

NOVA SCOTIA UTILITY AND REVIEW BOARD

IN THE MATTER OF THE *PUBLIC UTILITIES ACT*
- and -

IN THE MATTER OF an application by **NOVA SCOTIA POWER INCORPORATED** for approval of capital application project CI C0053316 – Transmission Customer Performance Regulations Compliance Project – Michelin Waterville Dynamic Voltage Restorer, in the amount of \$31,170,675

BEFORE: Roland A. Deveau, K.C., Vice Chair
Richard J. Melanson, LL.B., Member
Steven M. Murphy, MBA, P.Eng., Member

APPLICANT: **NOVA SCOTIA POWER INCORPORATED**
Blake Williams, Counsel

INTERVENORS: **CONSUMER ADVOCATE**
David J. Roberts, Counsel
Michael Murphy, Counsel

SMALL BUSINESS ADVOCATE
E.A. Nelson Blackburn, K.C.
Melissa P. MacAdam, Counsel
Rebekah Powell, Counsel

INDUSTRIAL GROUP
Nancy G. Rubin, K.C.
Brienne Rudderham, Counsel
Dylan MacDonald, Counsel

ENERGY STORAGE CANADA (ESC)
Justin Rangooni

NRSTor INCORPORATED
Homaira Siddiqui
Jason Rioux

BOARD COUNSEL: William L. Mahody, K.C.

FINAL SUBMISSIONS: October 15, 2024

DECISION DATE: **November 5, 2024**

DECISION: **The capital application is approved in the amount of \$31,170,675.**

TABLE OF CONTENTS

I	SUMMARY	4
II	BACKGROUND.....	5
III	POWER QUALITY ISSUES AT MICHELIN	6
IV	PROPOSED APPLICATION OF DVR TECHNOLOGY AT MICHELIN	13
V	EVIDENCE AND SUBMISSIONS.....	18
VI	ANALYSIS AND FINDINGS	21
	1. Is the Project needed to comply with the <i>Regulations</i> ?	21
	2. Is the Project the lowest cost alternative to address the power quality issue at Michelin's Waterville plant?	22
	3. Should ratepayers be responsible for the costs of any penalties that may be imposed on NS Power for failing to comply with the <i>TCPRs</i> ?	23
	4. Other Recommendations by the Intervenors	24
VII	CONCLUSION.....	25

I SUMMARY

[1] Nova Scotia Power Incorporated applied to the Board for approval of capital costs of \$31,170,675 to install a Dynamic Voltage Restorer at the Michelin tire manufacturing facility in Waterville, Kings County, Nova Scotia, to comply with the *Transmission Customer Performance Regulations*.

[2] NS Power states that the project is necessary to comply with the *Regulations*, which require NS Power to deliver stable voltage to a transmission customer under standard operating conditions and during any transient disruptions. The requirement is to maintain voltage within a prescribed range for a period of 0.02 to 1.0 seconds following a disruption. Voltage sags outside the limits established by the *Regulations* can, and have, resulted in manufacturing disruptions at the Michelin Waterville facility.

[3] The application is to install Dynamic Voltage Restorer (DVR) technology at the point of interconnection between NS Power's transmission system and the Michelin facility. DVR technology is typically used for industrial manufacturing facilities and is comprised of devices which boost the voltage during a voltage sag. The purpose of installing the DVR assets on NS Power's system is to address voltage sag experienced by the Michelin facility.

[4] Having reviewed the evidence and the submissions, the Board accepts the evidence presented in this matter that the DVR technology project is required for NS Power to comply with the *Regulations* and that it is the only available alternative to address these power quality issues. The Board finds the project costs are reasonable and approves NS Power's application for capital costs of \$31,170,675 for the Michelin Waterville Dynamic Voltage Restorer Project.

II BACKGROUND

[5] The *Nova Scotia Power Incorporated Performance Standards Regulations*, N.S. Reg. 256/2022, were made under Section 52A of the *Public Utilities Act*. Coming into effect on November 15, 2022, s. 3 provides:

Power quality

- 3** (1) Nova Scotia Power Incorporated must do all of the following:
- (a) deliver stable voltage to a transmission customer under standard operating conditions and during any transient disruptions;
 - (b) maintain voltage on the low side bus of the substation transformer serving a transmission customer within a range of 0.7 and 1.2 pu for the period of 0.02 to 1.0 s following a disruption.
- (2) If a transmission customer provides evidence to Nova Scotia Power Incorporated and the Board that the transmission customer's operations have been impacted by receiving power quality less than the range specified in subsection (1), Nova Scotia Power Incorporated must undertake mitigation measures to provide the transmission customer with the power quality specified in clause (1)(b).
- (3) Any expenses reasonably incurred by Nova Scotia Power Incorporated in ensuring compliance with subsection (1) will be allocated across all customer classes as a transmission network resource.
- (4) The penalty for failing to provide power quality specified in subsection (1) within 18 months of a transmission customer providing evidence of impacts is \$25 000 per month until the power quality specified in clause (1)(b) is provided.
- (5) The Board must appoint a third party to confirm that Nova Scotia Power Incorporated provides the power quality specified in subsection (1).

