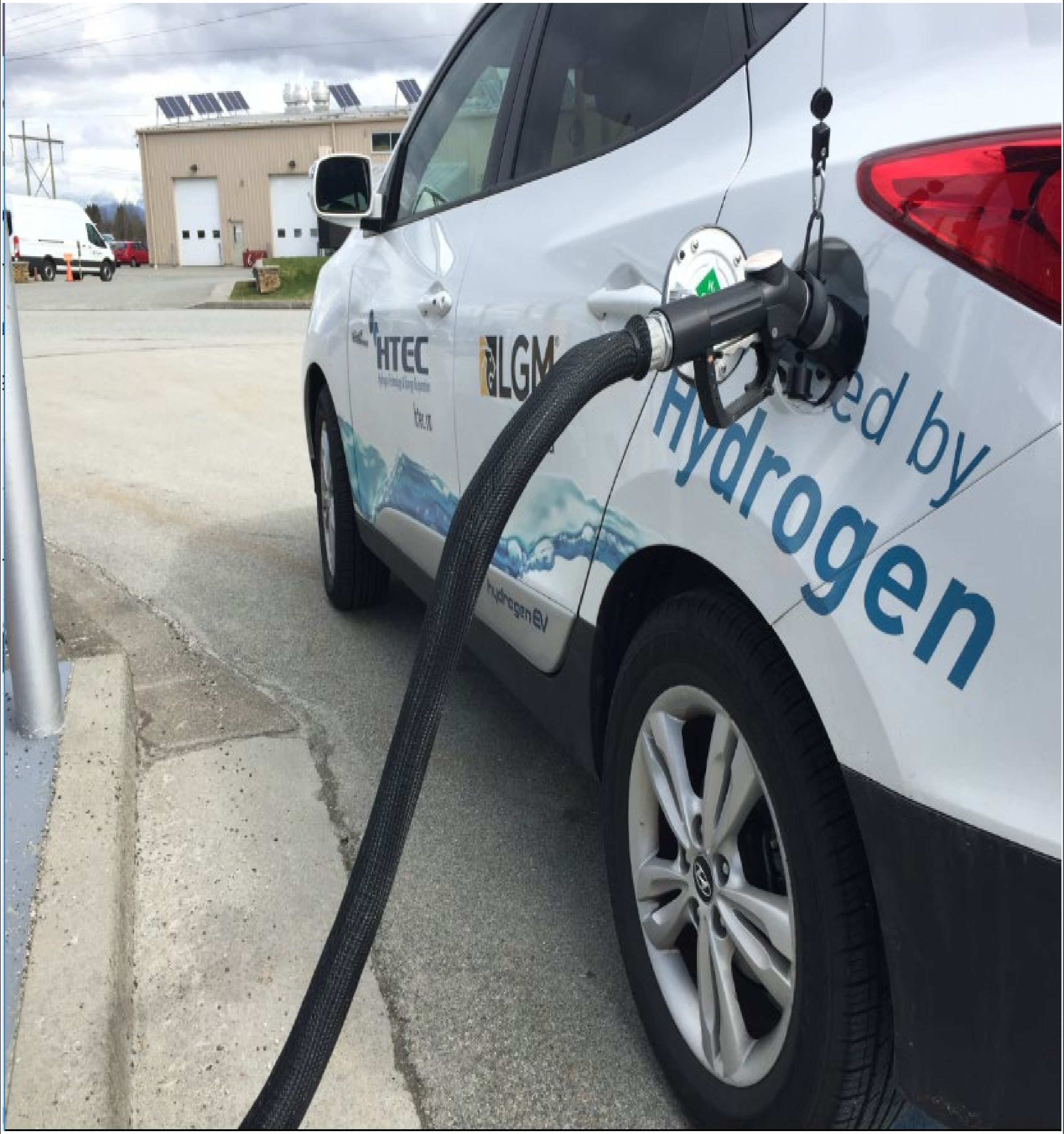
Feasibility Study

Zero Emissions Fleet Initiative- Infrastructure Safety Study

Capital Regional District | November 2017



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1. Introduction

This document summarizes the overall requirements for the safe and successful construction of a permanent hydrogen fuelling station to fill Fuel Cell Electric Vehicles (FCEVs) within the Capital Regional District (CRD). These requirements relate to the vehicle Original Equipment Manufacturers' (OEM) key expectations for station performance, overall technical specifications, station components, common safety concerns, and applicable codes and regulations for safe operation. Permitting and the importance of early public engagement, as well as the practicality of mobile refuelling will also be discussed.

