

**Attachment 1:**  
**Exemption Applicant's submission in support of the Exemption Application**

As per IESO Market Rule Chapter 4, Appendix 4.2, Category 1 (Off-Nominal Frequency), generation facilities directly connected to the IESO-controlled grid shall have the capability to: Operate continuously between 59.4 Hz and 60.6 Hz and for a limited period of time in the region above the straight lines on a log-linear scale defined by the points (0.0 s, 57.0 Hz), (3.3 s, 57.0 Hz), and (300 s, 59.0 Hz).

The Standby Generator Load-Shedding Scheme (SGLS) at OPG's Darlington Nuclear Generating Station (DNGS) currently does not meet the IESO Market Rule Chapter 4, Appendix 4.2, Category 1 requirement. Specifically, the DNGS SGLS will automatically separate the DNGS Standby Generators (SGs) from the IESO-controlled grid within the no-trip region defined by Market Rule Chapter 4, Appendix 4.2, Category 1. The SGLS underfrequency protection relay is set to operate at (58 Hz, 0.5 s).

The intent of this Exemption Application is for OPG to seek IESO approval for exemption to IESO Market Rule Chapter 4, Appendix 4.2, Category 1 for the life of the equipment and any replacement components. This will allow the SGLS to automatically separate the DNGS SGs from the IESO-controlled grid (ICG) within the no-trip region defined by Market Rule Chapter 4, Appendix 4.2, Category 1.

**Technical Justification Summary:**

As described in detail below (Background and Technical Justification), this Exemption Application is based on the following technical justification:

- The design basis (purpose) of the SGs and SGLS at DNGS is for nuclear safety.
- The DNGS SGLS is part of a nuclear safety related system.
- Modification to the SGLS would require CNSC approvals as it could pose a potential risk to nuclear safety.
- Modifications to the DNGS SGLS and station configuration to comply with the Market Rule requirement would require extensive engineering review and approximate project costs of more than [REDACTED].
- The DNGS SGs and SGLS were in service prior to Market Opening and the IESO Market Rules.
- The DNGS SGs are not offered into the IESO-administered market for commercial gain.
- The DNGS SGs are only connected to the ICG during Safety Related System Tests (SRSTs) as required by the Canadian Nuclear Safety Commission (CNSC) to satisfy CSA N290.5-16 and REGDOC 2.5.5.
- For DNGS SG SRSTs, the planned connection duration to the ICG is approximately 37 hours every 2 years per SG.
- The IESO currently arms compensating load shedding (UFLS program) to account for the DNGS SGLS automatic separation of SGs from the ICG within the no-trip region.
- In OPG's opinion, this exemption, if granted:
  - o would not materially impact the ability of the IESO to ensure non-discriminatory access to the ICG;
  - o would not materially increase costs of *market participants*; and
  - o would not materially increase costs of the IESO.

## **Background and Technical Justification:**

The four DNGS SGs (0-49120-SG1, SG2, SG3, and SG4) supply internal standby Class III Power in the event of a loss of Class IV Power and/or loss of coolant accident (LOCA), which is considered a design basis accident. The purpose of the Class III Power System is to provide electrical power to specified Class III nuclear safety related loads to ensure that the following Control, Cool, Contain, and Monitoring functions at DNGS are achieved:

- The nuclear reactor is safely shut down and remains shutdown;
- The reactor decay heat is removed;
- The status of steam supply is monitored;
- The release of radio-nuclides from the containment, if any, is limited.

When the DNGS SGs are in operation during a design basis accident they are connected internally to nuclear safety related loads; in this configuration the SGs are not connected to the ICG and thus are not required to comply with the IESO Market Rules. However, during routine testing (SRSTs), the SGs are connected to the ICG through a DNGS System Service Transformer (SST) via the DNGS Class IV Power System. When the SGs are connected to the ICG, they are required to comply with the IESO Market Rules, including Market Rule Chapter 4, Appendix 4.2, Category 1.

When connected to the ICG, the DNGS SGLS underfrequency protection relay is set to operate at (58 Hz, 0.5 s) per NK38-PRL-65855-10001; this setting will automatically separate the SGs from the ICG within the no-trip region defined by Market Rule Chapter 4, Appendix 4.2, Category 1. The SGLS automatically separates the SG in order to poise the SG to be loaded with Class III nuclear safety loads in a predetermined sequence to prevent overloading the SGs during a design basis accident.

The SGLS and SGs were in service prior to Market Opening and the IESO Market Rules, and are part of the Power Reactor Operating Licence (PROL) for DNGS. The SGLS underfrequency protection relay settings have remained unchanged since DNGS received its PROL and came into service. In OPG's assessment, modifications to the DNGS SGLS and station configuration to comply with Market Rule Chapter 4, Appendix 4.2, Category 1 would require significant engineering assessment and approximate project costs of more than [REDACTED]. There is no plan to modify the SGLS. As the SGLS is part of a nuclear safety related system, modifying the existing SGLS from the original design basis would also require CNSC approval as a modification could introduce a nuclear safety risk due to a potential latent unanalyzed scenario caused by the modification.

As mentioned, the SGs are only connected to the ICG during routine testing (SRSTs). The planned connection duration to the ICG is approximately 37 hours every 2 years per SG:

- 1 hour every 8 weeks per year;
- 24 hours every 2 years;
- The net MW exported to the ICG during an SG SRST is approximately 19 MW (when the SG is generating at 25 MW maximum output).
- There are 4 DNGS SGs; only 1 SG is tested at any one time.
- Historically, it would be rare for the ICG frequency to be operating at 58 Hz or lower.

Although the original design basis allowed the SG to be connected to the ICG and offered for peaking purposes, this functionality is no longer available. As per operating manual [REDACTED]

██████ effective January 1, 2011, SGs will no longer be available to the grid (PMC) for peaking purposes. Thus, the SGs will not be offered into the IESO-administered market for commercial gain; the SGs are only connected to the ICG during SRSTs as required by the CNSC to satisfy CSA N290.5-16 and REGDOC 2.5.5.

During the commissioning of the DNGS SG Controls Upgrade Project (2012-EX953) it was identified that the SGLS automatically separated the SGs from ICG within the non-trip region defined by Market Rule Chapter 4, Appendix 4.2, Category 1. To address the SGLS automatically separating the SGs from the ICG within the non-trip region, an equivalent amount of compensating load shedding has been armed by the IESO in their UFLS program. OPG proposes that this IESO mitigating action continue.

The granting of this exemption to IESO Market Rule Chapter 4, Appendix 4.2, Category 1 for the life of the equipment and any replacement components (associated with the SGLS and SG) will allow the existing DNGS SGLS to continue to automatically separate the DNGS SGs from the ICG within the no-trip region, which would be a rare event. There would be no corrective action plan to modify the existing SGLS or station equipment to comply with Market Rule Chapter 4, Appendix 4.2, Category 1. Based on the justification provided above, in OPG's opinion, the exemption, if granted:

- Would not materially threaten the ability of the IESO to ensure non-discriminatory access to the ICG;
- Would not materially increase costs of *market participants*;
- Would not materially increase costs of the IESO;
- Would not materially give OPG an undue preference in the IESO-administered markets.