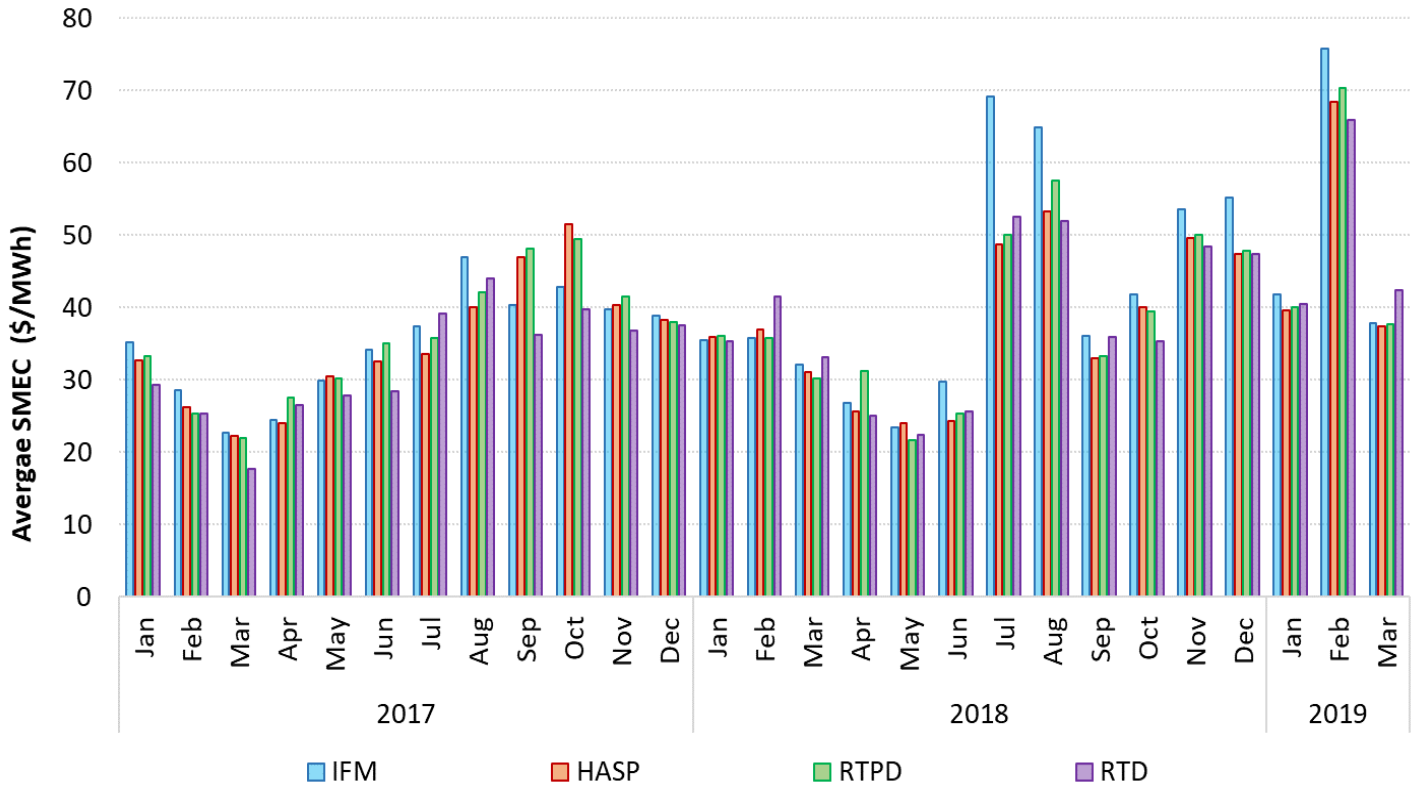
Stakeholders' comments

- Analyze impacts of load forecast accuracy
  - Yes, this item is in scope
- Analyze performance of RDRR
  - RDRR has been infrequently used. Potential item for future consideration
- Analysis impact of gas conditions
  - Yes, to the extent of gas dynamics internalized in gas prices, the ISO is analyzing this driver
- Concerns of balancing the schedule with a comprehensive product of analysis
  - The ISO will evaluate schedule of analysis and adjust as needed

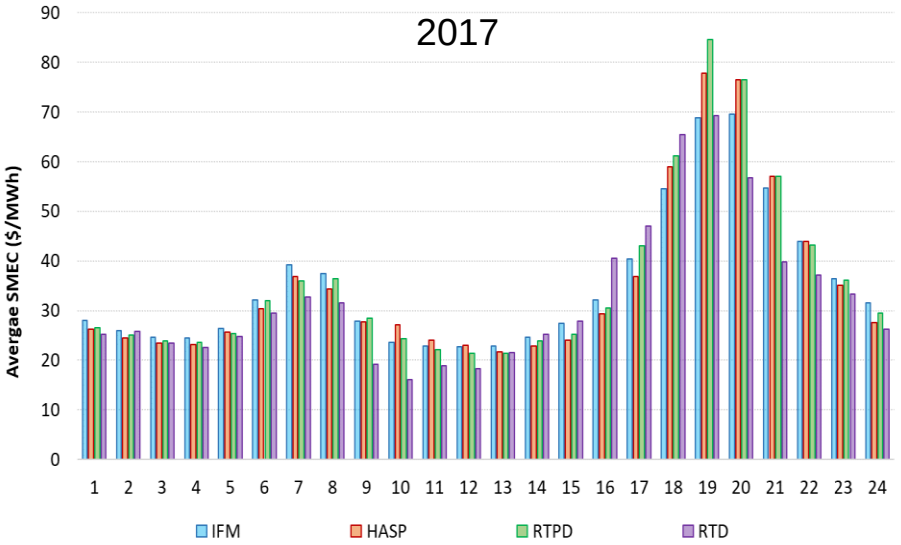
Stakeholders' comments

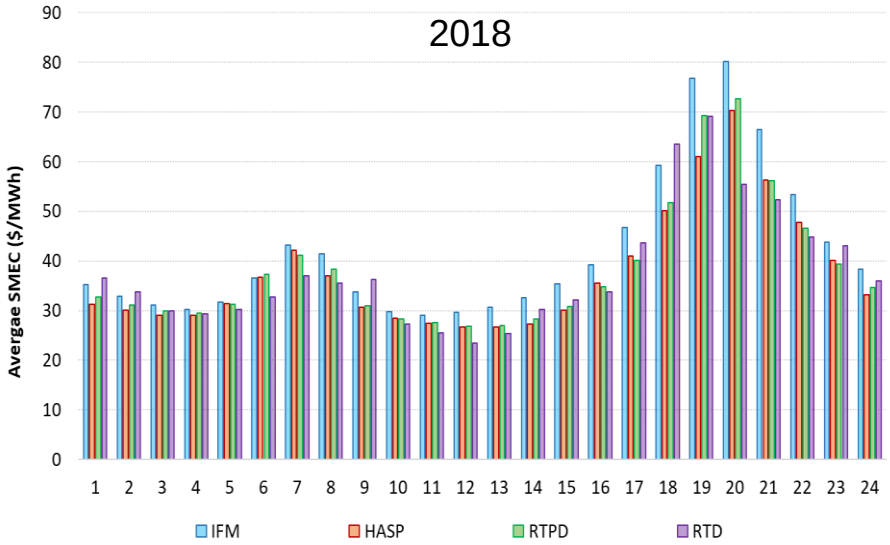
- Analyze effect and magnitude of operator actions
  - Yes, this item is in scope
- Take this effort more holistically from the market design of energy-only perspective
  - The effort is to evaluate price performance of current design; this is not a policy effort
  - The outcome of this effort may inform ongoing or needed Policy efforts
- Have a window for submission of stakeholder comments after the first report is posted
  - Yes, the schedule has been adjusted to include Stakeholders comments

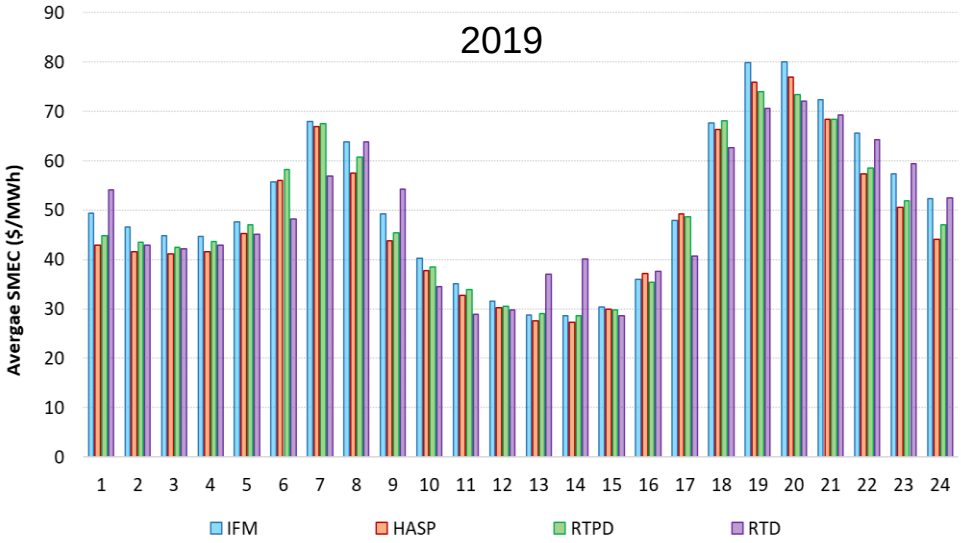
DLAP-based prices on aggregate show a price divergence