[Exhibit N-1, p. 10]

[6] NS Power has referred to the *Regulations* alternatively as the *Transmission Customer Performance Regulations (TCPRs or Regulations)*.

[7] NS Power applied to the Board on April 12, 2024, for approval of capital costs of \$31,170,675 for its *TCPRs Compliance Project - Michelin Waterville Dynamic Voltage Restorer* (Project Work Order CI C0053316).

[8] The purpose of the application is to install DVR technology at the point of interconnection between NS Power's transmission system and the Michelin tire

manufacturing facility in Waterville, Kings County, Nova Scotia. As described in greater detail later in this decision, DVR technology is typically used for industrial manufacturing facilities and is comprised of devices which work by boosting voltage during a voltage sag. NS Power stated that the purpose of installing the DVR assets on NS Power's system is to address voltage sag experienced by the Michelin facility, adding that the project is necessary to comply with the *Regulations*.

[9] The Board determined that this matter would be conducted by way of a paper hearing and issued a Hearing Order on April 17, 2024, setting out a timeline for Information Requests (IRs) to NS Power and written submissions. Notices of Intervention were filed by the Consumer Advocate, Small Business Advocate, Industrial Group, Energy Storage Canada, and NRSTor Incorporated.

[10] On July 9, 2024, NS Power responded to IRs from the Consumer Advocate, Small Business Advocate, Energy Storage Canada, Board staff, and EA Technology Limited, the Board Counsel consultants. Evidence was filed by EA Technology and Melissa Whitten, Daymark Energy Advisors, on behalf of the Small Business Advocate. NS Power submitted its Reply Evidence on September 13, 2024. Written closing submissions were completed on October 15, 2024.

III POWER QUALITY ISSUES AT MICHELIN

[11] Michelin operates three plants in Nova Scotia, in Waterville, Bridgewater and New Glasgow. The Waterville plant produces truck tires and operates 24 hours a day, 7 days a week all year except for a few holidays. The Waterville plant, which is connected to NS Power's 69 kV overhead transmission system, has experienced power quality issues that it says have resulted in operational and financial impacts. NS Power,

Michelin and consultants have been investigating these power disruptions since 2016 to determine the root cause of the power quality issues and potential solutions. The root cause was determined to be lightning strikes on the transmission system. Even lightning strikes some distance away from the Michelin plant can cause voltage sags.

[12] Lightning strikes are unpredictable and cause a sudden change in current conditions on transmission lines. There can be a direct lightning strike to the line or an indirect lightning strike to the ground that causes a current in the conductors of the overhead line. The surge voltage may exceed the capabilities of the insulators that leads to a flashover. The current can then flow through unintended paths and create a fault in the system. The fault will impact the voltage in the system and, depending on the severity, can damage equipment and disrupt power supply.

[13] A power system contains protective relays that detect faults, causing a circuit breaker to trip and interrupting the overloaded current and protecting the system by stopping the voltage drop. A system that responds quickly to voltage sags will remove the faulted section and allow the remaining portion of the transmission system to recover to normal levels. Depending on how severe the surge and how fast the system protection occurs, a voltage sag may occur. A voltage sag is a short duration reduction in the voltage of an electric power distribution or transmission system.

[14] NS Power system operators use the Supervisory Control and Data Acquisitions (SCADA) system to identify and record faults in the system. Michelin is a large industrial customer and NS Power has an accounts department dedicated to communicating and addressing concerns directly with Michelin.

