INDEPENDENT MARKET OPERATOR

# December 2014 MAC: LFAS Requirement Investigation Update

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Background

LFAS analysis update

Sculpting options

Next steps

# LFAS performance and costs

- Technical Rules require frequency between 49.8 and 50.2 Hz for 99% of the time

  (System Management's own standard: 99.9%)

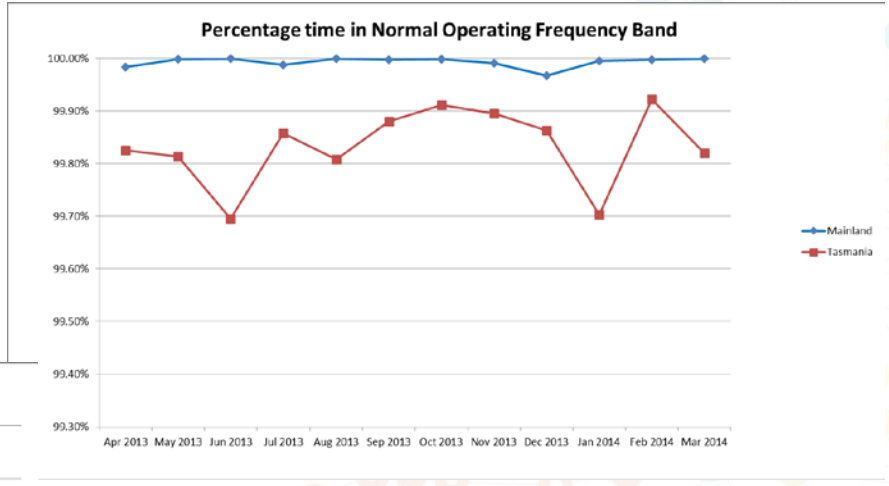
- **Performance exceeds the Technical Rules standard and costs are very high**
  - Actual performance level >99.97%
  - Over $50million a year

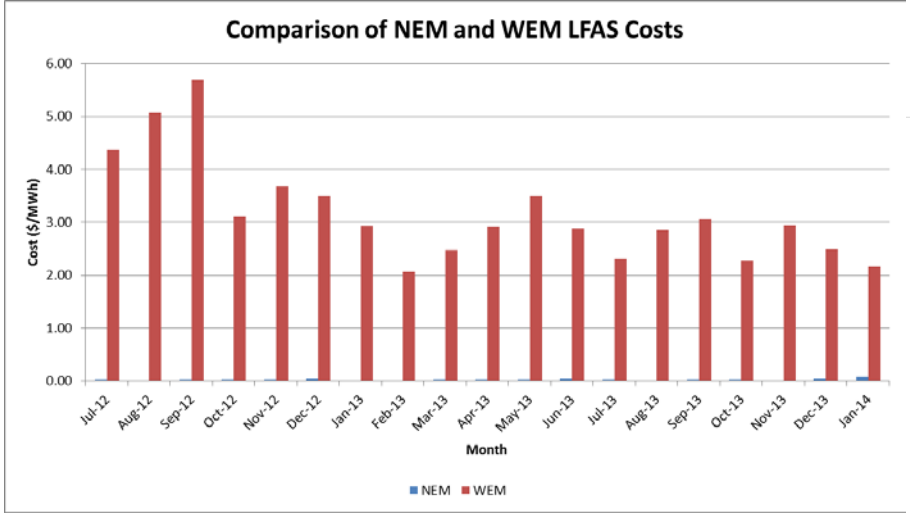
| Month | Time within 49.8-50.2 Hz | Total LFAS Cost |
|---|---|---|
| May 2013 | 99.98% | $5,421,487 |
| June 2013 | 99.99% | $4,663,093 |
| July 2013 | 99.98% | $4,037,705 |
| August 2013 | 99.98% | $4,658,579 |
| September 2013 | 99.97% | $4,729,591 |
| October 2013 | 99.98% | $3,602,735 |
| November 2013 | 99.98% | $4,594,275 |
| December 2013 | 99.98% | $4,304,983 |
| January 2014 | 100.00% | $4,113,704 |
| February 2014 | 100.00% | $4,018,299 |
| March 2014 | 100.00% | $4,570,728 |
| April 2014 | 100.00% | $4,645,353 |
| **TOTAL COST:** | | **$53,360,532** |

