ENBRIDGE

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October 15, 2025

VIA RESS AND EMAIL

Ritchie Murray
Acting Registrar
Ontario Energy Board
2300 Yonge Street, Suite 2700
Toronto, ON M4P 1E4

Dear Ritchie Murray:

Re: Enbridge Gas Inc. (Enbridge Gas or the Company)
Ontario Energy Board (OEB) File: EB-2019-0294
Markham Low Carbon Energy Project (the Project)
Planned Hydrogen Blend Increase

On March 31, 2020, Enbridge Gas filed an updated application to the Ontario Energy Board (OEB) under section 90 of the *Ontario Energy Board Act, 1998* (OEB Act), for an order granting leave to construct approximately 755 meters (m) of natural gas pipeline, three stations and two network disconnects (Proposed Facilities) in the City of Markham. The purpose of the Proposed Facilities was to enable Enbridge Gas to conduct a pilot project that involved blending the standard natural gas that it currently distributes with up to 2% of hydrogen gas by volume (blended gas). The blended gas was to be distributed within an isolated portion of Enbridge Gas's existing distribution system called the Blended Gas Area (BGA). On October 29, 2020, the OEB approved the Project, subject to certain conditions as described in its Decision and Order.[1] Enbridge Gas began injecting blended gas in the BGA in October, 2021, serving approximately 3,600 customers at that time.[2]

In accordance with the OEB's Pilot Project Condition of Approval (PPCOA) number 1,

> Enbridge Gas shall advise the OEB of any changes to the Project, including any development of a second phase for hydrogen blending[3],

Enbridge Gas is hereby advising the OEB that after four successful years of Project operation, the Company now intends to increase the hydrogen blend from up to 2% to up to 5% by volume within the existing BGA beginning January 1, 2026, for the remainder of the pilot's 5-year term which ends in October 2026. No additional facilities are required to be constructed to support this blend increase.

In order to eliminate any bill impacts on customers resulting from this blend increase, Enbridge Gas is proposing to increase Rider M amounts for eligible Rate 1 and Rate 6 customers in the BGA. Enbridge Gas requests that the OEB consider this letter as Enbridge Gas's application for approval of the updated Rider M.

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[1] EB-2019-0294 Decision and Order, October 29, 2020.
[2] The number of customers in the BGA has grown to approximately 4,300 as of September, 2025.
[3] EB-2019-0294 Decision and Order, October 29, 2020, Schedule B

In support of this plan, Enbridge Gas is providing by way of this letter the following materials:

1. Project Overview, including:
    a) Project Description and Timing
    b) Policy Context
    c) Community Engagement Activities
2. Hydrogen Blending Pilot Project Update
3. TSSA Letter of Support
4. Rider M Updates

1. Project Overview

a) Project Description and Timing

Effective January 1, 2026, Enbridge Gas intends to increase the hydrogen blend in the BGA from a maximum of 2% to 5% by volume, for the final year of the existing Markham Low Carbon Energy Project pilot. This adjustment requires no construction or modifications to existing facilities, as all infrastructure was originally designed to accommodate the 5% blend. All current safety systems—including emergency shut down, gas detection, and real-time monitoring—will remain in place, with continued and additional monitoring activities such as leak surveys to ensure ongoing safety and reliability.

The timing of the blend increase is aligned with the final year of the pilot to allow for comprehensive data collection for up to 5% by volume blends in the BGA to be included as part of the full operational report to be filed with the OEB after five years, as required by the PPCOA number 2. The blend increase represents a simple operational modification, supported by positive pilot results to date and industry standards, with no cost impact to customers and day-to-day operations.

b) Policy Context

The planned hydrogen blend increase in Markham—from up to 2% to up to 5% by volume—is supported by policy goals in Ontario. Ontario's Integrated Energy Plan (IEP) promotes an "all-of-the-above" energy strategy that includes electricity, natural gas, hydrogen, and other fuels working together to meet growing demand.[4] Similarly, the Ontario Low-Carbon Hydrogen Strategy released in April 2022 identifies hydrogen blending as a viable low-carbon option to leverage existing energy infrastructure, with multiple potential applications. In fact, the Ontario Low-Carbon Hydrogen Strategy showcases Enbridge Gas's hydrogen blending project (and other hydrogen technologies) as reflecting "Ontario's desirability as a jurisdiction for research and development, innovation and manufacturing."[5]

Further supporting this direction, following the start of blending in the BGA in 2021, the Canadian Standards Association (CSA) issued a response to a request for interpretation on April 18, 2023, confirming that natural gas containing up to 5% hydrogen by volume is covered under existing certification protocols using Test Gas A - a standard representation of natural gas used during appliance testing. This conclusion, supported by input from testing agencies,

[4] Energy for Generations, June 2025, for example p. 14, 29, 96. https://www.ontario.ca/files/2025-07/mem-energy-for-generations-en-2025-07-18.pdf.
[5] Ontario's Low-Carbon Energy Strategy, April 2022, p. 24. https://www.ontario.ca/files/2022-04/energy-ontarios-low-carbon-hydrogen-strategy-en-2022-04-11.pdf

manufacturers, and institutions, affirms that all CSA-certified appliances can safely operate with hydrogen blends up to 5% without requiring recertification.

c) Community Engagement

Enbridge Gas has developed a community engagement plan to support the hydrogen blend increase, including the distribution of information mailers and invitations to an information session for affected customers. The information session is scheduled for Wednesday, November 5, 2025, from 5:00 PM to 7:00 PM at the Enbridge Technology and Operations Centre (TOC) in Markham Ontario. The engagement plan will inform approximately 4,300 impacted customers of the upcoming increase in hydrogen blending, covering project background, safety and operational assurances, billing impacts, and next steps. Feedback will be collected via email prior to and during the session through comment logging and summarized in a post-event memo. This memo along with a log of customer communications for this increased hydrogen blending period will be submitted to the OEB with the post-pilot operational report.

2. Hydrogen Blending Pilot Project Update

Enbridge Gas has prepared a Hydrogen Blending Pilot Project Update ("Update") ahead of the required five-year operational report to support the Company's planned changes to the Project. The Update summarizes the Project's performance to date and demonstrates positive operational and technical results as verified through data collection and validated through industry research findings and current standards. The Update also provides some of the operational data and information requested as part of the post-pilot reporting requirements listed in the EB-2019-0294 OEB Decision and Order PPCOA. A final operational report will still be filed after the full five year pilot has concluded, including findings from blending at up to 5% by volume. The Hydrogen Blending Pilot Project Update can be found at Attachment 1.

3. TSSA Support Letter

On June 3, 2025, Enbridge Gas contacted the TSSA to inform them of the Company's intent to increase the blend percentage of the Project up to 5% by volume. The TSSA completed a technical assessment of the project and provided their approval on September 25, 2025 for Enbridge Gas to proceed with this increase. The TSSA's approval letter can be found at Attachment 2 to this letter (also found at Attachment C to the Hydrogen Blending Pilot Project Update).

4. Rider M Updates

The purpose of Rider M – Hydrogen Gas Rider is to compensate customers located in the BGA for the additional costs associated with the increase in volumetric consumption for blended gas as compared to standard gas. Blended gas has a lower heat content, and therefore a customer must consume additional blended gas compared to standard gas to achieve the same amount of energy per m^3. A typical Rate 1 residential customer in the EGD rate zone consumes approximately 2,400 m^3 of natural gas per year. To achieve the same amount of energy, that typical customer in the BGA would have to consume approximately 2,433 m^3 for 2% blended gas and 2,483 m^3 for 5% blended gas, per year. For a typical Rate 6 customer, the annual volume using standard gas is 22,606 m^3 as compared to 22,918 m^3 for 2% blended gas and 23,384 m^3 for 5% blended gas. Rider M compensates customers for the cost associated with the additional volume of blended gas required annually.

Consistent with the OEB's Decision and Order in EB-2019-0294, Enbridge Gas has reviewed the current Rider M amounts in light of the planned hydrogen blend percentage increase. The planned increase from 2% to 5% hydrogen will result in material[6] changes to the amount of the rider credits based on the most recent approved rates (EB-2025-0244), and therefore Enbridge Gas is proposing to increase the rate rider credits from $15 to $26 for Rate 1 customers and from $126 to $217 for Rate 6 customers. Enbridge Gas will continue to absorb the costs associated with Rider M.

The calculations supporting the updated Rider M are shown in Table 1.

As described in Enbridge Gas's application and evidence in EB-2019-0294, Enbridge Gas has arranged to procure hydrogen from 2562961 Ontario Ltd. In a manner that keeps ratepayers cost-neutral for the duration of the pilot.[7] Under this approach, the price paid for the hydrogen will be the same price paid for traditional natural gas and will fluctuate according to the market cost of natural gas. There will be no impact to customer bills as the cost of hydrogen will be the same as the cost of traditional natural gas.

Enbridge Gas respectfully requests a Decision from the OEB on the proposed changes to Rider M by December 3, 2025 to enable an implementation date of the hydrogen blend increase and updated Rider M by January 1, 2026.

Enbridge Gas submits that no hearing is required for this limited request to update Rider M, and requests that the OEB proceed by way of delegated authority in processing this application. Enbridge Gas would be happy to answer any questions and provide any assistance to support the expeditious consideration of this matter.

Sincerely,

Patricia Squires

Patricia Squires
Manager, Regulatory Applications – Leave to Construct

Cc: David Stevens (Enbridge Gas External Counsel)
Henry Ren (Enbridge Gas Internal Counsel)
Intervenors in EB-2019-0294

[6] "Material" is defined as an increase or decrease of 25% or more (EB-2019-0294 Decision and Order, p. 28).
[7] EB-2019-0294, Exhibit B, Tab 1, Schedule 1, pp 17-18. Additional details on the hydrogen commodity cost arrangements can be found at EB-2019-0294 Exhibit I.STAFF.2.

Table 1
Calculation of Rider M at 5% Hydrogen Blend Gas - EGD Rate Zone

Line No.	Particulars	Rate 1 - Typical Residential ($) 5% Blended Gas	Standard Gas (1)	Change	Rate 6 - Average Commercial ($) 5% Blended Gas	Standard Gas (2)	Change
		(a)	(b)	(c) = (a - b)	(d)	(e)	(f) = (e - d)
1	Annual Volume (m^3)	2,483	2,400	83	23,384	22,606	778
2	Monthly Customer Charge	321	321	0	990	990	0
3	Delivery Charges	293	284	9	2,403	2,332	71
4	Gas Supply Transportation	130	126	4	1,227	1,187	41
5	Gas Supply Commodity	305	295	10	2,876	2,781	96
6	Total Bill - Sales Service	1,049	1,025	24	7,497	7,290	207
7	Existing Rider M (3)			15			126
8	Increase in Rider M (line 6 - line 7 / line 7)			60%			64%
9	**Proposed Rider M (4)**			**26**			**217**

Notes:

(1) EB-2025-0224, Exhibit F, Tab 1, Schedule 1, Appendix D, p. 1, column (c), lines 1 - 5.

(2) EB-2025-0224, Exhibit F, Tab 1, Schedule 1, Appendix D, p. 1, column (c), lines 22 -26.

(3) EB-2025-0224, Exhibit F, Tab 1, Schedule 1, Appendix B, p. 118.

(4) Proposed Rider M is rounded up $2 and $10 for Rate 1 and Rate 6 respectively. Under this approach customer receiving blended gas are appropriately compensated even where there are modest increases in the price of natural gas over the course of a year.

Hydrogen Blending Pilot Project Update
EB-2019-0294

Date: 2025-October

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Life Takes Energy

Executive Summary

In its Decision and Order for the EB-2019-0294 proceeding the Ontario Energy Board (OEB) granted Enbridge Gas Inc. (Enbridge Gas or the Company) leave to construct the Low Carbon Energy Project (LCEP). As part of that Decision and Order the OEB set out several Pilot Project Conditions of Approval.

This Hydrogen Blending Pilot Project Update (EB-2019-0294) has been prepared ahead of the required five year operational report to inform the OEB of planned changes to the Project as per EB-2019-0294 OEB Decision and Order, Schedule B - Pilot Project Conditions of Approval (PPCOA). It is being utilized to inform the OEB of the Company's intent to increase the hydrogen blend percentage from up to 2% by volume, to up to 5% by volume within the Blended Gas Area ("BGA"). This is based on positive operational and technical results as verified through data collection and validated through industry research findings and current standards. The Hydrogen Blending Pilot Project Update will also provide operational data and information requested as part of the reporting requirements listed in the OEB Decision and Order PPCOA. A final operational report will still be filed after the conclusion of the five year period since commissioning, including findings from blending at up to 5% by volume.

Background

Enbridge Gas filed an updated application[1] with the OEB on March 31st, 2020 for an order granting leave to construct approximately 755 meters (m) of natural gas pipeline, three stations and two network disconnects in the City of Markham. The OEB assigned docket number ED-2019-0294 to Enbridge Gas's application for this project, called the Low Carbon Energy Project (LCEP). As part of the application, Enbridge Gas recommended these facilities deliver up to 2% hydrogen gas in natural gas ("Blended Gas") to customers within an isolated portion of its existing distribution system, located in Markham, Ontario, called the Blended Gas Area ("BGA").

Following the OEB's Decision and Order[2] granting leave to construct the LCEP, Enbridge Gas initiated design, procurement, construction and commissioning activities, culminating in the injection of blended gas into the BGA in October, 2021.

