

Presentation of Recalculated 2017 Loss Factors Determined Under Loss Factor Rule

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- Introductions and agenda (slides 1-3)
- Summary of loss factors and related information posted on AESO website (slides 4-6)
- Loss factor results, including changes from previous loss factor posting and exclusion rates (slides 7-15)
- Shift factor results (slide 16)
- Comparisons of new and prior loss factors (slide 17)
- Development of 2018 loss factors (slides 18-22)
- Discussion and questions (slide 23)

Please ask questions during presentation

AESO posted recalculated 2017 loss factors on its website on September 12, 2017



- 2017 loss factors were initially posted on May 11, 2017
 - May 11 version of loss factors was withdrawn following technical meeting on May 18
- Recalculated 2017 loss factors were posted on July 13, 2017
 - Correction of error in workbook posted on July 7, 2017
 - Summary of differences between July 13 and May 11 loss factors was also posted on July 13, 2017
 - July 13 version of loss factors was withdrawn following questions from stakeholders
- Summary of differences between September 12 and July 13 loss factors will be posted this week

AESO posted recalculated 2017 loss factors on its website on September 12, 2017 (cont'd)

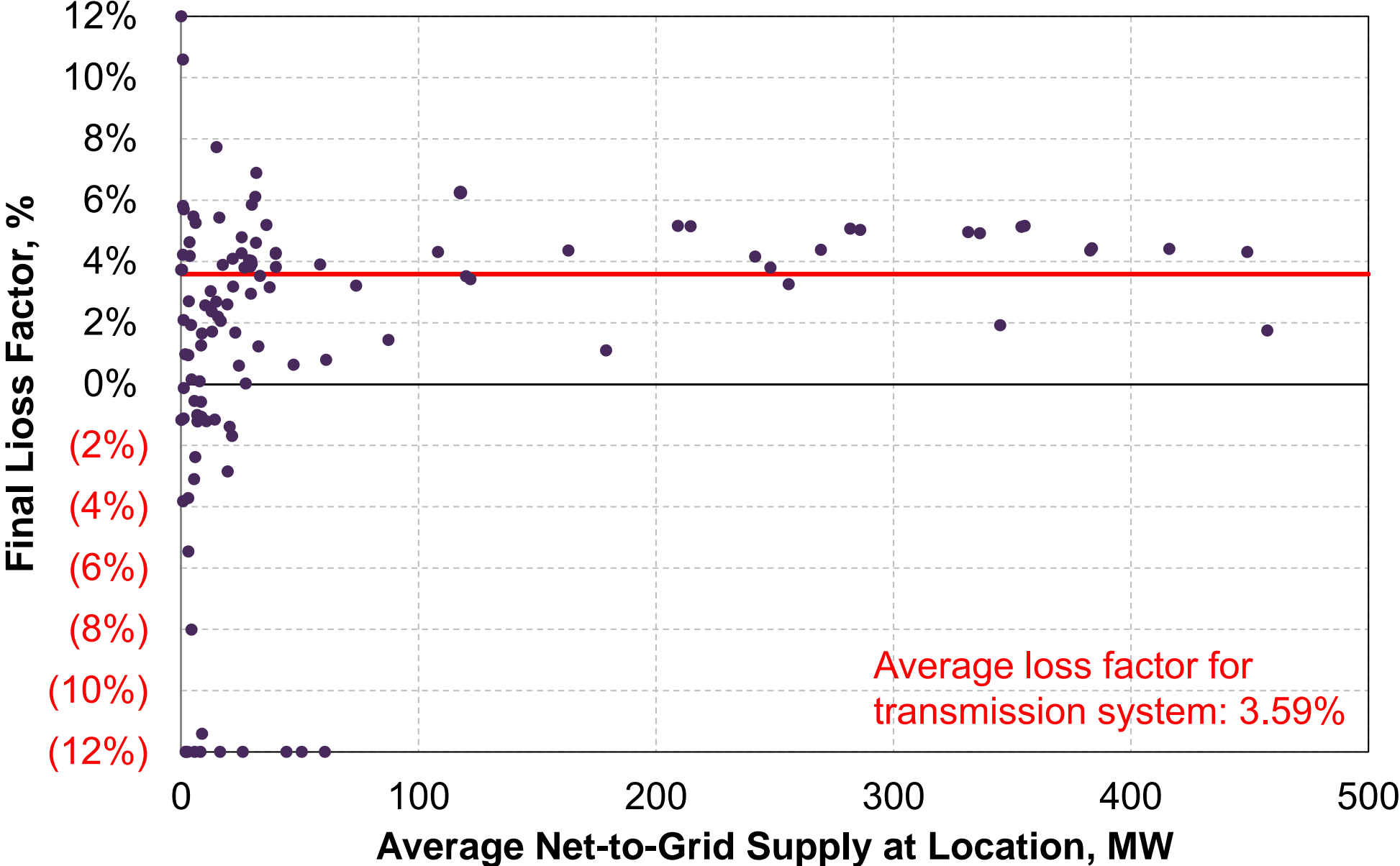


- Loss factors were posted in accordance with section 501.10 of ISO rules, *Transmission Loss Factors* (“Loss Factor Rule”)
 - Rule was confirmed by Commission in Decision 790-D05-2016 issued on November 30, 2016 regarding AESO’s Phase 2 Module B compliance filing in Proceeding 790
 - Subsection 3(1.1) of Loss Factor Rule requires AESO to publish final loss factors for 2017 as soon as practicable in 2017
 - Loss factors determined under Loss Factor Rule will be effective from January 1, 2017 to December 31, 2017