# LFAS performance in the NEM

NEM standard is 99.0%

NEM performance also exceeds standard, but costs are **much** lower…




Average $/MWH (total energy volumes)

NEM $0.03 vs WEM $3.14

Total cost

NEM $8.2M vs WEM $89.4M

# 2014 Ancillary Service Study (5 year review)

- 99.9% “much more onerous than typical frequency standards elsewhere”
- Other markets 97%-99%
- LFAS costs very high compared with other markets
- Scope to reduce LFAS costs
- Cannot measure usage accurately – Synergy dispatch
- Shorter dispatch cycle and more flexible ramping recommended

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# LFAS analysis – recap

- Early 2013, IMO and System Management working group established to investigate LFAS usage to
  - understand its causes/sources (potential for causer-pays approach)
  - identify opportunities to reduce the cost of LFAS
- Driver of the review – high LFAS costs
- Challenges
  - measurement of LFAS not possible due to dispatch of Synergy portfolio
  - captures events which should be spinning reserve or load rejection reserve
- Therefore, **this analysis represents a 'worst case' scenario**
- Despite the challenges, has
  - clearly identified the sources of LFAS
  - identified a range of options to reduce

# LFAS sources

- Four main sources of LFAS:
  1. Deviation of actual **load** from forecast
  2. Deviation of **NSG output** from forecast
  3. **Ramping** by generators
  4. SG **deviation from Dispatch Instructions**
- But, in addition to portfolio dispatch, the analysis is clouded by errors – previously called ‘Source 5’:
  - ‘behind the fence’ forecast error
  - auxiliary load forecast error
  - dispatch error (residual error)

  These errors don’t result in actual response by LFAS facilities, but distort the analysis and have other impacts

# Options to reduce LFAS – load

- Options already implemented
  - System Management ‘alarm’ to alert controller to significant deviations – March 2014
  - no current plans for review/refinement
- Options post Electricity Market Review
  - reduce gate closure and dispatch cycles

# Options to reduce LFAS – NSG forecast error

- Discussions with wind farm operators
- Options now
  - Reduce ramp rates for out of merit dispatch
- System Management has advised it will review two options:
  - Short term initiative:  An increase in control room resources to enable increased manual intervention in managing generator ramp rates.
  - Longer term initiative: Changes to XA21 (This project will be prioritised after the Auxiliary Load Forecast and Sculpting projects.  As this is a significant SCADA project it will likely be captured in the EMR process).
- Options post Electricity Market Review
  - shorter gate closure and dispatch cycles
  - restrictions on start up rate
  - general restrictions on ramp rates
  - ‘causer pays’ cost allocation

# Options to reduce LFAS – Ramping

- Possible short term option
  - System Management has suggested it could ramp the generators at the beginning of each interval according to the load requirement, not their standing data ramp rate
  - if System Management can confirm its ability to do this, IMO can progress necessary rule change to adjust TES calculation
- Options post Electricity Market Review
  - reduce gate closure and dispatch cycles
  - general restrictions on ramp rates
  - ‘causer pays’ cost allocation

# Options to reduce LFAS – Deviations from DIs

Most significant deviations occur when a facility trips or fails to start, but does not update its availability in Balancing Submissions for some time.

