

Proposed Draft Amendments to Appendix 4.2 and 4.3 of the Market Rules

Public Webinar

March 31, 2020

Agenda

- Why amend Appendix 4.2 & 4.3?
- Rationale for proposed amendments
- Next Steps
- Discussion

Why Amend Appendix 4.2 & 4.3?

- Clarify performance requirements for inverter-based generation units
- Address risk to system reliability identified in IESO's 2019 Operability Assessment due to increased penetration of distributed energy resources (DERs) and load displacement units (LDUs)
- Alleviate exciter and power system stabilizer (PSS) requirements on small synchronous generation
- Align the performance requirements with on-site validation testing

Why Amend Appendix 4.2 & 4.3? (cont'd)

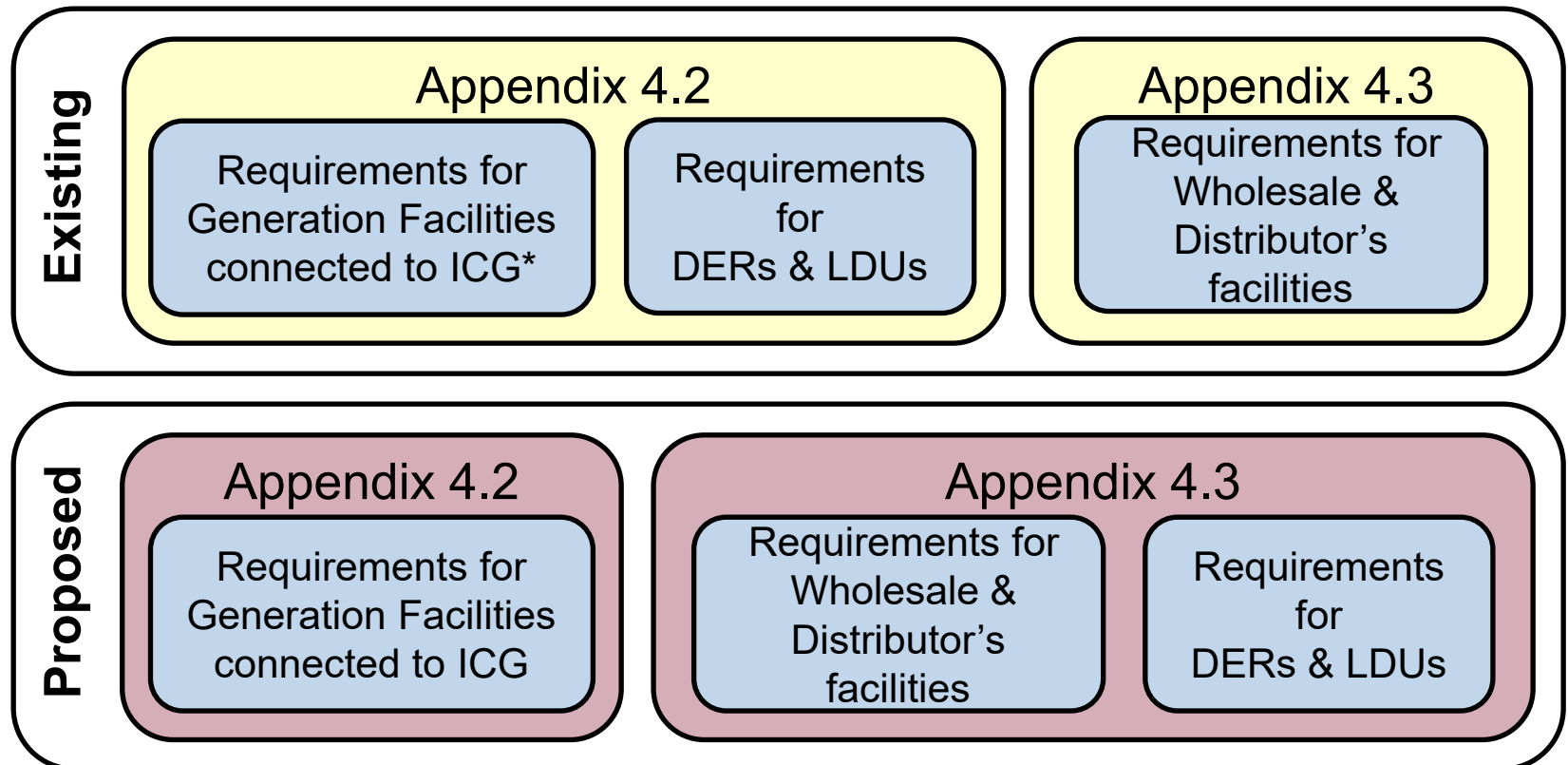
- Bring the appendices up to date with following updated standards:
 - NERC PRC-024-3: Generator Frequency and Voltage Protection
 - CSA 22.3 No. 9: Interconnection of Distributed Energy Resources and Electricity Supply Systems
- Consolidate performance requirements for ease of identifying applicability
- Mitigate the reliability risks associated with large loads frequently tripping for out-of-zone faults