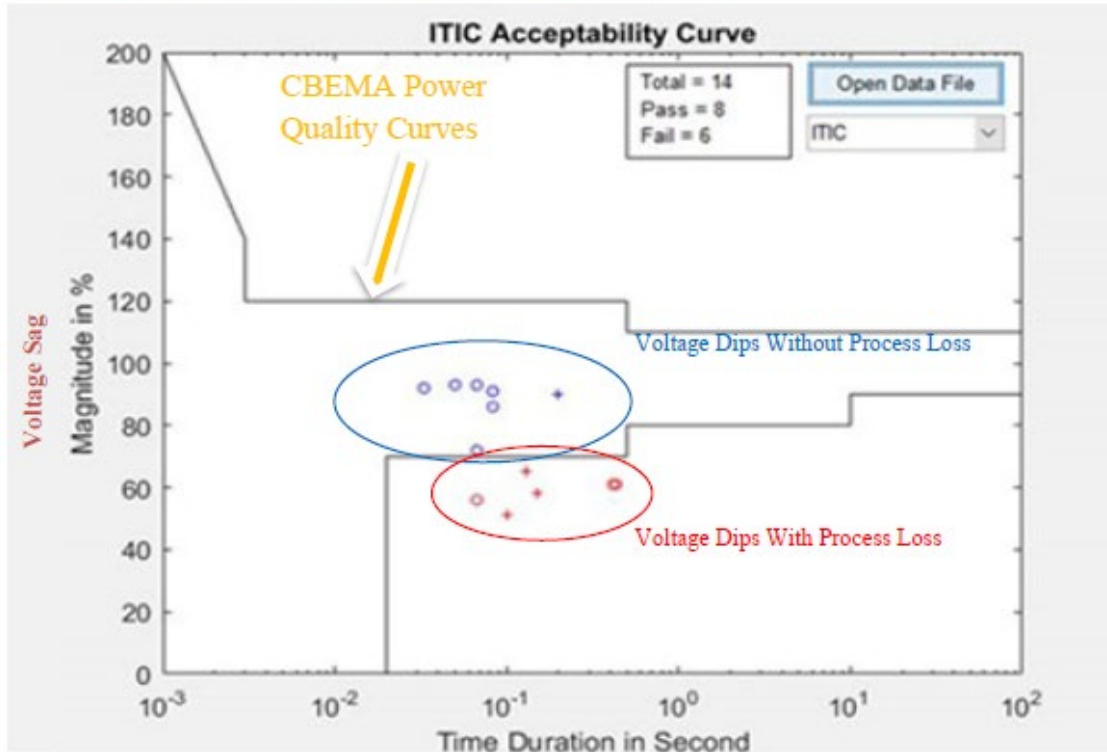
[15] Several consultants studied the power quality issues at the Michelin facility. In 2016, Stantec provided a report that reviewed the magnitude and duration of the

voltage disturbance. They concluded that “a dip to no less than 85% of the nominal voltage for a duration of no more than 10 ms may be regarded as a specification for consideration by NSPI” [Stantec Report page 4]. This report helped NS Power investigate the issue. Its analysis determined that lightning strikes caused the voltage sags at the facility.

[16] In 2018, S&C Electric Company evaluated the power quality data and provided potential solutions. It found that Stantec’s recommendation was stricter than the Information Technology Industry Council’s (ITIC) (formerly Computer and Business Equipment Manufacturer’s Association) power quality industry standard. The ITIC power quality standard curve was developed in the 1970’s and is used as an indicator of when additional power supply support may be required. It is an industry accepted guideline for defining tolerance of voltage variations for specified durations and informs the design of sensitive power electric equipment. The ITIC curve indicates that when voltage dips below 90% of the system nominal voltage, for a time greater than 20 ms, the sensitive equipment at the Michelin Waterville plant trips on undervoltage.

[17] An energy meter was installed on the secondary side of the Michelin Waterville facility’s 69 kV/4.16 kV transformers to record power quality events at the plant. Any disturbance events were plotted against the ITIC curve. NS Power provided Figure 1 below that shows 12 events recorded in 2020 and 2021. Five voltage sags (circled in red) resulted in plant disruptions that impacted production and resulted in significant financial losses. Seven voltage sags (circled in blue) were able to recover without any disruptions or process loss. Michelin stated that it has seen a similar number of disturbances in 2022 and 2023.

Figure 1 – Michelin Waterville Disturbance Examples



[Exhibit N-1, p. 14]

[18] The main area of the plant that is impacted by the voltage sags is the boiler house because it contains sensitive equipment. The 2018 S&C Electric Company report explains that:

Michelin indicated that the major area of concern is the boiler house. The boiler house consists of equipment that is essential in the manufacturing processes. Air compressors, chillers, boilers and other VFD motor-driven processes. If the VFD [variable frequency drive] for the large centrifugal air compressor trips due to any reason, the air compressor is required to spin down and stop before restarting. The spin down time is roughly 10 minutes. A significant portion of the manufacturing processes require compressed air, particularly in the tire vulcanizing process. If this process is interrupted, the probability of waste product is high and some in process product is not salvageable or recyclable.

[Exhibit N-4, EA Technology IR-7, Att. 2, S&C Report, p. 19]

[19] This 2018 report also stated that Michelin has 18 large low voltage uninterruptible power supply systems on the critical electrical distribution panels that were installed to give the equipment some immunity to the voltage sags. Manufacturing engineers' observations are that the newer variable frequency drives (VFD's) are more

sensitive to voltage sags compared to the older units. This is a concern as equipment is upgraded and the voltage sag issue may potentially increase in frequency.

