System Market Power discussion

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Market Surveillance Committee Meeting
General Session
April 5, 2019

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Background

- In June 2018 the Department of Market Monitoring recommended that the ISO consider actions to be taken to reduce the conditions in which market power may exist

- Currently the Residual Supply Index (RSI) is used to identify hours in which system market power may exist

- DMM reports track RSI metrics for the top pivotal suppliers

Current RSI calculation

- RSI metrics employed by DMM is not a counter-factual metric but an after-the-fact metric developed using market data from the day-ahead market solution

- While the RSI metric is well established, its components can take different values depending on the data considerations and assumptions made

- RSI metrics calculated as recent as 2017 Study Year are based on hour-by-hour calculations and showed hours with RSI below the competitive threshold (1pu)

RSI calculation

- A group of *n* participants will be considered jointly pivotal if

$$\sum_{i=1}^{n} P_i > P_S - P_D$$

where

P_i: supply *under* control of participant *i (i-th Pivotal supplier)*

P_S: total system supply

P_D: system demand

- Rearranging the above equation, the Residual Supply Index (RSI) is

$$RSI_n = \frac{P_S - \sum_{i=1}^{n} P_i}{P_D}$$

if RSI_n *<1,* the *n-th* pivotal test fails

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Basis used in DMM's current RSI calculation

- P_D *: system demand*

  Day-ahead load forecast **+**

  Regulation up requirements **+**

  Operating Reserves requirements

- P_S *: total system supply*
  - ✓ *Energy bids only*
  - ✓ *All types of internal generation (physical only)*
  - ✓ *Interties (including Import wheels)*

- P_i *: Pivotal supplier*
  - ✓ *Considers all affiliates*
 - ✓ *Excludes Net buyers from the test*

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What should the system demand P_D be?
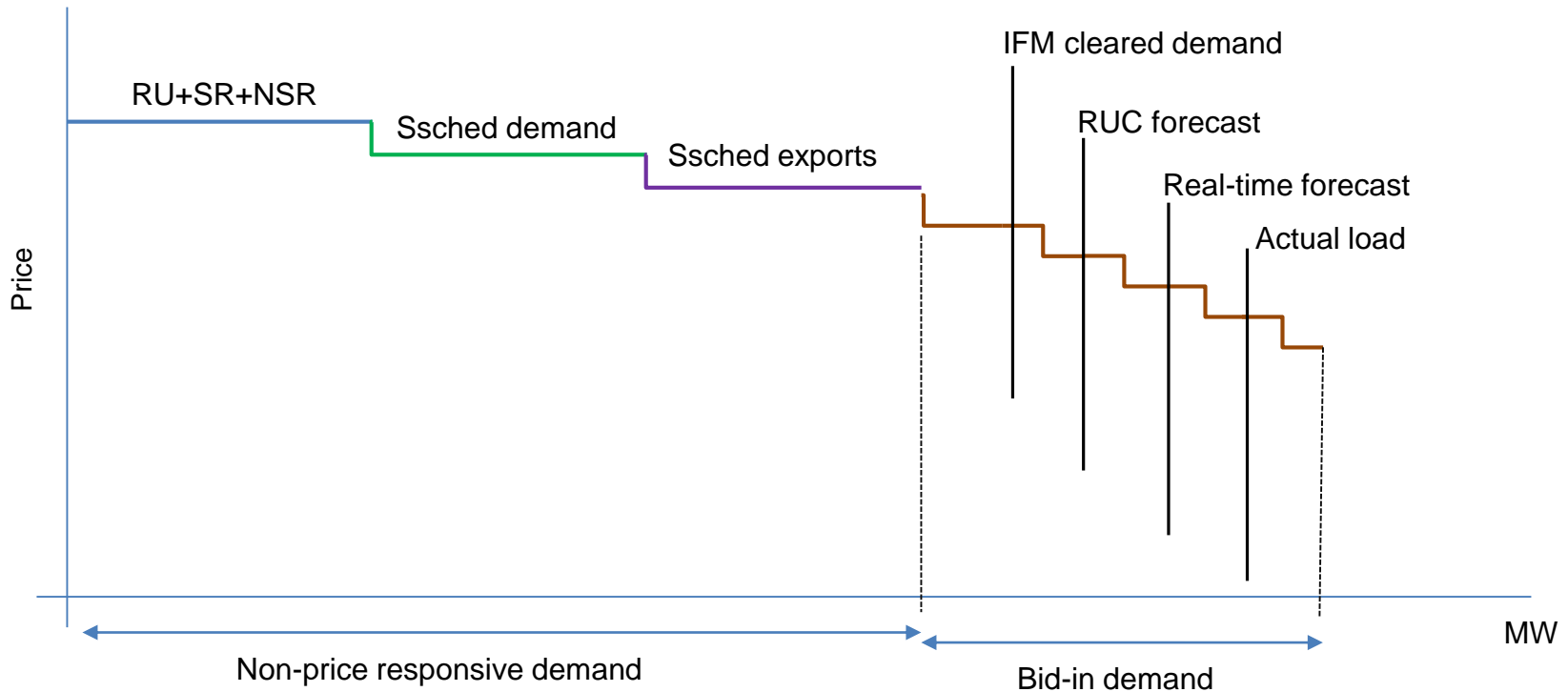
- Price responsive demand can curb market power in day-ahead

What should the supply (P_S, P_i) be?