Rationale for Proposed Amendments

Appendix 4.2

Scope of Appendices 4.2 & 4.3

- ❖ Update: Performance requirements for wholesale customers and distributors will be consolidated in App. 4.3



*IESO-controlled grid

Scope of Appendices 4.2 & 4.3 (cont'd)

➤ Rationale:

- Market participants sometimes have difficulties identifying requirements applicable to their projects
- DER requirements in Appendix 4.2 were often overlooked
- The proposed change consolidates requirements by market participants type, hence, it is easier to identify applicable performance requirements

Appendix 4.2: Category #1 “Off-Nominal Frequency Operation”

- ❖ Update: Add high frequency ride-through to the requirements
- Rationale:
 - Prevent uncertainty on whether generation units will trip or ride-through high frequency events
 - Align this requirement with the NERC frequency ride-through requirement specified in NERC PRC-024-3

Appendix 4.2: Category #2 “Speed / Frequency Regulation”

- ❖ Update: Updated the active power speed of response requirement to be based on “step change” and not “rate of change” of frequency
- Rationale:
 - Align the requirement with how on-site validation testing is performed. Typically the test is conducted by applying a step change to the reference as ramping the reference, 0.1%/s for 10 seconds, is not always feasible

Appendix 4.2: Category #3 “Voltage Ride-Through”

- ❖ Update: Clarify that momentary cessation is not permitted without IESO’s approval
- Rationale:
 - Prevent inverter-based units from ceasing injections as a form of ride-through which can adversely impact system reliability
 - Momentary cessation has been a key contributor to the cause of recent system disturbances for other ISOs
 - Align this requirement with NERC PRC-024-3

Appendix 4.2: Category #5 “Reactive Power”

- ❖ Update: Clarify the reactive power requirement for generation facilities with long tap lines
- Rationale:
 - Clarify the dynamic reactive power requirements for the generation fleet, regardless of the technology, while continuing to ensure proper reactive compensation for projects with tap lines.

Appendix 4.2: Category #6 “Automatic Voltage Regulator”

- ❖ Update: Clarify that voltage shall be controlled at the low voltage terminals of the MOT
- ❖ Update: Clarify that reactive droop or Automatic Voltage Regulator (AVR) reference compensation shall not be enabled without IESO permission (mainly for multiple generation with a common low voltage bus)
- Rationale:
 - Simplifies voltage controls as isolation provided by MOT and makes AVR system less susceptible to interference from external controllers
 - MOT tap will be changed less frequently

Appendix 4.2: Category #7 “Excitation System”

- ❖ Update: Alleviate exciter requirement on synchronous units < 20 MVA & facilities < 75 MVA
- ❖ Update: Clarify that this requirement will be validated under open circuit conditions and not full load
- Rationale:
 - Generation units smaller than the above threshold have difficulties meeting this requirement. However, typically this has insignificant risk to reliability
 - Threshold aligns with NERC threshold for Bulk Electric System (BES) generation

Appendix 4.2: Category #8 “Power System Stabilizer”

❖ Update: Alleviate PSS requirement on synchronous units < 20 MVA & facilities <75 MVA

➤ Rationale:

- Generation units smaller than the above threshold have difficulties meeting this requirement however, typically this has insignificant risk to reliability
- Threshold aligns with NERC threshold for BES generation

Appendix 4.2: Category #12 “Reactive Power Response to Voltage Change”