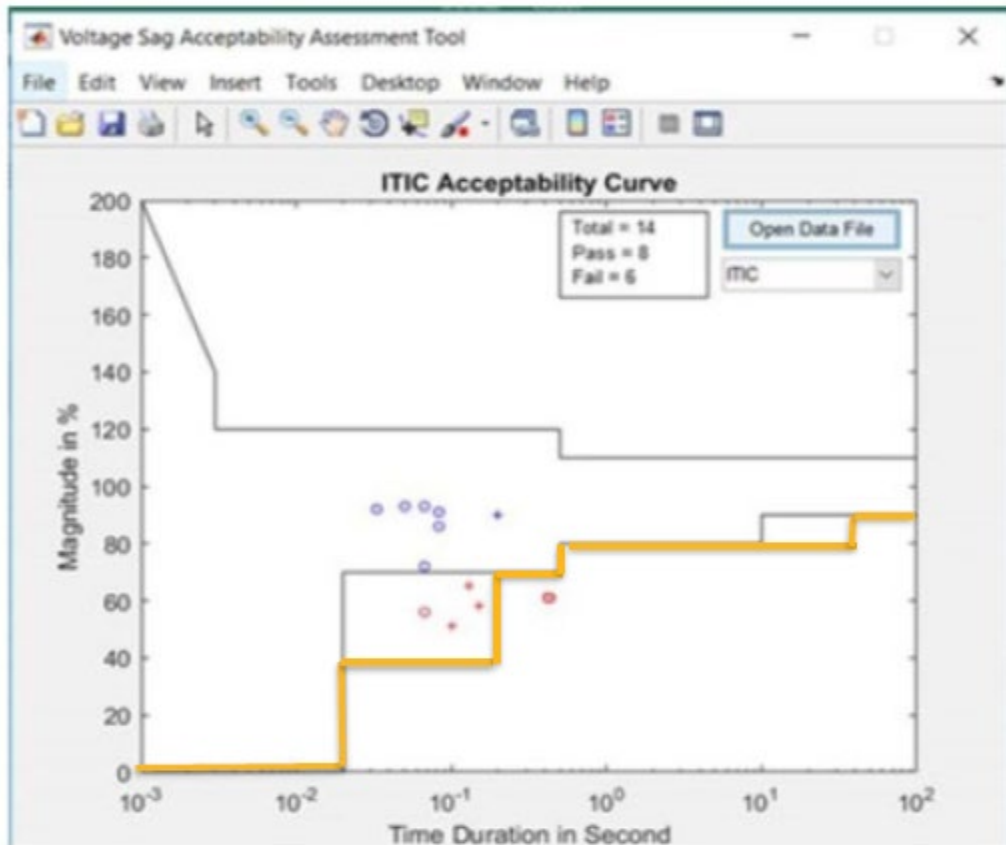
[20] In the Board Counsel consultants' report, EA Technology noted that the Standards Council of Canada IEC 61000-2-4 provides guidance on electromagnetic environmental classes and compatibility levels. According to the definitions, the Michelin Waterville plant would fall into a class 3 electromagnetic environment. EA Technology observed that:

The measured sags suggest that one aspect of the problem being experienced by Michelin is that the affected items of plant do not exhibit the level of immunity that should be achieved for equipment to be used in a class 3 environment.

[Exhibit N-8, p. 10]

[21] EA Technology explained in its report that a Class 3 electromagnetic environment is one that applies to industrial environments in which the connections with the power system provide higher compatibility levels for disturbance events.

[22] EA Technology provided the graph below with an orange line showing a scenario where the equipment exhibited a higher level of immunity in line with the class 3 environment. The result would be that only one plant disruption would occur.



[Exhibit N-8, p. 9]

[23] The power disruptions at the Michelin Waterville plant have been occurring over the past 10 years but have become more frequent in recent years. NS Power states that climate change is increasing the temperature and moisture making conditions favorable for lightning and these lightning strikes are becoming more frequent.

[24] The other two Michelin plants do not experience the same voltage sag issues. NS Power has seven transmission customers and is not aware of any other customers experiencing power quality issues like the Michelin Waterville plant. NS Power stated that others are not experiencing issues due to lightning strikes because they are connected to a higher voltage transmission line (138 kV vs 69 kV), are positioned closer to major transmission corridors (the Michelin New Glasgow plant is located near the Trenton generating station) and the other areas do not experience as many lightning

strikes as the Waterville area. In response to IR-8 from EA Technology, NS Power indicated that Environment Canada data confirmed the Kentville region, where the Waterville plant is located, has recorded the second highest lightning activity in the province over the last 25 years with data showing increasing strikes the last five years.

[25] The Michelin Waterville plant is also on the NS Power transmission line that has the lowest short circuit megavolt-amperes (MVA) level, or the weakest electrical source, of all the Michelin plants in Nova Scotia. The higher the MVA level, the more short circuit current is available and the better the system is able to maintain system voltage and power supply during system disturbances. On a lower MVA system, a fault will cause a voltage disturbance that is more severe and will impact the entire transmission grid.

[26] The *TCPRs* came into effect November 2022. The *Regulations* define power quality metrics and thresholds for maintaining power and stable voltage conditions. The voltage sags experienced by the Michelin Waterville plant cause interruptions outside the acceptable thresholds mandated in the *TCPRs*. On February 20, 2024, the Board received a letter from Michelin identifying power quality issues experienced at the Waterville plant that were not in compliance with the *TCPRs*.

[27] The *Regulations* state that NS Power is responsible for noncompliance issues rather than the customer. NS Power must provide the specified power quality to the Michelin Waterville plant within 18 months of being provided evidence that its “operations have been impacted by receiving power quality less than the range” specified in the *TCPRs*.