2. Hydrogen - a safe fuel

Hydrogen is a carbon-free, non-toxic fuel that can be domestically produced from local resources. Most hydrogen is made from natural gas, but increasingly it is made from water, biogas and biomass. For more than 75 years, hydrogen has been safely handled, distributed and dispensed.

a. Properties and why it is safe

Hydrogen is the lightest molecule in the universe and diffuses rapidly in its gaseous state, elevating at approximately 20 meters per second. This property is known as high buoyancy. High buoyancy makes it unlikely to accidentally form a flammable mixture with hydrogen. Codes and standards take into account the buoyancy and diffusivity of hydrogen when designing structures to store, transport, and use hydrogen safely. Generally, a hydrogen release dissipates very quickly.

Hydrogen is odorless, colorless and tasteless: Hydrogen sensors are used to detect leaks and have been used to meet safety standards for decades.

Hydrogen falls under special electrical classification as it is deemed flammable, and as such, explosive atmospheres exist when this gas is present above the lower explosive limits (LEL). The LEL of hydrogen gas is 4.0% by volume. Section 18 of the Canadian Electrical Code, CSA22.1, requires the use of specific classified electrical equipment in locations defined as Hazardous.

A typical fueling station will have from 76 000 to 284 000 liters of gasoline on site at a time, while the current hydrogen station configurations will have 50kg to 1 000 kg on site. Typical gasoline tankers will carry 34 000 liters of gasoline, while hydrogen delivery vehicles will carry 100 to 300 kg of the gas.

A hydrogen fueling station has several safety features that include emergency stop button to de-energize the system if problems occur, fire and flame detection equipment in both open and enclosed spaces, hydrogen detection equipment, pressure relieving devices throughout, safety signage, and equipment interlock to ensure only trained personnel have access.

b. Hydrogen as a regulated fuel

Hydrogen is a recognized fuel for transportation and has been classified as such. In addition to transportation, hydrogen is commonly used in large quantities in the petroleum refinery process, in several industrial applications, and as fuel for space exploration. These uses resulted in reliable standards used to safely produce, store, and transport hydrogen. For example the National Fire Protection Association standard - NFPA 55 – Compressed Gases and Cryogenic Fluids Code, which is still in use, was established as early as 1975 and covered the installation and safe handling of hydrogen equipment. With the continued development of hydrogen as a fuel for transportation, a dedicated standard, NFPA 2 - Hydrogen Technologies Code was first issued in 2011, to better issues associated with dispensing and laboratory applications.

The Canadian Hydrogen Installation Code, Standard CAN/BNQ 1784-000, sets the installation requirements for hydrogen generating equipment, hydrogen-powered equipment, hydrogen dispensing equipment, hydrogen storage containers, hydrogen piping systems and their related accessories. The code applies to all gaseous and liquid hydrogen applications with some exceptions that don't relate to fuelling stations. This code is approved by the Standards Council of Canada, however NFPA-2 is the most widely adopted standard and also the standard that the British Columbia Safety Authority (BCSA, now known as Technical Safety BC) is most familiar with. It can be argued that a precedent has been set in BC to follow NFPA-2 for the time being.

The application of appropriate codes and standards make hydrogen fuel just as safe as—or safer than—gasoline or other commonly used fuels, such as compressed natural gas (CNG). Hydrogen systems are engineered systems that follow prescriptive hydrogen standards. They have proven to be very safe in numerous stations and vehicles, and they are approved by a wide variety of groups for operation in public settings in British Columbia, California, Germany, UK, Korea, and Japan. Many other countries are also beginning to install hydrogen station networks.

A series of typical questions and answers as they related to community concerns around hydrogen can be found in Appendix A. These questions can be reasonably anticipated at a public meeting.

3. Permitting

Permitting requirements will differ from station to station depending on the site characteristics, station type, and the local jurisdiction's unique processes. In BC, local governments have the ultimate authority to approve or deny any project. A design approved in one community does not guarantee approval of the same design in another community. However HTEC has successfully applied for permits in Vancouver, North Vancouver, Surrey, Burnaby, Whistler, and Woodside California, which should lend itself to valuable guidance for the permitting process within the CRD.