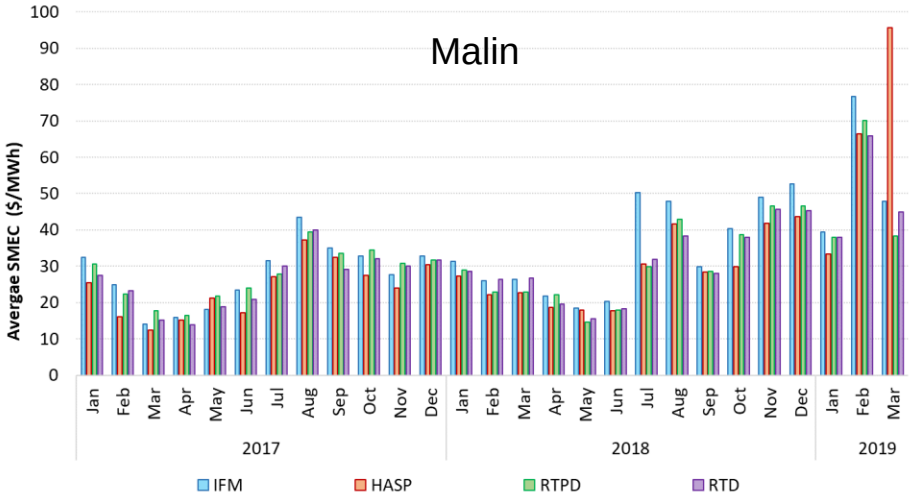
Price trends may started to evolved more strongly in 2018

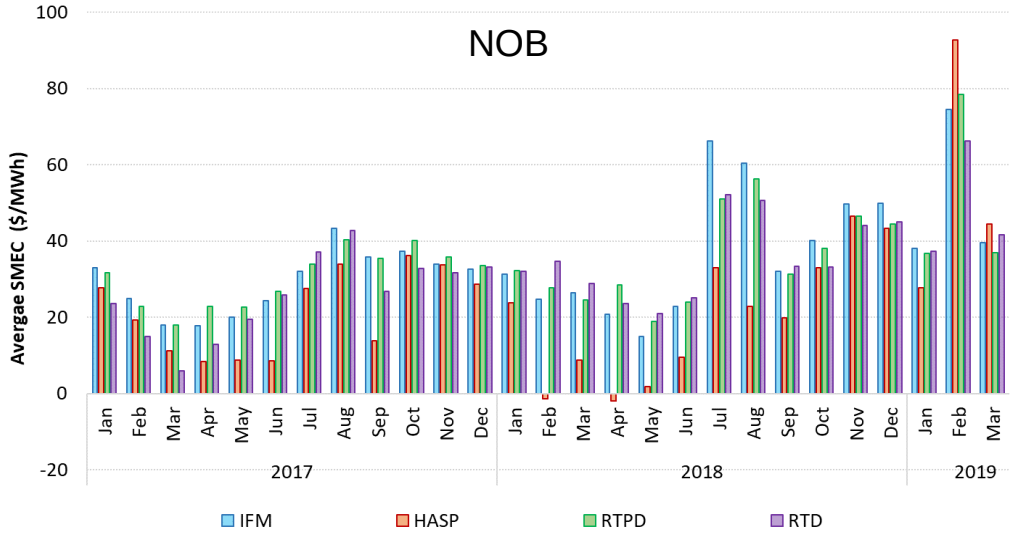




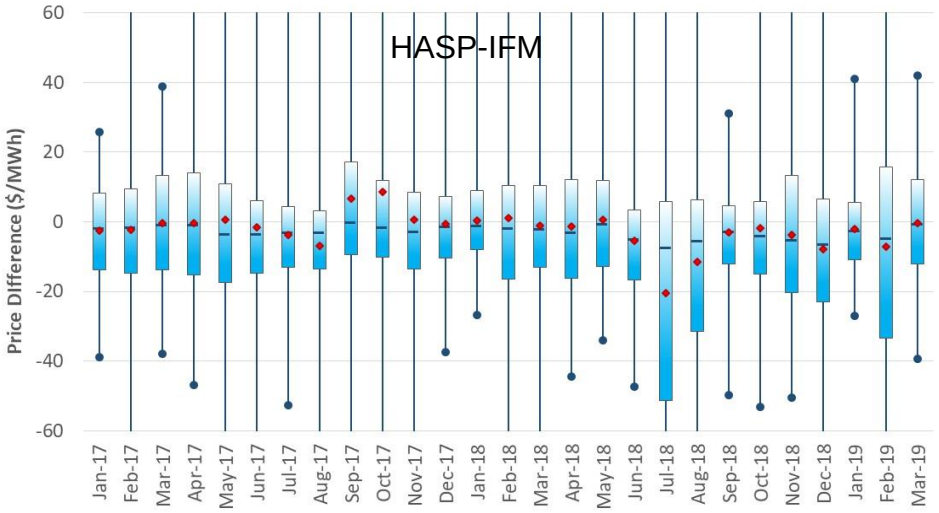


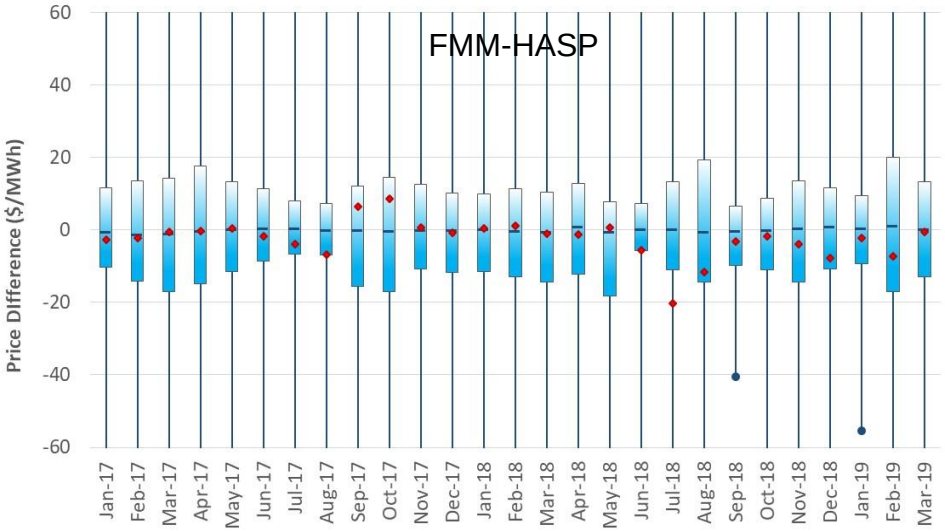
Prices at interties may see different performance from DLAPs