 - September 12 loss factors are expected to be used for billing on statements of account issued in October 2017 for initial, interim and final settlement of September, July and May 2017, respectively
 - Adjustments to loss factors for January to April 2017 will be implemented following October billing cycle

AESO also posted additional information used to establish 2017 loss factors

- Subsection 3(2) of Loss Factor Rule requires AESO to publish additional information at same time as loss factors
 - Hourly merit order data for 2017 loss factors
 - Sample of 144 hours of load data for 2017 loss factors
 - Process for requesting access to system topologies
 - Procedure to determine transmission system losses for loss factor calculations
 - Software and scripts used to calculate hourly raw loss factors
 - Workbook showing calculations for 2017 loss factors
- Transmission system losses
 - Anticipated losses of 2,230 GWh for 2017
 - Average loss factor of 3.59% for 2017

Final loss factors continue to show greater dispersion for smaller net-to-grid volumes



Several changes were implemented for September 12 loss factor calculation

- Merit order offers have been corrected for three generating units that increased maximum capability in 2016
 - Historical derates had previously been overwritten by increase in maximum capability
 - Also affected average profile applied to one new generator
- H R Milner unit on mothball outage has been removed from merit order for remainder of year
- Missing reversing points-of-delivery (load services with distribution-connected generators) have been included
- Merit order offers have been corrected for industrial systems that offer on a net-to-grid basis
- Volumes in all hours (including excluded hours) are now used in annual shift factor calculation

Several changes were implemented for September 12 loss factor calculation (cont'd)

