

The background of the entire page is a purple-tinted image showing a network of water molecules (represented as small spheres connected by lines) and larger, reflective bubbles. The bubbles are arranged in a way that suggests a liquid surface or a cluster of droplets.

BC Hydrogen Regulatory Mapping Study

JUNE 2023

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Acknowledgments

The BC Hydrogen Regulatory Mapping Study was conducted by Stantec from May 2022 to June 2023. The project team would like to thank the many individuals and other stakeholders who provided input to the study through participation in interviews and feedback. The team would also like to thank the B.C. Centre for Innovation and Clean Energy (CICE) and the Ministry of Energy, Mines and Low Carbon Innovation (MEMLI) for their guidance during the study.



Ministry of
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Executive Summary

The Government of British Columbia (BC) released the BC Hydrogen Strategy in July 2021 (the Strategy) to provide a blueprint for using low-carbon hydrogen to help decarbonize sectors of the economy, achieve climate goals, and support an emerging clean technology sector. A key objective of the Strategy is to remove roadblocks, harmonize regulations and permitting, and establish an effective regulatory regime for fast-tracking hydrogen deployment. The B.C. Centre for Innovation and Clean Energy (CICE) and the Ministry of Energy, Mines and Low Carbon Innovation (MEMLI) engaged Stantec Consulting Ltd. (Stantec) to prepare this regulatory mapping study to identify the current regulatory framework applicable to the development of hydrogen production projects in BC (the study). This study describes the current framework applicable to hydrogen development, including current barriers, and provides recommendations to streamline the regulatory process to accelerate hydrogen project deployment. The study has been undertaken in two distinct phases to support a regulatory review as well as government decision-making.

The study presents six representative low-carbon hydrogen projects to illustrate how different regulatory approvals may apply. The projects considered are listed in the box to the right.

Hydrogen development projects are subject to the same provincial, federal, and municipal regulatory frameworks as other larger-scale capital projects. Applicable requirements are typically based on the layout and design configuration of project components, process inputs, production methods, and production outputs.

Low-carbon hydrogen projects presented in this study

- » Electrolytic hydrogen production using electricity from the BC Hydro grid
- » Electrolytic hydrogen production using electricity from an off-grid source (i.e., solar or wind)
- » Hydrogen produced from natural gas with carbon capture utilisation and storage (CCUS)
- » Hydrogen produced from the thermal decomposition of methane at high temperatures (i.e., pyrolysis)
- » Ammonia produced from low-carbon hydrogen
- » Methanol produced from low-carbon hydrogen

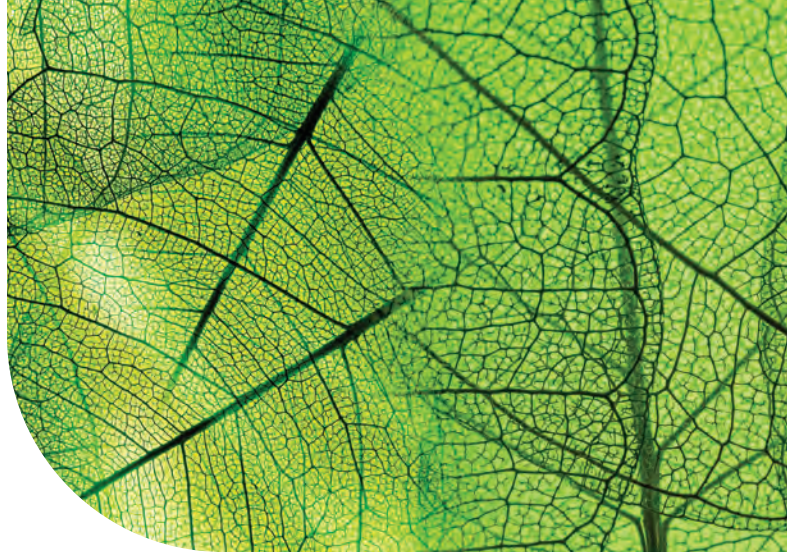
Current Applicable Framework

Environmental Assessment

The requirements of the BC *Environmental Assessment Act* (BCEAA) and the federal *Impact Assessment Act* (IAA) would precede all other provincial, federal, and municipal permitting. The Reviewable Project Regulation (RPR) under the BCEAA defines which projects require an environmental assessment (EA) through established thresholds. Hydrogen-specific production thresholds are defined under the organic and inorganic chemical industry grouping in the RPR. Specifically, a proposed hydrogen project would be automatically reviewable (i.e., require an EA) if production output of hydrogen is greater than 100,000 tonnes/year. Further, a hydrogen development project may also automatically trigger an EA through associated project components and/or ancillary infrastructure depending on the project design (e.g., wind generating facility, electricity transmission lines, marine terminal construction, shoreline modification).

For reviewable projects, the BCEAA establishes a seven-step EA process that encompasses early engagement, EA readiness, process planning, application development and review, effects assessment, recommendation, and decision. Currently, hydrogen production is grouped in the RPR within a broad category of industrial projects, which includes the manufacturing of poisonous/toxic chemicals. This broad grouping does not distinguish low-carbon hydrogen production from other industries that may have a much larger environmental footprint.

The IAA governs the preliminary approval process for large capital projects across Canada. The Physical Activities Regulations under the IAA set out the thresholds for a designated project. There are currently no specific hydrogen production thresholds; however, depending on the design of a specific project other thresholds may be applicable (e.g., development of a marine terminal for ships larger than 25,000 deadweight tonnage).



Provincial, Federal and Municipal Regulatory Framework

In November 2022, the BC Government passed the *Energy Statutes Amendment Act* changing the BC Oil and Gas Commission (BC OGC) to the BC Energy Regulator (BCER), and establishing its authority to regulate the manufacturing of hydrogen, ammonia, methanol as well as carbon dioxide (CO₂) transportation. This is an important first step in establishing a more streamlined regulatory framework for hydrogen projects. The legislation has created a regulatory framework with a single-window regulator for hydrogen development and replaces the former *Oil and Gas Activities Act* with the *Energy Resources Activities Act*.

The legislative changes enable the BCER to regulate all scales of hydrogen, ammonia, methanol, and carbon storage projects, in addition to oil and gas projects. The BCER will also regulate pipelines, facilities, wells, and related activities.

Technical Safety BC (TSBC) authority related to hydrogen, includes regulating storage utilization of hydrogen in industrial processing and production applications in accordance with the *Safety Standards Act* and Gas Safety Regulations. TSBC also governs ancillary equipment such as electrical

equipment and systems, hydrogen systems, boilers, pressure vessels, and refrigeration systems.

TSBC and the BCER currently coordinate on their spheres of regulatory authority for the oil and gas sector. Similar coordination is expected as it relates to the regulation of hydrogen.

The BC Utility Commission (BCUC) would play a role in regulating projects that are considered a public utility. Public utility companies must comply with the *Utilities Commission Act*; this includes rate applications, compliance filings, and submitting applications for capital expenditures, and may also include long-term resources and conservation plans, as required.

The BCUC is expected to clarify the regulation of hydrogen energy services in 2023 as an outcome of its inquiry into the regulation of hydrogen energy services, and how aspects of the *Utilities Commission Act* will apply.

Depending on the design and configuration of projects, regulatory approvals applicable to hydrogen development can be categorized into design-based requirements and site location-specific requirements.

Provincial design-based requirements that could apply to hydrogen projects include, but are not limited to:

<i>Water Sustainability Act</i>	Water licences
<i>Environmental Management Act</i>	Waste discharge approvals for air emissions and effluent discharge permits
<i>Utilities Commission Act</i>	Approvals for public utilities
<i>Oil and Gas Activities Act</i>	Permits for the construction and operation of facilities, pipelines and related activities
BC Hydro	Connection standards and approvals
<i>Transportation of Dangerous Goods Act (BC)</i>	Transport requirements

Provincial location-based regulatory requirements that could apply to hydrogen projects include, but are not limited to:

<i>Water Sustainability Act</i>	Notification/approval for changes in and about a stream
Contaminated Sites Regulation	Release notices for contaminated sites
<i>Wildlife Act</i>	Permits related to fish and wildlife
<i>Heritage Conservation Act</i>	Investigation and alteration permits
<i>Land Act</i>	Licences of occupation
<i>Forest Act</i>	Licences/permits to cut
<i>Agricultural Land Commission Act</i>	Approvals for non-farm use of Agricultural Land Reserve

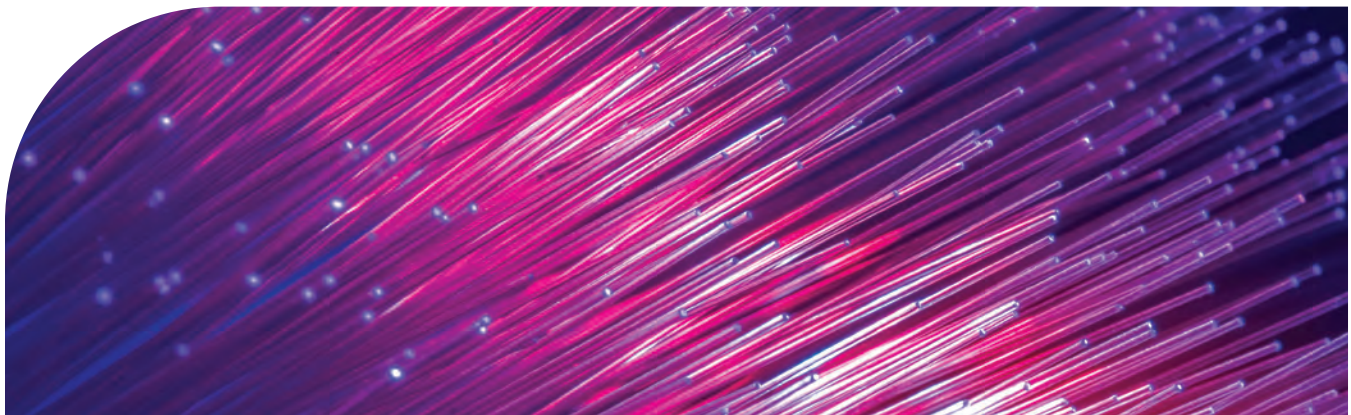
NOTE: These are high level summaries, further details are provided in the BC Hydrogen Regulatory Mapping Study.

Depending on specific design components and the location of each hydrogen project, federal requirements that could potentially apply to hydrogen projects include, but are not limited to:

<i>Impact Assessment Act</i>	Relevant port authority project review
<i>Canadian Environmental Protection Act</i>	Disposal at sea permits
<i>Canadian Navigable Waters Act, 1999</i>	Approvals for work that interferes with navigation
<i>Fisheries Act</i>	Request for review/authorization
<i>Species at Risk Act</i>	Authorization for relocation of species of risk or destruction of a residence
<i>Aeronautics Act</i>	Aeronautical obstruction clearance
<i>Transportation of Dangerous Goods Act (Canada) / Ammonia Code of Practice</i>	Transport requirements

NOTE: This is a high level summary. Details are provided in the BC Hydrogen Regulatory Mapping Study.

Hydrogen projects developed within municipal boundaries would also require approvals established in bylaws enabled by the *Local Government Act* and Community Charter. In situations where there is regulatory overlap with a provincial agency such as the BCER, a municipality typically works with the senior level of government for review and approval.