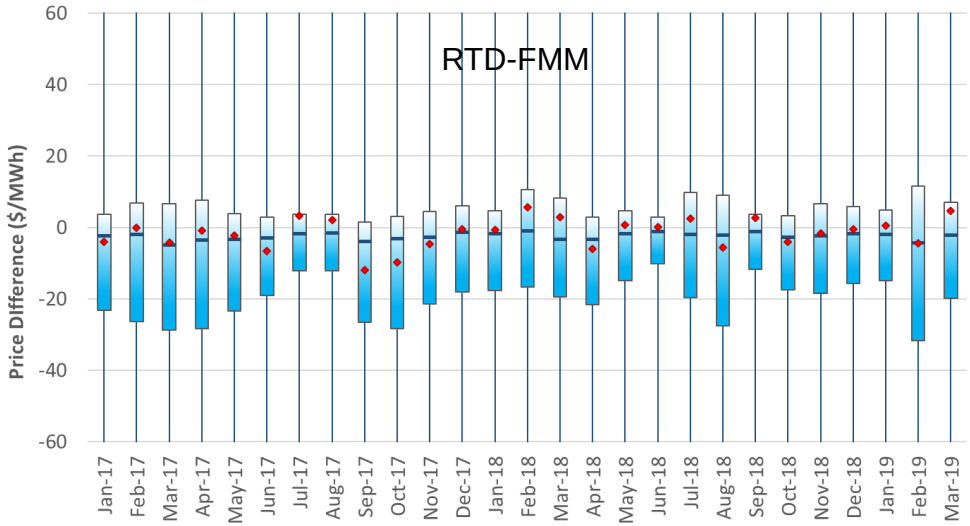




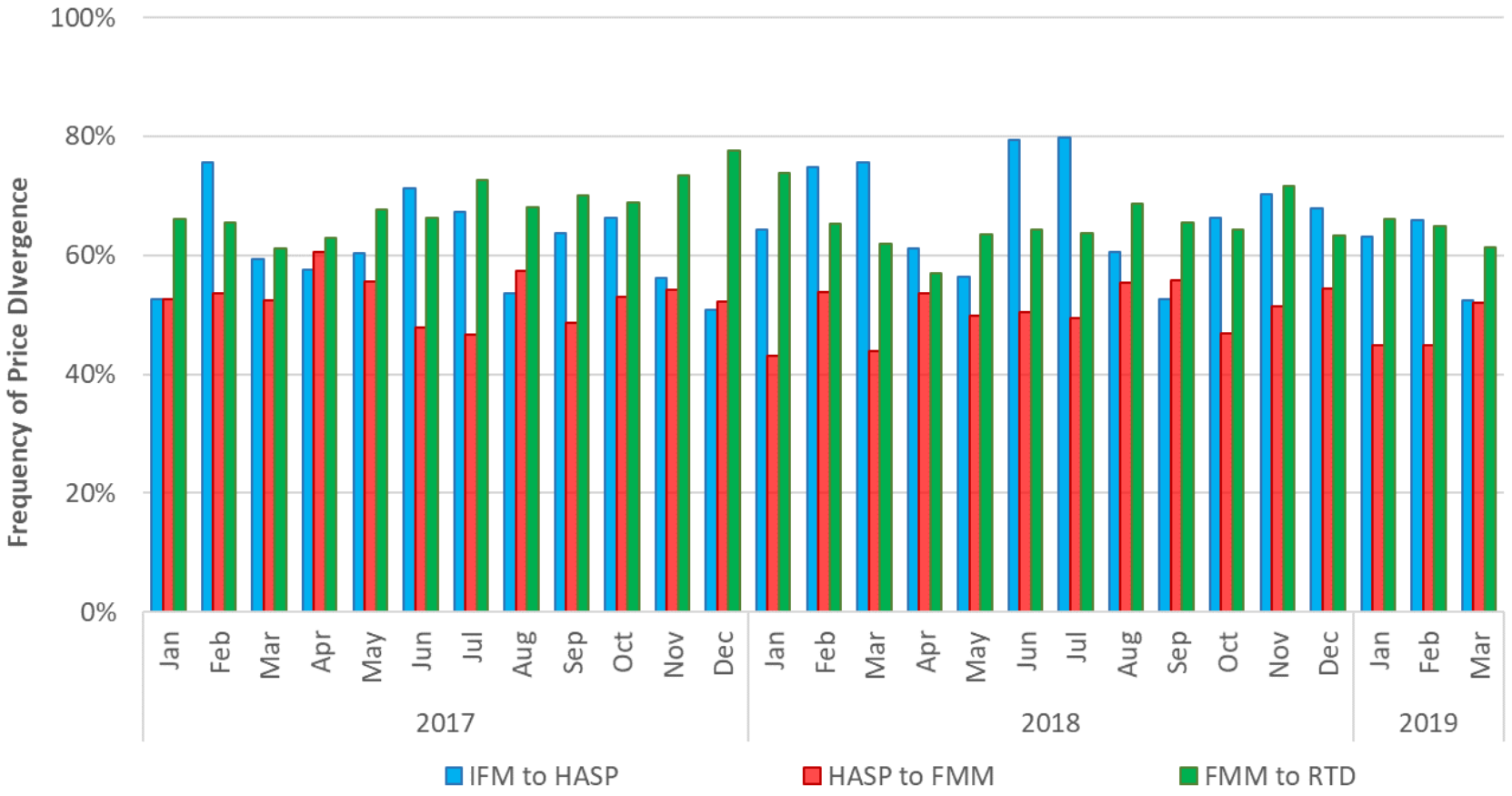
Price spreads trends beyond simple averages