- Current RSI calculations rely on bid data pre-processed within the market calculation; these are referred as *Output bids*

- Range of *Output Bids is based* on the already optimized DAM solution

- This data is not reliable as it does not necessarily reflect the "available" supply all the time.
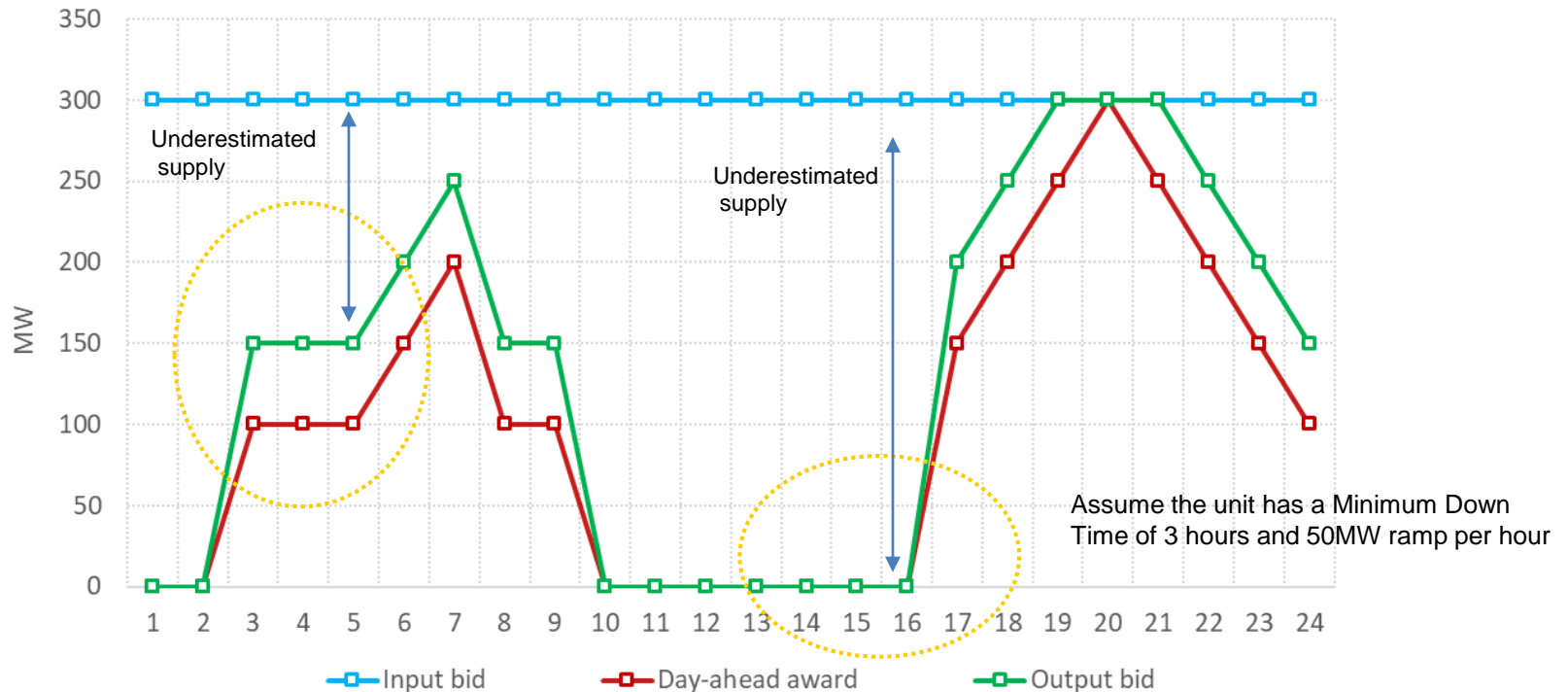
Supply considered using input bids will be greater than supply considered with pre-processed bids

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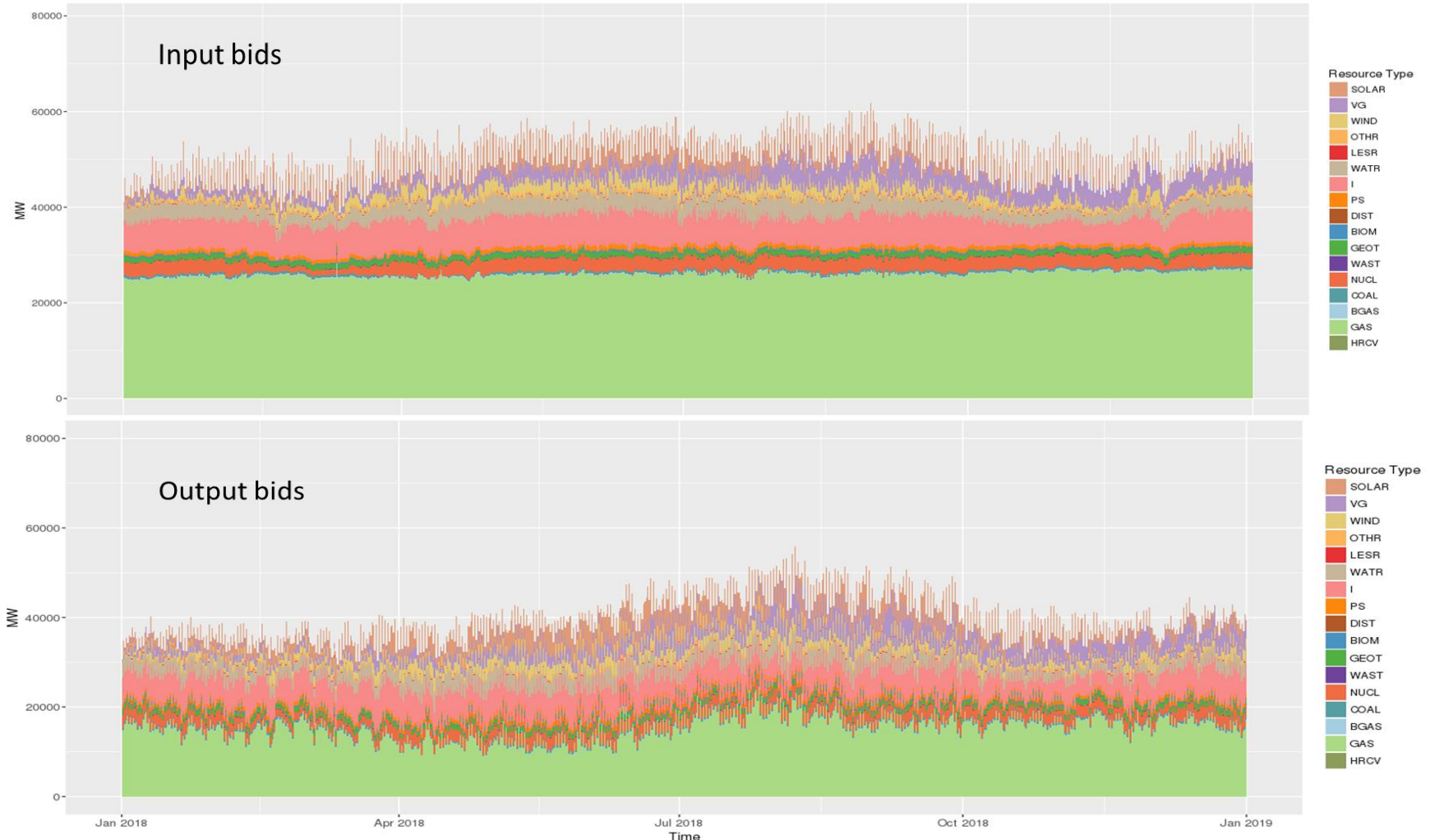
Using inputs versus solution-based available capacity will yield different outcomes