Indigenous Consultation

For projects subject to a provincial EA, the BCEAA incorporates consensus-seeking with Indigenous groups for key decisions throughout the EA process. This approach is consistent with the United Nation's interpretation of free, prior and informed consent which emphasizes the importance of the process of dialogue and negotiation over the course of a project from planning to implementation. If a project does not require a provincial EA under the BCEAA, consultation requirements will be met through specific permitting processes. For example, the BCER expects proponents to engage with Indigenous groups prior to and throughout the permitting process.

The Government of Canada must consult and, where appropriate, accommodate Indigenous groups when the Crown contemplates conduct (issuance of a permit) that might adversely impact potential or established Aboriginal or Treaty rights within areas of federal jurisdiction. The IAA has a focus on early planning and engagement as well as increasing opportunities for Indigenous peoples to participate in the assessment process. If a project does not trigger a federal EA under the IAA, federal consultation requirements would be met through specific permitting requirements, such as *Canada Marine Act* relevant port authority project review, *Canadian Navigable Waters Act*, and/or the *Fisheries Act* depending on the applicability to a specific project.



Literature Review of Other Jurisdictions

To contextualize the BC regulatory findings, a high-level review was conducted of other national and international jurisdictions to identify supporting policies and progressive initiatives that have been implemented to remove regulatory barriers in those jurisdictions. Policy developments were reviewed in Ontario, Alberta, Australia, United Kingdom, the Netherlands, Germany, and the United States (California and Texas). In many jurisdictions, legislators appear to be playing catch-up with policy to incentivize hydrogen and interest in developing the industry, and hydrogen projects at this time are largely expected to be developed and operated within existing regulatory regimes. Governments in all jurisdictions reviewed appear to be in the early stages of adapting regulations and developing new approaches to the emerging hydrogen industry.



Conclusion and Recommendations

Conclusion

The BC Government has made significant steps towards streamlining the regulatory framework for hydrogen projects by replacing the *Oil and Gas Activities Act* with the *Energy Resource Activities Act* and expanding the BCER's mandate to become the single window regulator for hydrogen.

Although important legislative changes have occurred, there will likely be a transitional period during which BCER regulation of hydrogen, ammonia, and methanol projects will rely on permit conditions. It is unclear when the new supporting regulatory framework will be in place, the support available to proponents during the transitional period, as well as the length of time required for the BCER to build capacity and issue specific guidance. Some of the former BC OGC regulations will likely require modification to facilitate the regulation of hydrogen, ammonia, and methanol as well as the storage of carbon dioxide. Several regulations that are tailored specifically to technologies and approaches in the oil and gas industry will likely require changes, or new regulations may be needed to accommodate hydrogen, ammonia, and methanol.

In some jurisdictions, a hydrogen production facility will require permitting or approvals from the BCER, TSBC, and the local municipality. It is unclear how these regulators will work together and reduce duplication and inefficiencies to streamline the process. Hydrogen projects could be proposed at a small scale to meet local requirements in proximity to demand. A tiered approach to regulation may be appropriate in line with the nature and scale of projects.

Indigenous groups have successfully entered into decision-making agreements with the provincial and federal governments regarding implementation of their own environmental standards (e.g., Tahltan Central Government and the Province of BC), which potentially adds another layer of approvals for projects to proceed.

Finally, some urban municipalities may lack suitably zoned industrial land within Official Community Plans and Zoning Bylaws to accommodate hydrogen developments, given substantial residential and commercial development pressure.

As hydrogen is an emerging technology in BC, it is anticipated that awareness and technical knowledge of hydrogen (including potential risks) amongst municipalities, Indigenous groups, and the public is very low, which could add risks for new projects.

Recommendations to address barriers to hydrogen development

- » Consider changes to regulations and/or new regulations that can be scaled to different sizes of hydrogen projects.
- » Provide guidance to proponents on how to obtain a *Water Sustainability Act* authorization for water diversion and use for hydrogen production.
- » Develop regulatory framework guidance for hydrogen proponents navigating the regulatory process, including providing additional guidance to first of their kind projects that are at the permitting stage.
- » Modify and/or develop new agreements and processes with other regulators to enhance the BCER single window approach, where appropriate.
- » Review of national and international technical codes and standards to support the regulatory framework to ensure safety and public confidence in the hydrogen industry.
- » Clarify the regulation of hydrogen services through the BCUC inquiry.
- » Establish a working group to review and consider the applicability of the hydrogen production threshold under the provincial environmental assessment process.
- » Provide Local and municipal permitting support for hydrogen projects, including building capacity within the BCER and TSBC to support municipalities in line with the new framework.
- » Work with Indigenous groups to co-develop consent-based decision-making agreements that formalize targets.
- » Undertake Education and further engagement with Indigenous and non-Indigenous communities regarding hydrogen development to improve awareness and technical knowledge.

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Acronyms/Abbreviations

the Agency	Impact Assessment Agency of Canada
AIA	Archaeological Impact Assessment
ALC	Agricultural Land Commission
ALR	Agricultural Land Reserve
AOA	Archeological Overview Assessment
BC	British Columbia
BC EAO	British Columbia Environmental Assessment Office
BCER	British Columbia Energy Regulator
BC OGC	British Columbia Oil and Gas Commission
BCEAA	British Columbia <i>Environmental Assessment Act</i>
BCUC	British Columbia Utilities Commission
CAC	criteria air contaminants
CCUS	Carbon Capture, Utilisation and Storage
CER	Canada Energy Regulator
CICE	B.C. Centre for Innovation and Clean Energy
CNWA	<i>Canadian Navigable Waters Act</i>
CPCN	Certificate of Public Convenience and Necessity
CSA	Canadian Standards Association
CSR	Contaminated Sites Regulations

DFO	Fisheries and Oceans Canada
DPD	Detailed Project Description
DRIPA	<i>Declaration on the Rights of Indigenous Peoples Act</i>
DWT	deadweight tonnes
EA	environmental assessment
EAC	environmental assessment certificate
EMA	<i>Environmental Management Act</i>
ERAA	<i>Energy Resources Activities Act</i>
ESAA	<i>Energy Statutes Amendment Act</i>
GHG	greenhouse gas
IAA	<i>Impact Assessment Act</i>
IPD	Initial Project Description
ISO	International Organization for Standardization
MECCS	Ministry of Environment and Climate Change Strategy
MEMLI	Ministry of Energy, Mines and Low-Carbon Innovation
NAICS	North American Industry Classification System
NG	natural gas
OCP	Official Community Plan
OGAA	<i>Oil and Gas Activity Act</i>
RfR	Request for Review

RO	reverse osmosis
RPR	Reviewable Projects Regulation
SARA	<i>Species at Risk Act</i>
SMR	Steam Methane Reforming
the Strategy	BC Hydrogen Strategy
TAC	Technical Advisory Committee
TDGA (BC)	<i>Transportation of Dangerous Goods Act (BC)</i>
TDGA (Canada)	<i>Transportation of Dangerous Goods Act, 1992 (Canada)</i>
TSBC	Technical Safety BC
TSSA	Technical Standards and Safety Authority
UNDRIP	United Nations Declaration on the Rights of Indigenous Peoples
US DOE	US Department of Energy
WSA	<i>Water Sustainability Act</i>

Glossary

auto thermal reforming	combines steam reforming of methane and combustion of methane simultaneously in a reactor over a specific catalyst bed
partial oxidation technologies	methane is mixed with oxygen sub-stoichiometric at high temperature and pressure (there is no catalyst bed in the reactor)
steam methane reforming (SMR)	methane is reacted with high pressure/high temperature steam using a catalyst to produce the hydrogen

Units of Measure

CH ₄	methane	N ₂ O	nitrous oxide
CO ₂	carbon dioxide	NO _x	nitrous oxides
CO	carbon monoxide	O ₂	oxygen
Fe	iron	PM _{2.5}	fine particulate matter
GW	gigawatt	SO ₂	sulphur dioxide
H ₂	hydrogen		
H ₂ O	water		
H ₂ S	hydrogen sulfide		
ha	hectare		
kg	kilogram		
km	kilometre		
kPa	kilopascal		
kV	kilovolt		
m ³	cubic metre		
m	metre		
mm	millimetre		
MJ	megajoule		
MW	megawatt		
N ₂	nitrogen		

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1 Introduction

1.1 Study Overview

The Centre for Innovation and Clean Energy (CICE) and the Ministry of Energy, Mines and Low Carbon Innovation (MEMLI) engaged Stantec Consulting Ltd. (Stantec) to prepare this regulatory mapping study to identify the current regulatory framework applicable to the development of hydrogen production in British Columbia (BC; the study).

The Government of BC released the BC Hydrogen Strategy in July 2021 (the Strategy) to provide a blueprint for how low-carbon hydrogen could help decarbonize sectors of the economy, achieve climate goals, and support an emerging clean-technology sector. A key objective of the Strategy is to remove roadblocks, harmonize regulations and permitting, and establish an effective regulatory regime for fast-tracking hydrogen deployment. This study will support decision-making in meeting this objective by describing the regulatory framework based on different hydrogen production pathways, identifying gaps in knowledge, and discussing opportunities to improve the regulatory process.

The study has been directed by the CICE Steering Committee, which includes representatives from CICE and MEMLI. The study includes the following objectives:

- » Provide an overview of the current regulatory framework based on multiple hydrogen production pathways
- » Identify the current role and jurisdictional oversight of key regulators that may be involved in regulating hydrogen in the province
- » Solicit feedback from various government stakeholders to confirm their current jurisdictional authority and discuss regulatory gaps and the potential for regulating hydrogen
- » Identify gaps in regulatory oversight and barriers for hydrogen project deployment
- » Integrate feedback from provincial agencies on the initial findings
- » Contextualize the current BC framework against the regulatory policy in other jurisdictions, within Canada, and internationally

- » Conduct further engagement with stakeholders, including Indigenous clean energy development organizations
- » Provide recommendations to streamline the regulatory process to accelerate hydrogen project deployment

The study has been undertaken in two distinct phases. During the first phase, an initial regulatory overview report was issued in July 2022 that described the regulatory framework at that time, the jurisdictional authority of key regulators, and initial gaps and barriers. The overview report was used to support a regulatory review and government decision-making. During phase two, the study was updated and refined through further consultation and review to assess regulatory gaps and barriers for low-carbon hydrogen deployment. The findings of phases one and two are presented, along with key recommendations, in this final report.

1.2 Hydrogen Policy in British Columbia

The CleanBC Roadmap outlines targets under the *Climate Change Accountability Act*, which are fundamental in achieving climate action goals and a net-zero future (Government of BC 2021a). Hydrogen is recognized as playing a key role in meeting CleanBC's decarbonization targets (Zen & the Art of Clean Energy Solutions 2019). As part of the CleanBC Roadmap, the Strategy outlines the BC Government's plan to be a world leader in growing the hydrogen economy by accelerating production and use of low-carbon hydrogen.

The Strategy's main objectives include developing a policy framework to support hydrogen production, creating regional hydrogen hubs, and incentivizing the adoption of hydrogen fuel cell vehicles in the local market (Government of BC 2021b). The BC Government is supporting the Strategy with investment of \$10 million over three years to develop policies to advance the hydrogen economy (Government of BC 2021c).