- Possible shorter term options
  - The IMO considers both Market Participants and System Management could respond faster when Facilities fail to comply with Dispatch Instructions (IMO already monitoring events with high constrained on/off impacts)
  - System Management will prepare a case for increasing control room resources (see slide 10).
  - Treat Forced Outages as Spinning Reserve events
- Possible longer term options (including post Electricity Market Review)
  - ‘causer pays’ cost allocation
  - Rule changes to specify after what period of non-compliance System Management must treat facility as unavailable

# LFAS Sources: Analysis for October 2014

Error in converting forecasts from as-generated to sent out – currently skewing analysis

| Percentile | 1. System Load | 2. NSG Forecast | 3. BMO Ramp Rate | 4. SG DI Deviation | Error: BTF Load | Error: Synergy Aux Load | Error: IPP Aux Load | Error: Dispatch Error | Total (with Errors) | Total Sources 1-4 |
|---|---|---|---|---|---|---|---|---|---|---|
| 0.05% | -116 | -134 | -75 | -28 | -18 | 50 | -10 | -21 | -71 | **-136** |
| 0.50% | -70 | -66 | -53 | -18 | -11 | 52 | -7 | -5 | -29 | **-95** |
| 1% | -60 | -53 | -46 | -14 | -8 | 53 | -5 | -4 | -14 | **-79** |
| 2% | -52 | -42 | -37 | -9 | -5 | 53 | -4 | -3 | -1 | **-66** |
| 3% | -47 | -36 | -32 | -6 | -5 | 54 | -4 | -2 | 5 | **-59** |
| 4% | -43 | -32 | -29 | -5 | -4 | 54 | -4 | -2 | 10 | **-54** |
| 5% | -40 | -30 | -26 | -4 | -4 | 54 | -3 | -1 | 14 | **-50** |
| 10% | -31 | -21 | -17 | -1 | -3 | 55 | -3 | 0 | 27 | **-37** |
| 50% | -4 | 0 | 0 | 4 | 0 | 62 | 0 | 3 | 63 | **-2** |
| 90% | 17 | 20 | 17 | 9 | 3 | 69 | 1 | 6 | 96 | **32** |
| 95% | 25 | 28 | 27 | 14 | 4 | 71 | 2 | 7 | 108 | **44** |
| 96% | 28 | 30 | 30 | 16 | 4 | 72 | 2 | 7 | 112 | **48** |
| 97% | 31 | 33 | 35 | 18 | 5 | 72 | 2 | 7 | 117 | **53** |
| 98% | 36 | 37 | 41 | 21 | 6 | 73 | 2 | 8 | 125 | **61** |
| 99% | 44 | 48 | 50 | 24 | 9 | 74 | 3 | 9 | 139 | **75** |
| 99.50% | 54 | 59 | 58 | 30 | 12 | 75 | 4 | 10 | 149 | **85** |

Note: this is a ‘worst case’ analysis – accurate measurement not possible

# Auxiliary load forecast error

- ‘As generated’ load forecast -> ‘sent out’ Dispatch Instructions
- Calculation changes March and October 2014
- Synergy forecast affected by low coal usage in October
- Forecast RDQ and out of merit dispatch impacts
- System Management will determine the cost and timing of creating a persistence ‘as generated’ forecast.  A cost estimate will be presented to the next MAC meeting.