Physical +Virtuals

Input bids   Output Bids

Physical only

Input bids   Output Bids
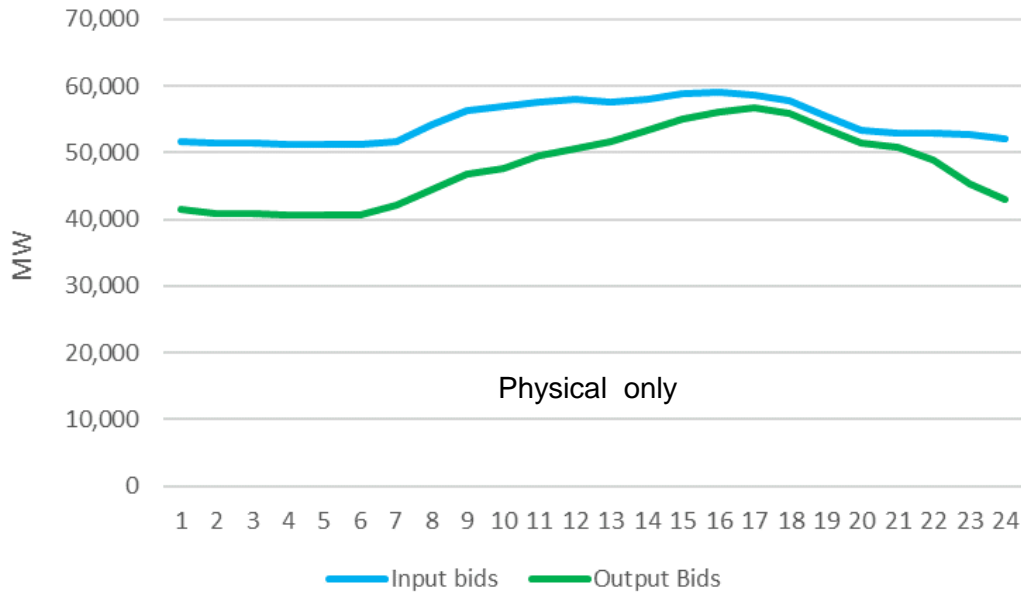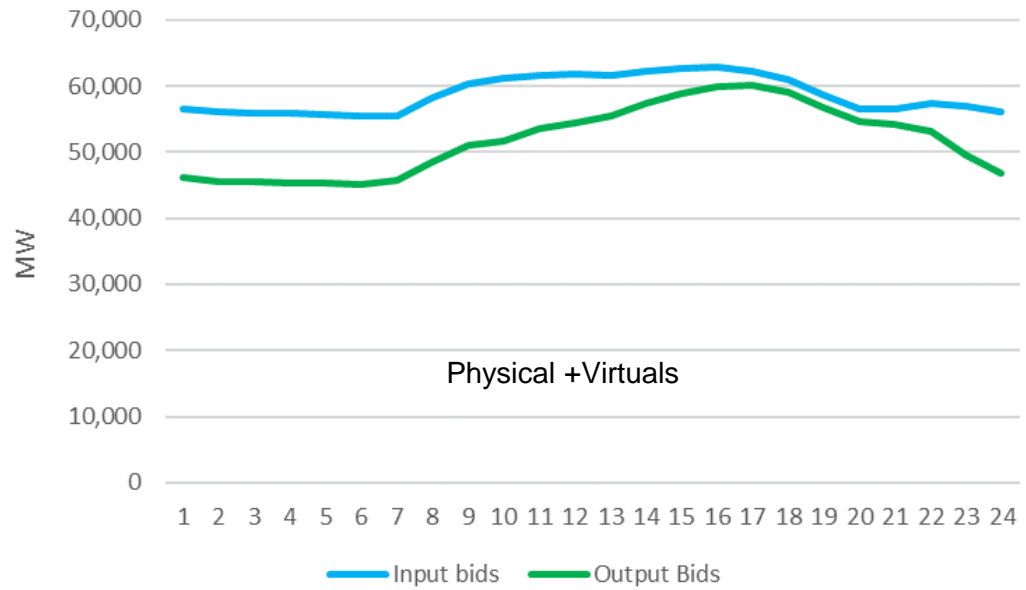
Input bids against different assumptions of demand lead to different outcomes of RSI
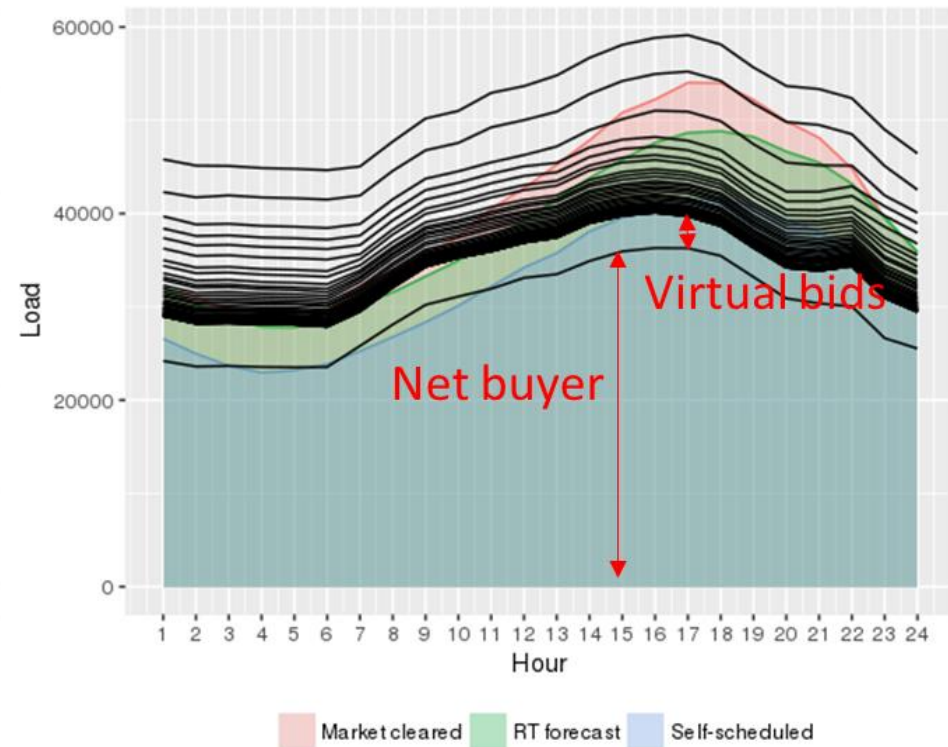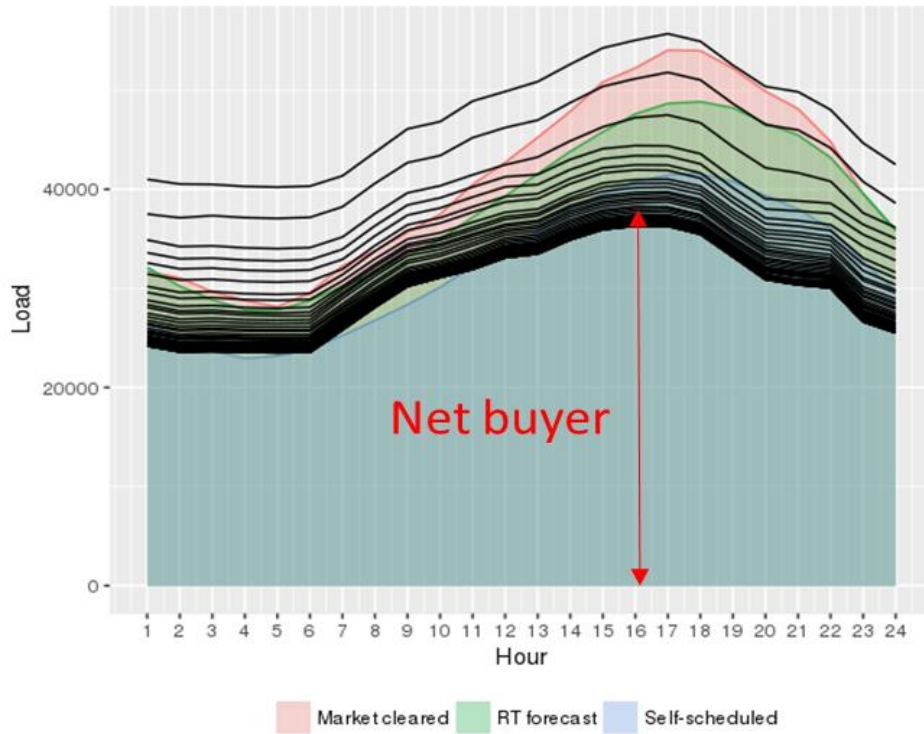
# Assumptions for the Supply and Demand components of RSI calculation for sensitivity analysis

Supply	Demand
1. Input physical - net buyer	1. Measurement
2. Output physical	2. Cleared demand
3. Output physical - net buyer	3. Self-schedule
4. Output physical + virtual - net buyer	4. DA forecast
5. Input physical+ virtual - net buyer	5. RT forecast