A major piece of the station permitting process is dedicated to ensuring stations are built to current codes and standards. The following text provides references to BC codes and guidance, which can be amended by local jurisdictions in certain circumstances. In BC, cities typically grant building permits as they relate to site usage, parking, setbacks, building code and electrical code compliance. Technical Safety BC is responsible for pressurized systems to ensure they comply with code and are operated safely. Both the Jurisdiction having authority (JHA) and Technical Safety BC will grant the operating permits.

a. Applicable Codes and Regulations

The following is a list of the most applicable codes to hydrogen fuelling infrastructure in BC.

- NFPA-2 National Fire Protection Association Hydrogen Technologies Code (2016). The purpose of this code shall be to provide fundamental safeguards for the generation, installation, storage piping, use, and handling of hydrogen in compressed gas (GH2) form or cryogenic liquid (LH2) form.
- CAN/BNQ 1784-000/2007 – Canadian Hydrogen Installation Code. The purpose of this code is to establish the installation requirements for hydrogen generating equipment, hydrogen utilization equipment, hydrogen dispensing equipment, hydrogen storage containers, hydrogen piping systems and their related accessories.
- ASME – B31.12 – Hydrogen Piping and Pipelines. This code is applicable to piping in gaseous and liquid hydrogen service and to pipelines in gaseous hydrogen service.
- CSA - C22.1-12 Canadian Electrical Code (2012) the object of this Code is to establish safety standards for the installation and maintenance of electrical equipment. In its preparation, consideration has been given to the prevention of fire and shock hazards, as well as proper maintenance and operation.
- CSA - B51-14 Boiler, Pressure Vessel, and Pressure Piping Code (2014) It is intended mainly to fulfill two objectives: first, to promote safe design, construction, installation, operation, inspection, testing, and repair practices, and second, to facilitate adoption of uniform requirements by Canadian jurisdictions.

b. Temporary Installations

The subject of temporary installations, moving stored hydrogen, and mobile refuellers as an option to permanent installations reveals that the overall permitting and safety requirements are similar at best, and in the case of mobile refuellers much more complex (see Appendix B for a discussion of mobile refuelling in California).

Moving stored hydrogen in Canada requires special Transport Canada permits, while moving a temporary fuelling station simply requires the station to be completely purged of any hydrogen, essentially making it an inert assembly of equipment.

Installing a temporary fuelling station has few precedents and by all indications would need to meet all of the codes and regulations set out for a permanent station. A temporary installation might fall under the category of a short term event, and each municipality may have less stringent requirements for foundations and structures, however it is unlikely the requirements around siting, setbacks, and related safety equipment will be any different from a permanent station.

c. Regulatory Approval and Safety

Fuelling stations must meet the requirements of the local authorities having jurisdiction which include:

- Approval of the Municipality and Fire Department in which the Hydrogen refuelling station will be installed.
- Registration of pressure vessels pressure piping and fittings Boiler and Pressure Vessel Safety Program of the BCSA. The pressure retaining components for which the Boiler and Pressure Vessel Program has jurisdiction and for which design registration is required are defined in Part 1, section5.1
- Approval in principle from the BCSA, Engineering and Standards, for the proposed installation design.
- Satisfactory site inspection of the installed pressure vessels by a BCSA Boiler Safety officer as well as the complete fuelling station by a BCSA Gas Safety officer.

d. Site layout, setbacks and hazardous zone considerations.

Choosing the correct site is critical for hydrogen fuelling stations because installation of pressurised gas systems in British Columbia requires the review and approval by the BCSA. For public fuelling facilities a definitive set of Canadian codes and standards is not available when it comes to setback requirements. As such a Professional Engineering firm like HTEC must work with the BCSA and apply a combination of best practice and applicable codes from similar installations. From this, a design basis would be generated that ensures a safe design that would be accepted by the BCSA and fit on the selected site.

What makes this process complex is the need to balance regular building code requirements, hazardous zone needs, hydrogen specific setbacks, and general aesthetics. The biggest driver of setback requirements is the amount of stored hydrogen on site, and how far the storage is from exposures, which is defined as, among other things, existing building HVAC, property lines, public roads, sidewalks, parking, adjacent buildings, and overhead power lines.