Background

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Sculpting options

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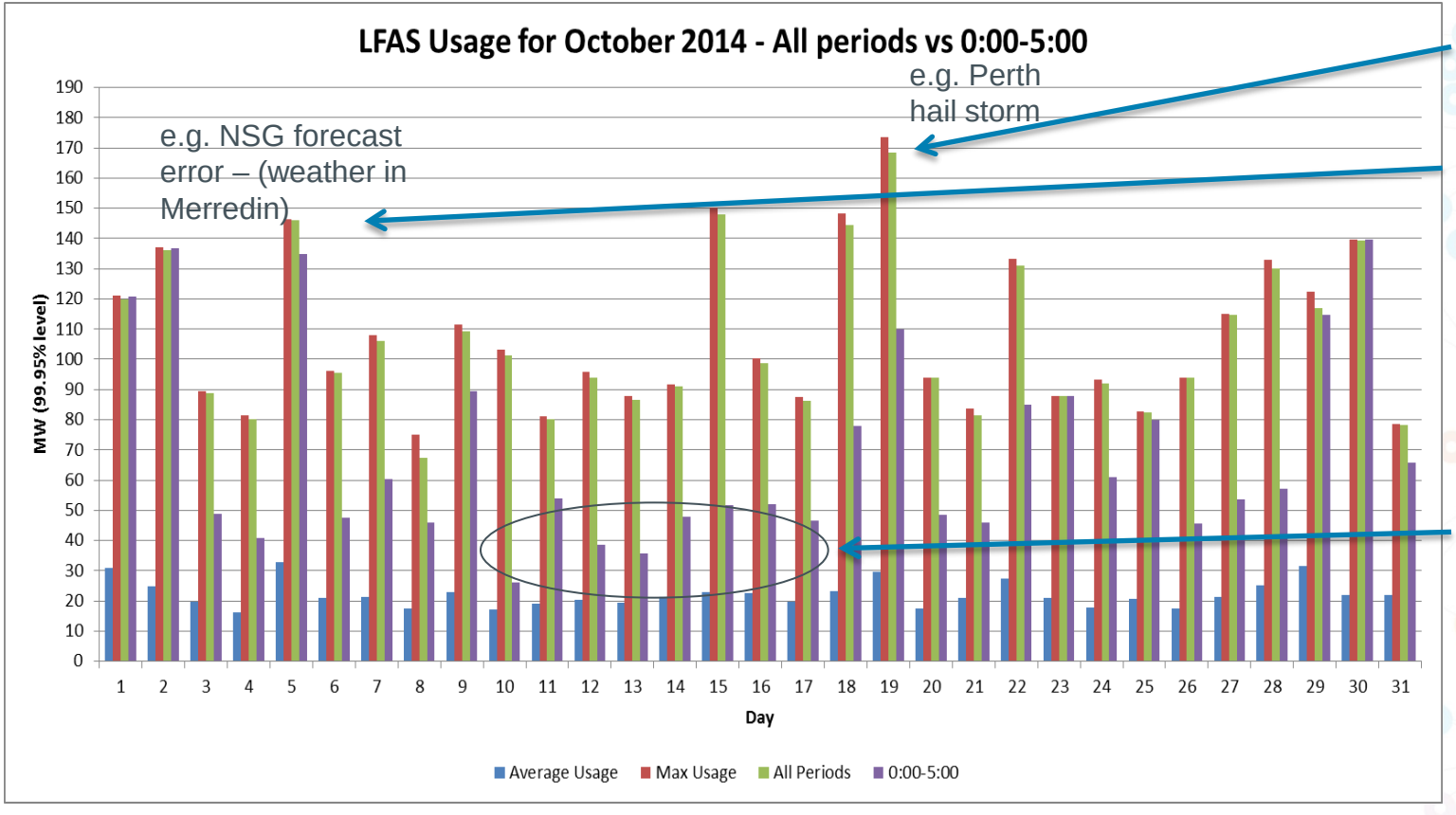
# Sculpting

- The Market Rules enable System Management to set and procure (though the LFAS market) a different LFAS quantity in each Trading Interval
- LFAS use fluctuates across the day and year – scope to reduce quantity at certain times was identified by ROAM in a report for the IMO in 2010
- Analysis indicates good potential, particularly overnight
- Weather is a key factor