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Sample peak day of RSI metrics using 25 cases for sensitivity analysis shows a large spectrum of outcomes
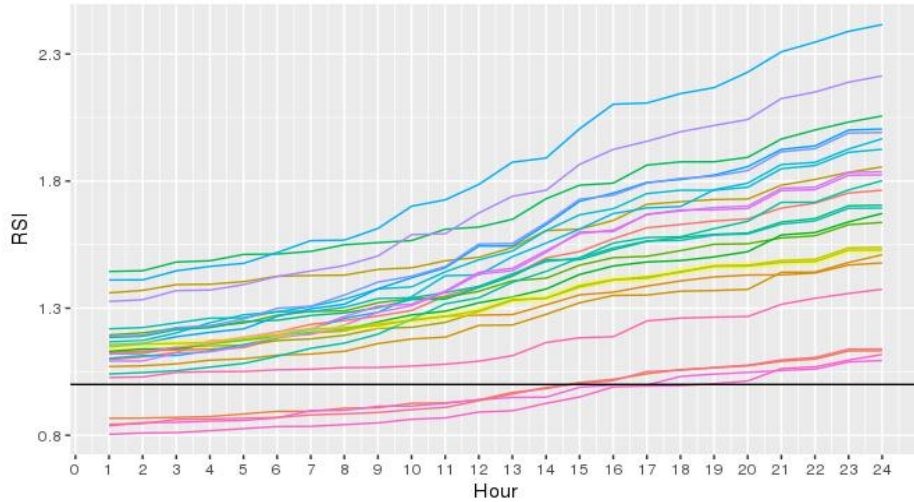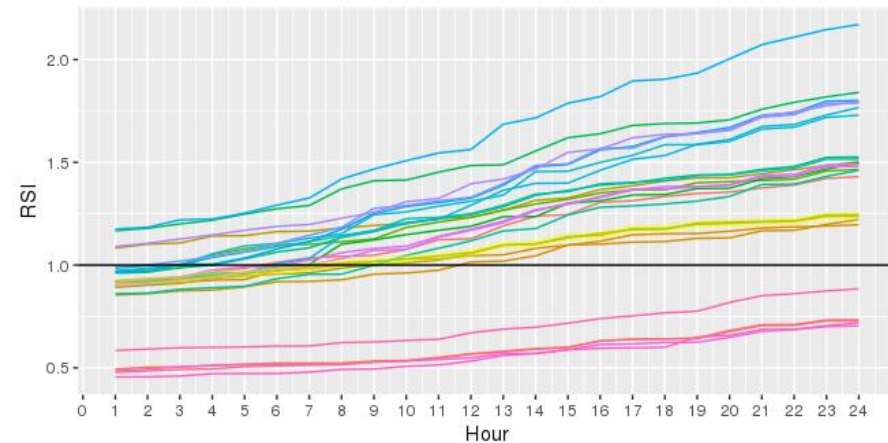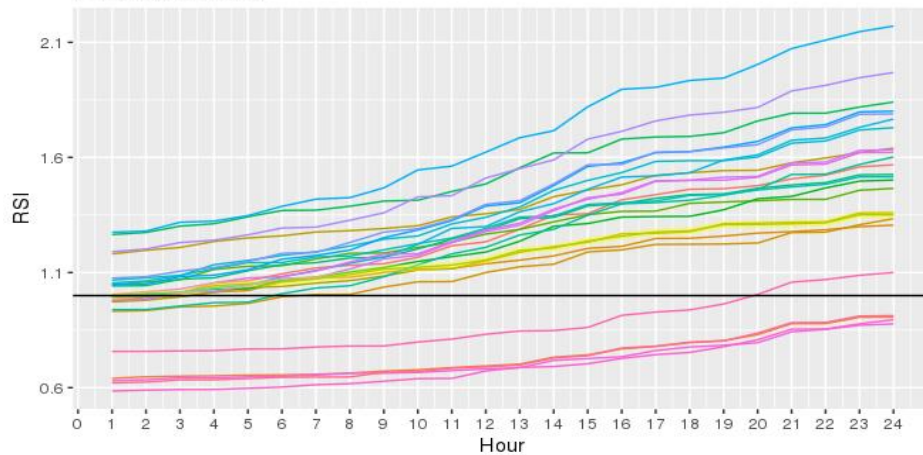
Sensitivity analysis for 50 different scenarios shows a wide range of potential outcomes