IV PROPOSED APPLICATION OF DVR TECHNOLOGY AT MICHELIN

[28] The *TCPRs* require NS Power to deliver stable voltage to a transmission customer under standard operating conditions and during any transient disruptions. Further, the *TCPRs* address voltage sags by requiring NS Power to maintain voltage on the low side bus of the substation transformer serving a transmission customer within a range of 0.7 and 1.2 pu [percentage unit] for the period of 0.02 to 1.0 s [seconds] following a disruption. A voltage sag refers to a short-duration reduction in the voltage of an electric power distribution or transmission system.

[29] As noted above, voltage sags outside the parameters established by the *TCPRs* can and have resulted in manufacturing disruptions at the Michelin Waterville facility. The voltage sag issues at the facility are not the result of deficiencies in NS Power's transmission and distribution system. Instead, they are the result of lightning strikes to the transmission system. The *TCPRs* do not require a transmission customer to address power quality issues related to voltage sag. The onus, pursuant to Section 3(2) of the *TCPRs*, is on NS Power to "undertake mitigation measures to provide the transmission customer with the power quality specified in clause (1)(b)."

[30] Prior to the introduction of the *TCPRs*, NS Power had been working with Michelin to identify possible solutions to the Waterville facility's power quality issues. In 2022, NS Power engaged Manitoba Hydro International (MHI) to assess and evaluate options. Three options for improving the facility's low voltage ride through were studied:

- Installing a STATCOM at 4.16 kV;
- Installing an Ultracapacitor system with a fast disconnect switch (note that DVR technology is often referred to as technology similar to ultracapacitor systems and uninterruptible power supply); and

- Using a Battery Energy Storage System (BESS), connected to the 138kV transmission system, with islanding capabilities in combination with a 2-cycle breaker.

[31] The MHI study found that to achieve a good level of coverage, it would be necessary to install a relatively large STATCOM device with a high short-term MVAR reactive support capability. The study also found that an ultracapacitor system (similar to a DVR) would virtually eliminate all low voltage trips, as long as enough energy was stored in the system. However, this system, would come at a potentially high initial investment cost, considerable added operational losses and higher maintenance requirements. The study concluded that although the use of a BESS system with islanded capabilities would not entirely eliminate low voltage trips, it offered the best compromise in terms of reduced initial investment cost (if the BESS is not considered to be part of the project), and improvement of low voltage ride through capabilities. It also had the added benefit of being able to provide services to the AC network through energy storage service, frequency regulation and system strength.

[32] These conclusions were reached in the absence of the *TCPRs*, which came into effect late in 2022, after the issuance of MHI's report. However, with the *TCPRs* coming into effect, NS Power believes it is now clear that a DVR solution is the only technically feasible solution to address the *TCPRs'* requirements. Specifically, the company noted that the 2022 MHI report indicated that unlike the DVR solution, the BESS option does not fully eliminate the customer's load trips due to low voltage. Therefore, it does not meet the *TCPRs'* requirements. In response to EA's IR-18, NS Power also noted that in the BESS option, the combination of battery equipment response and higher voltage switching equipment would have a much slower response time than a DVR

system. Comparatively, MHI found that DVR technology will eliminate all voltage sag issues, provided that there is enough stored energy in the ultracapacitor system.

[33] Once the *TCPRs* were in effect, NS Power again engaged MHI in 2023 to further study and confirm that the installation of the DVR solution as proposed would not negatively impact the NS Power transmission system. MHI provided its final report in September 2023, concluding that the uninterruptible power supply (i.e., DVR) solution would not adversely impact the system. The report also considered the operation of the DVR in response to various lag conditions. In simulated fault cases, the DVR system successfully protected the load from voltage dips in alignment with the *TCPRs* required response time of 20ms. However, the report did note several issues observed in the simulations. In response to the Consumer Advocate's IR-10, NS Power stated that these issues will be addressed through additional voltage support, trigger algorithm design changes, and system model corrections.

[34] NS Power says it took care to study and confirm that DVR technology will work as intended. This work was completed with the assistance of the technology provider Proventus and its manufacturer Maschinenfabrik Reinhausen, as well as MHI. NS Power stated that the DVR technology is expected to significantly improve the reliability of Michelin Waterville facility's power quality, or virtually eliminate voltage sag altogether. The company also noted that the technology may also be able to address other transmission customer power quality issues should they arise, contributing to better overall reliability for transmission connected customers.

[35] DVR technology is typically used for industrial manufacturing facilities and is comprised of devices which work by boosting the voltage during a voltage sag. DVR technology injects voltage into a system within 1/100th of a second to bring the voltage

back up to a range required by any particular facility. DVR is a combined package of multiple fast acting technologies: a DVR “container” consists of Ultra Capacitors (UCs), an ultrafast thyristor switch, power filters, DC/DC converters, and DC/AC converters. The DVR container allows an electric charge to be stored in the UCs from the electric grid and sits idle. When the voltage on the grid side drops below a preset value, the DVR islands the load and provides electrical energy using the charge stored in the UCs. The DVR responds to grid-sourced voltage dips and micro-interruptions, automatically islands a load, and provides all the electrical energy requirement within 0.02 of a second. The DVR island operation mode operates with the same characteristic as the grid (nominal voltage, phase angle, and frequency).