The Strategy notes that to meet emission reduction targets, BC must focus on advancing and providing support for renewable, low-carbon, or zero-emission hydrogen pathways, with the BC Government working to remove roadblocks and harmonize regulation and permitting (Government of BC 2021b). Regulatory agencies are highlighted in the Strategy as having an important role in regulating safe production and protecting water resources; they need to establish regulations and permitting requirements that are clear and consistent

across sectors and jurisdictions (Government of BC 2021b). The regulatory changes proposed in the Strategy (Government of BC 2021b) include:

- » Allow the British Columbia Oil and Gas Commission (BC OGC) to regulate hydrogen production if produced from fossil fuels
- » Establish a regulatory framework that is compatible with relevant provincial, federal, and international codes, standards, and regulations for hydrogen production
- » Create a regulatory framework for carbon capture and storage
- » Align the provincial regulatory framework to encourage the development of hydrogen production

Since the Strategy's release, the BC Government has taken steps to fulfill recommendations to support the low-carbon hydrogen industry, including introducing a discounted electricity rates (the CleanBC Industrial Electrification Rates) and enabling natural gas utilities to add hydrogen to their systems under the Greenhouse Gas Reduction Regulation. In November 2022, the BC Government passed the *Energy Statutes Amendment Act* (ESAA), changing the BC OGC to the BC Energy Regulator (BCER), and establishing its authority to regulate hydrogen, methanol, and ammonia production, and carbon dioxide (CO₂) transportation and underground storage. This is an important first step in establishing a more streamlined regulatory framework for hydrogen projects.

2 Methodology

2.1 Study Methods

To understand the specific regulatory requirements of different production pathways, the study has defined high-level design details for six proxy projects to illustrate how they may trigger different regulations. Each proxy project has been reviewed against federal, provincial, and municipal regulatory requirements to identify potential approval triggers. Several sources have been used to conduct the desktop analysis including research publications, policy documents, statutes, and our professional knowledge with permitting applications. Relevant regulatory requirements for each proxy project have been summarized and gaps in the regulatory process have been identified.

To contextualize the current regulatory framework in BC for hydrogen, a high-level scan of the current regulatory framework in different Canadian and international jurisdictions is provided. This review is based on published information, including policy documents, update reports, and available literature describing the current regulatory strategy, and any intended future regulatory changes to streamline the process. The jurisdictional scan is limited to published information online available at the time of writing.

Stantec has conducted consultation with stakeholders across provincial government and representative industry contacts to discuss gaps in knowledge. Discussions with each regulator have focused on confirming the performance and issues associated with various regulations in place. Key provincial government agencies and local government contacted to support the analysis have included:

- » BC Environmental Assessment Office (BC EAO)
- » BC OGC (now the BCER)
- » Technical Safety BC (TSBC)
- » BC Utilities Commission (BCUC)
- » Ministry of Environment and Climate Change Strategy (MECCS)
- » MEMLI
- » City of Burnaby

Stakeholder engagement was also conducted with Indigenous clean energy development organizations to understand barriers and to ground truth recommendations.

2.2 Study Limitations

The analysis is intended to provide an overview of regulatory requirements and approvals that could apply to proxy projects across potential value chains to inform policy and future decision-making. As such, the study focuses on key regulatory requirements in BC that could challenge or present roadblocks to widespread deployment of larger-scale hydrogen production projects. The analysis includes consideration of the applicability of potential regulatory triggers; however, the study is not exhaustive of all legislative requirements that may be applicable. Proponents should fully screen individual projects against applicable regulatory requirements based on specific design information and selected site locations.

Changes to the provincial regulatory framework, including the passing of the ESAA, occurred during preparation of the study. This report has been revised to capture changes, where appropriate, but the study has not considered the potential modifications to existing BCER regulations or new regulations that may be required under the *Energy Resource Activities Act* (ERAA) to accommodate hydrogen, ammonia, and methanol production and CO₂ storage.

2.3 Proxy Projects

The Strategy notes that hydrogen projects may need to be regulated based on specific pathways or end use (Government of BC 2021). To understand the regulatory requirements of different production pathways, the study has defined and considered basic high-level design details for six proxy projects. The regulatory requirements for hydrogen production projects can typically be identified based on physical layouts, process inputs, production methods, and production outputs, so these have been defined for the proxy projects. The design details presented for each proxy project described below reflect the typical level and type of information required to screen projects against key regulatory requirements in BC. The study has considered potential distribution/transport options for hydrogen, methanol, and ammonia, but has not considered the regulatory requirements/approvals connected to hydrogen utilization (e.g., the use of hydrogen as a feedstock in iron and steel manufacturing, transportation uses, heat or fuel uses). The proxy projects

identified are not exhaustive of all possible project configurations, but the regulatory review is broad enough to apply many of the thresholds identified to other similar projects.

A summary of each proxy project is provided in the sections below. Process flow diagrams for each proxy project are provided in Appendix A.

2.3.1 Proxy Project 1: Electrolytic Hydrogen Produced using On-Grid Electricity

Proxy Project 1 is defined as an electrolytic hydrogen production facility that would produce and deploy low-carbon hydrogen for distribution to several end-use pathways. Depending on the scale of the development, a broad range of electrolyzers (5 megawatt [MW] to over 1 gigawatt [GW]) could form the design basis of a potential project in this category. As a benchmark, a 160 MW electrolyzer (alkaline or proton exchange membrane electrolyzer) could produce approximately 26,000 tonnes/year of hydrogen, while a much larger 1 GW electrolyzer could produce approximately 140,000 tonnes/year. This proxy project would require power from the BC energy grid (BC Hydro) and treated freshwater (e.g., reverse osmosis [RO], electrode ionization) as process inputs. Considerations for this proxy project include proximity to reliable freshwater (meeting daily cubic metre [m³]/day intake requirements) and high voltage powerlines. Potential distribution options would depend on end-use requirements, including export through a marine terminal, trucking (tube trailer trucks), or distribution through pipeline infrastructure. Hydrogen can be stored as a gas in high-pressure storage tanks, or as a liquid in the cryogenic form in dedicated containers. A summary of the main components of an on-grid low-carbon hydrogen project is provided in Table 1.

Table 1 Proxy Project 1

Project Component	Assumed Requirements/Considerations
Process Inputs	<ul style="list-style-type: none"> Electricity from BC Hydro (0.5 MJ/kg H₂) Water 9–14 kg H₂O/kg H₂
Design Components	<ul style="list-style-type: none"> Electrolysis process (e.g., alkaline water electrolysis, or proton exchange membrane), including oxygen and hydrogen treatment Water treatment plant (usually required for all sources, even a municipal water source) Ancillary infrastructure (e.g., low voltage distribution, instrument air system, nitrogen system, cooling water system, wastewater system, and firewater and associated safety systems) Land clearing required depending on scale of project

Table 1 Proxy Project 1

Project Component	Assumed Requirements/Considerations
Production Outputs	<ul style="list-style-type: none"> • H₂ • O₂
Emissions/ Discharges	<ul style="list-style-type: none"> • Waste from water treatment^a • H₂ venting • Water vapor from cooling tower
Storage	<ul style="list-style-type: none"> • On-site storage of hydrogen
Distribution	<ul style="list-style-type: none"> • Pipeline^b (pure H₂ or mixed with gas supply) (possible NPS 4–8) • Truck tube trailer (compressed) • Marine terminal facility and tankers (liquid H₂)

NOTES:

^a Depends on quality of water source. The hydrogen production process in this proxy requires high purity water, which can be achieved using a water purification system like RO. RO systems are widely used for achieving high purity water by passing a water stream with contaminant through a semi-permeable membrane, resulting in high purity water passing through while contaminants (minerals) are concentrated and rejected as waste. As an order of magnitude estimate assume 30% of the water stream will be discharged from the treatment system and the remainder will be used for electrolysis or utilized in the cooling system as makeup.

^b ASME B31.12 is the American Standard for hydrogen piping and pipelines.

H₂ hydrogen

kV kilovolt

H₂O water

m³ cubic metres

kg kilogram

O₂ oxygen

2.3.2 Proxy Project 2: Electrolytic Hydrogen Produced using Off-Grid Electricity

Proxy Project 2 is defined as including all the same core project components identified for the on-grid system (Proxy Project 1), but electricity would be supplied from an off-grid source (i.e., solar, wind, or geothermal). Therefore, this proxy project includes development of renewable power as well as the hydrogen production facility. We understand that this category could include a wide range of projects from smaller off-grid supply for local use (e.g., 10 MW electrolyzer) to the development of a wind farm supplying power to a 300 MW electrolyzer, including associated battery storage requirements. A summary of the main components of an off-grid low-carbon hydrogen project is provided in Table 2.

Table 2 Proxy Project 2

Project Component	Assumed Requirements/Considerations
Process Inputs	<ul style="list-style-type: none"> Electricity (renewable source, e.g., wind turbines, solar farm, or geothermal facility) Water (9–14 kg H₂O/kg H₂) Electrical substations and power storage (due to intermittency of solar or wind, the storage must be much bigger compared to Proxy Project 1, on-grid electrolytic)
Design Components	<ul style="list-style-type: none"> Electrolysis process (e.g., alkaline water electrolysis or proton exchange membrane), including oxygen treatment and hydrogen treatment Water treatment plant (usually required for all sources, even a municipal water source) Ancillary infrastructure (e.g., solar panels, wind turbines, low voltage distribution, instrument air system, nitrogen system, cooling water system, wastewater system, and firewater and associated safety systems) Land clearing required for the hydrogen facility and the renewable energy source (area required would depend on the scale of the project)
Production Outputs	<ul style="list-style-type: none"> H₂ O₂
Emissions/Discharges	<ul style="list-style-type: none"> Waste from water treatment (e.g., 300 m³/day^a) H₂ venting Water vapor from cooling tower
Storage	<ul style="list-style-type: none"> On-site storage of hydrogen
Distribution	<ul style="list-style-type: none"> Pipeline^b (pure H₂ or mixed with gas supply) (possible NPS 4–8) Truck tube trailer (compressed) Local use

NOTES:

^a Depends on quality of water source. The hydrogen production process in this proxy requires high purity water, which can be achieved using a water purification system like RO. RO systems are widely used for achieving high purity water by passing a water stream with contaminant through a semi permeable membrane, resulting in high purity water passing through while contaminants (minerals) are concentrated and rejected as waste. As an order of magnitude estimate assume 30% of the water stream will be discharged from the treatment system and the remainder will be used for electrolysis or utilized in the cooling system as makeup.

^b ASME B31.12 is the American Standard for hydrogen piping and pipelines.

H₂ hydrogen

kV kilovolt

H₂O water

m³ cubic metres

kg kilogram

O₂ oxygen

2.3.3 Proxy Project 3: Hydrogen Produced from Natural Gas with Carbon Capture Utilization and Storage

Proxy Project 3 is defined as producing hydrogen from natural gas, using either steam methane reforming (SMR), auto-thermal reforming, or partial oxidation technologies. This proxy project would include the use of carbon capture, utilization, and storage (CCUS) technologies. Natural gas hydrogen plants can vary greatly in size from 8,000 tonnes/year to 1,000,000 tonnes/year of hydrogen output. Site location considerations include proximity to natural gas feedstock, existing pipeline infrastructure, and a suitable location for CCUS. It is assumed that development of these types of projects are most likely to occur in northeastern BC, either on brownfield or greenfield sites, thereby taking advantage of existing natural gas sources, oil, and gas pipeline infrastructure and suitable CCUS sites (e.g., depleted gas pools and deep saline formations). Potential distribution options would depend on end-use requirements and could include truck tube trailer loading or pipeline infrastructure.

A summary of the main components of Proxy Project 3 is provided in Table 3.