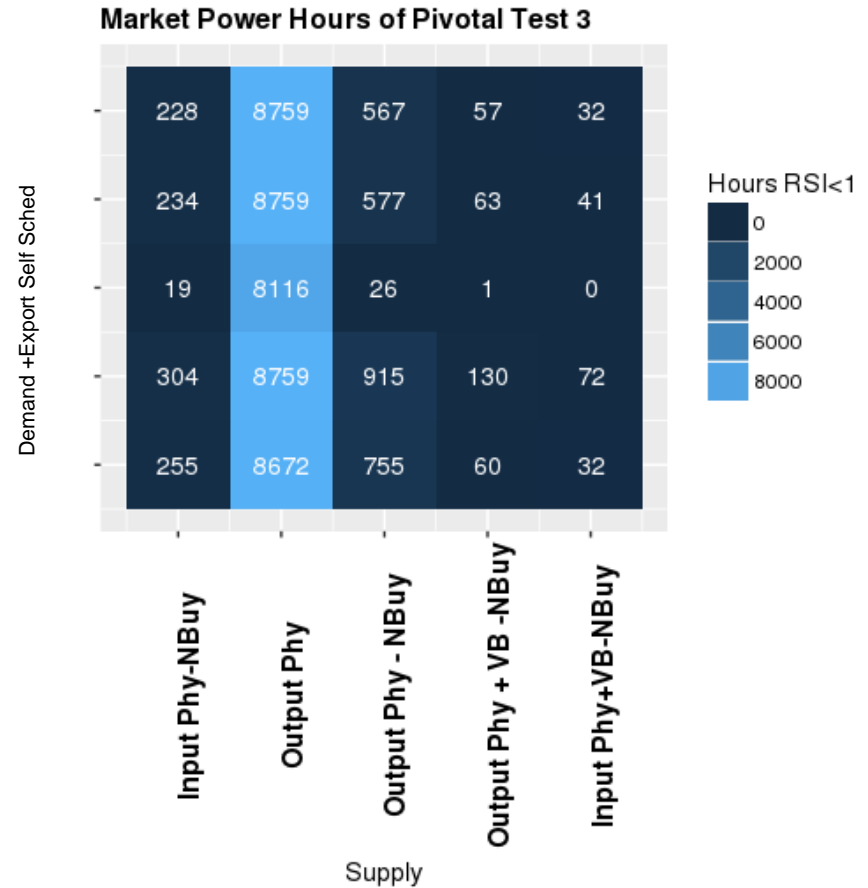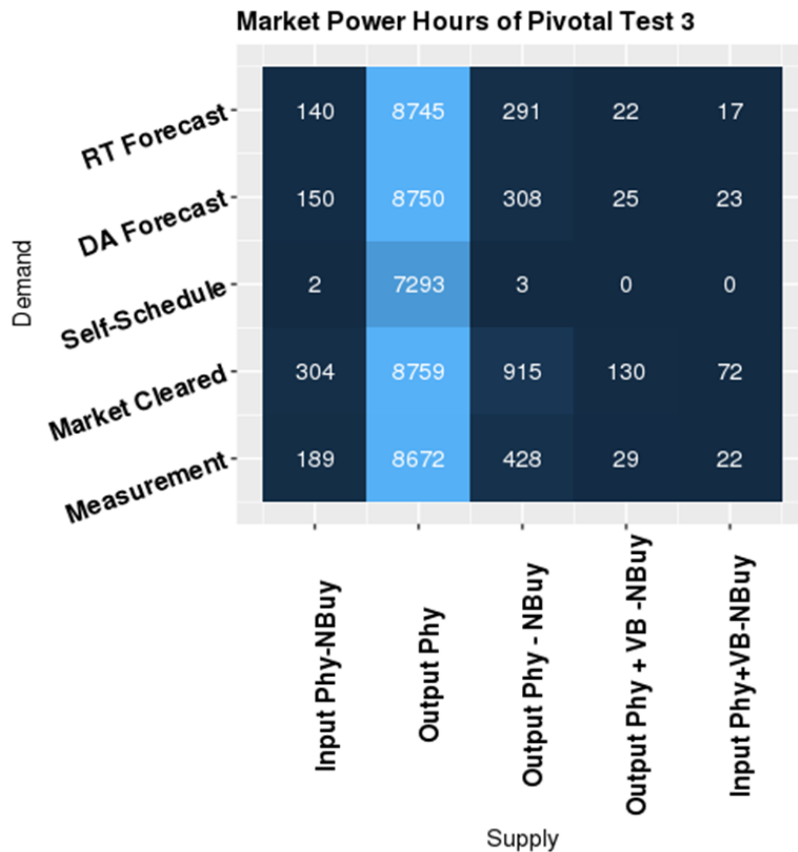

Market Power Hours of Pivotal Test 1
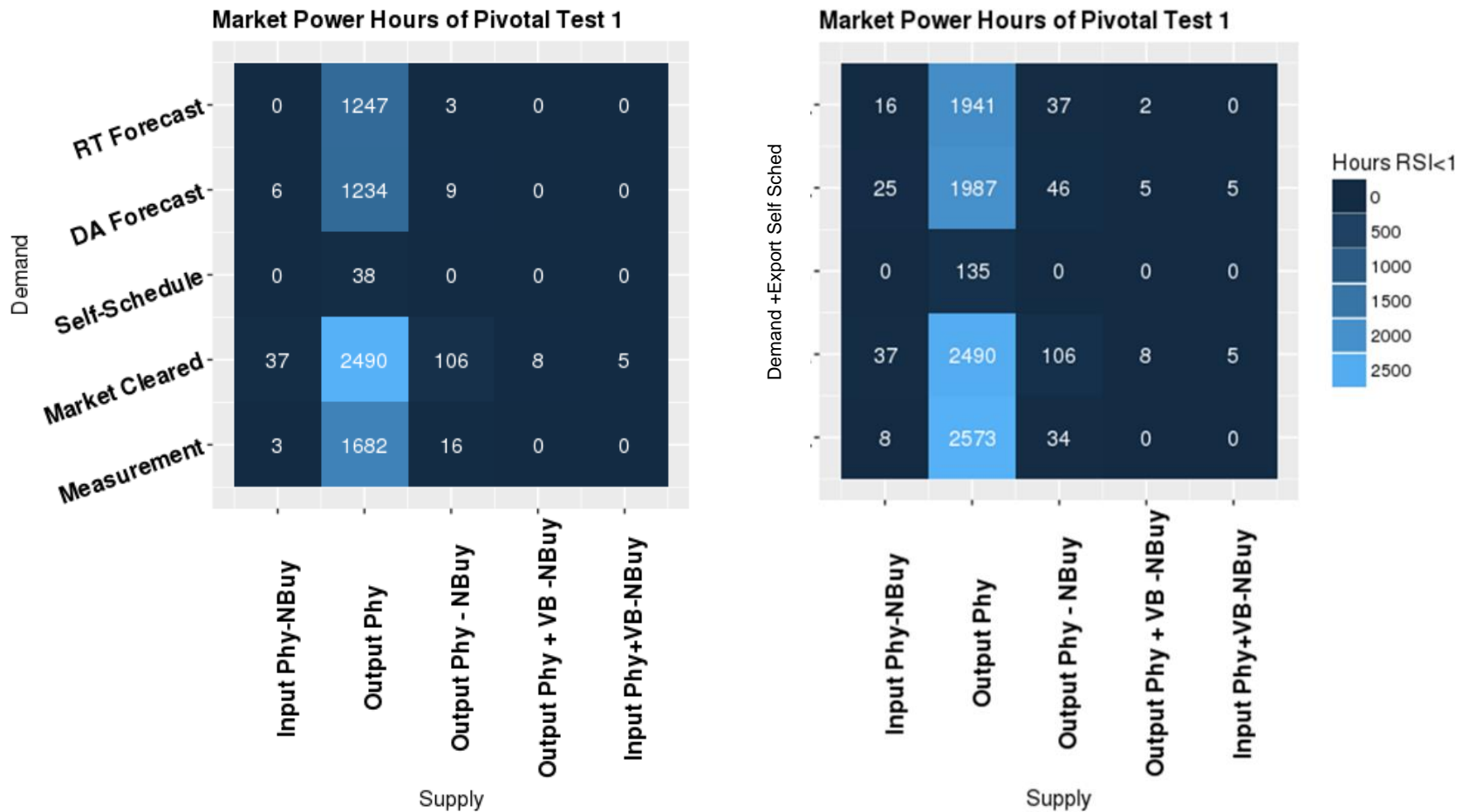
Sensitivity analysis for 50 different scenarios shows a wide range of potential outcomes