A hydrogen fuelling facility integrated into an existing gas station needs to consider several codes including gasoline, cryogenic fluids, and hydrogen installation codes. Setbacks, or clearances to exposures, are prescribed by the codes in the case where there is a real risk to people or property (exposures) due to the amount of energy contained in the system. These are distinctly different from the hazardous zones required for electrical equipment. Hazardous zones for electrical equipment add further complexity to the siting requirements and have a direct bearing on the overall footprint of the hydrogen fuelling infrastructure and therefor the site itself. Hazardous zones are defined in Table 3.2 below.

The National Fire Protection Association's NFPA -2 and the National Standard of Canada's BNQ-1784-000 Canadian Hydrogen Installation Code set out a number of requirements regarding the installation of hydrogen systems. The NFPA-2 code is set to provide fundamental safeguards for the generation, installation, storage, piping, use, of hydrogen in compressed gas form. NFPA-2 provides a more comprehensive set of guidelines and as such HTEC recommends following NFPA-2 for hydrogen installations.

Table 3.1 is an excerpt from NFPA-2 and outlines the required clearance distances from bulk storage to exposures based on typical maximum pipe size. The hydrogen system will need to be examined for specific pressures and line size to determine exact setback requirements. The bulk storage system is defined as the storage vessel and associated pipework to the automatic shut-off valve, which the system can close in the event of a shut-down (emergency or otherwise). Bulk storage is any amount of compressed hydrogen storage above 141.6 Nm^3 (5,000 scf).

Table 3.1 : Excerpt from NFPA 2 – Minimum Distance from Outdoor GH2 Systems to Exposures (NFPA -2 Table 7.3.2.3.1.1(a))

Pressure	**>15 to ≤ 250 psig**	**>250 to ≤3000 psig**	**>3000 to ≤7500 psig**	**>7500 to ≤15000 psig**
Group 1 Exposures	m	m	m	m
• Lot line • Air intakes (HVAC, compressors, other) • Operable openings in buildings and structures • Ignition sources such as open flames and welding	12	14	9	10
Group 2 Exposures	m	m	m	m
• Exposed persons other than those servicing the system • Parked cars	6	7	4	5
Group 3 Exposures	m	m	m	m
• Buildings of non-combustible non-fire-rated construction • Buildings of combustible construction • Flammable gas storage systems above or below ground *Cont'd…*	5	6	4	4

• Hazardous materials storage systems above or below ground • Heavy timber, coal, or other slow-burning combustible solids • Ordinary combustibles, including fast-burning solids such as ordinary lumber, excelsior, paper, or combustible waste and vegetation other that found in maintained landscaped areas • Inoperable openings in buildings and structures • Encroachment by overhead utilities (horizontal distance from the vertical plane below nearest overhead electrical wire of building service) • Piping containing other hazardous materials • Flammable gas metering and regulating stations such as natural gas or propane				

In addition to setbacks based on stored energy, hazardous zone classification is required to meet section 18 of the Canadian Electrical Code. Section 18 of the Canadian Electrical Code, CSA22.1, requires the use of specific classified electrical equipment in locations defined as Hazardous. Hydrogen falls under this classification as it is deemed flammable, and as such, Class I atmospheres exist when this gas is present above the lower explosive limits (LEL). The LEL of hydrogen gas is 4.0% by volume.

Class I locations are further divided in to three zones depending on the frequency and duration of the explosive atmosphere. These zones are defined as follows:

Table 3.2 Hazardous Zone Definition

Zone	Definition
Zone 0	Explosive gas atmosphere present continuously or are present for long periods of time
Zone 1	Explosive gas atmosphere are likely to occur in normal operation, or, the location is adjacent to a Class I, Zone 0 from which explosive gas atmosphere could be communicated
Zone 2	Explosive gas atmospheres are not likely to occur in normal operation and, if they do occur, they will exist for a short time only; or, the location is adjacent to a Class I, Zone 1 location, from which explosive gas atmospheres could be communicated, unless such communication is prevented by means of positive ventilation (with safety system)

Depending on the rating of the classified zone, different requirements exist for the installation of electrical equipment. The specifics of these installation requirements are beyond the scope of this report, but can be ascertained from Section 18 of CSA22.1. Rigorous engineering calculations are required to ensure each hydrogen installation meets the electrical code in order to be considered safe. HTEC has gone through this exercise on numerous projects and is well equipped to provide guidance on hazardous zone classifications and related design and installation requirements. Pre-application outreach, public engagement, stakeholder buy in.