[36] The proposed Michelin DVR Project scope includes the installation and commissioning of a 15 MVA/1-second system, consisting of three identical 5 MVA/1-second DVR containers, feasibility studies, integration, design, and post installation. The project will be designed to serve the existing facility peak load of approximately 14 MVA. However, the design of the DVR solution allows for expansion of the DVR technology on site in the event of increased facility capacity.

[37] The project work will include installation of a switchgear in an electrical-house (e-house), three 5 MVA DVR inside containers, six new transformers, two station service transformers, two grounding transformers, approximately 13km of electrical cables, 4 MVAR of capacitor banks and an electrical ground grid. The project will also deliver all the civil infrastructure required to support the installation of the electrical equipment and accessories. Post-Installation, there will be a “Burn-in Period” where the DVR system is tested. Once the DVR is fully site-commissioned, the DVR will undergo

field monitoring and corresponding adjustments to verify and refine operation for actual voltage sag events for a period up to four months.

[38] The expected life of the DVR solution will vary. The expected useful life of the capacitor banks is 20 years. However, the project will create multiple assets in different asset pools, including substation transformers and underground conduits, and these assets will have multiple different useful lives. The DVR system can be refurbished at the end of its service life. The DVR capacitor banks will be evaluated at that time. If the energy storage capacity through refurbishment is below the necessary level to support the facility, components of the DVR will be replaced with similar components or supplemented by adding additional capacitors to the DVR container.

[39] DVR is new technology to NS Power, and the company is not aware of other instances where DVR technology has been deployed as proposed for the Michelin project. In response to NSUARB IR-17, NS Power gave two examples where DVR has been employed at other industrial facilities with loads over 1MW. NS Power understands that those industrial facilities are connected at the distribution level. However, the DVR equipment vendor has indicated that there are no concerns applying the same equipment to a transmission-connected facility. NS Power does not anticipate any concerns with voltage recovery or noise.

[40] In addition, MHI's 2022 report noted that a DVR system would virtually eliminate all low voltage trips, provided there is enough energy stored in the system. In response to NSUARB IR-7a), NS Power stated that factors that could lead to insufficient stored energy in the DVR system are considered low probability events. Further, in response to NSUARB IR-7c), NS Power stated that DVR has capacity to respond to successive voltage sags and can respond to subsequent voltage sags while recharging

after a prior event. The number of consecutive sags depends on the duration of each event and facility load conditions at the time. The DVR is programable to accept a recharge rate governed by NS Power grid limitations. NS Power will initially apply a recharge time of approximately five seconds. However, as part of commissioning and through the Burn-in Period, NS Power will work to optimize recharge time while maintaining grid stability.

V EVIDENCE AND SUBMISSIONS

[41] EA Technology reviewed whether NS Power's capital application complies with the *Regulations*. In its report, it observed that the *TCPRs* "place certain onerous obligations upon Nova Scotia Power with regards to the stability of the voltage experienced by transmission connected customers". After reviewing a number of international standards which have been adopted by the Canadian Standards Association, it noted that the power quality requirements prescribed by the *Regulations* appear to be unique to Nova Scotia, and inferred the requirements "may have been introduced with the intention of making Nova Scotia a leader in this arena and thus making Nova Scotia a more attractive location for industrial investment".

[42] EA Technology noted that other jurisdictions generally address other aspects of power quality:

... The more typical power quality parameters which are subject to regulation, or some form of control are voltage levels defined over 10-minute periods, flicker and harmonic distortion, none of which are addressed by these [Nova Scotia] regulations. Incidences of voltages below the 90% threshold for a sag are typically managed for normal operation by design of the network to avoid disturbances being caused by customer connected equipment. Voltage sags which arise from a fault such as those which are the driver for the installed mitigation are an unfortunate and an inherent part of any interconnected power system.

[Exhibit N-8, p. 3]

[43] It described the impact of the *Regulations* in Nova Scotia:

The Transmission Customer Performance Regulations are the sole driver forcing Nova Scotia Power to take action to alleviate problems experienced by one customer who will be the only customer to directly benefit from costs which are to be apportioned across the entire body of ratepayers.

These Regulations appear to be unique in the level of voltage stability that is to be provided and where it is to be provided. To provide that level of support for an entire transmission connected customer's load is a serious undertaking and inevitably means that equipment within the plant which would not have mal-operated due to the voltage sag as a result of an inherent level of immunity has been supported to operate unnecessarily.

[Exhibit N-8, p. 15]

[44] EA Technology reviewed the alternatives considered by NS Power to address the voltage sag issues at the Michelin Waterville manufacturing facility, including the super capacitor DVR system, a STATCOM solution, and a battery energy storage system (BESS).