The Decision and Order in EB-2019-0294 contained both Leave to Construct Conditions of Approval[3] (COA) as well as Pilot Project Conditions of Approval (PPCOA)[4]. The PPCOA included the following condition:

> After 5 years of operational experience, Enbridge Gas shall file a report with the OEB that, at a minimum, includes the following:
>
> - Actual fully allocated costs of the Project relative to budget
> - Research findings including any evidence of negative impacts on the distribution system and end use appliances, and the actual $/tCO2e associated with the Project
> - A log of communications with stakeholders including customers and the TSSA
> - Conclusions arising from the Project-generated knowledge (e.g., risks/mitigations)
> - Recommendations for next steps (e.g., discontinue or expand the pilot, adjust the concentration of hydrogen) and the potential timing of any related applications to the OEB

Once the blending facilities went into operation, Enbridge Gas began injecting and monitoring blending activities, focusing on three major areas: (1) ensuring the maximum hydrogen injection rate was not exceeded at the blending station, (2) quantifying network leak rates through leak survey, and (3) monitoring the project hotline for any customer concerns and end-user appliance issues.

After approximately four successful years of the LCEP pilot, all three areas of focus were satisfied. Enbridge Gas now intends to increase the hydrogen blend from up to 2% to up to 5% by volume within the BGA. This service fluid change to 5% blended gas is supported by the Canadian Standards Association (CSA) which acknowledges that blending up to 5% hydrogen by volume is covered under current appliance certifications (see Attachment B, pages 15 to 19), approval from the Technical

[1] https://www.rds.oeb.ca/CMWebDrawer/Record/687734/File/document
[2] https://www.rds.oeb.ca/CMWebDrawer/Record/691859/File/document
[3] Ontario Energy Board Decision and Order, EB-2019-0294, Enbridge Gas Inc., October 29, 2020, Schedule C.
[4] Ontario Energy Board Decision and Order, EB-2019-0294, Enbridge Gas Inc., October 29, 2020, Schedule B.

Standards Safety Authority ("TSSA") to proceed with up to 5% blending, and positive results from monitoring activities and end user equipment testing.

Enbridge Gas is currently undertaking a feasibility study to evaluate the implications of blending hydrogen into natural gas networks across its entire Ontario system. The project, referred to as the Hydrogen Blending Grid Study, was introduced in the Company's Rebasing Phase 1 proceeding [5]. Increasing the hydrogen blend in the BGA will allow Enbridge Gas to collect field data to confirm operational aspects at a 5% hydrogen blending level. It is expected that these results will support the broader goals of the ongoing Hydrogen Blending Grid Study.

[5] EB-2022-0200 Exhibit 4 Tab 2 Schedule 6

A. Design & Pre-commissioning

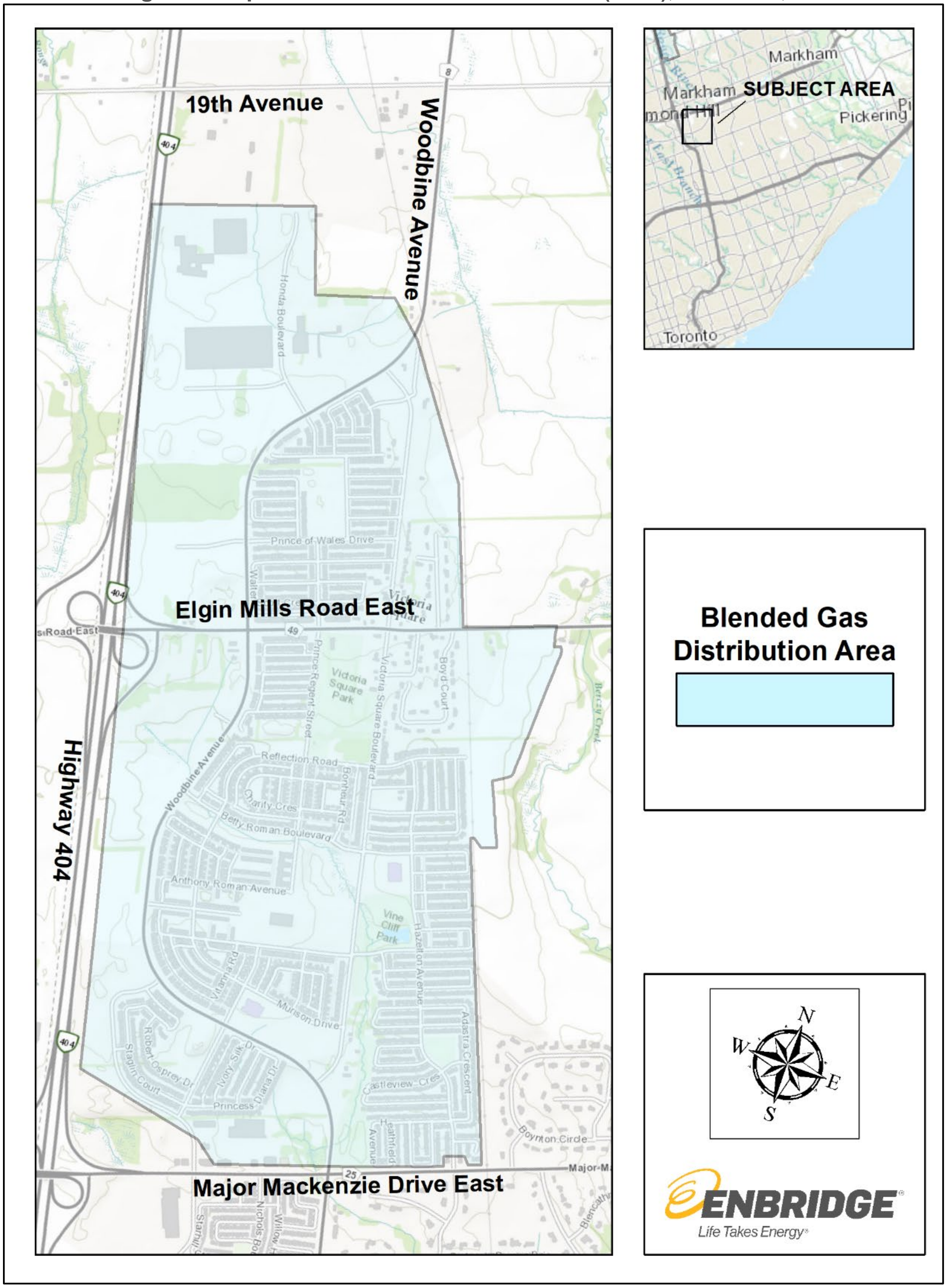
As part of the design phase, the hydrogen blending station went through a detailed and comprehensive Hazard and Operability (HAZOP) study with the objective of identifying all hazards associated with the plant operation and identifying mitigating measures based on hazard severity and risk tolerance. The findings of the HAZOP study directed the engineering controls that were designed into the plant to ensure safety. The hydrogen building was designed with a 2-hour fire-rated exterior to prevent damage to critical equipment. The building was equipped with the appropriate Emergency Shut Down (ESD) system, hydrogen gas detector, combustible gas and flame detectors. The station is also equipped with a Gas Chromatograph (GC) that provides real-time sampling and monitoring of the hydrogen composition in the blended gas. Strobe lights, providing visual and audible alarms, were installed on the Remote Telemetry Unit (RTU) building to alert field personnel of upset conditions. Several key pre-commissioning activities were completed prior to the commencement of hydrogen blending. The activities were identified through the Management of Change (MOC) process implemented at Enbridge Gas to ensure safe and reliable start-up.

Key activities included:

- Network modifications to convert targeted system into an isolated loop.
- Development of an Emergency Response Plan
- Implementation of training for impacted internal and external stakeholders.
- Development and implementation of a Fire Safety Plan in consultation with the local Fire Department.
- Clarification of roles and responsibilities of all impacted stakeholders including front line workers, gas controllers, contractors, and emergency responders.
- Final inspection and regulatory approval of installed assets through TSSA and the Electrical Safety Authority (ESA).

Enbridge Gas commenced blending hydrogen into the BGA in October 2021. The BGA, shown in Figure 1, is made up of ~1 km of steel and 110 km of plastic pipe and originally serviced approximately 3,600 customers. The number of customers in the BGA has grown to approximately 4,300 as of September 2025.

Figure 1 Map of Markham Blended Gas Area (BGA), Markham, ON



The injection of hydrogen in the BGA was enabled through the hydrogen blending station. A picture of the blending station is provided at Figure 2. The blending station design, construction and installation underwent the Field Approval Program with the TSSA for approval of custom-made appliances and equipment that cannot be certified by designated certification organizations.

Figure 2: Markham Hydrogen Blending Station

The facility's components can be categorized into three parts: natural gas assets, hydrogen gas assets and natural gas/hydrogen blended gas assets. Natural gas and blended natural gas/hydrogen assets were designed to meet the requirements of CSA Z662, while hydrogen assets were designed in accordance with CAN/BNQ-1784, ASME B31.12 and CSA B51. All electrical components, equipment and accessories were designed and installed as per CSA C22.1, and hazardous area classification was determined in accordance with CAN/BNQ-1784 and IEC 60079-10-1.

B. Operations Monitoring and Improvements

Successful commissioning and injection of hydrogen into the BGA initiated the monitoring and continuous improvement phase of the project. Monitoring and continuous improvement activities focused on three major areas: the blending station, distribution system, and end-user appliances.

B.1. Blending Station

In the months following commissioning, an operational dashboard tool was developed to monitor blending station activities and identify trends to inform improvement efforts that would enhance operational safety, performance reliability, and emissions reduction. Key operational metrics from the dashboard are provided in section C.1.

Some examples captured by the dashboard that resulted in blending station improvements are described below.

- Extreme weather events, high wind and snow, resulted in impacts to the operation of safety instrumentation. For example, a fire detector failure was experienced during a heavy snowstorm due to icing over the screen and blockage of line of sight to the hydrogen injection point. Privacy screening was installed within the station fence to prevent snow build-up and camera angulation was adjusted to prevent this operational safety issue from re-occurring.
- The amount of hydrogen injected depends on downstream network demand, which varies greatly with ambient temperature, on a network that supplies residential and commercial customers. To account for this variability, the plant was designed with two runs: a low-flow summer run and a high-flow winter run. The switch-over between the runs required operator intervention which proved time-consuming for the Operations team as shutdown would occur often, especially during the fall and spring months (i.e. shoulder seasons). Split-Range Control logic was implemented, which allowed the two runs to work simultaneously to respond to changes in the downstream network demand. Additionally, automated start-up from low flow conditions was implemented in the control logic of the summer run to improve station performance reliability.
- To continue the pursuit efforts of emission reduction improvements, the hydrogen flow control valve actuators were powered by natural gas that had to vent periodically as part of their normal operation, however, these devices were switched to being electric powered to prevent venting of natural gas to atmosphere.

The dashboard allowed Enbridge Gas to respond quickly to operational challenges and implement mitigating measures. These improvements were implemented in September of 2022, which allowed for faster and more efficient blending station response and more stable control and drove further emissions reduction and cost savings in manual labour. Lessons learned from the design and operation of the plant are being documented in the Company’s hydrogen facilities design standards , and the Company’s Operation and Maintenance (O&M) Manual for use in future hydrogen blending projects.

B.2. Distribution System

The Distribution Integrity Management Program (DIMP) team at Enbridge Gas, responsible for creating integrity management plans for the distribution network, has created an integrity plan to monitor the effects of hydrogen addition on BGA network components. The plan includes mitigation and monitoring activities such as accelerated replacement of historically problematic fittings and a leak detection program. The leak detection program compares leak rates under blended gas services with historical natural gas leak rates to confirm effect of hydrogen. The results of the integrity plan are discussed in section C.2.

B.3. End User Equipment

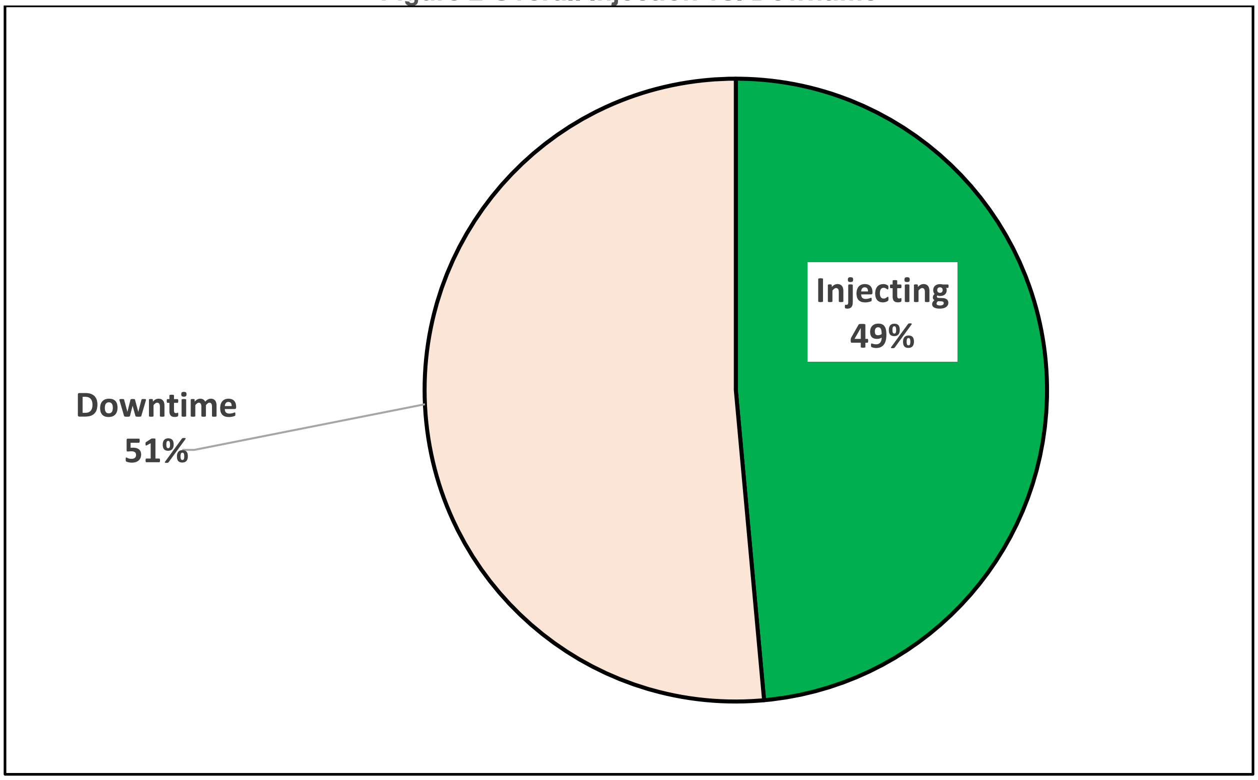
Prior to commissioning, flyers were mailed to customers in the BGA informing them of the expected start date and communication methods dedicated to those impacted customers. The flyers informed the customers about the hydrogen blending-specific phone number and email that can be utilized to bring up any concerns or questions they may have. The results of the outreach are presented in section D.2

C. Operational Results

C.1. Blending Station

The October 2021 (commissioning) to October 2025 period represents approximately 35,100 hours of operations. The total hydrogen injection hours that were achieved in that period were approximately 17,000 hours, accounting for 49% of total time available (Figure 2).