- ❖ Update: Add a requirement for reactive power speed of response for inverter-based units
- Rationale:
 - Added in lieu of Category 7: Excitation System, that was limited to synchronous generation in proposed updates
 - Clarify the reactive power speed of response requirement for inverter-based units
 - Brings the reactive power speed response of inverter-based units to the same level as conventional generation with typical parameters

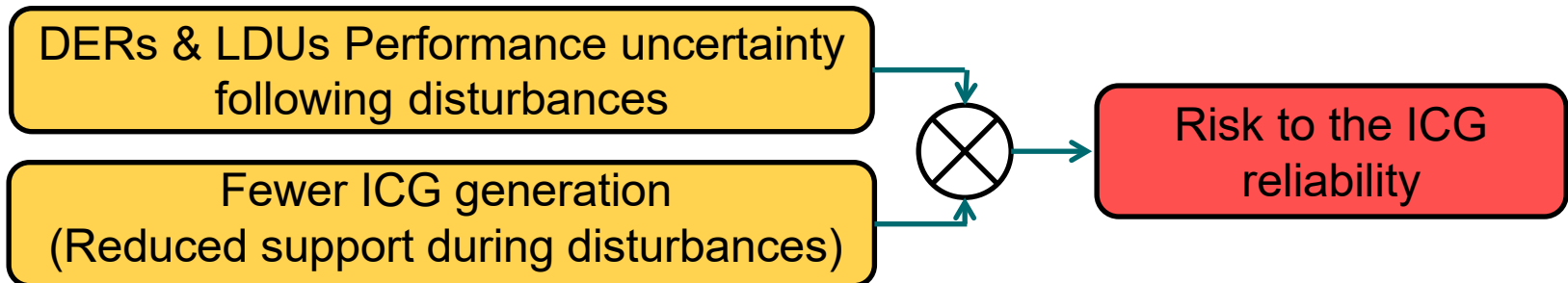
Appendix 4.3

Appendix 4.3: Preamble

- ❖ Update: Include a grandfathering clause applicable to Appendix 4.3 requirements
- Rationale:
 - Proposed amendments will be applicable only to new equipment and existing equipment will be grandfathered
 - This addresses concerns raised by stakeholders regarding the compliance of existing equipment

Appendix 4.3: Category #11 “Generation Units”

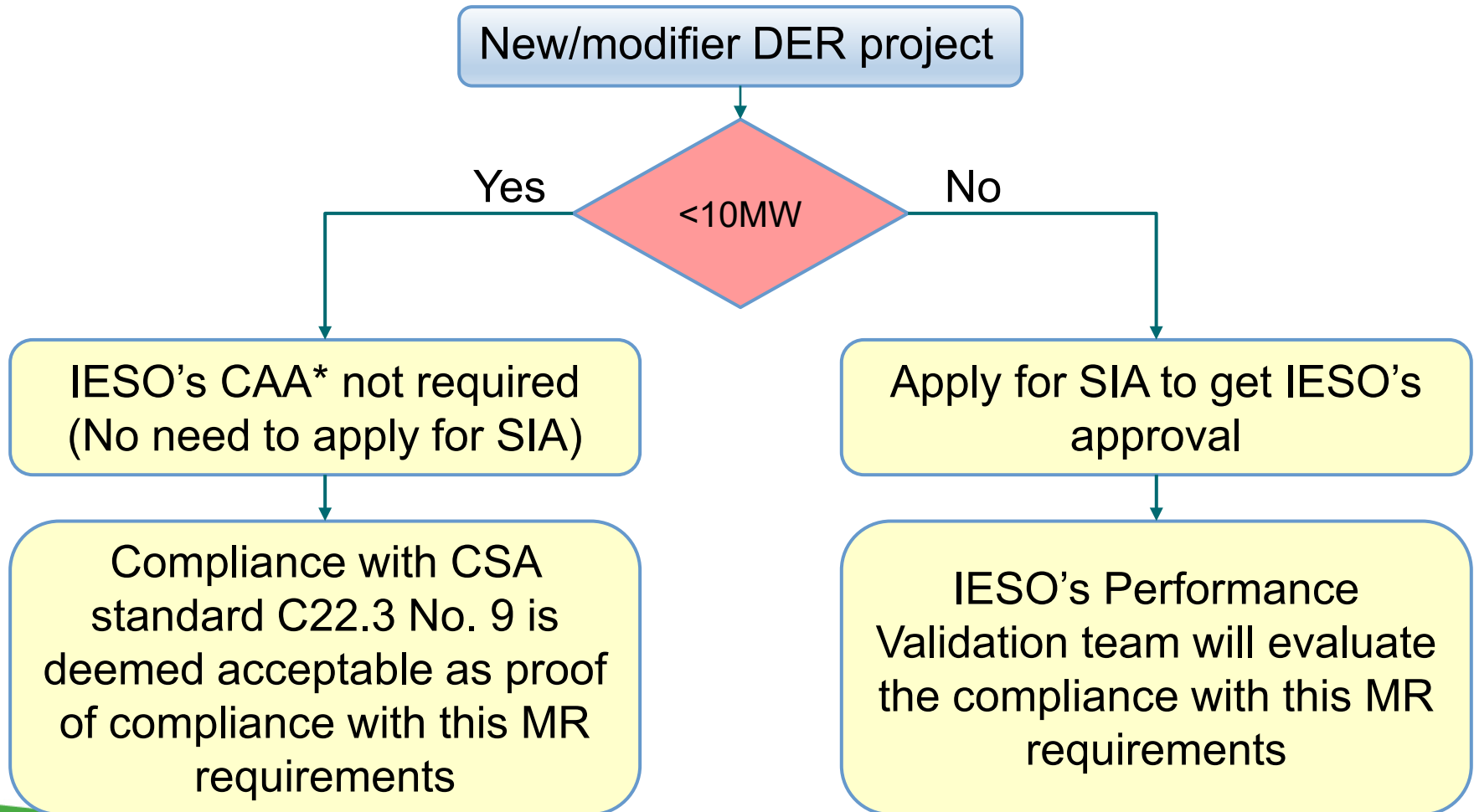
- ❖ Update: Clarify performance requirements applicable to DERs and LDUs, i.e., Ride-through and droop requirements
 - ❖ Update: Extend those requirements to DERs and LDUs < 10 MW & facilities < 50 MW
- Rationale
- Mitigate the risks identified in IESO 2019 Operability Assessment due to increased penetration of DERs & LDUs



