
IMO Staff Recommendation to Panel on Exemption Application (General)

PART 1 – GENERAL INFORMATION

Market Participant Name: **Five Nations Energy Inc.**

Location/Site: Fort Albany, Attawapiskat and Kashechewan Stations

Exemption Application ID: 01-1155

Market Participant ID:

Description of Exemption Requested: **Exemption from need to provide:**

(a) voltage reduction capability, and

(b) automatic under-frequency load-shedding capability.

Date Exemption Application Received: June 19, 2001

Date all relevant application information supplied by applicant: September 6, 2001

Management Approvals Obtained (YES or NO): YES

Section of the *Exemption Application and Assessment Procedure* under which the Exemption Application is made:

- *Section 1.4.1*

Market Rule(s) or related Market Manual(s) from which exemption is requested (copy of Market Rule(s) or Manual(s) attached): *Market Rules Baseline 6.5, Chapter 4, Appendix 4.4 Item 8; and Appendix 4.4 Item 3, and Section 10.4. as they relate to automatic under-frequency load-shedding requirements only; and Chapter 5, Section 10.3 as it relates to voltage reduction only*

Third Party Submissions Received (YES or NO):

Supplemental Assessment Information Attached (YES or NO): NO

Related Historical Exemption Application(s) or Related Exemption Application(s) in Process (YES or NO): **Yes, application 01-1040 for CNP Inc., recommendation provided**

N. B. If YES, see attached History of Exemption Applications: Not Applicable

Role of applicant in the market as it relates to this exemption application: Transmitter

Part 2 – Recommendation

Recommendation: GRANT both requests for exemption from the requirement to provide (a) voltage reduction capability and (b) automatic under-frequency load-shedding capability with conditions on both.

Monitoring information shall be provided by the applicant as a condition of this exemption:

- Notify the IMO when the Five Nations' facilities undergo expansion, or a new facility is connected; and
- Provide the IMO with the total demand, when requested.

Criteria Used in Assessment of General Exemption Applications (Section 1.4.2 of *Exemption Application and Assessment Procedure*):

(If X appears in a box, the criterion is applicable to this exemption application and is evaluated in Part 3 – Details of Assessment; if X does not appear in a box, the criterion is not applicable to this exemption application.)

Whether the exemption that is the subject-matter of the exemption application would, if granted, materially:

- impact the ability of the IMO to direct the operations and maintain the reliability of the IMO-controlled grid; ☒
- impact the ability of the IMO to ensure non-discriminatory access to the IMO-controlled grid; ☐

Granting an exemption from the requirement to have automatic under-frequency load-shedding facilities or voltage reduction facilities does not impact on the ability of the IMO to provide access to the IMO-controlled grid.

- affect the ability of the IMO to operate the IMO-administered markets in an efficient, competitive, and reliable manner; ☐

Granting an exemption from the requirement to provide automatic under-frequency load-shedding facilities or voltage reduction facilities does not impact on the operation of the IMO-administered markets.

- increase costs of market participants; or ☐

Granting an exemption application from the requirement to have an automatic under-frequency load-shedding facility or voltage reduction facilities does not increase the costs to other transmitters required to meet this obligation.

- increase costs of the IMO; ☐

Granting this exemption does not increase the cost to the IMO.

Whether the exemption that is the subject-matter of the exemption application would, if granted, give the exemption applicant an undue preference in the IMO-administered markets; ☐

Considering transmission rates are regulated by the Ontario Energy Board (OEB), the avoided costs of compliance do not raise issues of competition.

Whether the cost or delay to the exemption applicant of complying with the obligation or standard to which the exemption application relates is reasonable, having regard to the nature of the obligation or standard, the nature of the exemption application and the anticipated impact of non-compliance by the exemption applicant in terms of the elements referred to above; ☒

The adequacy of the exemption plan submitted by the exemption applicant; ☐

No exemption plan is required.

Where the exemption applicant is the IMO, the identification of the benefit to market participants of compliance with the obligation or standard relative to the financial and other resources required to achieve compliance within such deadlines as may be applicable; ☐

Applicant is not the IMO.

Where the exemption applicant is the IMO, the manner in which it proposes to operate in the IMO-administered markets or direct the operations and maintain the reliability of the IMO-controlled grid during the period in which the exemption would be in effect; ☐

Applicant is not the IMO.

Whether the facility or equipment that is the subject-matter of the exemption application:

Fort Albany, Attawapiskat and Kashechewan stations are new installations.

- was in service or was returned to service on the date on which the obligation or standard to which the exemption application relates came into force; ☐

- was ordered by the exemption applicant on or prior to the date on which the obligation or standard to which the exemption application relates came into force; or ☐

- was in the process of construction on or prior to the date on which the obligation or standard to which the exemption application relates came into force; and ☐

The capability of the owner of the facility to operate the facility consistent with the terms of the proposed exemption. ☐

The terms and conditions of the recommendation do not require the applicant to operate in a manner outside of the capabilities of the equipment.