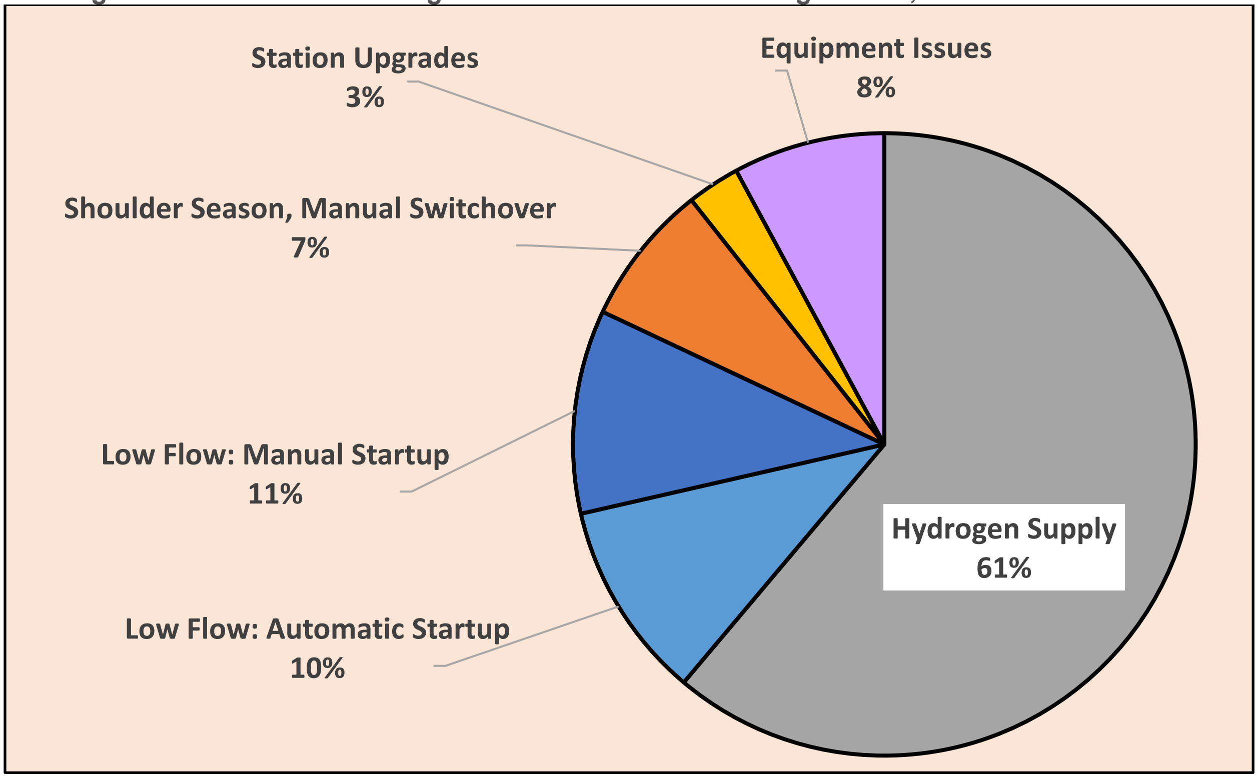
Figure 2 Overall Injection vs. Downtime



Note that in all cases, reliable natural gas supply to customers is unaffected, regardless of whether the blending station is injecting hydrogen or experiencing downtime.

The breakdown of contributing factors for the downtime associated with the operational period is shown in Figure 3.

Figure 3 Factors Contributing to Downtime of the Blending Station, Oct. 2021 – Oct. 2025



Hydrogen Supply, which is associated with the hydrogen production facility's downtime, accounts for most of the downtime (at 61%) for the blending station.

The Station Upgrade activities account for 3% of downtime, which includes commissioning and implementation of the improvement activities. Equipment issues requiring maintenance and new parts associated with fire detectors, regulators, Coriolis meter, and the gas chromatograph resulted in 8% of total downtime.

The variability in downstream system demand during the shoulder seasons (fall and spring) resulted in flows on the summer-flow run or winter-flow run that were outside of their programmed operational ranges, resulting in plant shutdowns and an operator dispatched to site to restart the plant. This amounted to 11% of total shutdown time when the summer-run's lower range was depleted (Low Flow, Manual Startup) and 7% when the summer-run's upper range was exceeded (Shoulder Season, Manual Switchover).

As discussed in section B.1, post commissioning (October 2021) improvement opportunities were recognized and were implemented by September 2022 (within one year of commissioning). Figure 4, dashboard pre-improvements, and Figure 5, dashboard post-improvements, show the effects of implementing that improvement on plant downtime.

The Shoulder Season Switchover issue was eliminated with the introduction of Split-Logic Control. This upgrade allowed for automated switchover between runs without the dispatch of personnel to site.

The issue of Low Flow Manual Startups prompted the implementation of control logic to automate plant restarts, once downstream demand naturally increased with the seasonal customer demand cycle. This resulted in decreasing the associated downtime from 35% in the first year to 15% over the following three years.

Figure 6 compares the downtime (excluding hydrogen supply) in the pre- and post-improvements years. As seen in Figure 6, the implementation reduced downtime significantly. Across all of 2023, 2024 and 2025 (period ending), the total downtime was less than half of the downtime incurred in 2022.

To further enhance the safety, reliability, response time, and improve hydrogen blending downtime, Enbridge Gas moved to qualify existing technicians to operate on hydrogen equipment with a TSSA hydrogen license in addition to their existence natural gas license. This step allows technicians to operate on natural gas and on hydrogen assets.

Figure 4 Factors Contributing to Downtime of the Blending Station, 1st Year

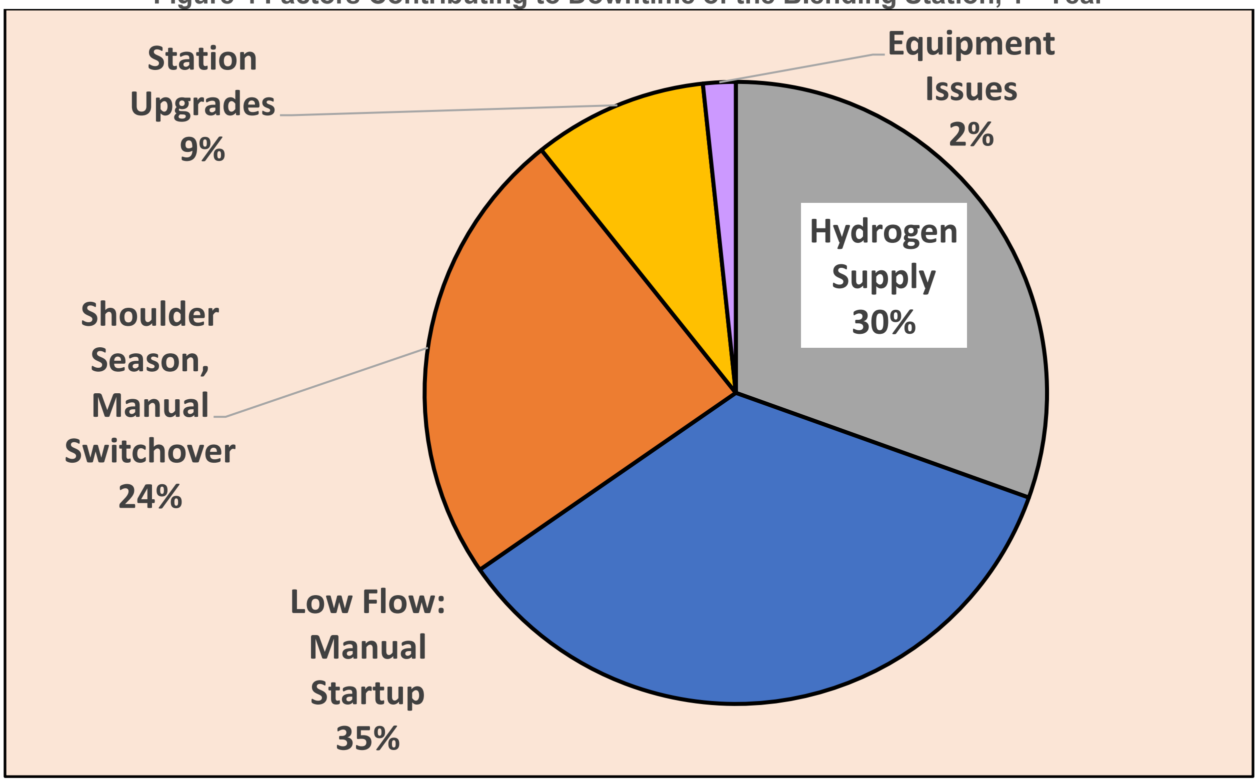


Figure 5 Factors Contributing to Downtime of the Blending Station, Oct. 2022 – Oct. 2025

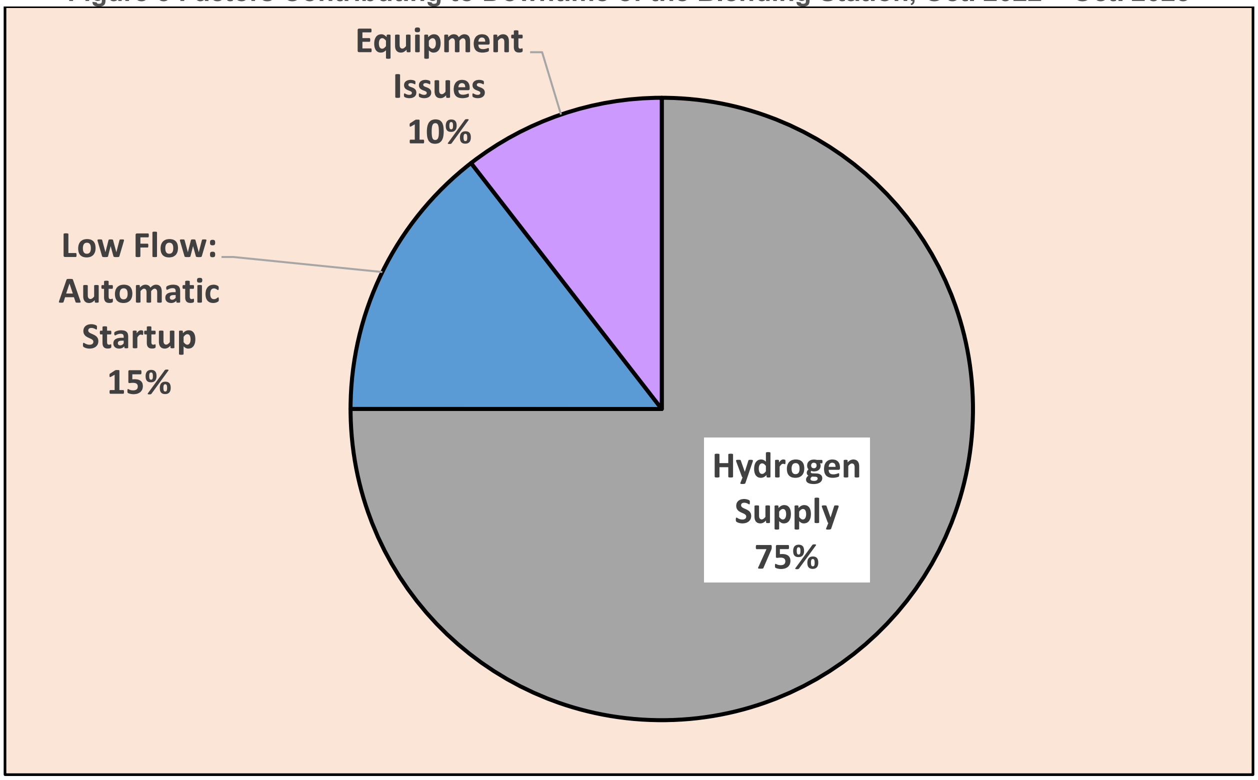
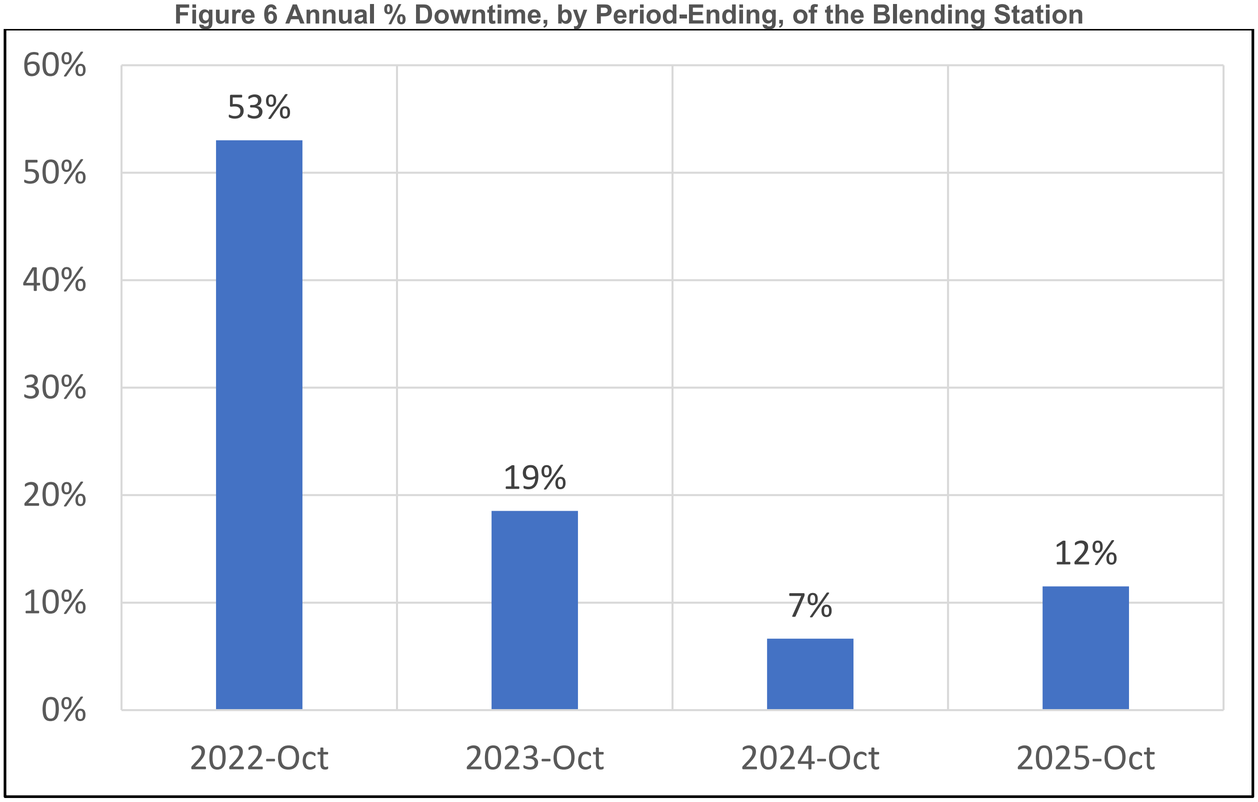


