

# KINGDOM COMMUNITY WIND WINTER OPERATING PROTOCOL

June, 2011

A. Purpose:

The ice throw analysis performed by Garrard Hassan America, Inc. (GH) (Exh. Pet.-ML-3) concluded that there would be adequate protection against ice throw if Green Mountain Power Corporation (“GMP”) implemented a Winter Operating Protocol requiring operator or automatic shutdown of the turbines under the conditions identified in the GH report. In its May 31, 2011 Order, the Public Service Board required that GMP adopt such a protocol containing the specifications in Exh. Pet.-ML-3:

(26) Prior to commencement of construction, Petitioners shall prepare a winter operating protocol, subject to review by the parties and approval by the Board, which shall require that the proposed turbines be placed in pause mode under any of the following circumstances: (a) installed ice monitoring device(s) or heated wind sensors (installation subject to reliability testing) detect if unsafe conditions are present due to icing conditions; (b) ice accretion is recognized by the remote or on-site operator; (c) air temperature, relative humidity and other meteorological conditions at the site are conducive to ice formation; (d) air temperature is several degrees above 0 degrees Celsius after icing conditions; and, (e) any other weather conditions that may result in the unsafe operation of the turbines. The winter operating protocol shall include periodic testing to document protocol performance. Parties with standing on the issue will have two weeks to comment on the winter operating protocol from the time it is filed.

This Winter Operating Protocol is intended to meet the Board requirements. It reflects the specifications and recommendations of GH.

B. Requirements:

1. The wind turbines will be monitored on a 24x7 basis throughout the year. The turbines shall be subject to shutdown under the following climatic conditions (“Icing Conditions”):
  - a. Air temperature, relative humidity and other meteorological conditions at the site are conducive to ice formation.
    - i. Precipitation or fog in the previous 24 hours.
    - ii. Temperature hovered around freezing during precipitation/fog conditions.
  - b. Air temperature is several degrees above 0 C after icing conditions have existed at the site.
  - c. Other weather conditions at the project site which appear to create an unsafe operating environment.
2. The turbines shall be shut down under the following conditions where icing is present, through automated controls, remote operator or on-site operator.

- a. Automated shutdown of the turbine when vibration or other out of balance operation is detected.
  - b. Manual shutdown by on-site operator when Icing Conditions are identified by the on-site operator or by the installed ice monitoring device providing an automated alert of Icing Conditions to remote operator.
  - c. Manual shutdown when ice accretion is recognized by the remote operator (through changes in the power output of the turbines when Icing Conditions exist) or is recognized by the on-site operator through visual detection.
3. Restarting of the turbines after an icing event. Turbine shall not be automatically restarted until a pre-startup inspection has been completed, either on-site or by remote visual inspection.

Visual inspection shall verify that hazardous conditions due to icing no longer exist, based on an analysis of the following factors for each affected turbine:

- a. Ice accumulation on the ground surrounding the turbines.
  - b. Ice build-up on the blade.
  - c. Ice build-up on the nacelle and radiator.
  - d. Compacted snow on any part of the turbine.
  - e. Compacted snow formations on the ground around the turbine.
4. Monitoring techniques and methods:
    - a. An ice monitoring device shall be installed at the project site.
    - b. Turbines shall be equipped with vibration detection equipment.
    - c. Remote visual inspection cameras will be installed at the project site to facilitate remote turbine restart after a shut down due to icing conditions.
    - d. The above ice detection equipment shall be maintained in accordance with the manufacturer's specifications to ensure accurate operation of the equipment.
  5. Safety of personnel at the project site:
    - a. All personnel at the project site shall adhere to the site specific safety requirements required by Vestas before approaching the turbines to verify whether the turbines can be restarted safely.
  6. Evaluation and update:
    - a. On-site and remote monitoring will take place on a weekly basis during months when Icing Conditions exist to evaluate effectiveness of the protocol compared with recorded weather conditions at the project site. Evaluation shall include:
      - i. Comparison of actual ice accretion on the turbine components against atmospheric conditions when ice accretion is expected to occur.
      - ii. Evaluation of the duration and speed with which ice accretion occurs during icing events.
    - b. This Winter Operating Protocol shall be subject to modification, upon Board approval, as necessary to ensure that unsafe conditions are minimized at the Project site and that shut down of the turbines shall occur under the appropriate climatic conditions.