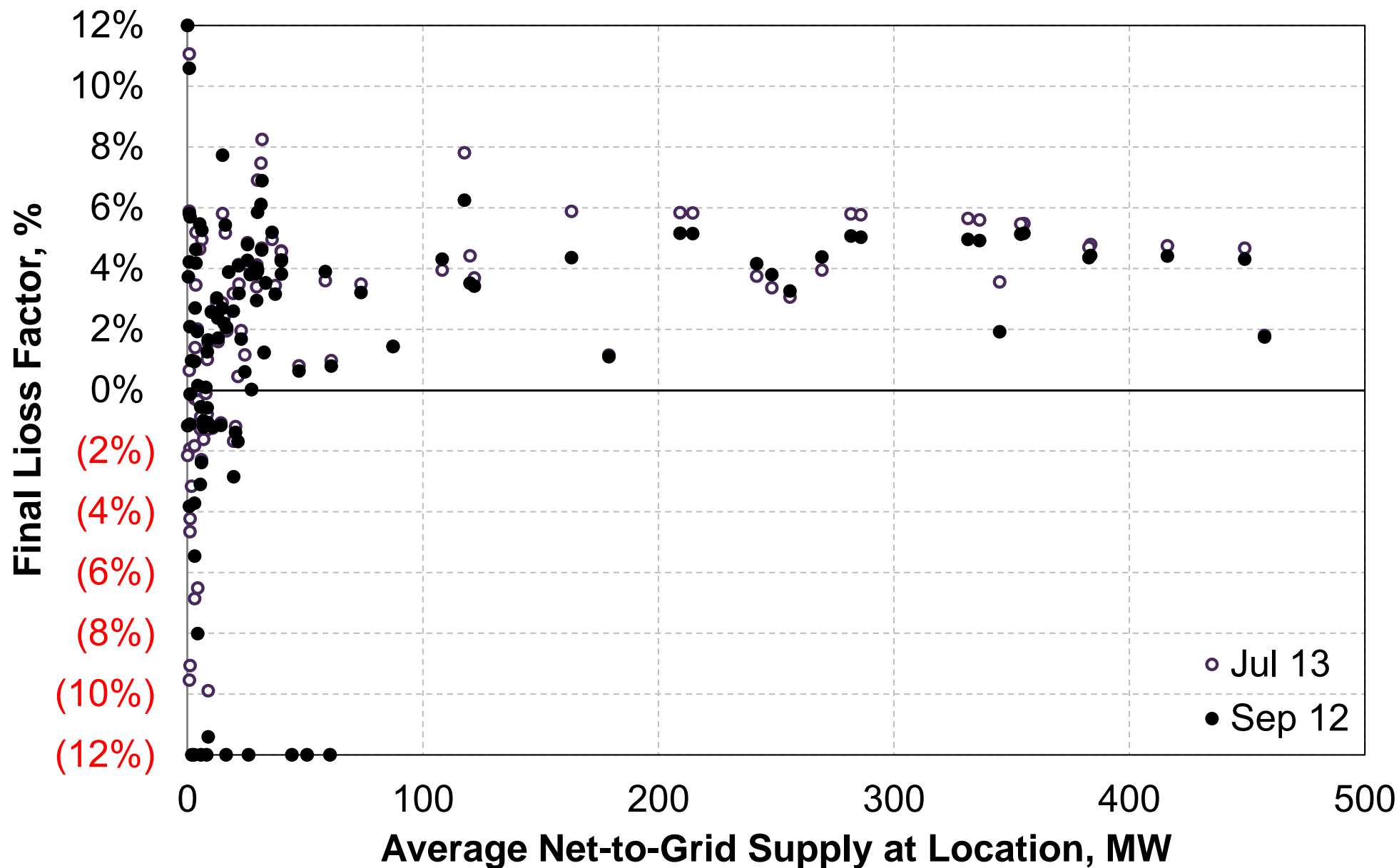


- Modelling of industrial systems has been reviewed and refined where necessary

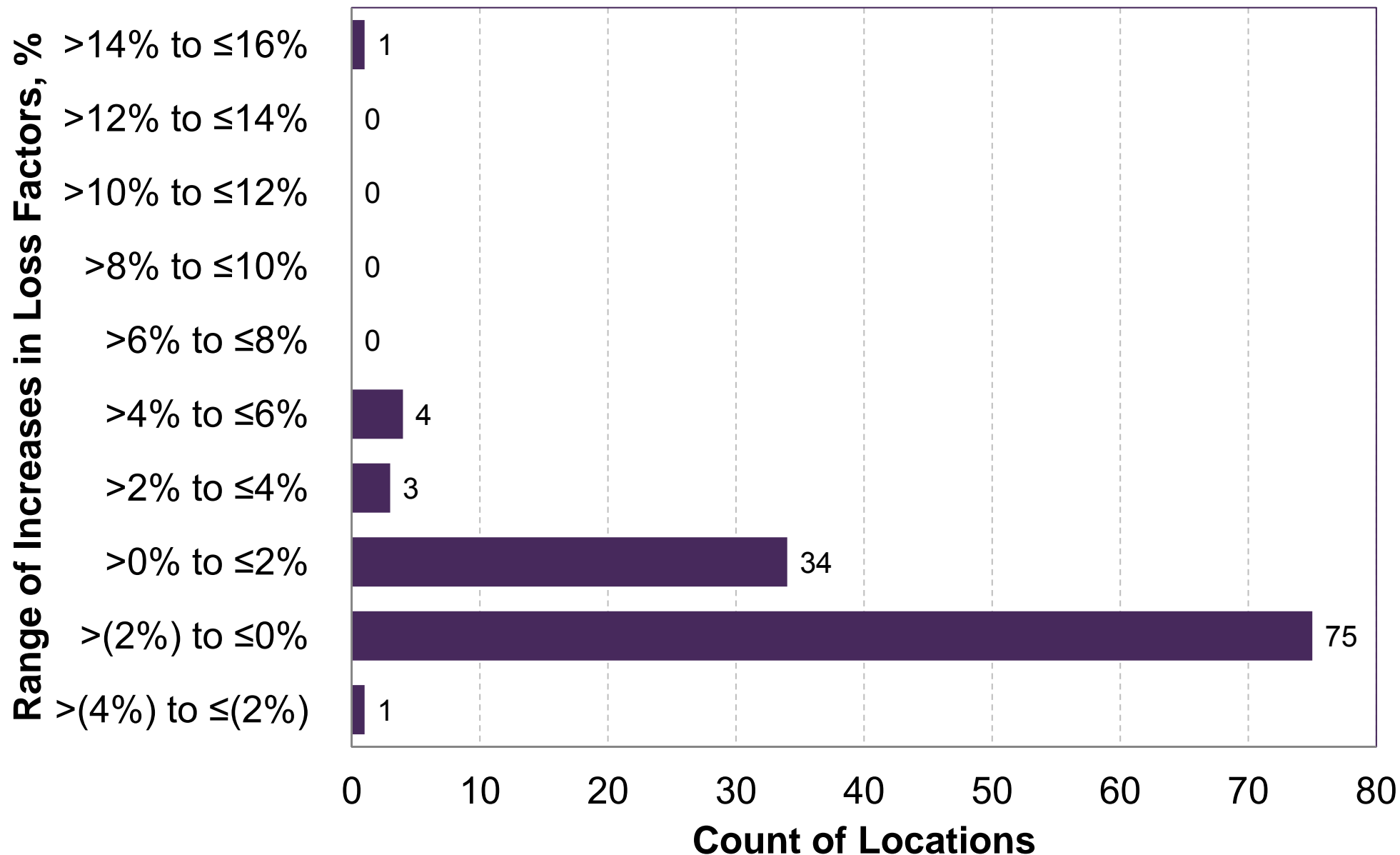
Other matters were reviewed but no changes were required

- Some industrial sites are correctly modelled with no net-to-grid generation, based on historical data
- Some sites have the same output from hour to hour based on merit order volumes being fully dispatched
- Marginal unit in workbook results from simulation for 2017
 - Marginal unit in merit order data is based on historical dispatch in 2015
- Formula in exclusion rate calculation confirmed as correct
 - AESO has adopted conservative approach to exclusion rates
- Differences from historical metered volumes attributed to operating reserves