Figure 6 Annual % Downtime, by Period-Ending, of the Blending Station



C.2. Distribution System Monitoring

In 2023, a leak survey was completed as per the Company's Distribution Integrity Management Program (DIMP) to understand the impact of hydrogen blending on the BGA. The leak survey results prior to the hydrogen blend were compared with those obtained after almost three years of blending hydrogen. The results from the leak survey confirmed that blending up to 2% had no effects on network components, and there were no unplanned releases of gas caused by hydrogen blending.

C.3. Research Findings on End User Equipment

To date, Enbridge Gas has not identified, or been made aware of as reflected in section D.2., any impacts to appliance types that are expected to be in service within the BGA as a result of blending hydrogen at the current or intended levels of hydrogen. The Company continues to be a member of a Joint Industry Partnership (JIP) led by DNV, an industry leader in combustion theory, burner design, and hydrogen research. The research completed by the JIP thus far indicates that there is no evidence of adverse effects in any North American CSA-certified appliance due to hydrogen blended natural gas at 5% and levels far above this.

After the commencement of blending in the BGA, a response to a request for interpretation was publicly issued on April 18th, 2023 by the CSA, supported by input from several parties including testing agencies, manufacturers and institutions, concluding that natural gas containing up to and including 5% of hydrogen by volume is covered by testing with Test Gas A, a theoretical definition used to represent natural gas as received from local distribution companies during certification of appliances on natural gas. This was an important conclusion because it provides acceptance that all CSA-certified appliances can be operated with hydrogen blends up to and including 5% hydrogen without recertification with a new test gas. To inform this conclusion, testing was performed on a variety of appliances using the applicable CSA series of standards, which are used to confirm safe and reliable operation of appliances on natural gas. The CSA Group themselves completed testing on standard residential appliances including furnaces, boilers, hot water tanks, and space heaters, showing safe operation up to 15% hydrogen blend (the upper limit of testing performed)[6]. Testing also confirmed that blending can successfully aid the general decrease overall GHGs including NOx within the BGA.[7]

Enbridge Gas continues working with the CSA to support the efforts in determining safe limits to blending hydrogen in natural gas appliances. This includes continued support of testing through the long-term Joint Industry Partnership performed by DNV (expected to be completed in Q1-2026). The National Research Council of Canada also completed a survey of testing results which confirms safe operation of natural gas appliances on hydrogen blended natural gas concluding that the majority of natural gas appliances tested are capable of operating at minimum of 20% hydrogen blended natural gas). [8]

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[6] **Suchovsky, C.J., Ericksen, L., Williams, T.A., Nikolic, D.J. (2021).** Appliance and Equipment Performance with Hydrogen-Enriched Natural Gases. Canadian Standards Association, Toronto, ON

[7] Paul Glanville, Alex Fridlyand, Brian Sutherland, Miroslaw Liszka, Yan Zhao, Luke Bingham and Kris Jorgensen Impact of Hydrogen/Natural Gas Blends on Partially Premixed Combustion Equipment: NOx Emission and Operational Performance, Energies 2022, 15, 1706. (https://www.mdpi.com/1996-1073/15/5/1706)

[8] Yeong Yoo, Aminul Islam, Francois Girard Data Collection and Analytics for Hydrogen Blending Testing on End - Use Appliances and Related Controls. National Research Council Canada, Report Number CEI-56640, Cat.No. NR16-471/2024E-PDF, ISBN: 978-0-660-74594-7, August 2024

In other jurisdictions , successful operation of CSA approved appliances using up to 15% hydrogen blended gas as an energy source has been shown to be possible and safe, in fact, the gas supplied by Hawai'i Gas includes up to 15% hydrogen since the 1970's. [9]

Enbridge Gas is committed to continue delivering safe and reliable natural gas to customers and that includes blended hydrogen/natural gas. This is achieved through the advancement of field testing, industry partnership in research and development, and code and standards technical committees engagements to confirm an appropriate % blend for the distribution system including end use appliances.

[9] Hydrogen, Hawai'i Gas, https://www.hawaiigas.com/sustainability/hydrogen

D. Stakeholder Communications

D.1. TSSA

On October 4th, 2021, the TSSA issued a Fuel Safety Inspection Report to Enbridge Gas certifying that the blended gas facility/equipment has been inspected in accordance with Ontario's Technical Standards & Safety Act and the appropriate regulations and codes.

On June 4th, 2025 a letter was submitted to the TSSA informing of Enbridge Gas's intent to increase the maximum hydrogen blend percentage from up to 2% by volume to up to 5% by volume, and that Enbridge Gas would update the Risk Assessment previously submitted in 2021 to account for the risk associated with the new blending limit.

On July 11, 2025 Enbridge Gas submitted the updated Risk Assessment to the TSSA, through the application for consultation process.

On September 25th, 2025, the TSSA issued a response and approval to increase the hydrogen blend into the Markham BGA from 2% up to 5%. [10]

D.2. BGA Customers

In accordance with the requirement to log stakeholder communications, Enbridge Gas created a project hotline managed by Dillon Consulting to log stakeholder engagement during and after project construction. The hotline was active until December 2023, after which customers were able to contact the Enbridge Gas Customer Care number directly to resolve concerns or to answer questions.

Comments and complaints prior to December 2021 were captured in the Enbridge Gas Post Construction Report filed with the OEB on December 17th, 2021.[11] All additional known customer communications that were understood to be hydrogen blending related in the Blended Gas Area have been summarized in Table 1 – *Communication Log*. No comments and complaints were received between Dec 2021 and Sept 2023.

[10] TSSA FS Engineering Consultation, Work Order No. 14717263

Table 1 Customer Communication Log

Date	Method of Contact	Summary of Concern and Resolution
Nov 13th 2023	Phone Call to Enbridge	▪ Customer was concerned they had not yet received their monthly bill. ▪ Enbridge's Customer Service Representative (CSR) resolved the situation by notifying the customer that the hydrogen rate rider was still being manually applied, and as a result, the bill had not been issued. The customer was satisfied with the response and did not have further questions about the hydrogen blending program.
Mar 5th 2025	Phone Call to Enbridge	▪ Customer had an inquiry on the hydrogen rate rider. ▪ Enbridge's CSR resolved the situation by explaining the adjustments. Customer did not have further concerns.
Apr 11th 2025	Phone Call to Enbridge / email	▪ On April 11th, Customer called Enbridge requesting to be removed from the Hydrogen Blending trial. ▪ A follow-up call was initiated by Enbridge's CSR on June 11th where Customer stated reservations about hydrogen being introduced into the home. Customer confirmed they have not experienced any equipment issues or problems with the blended gas. Concerns were also raised regarding potential well water contamination based on a recent interaction with an individual offering local water testing. A letter was sent to Customer via email on June 27th addressing the concerns. No further communication was received.
May 2nd 2025	Phone Call to Enbridge	▪ Customer had an inquiry on the hydrogen rate rider. ▪ Enbridge's CSR resolved the situation by explaining the adjustments. Customer did not have further concerns.
May 7th 2025	Phone Call to Enbridge	▪ Customer had an inquiry on the hydrogen rate rider. ▪ Enbridge's CSR resolved the situation by explaining the adjustments. Customer did not have further concerns.
June 9th 2025	Phone Call to Enbridge	▪ Customer had an inquiry on the hydrogen rate rider. ▪ Enbridge's CSR resolved the situation by explaining the adjustments. Customer did not have further concerns.

E. Costs and Emissions Reduction

E.1. Emissions Reduction

Table 2 outlines the hydrogen consumed, natural gas saved, and tonnes of CO_2 equivalent (tCO_2e) abated due to hydrogen blending in the BGA from October 2021 until October 2025. The total tCO_2e abated over the approximately 4-year period was 239 tCO_2e, averaging 60 tCO_2e per year. In the original submission to the OEB, Enbridge Gas estimated that the greenhouse gas (GHG) emissions reduction associated with using blended gas containing up to 2% hydrogen by volume in the BGA would be between 97 to 120 tonnes tCO_2e per year. The difference in predicted vs. actual can be attributed to the downtime experienced as outlined in section B.1

Table 2 Emissions Reduction

Year	H_2 Consumed (m^3*1000)	H_2 Consumed (kg)	Natural Gas Saved (m^3*1000)	tCO_2e Abated	Comments
Oct-Dec 2021	12	983	4	7	Blending commenced Q4 2021
2022	137	11658	46	89	Disruption in hydrogen supply & blending facility improvements
2023	115	9809	39	75	Disruption in hydrogen supply
2024	71	6047	24	46	Disruption in Hydrogen supply
Jan-Oct 2025	38	3211	12	22	Disruption in Hydrogen supply

E.2. Actual Cost vs. Budget Cost

In 2022, a post construction financial report was filed with the OEB for this project[11] containing actual vs. budget capital costs for the construction of the blending station. For reference, the financial report is included as Attachment A to this report. The project's cost was 30% higher than the estimate, with the variance attributed to hydrogen blending station materials, pipeline and station labour costs, and contingency allocation as outlined in the post construction financial report.

In addition to the costs covered in the documentation above, the September 2022 station upgrades described in C.1 amounted to an additional $150,827 of capital expenses.

[11] EB-2022-0200, Exhibit 1, Tab 12, Schedule 1, Attachment 1, p. 18. (See also Attachment A)

E.3. Operating Expenses

The operating costs associated with the blending station can be found in Table 3 below. These operating costs include materials purchased, outside services required for improvements to the blending station, operation/maintenance costs for both planned and unplanned downtime for the blending station, the cost of hydrogen, and the hydrogen rate rider that has been paid to each customer within the BGA. These costs have been broken down on a yearly basis.

Table 3 Operating Costs (OPEX) for Blending Station

Year	Materials / Outside Services	Maintenance	Hydrogen Supply	Hydrogen Rate Rider	Total OPEX
Oct-Dec 2021	$ -	$ 100,958	$ 946	$ 38,958	$ 101,904
2022	$ 17,519	$ 156,442	$ 11,326	$ 39,068	$ 202,981
2023	$ 4,151	$ 19,591	$ 5,685	$ 73,136	$ 102,563
2024	$ 17,703	$ 17,446	$ 2,351	$ 63,707	$ 101,207
Jan-Oct 2025	$ 7,582	$ 4,290	$ 2,322	$ 40,044	$ 54,238

As shown above, the initial years required outside services and material costs to overcome new technology reliability, integration challenges, and to complete improvement opportunities within the blending station. These improvements lead to less downtime, and more efficient, reliable, and automated operations. The recent trend of operating costs per year is downward, with 2025 showing a continued downward trend on a year-to-date basis.

E.4. Actual $/tCO2e

The cost of GHG emissions reduction from hydrogen consumption can be determined by calculating the difference in commodity costs between hydrogen and natural gas divided by the difference in emissions produced from the combustion of hydrogen and natural gas. Appendix A provides a general formula which can be used to calculate the cost per tonne of carbon emissions reduced in different cost scenarios as provided in EB-2019-0294, Exhibit I.ED.11 a.