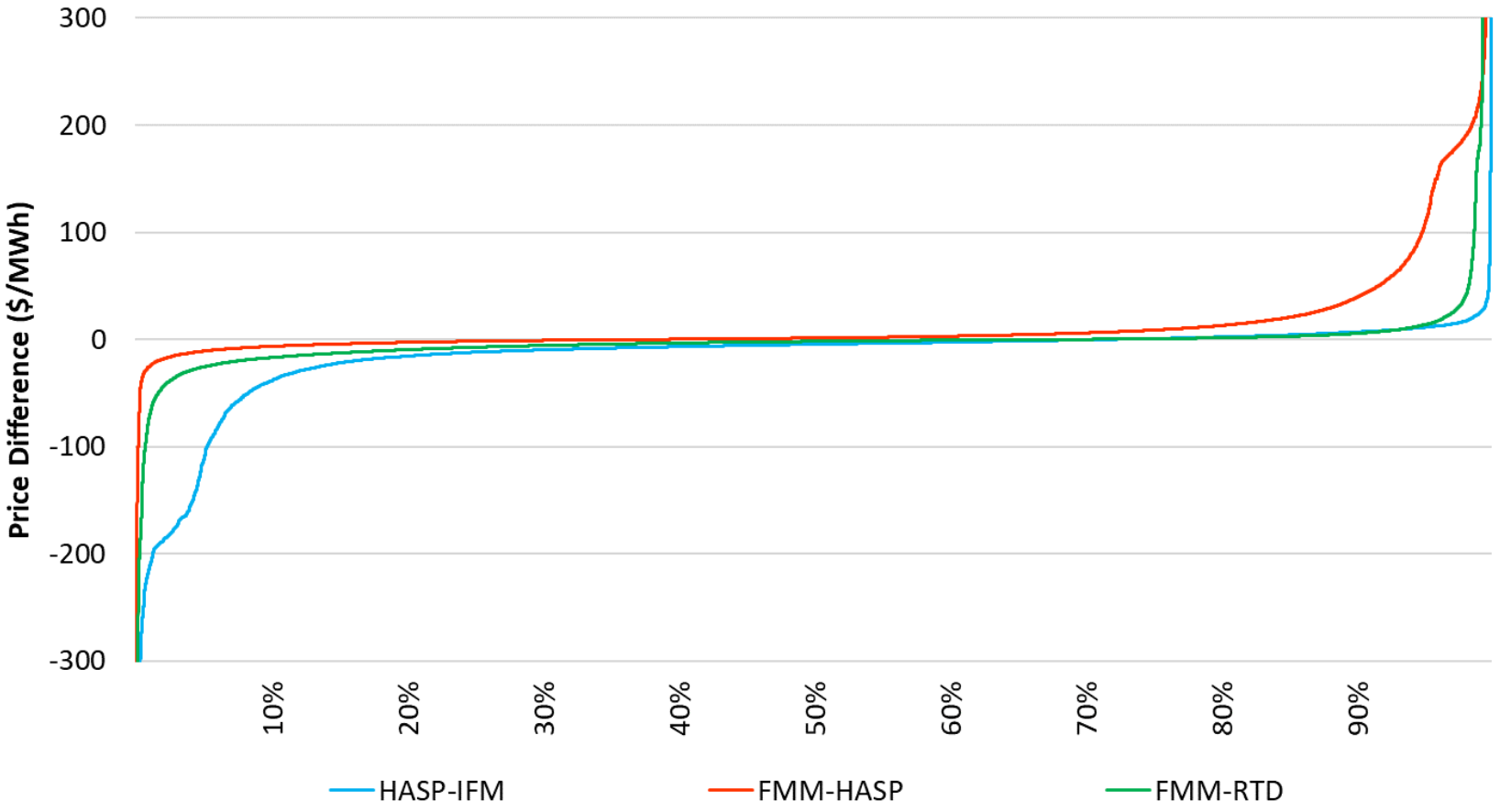




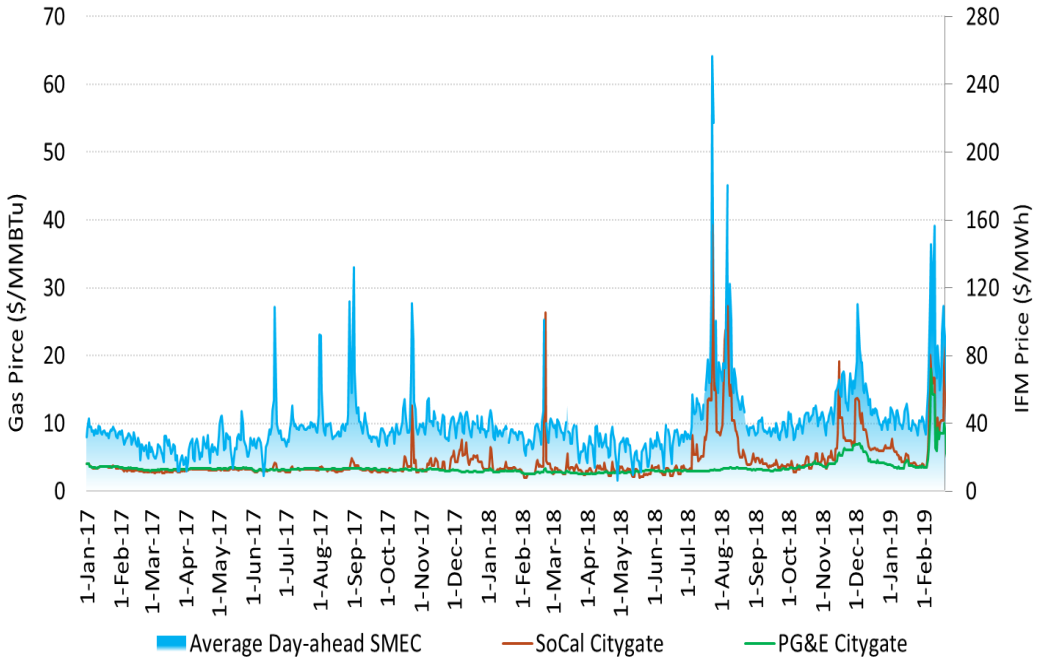
Monthly frequency of price divergence between markets

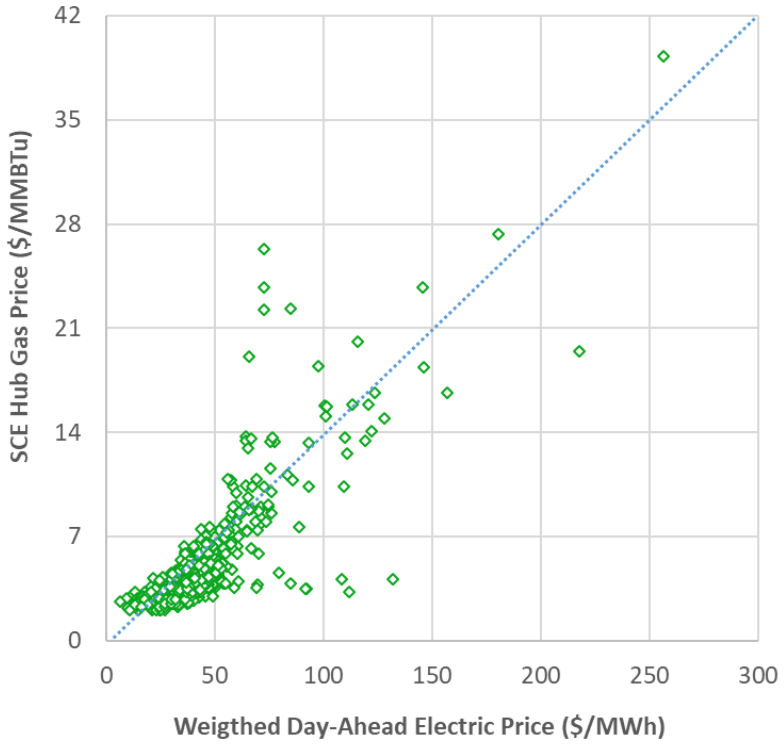


Price divergence between markets at NOB

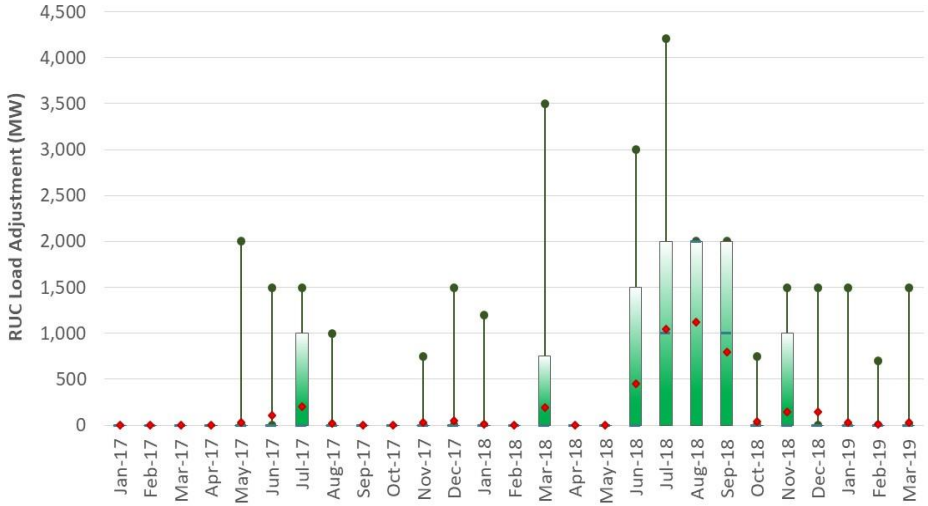


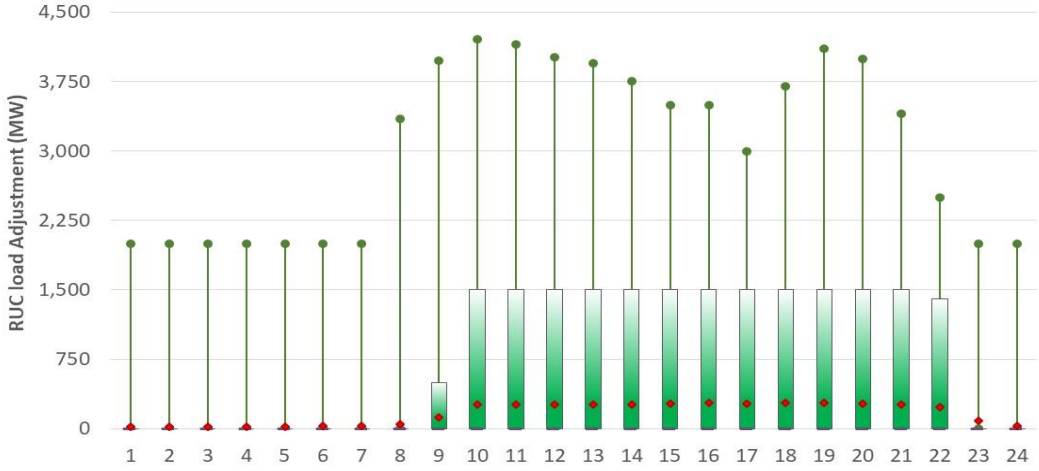
Gas dynamics has a strong impact on electric prices



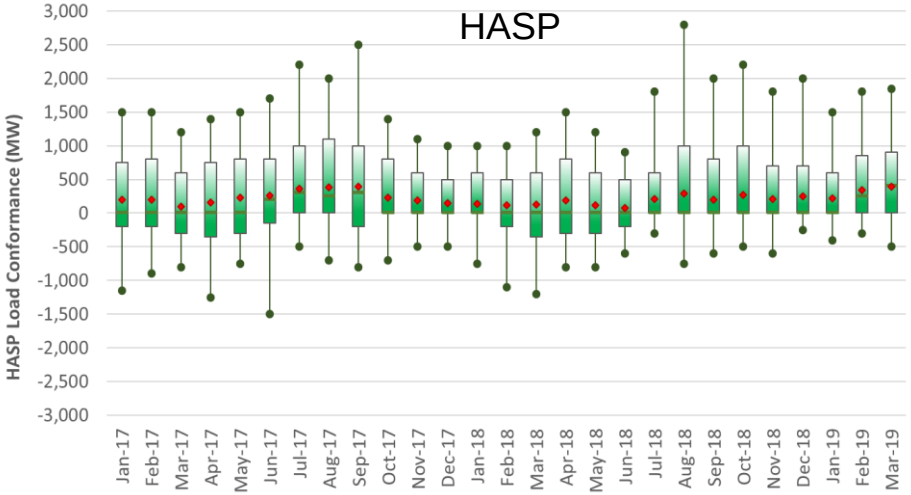


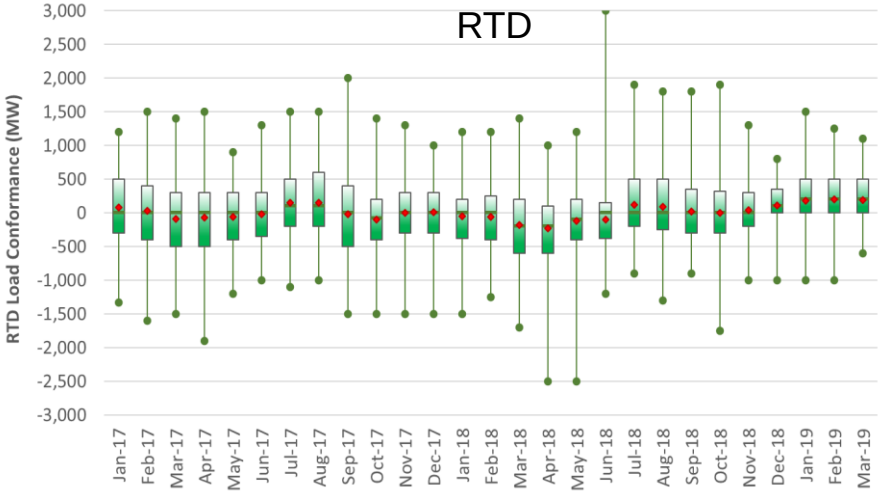
RUC adjustments spike in summer months during peak hours

