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## Introduction

Given the climate changes we have experienced in the last few years, possibilities of weather anomalies such as extreme cold weather are entirely credible. Prolonged power interruption during extreme cold weather requires expedition of a pre-defined plan to ensure equipment and facility damage as well as safety risks are mitigated or eliminated.

The IESO and a number of market participants have gathered information to assess system restoration after a power grid blackout on a very cold winter day. We recommend that participants perform an impact assessment of their equipment and operations through a cold weather outage scenario. Examples of potential challenges include:

- Back-up batteries have reduced capacity
- Emergency backup generators fail to start
- Equipment may not operate reliably (e.g., circuit breaker malfunction)
- Production processes and products freeze or are ruined mid-process
- Permanent equipment damage (e.g., pipes freezing) during prolonged outages
- Personnel safety issues
- Potential environmental impacts (e.g., chemical tank rupture due to freezing)

Participants should assess their processes, facilities, equipment and procedures to find ways to mitigate the impact of an extended outage during a period of cold weather. Listed below are some suggestions that participants should consider while reviewing their emergency plans and preparations for a cold weather outage. This summary applies to all participants.

Addressing these issues will help protect your assets and facilities and will help you decide what you might need to do differently during a cold weather blackout.

## Recommendation:

Develop and implement cold weather procedures to address extended cold weather outages and their impact on your equipment and facility, or on the environment.

Listed below are things to consider, with examples:

### Operational processes and procedures

- Arrange cold-weather emergency response mutual aid agreements with neighbouring and partnering industries or contracting firms:
  - Share cold weather equipment, spare parts and supply inventories
  - Exchange 24/7 cold weather facility surveillance personnel
- Arrange alternate fuel supplies:
  - Determine your facility's priority for back-up fuel sources. Don't assume that you will be the highest priority customer during a grid black-out – you must arrange this contractually ahead of time.
  - Consider alternate fuel sources for your facility and processes. (e.g., natural gas and fuel oil storage).
  - Ensure the back-up fuel supply cold temperature inhibitors can withstand low temperature operation consistent with your geographical area's weather historical trends.
  - Have enough propane tanks onsite or available for portable propane space heaters.
- Have a cold weather plan that includes cold weather tasks and considerations:
  - De-energizing non-essential loads from your back-up supplies (lighting, process equipment, heating equipment, etc.)
  - Expediting draining liquid from pipes and processes that are prone to freezing

### Equipment

- If not already in place, consider installing or having available quick connection for critical equipment and processes:
  - Emergency back-up generators
  - Emergency back-up air compressors
  - Additional portable tri-pod lighting
  - Portable propane space heaters
- Identify any circuit breaker cold weather limitations:
  - Compressed air supply depletion – minimize any air-type circuit breaker operation
  - Compressed air moisture content – maintain compressed air dew points at their lowest (at least -60°C to prevent circuit breaker contact flashover)
  - Sulphur-hexafluoride (SF<sub>6</sub>) circuit breakers – maintain required SF<sub>6</sub> pressure above alarms points and maintain tank temperatures above freezing with auxiliary heaters
- Identify equipment and processes that might freeze:

- Have a list of equipment and processes that must have their piping drained to prevent destructive damage
- Some processes freeze over a prolonged period of time (e.g., high pressure steam condenses over a period of several hours)
- Assess your back-up power system’s mission time in cold weather:
  - Batteries’ capacity is reduced in colder weather – consider upgrading your battery installations to increase availability. Other options may be cycling your battery loads, disconnecting non-essential loads, or supplementing loads with back-up generation
  - Liquid fuel sources may deplete more quickly in cold weather – consider installing larger tanks, and avoid over-use or overloading

### Training

- As time is of the essence when responding during a cold weather power blackout, ensure that you train operating personnel on all aspects of:
  - Rapid 24/7 staff deployment – this will also help you determine actual response times during inclement weather. Run unannounced winter drills in off-peak hours.
  - Initial communications and responses:
    - Who to call
    - What to say
    - What information you should have ready
    - Next steps
  - Prioritizing actions: What is different in cold weather than any other time of the year if a blackout occurs? What effect will that have on our operations or facility?
  - Handling numerous and changing priorities and requests:
    - Is there an appointed cold weather emergency event coordinator?
    - Who will consider and decide the actions to take during a cold weather event?
  - Consider a very cold weather scenario for a future drill or exercise:
    - Loss of fuel supply to your facility – how does your staff respond?
    - Loss of local electrical supply to your facility in cold weather – remember, a black-out need not be wide-spread to affect your facility