Enbridge Gas agreed to purchase hydrogen (produced via electrolysis utilizing Ontario grid electricity) at the same cost as traditional natural gas throughout the duration of the Hydrogen Blending Pilot Project, and thus, there is no incremental cost of fuel for the Hydrogen Blending Pilot Project resulting in $0/tCO2e cost.

F. Next Steps

Prior to the planned blend percentage increase, Enbridge Gas will undertake the following steps:

1) Update the Hydrogen Rate Rider to offset the increase in volume of blended gas used for the customers connected to the BGA.
2) Undertake all necessary outreach activities for customers in the BGA to inform them of the proposed change and receive feedback.

After the blend percentage is increased, Enbridge Gas will continue to monitor lines of communications with the community and document concerns raised.

The planned in-service date for the increase in blend percentage is January 1, 2026. Post increase, the same monitoring activities performed for the first 4 years of the pilot will be continued and all findings and results will be included in the final report submitted to the OEB after the conclusion of the pilot project in October 2026.

G. Appendix A – Actual $/tCO2e General Formula

(a)	(b) = (a) × (p)	(c) = (b) / (s)
Average Customer Usage (m^3)	Average Customer Energy Input (MJ)	Blended Gas Volumetric Consumption (m^3)

(d) = (c) × (r)	(e) = (c) − (d)	(f) = (a) × (t)
Volume of Hydrogen in Blended Gas (m^3)	Volume of Methane in Blended Gas (m^3)	GHG From Traditional Natural Gas (tCO_2e)

(g) = (e) × (t)	(h) = (f) − (g)	(i) = (h) × (u)
GHG From Blended Gas (tCO_2e)	GHG Reductions per customer (tCO_2e)	Total GHG Reductions (tCO_2e)

(j) = (c) × (u)	(k) = (a) * ((v) + (w))	(l) = ((d) * (x)) + ((e) * (v)) + ((c) * (w))
Annual Volume of Hydrogen Blended (m^3)	Cost of Traditional Natural Gas ($/yr)	Cost of Blended Gas at Lower Price Hydrogen ($/yr)

(m) = ((d) * (y)) + ((e) * (v)) + ((c) * (w))	(n) = ((l) – (k)) / (h)	(o) = ((m) – (k)) / (h)
Cost of Blended Gas at Higher Prices Hydrogen ($/yr)	Cost of GHG Reduction for Lower Cost Blended Gas ($/$tCO_2e$)	Cost of GHG Reduction for Higher Cost Blended Gas ($/$tCO_2e$)

Table 4 Constants and Variables used in $/tCO2e Formula

Var.	Unit	Value	Description
p	MJ/m3	39.02	Higher Heating Value of Natural Gas [12]
q	MJ/m3	12.7	Higher Heating Value of Hydrogen [12]
r	vol %	2%	Amount of Hydrogen
s	MJ/m3	37.98	Higher Heating Value of the Blended Gas (q)*(r) + (1-(r))*(p))
t	tCO2e/m3	See Table 5	Emission Factor for Marketable Natural Gas (CO2 Equivalent Emission Factor)
u	-	4,360	Number of Customers, as of May 2025
v	$/m3	0.0812	Commodity Cost of Natural Gas ($/m3) [12]
w	$/m3	See Table 6	Carbon Charge
x	$/m3	0.56	Example Commodity Cost of Low Range Hydrogen ($/m3) [12]
y	$/m3	0.70	Example Commodity Cost of High Range Hydrogen ($/m3) [12]

Table 5 Emission Factor for Marketable Natural Gas by Year (t) [13]

Year	Emission Factor (tCO2e/m3)
2021	0.001888
2022	0.001921
2023	0.001921
2024	0.001921
2025	0.001921

Table 6 Carbon Charge by year [14]

Year	Carbon charge on marketable natural gas - Ontario ($/m3)
April 1, 2019 - March 31, 2020	0.0391
April 1, 2020 - March 31, 2021	0.0587
April 1, 2021 - March 31, 2022	0.0783
April 1, 2022 - March 31, 2023	0.0979
April 1, 2023 - March 31, 2024	0.1239
April 1, 2024 - March 31, 2025	0.1525
After April 1, 2025	0

[12] As provided in Exhibit I.ED.11 per Application EB-2019-0294 (EGI_IRR_20200615)
[13] National inventory report : greenhouse gas sources and sinks in Canada.: En81-4E-PDF - Government of Canada Publications - Canada.ca
[14] Government of Canada. (2025). *Greenhouse Gas Pollution Pricing Act (S.C. 2018, c. 12, s. 186)*. Justice Laws Website. https://laws-lois.justice.gc.ca/eng/acts/G-11.55/index.html

H. Attachments

H.1. Attachment A

Excerpt EB-2022-0200, Exhibit 1, Tab 12, Schedule 1, Attachment 1, Page 18 of 18

H.2. Attachment B

List of CSA Formal Interpretations February 22, 2023 to December 22, 2023

H.3. Attachment C

TSSA FS Engineering Consultation, Work Order No. 14717263

EB-2019-0294: Low Carbon Energy Project
Post Construction Financial Report

Project Cost Forecast to Actual:

Item No.	Description	Project Estimate ($)	Actual Cost ($)	Variance ($)	Variance (%)
	Material Costs				
1	Pipeline Material	133,000	213,732	80,732	61%
2	Other Stations Material	115,000	409,317	294,317	256%
3	Hydrogen Blending Station	693,000	1,149,691	456,691	66%
4	**Total Material Costs**	941,000	1,772,740	831,740	88%
	Labour Costs				
5	Pipeline Labour Costs	947,000	1,574,045	627,045	66%
6	Stations Labour Cost	337,000	823,536	486,536	144%
7	**Total Labour Cost**	1,284,000	2,397,581	1,113,581	87%
8	External Permitting, Land, Environmental & Regulatory Cost	20,000	15,703	(4,297)	-21%
	Outside Services				
9	Outside Services - Pipeline	716,000	792,501	76,501	11%
10	Outside Services - Stations	45,000	281,689	236,689	526%
11	Total Outside Services	761,000	1,074,190	313,190	41%
12	Direct Overheads	105,000	174,286	69,286	66%
13	Contingency Costs	778,000		(778,000)	-100%
14	**Project Cost**	3,889,000	5,434,500	1,545,500	40%
15	Indirect Overheads	1,260,395	1,241,231	(19,164)	-2%
16	IDC	82,870	103,598	20,728	25%
17	**Total Cost**	5,232,265	6,779,329	1,547,064	30%

Notes: Clean up and restoration work on the Low Carbon Energy Project is still ongoing. Within the actual cost column, Enbridge Gas has included $11,200 of forecasted remaining capital costs and $44,834 of forecasted IDC charges to be incurred until Dec 2022.

Variance Explanations:

Item No.	Category	Variance Explanation
3	Hydrogen Blending Station	The primary driver in the variance within the Hydrogen Blending Station Materials was largely due to the additional components that were identified as a requirement by Engineering through the design process that were not included in the class 4 estimate in the original LTC application. At high level, this included: the Gas Chromatograph ($175k), Filter Station ($128k), as well as other station safety features and critical station spare parts.
5	Pipeline Labour Costs	Pipeline Labour Costs were higher than estimated due to various attributes during the project. Extra costs were attributed to welding procedures; specified procedures required to weld the pipeline took extra time to complete. The tie in excavation was deeper than anticipated and took extra time to hydrovac and shore excavation. Civil/grading designs were at a preliminary stag, Enbridge Gas incurred additional costs to grade and restore adjacent lands to the station for topsoil and seed.
6	Stations Labour Cost	At the time of the LTC application, electrical and civil were not yet designed. Higher labour costs are attributed to the high cost for electrical trenching/cabling to feed the new station as well as civil labour costs for the Hydrogen Blending Station Compound.
13	Contingency	Contingency for the Project was fully utilized on Materials and Labour Cost overages.

Formal Interpretations/ Interprétation formelle

This section lists questions that individuals have submitted about a particular standard. Each question has been reviewed and answered by the appropriate committee. If you would like to submit a question about a particular standard, please see the end notes in the preface of that standard.

Posted December 22, 2023

The following interpretation regarding Clause 4.4 of CSA Standard Z662:23, Oil and gas pipeline systems, has been approved by the Members of the CSA Standards Technical Committee on Petroleum and Natural Gas Industry Pipeline Systems and Materials (K110).

Question 1: Since the required valve spacing in Table 4.7 is not specified for all Class 1 locations, and all Classes for LVP pipelines, and Note 1 states that the company shall demonstrate the suitability of valve spacing as described in Clauses 4.4.4 and 4.4.7, if a valve is to be relocated with similar release volumes and the same controls are in place for its operation, can the valve be relocated as needed without further evaluation?

Answer 1: No

Question 2: If a valve, such as in all Class 1 locations or anywhere on an LVP pipeline, is to be relocated, must the demonstration as described in Clauses 4.4.4 and 4.4.7 be completed to confirm suitability of the revised valve spacing?

Answer 2: Yes

The following interpretation regarding Clause 10.11.4.3 of CSA Standard Z662:23, Oil and gas pipeline systems, has been approved by the Members of the CSA Standards Technical Committee on Petroleum and Natural Gas Industry Pipeline Systems and Materials (K110).

Question: Is Clause 10.11.4.3 a) i) supposed to read “All tests shall be in accordance with the procedures of ASME PCC-2, Article 401”?
Answer: Yes

The following interpretation regarding Clauses 6.3.4.2 and 8.1.7 of CSA Standard Z662:23, Oil and gas pipeline systems, has been approved by the Members of the CSA Standards Technical Committee on Petroleum and Natural Gas Industry Pipeline Systems and Materials (K110).

Question 1: Was the intent of the reference in Clause 6.3.4.2 to Clause 4.1.10 actually intended to refer to Clause 4.1.12?
Answer 1: Yes

Question 2: Was the intent of the reference in Clause 8.1.7 to Clause 4.1.10 actually intended to refer to Clause 4.1.12?

Answer 2: Yes

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The following interpretation regarding Figure 1.1 and Table 4.2 of CSA Standard Z662:23, Oil and gas pipeline systems, has been approved by the Members of the CSA Standards Technical Committee on Petroleum and Natural Gas Industry Pipeline Systems and Materials (K110).

Question 1: In accordance with Figure 1.1, are all types of dense phase or liquid CO2 stations (measuring, pressure regulating, pumping) excluded from the scope of CSA Z662?

Answer 1: Yes

Question 2: Table 4.2 provides location factors for CO2 "stations" (see Note 3 to Table 4.2). Are these location factors intended to be used for dense phase or liquid CO2 station design?

Answer 2: No

Question 3: Does metering (including piping, valves, measurement equipment and related instrumentation) installed for the purposes of leak-detection (in accordance Clause 10.3.4) meet the definition of a "measuring station" as shown in Figure 1.1?

Answer 3: Yes

Question 4: Does metering installed for the purposes of leak-detection, where this piping is installed as part of a dense phase or liquid CO2 pipeline system, require the use of station isolation valves?

Answer 4: Yes

Question 5: Is the piping between the isolation valves, as part of a dense phase or liquid CO2 pipeline system, surrounding metering for leak detection, within the CSA Z662 scope (as shown in Figure 1.1)?

Answer 5: No

The following interpretation regarding Clause 4.10 of CSA Standard Z662:23, Oil and gas pipeline systems, has been approved by the Members of the CSA Standards Technical Committee on Petroleum and Natural Gas Industry Pipeline Systems and Materials (K110).

Question 1: Clause 4.10 makes mention of requirements for "welded attachments" that are being welded directly to pipe. Would a welded lifting lug meet the definition of a "welded attachment" in this clause?

Answer 1: Yes

Question 2: Clause 4.10 states "Where welded attachments are required for pipelines designed to operate at hoop stress levels of more than 50% of the specified minimum yield strength of the pipe, such attachments shall be welded to a separate cylindrical member that completely encircles the pipe…".

If the lifting lug were to be welded on piping where design hoop stress levels exceed 50% of the SMYS of the pipe, would the lifting lug need to follow this requirement of being welded to a separate cylindrical member? This is taking into consideration that a lifting lug will not be under additional stress during pipeline operations – it is only under stress during above-ground piping transportation and assembly.

Answer 2: Yes

The following interpretation regarding Clause 4.5.2 d) of CSA Standard Z662:23, Oil and gas pipeline systems, has been approved by the Members of the CSA Standards Technical Committee on Petroleum and Natural Gas Industry Pipeline Systems and Materials (K110).

Question 1: Where non-sour HVP station piping is designed by ASME B31.3, as allowed by Clause 4.14.3.8 d), do the requirements of Clause 4.5.2 d) apply?

Answer 1: No

Question 2: If the answer to question 1 is "Yes", then in the case where drain piping is isolated by a root valve from process and piping internal pressure after root valve is near atmospheric, are threaded joints in these cases allowed?

Answer 2: N/A

Question 3: If the answer to question 1 is "Yes", some piping flanges may not be practical such as cavity drain system of DIB/DBB ball valve or TRV of DIB-1 or equipment drains on pumps, compressors, or similar. In these cases, are threaded joints allowed?

Answer 3: N/A

The following interpretation regarding Clause 16.9.3.1 of CSA Standard Z662:23, Oil and gas pipeline systems, has been approved by the Members of the CSA Standards Technical Committee on Petroleum and Natural Gas Industry Pipeline Systems and Materials (K110).

Question 1: Clause 16.9.3.1 Partial-penetration welds states that partial-penetration welds are not allowed in sour service applications. When attaching scraper bars, either directly to a barred tee or welding them to a connecting plate/bar to help shorten the length of unsupported scraper bars in a larger size branch outlet, which are technically considered non-pressure-retaining attachments, does Clause 16.9.3.1 restrict the welding to a full-penetration design only?