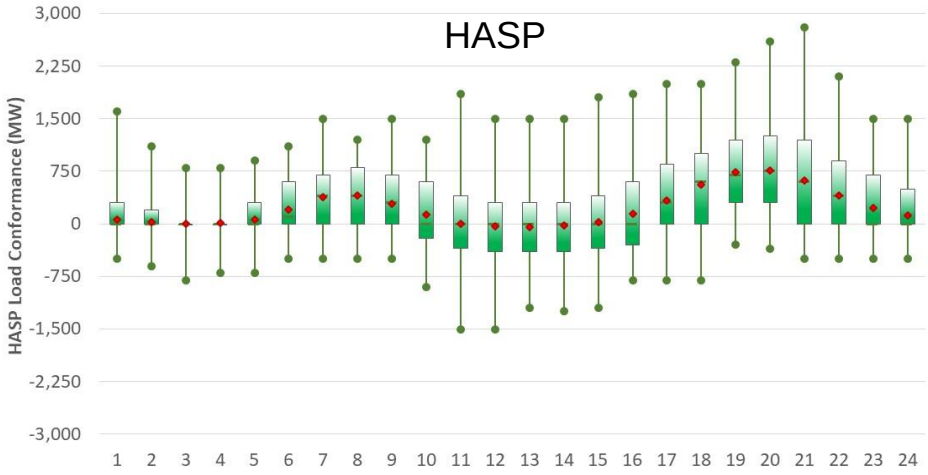


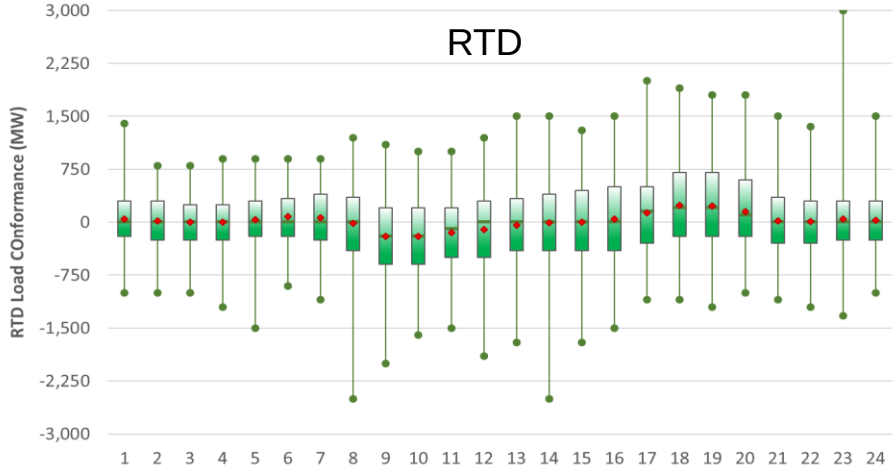


Load conformance in real-time is frequently used

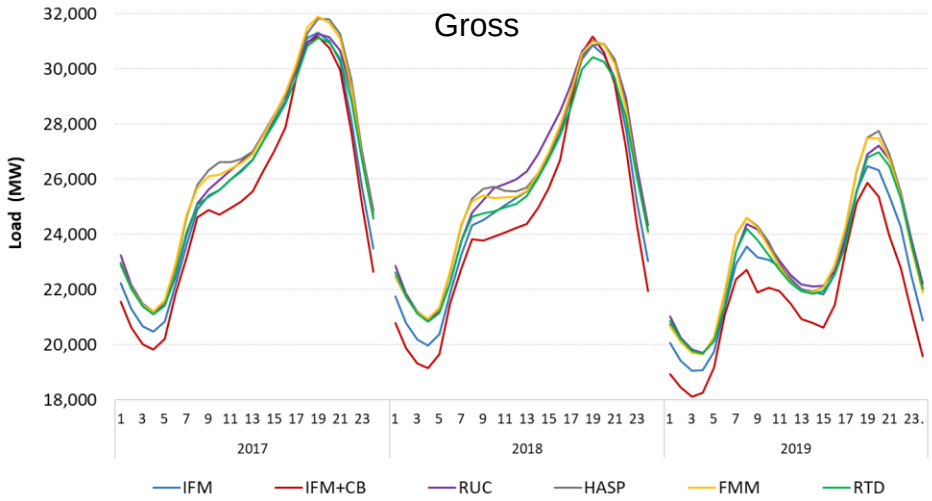


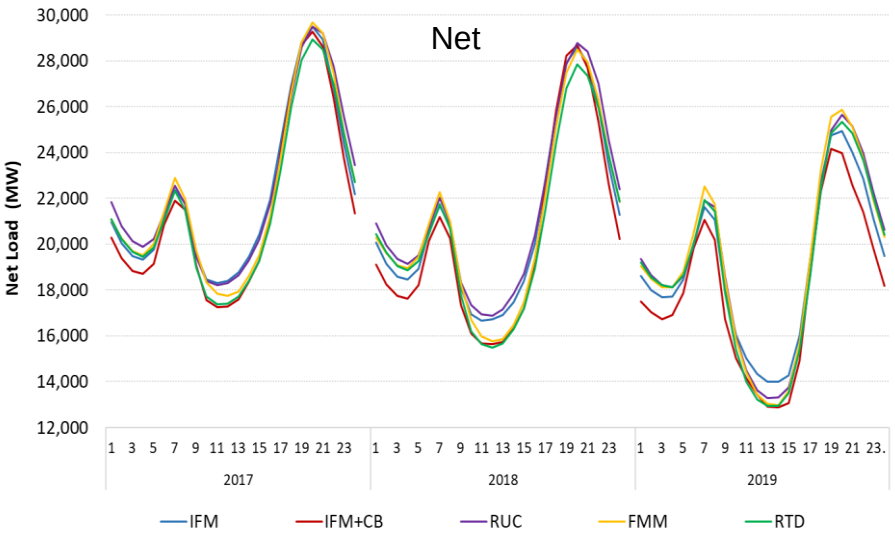


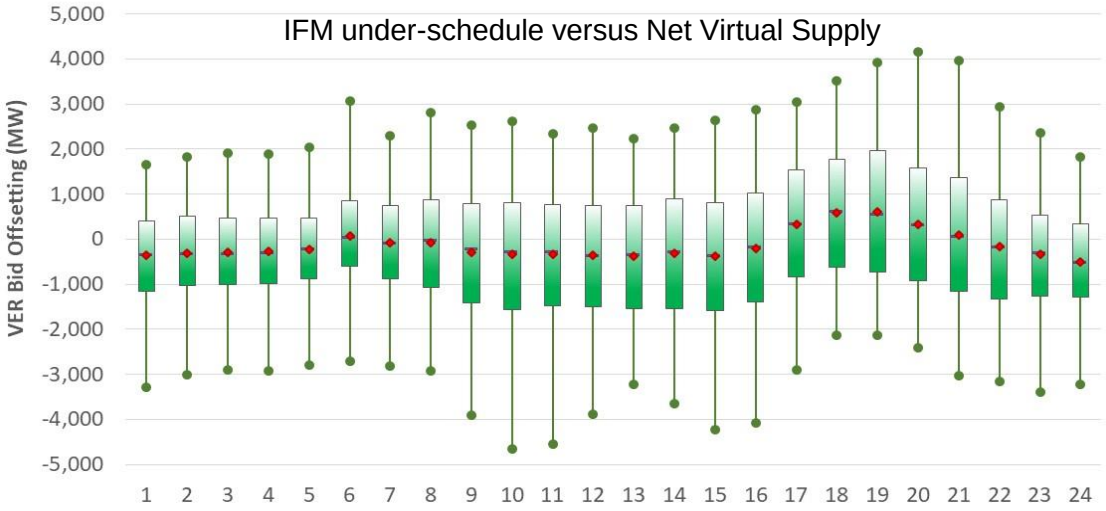




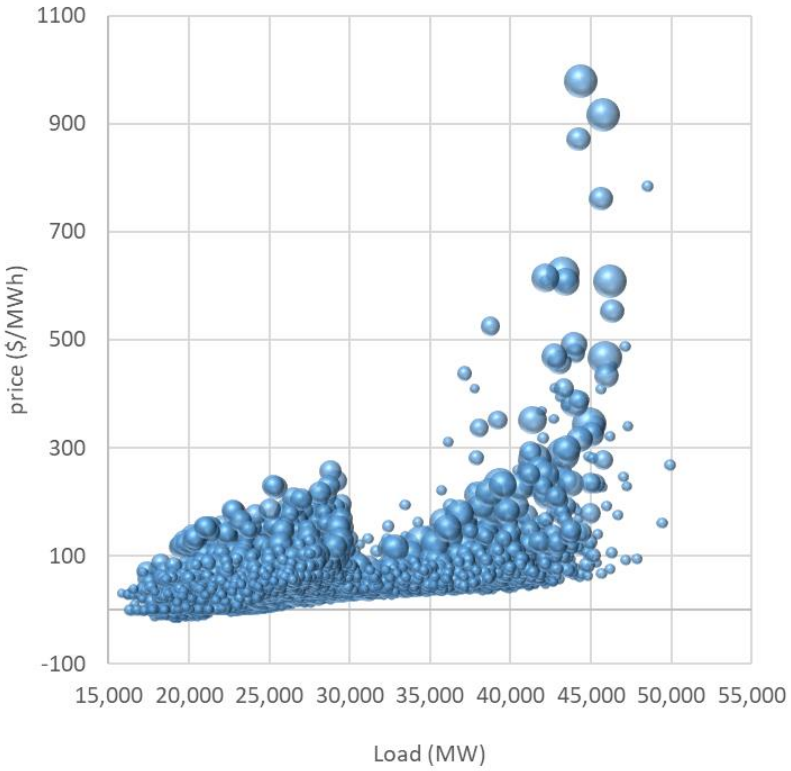