HTEC successfully designed and built a H2 station in Woodside, California and has successfully garnered building permits and BCSA approval for the first public hydrogen fuelling station to be built in BC, sited in the city of Vancouver. HTEC has installed, or participated in installing private stations in BC, which went through the same approval process as the public station, with the AHJ being the BCSA.

Key elements of success were finding the right site. For the public station in California HTEC analysed over 50 different site locations around San Francisco and engaged with specific station owners at good potential sites.

A good site is one that is situated close to early adopter neighbourhoods and close to major routes. The site has to have enough space to put an H2 station and separated H2 dispenser without complicated underground piping and without significantly affecting current traffic flows in area. Typically, it would require between 85-135 m^2 depending on the H2 production and onsite storage. The site has to have enough space for the manoeuvrability of a class 8 truck and trailer, which is similar to current gasoline delivery trucks. Since the compressors can generate noise a station should not be located in a very quiet neighbourhood. Compressor noises from a station located next to a relatively busy street would hardly be noticeable. The site should ideally already have high voltage supply onsite (600VAC).

In order to facilitate a successful approval early engagement and education of the property owner, particularly around the technology, the opportunities and the risks is important. The property owner will be called on throughout the application and construction process, so it is critical that they are fully educated to avoid costly changes or retraction of their commitment to the project.

Engagement with the fire department to provide first responder training, and local neighbours, educating them on the technology, the applicable codes, and how a proposed station will meet those codes will impart confidence and stave off any uninformed resistance during any public hearings.

Early engagement with the local municipality to understand concerns and local public hearings on site with vehicles, responding to public queries face to face meetings are all effective tools to facilitate a smooth permitting process.

HTEC are the only experts in BC in designing and building high pressure hydrogen systems, especially filling stations. HTEC is well positioned to would work with the local municipality, fire department, and the BCSA to get the approval of the building permit, and HTEC can work with the contractors to facilitate trade specific permits and ensure problem free construction and commissioning.

4. Infrastructure – OEM requirements and station components

In order to ensure complete compatibility between hydrogen vehicles and fuelling stations a set of protocols and equipment standards have been developed. These protocols and standards ensure problem free fuelling at any station build in North America. Stations that conform to these standards and protocols can reliably sell hydrogen fuel to for any hydrogen vehicle built by North American OEMs.

a. OEM Requirements

Published standard protocols and standards that relate to hydrogen fueling have been adopted by OEMs and most jurisdictions in order to ensure safety. The OEMs require rigorous validation testing of new hydrogen stations against the standards before they will allow their vehicles to be filled by customers. These protocols and standards are discussed here.

The Society of Automotive Engineers (SAE) International J2601:2014 – Fueling Protocols for Light Duty Gaseous Hydrogen Surface Vehicles sets out the filling rate and target pressure of the vehicle based on a number of input conditions such as vehicle temperature, ambient temperature, pressure and tank size. The protocol specifies a maximum hydrogen temperature of the hydrogen gas leaving the station. This standard also establishes under what conditions a fill must fall back to a more conservative fill case, and ultimately when a fill must be aborted. The outcome of the standard is to limit the maximum temperature of the hydrogen in the vehicle at the end of the fill. The act of filling a vehicle causes the hydrogen to warm up, and the Type 4 tanks used on FCEV have a maximum working temperature of 85C. This standard was developed to ensure that this temperature would never be exceeded under all conditions.

SAEs J2799:2014 - Communication Protocol establishes how the vehicle communicates critical information to the station, and is an integral part of J2601. There is provision within J2601 to fill a vehicle without this communication, but it is at a substantially reduced rate as a conservative alternative.

SAE J2600:2012 - Nozzle Geometry or ISO 14687 establishes the physical hydrogen interface between the vehicle and station to ensure a proper fit of the nozzle and the vehicle receptacle.

Hydrogen dispensed at the station shall meet the requirements in the SAE J2719: 2011, “Hydrogen Fuel Quality for Fuel Cell Vehicles”. This standard establishes the purity requirements for fuel cell grade hydrogen for use in FCEVs. The OEM’s will require a Quality

Control Plan to be implemented as part of the ongoing verification of compliance to J2719. Stations must undergo and pass the hydrogen purity test to become considered to be operational, and must undergo testing every 6 months. Station must also be tested if hydrogen lines are potentially exposed to contamination due to maintenance or other activity.