- Align the requirement for DER and LDU <10 MW with the CSA 22.3 No.9

Appendix 4.3: Category #11 (cont'd)

What does the change mean for distributors?



*Connection Assessment & Approval

Appendix 4.3: Category #12 “Voltage Ride-through”

- ❖ Update: Add a requirement to ensure that equipment within a load or distribution facility will not inadvertently trip for out-of-zone faults
- Rationale:
 - Mitigate the reliability risks associated with large loads frequently tripping for out-of-zone faults
 - Avoid disconnecting economically dispatched generation that would otherwise be automatically rejected in response to the non-consequential load loss

Next Steps: Request for Feedback

- The IESO is requesting stakeholder feedback on the proposed updates to market rule appendices 4.2 and 4.3
 - In addition to the summary of the proposed changes outlined in this presentation, the red-lined market rules are posted on the [engagement page for this initiative](#)
- Responses can be sent to engagement@ieso.ca until April 21, 2020. Please use the feedback form that can be found under the March 31 entry on the [engagement page](#)
- The IESO will incorporate changes to draft market rule appendices based on feedback where applicable
- Pending the feedback received, the IESO will seek Technical Panel approval for the proposed amendments

Relevant Information

Market Rules Chapter 4 Appendices:

<http://www.ieso.ca/-/media/Files/IESO/Document-Library/Market-Rules-and-Manuals-Library/market-rules/mr-chapter4appx.pdf?la=en>

2019 Operability Assessment:

<http://ieso.ca/Sector-Participants/System-Reliability/Operability-Assessment>

NERC PRC-024-3: Generator Frequency and Voltage Protection:

https://www.nerc.com/pa/Stand/Project%20201804%20Modifications%20to%20PRC0242/2018-04_PRC-024-2_clean_12052019.pdf

IESO's response to the stakeholder feedback to the July 2019 ESAG engagement activity:

<http://www.ieso.ca/-/media/Files/IESO/Document-Library/engage/esag/esag-20190806-response-to-stakeholder-feedback.pdf?la=en>

Overview of the Connection Assessment and Approval Process:

<http://www.ieso.ca/Sector-Participants/Connection-Process/Overview>

Questions?