Overall demand requirements vary across the markets





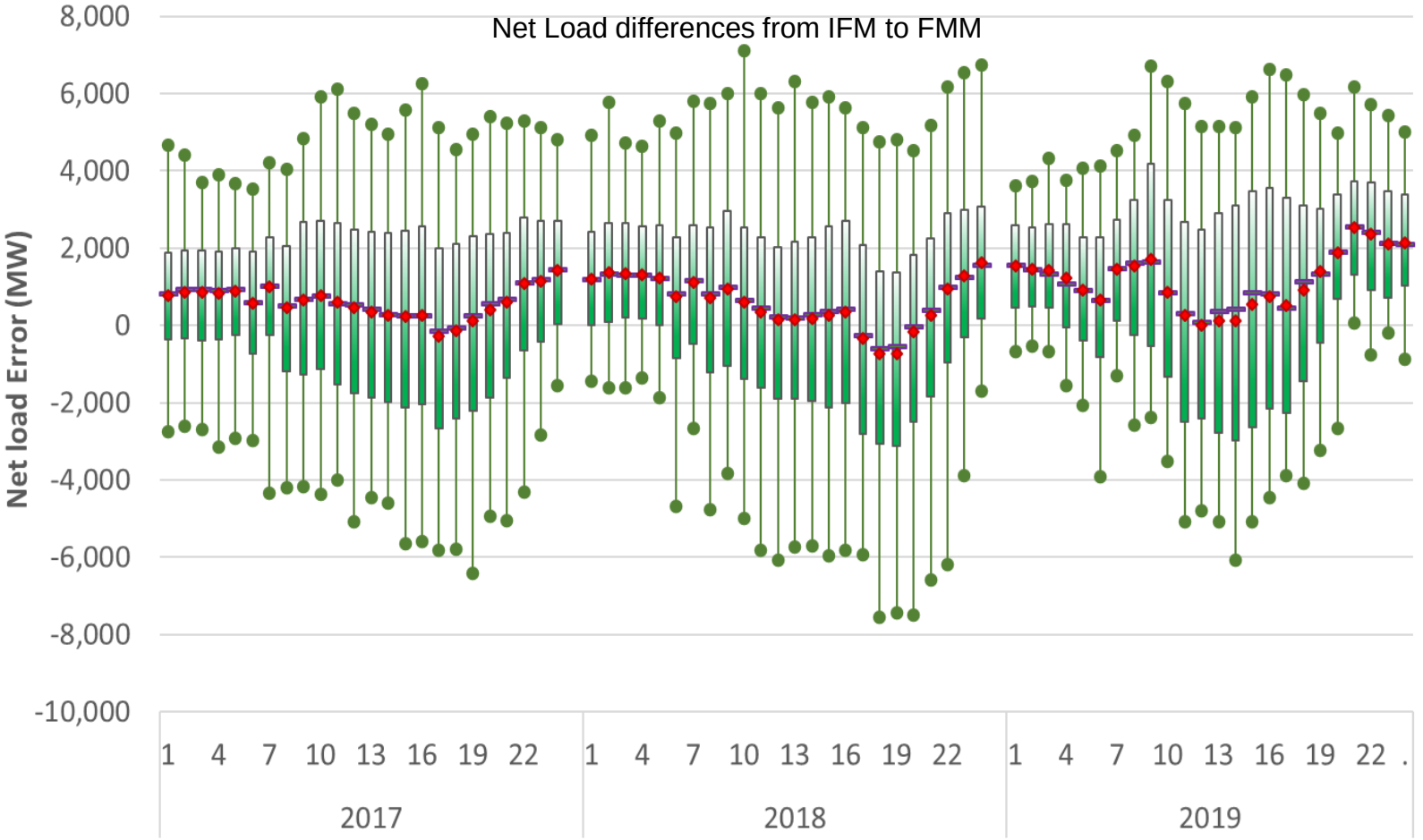


High day-ahead prices correlated to tight supply and high gas prices

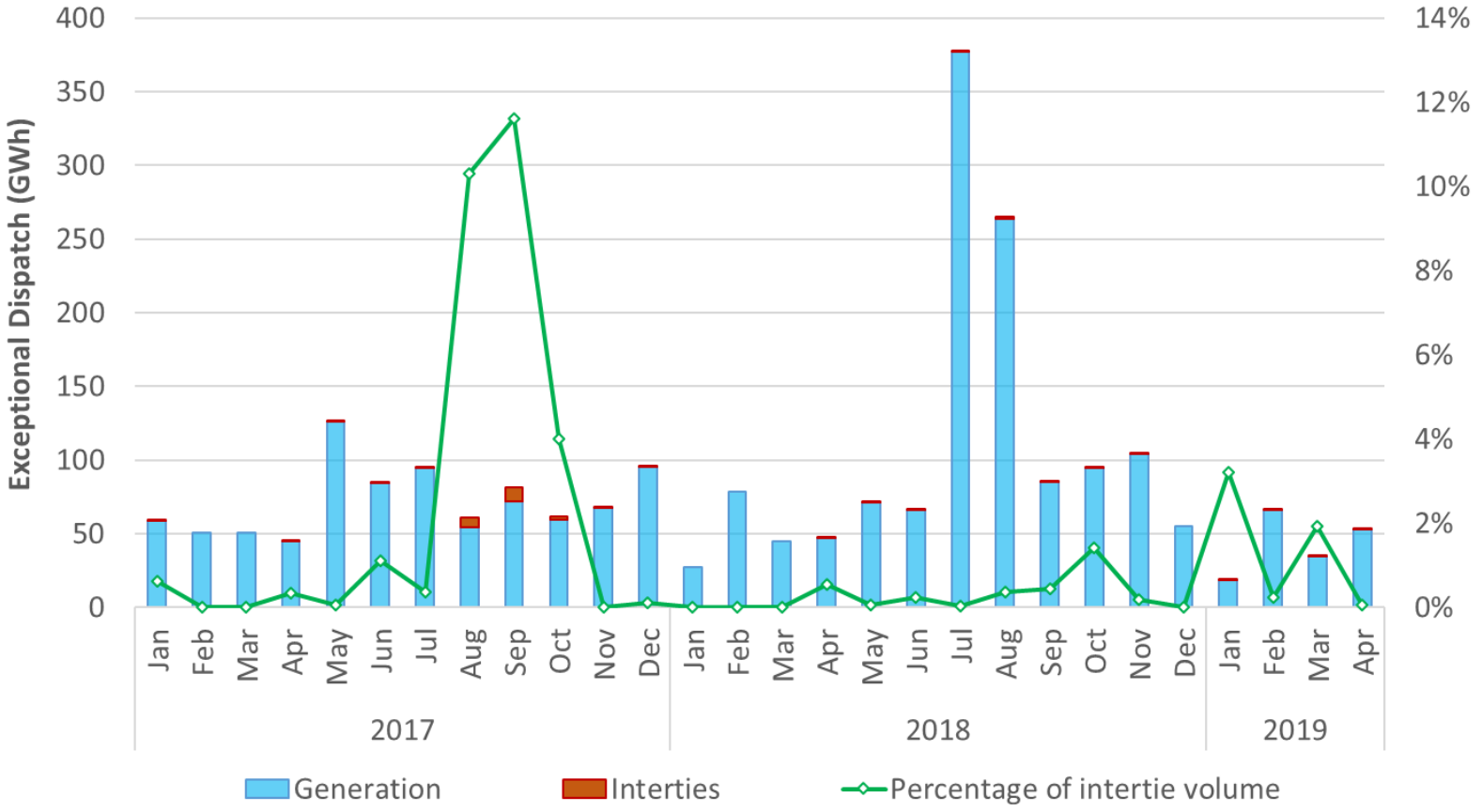


The bubble size represent the gas price value; the higher the gas price the larger the bubble