Table 3 Proxy Project 3

Project Component	Assumed Requirements/Considerations
Process Inputs	<ul style="list-style-type: none"> Natural gas (NG) or other hydrocarbon (pipelines, existing or new) Natural gas feedstock tie-in: 3.5 kg NG/kg H₂ Water to create steam (16 kg water/kg H₂) Electricity (0.5 MJ/kg H₂)
Design Components	<ul style="list-style-type: none"> Hydrogen production units (e.g., SMR) Natural gas cleaning (removal of natural gas liquids, CO₂, and sulphur compounds) Ancillary infrastructure, including utilities (nitrogen, air, water) Steam generating equipment (ASME Section 1: boiler equipment) Flare for natural gas and acid gas relief during maintenance and emergency events CCUS system, including capture at source, upstream compression, CO₂ pipeline with dehydration, compression, and injection system (depleted oil and/or gas pools, geology, or deep saline formations) Land clearing required depending on the scale of the project

Table 3 Proxy Project 3

Project Component	Assumed Requirements/Considerations
Production Outputs	<ul style="list-style-type: none"> • H₂ • CO₂ (if captured) • Natural Gas Liquids (ethane, propane) from natural gas processing
Emissions/Discharges	<ul style="list-style-type: none"> • CO₂ (fugitive and natural gas combustion) • CCUS can capture up to 95% CO₂, 95% sulphur compounds from natural gas cleaning • CH₄ (fugitive and natural gas combustion) • N₂O (natural gas combustion) • CACs (NO_x, PM_{2.5}, SO₂, CO, H₂S)
Storage	<ul style="list-style-type: none"> • On-site/off-site storage of hydrogen and/or carbon dioxide
Distribution	<ul style="list-style-type: none"> • Pipeline (pure H₂ or mixed with gas supply) (possible NPS 4–8) • Pipeline infrastructure required for CCUS • Truck (compressed)

NOTES:

CAC	criteria air contaminant	kg	kilogram
CCUS	carbon capture, utilisation and storage	MJ	megajoule
CH ₄	methane	N ₂ O	nitrous oxide
CO	carbon monoxide	NG	natural gas
CO ₂	carbon dioxide	NO _x	nitrous oxides
H ₂	hydrogen	PM _{2.5}	fine particulate matter
H ₂ S	hydrogen sulfide	SMR	steam methane reforming
		SO ₂	sulphur dioxide

2.3.4 Proxy Project 4: Hydrogen Produced from Methane Pyrolysis

Proxy Project 4 is defined as producing hydrogen from the thermal decomposition of methane at high temperatures (i.e., pyrolysis). The methane feedstock for this process can be from fossil methane (i.e., natural gas) or from biomethane. It is assumed that the sources of biomethane are not sufficient in BC at this time, so the methane source would likely be natural gas. The pyrolysis process generates solid carbon (e.g., carbon black) as a by-product, which avoids carbon dioxide emissions and the requirements for CCUS. This technology is currently in the research and development stage with issues such as yield, catalyst list, fouling, and cost of operation affecting commercialization. It is assumed that development of these types of

projects are most likely to occur in northeastern BC, either on brownfield or greenfield sites, thereby taking advantage of existing natural gas sources. Since this type of hydrogen production is still in development, the design components are summarized at a high level in Table 4.

Table 4 Proxy Project 4

Project Component	Assumed Requirements/Considerations
Process Inputs	<ul style="list-style-type: none"> • Feedstock methane (~4 kg CH₄ / kg H₂ – not including fuel for heating) • Electricity or fuel for heating • Water used as a coolant
Design Components	<ul style="list-style-type: none"> • Pyrolysis unit • Power transmission • Closed-loop water cooling system • Ancillary infrastructure, including utilities (specifics depending on technology identified) • Natural gas cleaning, including acid gas disposal (H₂S and CO₂) • Flare for natural gas relief during maintenance and emergency events • Storage for waste carbon • Land clearing required depending on the scale of the project
Production Outputs	<ul style="list-style-type: none"> • H₂ • Solid carbon (e.g., carbon black) • Natural gas liquids (ethane and propane) from natural gas cleaning • Solid carbon (e.g., carbon black produced if fossil methane or biomethane is used as the input)
Emissions/Discharges	<ul style="list-style-type: none"> • Potential for methane leaks
Storage	<ul style="list-style-type: none"> • On-site storage for methane and produced hydrogen • Storage for waste carbon and/or distribution infrastructure of valuable solid carbon
Distribution	<ul style="list-style-type: none"> • Pipeline (pure H₂ or mixed with gas supply) • Truck (compressed)

NOTES:

CO₂ carbon dioxide

H₂ hydrogen

H₂S hydrogen sulfide

2.3.5 Proxy Project 5: Ammonia Produced from Low-Carbon Hydrogen

Proxy Project 5 is defined as producing ammonia from nitrogen gas and hydrogen gas. We have assumed that hydrogen is produced from a low-carbon technique, but it is only considered as an input to this proxy project. Most ammonia is used for fertilizers, although there is some consideration of it as a fuel source. The production of hydrogen would, therefore, follow a pathway shown in Proxy Projects 1 or 2. We have assumed that the nitrogen source would be from the atmosphere (N₂) using an air separation unit. We assume that ammonia will be produced through the well-known Haber-Bosch process using high pressure and high temperature. For this proxy project, we have assumed that the ammonia would be exported internationally from BC from a marine export terminal. Ammonia is classified as a dangerous good under the *Transportation of Dangerous Goods Act, 1992* (TDGA [Canada]) and has safety issues for transportation. Ammonia can be converted to granular urea, which can be exported as a fertilizer, but we have not considered this additional processing step in this proxy project analysis. We understand that projects with outputs up to 700,000 tonnes/year utilizing a 1 GW electrolyzer could be developed. A summary of the main components of an ammonia project is provided in Table 5.

Table 5 Proxy Project 5

Project Component	Assumed Requirements/Considerations
Process Inputs	<ul style="list-style-type: none"> • H₂ (could be provided via pipelines or modular transport, such as trucked) • N₂ (from atmosphere) • Cooling water (closed loop) • Electricity • Catalyst (e.g., Fe with other elements)
Design Components	<ul style="list-style-type: none"> • Nitrogen capture technology (air separation unit, cryogenic process block) • Water treatment infrastructure • Haber-Bosch process plant, including compressors and boilers/heaters • Land clearing required depending on the scale of the project
Production Outputs	<ul style="list-style-type: none"> • Ammonia

Table 5 Proxy Project 5

Project Component	Assumed Requirements/Considerations
Emissions/Discharges	<ul style="list-style-type: none"> • O₂ • Water vapour • Waste stream from water treatment (i.e., concentrate water stream from RO system) • Ammonia (fugitive and vented) (leading to secondary PM_{2.5}) • CACs (NO_x, PM_{2.5}, SO₂, CO) from natural gas-fired boiler (Haber-Bosch processing plant) • CO₂, CH₄, N₂O from natural gas-fired boiler (Haber-Bosch processing plant)
Storage	<ul style="list-style-type: none"> • Storage tanks for transport in accordance with Canadian Standards Association (CSA) B620 • On-site storage of ammonia, hydrogen
Distribution	<ul style="list-style-type: none"> • Truck • Rail • Marine transport terminal (export)

NOTES:

CAC criteria air contaminant
 CH₄ methane
 CO carbon monoxide
 CO₂ carbon dioxide
 Fe iron
 H₂ hydrogen

N₂ nitrogen
 N₂O nitrous oxide
 NO_x nitrous oxides
 O₂ oxygen
 PM_{2.5} fine particulate matter
 RO reverse osmosis
 SO₂ sulphur dioxide

2.3.6 Proxy Project 6: Methanol Produced From Low-Carbon Hydrogen

Proxy Project 6 is defined as the production of methanol from low-carbon hydrogen production. In the production of methanol, CO₂ is mixed with hydrogen gas. For this proxy project, we have assumed that CO₂ is obtained from an outside source, and it is not generated as part of the project. Theoretically, the CO₂ could be sourced from an industrial process to reduce CO₂ emissions. We understand that projects with an output of up to 150,000 tonnes of methanol per year are under consideration.

We have assumed that the methanol produced in BC would be exported to international markets via marine transportation. Methanol is used in the production of many chemicals, including formaldehyde, and is used in plastic production. A summary of the main components of a methanol project is provided in Table 6.

Table 6 Proxy Project 6

Project Component	Assumed Requirements/Considerations
Process Inputs	<ul style="list-style-type: none"> • H₂ • CO₂ • Cooling water (closed loop) • Electricity
Design Components	<ul style="list-style-type: none"> • Methanol plant • Syngas reactor • Syngas flare • Water treatment for industrial water • Storage for inputs (H₂, CO₂) • Land clearing required depending on the scale of the project
Production Outputs	<ul style="list-style-type: none"> • Methanol • Water
Emissions/Discharges	<ul style="list-style-type: none"> • CO₂ (fugitive and combustion)
Storage	<ul style="list-style-type: none"> • On-site storage of methanol and H₂ • Storage tanks for transport in accordance with CSA B620
Distribution	<ul style="list-style-type: none"> • Truck • Rail • Marine transport terminal (export)

NOTES:

CO₂ carbon dioxide

CSA Canadian Standards Association

H₂ hydrogen



3 Environmental Assessment Framework

Reviewing a project against the requirements of the BC *Environmental Assessment Act* (BCEAA) and the federal *Impact Assessment Act* (IAA) is usually one of the first steps in identifying the regulatory framework for larger-scale capital projects in BC. If an environmental assessment (EA) is required for such projects, this would precede other provincial, federal, and municipal permitting. A review of potential triggers under BCEAA and IAA applicable to the hydrogen proxy projects identified is provided below. Separate Indigenous group assessment and review requirements that may apply are discussed in Section 5.0.

3.1 British Columbia *Environmental Assessment Act*

3.1.1 Overview

The BCEAA governs the preliminary approval process for large capital projects in BC. The current Act was modernized and came into force on December 16, 2019. The BCEAA review process is administered by the BC EAO. The BCEAA is intended to promote sustainable economic development by ensuring projects are constructed and operated in a manner that limits adverse environmental, social, economic, cultural, and health impacts while providing long-term economic and social benefits. Through the associated process and policies, the BCEAA also provides the Province of British Columbia with a process for meeting its Crown duty to consult with potentially affected Indigenous groups. Projects that are prescribed as 'reviewable' must receive an environmental assessment certificate (EAC) or an exemption order before it can proceed.

From a legislative perspective, the BCEAA establishes the framework for EAs, including associated timelines, and is supported by several regulations. The Reviewable Projects Regulations (RPR)¹ set out the thresholds for notifications and reviewable projects that are subject to the BCEAA. The applicability of thresholds to the proxy projects are discussed further below.

¹ [Reviewable Projects Regulation \(gov.bc.ca\)](https://www.gov.bc.ca)

3.1.2 BCEAA Thresholds Under the Reviewable Projects Regulation

The RPR under the BCEAA defines which projects require a review (EA). Thresholds are categorized in the regulation for a variety of criteria including scale, geographical location, potential for adverse effects, and specific project type or industry. A summary of the thresholds under the RPR applicable to the hydrogen proxy projects is provided in Table 7. Relevant thresholds that could be applicable include those listed under organic and inorganic chemicals, electricity projects (including energy transmission and storage), petroleum and natural gas (transmission pipelines for hydrogen derived from natural gas), and transportation (marine terminal) construction. Proponents should review potential thresholds for individual projects to understand and manage potential design-related regulatory risks.