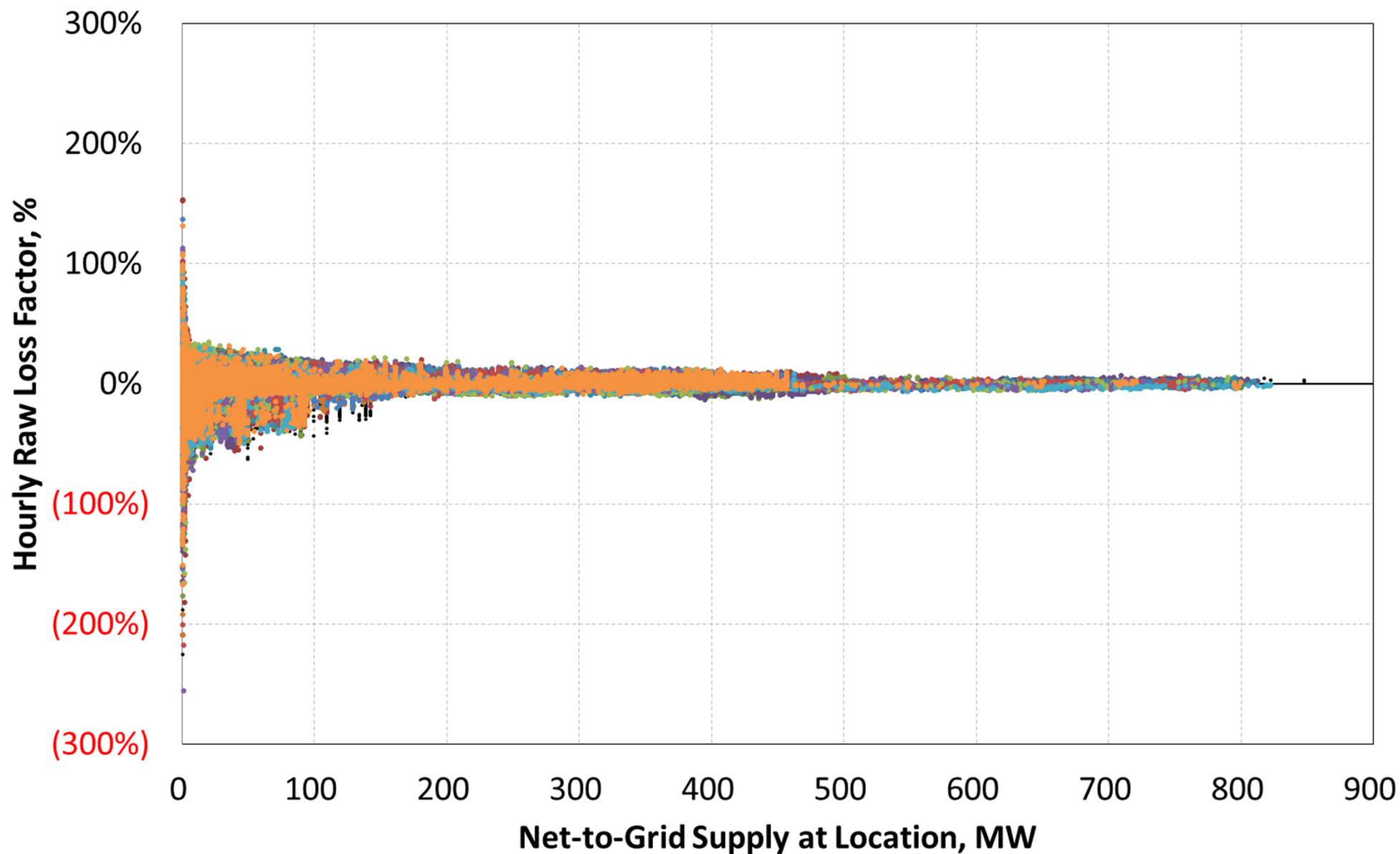
Some loss factors have changed significantly compared to July 13 version



Over 90% of loss factors changed by less than $\pm 2\%$, compared to July 13 version



Range of hourly raw loss factors has reduced to (256%) to +153%



About 55% of all hours and locations had dispatch and data for loss factor calculations



| Hours (×127) | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Annual |
|-----------------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|-----------|
| Total hours | 92,256 | 83,328 | 92,132 | 89,280 | 92,256 | 89,280 | 92,256 | 92,256 | 89,280 | 92,256 | 89,404 | 92,256 | 1,086,240 |
| No dispatch | (39,589) | (37,734) | (41,827) | (44,043) | (42,011) | (39,347) | (41,050) | (42,700) | (41,809) | (44,809) | (40,037) | (41,616) | (496,572) |
| Missing data | (1,456) | (1,314) | (1,474) | (1,438) | (1,462) | (719) | (744) | 0 | 0 | 0 | 0 | 0 | (8,607) |
| Potential hours | 51,211 | 44,280 | 48,831 | 43,799 | 48,783 | 49,214 | 50,462 | 49,556 | 47,471 | 47,447 | 49,367 | 50,640 | 581,061 |

| Percentages | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Annual |
|-----------------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| Total hours | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% |
| No dispatch | (42.9%) | (45.3%) | (45.4%) | (49.3%) | (45.5%) | (44.1%) | (44.5%) | (46.3%) | (46.8%) | (48.6%) | (44.8%) | (45.1%) | (45.7%) |
| Missing data | (1.6%) | (1.6%) | (1.6%) | (1.6%) | (1.6%) | (0.8%) | (0.8%) | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | (0.8%) |
| Potential hours | 55.5% | 53.1% | 53.0% | 49.1% | 52.9% | 55.1% | 54.7% | 53.7% | 53.2% | 51.4% | 55.2% | 54.9% | 53.5% |