[45] EA Technology concluded:

The Super Capacitor DVR solution was the only one capable of meeting the requirements imposed by the Transmission Connected Performance Regulations since the coupling breaker couldn't operate until 2 cycles after the disturbance which would not meet the response time required.

[Exhibit N-8, p. 10]

[46] The BESS solution was not considered to comply with the *Regulations* because "it would have been unable to disconnect quickly enough" [Conclusion 3]. It also observed that "Some of the events could have been avoided if the [Michelin] equipment exhibited immunity in line with class 3 environment" [Conclusion 6].

[47] Finally, EA Technology noted that the specific requirements prescribed by the *TCPRs* limited the types of solutions that were available to address the issue, and there may be "more cost-effective ways of mitigating the effects of [voltage] sags", but that these would not meet the requirements of the *Regulations*. EA Technology made one recommendation in its report:

The main recommendation of this report is:

- R1. Notwithstanding that as the regulations stand there is no encouragement for transmission connected customer to make any investment within their plant to address the effects of voltage sags, Nova Scotia Power should be encouraged to work with the customer to facilitate the connection of customer equipment to manage the immunity of their equipment to the sags which are an inherent part of connecting to the public electricity network.

[Exhibit N-8, p. 17]

[48] Ms. Whitten submitted evidence on behalf of the Small Business Advocate.

She stated that the “investment may not meet power quality performance standards at the Michelin plant depending on the location and frequency of future lightning strikes”.

She added that NS Power had not directly addressed cost and performance risks related to installing the DVR technology in the plant. Finally, she said that NS Power had not addressed the risk of incurring penalties imposed under *TCPRs* Section 3.4 to remedy the voltage sag problem within the prescribed 18-month timeline. Her recommendations

included:

2. Require NS Power to confirm that it will not seek to recover costs associated with any penalties imposed under the TCPR for failing to meet the provisions of the TCPR.
3. Deny recovery from ratepayers of any and all costs associated with NS Power’s agreement to procure and install Switched Capacity Bank (SCB) assets inside the fence of the Michelin plant, including capital, labor and O&M costs as well as any contract penalties for delivery, installation and performance of these assets.
4. Require NS Power to file a report with each of the next two annual ACE Plan filings documenting how well the [project] has a) performed as a fast-acting resource, including during documented lightning events, and b) improved voltage sag immunity.

[Exhibit N-9, pp. 20-21]

[49] In its submissions, the Small Business Advocate did not pursue Ms.

Whitten’s recommendation to deny recovery from ratepayers of any costs related to installation of the assets “inside the fence of the Michelin plant”. The Small Business Advocate acknowledged that the *TCPRs* are “very narrowly drafted, providing little room to explore alternative solutions that are more economical”. However, the Small Business Advocate adopted Ms. Whitten’s recommendations for NS Power reporting and seeking

confirmation from NS Power that it would not seek to recover costs associated with any penalties for failing to meet the provisions of the *TCPRs*.

[50] Similarly, the Consumer Advocate submitted that there “appears to be little ground within the *TCPRs* upon which the Board could deny the application”, noting EA Technology’s findings about the prescriptive nature of the *TCPRs*. The Consumer Advocate supported EA Technology’s recommendation that NS Power work with Michelin about steps Michelin itself can take to improve the ability of its equipment to address voltage sags.

VI ANALYSIS AND FINDINGS

1. Is the Project needed to comply with the *Regulations*?

[51] When a transmission customer provides evidence to NS Power and the Board that the customer’s operations have been impacted by receiving power quality outside than the range specified in the *Regulations*, NS Power is required to take mitigation measures to provide that customer with the power quality that satisfies the minimum level outlined in the *Regulations*. Michelin has advised NS Power and the Board that over the past number of years its Waterville facility has received power quality that is outside the range specified in s. 3(1) of the *TCPRs*. Under the *Regulations*, NS Power is required to fix the power quality issues at Michelin’s Waterville facility.

[52] NS Power applied to the Board to install the DVR technology assets at the Waterville facility. It stated that this solution is the only commercially available solution that meets the requirements of the *TCPRs*. After reviewing the options, EA Technology agreed with NS Power that the DVR solution is the only option capable of meeting the

TCPRs requirements. Ms. Whitten's engagement with the Small Business Advocate did not include evaluating other alternatives.

[53] None of the parties challenged NS Power's and EA Technology's finding that installing the DVR technology was the only available option to comply with the *TCPRs*. The Consumer Advocate and Small Business Advocate both acknowledged the prescriptive nature of the *TCPRs*, requiring NS Power to satisfy a high threshold for voltage levels during the required time intervals at the Waterville facility. The Consumer Advocate concluded that there "appears to be little ground within the *TCPRs* upon which the Board could deny the application".

[54] The Board accepts the evidence of both NS Power and EA Technology that the DVR solution is the only option capable of meeting the *TCPR* requirements at the Michelin Waterville facility.