PART 3 – DETAILS OF ASSESSMENT

Exemption Request:

Five Nations Energy Inc. is requesting an exemption for the requirement to provide:

- (a) voltage reduction facilities for transformer stations; and
- (b) automatic under-frequency load shedding

at Fort Albany, Attawapiskat and Kashechewan transformer stations.

Five Nations Energy Inc. presents various reasons to support their application:

1. Their facilities and forecasted demand of less than 10MW have negligible impact on the IMO-controlled grid;
2. They cannot provide voltage reduction effectively due to their facilities' remoteness and the capability of their transformers to tap change only off-load (i.e. their tap changing equipment is only designed to be operated following the interruption of supply to customers); and
3. The operation of other automated controls on equipment that is installed at the stations (shunt reactors) has not been designed to coordinate with automatic under-frequency load shedding and does not assist in providing voltage reduction.

The exemption application cites Section 7.1.2 (Under-frequency load-shedding facilities) and Section 7.1.3 (Voltage Reduction Facilities) of the IMO-Five Nations Operating Agreement as the document to which the exemption application relates.

Market Rule Requirements:

This exemption pertains to *Appendix 4.4 (Transmitter Requirements)* of *Chapter 4 (Grid Connection Requirements)*, in particular:

Item 3, Load-shedding facilities: "Each transmitter shall comply with IMO requirements for automatic under-frequency load shedding in accordance with its operating agreement."

Item 8, Voltage Reduction: "Transmitters shall install facilities to reduce distribution voltages by 3% and 5%."

In addition, *Section 10.4: Under-Frequency Load Shedding; subsection 10.4.6* of *Chapter 5* in the *Market Rules* states that arrangements be made to enable the disconnection of automatic under-frequency demand of at least 30% of the total peak customer demand.

In addition, *Section 10.3.3* of *Chapter 5* in the *Market Rules* states "each distributor and connected wholesale customer that receives a direction from the IMO to reduce demand shall achieve the reduction in demand within 5 minutes of receipt of the direction"

PART 3 – DETAILS OF ASSESSMENT

Assessment:

A: Voltage Reduction

Voltage reduction is a demand control method used to reduce the amount of power to be consumed by non-dispatchable loads during times of insufficient supply of generation, to forestall the need to directly reduce non-dispatchable load by manual load shedding.

Five Nations are restricted in achieving voltage reduction as per their current design and installation by the following factors:

- Five Nations does not have equipment installed that would enable them to implement the voltage reduction without interruption to customers (i.e. under-load tap changers on their transformers) at Fort Albany, Kashechewan and Attawapiskat. In order to use their presently installed off-load tap changers would require interrupting all customers, as there is only one source of supply (single transformer for each station) and no alternate source of supply to their customers.
- The voltage reduction equipment that is presently installed (i.e. off-load tap changers) takes considerable time to manually operate to achieve the voltage reduction (greater than 30 minutes). The IMO requires operation of voltage reduction and other demand control actions to be carried out within five minutes of receipt of the direction.
- Even if Five Nations had the capability to initiate the voltage reduction (under-load tap changers), they do not have the remote supervisory control built into their facilities to affect voltage reduction promptly or remotely.

In addition, the size of the Five Nations demand is very small (in total, anticipated to be much less than 10MW at this time). The overall impact of voltage reduction being carried out by Five Nations would be minimal, based on historical data. It is calculated that a 5% voltage reduction conducted at all three transformer stations would achieve a demand reduction to Ontario of less than 0.3 MW.

B. Under-frequency load shedding

In the event of a major disturbance, generation and load may no longer be in balance. When this occurs, the interconnected system frequency will fluctuate. If the disturbance results in too little generation for the load, the frequency will drop. If the disturbance results in too much generation for the load, the frequency will increase. Automatic controls on all generating units, known as speed governors, will act to restore the system slowly to a stable frequency. In addition, generating units are only capable of operating within a relatively narrow range of frequency without incurring damage to the facilities due to vibration.

The purpose of under-frequency load shedding is to automatically reduce load when the frequency declines rapidly, to attempt to arrest the frequency decline and hold the system frequency above the point at which generating stations would be automatically removed to prevent damage. By taking this automatic action, as many generators as possible remain on-line following the disturbance, and their speed governor controls have time to act to restore a stable frequency. In this way, a disturbance may be prevented from becoming a widespread total blackout. The facilities used to achieve automatic load disconnection are called under-frequency load-shedding facilities.