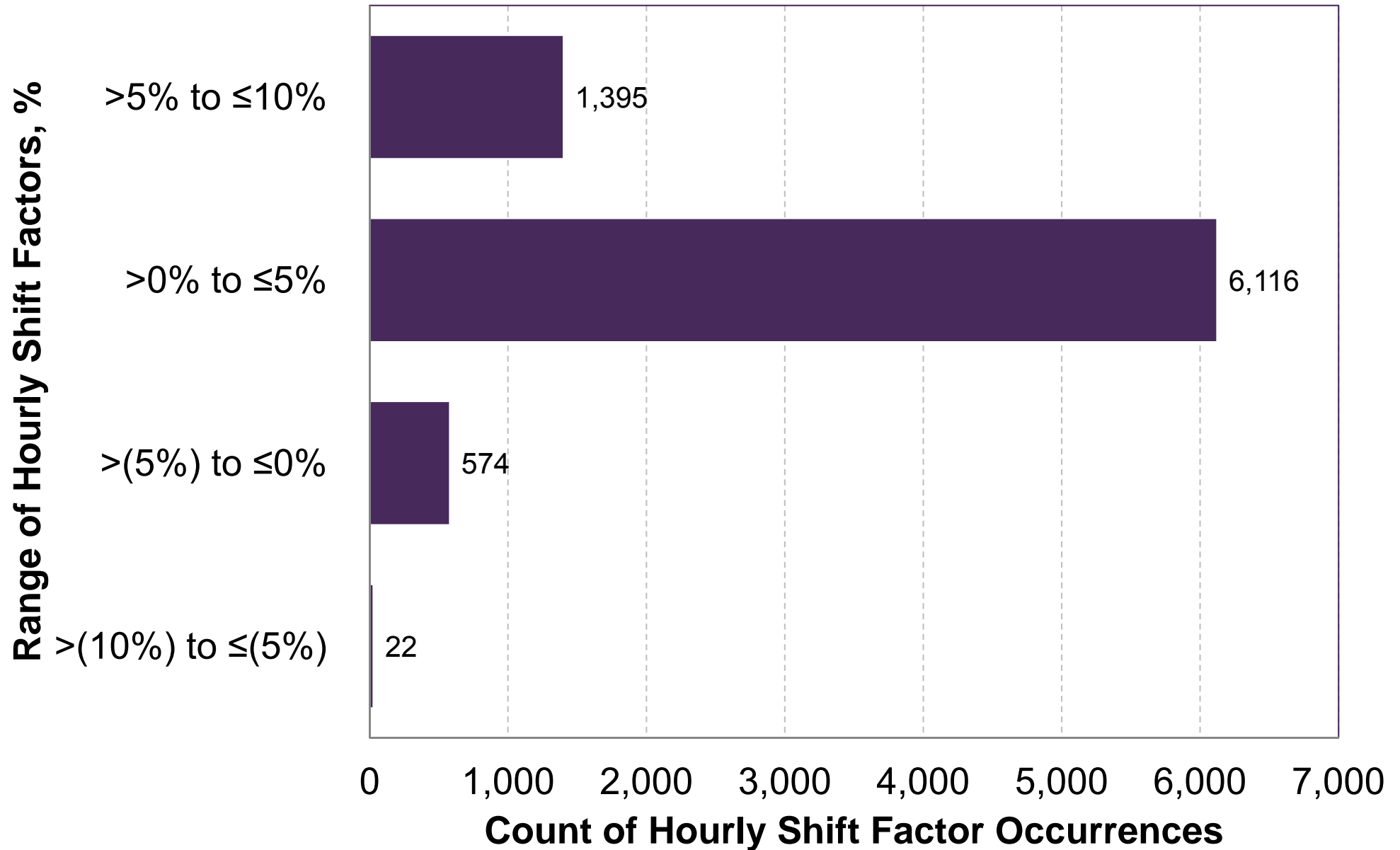
Over 97% of all potential hours solved, with 6% more excluded in same hours