The most likely thresholds applicable to hydrogen projects are outlined under the organic and inorganic chemical industry in Part 2, Table 1 of the RPR. Industrial gas manufacturing, including hydrogen, is defined in the North American Industry Classification System, 2017 (NAICS) as code 325120, and a proposed project would be reviewable if production output of hydrogen is greater than 100,000 tonnes/year (Proxy Projects 1-4). Further, projects producing ammonia (NAICS 325313) in the form of anhydrous or ammonium hydroxide and methanol (NAICS 325190) are classified materials under the TDGA (Canada) and would be reviewable if output is more than 5,000 tonnes/year (Proxy Projects 5 and 6). We understand that ammonia (i.e., anhydrous or ammonium hydroxide) falls under two classes of the TDGA (Canada) relevant to the RPR; specifically, Class 6 (poisonous/toxic) and Class 8 (corrosive), in addition to Class 2 (gas under pressure), which falls outside of the RPR description. There is no class specifically listed for flammable gas in the RPR, but given that ammonia can explode if heated it may also fall under Class 2 of the Act. Methanol also falls under Class 6 (poisonous/toxic) of the TDGA (Canada) relevant to BCEAA, in addition to Class 3 (flammable liquid) not listed in the RPR.

Table 7 Potentially Applicable Thresholds Under the Reviewable Projects Regulation

RPR Section	Description	Applicability to Proxy Projects
Part 2 Industrial Projects Table 1 Organic and Inorganic Chemical Industry Industrial gas manufacturing (NAICS 325120) Chemical fertilizer (except potash) manufacturing (NAICS 325313). Other basic organic chemical manufacturing (NAICS 325190)	New manufacturing facility that has a production capacity of > 100,000 tonnes/year, or produces materials classified under the <i>Transportation of Dangerous Goods Act</i> 1992 (Canada) as "Explosives", "Flammable solids", "Corrosives", "Poisonous (toxic) and infectious substances" or "Oxidizing substances; organic peroxides" and has a production capacity of ≥ 5 000 tonnes/year.	The thresholds would apply to all Proxy Projects 1-4 producing hydrogen (NAICS 325120) if production capacity is greater than 100,000 tonnes/year. As ammonia (NAICS 325313) and methanol (NAICS 325190) are both classified under the TDGA (Canada), proposed projects with a capacity of greater than 5,000 tonnes/year would also be reviewable (Proxy Projects 5 and 6).
Part 4 Energy Projects Table 7 Electricity Projects Power Plants	New hydroelectric or thermal electric power plant, or another power plant (not including those listed below) with a capacity of > 50 MW of electricity. New land-based wind generating facility with 15 or more turbines. A new wind generating facility with at least one turbine located in water and a total of 10 or more turbines. A new in-stream tidal power facility with a rated nameplate capacity of ≥ 15 MW or other tidal power generating facility.	Proposed off-grid hydrogen projects (Proxy Project 2) requiring the development of an electrical generating facility meeting one of the listed thresholds would be reviewable.
Part 4 Energy Projects Table 7 Electricity Projects Transmission Lines	New transmission line of 345 kV or higher voltage and of 40 km or more in length, if the land on which the line is built is not alongside and contiguous to an area of land previously developed for a transmission line, transmission pipeline, public highway, or railway.	This threshold could apply to all proxy projects depending on length of line, voltage requirements, and location.

Table 7 Potentially Applicable Thresholds Under the Reviewable Projects Regulation

RPR Section	Description	Applicability to Proxy Projects
Part 4 Energy Projects Table 8 Petroleum and Natural Gas Projects Energy Storage Facilities	Any other energy storage facilities for a project with a total design capacity to store one or more energy resources in a quantity that can yield by combustion ≥ 3 petajoule of energy.	The specific thresholds listed for energy resource and storage facilities would not apply to Proxy Projects 1 and 2 as the Regulation defines an energy resource as a "...natural gas and oil, and all other forms of petroleum and hydrocarbon, in gaseous or liquid state, and electricity." The definition of energy storage in the Act "means a place where an energy resource is accumulated or stored in bulk as part of the process of being transported or distributed." The energy storage threshold could potentially apply to Proxy Project 3 and Proxy Project 4 but is unlikely given the large yield trigger.
Part 4 Energy Projects Table 8 Petroleum and Natural Gas Projects Transmission Pipelines	New transmission pipeline facility with: <ol style="list-style-type: none"> 1. A diameter of ≤ 114.3 mm and a length of ≥ 60 km, 2. A diameter of between 114.3 and 323.9 mm and a length of ≥ 50 km, or 3. A diameter of > 323.9 mm and a length of ≥ 40 km if the land on which the pipeline is built is not alongside and contiguous to an area of land previously developed for a transmission line, transmission pipeline, public highway, or railway.	A transmission pipeline is defined under the regulation as "a pipe or system of pipes through which natural gas, oil or solids, or a liquid or gas derived from natural gas, oil or solids, whether in suspension or some other form, is transported." A pipeline transporting hydrogen gas produced via water electrolysis does not meet the definition of a transmission pipeline, therefore this threshold would not apply to Proxy Projects 1 and 2. This threshold could apply to natural gas feedstock applicable to Proxy Project 3 or Proxy Project 4.

Table 7 Potentially Applicable Thresholds Under the Reviewable Projects Regulation

RPR Section	Description	Applicability to Proxy Projects
Part 5 Water Management Projects Table 9 Water Management Projects Water Diversion Projects	Project incorporating new works that are: <ol style="list-style-type: none"> Constructed for the diversion of water, and Designed to divert water at a maximum rate of ≥ 10 million m^3/year 	This threshold would not apply to projects connecting to municipal/existing water sources and is unlikely to apply to proposed hydrogen projects (Proxy Projects 1-4) requiring new water abstraction works, given the magnitude of water diversion automatically triggering review and the water input requirements (e.g., electrolytic hydrogen water 9–14 kg H_2O /kg H_2).
Part 5 Water Management Projects Table 9 Water Management Projects Groundwater Extraction	Project incorporating new works that: <ol style="list-style-type: none"> Consists of the extraction of groundwater from one of more aquifers Is operated intermittently or continuously for > 1 year, and Is designed to be operated so that groundwater is extracted at a rate of > 75 litres/second 	This threshold would not apply to projects connecting to municipal/ existing water sources but could potentially apply to proposed hydrogen projects comprising groundwater extraction components (Proxy Projects 1-4) as process inputs (e.g., electrolytic hydrogen water 9–14 kg H_2O /kg H_2).
Part 5 Water Management Projects Table 9 Water Management Projects Shoreline Modification	Project incorporating new works that: <ol style="list-style-type: none"> Results in changes in or about a stream, marine coastline or estuary Entails dredging, filling or other direct physical disturbance of > 1000 m of linear shoreline, or a combination of foreshore and submerged land, below the natural boundary of a stream, marine coastline or estuary 	This threshold would apply to proposed hydrogen projects (Proxy Projects 1-6) if disturbance to a shoreline, or to foreshore or submerged land, is required in the construction of a component of the project.

Table 7 Potentially Applicable Thresholds Under the Reviewable Projects Regulation

RPR Section	Description	Applicability to Proxy Projects
Part 7 Transportation Projects Table 13 Transportation Projects Railways	A project that requires new rail access consisting of 20 continuous kilometres or more of track, if the railway is not alongside and contiguous to an area of land previously developed for a transmission line, transmission pipeline, public highway or railway.	Proxy Projects 5 and 6, where distribution of rail is considered a possibility, could trigger this threshold, depending on the length of track and its location (i.e., whether it is contiguous to previously developed linear infrastructure).
Part 7 Transportation Projects Table 13 Transportation Projects Marine Port Projects (other than Ferry Terminals)	A new marine port project, if construction of the project entails dredging, filling, or other direct physical disturbance of: <ol style="list-style-type: none"> ≥ 1 000 m of linear shoreline, or ≥ 2 ha of foreshore or submerged land, or a combination of foreshore and submerged land, below the natural boundary of a marine coastline or marine estuary 	This threshold could apply to proposed hydrogen projects (Proxy Projects 1-6) with export marine terminal components requiring infilling, dredging, or shoreline disturbance of more than 1,000 m of linear shoreline, or if infilling, dredging, or other direct physical disturbance affects an area greater than 2 ha.
Section 4 Effects Thresholds	Emits 380 000 tonnes or more per year of one or more greenhouse gases directly from project facilities, measured in carbon dioxide equivalents, determined in accordance with Part 3 of the Greenhouse Gas Emission Reporting Regulation, B.C. Reg. 249/2015.	The greenhouse gases (GHG) threshold would not apply to electrolytic hydrogen (Proxy Projects 1 and 2), nor would it apply to hydrogen produced from natural gas using CCUS (Proxy Project 3), or the pyrolysis process (Proxy Project 4). Additionally, it is assumed low-carbon hydrogen would be used in ammonia and methanol production.
Section 4 Effects Thresholds	Includes a location in an area listed in the Protected Areas Regulation and the project will have a significant adverse environmental, economic, social, cultural, or health effect in the area.	This threshold is location-specific and would only apply to projects being proposed in protected areas.

Table 7 Potentially Applicable Thresholds Under the Reviewable Projects Regulation

RPR Section	Description	Applicability to Proxy Projects
Section 4 Effects Thresholds	<p>Includes clearance of 60 km or more of land that is developed for transmission line, transmission pipeline, railway, public highway, or resource road, if the land is not alongside and contiguous to an area of land previously developed for one of those purposes or 600 ha or more of land, unless the clearance has been authorized by the minister, or delegate, under the <i>Resort Timber Administration Act</i>.</p> <p>Would not apply to transmission lines, pipelines, public highways, or railways.</p>	This threshold would only be relevant to projects requiring large areas of land clearing.

NOTES:

CCUS carbon capture, utilization and storage
 GHG greenhouse gases
 H₂ hydrogen
 H₂O water
 ha hectare
 kg kilogram
 km kilometre

kV kilovolt
 m³ cubic metres
 m metre
 mm millimetre
 MW megawatt
 TDGA (Canada) *Transportation of Dangerous Goods Act, 1992 (Canada)*

3.1.3 Other Considerations

Under Section 10(1) of the BCEAA, projects are required to submit a Project Notification to the BC EAO if the project meets specific criteria. The criteria for notification for new projects include:

- » Federally designated projects: designated under the IAA and not wholly located on federal lands or a reserve
- » Design or effects thresholds: a project would meet the project design or effects thresholds if those thresholds were reduced by 15%
- » Workforce: a project that would result, at the peak of construction or operations, in the employment by the proponent of 250 or more employees or contractors who work more than 30 hours per week on an annual basis at the project facilities
- » Greenhouse gases: a new project that emits 125,000 tonnes per year or more of one or more greenhouse gases directly from project facilities
- » Transmission line: a transmission line greater than 230 kV and greater than 40 km in length
- » Linear clearance: projects that include the clearance of 40 km or more of land that is to be developed for an electrical transmission line, transmission pipeline, railway, public highway, or resource road, if the land is not alongside and contiguous to an area of land previously developed for one of those purposes
- » Land clearance: projects that include the clearance of 450 ha or more of land, unless the clearance has been authorized by the Minister, or delegate, under the *Resort Timber Administration Act*

If a project requires a notification, it should include information about the types of activities and facilities planned, the history of engagement with Indigenous groups and the public, and the approvals or permits needed for all phases of the project (e.g., construction and operation). Once a Project Notification has been submitted to the EAO, the Chief Executive Assessment Officer has 60 days to: refer the project notification to the Minister of Environment and Climate Change Strategy to decide whether the project should be designated a reviewable project; require further time to review the notification; or determine that no further review of the project notification is required and the project may proceed to permitting with other agencies.