2. Is the Project the lowest cost alternative to address the power quality issue at Michelin's Waterville plant?

[55] Having found that the DVR solution is the only option capable of complying with the *TCPRs* at the Michelin Waterville facility, the Board turns to the proposed cost of the DVR project. In capital project applications by public utilities, including NS Power, the Board must consider whether the project is the lowest long-term cost for the utility, and ultimately, ratepayers.

[56] The SBA acknowledged that the *TCPRs* are "very narrowly drafted, providing little room to explore alternative solutions that are more economical". EA Technology noted that the *TCPRs* do not incent transmission customers to make investments within their plants to mitigate the impact of voltage sags. Further, presumably there will be ongoing maintenance and replacement and additional issues that may arise

from its operation. Nevertheless, the *TCPRs* make NS Power solely responsible for this mitigation measure and requires the cost to be borne by all ratepayers.

[57] Ms. Whitten stated that NS Power did not directly address cost and performance risks related to its agreement to install the DVR technology assets inside the Michelin plant. Further, she recommended that the Board:

Deny recovery from ratepayers of any and all costs associated with NS Power's agreement to procure and install Switched Capacity Bank (SCB) assets inside the fence of the Michelin plant, including capital, labor and O&M costs as well as any contract penalties for delivery, installation and performance of these assets.

[Exhibit N-9, pp. 20-21]

[58] However, no party, including the Small Business Advocate, provided any evidence challenging the cost of the project proposed by NS Power. In the circumstances, the Board has no evidence before it about cost except what is in the application. The extent and location of the mitigation measures to be undertaken by NS Power is set out in the *TCPRs*:

3(1)(b) maintain voltage on the low side bus of the substation transformer serving a transmission customer within a range of 0.7 and 1.2 pu for the period of 0.02 to 1.0 s following a disruption. [Emphasis added]

[Exhibit N-1, p. 10]

[59] The Board approves NS Power's application at the proposed cost of \$31,170,675. As with all Board-approved projects, the Board expects the execution of the project to be conducted in a reasonable and prudent manner, and only to the extent needed to comply with the *TCPRs*.

3. Should ratepayers be responsible for the costs of any penalties that may be imposed on NS Power for failing to comply with the *TCPRs*?

[60] Ms. Whitten recommended that the Board:

Require NS Power to confirm that it will not seek to recover costs associated with any penalties imposed under the TCPR for failing to meet the provisions of the TCPR.

[Exhibit N-9, p. 20]

[61] The SBA reiterated this recommendation in her closing submission.

[62] In its rebuttal submission, NS Power confirmed that in the event it receives a penalty under the *TCPRs*, it will not seek to recover those related costs from ratepayers.

4. Other Recommendations by the Intervenors

[63] There are two further recommendations that must be canvassed.

[64] First, Ms. Whitten recommended that NS Power file a report with each of the next two annual ACE Plan filings documenting how well the project has a) performed as a fast-acting resource, including during documented lightning events, and b) improved voltage sag immunity.

[65] While the Board considers that Ms. Whitten's recommendation has merit, it is not an issue to be decided in this proceeding. The Board observes that subsection 3(5) of the *TCPRs* provides that the Board must appoint a third party to confirm that NS Power "provides the power quality specified" in the *Regulations*. This issue was not a point directly canvassed in this proceeding. Accordingly, the Board directs NS Power to advise the Board once the project is completed and the Board will initiate another process to address subsection 3(5).

[66] Second, EA Technology's "main recommendation" of its report was:

R1. Notwithstanding that as the regulations stand there is no encouragement for transmission connected customer to make any investment within their plant to address the effects of voltage sags, Nova Scotia Power should be encouraged to work with the customer to facilitate the connection of customer equipment to manage the immunity of their equipment to the sags which are an inherent part of connecting to the public electricity network.

[Exhibit N-8, p. 17]

[67] In its Rebuttal Evidence, NS Power responded positively to this recommendation:

NS Power agrees in principle to adopt EA Technology's recommendation. The Company regularly engages with its large industrial customers as a normal course of business operations, through its Key Accounts and Customer Solutions department. Should power quality issues be brought to NS Power's attention, the Company will explore and encourage customer sited, behind-the-meter solutions to address customer equipment voltage sag immunity where applicable.

[Exhibit N-10, p. 5]

[68] The Board encourages such discussions, which may be helpful in providing more timely and less costly options to deal with such disruptions.

VII CONCLUSION

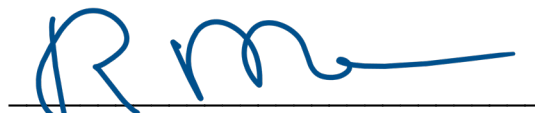
[69] The Board approves NS Power's application for capital costs in the amount of \$31,170,675, for the Michelin Waterville Dynamic Voltage Restorer Project. The Board finds that the Project is required for NS Power to comply with the *TCPRs*. Based on the evidence presented, the Board finds the Project costs to be reasonable.

[70] An Order will issue accordingly.

DATED at Halifax, Nova Scotia, this 5th day of November, 2024.



Roland A. Deveau



Richard J. Melanson



Steven M. Murphy