Answer 1: No, Clause 16.9.3.1 is intended to be specific to butt welds.

Question 2: Does Clause 16.9.3.1 prohibit use of partial penetration welds for welds other than butt welds (e.g., fillets for scrapper bar attachments).

Answer 2: No

The following interpretation regarding Clause 10.3.2.1 and Table 4.9 of CSA Standard Z662:23, Oil and gas pipeline systems, has been approved by the Members of the CSA Standards Technical Committee on Petroleum and Natural Gas Industry Pipeline Systems and Materials (K110).

Question: For an operating pipeline, if it is found that the depth of cover is less than the requirements in Table 4.9, could it be determined to be acceptable, using Clause 10.3.2.1

Answer: Yes

The following interpretation regarding Clause 8.5.2.2 and Table C.1 of CSA Standard Z245.1:22, Steel pipe, has been approved by the Members of the CSA Standards Technical Committee on Petroleum and Natural Gas Industry Pipeline Systems and Materials (K110).

Question: Clause 8.5.2.2 states that Charpy V-notch impact test shall be performed at -5 C or lower, Table C.1 (Informative) states that tests shall be performed at temperatures lower than -5 C. Does the verbiage in the main body of the standard take precedence over the verbiage in the informative Annex C?

Answer: Yes

The following interpretation regarding Clauses 7.2.5.2, 17.2, and 17.3 of CSA Standard Z245.1:22, Steel pipe, has been approved by the Members of the CSA Standards Technical Committee on Petroleum and Natural Gas Industry Pipeline Systems and Materials (K110).

Question: Is cold flattening allowed for a round bar tension test specimen used for the elevated temperature transverse weld tension test?

Answer: Yes

The following interpretation regarding Clauses 5.5.3 and 12.10 of CSA Standard Z245.17:22, Cold bends, has been approved by the Members of the CSA Standards Technical Committee on Petroleum and Natural Gas Industry Pipeline Systems and Materials (K110).

Question: In Clause 5.5.3: “For bends intended for sour service, relieving shall be required if the fiber strain exceeds 5%.”
In Clause 12.10: “Bends with a fiber strain of 5% or greater shall be subject to a post-bend heat treatment in accordance with Clause 7.2.”
If a cold bend exhibits a fiber strain of 5% exactly, should the bend be subjected to a post bend heat treatment?

Answer: Yes

The following interpretation regarding Clause 5.5 f) of CSA Standard Z245.15:22, Steel valves, has been approved by the Members of the CSA Standards Technical Committee on Petroleum and Natural Gas Industry Pipeline Systems and Materials (K110).

Question: In accordance with CSA Z245.15 Clause 5.5 f), a sealant fitting shall be furnished with a vented cap. Is it the intent of Clause 5.5 f) that all sealant fittings have caps?

Answer: No. If caps are installed, they shall comply with Clause 5.5 f).

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The following interpretation regarding Clause 5.2.1 of CSA Standard Z245.21:22, Plant-applied external polyethylene coating for steel pipe, has been approved by the Members of the CSA Standards Technical Committee on Petroleum and Natural Gas Industry Pipeline Systems and Materials (K110).

Question 1: In accordance with CSA Z245.21:22, is the PE virgin resin manufacturer required to perform Table 3 property testing on every lot produced?
Answer 1: No

Question 2: Is the PE virgin resin manufacturer required to report CSA Z245.21:22 Table 3 properties on every certification document (COA) that is provided to the customer with each lot?
Answer 2: Yes

The following interpretation regarding Clause 6.1.1 of CSA Standard Z245.22:22, Plant-applied external polyurethane foam insulation coating for steel pipe, has been approved by the Members of the CSA Standards Technical Committee on Petroleum and Natural Gas Industry Pipeline Systems and Materials (K110).

Question: When reagent grade (>=95%) cyclopentane (i.e., a single molecule chemical whose molecular and structural formula don't change regardless of manufacturer) is used as a blowing agent in the polyurethane foam insulation system, it is not required to re-qualify the insulation system if there is only a change in cyclopentane manufacturer providing the formulation of polyol/isocyanate and the amount of cyclopentane stay the same.

Answer: Agree.

Posted October 24, 2023

The following interpretation regarding Clause 12.8.3 of CSA N293:23, Fire protection for nuclear power plants, has been approved by the Members of the CSA Standards Technical Committee on *Fire Protection for Nuclear Power Plants (N293).*

Question: Does implementing the incident action plan in which responders are operating in the hot zone (offensive operations, full team activation/participation) to rescue a casualty meet the 15 minute sustained intervention timeline required per CSA N293 clause 12.8.3?

Answer: No

Comments: Based on N293:23 Clause 5.2.1 Nuclear safety performance objectives, the response is "NO". Sustained intervention of the fire event should be achieved within 15 minutes. Having a casualty in hot zone and rescue operation in full swing does not negate the need to address the fire event. For example, under a fire event with casualty, if the typical firefighting means at the location is foam, sustained firefighting activity commenced within 15 minutes meets the intent of N393 (considering N293 nuclear safety performance objectives).

Although a primary search is part of the incident action plan, it does not override the need for sustained intervention to ensure nuclear safety. Primary search is a quick but thorough search for casualties or occupants in the incident area to obtain an all clear and par. The incident commander can make the call to announce that a primary search cannot be completed at this time if the situation warrants it and move to the next step which is fire control. Fire control is application of extinguishing agent with sufficient manpower, equipment and product to control the fire and lead to extinguishment.

Posted August 29, 2023

The following interpretation regarding Table 17 of CSA Standard A23.1-14, Concrete materials and methods of concrete construction, has been approved by the Members of the CSA Standards Technical Committee on Concrete Materials and Construction.

Question: If we are casting a footing using formwork for the sides, our interpretation is that it is not cast against ground. Can we use the two ratios listed in Table 17 around the bar diameter and aggregate size?

Answer: YES, "Cast against and permanently exposed to earth" requires both conditions to be met.

The following interpretation regarding Table 17 of CSA Standard A23.1-14, Concrete materials and methods of concrete construction, has been approved by the Members of the CSA Standards Technical Committee on Concrete Materials and Construction.

Question 1: For buried footings, all faces shall have concrete cover of 75 mm even though the side and top faces are NOT cast directly against earth?

Answer 1: NO, cover requirements are relative to the exposure conditions of each surface of the element.

Question 2: Does the application of 75 mm concrete cover need to meet both "cast against earth" AND "permanently exposed to earth" conditions?

Answer 2: YES

Posted August 10, 2023

The following interpretation regarding Clause 5.13 of CSA Standard B149.5-20, Propane fuel systems and containers on motor vehicles, has been approved by the Members of the CSA Standards Technical Committee on *Autogas/DME Transportation Technical Committee (U1004).*

Question 1: Are the requirements for propane cylinders installed on recreational vehicles, while the recreational vehicle is located within a repair garage, within the scope of B149.5?

Answer 1: No. The CSA B149.5 code contains requirements for the container mounting. CSA B149.5 does not have requirements for servicing recreational vehicles. The servicing and maintaining of recreational vehicles requirements are noted in the CSA B149.2 code. CSA B149.2 Clause 15.12 is applicable to this question. The CSA B149.5

committee proposes to have a similar of CSA B149.2 Clause 5.11.9 within CSA B149.2 Clause 5.12.

Question 2: If so, do the requirements in 5.13 for propane-fuelled vehicles also apply to a recreational vehicle while it is located within a repair garage?

Answer 2: No, this question is not applicable.

Posted August 2, 2023

The following interpretation regarding Clause 5.8 g) of CSA Standard W59-18, Welded steel construction, has been approved by the Members of the CSA Standards Technical Committee on *Welding of Bridges, Buildings and Machinery (G156)*.

Question 1: Is a gap of 0.5 mm with the inner surface of the flanges acceptable?

Answer 1: No

Question 2: Is a gap of 0.25 mm with the inner surface of the flanges acceptable?

Answer 2: No

Question 3: Is a gap of 1 mm with the inner surface of the flanges acceptable?

Answer 3: No

Posted July 25, 2023

The following interpretation regarding Clause 4.3.3.2 e) of CSA Standard A770:16, Home inspection, has been approved by the Members of the CSA Standards Technical Committee on *Home Inspection (A138)*.

Question: Is the intent of Clause 4.3.3.2 (e) to only report items that are inoperative or not installed correctly as opposed to listing items that are functioning normally?

Answer: Yes

Posted July 7, 2023

The following interpretation regarding Clause 4.21.1 of CSA Standard Z662:19, Oil and gas pipeline systems, has been approved by the Members of the CSA Standards Technical Committee on *Petroleum and Natural Gas Industry Pipeline Systems and Materials (K110)*.

Question 1: In order to determine if the odorant is readily detectable, and fulfill the Z662.4.21.1 requirement, is having an employee smell the gas our only way to meet the requirement in this clause?

Answer 1: No

The following interpretation regarding Clause 14.5.2 and I.5 (Pressure Testing) of CSA Standard Z662:19, Oil and gas pipeline systems, has been approved by the Members of the CSA Standards Technical Committee on *Petroleum and Natural Gas Industry Pipeline Systems and Materials (K110).*

Please note that RFI regarding Clause 14.5.2 and I.5 (Pressure Testing) was already approved and posted on Feb 22, 2023. However, it was an incorrect version and will be taken down from the CSA Standard Current Activities site.

Question 1: According to Clauses 14.5.2 and I.5, the minimum strength test pressure shall be increased in accordance with Equation 24 in para. 345.4.2 of ASME B31.3-2018. Is it the intent of the Z662 Standard, for pipelines designed and built to Annex I, that the allowable stresses for the purposes of equation 24 from B31.3, come from Table K-1 or K-1M?

Answer 1: Yes, but only for materials that are listed, as defined in Clause I.3.1.2.

Question 2: Annex I was developed based upon ASME B31.3, Chapter IX (High Pressure Piping). Can the minimum strength test pressure be calculated based upon Equation 38 in para. K345.4.2 of ASME B31.3 with the allowable stresses from Table K-1?

Answer 2: No

Question 3: Shall design allowable stresses be used in accordance with Equation 24 in para. 345.4.2 of ASME B31.3 for unlisted materials in Clause 14 or Annex I, as applicable?

Answer 3: Yes

The following interpretation regarding Clauses 4.3.4 Class location end boundaries of CSA Standard Z662:19, Oil and gas pipeline systems, has been approved by the Members of the CSA Standards Technical Committee on *Petroleum and Natural Gas Industry Pipeline Systems and Materials (K110).*

Question 1:
Can the company choose which dwelling unit is used to set the end boundary that results in the minimum length for Class 3 location?
Answer 1: No, the criteria establishes which dwelling unit to use, see Clause 4.3.4.5.

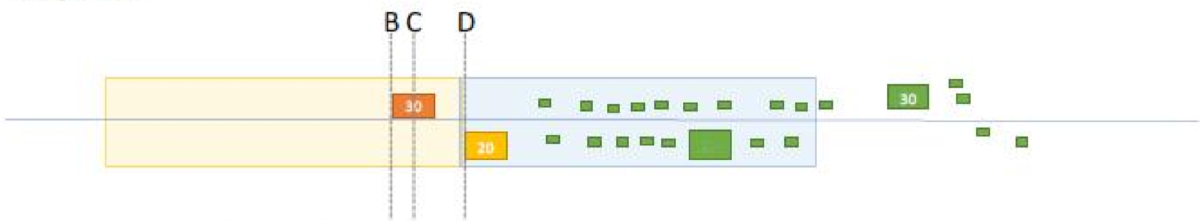
Question 2: From the diagrams provided, is the yellow 20 unit building the dwelling unit that sets the end boundary for the class 3 location as per Clause 4.3.4.5?

Diagram 1

Orange structure is the "critical dwelling unit" for class 3 location

Just inside a class location assessment area that contains 46 or more dwelling units
✓ 82 units in the blue class assessment unit
Just outside the closest class location assessment area that contains 45 or fewer dwelling units
✓ 0 units in the yellow class assessment unit

Diagram 2



Yellow structure is the "critical dwelling unit" for class 3 location

Just inside a class location assessment area that contains 46 or more dwelling units
✓ 56 units in the blue class assessment unit
Just outside the closest class location assessment area that contains 45 or fewer dwelling units
✓ 30 units in the yellow class assessment unit

Answer 2: Yes

The following interpretation regarding Clause 15.2 n) of CSA Standard Z245.1:22, Steel pipe, has been approved by the Members of the CSA Standards Technical Committee on *Petroleum and Natural Gas Industry Pipeline Systems and Materials (K110).*

Question 1: For pipe 60.3 mm OD or larger, where the specified hydrostatic test pressure is calculated in accordance with Clause 9.4.2, are the marking requirements of Clause 15.2.n) applicable?

Answer 1: Yes, if the hydrostatic test pressure exceeds the minimum pressure required by Clause 9.4.1.

Question 2: For pipe 60.3 mm OD or larger, where the specified hydrostatic test pressure is calculated in accordance with Clause 9.4.2, can such specified hydrostatic test pressure be stenciled for Marking?

Answer 2: Yes, if the hydrostatic test pressure exceeds the minimum pressure required by Clause 9.4.1.

Question 3: For pipe 60.3 mm OD or larger, where the specified hydrostatic test pressure exceeds the minimum test pressure required by Clause 9.4.1, but is calculated by Clause 9.4.2, shall the hydrostatic test pressure stenciled be the pressure calculated by Clause 9.4.1 or by Clause 9.4.2?

Answer 3: Z245.1:22 does not currently specify which hydrostatic test pressure must be stenciled.