An individual or group may apply to the Minister of Environment and Climate Change Strategy to designate a project, that is not substantially started and not automatically reviewable under the BCEAA, as a reviewable project. When making the decision as to whether to designate a project as reviewable, the Minister must consider certain criteria, including whether the project could have effects on an Indigenous nation and its constitutional rights.

A proponent, whose project is not automatically reviewable under the BCEAA, can also apply to have the project designated as reviewable and, after considering the application, the Chief Executive Assessment Officer may decide to do so.

3.1.4 Environmental Assessment Process

For reviewable projects, the BCEAA comprises a seven-step EA process that encompasses early engagement, EA readiness decision, process planning, application development and review, effects assessment, recommendation, and decision. Key milestones under each step are summarised below and shown graphically in Figure 1. Further details of the process—including requirements for Indigenous or public participation, proponent and BC EAO deliverables, and mandated timelines—are provided in Appendix B. The overall review process includes up to a maximum of 570 days of government time (green line in Figure 1) and determines whether a project should commence with an EA, exempts the project from assessment, or terminates the EA review process. Proponent time (yellow line in Figure 1) is limited to one year for development of the Detailed Project Description (DPD) and three years for preparation of the EAC application. Both documents can progress in parallel to government tasks and can be submitted more quickly than the stipulated maximum proponent timelines.

The BC EAO has developed a comprehensive guidance framework categorised by each EA process phase; the full range of guidance is available through their website².

A reviewable project must possess an EAC or issued exemption to proceed through to post-certificate permitting. Information related to a project's permitting requirements is provided in the Initial Project Description (IPD), which would inform the permitting plan developed as part of the Process Order. A final permitting document is prepared when the EAC is issued, outlining the issues carried forward for further consideration.

² www2.gov.bc.ca/gov/content/environment/natural-resource-stewardship/environmental-assessments/guidance-documents/2018-act-guidance-materials

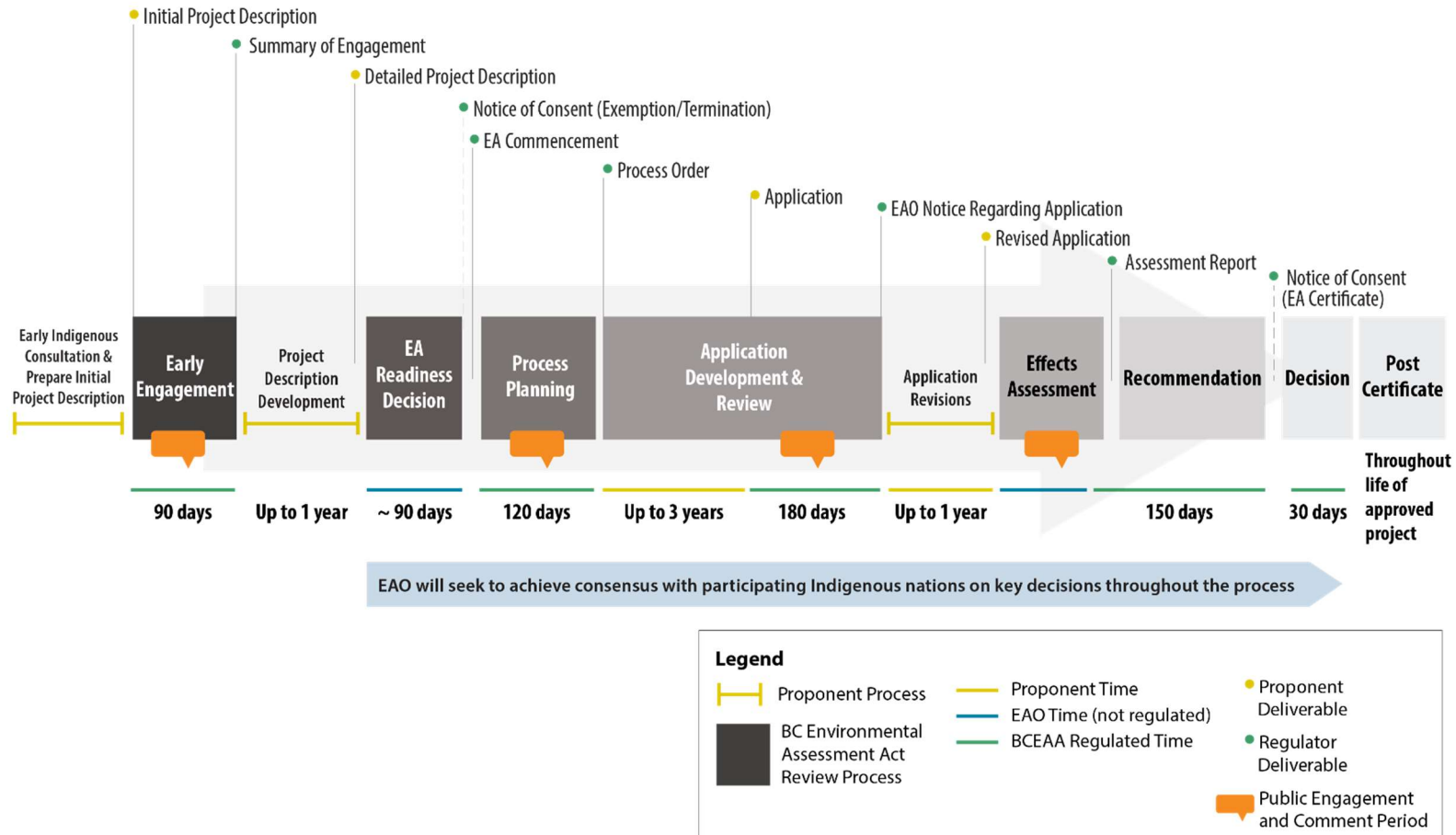
3.1.5 Future Considerations for Hydrogen Projects

The current BCEAA came into force on December 16, 2019, following an extensive revitalization process. The BCEAA requires that a review of the Act be initiated within five years of having come into force. A review of the BCEAA will be initiated in 2024. During the next scheduled review, it is possible the RPR could be re-evaluated to capture a broader range of hydrogen projects (e.g., smaller scale projects) that may not be automatically reviewable under the current Act. There is also uncertainty on how the government climate change policies such as CleanBC—intended to incentivize and fast track projects—may influence future decision-making. Currently hydrogen production is grouped within a broad category of industrial³ projects defined within NAICS codes, which includes the manufacturing of poisonous/toxic chemicals. This broad grouping does not distinguish hydrogen production appropriately (character, production methods, emissions, and potential for negative environmental effects) from other industries that may have a much larger environmental footprint⁴. Changing the requirements to capture a wider range of hydrogen projects may present a considerable hurdle to low-carbon hydrogen development, given that BCEAA process for a Reviewable Project for the proponent from planning (including the Initial Project Description) to the Minister’s Decision can take 3 to 5 years, but may take longer. An example indicative schedule for a proxy project triggering an EA under BCEAA is provided in Appendix C.

³ Currently, under *BC Environmental Assessment Act*, the most likely threshold that applies to hydrogen production facilities (Proxy Projects 1-4) is stipulated under Part 2 (Industrial Projects), Table 1 (Organic and Inorganic Chemical Industry) of the RPR; this would apply to projects with a production capacity greater than 100,000 tonnes/year.

⁴ For example, an electrolytic low-carbon hydrogen facility (Proxy 1 and 2) would require electricity and water (approx. 9-14 kg H₂O/kg H₂) as an input, outputs of H₂ and O₂, emission/discharges of wastewater (approx. 30% of water stream), H₂ venting, and water vapor. As such, environmental effects for these projects are likely to be predictable or mitigatable and could be addressed through the established permitting framework. Other non-production potential RPR thresholds (e.g., transmission lines, pipelines, marine ports) would still apply given the potential for significant effects.

Figure 1 British Columbia *Environmental Assessment Act* Review Process



SOURCE: Stantec 2023

3.2 *Federal Impact Assessment Act*

3.2.1 Overview

The IAA came into force on August 28, 2019 and governs the preliminary approval process for large capital projects across Canada. The IAA focuses on “impact assessment” for a broad suite of factors, including environmental, health, social, and economic effects of designated projects, and is intended to promote projects that are in the public interest. The IAA also attempts to promote the concept of “one project, one review” through coordination with provinces, and establishes a single agency responsible for assessments, the Impact Assessment Agency of Canada (the Agency). Similar to the BCEAA, the IAA has a focus on early planning and engagement as well as increasing opportunities for Indigenous peoples to participate in the assessment process.

From a legislative perspective, the IAA establishes the framework for EAs and is supported by two regulations:

- » Physical Activities Regulations (also known as the Project List): sets out the types of projects that may be subject to a federal impact assessment (i.e., designated projects)
- » Information Requirements and Time Management Regulations: includes information requirements for the planning phase and sets clear criteria under which legislated timelines could be suspended

Stantec notes that the IAA allows for the development of cost recovery regulations that can provide the Government of Canada with the opportunity to recover certain costs from the proponent.

3.2.2 IAA Thresholds

The Physical Activities Regulations under the IAA set out the thresholds for a Designated Project. The Regulations provide clarity and certainty as to which projects are subject to the IAA process. An overview of the thresholds that may apply to hydrogen proxy projects depending on site location and project configuration are provided in Table 8. Potential thresholds relevant to the proxy projects identified include Section 1 for protected locations, Section 39 for transmission lines and pipelines, Section 41 for construction of a pipeline for distribution, and Section 52 and 53 for development of a marine terminal to support berthing of ships.

Table 8 Physical Activities Regulations Criteria

IAA Physical Activities Regulation Section	Description	Applicability to Proxy Projects
National Parks and Protected Areas Section 1	The construction of a new electrical-generating facility or electrical transmission line, industrial facility, or new marine terminal in a wildlife area, defined under the Wildlife Area Regulations; a migratory bird sanctuary defined in the Migratory Bird Sanctuary Regulations; or a protected marine area established under the <i>Canada Wildlife Act</i> .	Threshold could apply to proxy projects developed in a protected location.
Electrical Transmission Lines and Pipelines Section 39	The construction, operation, decommissioning, and abandonment of a new international electrical transmission line with a voltage of 345 kV or more that requires a total of 75 km or more of new right-of-way, or a new interprovincial powerline designated under the <i>Canadian Energy Regulator Act</i> .	This threshold would only apply to proxy projects requiring an international electrical transmission line.
Electrical Transmission Lines and Pipelines Section 41	<p>The construction, operation, decommissioning, and abandonment of a new pipeline, as defined in section 2 of the <i>Canadian Energy Regulator Act</i>, other than an offshore pipeline, that requires a total of 75 km or more of new right of way.</p> <p>Per the <i>Canadian Energy Regulator Act</i>, “pipeline” means a line—including all branches, extensions, tanks, reservoirs, storage or loading facilities, pumps, racks, compressors, interstation communication systems, real or personal property, or immovable or movable, and any connected works—that connects at least two provinces or extends beyond the limits of a province, or an area referred to in paragraph (C) of the definition <i>designated area</i> in section 368 and that is used or is to be used for the transmission of oil, gas or any other commodity. It does not however include a sewer or water pipeline that is used or is to be used solely for municipal purposes.</p>	Threshold would only apply to proxy projects that include development of a pipeline requiring 75 km more of new right-of-way (Proxy Projects 1-4) that meets the definition of a pipeline under the <i>Canadian Energy Regulator Act</i> .