Uncertainty from day-ahead to real-time is significant

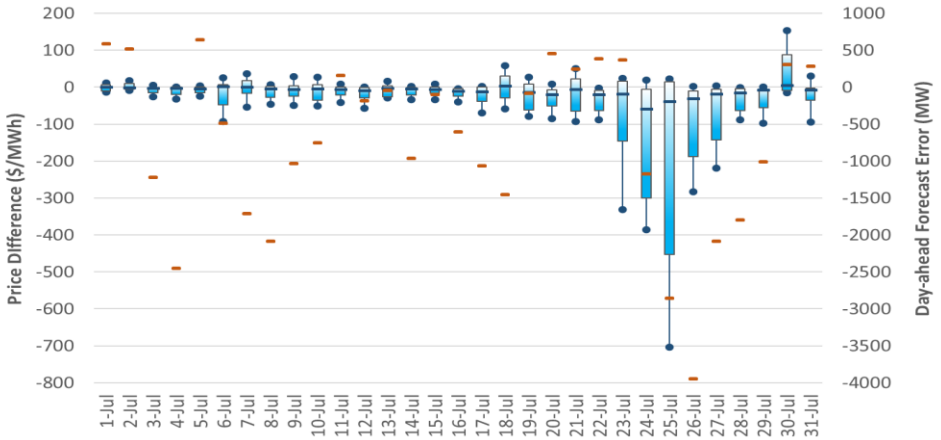


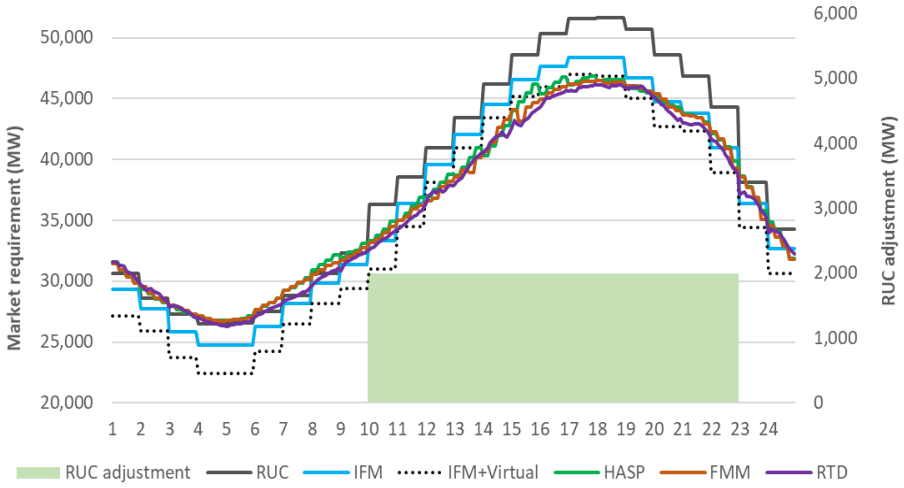
The volume of manual dispatches on interties is relatively small

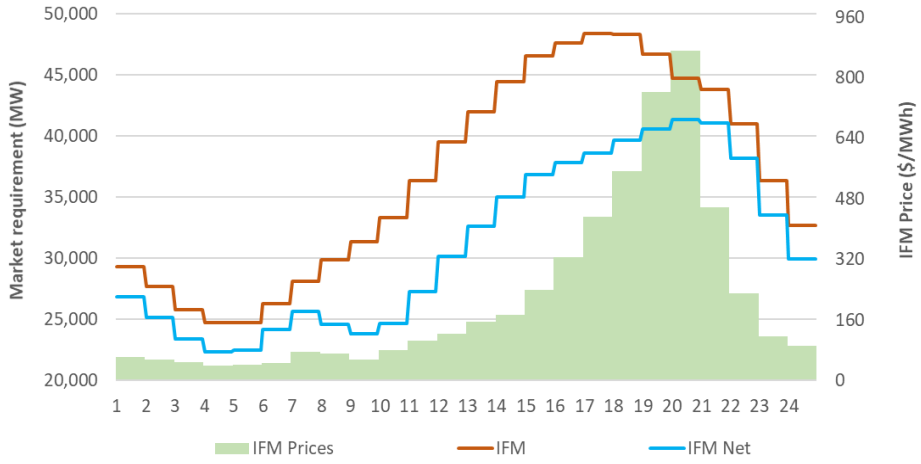


Case Study: High day-ahead prices on July 25, 2018

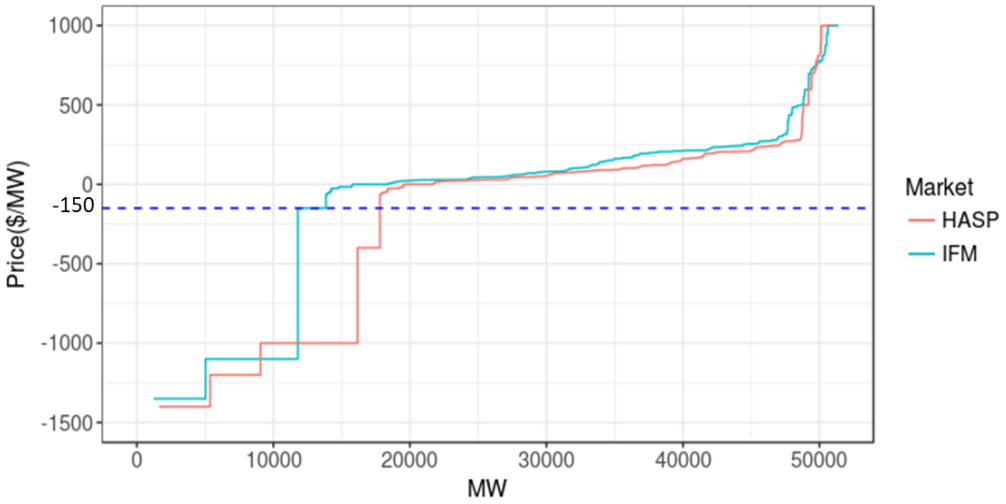
- Day with high volatility
- Peak day of the year
- Significant load forecast error