# Sensitivity analysis for 50 different scenarios shows a wide range of potential outcomes

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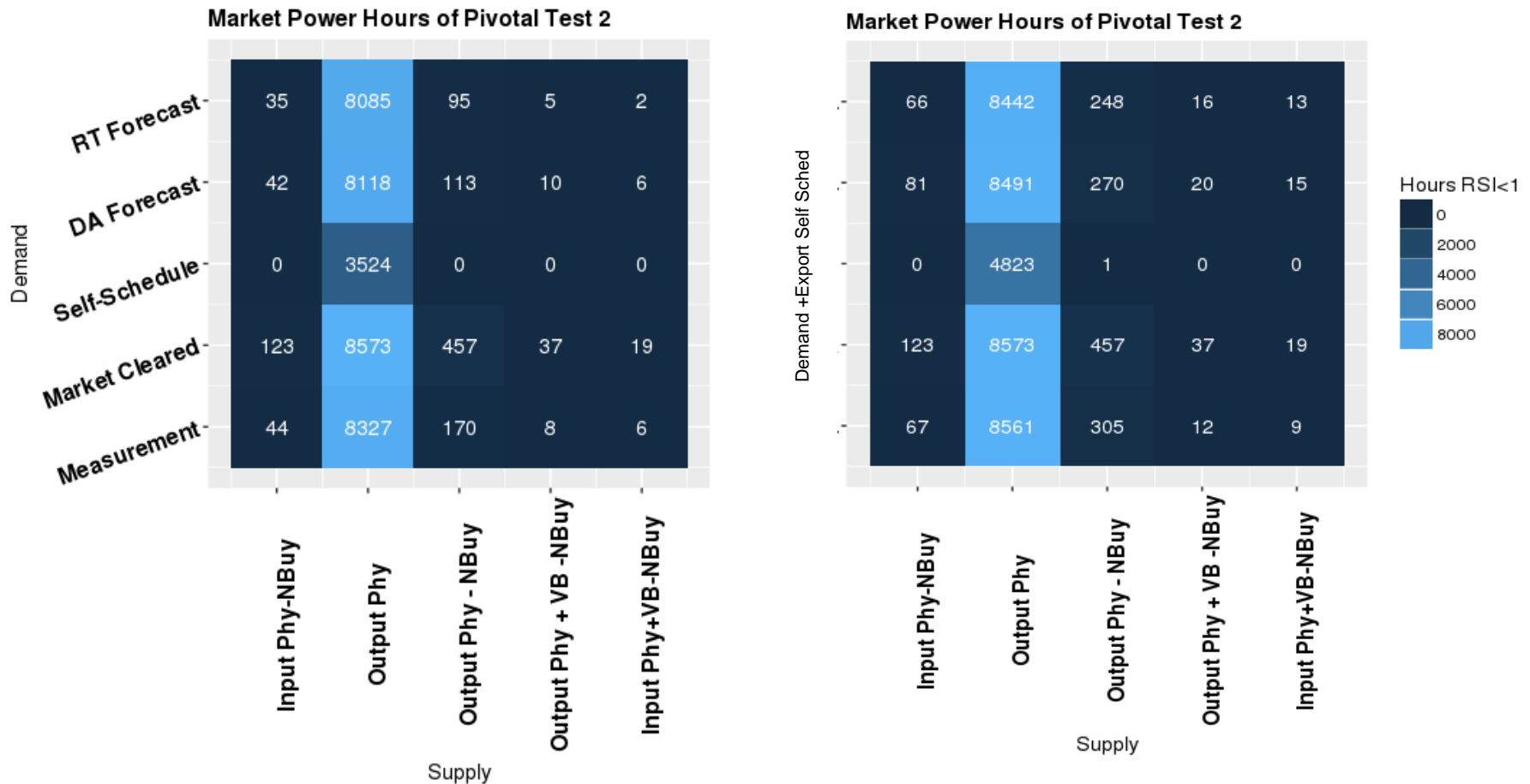
Differences in supply available between day-ahead and real-time markets can become more pronounced with the lack of flexibility in real-time