Table 8 Physical Activities Regulations Criteria

IAA Physical Activities Regulation Section	Description	Applicability to Proxy Projects
Transport Section 52	The construction, operation, decommissioning and abandonment of a new marine terminal designed to handle ships larger than 25 000 DWT.	Threshold could apply to proxy projects with a marine terminal component required for exporting hydrogen feedstock (e.g., chemical carriers like ammonia or methanol; Proxy Projects 5 and 6).
Transport Section 53	The expansion of an existing marine terminal, if the expansion requires the construction of a new berth designed to handle ships larger than 25 000 DWT and, if the berth is not a permanent structure in the water, the construction of a new permanent structure in the water.	Threshold could apply to proxy projects with a marine terminal component required for exporting hydrogen feedstock (e.g., chemical carriers like ammonia or methanol; Proxy Projects 5 and 6).

NOTES:

DWT deadweight tonnage

km kilometre

kV kilovolt

3.2.3 Assessment Process

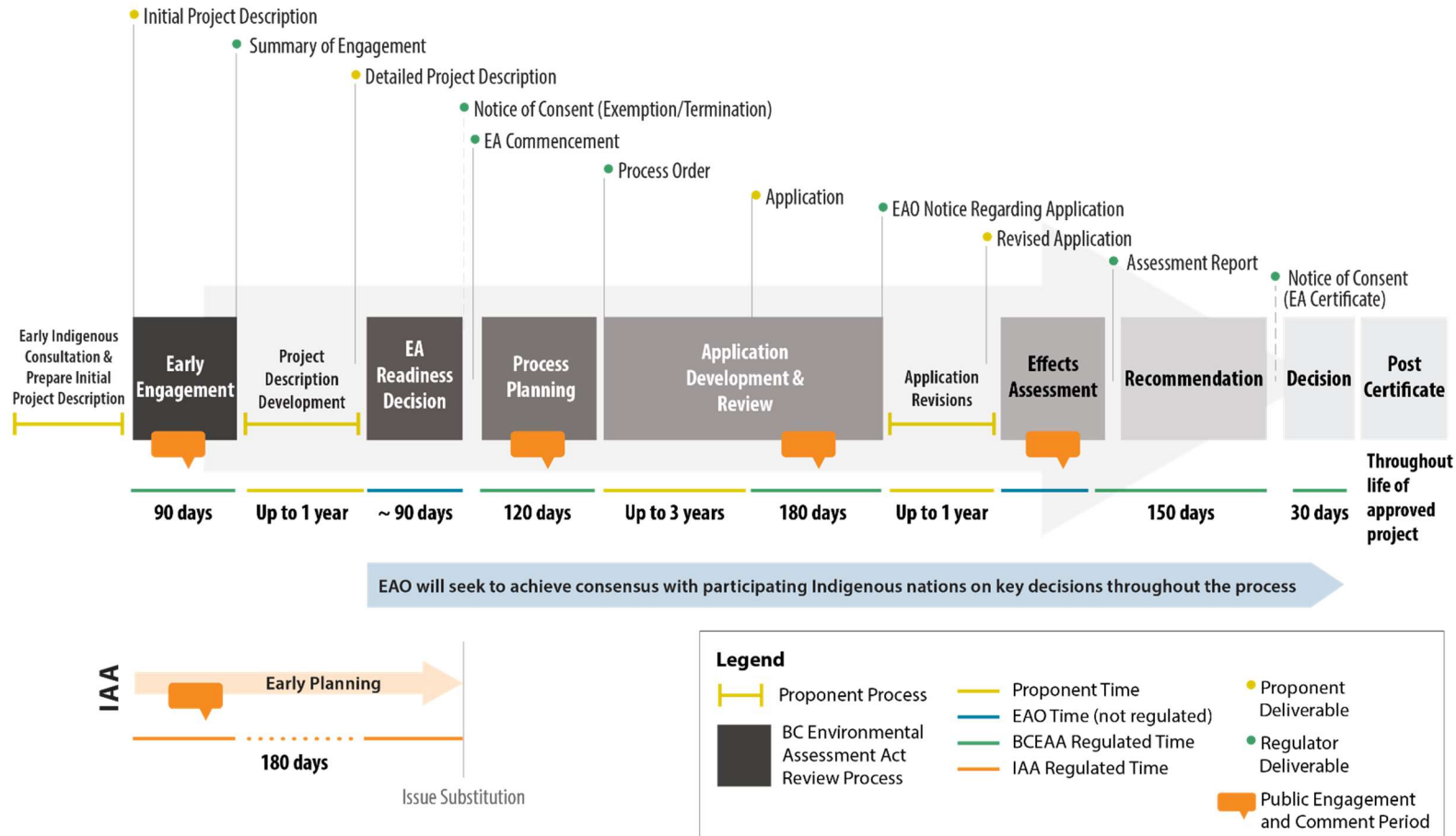
The EA process under the IAA is a five-step process for designated projects that encompasses the planning, assessment, review, approval, and follow-up of a project. The process can include up to 510 days of government time (60 days shorter than the BCEAA timeline) for an independent review. A summary of each phase of the IAA review process is provided in Appendix D.

For projects that trigger both provincial and federal environmental assessments, the process may be completed either through a coordinated environmental review process or a substituted assessment process. A coordinated process involves the Agency and the BC EAO managing the EA and their respective reviews in a cooperative fashion. Under this scenario, the provincial and federal ministers make independent decisions.

Under a substituted process, the BC EAO manages the EA in a manner that meets substitution criteria set out in the Agency's substitution decision, and the BC EAO prepares an Assessment Report that the provincial and federal ministers then use to make independent decisions. The Agency and the BC EAO signed a cooperation agreement⁵ to conduct impact assessments in a cooperative manner, establish joint early engagement processes, facilitate common requirements for documents, and facilitate joint issuance of documents. This cooperation agreement forms a basis of understanding for both coordinated and substituted processes. It is anticipated that most review processes in BC would be substituted given the robustness of the BCEAA and the federal government's precedent in accepting requests. The IAA and BCEAA processes merged under substitution are presented in Figure 2.

⁵ www.canada.ca/en/impact-assessment-agency/corporate/acts-regulations/legislation-regulations/canada-british-columbia-impact-assessment-cooperation/canada-bc-cooperation-agreement.html

Figure 2 British Columbia *Environmental Assessment Act* and *Impact Assessment Act* Substituted Process



SOURCE: Stantec 2023



4 Provincial Permitting Framework

An overview of the current provincial framework is provided below, including the jurisdictional authority of key agencies that may be involved in regulating hydrogen projects in BC. Potential triggers for provincial acts are identified along with any regulatory gaps.

4.1 Jurisdictional Authority of Key Agencies

On November 24, 2022, the Government of BC passed Bill 37, which included the ESAA and established the BCER with expanded responsibilities to regulate hydrogen and associated chemical carriers. The legislation has created a regulatory framework with a single-window regulator for hydrogen development, an important first step in establishing a more streamlined approach. Planning for the change in legislation occurred during phase one of this study, initial findings from the regulatory overview report helped inform decision-makers regarding the jurisdictional authority of several key agencies prior to the government enacting legislation to establish the BCER.

To contextualize the current regulatory framework, the jurisdictional authority of several key agencies has been described, including regulatory mandates for the BCER, TSBC, BCUC, and the MEMLI. In addition to the jurisdictional authority of regulators described below, various other provincial regulators identified in Table 9 may be involved in regulating projects for certain permits and approvals that may fall outside of the BCER's responsibilities and its mandate. Other regulators that could play a role in issuing permits and approvals include the Ministry of Forests; the Ministry of Water, Land, and Resource Stewardship; the Agricultural Land Commission (ALC); and the MECCS.

4.1.1 BC Energy Regulator

4.1.1.1 Overview

Prior to the BC Government passing the ESAA, the former BC OGC functioned as single-window regulatory agency constituted under the *Oil and Gas Activities Act* (OGAA) with a mandate to ensure oil and gas safety and design standards. In addition, the BC OGC had authority to oversee the full-cycle engineering,

environmental, land and human factors of oil and gas projects as well as the manufacturing of organic compounds from natural gas. The regulatory mandate included refineries, facilities, pipelines, associated oil and gas activities (e.g., oil and gas roads). Further, the former BC OGC had regulatory duties under the *Geothermal Resources Act* to regulate some aspects of geothermal developments in BC. Under OGAA, and specified provisions in the *Land Act*, *Water Sustainability Act*, *Environmental Management Act*, *Forest Act*, and *Heritage Conservation Act*, the former BC OGC provided proponents with a streamlined “single window” approach to permitting and approvals of oil and gas activities and any related activities (Figure 3). During phase one of this study, it was identified that the BC OGC did not possess the legal mechanism to regulate hydrogen projects in BC as the manufacturing⁶ of hydrogen did not meet the definition of an oil and gas activity under Section 1 of OGAA and hydrogen was also not a prescribed substance for pipelines regulated under OGAA. To address the obvious gap in regulatory authority, the BC Government passed the ESAA in November 2022, replacing OGAA with the ERAA and establishing the BCER. The change in legislation has expanded the existing single-window regulatory framework of the BCER to include hydrogen, methanol, and ammonia manufacturing, in addition to providing further clarification related to underground storage of CO₂.

The ERAA will require permits for an energy resource activity as defined in the Act, including the former BC OGC’s mandate for the exploration, development, gathering, production, processing, storage, and disposal of petroleum or natural gas, in addition to the manufacturing of hydrogen, ammonia, and methanol. Further, the ERAA specifically includes exploration and development of a storage reservoir for CO₂. The definition of a pipeline is also expanded in the ERAA to enable the BCER to regulate pipelines carrying hydrogen, methanol, and ammonia for an energy resource activity.

The legislative changes enable the BCER to regulate all scales of hydrogen, ammonia, methanol, and carbon storage projects, in addition to oil and gas projects. The BCER will also regulate pipelines, facilities, wells, and related activities that are required to facilitate the energy resource activity. The regulatory authority of the BCER applies to the construction of facilities and pipelines on lands, private or Crown, including near-shore components and activities. The BCER reviews engineering designs, including technical components of projects, conducts consultation with Indigenous groups and community engagement; and makes a permitting

⁶ The term manufacturing is used to be consistent with legislation applicable to the BCER, including the ERAA; the term production is used elsewhere in this report.

decision on an energy resource activity. The BCER will continue with compliance tracking, inspections, reviewing operational documentation, providing guidance, responding to incidents, and imposing penalties for non-compliance for projects within its mandate, when necessary.

In making regulations, under Section 112 of OGAA (which will be the same section in the new ERAA), the Board of the BCER may adopt by reference (in whole or with changes) any regulation, code, standard, or rule made by another jurisdiction (including a foreign jurisdiction). This authority enables the BCER to make an update to regulations as standards evolve and allows for a comprehensive approach to managing the complexities associated with the different activities it regulates, which can vary significantly in purpose, size, and location. It is anticipated that the regulatory framework under ERAA will include codes, standards, and/or rules relevant to hydrogen, ammonia, methanol, and CO₂.