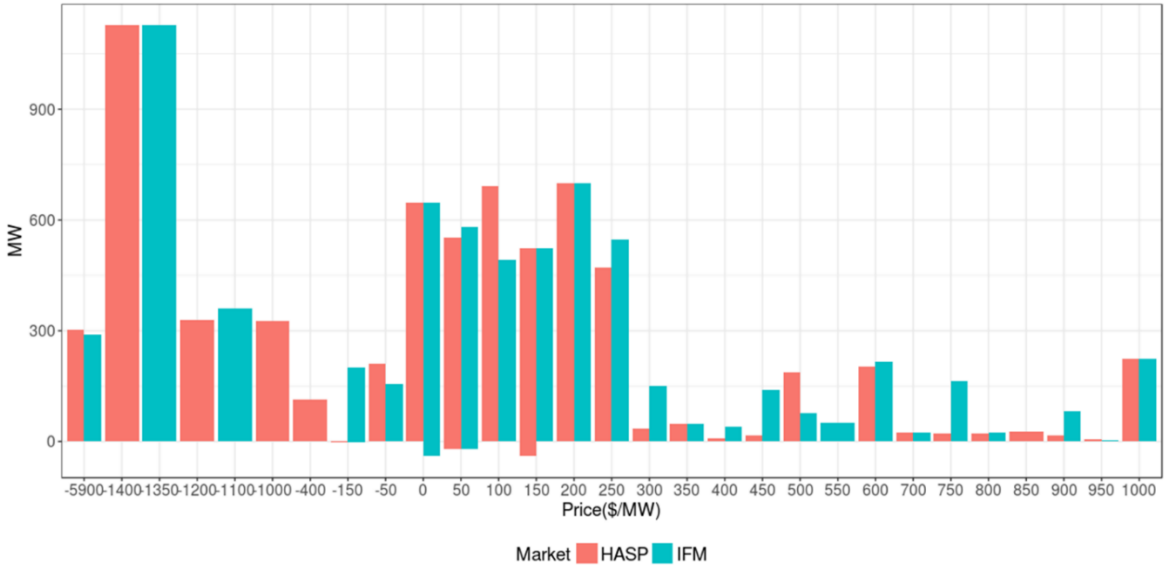




Case Study: July 25, 2018

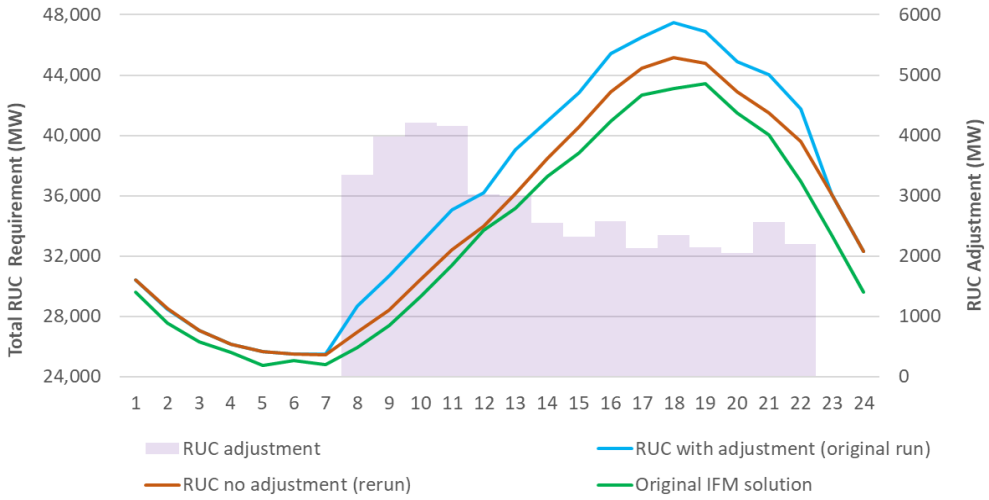


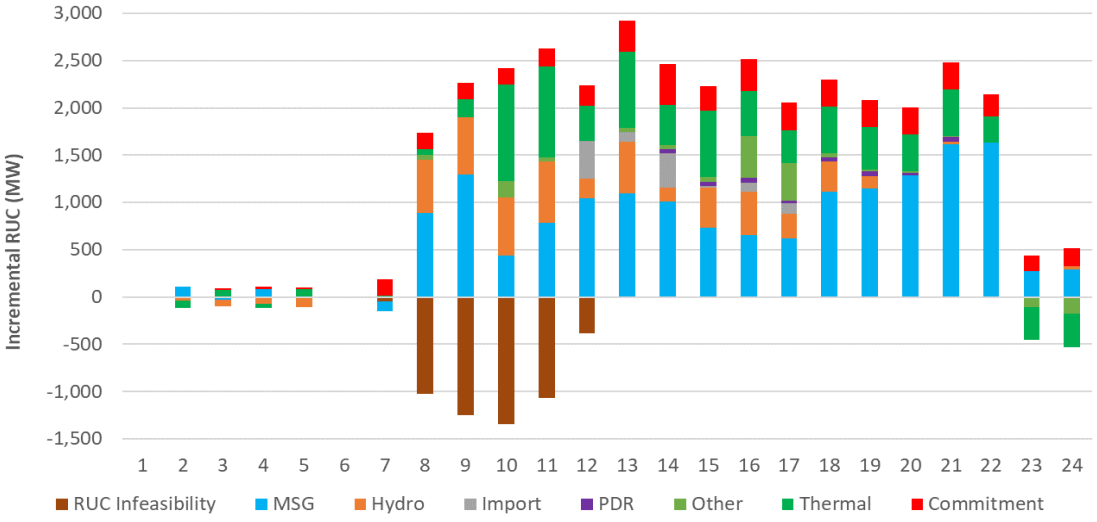
- Bids in the range of marginality not extremely different



Case Study: RUC adjustment for July 8, 2018

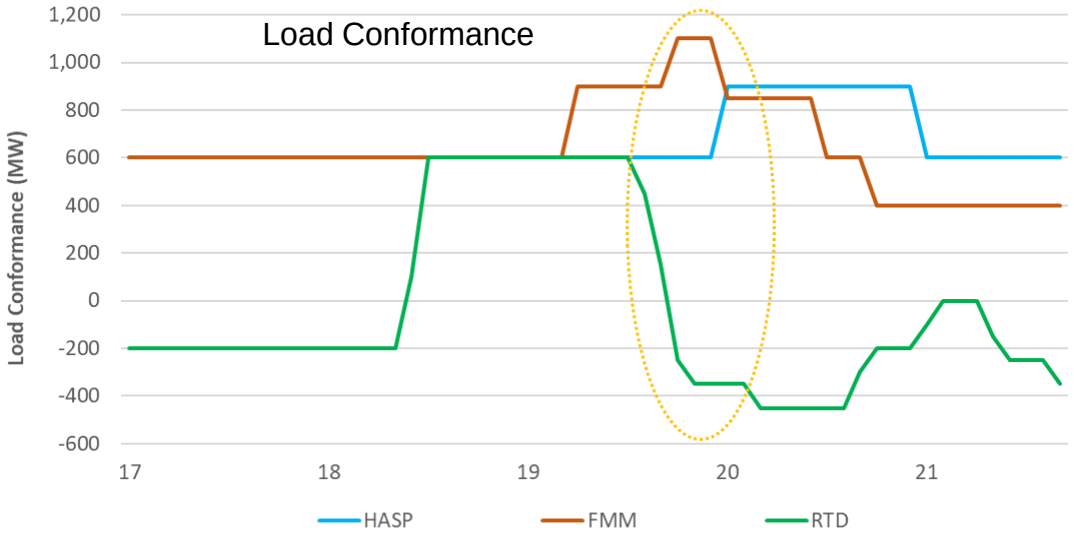
- Although it was large, RUC adjustment did have minimum impact on the real-time market





Case Study: Price divergence on March 1, 2019

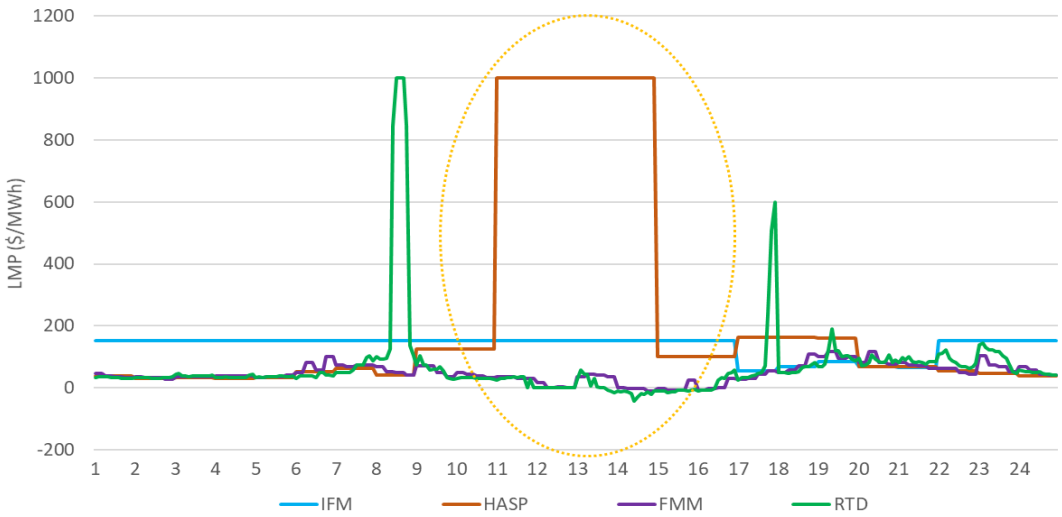
- HASP: $48
- FMM: $1000
- RTD: $36



- FMM had an additional 1,300MW requirements to clear than HASP:
  - Conformance: 500MW
  - export losses: 100MW
  - reduction of renewables: 200MW
  - load forecast increase: 500MW
- From FMM to RTD conformance reduced from 1,100MW to -350MW

Case Study: Price divergence at NOB on March 1, 2019

- Cold weather in the West
- High gas prices
- NOB with 0 MW in the export direction
- IFM cleared both Imports and Exports, binding at $151



- In HASP, self schedules in export direction above tie limit, and insufficient bids to counter-flow
- HASP curtails the export self schedules and penalty prices set the HASP prices at $1000.
- FMM/RTD are feasible and no flows are optimized on NOB; so no congestion on NOB tie.

Schedule

Task	Schedule
Draft proposal for analysis	Monday April 3, 2019
Discussion at MSC meeting	Friday April 5, 2019
Stakeholder call	Wednesday April 10, 2019
Stakeholder comments	Wednesday April 17, 2019
Posting of first report	Monday June 17, 2019
Stakeholder call	Friday June 21, 2019
Stakeholder comments	Wednesday, July 3, 2019
Final report	Wednesday July 31, 2019
Stakeholder call	Wednesday August 7, 2019