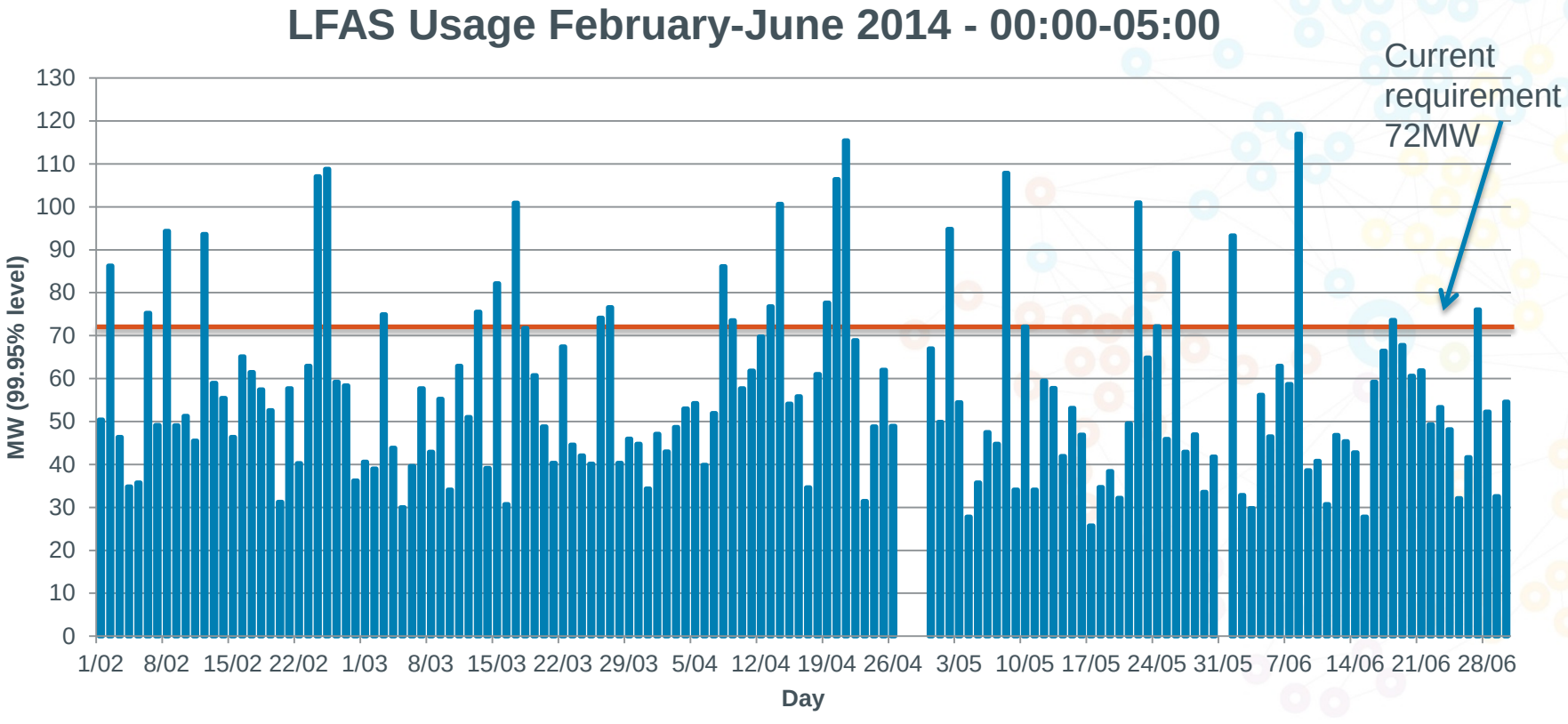
# Sculpting options – midnight to 5:00am