PART 3 – DETAILS OF ASSESSMENT

The IMO-controlled grid is divided into load-shedding areas, which individually must meet the requirement for enabling the disconnection of at least 30 % of the area's peak customer demand, after allowing for control equipment on maintenance and generators which cannot operate down to the frequency at which load shedding is initiated. Five Nations is located in an Under-Frequency Load-Shedding Area (UFLS AREA #4) which has the capability of automatically disconnecting 650 MW out of the total Area load of 1480 MW. Unfortunately, there are a large number of generators in this area that cannot operate off-nominal frequency, resulting in an overall lack of sufficient under-frequency load-shedding facilities to meet the needs in this area. The installation of an under-frequency load facility to reject 30% of Five Nations' total load of 10 MW, expected in the foreseeable future, would have positive but small contribution to the Area's load-shedding capability and would result in a negligible improvement in the performance of this area during a disturbance.

Cost to Comply:

- A) The cost of installing an under-frequency load-shedding facility at only one of the three transformer stations is approximately \$40,000. (Typically, UFLS would only be required at one of the three stations.) Maintenance costs are approximately \$ 1000 every two years.
- B) Costs for retrofitting of voltage reduction capability has been estimated by Five Nations Energy Inc. at \$3 million for all three transformer stations. The cost of installing supervisory control to enable voltage reduction to be initiated within five minutes of a direction by the IMO is additionally between \$100,000 and \$200,000 for all three stations.

Recommendation:

It is recommended that both exemption requests for (a) voltage reduction capability and (b) automatic under-frequency load-shedding capability be GRANTED with conditions on the basis of:

- Small size, resulting in a minor impact on reliability of the IMO-controlled grid if voltage reduction and automatic under-frequency load shedding is not carried out by Five Nations Energy Inc.;
- Inability to carry out voltage reduction due to equipment not being installed and lack of supervisory control;
- The cost to comply for the applicant is very large in relation to the small effect on maintaining the reliability of the IMO-controlled grid.

Thus, Five Nations Energy Inc. would be exempt from providing voltage reduction and automatic under-frequency load-shedding capabilities at Fort Albany, Attawapiskat and Kashechewan stations for the life of the 115 kV transformers at these stations.

It is recommended that monitoring information be provided by the applicant as a condition of this exemption:

- Notify the IMO when the aforementioned facilities undergo expansion, or a new facility is connected; and
- Provide the IMO with the total demand met by the aforementioned facilities, when requested.

PART 4 – TERMS AND CONDITIONS

Effective Date of Exemption (or event causing exemption to become effective)	Date Exemption Application received
Date of Expiration of Exemption <ul style="list-style-type: none"> If greater than 5 years, the Panel must be satisfied that the circumstances justify a later date Circumstances which will cause the exemption to immediately expire 	Date of expiration is for the life of the equipment (estimated to be 20 - 30 years depending on transformer loading and wear over the life of the equipment). To require compliance before the end of the life of the equipment would require replacement of the transformer(s) at cost in excess of \$3 million.
Market Rule (s) or related Market Manual(s) from which the Exemption is granted	Chapter 4, Appendix 4.4, Item 8 Chapter 4, Appendix 4.4, Item 3 in relation to automatic under-frequency load-shedding requirements only Chapter 5, Section 10.3 in relation to voltage reduction only Chapter 5, 10.4 in relation to automatic under-frequency load-shedding requirements only
Restrictions on the manner of operation and/or additional obligations to be met during the term of the Exemption, if any	None
Monitoring Information Required <ul style="list-style-type: none"> Information required to be provided by the Exemption Applicant for monitoring by the IMO 	Notify IMO when the facilities undergo expansion, or a new facility is connected. Provide IMO the total load when requested.
Payment of Costs <ul style="list-style-type: none"> Processing Costs (when introduced) Incremental Exemption Costs Settlement amounts to be withheld or repaid 	None

PART 4 – TERMS AND CONDITIONS

<p>Reconsideration/ Removal</p> <ul style="list-style-type: none"> • Date on which the Exemption will be reconsidered (<i>if applicable</i>) • Circumstances under which the Exemption will be reconsidered (<i>if applicable</i>) other than unforeseen future change in circumstances 	<p>Circumstances under which this exemption should be reconsidered are:</p> <ul style="list-style-type: none"> • The addition of any new transformer facilities to Five Nations Energy Inc.'s existing or new connections; • The addition of any means to regulate distribution voltages under load at the Fort Albany, Kashechewan or Attawapiskat transformer stations; and • For the portion of this exemption concerning under-frequency load-shedding facilities, if the total expected and/or peak loading of all three transformer stations exceeds 15 MW.
<p>Transferability</p> <ul style="list-style-type: none"> • List the terms and conditions that need to be met to allow for a transfer of this exemption to be approved by IMO staff 	<p>Approval to transfer this exemption may occur once the following criteria have been met:</p> <ol style="list-style-type: none"> 1. the transfer meets applicable terms and conditions set forth in the <i>exemption</i> itself and whether the transfer would affect the ability of the proposed transferee to comply with all of the terms and conditions of the <i>exemption</i>; and 2. the proposed transferee is a <i>market participant</i> or undertakes in writing to the <i>IMO</i> to apply for authorization as a <i>market participant</i>.
<p>Other:</p>	<p>Not Applicable</p>