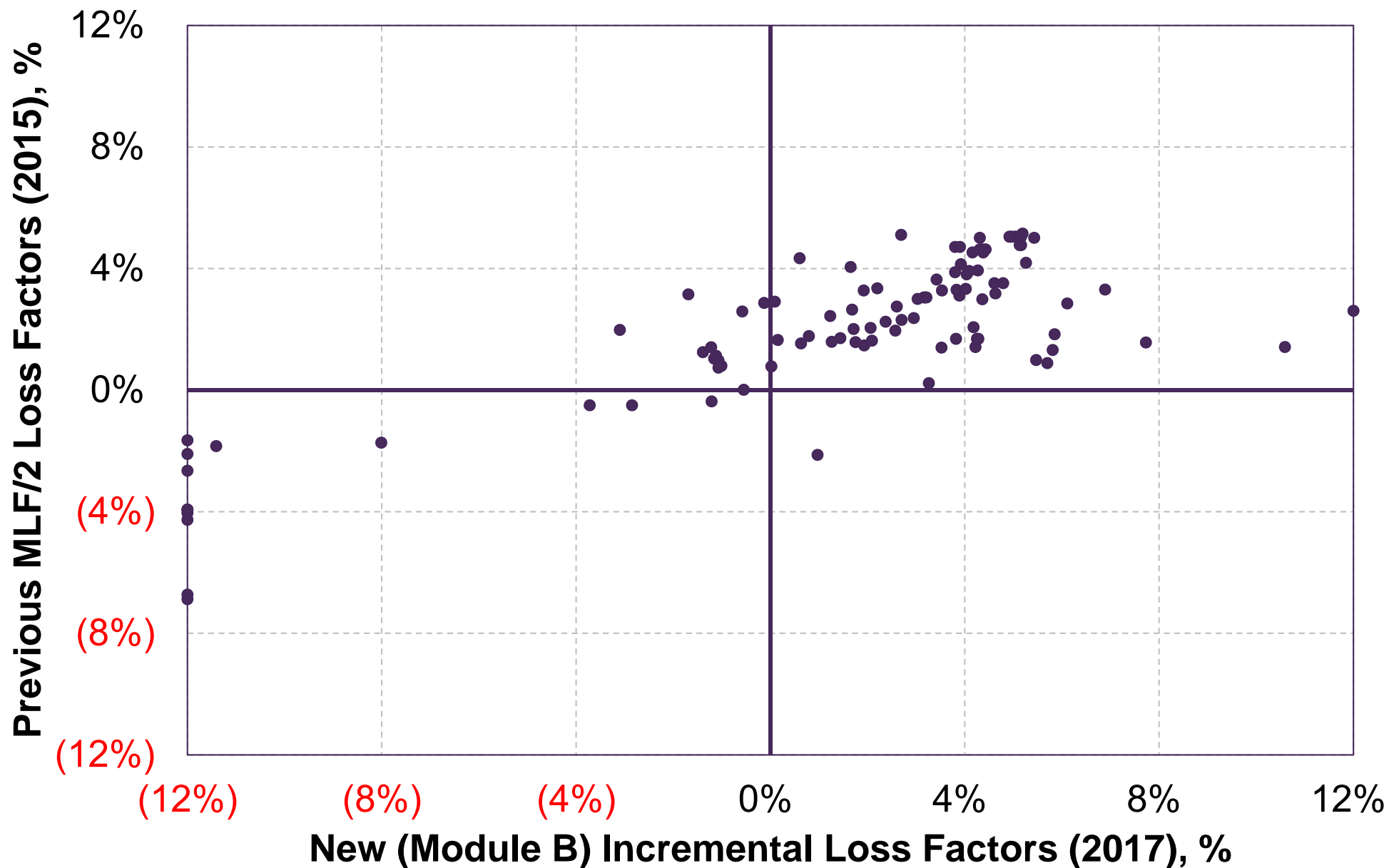
| Hours (×127) | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Annual |
|-----------------------|---------|---------|---------|--------|---------|--------|---------|--------|---------|---------|---------|---------|----------|
| Potential hours | 51,211 | 44,280 | 48,831 | 43,799 | 48,783 | 49,214 | 50,462 | 49,556 | 47,471 | 47,447 | 49,367 | 50,640 | 581,061 |
| Unsolved initial | (1,984) | (1,860) | (744) | (124) | (1,612) | (124) | 0 | (124) | (1,612) | (1,984) | (1,612) | (1,488) | (13,268) |
| Unsolved redispatched | (72) | (95) | (121) | (6) | (131) | (7) | (32) | (6) | (388) | (328) | (232) | (81) | (1,499) |
| Unsolved elsewhere | (2,232) | (4,031) | (2,912) | (366) | (3,168) | (277) | (1,264) | (286) | (8,226) | (4,667) | (4,958) | (2,318) | (34,705) |
| Solved hours | 46,923 | 38,294 | 45,054 | 43,303 | 43,872 | 48,806 | 49,166 | 49,140 | 37,245 | 40,468 | 42,565 | 46,753 | 531,589 |