Under NFPA 2, hydrogen stations are required to conduct an initial leak check with the vehicle and 1-2 mid-fill checks depending on the starting pressure of the vehicle. While NFPA 2 is not legislated in BC, it is generally accepted as the best practice.

Under NFPA 2, hydrogen stations are required include a pressure reliving valve which conforms to ASME B31.3 and CGA S-1.3 located as close to the vehicle as possible. This is typically positioned inside the dispenser housing. While NFPA 2 is not legislated in BC, it is generally accepted as the best practice.

Hydrogen Vent Systems - CGA 5.5 and API 521 outline requirements for the design and installation of hydrogen vent systems. These are the requirements under both NFPA 2 and BNQ CHIC.

b. Station components

Hydrogen stations will have different designs depending on how the hydrogen is produced, delivered, and where the station is located. Hydrogen stations may be integrated into an existing fueling station, such as a gasoline or compressed natural gas station, or constructed as a stand-alone project. Every hydrogen station includes, at minimum:

i. Hydrogen storage tank(s)

At a fuelling station, hydrogen is stored on site in a storage tank. Different tanks exist to accommodate cryogenic liquid hydrogen, and low- and high-pressure compressed gaseous hydrogen. Storage tanks are constructed from hydrogen-safe materials and contain several pressure relief and safe-venting mechanisms. While all stations will have medium and high-pressure storage tanks, the hydrogen supply method will dictate the bulk storage tank design (cryogenic, low or medium pressure gaseous). Most stations in North America utilise gaseous delivery due to the proximity of liquid hydrogen facilities.

ii. Compressor

Hydrogen flows from the storage tank to the compressor, which reduces the volume and increases the pressure, preparing the hydrogen for fuelling. Compressors also contain real-time monitoring controls and pressure relief systems.

iii. Chiller

After leaving the compressor, hydrogen typically enters a closed-loop cooling system to chill the molecules prior to dispensing. The chiller enables high-pressure, fast fills. The SAE J2601 standard requires the hydrogen to be delivered (when possible, for maximum transfer rate) at -

37C. This results in a fairly large cooling load to be handled by the station. Alternatively, the station may choose to cool a warmer temperature (with a slower filling rate). The old J2601 standard allowed for very slow fills at ambient conditions, but this now requires special approval from the OEM's as it is not currently part of the current version of J2601.

iv. Dispenser

Modern hydrogen dispensers are very similar to typical gasoline, diesel or CNG dispensers. Dispensing equipment can sometimes be placed under the canopy at an existing fueling station, but some station agreements do not allow alternative fuels to be co-located under the branded canopy. Some stations have hydrogen dispensers on the same island as other dispensers; other stations have hydrogen dispensers on their own island under the fueling canopy, just outside of canopy or on a separate section of property. This typically comes down to the site owner's preference.

- The station shall meet the requirements of SAE J2601:2014 "Fuelling Protocols for Light Duty Gaseous Hydrogen Surface Vehicles.
- Applicant should describe how they will demonstrate to the OEMs that they meet all performance and safety requirements.
- Station communications available for H70 fuelling according to SAE J2799

c. Hydrogen fuelling station maintenance considerations

General principles of routine preventative maintenance shall be applied, each component will require specific maintenance considerations and those need to be included in a comprehensive maintenance program. Information should be obtained from the equipment supplier to establish recommended practice for each item of the plant. The station developer should establish the overall maintenance program to be implemented once the station is operational.

Specific considerations for hydrogen fuelling station will include:

- Weekly on-site visual inspections
- Daily remote inspections via system monitoring and onsite security cameras
- Routine leak detection (monthly), such as bubble tests, at connections along the hydrogen supply infrastructure
- Routine calibration of hydrogen sensing equipment (every 3 months)
- Routine calibration of heat sensing equipment (every 3 months)
- Routine calibration of process sensors (annually) (pressure, flow, temperature, etc.)
- Periodic pressure tests of the pressurized systems
- Typical station control systems will run daily diagnostic pressure integrity test.
- Hydrogen compressor maintenance (annually).
- Coolant system inspection of level, temperature, and circulation loop integrity (monthly).
- Periodic third-party hydrogen quality sampling to ensure SAE standard compliance.
- Maintenance of hazardous zone compliance in terms of site cleanliness and proper storage of combustible materials

- Periodic manual safety system tests, including triggering hydrogen and flame sensors and e-stop push buttons (every 6 months)
- Safety relief device inspection and recertification (every 3 years)

Prior to station start-up a comprehensive maintenance program and supporting documentation should be in place.