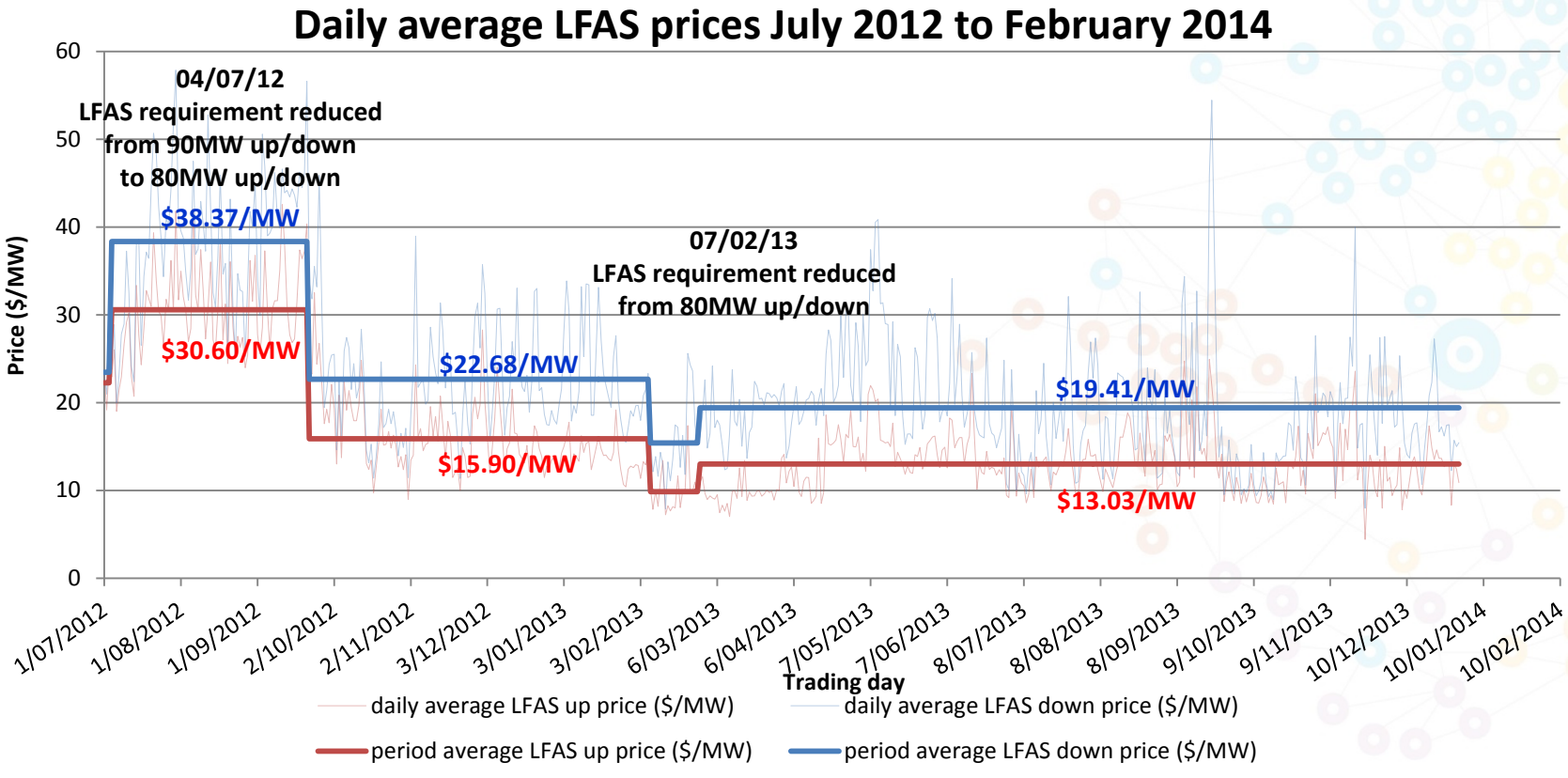

Several weather events in October 2014

But much lower usage at other times (even based on this a worst case analysis)

# Sculpting options – midnight to 5:00am (2)



# Reduced requirements do reduce cost



# Sculpting plan

- System Management will resource the following actions:
  - undertake a detailed review of the data to validate the opportunity
  - if the opportunity is verified then SM will scope the works required to realise the opportunity
  - present it’s findings and details of costs and risks to the March MAC meeting

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# Next steps

- Sculpting
- Source 5 correction
- SM investigating increase in control room resources
- Ramping generators other than at BMO ramp rate
- Waiting on EMR outcomes: shorter gate closure, shorter dispatch cycles, more flexible ramping, co-optimisation, etc…
- Ongoing monitoring

INDEPENDENT MARKET OPERATOR

# Questions

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