The following interpretation regarding Clauses 7.6.1, 7.7.1.2, and Figure 7.6 of CSA Standard Z662:19, Oil and gas pipeline systems, has been approved by the Members of the CSA Standards Technical Committee on *Petroleum and Natural Gas Industry Pipeline Systems and Materials (K110).*

Question: Does a procedure qualification test joint completed on a 16" diameter pipe by two welders require the full circumference to pass nondestructive examination when the welding parameters used are from half the circumference, and testing is performed from a half circumference as permitted in Figure 7.6 d) (Testing was performed and parameters recorded on the half circumference that passed nondestructive examination)?

Answer: No

The following interpretation regarding Clause 6.1.2.3 of CSA Standard CSA Z245.30:22, Field-applied external coatings for steel pipeline systems, has been approved by the Members of the CSA Standards Technical Committee on *Petroleum and Natural Gas Industry Pipeline Systems and Materials (K110).*

Question 1: Can the preparation of the test samples (Clause 6.1.2.3) for the applicator's qualification testing be completed on an actual production pipe or pipeline components?

Answer 1: Yes

Question 2: Upon successful production testing of Table 6, 7, 8 applicator qualification and coating quality test and an updated certificate, is applicator qualification considered proof of full requalification of applicators?

Answer 2: Yes

The following interpretation regarding Clause 5.3.5 of CSA Standard Z662:19, Oil and gas pipeline systems, has been approved by the Members of the CSA Standards Technical Committee on *Petroleum and Natural Gas Industry Pipeline Systems and Materials (K110)*.

Question: Can we use stainless steel material for buried pipeline if economically is feasible?

Answer: Yes, see Clause 5.1.3.

The following interpretation regarding Clause 4.5.2 d) Threaded joints of CSA Standard Z662:19, Oil and gas pipeline systems, has been approved by the Members of the CSA Standards Technical Committee on *Petroleum and Natural Gas Industry Pipeline Systems and Materials (K110)*.

Question 1: Are threaded joints as referred to in Clause 4.5.2 only meant to apply to the threaded connections where the seal is provided by the thread flanks of the mating threads?

Answer 1: Yes

Question 2: Are other connections, such as hammer union fittings, that seal through a metal to metal surface, which have a threaded nut that is used to provide the compression to the sealing surfaces, subject to the requirements of Clause 4.5.2?

Answer 2: No

The following interpretation regarding Clause 10.5.4.3 of CSA Standard Z662:19, Oil and gas pipeline systems, has been approved by the Members of the CSA Standards Technical Committee on *Petroleum and Natural Gas Industry Pipeline Systems and Materials (K110)*.

Question 1: Are natural gas **transmission** pipeline facilities, valve interconnect or stations, considered locations where **warning signs** shall be posted, per Clause 10.5.4.3?

Answer 1: Yes

Question 2: Could natural gas at a **transmission** pipeline facility, valve interconnect or station, be a hazard?

Answer 2: Yes

Question 3: Is the intent of **a warning sign in Clause 10.5.4.3** to alert "all persons", including visitors, general-public, and emergency responders, and not just company employees and contractors?

Answer 3: Yes

Posted July 7, 2023

The following interpretation regarding Clauses 5.6 & 4.1 / 4.1 Respectively of CSA Standard B181.0 and B181.1 / B181.2, Definitions, general requirements, and methods of testing for thermoplastic nonpressure piping/ Acrylonitrile-butadiene-styrene (ABS) drain, waste, and vent pipe and pipe fittings/ Polyvinylchloride (PVC) and chlorinated polyvinylchloride (CPVC) drain, waste, and vent pipe and pipe fittings, has been approved by the Members of the CSA Standards Technical Committee on *Plastic Non-Pressure Piping (B218).*

Question: Do you agree with the interpretation that CSA B181.0, B181.1, and B181.2 do not include provisions related to Backwater valves which prevents the use of thermoplastic materials other than ABS (for B181.1) or PVC or CPVC (for B181.2) for the non Solvent Welded components that are not connected to the piping system?

Answer: Yes

Posted June 14, 2023

The following interpretation regarding A23.2 – 25C – Clause 7.1.2 of CSA Standard A23.1/2, Concrete materials and methods of concrete construction/Test methods and standard practices for concrete, has been approved by the Members of the CSA Standards Technical Committee on *Concrete Materials and Construction (A152).*

Question: CSA A23.2 contains various concrete tests and the procedures required to correctly complete each of these tests. With respect to the standard field test for concrete these include:
- A23.2-1C Sampling plastic concrete
- A23.2-3C Making and curing concrete compression and flexural test specimens
- A23.2-4C Air content of plastic concrete by the pressure method
- A23.2-5C Slump of concrete
- A23.2-6C Density and yield of plastic concrete
- A23.2-7C Air content of plastic concrete by the volumetric method
- A23.2-9C Compressive strength of cylindrical concrete specimens
- A23.2-17C Temperature of freshly mixed hydraulic cement concrete
- A23.2-19C Slump flow of concrete

Within each these test methods are contained specific testing procedures and reporting requirements.

CSA A23.1 clause 4.4 Quality Control states the following:
4.4 Quality Control
4.4.2 Concrete acceptance
4.4.2.1.2
Sampling, testing, and inspection of concrete for acceptance purposes shall be carried out in accordance with CSA A23.2-25C."
4.4.2.1.3
Concrete testing used as the basis for acceptance shall comply with all aspects of the applicable CSA A23.2 field and laboratory test methods and standard practices. Acceptance of the concrete shall be subject to the procedures and criteria in CSA A23.2-25C.

Based on the above clauses, all concrete testing used to determine acceptance of the concrete must be
carried out in accordance with and comply with all aspects of the applicable CSA A23.2-25C test methods.

CSA A23.2-25C Standard Practice for sampling, testing, and inspection of concrete for acceptance purposes makes the following statements:

6 Reporting
Unless otherwise agreed, test results shall be provided to the owner, contractor, and concrete supplier within five working days of completion of the test. Both field and laboratory test reports shall include all information required by the applicable test methods of CSA A23.2.

7 Acceptance testing of concrete
7.1 Concrete acceptance
7.1.1 General
Concrete testing used as the basis for acceptance shall comply with all aspects of the applicable CSA A23.2 field and laboratory test methods and standard practices. Acceptance of the concrete shall be subject to the responsibilities in Clause 4 of CSA A23.1. Acceptance tests are summarized in Table 1.
7.1.2 Non-compliant test specimens
If any test specimen shows distinct evidence of improper sampling, making, curing, transporting, demoulding, handling, curing, or testing, the test specimen shall be disregarded and declared invalid. The test results of the remaining test specimen(s) shall be considered the test result.

Based the interrelated clauses contained in CSA A23.1 & A23.2, is it correct that a concrete test which has "NOT" followed all aspects of the associated CSA A23.2 field and laboratory test method, including following the test procedures and reporting requirements, must be "disregarded and declared invalid" and as such "cannot" be used "as a basis for acceptance"?

Answer: Yes

- The Technical Committee intended that results from an invalid test specimen should also not to be used for the rejection of concrete.
- Where there has been a deviation from the test procedure or the sample deemed non-compliant for the reasons in A23.2-25C, Clause 7.1.2, the test result can still provide useful information to the owner.
- It is recommended that any results obtained from invalid test specimens be not included for use in statistical analysis.

Posted June 5, 2023

The following interpretation regarding Section 13.2 of CSA Standard S16:19, Design of steel structures, has been approved by the Members of the CSA Standards Technical Committee on *Steel Structures for Buildings (A263).*

Question: For the axial tension design of long-length threaded rods connected together with turnbuckles or coupler nuts, used as x-bracing in steel buildings or holdown rods in timber buildings, should the capacity be the lower of the yield strength per 13.2.(a)(i) and the tensile strength per 13.2.(a)(iii) with Ane and Ag being taken as the tensile stress area of the rod or can yielding be excluded?

Answer: The axial tensile resistance of all-threaded and long-threaded structural steel rods connected with appropriate coupling nuts or turnbuckles so as to prevent thread stripping and subjected to static loading may be determined in accordance with Clause 13.2 (a) of S16:19, taking both Ane and Ag to be the tensile stress area as specified in the standard to which the threaded rods are manufactured.

S16 requirements reflect primarily the knowledge gained from research on steel structures and practical experience in steel construction. With respect to the design of steel rods used in structures of other materials, applications of S16 requirements are conditional because supplementary rules and requirements may be necessary in accordance with Clause 1.3 (b) of S16:19.

Posted April 19, 2023

The following interpretation regarding Clause 11.2.1 Pressure testing for digesters, of CSA Standard CSA/ANSI B149.6:20 has been approved by the Members of the CSA Technical Committee on *Fuels and Appliances Strategic Steering Committee [JB117)*

Question 1: The specification states that the test is to be concluded when the temperature is within ±0.2 oC or ±33 oF. The two temperature ranges provided are not equivalent. Similarly, the tolerance of the temperature measuring equipment is stated to be ±0.1 oC or ±32 oF, these are also not equivalent.

Answer 1: Agree

Note: The degree Celsius is correct, but not Fahrenheit

The following interpretation regarding Clause 8.6.5 Buried Piping, of CSA Standard CSA/ANSI B149.6:20 has been approved by the Members of the CSA Technical Committee on *Fuels and Appliances Strategic Steering Committee [JB117)*

Question 1: Should buried HDPE gas collection piping ranging in sizes from 12” to 24” and encircling 11-acre anaerobic lagoons be subject to section 8.6.5 regarding steel casings?

Answer 1: Yes

The following interpretation regarding Annex D/5.3.2 under "Flare (waste gas burner) controls, of CSA Standard CSA/ANSI B149.6:20 has been approved by the Members of the CSA Technical Committee on *Fuels and Appliances Strategic Steering Committee [JB117)*

Question 1: Are actuated louvers on a flare considered mechanical means of ventilation suitable for a mechanical pre-purge of an enclosed flare stack on their own?

Answer 1: No

The following interpretation regarding Clause 8 Piping and tubing systems and fitting in digester gas systems - 8.1.2, of CSA Standard CSA/ANSI B149.6:20 has been approved by the Members of the CSA Technical Committee on *Fuels and Appliances Strategic Steering Committee [JB117)*

Question 1: Should buried HDPE gas collection piping ranging in sizes from 12” to 24” and encircling 11-acre anaerobic lagoons be subject to section 8.1.2 regarding a minimum pipe slope of 2%?

Answer 1: Yes

Posted April 18, 2023

The following interpretation regarding all standards under the Z21/83 and CSA Gas Technical Committees, as listed below, has been approved by the Members of the CSA Technical Committees on *Gas Appliances and Related Accessories [JB101]* and *Performance & Installation of Gas Burning Appliances & Related Accessories [U101].*

Question: Do you agree that natural gas containing up to and including 5% of Hydrogen is covered by testing with Test Gas A?

Answer: Yes

Standard #	Title
CAN1-1.16	Recreational Vehicle Cooking Gas Appliances
CAN1-11.4	Portable-Type Gas Camp Refrigerators
CAN1-2.20	Gas-Fired Brooders
CAN1-3.1	Industrial and Commercial Gas Fired Package Boilers
CAN1-6.2	Draft Hoods
CGA 2.29	Hand-Held Torches for Fuel Gas
CGA 3.4	Industrial and Commercial Gas-Fired Conversion Burners
CGA 5.2	Gas-Fired Waterless Toilets
CSA 2.15	Gas-Fired Domestic Lighting Appliances
CSA 2.17	Gas-Fired Appliances for Use at High Altitudes
CSA 3.11	Lever Operated Pressure Lubricated Plug Type Gas Shut-Off Valves
CSA 3.16	Lever Operated Non-Lubricated Gas Shut-Off Valves
CSA 3.8	Gas-fired Equipment for Drying Farm Crops
CSA 6.18	Service Regulators for Natural Gas
CSA 6.19	Residential Carbon Monoxide Alarming Devices
CSA 8.1	Elastomeric Composite Hose and Hose Couplings For Conducting Propane and Natural Gas
CSA 8.3	Thermoplastic Hose and Hose Couplings for Conducting Propane and Natural Gas
CSA 9.4	Standard for manually operated metallic gas valves for use on piping systems up to 5 psig
LC 1/CSA 6.26	Fuel Gas Piping Systems Using Corrugated Stainless Steel Tubing
LC 2	Direct Gas-Fired Circulating Heaters for Agricultural Animal Confinement Buildings
LC 4/CSA 6.32	Press-Connect Metallic Fittings for Use in Fuel Gas Distribution Systems
LC 6	Natural Gas Operated Diaphragm Pumps
LC 7	Pipe Joint Sealing Compounds and Materials
Z21.1/CSA 1.1	Household Cooking Gas Appliances
Z21.10.1/CSA 4.1	Gas Water Heaters, Volume I, Storage Water Heaters with Input Ratings of 75,000 Btu Per Hour or Less
Z21.10.3/CSA 4.3	Gas Water Heaters, Volume III, Storage Water Heaters with Input Ratings Above 75,000 Btu Per Hour, Circulating and Instantaneous
Z21.101/CSA 8.5	Gas Hose Connectors for Portable and Moveable Gas Appliances
Z21.103	Unvented Portable Type Gas Camp Heaters for Indoor and Outdoor Use
Z21.104/CSA 9.2	Manual and automatic gas selector devices for use with gas-fired appliances
Z21.11.2	Gas-Fired Room Heaters, Volume II, Unvented Room Heaters