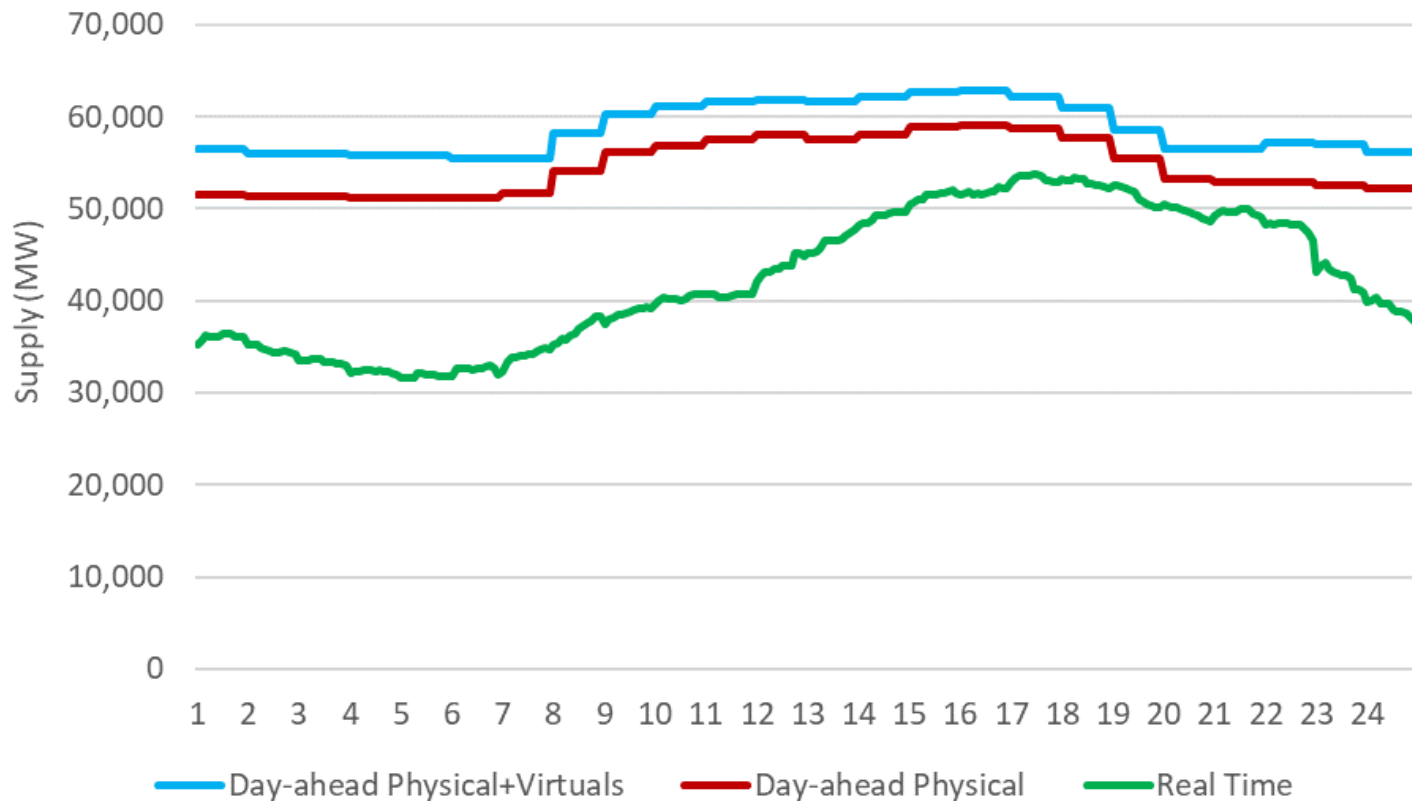
Supply not available in day-ahead but available in real-time for peak day of 2018 was largely with self schedules and from renewables
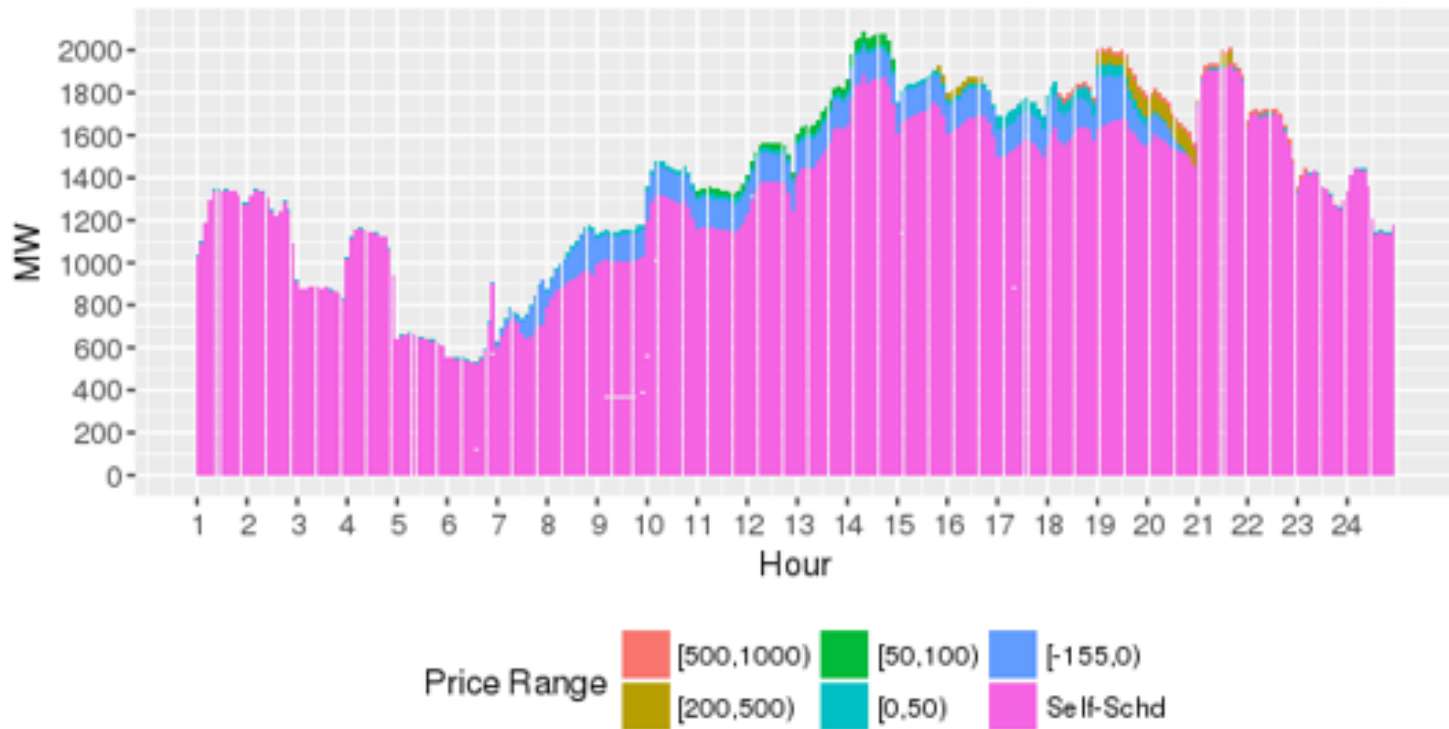
Supply not made available in day-ahead but available in real-time for peak day of 2018 was with self schedules and mainly from renewables