Appendix A

Typical Safety Questions and Answers:

How safe is venting hydrogen? Venting hydrogen is safe. Vented hydrogen does not directly pose a threat to humans as it is neither toxic nor carcinogenic. However, it can lead to a fire, explosion or excessive noise so it is vented through vent stacks high above people and equipment. Once in the atmosphere, the vented hydrogen disperses and rises very rapidly thus further reducing any potential issues.

Is hydrogen safe to breathe in? Hydrogen should not be inhaled due to its fuel properties. In the event of inhalation or contact, hydrogen is neither toxic nor carcinogenic.

Does hydrogen have an odour like Natural Gas? Hydrogen does not have an odour. It is noted that pure natural gas does not have an odour. A sulphur smelling additive causes the odour of natural gas smelt by the public.

Is hydrogen flammable and could there be an explosion? Hydrogen is flammable and can lead to an explosion in a similar way as gasoline and diesel. All fuels need to be used and handled properly to ensure safety. Hydrogen stations have numerous safety systems including fire sensors, hydrogen sensors, non-sparking electrical systems, and specifically designed vent systems to ensure safety.

Is hydrogen more or less flammable than typical fuels? The flammability of hydrogen is very similar to gasoline and natural gas however ignition and burning characteristics are slightly different. Both gasoline and diesel will ignite if a flame or spark is applied to a mixture of less than 1.5% in air, hydrogen needs to be in a mixture of at least 4% in air to ignite. Due to the lightness of hydrogen compared to air, hydrogen will disperse rapidly in an open area which means hydrogen will not pool like the fumes of other fuel sources. . Although hydrogen has a lower energy density, it can be ignited with a smaller amount of energy, therefore the potential dangers of hydrogen are similar to incumbent fuels. All need to be treated as flammable.

Can my kids still play outside during venting/deliveries? Yes, no problems at all, the process and systems are designed to be safe with multiple fail-safe features.

What are the risks for neighbors (especially those that live nearby) and customers visiting the site? The addition of hydrogen fuel to an existing fueling station does not increase the risk to neighbors or drivers, or general public. The quantity of hydrogen fuel at the site is far less than what is contained in gasoline, diesel or propane tanks at a typical station. Hydrogen is delivered in fully contained systems such that any venting is directed away safely. Customers will not be exposed to hydrogen fuel in the way they are to gasoline or diesel while using filling nozzles.

What are we doing to ensure the safety of the community and customers/site staff?
Emergency response programs will be created that integrate with existing site procedures as well as coordinating with first responders and fire fighters to make sure they are aware that hydrogen is on site and how to handle it in the event of emergency. Special site signage is also added to help improve safety.

Appendix B

As more FCEVs take the road and the hydrogen station network expands, mobile refuelers will be able to provide additional capacity in the case of station repair, or other unforeseen needs. With a hydrogen compressor, storage and dispenser on-board, mobile refuelers have capability to travel to designated locations and fill vehicles.

Mobile refuelers require specific approvals. Tanks on the mobile refueler will need to meet U.S. Department of Transportation (DOT) standards for moving flammable gases, either as pre-approved DOT tanks or special permit tanks. (The primary relevant regulation is 49 CFR 173.301.)67,68

The Compressed Gas Association TB25 “Design Considerations for Tube Trailers,” which has been incorporated by reference into 49 CFR 173.01, offers a solid starting point for planning to comply with DOT regulations. It should be used for performing analysis or performance testing. For composite tanks commonly used to store hydrogen, DOT standards require a full range of testing to verify integrity. Prior to testing, it is recommended that manufacturers of mobile refuelers contact the Pipeline and Hazardous Materials Safety Administration (PHMSA) at DOT to ensure tests and methods meet all requirements.

The California Fire Code and International Fire Code do not contain guidance on mobile fueling, but, depending on the site, there is information on mobile refueling in NFPA 2. Manufacturers of mobile refuelers should review NFPA 2 to ensure project compliance.