Z21.11.3	Gas-Fired Room Heaters, Volume III, Propane-Fired Portable Emergency Use Heater Systems
Z21.12	Draft Hoods
Z21.13/CSA 4.9	Gas-Fired Low Pressure Steam and Hot Water Boilers
Z21.15/CSA 9.1	Manually Operated Gas Valves for Appliances, Appliance Connector Valves and Hose End Valves
Z21.17/CSA 2.7	Domestic Gas Conversion Burners
Z21.18/CSA 6.3	Gas Appliance Pressure Regulators
Z21.19/CSA 1.4	Refrigerators Using Gas Fuel
Z23551-4	Safety and control devices for gas burners and gas-burning appliances — Particular requirements — Part 4: Valve-proving systems for automatic shut-off valves
Z23550	Safety and control devices for gas and/or oil burners and appliances - General requirements
Z21.20/CSA 2.22 No.60730-2-5/UL 60730-2-5 (2120)	Automatic Electrical Controls for Household and Similar Use - Part 2-5: Particular Requirements for Automatic Electrical Burner Control Systems
Z21.21/CSA 6.5	Automatic Valves for Gas Appliances
Z21.22/CSA4.4	Relief Valves for Hot Water Supply Systems
Z21.23/CAN1-6.6	Gas Appliance Thermostats
Z21.24/CSA 6.10	Connectors for Gas Appliances
Z21.35/CSA 6.8	Pilot Gas Filters
Z21.40.1/CGA 2.91	Gas-Fired Heat Activated Air Conditioning and Heat Pump Appliances
Z21.40.2/CGA 2.92	Air-conditioning and Heat Pump Appliances (Internal Combustion)
Z21.40.4/CGA 2.94	Performance Testing and Rating of Gas-Fired Air Conditioning and Heat Pump Appliances
Z21.41/CSA 6.9	Quick Disconnect Devices for Use with Gas Fuel Appliances
Z21.42	Gas-Fired Illuminating Appliances
Z21.47/CSA 2.3	Gas-Fired Central Furnaces
Z21.5.1/CSA 7.1	Clothes Dryers, Volume I, Type 1 Clothes Dryers
Z21.5.2/CSA 7.2	Clothes Dryers, Volume II, Type 2 Clothes Dryers
Z21.50/CSA 2.22	Vented Decorative Gas Appliances
Z21.54/CSA 8.4	Gas Hose Connectors for Portable Outdoor Gas-Fired Appliances
Z21.56/CSA 4.7	Gas-Fired Pool Heaters
Z21.57	Recreational Vehicle Cooking Gas Appliances
Z21.58/CSA 1.6	Outdoor Cooking Gas Appliances
Z21.60/CSA 2.26	Decorative Gas Appliances for Installation in Solid-Fuel Burning Fireplaces
Z21.63/CSA 11.3	Portable Type Gas Camp Heaters
Z21.66/CSA 6.14	Automatic Vent Damper Devices for Use with Gas-Fired Appliances
Z21.69/CSA 6.16	Connectors for Movable Gas Appliances

Z21.71	Automatic Intermittent Pilot Ignition Systems for Field Installation
Z21.72/CSA 11.2	Portable Type Gas Camp Stoves
Z21.73/CSA 11.1	Portable Type Gas Camp Lights
Z21.74	Portable Refrigerators
Z21.75/CSA 6.27	Connectors for Outdoor Gas Appliances and Manufactured Homes
Z21.76	Gas-Fired Unvented Catalytic Room Heaters for Use with Propane Gas
Z21.77/CSA 6.23	Manually-Operated Piezo-Electric Spark Gas Ignition Systems and Components
Z21.78/CSA 6.20	Combination Gas Controls for Gas Appliances
Z21.79/CGA 6.21	Gas Appliance Sediment Traps
Z21.8	Installation of Domestic Conversion Burners
Z21.80/ CSA 6.22	Line Pressure Regulators
Z21.81/CSA 6.25	Cylinder Connection Devices
Z21.84	Manually Lighted, Natural Gas Decorative Gas Appliances for Installation in Solid Fuel Burning Fireplaces
Z21.86/CSA 2.32	Vented Gas-Fired Space Heating Appliances
Z21.87/CSA 4.6	Automatic Gas Shutoff Devices for Hot Water Supply Systems
Z21.88/CSA 2.33	Vented Gas Fireplace Heaters
Z21.89/CSA 1.18	Outdoor Cooking Specialty Gas Appliances
Z21.90/CSA 6.24	Gas Convenience Outlets and Optional Enclosures
Z21.91	Ventless Firebox Enclosures for Gas-Fired Unvented Decorative Room Heaters
Z21.92/CSA 6.29	Manually Operated Electric Gas Ignition Systems and Components
Z21.93/CSA 6.30	Excess Flow Valves for Natural Gas and Propane Gas with Pressures up to 5 psig
Z21.94/CSA 6.31	Automatic Flammable Vapor Sensor Systems and Components
Z21.96/CSA 11.6	Portable Water Heaters for Outdoor Use
Z21.97/CSA 2.41	Outdoor Decorative Gas Appliances
Z21.98/CSA 4.10	Non-Metallic Dip Tubes for Use in Hot Water Heaters
Z83.11/CSA 1.8	Gas Food Service Equipment
Z83.18	Recirculating Direct Gas-Fired Heating and Forced Ventilation Appliances for Commercial and Industrial Applications
Z83.19/CSA 2.35	Gas-Fired High Intensity Infrared Heaters
Z83.20/CSA 2.34	Gas-Fired Tubular and Low Intensity Infrared Heaters
Z83.21/CSA C22.2 No. 168	Commercial Dishwasher
Z83.25/CSA 3.19	Direct Gas-Fired Process Air Heaters
Z83.26/CSA 2.37	Gas-Fired Outdoor Infrared Patio Heaters
Z83.4/CSA 3.7	Non-Recirculating Direct Gas-Fired Heating and Forced Ventilation Appliances for Commercial and Industrial Application

Z83.7/CSA 2.14	Gas-Fired Construction Heaters
Z83.8/CSA 2.6	Gas Unit Heaters, Gas Packaged Heaters, Gas Utility Heaters, and Gas-Fired Duct Furnaces
13.1	Combined Heat and Power Appliances

Posted April 6, 2023

The following interpretation regarding Clause 12.4.1.3 and Figure 12 of CSA Standard CSA N285.0-17 with Update No. 1, General requirements for pressure-retaining systems and components in CANDU nuclear power plants, has been approved by the Members of the CSA Standards Technical Committee on *CANDU Nuclear Power Plant Pressure-Retaining Systems and Components (Z953).*

Question 1: For a calandria tube that, in accordance with the Standard N285.0-17, is a "material" or "tubular product welded with filler material" and using Figure 12, does the clause 12.4.1.3 b) requiring a design drawing to be registered apply?

Answer 1: No

Question 2: For a calandria tube that, in accordance with the Standard N285.0-17, is a "material" or "tubular product welded with filler material" and using Figure 12, does the clause 12.4.1.3 i) requiring a check of pressure boundary integrity dimensions imply the critical dimensions of the drawing?

Answer 2: Yes

Question 3: For a calandria tube that, in accordance with the Standard N285.0-17, is as a "material" or "tubular product welded with filler material" and using Figure 12, do the pressure tests required by clause 12.4.1.3 m) include any tests other than those associated with the material specification requirements?

Answer 3: No

Question 4: For a calandria tube that, in accordance with the Standard N285.0-17, is a "material" or "tubular product welded with filler material" and using Figure 12, does the clause 12.4.1.3 n) requiring reconciliation statements apply?

Answer 4: No

Posted April 6, 2023

The following interpretation regarding Clause 6 of CSA N285.6.8 (2005 through 2017), Martensitic stainless steel for fuel-channel end fittings, has been approved by the

Members of the CSA Standards Technical Committee on *CANDU Nuclear Power Plant Pressure-Retaining Systems and Components (Z953).*

Question: If the material is reheat treated, are the test results obtained prior to the reheat treatment valid for evaluating against the Clause 6.2.1 and 6.3.1 criteria?

Answer: No

Posted Feb 22, 2023

The following interpretation regarding Section 27.8 of CSA Standard S16:19, Design of steel structures, has been approved by the Members of the CSA Standards Technical Committee on *Steel Structures for Buildings (A263).*

Question: Can it be assumed that the usage of Type D (ductile) buckling restrained braced frame, Rd = 4.0, Ro = 1.2 — appearing in section 27.8 of CSA-S16 including all referenced clauses and recommendations therein indicated— in the analysis and design of an SFRS warrant at least a 10% or less probability of collapse for All-Importance All-Occupancy type of buildings in Canada against the 2% percent probability of exceedance earthquake hazard stated in the National Building Code of Canada? If yes, please kindly indicate technical reference that could sufficiently explain the adoption of the values Rd and Ro proposed.

Answer: Typically, R-factors in S16 have been established in collaboration with the Standing Committee of Earthquake Design. There are technical papers that specifically provide background information for the R-factors specified for some systems but not for others. In any case, Standard S16 does not include a list of reference papers or bibliography.

Posted Feb 22, 2023

The following interpretation regarding Clause 7.2.7 of CSA Standard Z662:19, Oil and gas pipeline systems, has been approved by the Members of the CSA Standards Technical Committee on *Petroleum and Natural Gas Industry Pipeline Systems and Materials (K110).*

Question 1: When using an ASME section IX welding procedure per Clause 7.2.4 or 7.2.5 that has 2 or more PQRs covering multiple thicknesses, is the maximum carbon equivalent value for the welding procedure the highest base metal PQR CE value plus 0.05?

Answer 1: Yes

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The following interpretation regarding Figure 7.2, Note 5 a) of CSA Standard Z662:19, Oil and gas pipeline systems, has been approved by the Members of the CSA Standards Technical Committee on *Petroleum and Natural Gas Industry Pipeline Systems and Materials (K110)*.

Question 1: The standard specifies in Figure 7.2, Note 5 a) that where butt-welding items of unequal thicknesses and unequal SMYS's, the tensile strength of the deposited weld metal shall be at least equal to that of the item having the higher SMYS.

Answer 1: Agree

Question 2: Figure 7.2, Note 5 a) does not consider whether the item with the higher SMYS is the thinner or the thicker item.

Answer 2: Agree

Question 3: The standard does not specifically address butt-welding items of **equal** thickness and unequal specified minimum yield strengths.

Answer 3: Agree

Question 4: Is it the intent of Figure 7.2, Note 5 a) that when joining items of **equal** thickness, the tensile strength of the deposited weld metal be equal to that of the item having the higher SMYS?

Answer 4: No, Figure 7.2 does not address joining items of equal thickness

The following interpretation regarding Clause 15.2 b) of CSA Standard Z245.1:22, Steel pipe, has been approved by the Members of the CSA Standards Technical Committee on *Petroleum and Natural Gas Industry Pipeline Systems and Materials (K110)*.

Question 1: Can a ":" colon or "–" hyphen be used interchangeably at the option of the manufacturer for CSA Standard designation for the required markings and the certifications (e.g., MTRs), e.g., CSA Z245.1:22 or Z245.1-22?

Answer 1: Yes

Question 2: Can a ":" colon or "–" hyphen be used interchangeably at the option of the manufacturer for other CSA Standard designations for additional markings and the certifications (e.g., MTRs), where specified in the purchase order, e.g., CSA Z662:19 or Z662-19?

Answer 2: Yes

The following interpretation regarding Clause 5.3.3 of CSA Standard CSA Z245.30:22, Field-applied external coatings for steel pipeline systems, has been approved by the Members of the CSA Standards Technical Committee on *Petroleum and Natural Gas Industry Pipeline Systems and Materials (K110).*

Question: Does a change in the materials expiration date, require the applicators to be recertified under the new MQAP version?

Answer: No

The following interpretation regarding Clause 7.5.4.2 of CSA Standard CSA Z245.30:22, Field-applied external coatings for steel pipeline systems, has been approved by the Members of the CSA Standards Technical Committee on *Petroleum and Natural Gas Industry Pipeline Systems and Materials (K110).*

Question: May a read-out from a calibrated voltmeter, integrated into the holiday detector to be verified, be used to meet the requirements of "verified and tested against a voltmeter..." as required by Clause 7.5.4.2?

Answer: No

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September 25, 2025

ENBRIDGE GAS INC
500 CONSUMERS RD,
NORTH YORK ON M2J 1P8
CANADA

Work Order Type: FS Engineering Consultation
Work Order No.: 14717263

Dear ENBRIDGE GAS INC,

Thank you for submitting a consultation request. Enbridge Gas has requested to increase the hydrogen blend into the natural gas distribution system in the Markham area from 2% up to 5%. TSSA have carefully reviewed the findings presented in a final report prepared by DNV “10568403-1 Rev. 1”.

Please see below for the considerations and approval:

The Quantitative Risk Assessment “QRA” methodology presented in the report aligns with recognized industry principles and is consistent with CSA IEC 31010:20 and CSA Z662:23.

Details of project hours, contributors, and expertise have been shared, confirming the analysis was carried out thoroughly, with 135 hours dedicated to DNV “10568403-1 Rev. 1”.

Further to TSSA’s request for consideration, Enbridge has provided additional information on the methodology, supporting documentation, participant expertise, software tools, technical assumptions, use of reference data, societal risk metrics, leak frequency assumptions, and project duration.

Accordingly, approval is granted for Enbridge Gas to proceed with the hydrogen blending project up to 5% in the Markham gas distribution system. Ongoing adherence to applicable standards and monitoring requirements will be expected throughout the duration of operations.

Should you have any questions or require further assistance, I will be happy to assist you. For general enquiries, please contact a Customer Services Advisor at 1.877.682.TSSA (8772) or e-mail customerservices@tssa.org. When contacting TSSA regarding this file, please refer to the Work Order number provided above.

Yours in Safety,

Ghassan Chehade
Fuels, Hydrogen Safety Engineer
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September 25, 2025

ENBRIDGE GAS INC
500 CONSUMERS RD,
NORTH YORK ON M2J 1P8
CANADA

Work Order Type: FS Engineering Consultation
Work Order No.: 14717263

Dear ENBRIDGE GAS INC,

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Yours in Safety,

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