| Percentages | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Annual |
|-----------------------|--------|--------|--------|--------|--------|--------|--------|--------|---------|--------|---------|--------|--------|
| Potential hours | 100.0% | 100.0% | 100.0% | 100.0% | 100.0% | 100.0% | 100.0% | 100.0% | 100.0% | 100.0% | 100.0% | 100.0% | 100.0% |
| Unsolved initial | (3.9%) | (4.2%) | (1.5%) | (0.3%) | (3.3%) | (0.3%) | 0.0% | (0.3%) | (3.4%) | (4.2%) | (3.3%) | (2.9%) | (2.3%) |
| Unsolved redispatched | (0.1%) | (0.2%) | (0.2%) | (0.0%) | (0.3%) | (0.0%) | (0.1%) | (0.0%) | (0.8%) | (0.7%) | (0.5%) | (0.2%) | (0.3%) |
| Unsolved elsewhere | (4.4%) | (9.1%) | (6.0%) | (0.8%) | (6.5%) | (0.6%) | (2.5%) | (0.6%) | (17.3%) | (9.8%) | (10.0%) | (4.6%) | (6.0%) |
| Solved hours | 91.6% | 86.5% | 92.3% | 98.9% | 89.9% | 99.2% | 97.4% | 99.2% | 78.5% | 85.3% | 86.2% | 92.3% | 91.5% |

All hourly shift factors were in range of $\pm 10\%$



Module B loss factors have greater dispersion than previous loss factors



AESO will next be focusing on 2018 loss factors, followed by Module C calculations



- Loss Factor Rule requires loss factors to be published in early November
- Current Loss Factor Rule specifies project inclusion criteria in subsection 7
 - Project inclusion criteria were found to be unrealistic in 2017 loss factor preparation
- AESO considers revised project inclusion criteria would provide more realistic loss factor results
 - Revised criteria should also allow flexibility to address unanticipated circumstances
- Current Loss Factor Rule does not allow any variance from specified criteria to determine projects to be included for initial loss factor calculation

Loss Factor Rule would need revision to allow different project criteria to be used

- Rule cannot be revised through normal rule-making process in time to meet November deadline for 2018 loss factor publication
- Revising rule through normal process with typical stakeholder consultation would likely mean either:
 1. loss factors would be published after rule is revised, later than November deadline (likely near year-end); or
 2. different project inclusion criteria would be used for loss factors published in November, before rule is revised
- Timing and potential delays would be a concern with either approach
- Do stakeholders have any views on approach that should be used?

AESO has also considered whether earlier proposed amendment should be addressed

- Subsection 8(8)(c) of Loss Factor Rule will never operate due to subsection 8(7)
- AESO considers this an unintended outcome and had proposed an amendment of the rule
 - AESO withdrew proposed amendment following stakeholder comments
- AESO considers that rule should be revised to either:
 1. implement the amendment proposed earlier; or
 2. remove the inoperable subsection 8(8)(c)
- Do stakeholders have any views on whether this should be pursued or on approach that should be used?

AESO also considers one additional revision may be warranted



- Subsection 9(2) assigns the average system loss factor to a location if a loss factor cannot be calculated in any hour for that location
- A threshold of zero hours seems very high and could result in a final loss factor being based on a single hourly raw loss factor
- AESO suggests a threshold of ten hours may be more appropriate
 - Ten hours is approximately 0.1% of 8,760 hours
 - Only one location had final loss factor based on fewer than 10 hourly raw loss factors (5.67% calculated annual loss factor)
- However, if generator continues to operate for very few hours, impact is likely minimal

AESO also considers one additional revision may be warranted (cont'd)



- Do stakeholders have any views on whether this should be pursued or on approach that should be used?

Questions and discussion

- Loss factor information is posted on AESO website at www.aeso.ca
 - Grid ▶ Loss factors ▶ 2017 loss factors
 - Grid ▶ Loss factors ▶ 2017 loss factor development
- Additional questions can be directed to

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