Figure 3 Illustration of BC Energy Regulator Single-Window Regulation

What the BC Energy Regulator Regulates



SOURCE: Stantec 2023; Based on BC OGC concepts (BC OGC 2022c)

NOTES: The single-window approach will now apply to the BCER's regulation of hydrogen, ammonia, methanol and carbon storage.

4.1.1.2 Regulating Proxy Projects under the *Energy Resource Activities Act*

Although legislation has changed to allow BCER to regulate hydrogen, ammonia, and methanol manufacturing as well as carbon storage, changes to the regulations under ERAA were not published at the time of writing;

however, it is assumed that the BCER will regulate the full lifecycle of the proxy projects. For example, exploration activities (such as exploratory drilling for CO₂ storage) and pilot programs will require permits under the ERAA. In addition, permits will be required for construction and operation of the proxy projects, to decommission wells, facilities, and other related infrastructure. Under the current regulatory framework, obligations for decommissioning oil and gas infrastructure are included in the Dormancy and Shutdown Regulation, Drilling and Production Regulation, Oil and Gas Road Regulation, Oil and Gas Processing Facility Regulation, Liquefied Natural Gas Facility Regulation, and Pipeline Regulation. It is assumed that these regulations will be updated where necessary to reflect the BCER's expanded role.

The BCER will regulate many components of the proxy projects; however, we understand TSBC will be responsible for the safety of some components. Based on the definition changes in the ESAA, most pipelines that may be constructed and used for the proxy projects would be within BCER's mandate as the definition of a pipeline does not have a pressure or size threshold for water, hydrogen, methanol, ammonia, or CO₂. Further, it is expected that the BCER will regulate most components of the proxy projects as a facility is defined broadly in the new ERAA. In addition to facilities, the BCER will also regulate many activities associated with the proxy projects. For example, the BCER regulates associated oil and gas components such as powerlines, monitoring sites, and some dams. However, at this time it is unclear whether the BCER would regulate an off-grid electricity generation facility, such as a solar or wind farm associated with Proxy Project 2. Further, we understand that some components would not be regulated by the BCER, including the trucking or marine shipping of hydrogen, ammonia, or methanol. In addition, it is also unclear whether a marine terminal associated with an energy resource activity would be regulated by the BCER.

4.1.1.3 Carbon Capture and Storage

With the recent changes to legislation, the BCER has expanded regulatory authority to oversee all underground storage of CO₂, whether the CO₂ is generated from an energy resource activity. Previously, the BCER regulated only CO₂ storage associated with oil and gas projects.

The current application guidance for CO₂ storage is based on acid gas disposal, which is a waste fluid by-product of natural gas production consisting of H₂S and CO₂ (BC OGC 2022a). It is anticipated that the guidance for CO₂ from the BCER will be modified in the future to reflect the BCER's expanded role in regulating CO₂ storage. For clarity, petroleum and natural gas leases (which have certain storage rights) and storage reservoirs licences are administered under the *Petroleum and Natural Gas Act*, which is administered by

MEMLI, while permitting of well drilling, CO₂ injection and related activities are regulated under ERAA and are the responsibility of the BCER.

4.1.1.4 Gaps in Regulatory Authority

Although important legislative changes have occurred for hydrogen projects in BC, there will likely be a transitional period during which BCER regulation of hydrogen, ammonia, and methanol projects will rely on permit conditions as well as existing compliance and monitoring. It is unclear when updated regulations which reflect hydrogen-specific requirements will be in place or when support will be made available to proponents during the transitional period. Additionally, the length of time required for the BCER to build capacity and issue specific guidance is also uncertain.

We understand that the BCER and MEMLI are in the process of reviewing regulations in line with the BCER's regulatory authority. As such, some of the former BC OGC regulations will likely require modification to facilitate the regulation of hydrogen, ammonia, and methanol as well as the storage of CO₂. Several regulations that are tailored specifically to technologies and approaches in the oil and gas industry will likely require changes, or new regulations may be needed to accommodate hydrogen, ammonia, and methanol.

The BCER's future framework should include federal standards (e.g., Council of Canada) and international hydrogen technical codes and standards (e.g., such as those developed by the International Organization for Standardization [ISO]) to ensure safety and consistency for production, storage, pipeline and gas distribution, and end use. The ISO has a technical committee on hydrogen technologies (the Standards Council of Canada is the secretariat). To date they have published 18 hydrogen standards and 17 others are still under development⁷. The Canadian Standards Association has adopted many of the ISO hydrogen standards.

Development of hydrogen projects may be more likely in urban areas (e.g., Proxy Project 1) than oil and gas projects and there may be areas where the new BCER regulatory framework overlaps with municipal jurisdictions. Further work will be required to understand how BCER will work with municipalities or regional districts in regulating hydrogen projects. Hydrogen projects may also be proposed at a smaller scale than oil and gas projects (e.g., a small capacity electrolyzer to service a remote community). At this time, it is

⁷ [ISO/TC 197 - Hydrogen technologies](#)

uncertain whether these smaller projects will be considered lower risk and whether the BCER would allow modified or scaled requirements.

The BCER has several formal agreements and processes for oil and gas projects; for example, the former BC OGC and the ALC have a Delegation Agreement for oil and gas projects in northeast BC. It is uncertain whether these agreements and processes would apply to hydrogen, methanol, ammonia, and CO₂ storage.

4.1.2 Technical Safety BC

4.1.2.1 Overview

TSBC (formerly BC Safety Authority) is an independent authority constituted under the *Safety Authority Act* to oversee safety to promote activities which will enhance public safety and reduce the risk of hazards associated with regulated work within BC. TSBC reviews safety in design, manufacturing, disposal, construction, installation, operation, maintenance, and use of technical products, equipment, systems, and railways. Regulations under the *Safety Standards Act* relate to regulated products and list the adopted standards and codes for regulated gas work in BC. As detailed in the regulation, permits are required to install regulated gas works, and operating permits are required under specific circumstances. As hydrogen is defined as a gas in the Gas Safety Regulation, licensing and permitting requirements would currently apply to hydrogen projects. TSBC's authority related to hydrogen includes regulating storage and utilization of hydrogen in industrial processing and production applications in accordance with the *Safety Standards Act* and Gas Safety Regulations. TSBC also governs ancillary equipment such as electrical equipment and systems, hydrogen systems, boilers, pressure vessels, and refrigeration systems.

TSBC and the BC OGC signed a Memorandum of Understanding in October 2021 to work together on areas of mutual interest, including safety and the integrity of oil and gas systems and components under their respective jurisdictions. Stantec understands the regulatory focus of the former BC OGC related to facilities and pipelines defined under the former OGAA, whereas TSBC's oversight applied to other ancillary components, such as electrical equipment and boilers within a facility.

Ten municipalities have delegated permitting authority for portions of the *Safety Standards Act* for electrical, natural gas, and equipment; however, TSBC has maintained jurisdictional control over hydrogen within these judications.

4.1.2.2 Gaps in Regulatory Authority

TSBC, operating under the *Safety Authority Act*, currently regulates individual hydrogen facility components and other gas, electrical, and pressure systems. As discussed in Section 4.1.1.4, additional codes and standards applicable to support hydrogen production may need to be adopted to support TSBC's review of projects.

It is assumed that a new Memorandum of Understanding to encompass regulation of hydrogen between TSBC and the new BCER will be developed. If a proxy project is proposed in an urban area there may be some jurisdictional overlap between the new BCER, TSBC and the relevant municipality in reviewing the safety of various systems which could lead to uncertainty between regulators. To address jurisdictional gaps, further work will be required to better clarify roles and responsibilities between the various regulators.

4.1.3 BC Utilities Commission

4.1.3.1 Overview

The BCUC is an independent government agency that regulates public energy utilities in BC. As an economic regulator, the Commission sets the price range that persons should commercialize their products and services. The *Utilities Commission Act* defines the structure of the BCUC and details the regulation of public utilities. Under the Act, a public utility is defined as “means a person, or the person's lessee, trustee, receiver or liquidator, who owns or operates in British Columbia, equipment or facilities for (a) the production, generation, storage, transmission, sale, delivery or provision of electricity, natural gas, steam or any other agent for the production of light, heat, cold or power to or for the public or a corporation for compensation” (BCUC 2022). Public utility companies must regularly report their company financials to the BCUC to confirm compliance with approved charges and provide long-term resource and conservation plans as required.

If a public utility company wants to develop a project and pass charges on to rate payers, a Certificate of Public Convenience and Necessity (CPCN) under Section 45 of the *Utilities Commission Act* is required to determine whether the proposal conserves the public interest and there is a need for the project.

Applications for a CPCN are reviewed by a panel of BCUC commissioners that have statutory authority to approve (or deny) projects. Persons who are affected by a CPCN application may be granted the ability to intervene in BCUC proceedings and provide their views on the proposal being advanced.

The BCUC reviews the application based on evidence submitted by the applicant and submissions from interveners; a determination is then based on the approvals sought in the application. The CPCN process is approximately 12 to 18 months from application submission to approval.

Project financials must be reported back to the BCUC on a predetermined basis as written in the conditions of the CPCN. These are made available and reviewed by the BCUC for compliance with the CPCN.

On November 21 2022, the BCUC, pursuant to section 82 of the *Utilities Commission Act*, ordered an inquiry to review the BCUC's regulation of hydrogen energy services⁸. At the time of writing this inquiry is still ongoing.

4.1.3.2 Gaps in Regulatory Authority

The BCUC regulates projects that meet the definition of a public utility, and the process is primarily concentrated on public interest. While aspects of safety are usually regulated by other agencies, such as TSBC, the BCUC has jurisdiction and responsibility for the oversight and supervision of public utility safety and can regulate public utility safety where necessary.

When reviewing an application, BCUC assesses the adequacy of Indigenous and public consultation led by the proponent. Further, the BCUC considers environmental and archaeological concerns in the lens of risks to the project and rate payers.

The BCUC is expected to clarify the regulation of hydrogen energy services in 2023 as an outcome of its inquiry into the regulation of hydrogen energy services, and how aspects of the *Utilities Commission Act* would apply.

4.1.4 Ministry of Energy, Mines and Low-Carbon Innovation

4.1.4.1 Overview

The MEMLI is responsible for BC's electricity, alternative energy, mining and petroleum resource sectors, and supporting work to meet BC's GHG reduction targets. The latter includes energy efficiency and innovative technology, community energy systems, renewable and low carbon fuels, and zero-emission vehicles.

⁸ [BCUC Inquiry into the Regulation of Hydrogen Energy Services - BCUC](#)

As discussed above, BC introduced the BC Hydrogen Strategy (Government of BC 2021) in July 2021, intended to make BC a leader in hydrogen development. This initiative is part of the CleanBC plan and furthers the BC Government's commitment to achieving net zero emissions by 2050. The main objectives of this plan include developing a policy framework to support hydrogen production, creating regional hydrogen hubs, and incentivizing the adoption of hydrogen fuel cell vehicles in the local market. The MEMLI–Energy and Industry Decarbonization Branch is in the process of implementing the Strategy and identifying specific regulatory changes. This study will support decision-making in setting a hydrogen regulatory framework for BC.

4.1.4.2 Gaps in Regulatory Authority

As noted in Section 4.1.1.3, MEMLI regulates underground storage tenures, which would apply to CCUS projects. We understand the BC Government is presently working to provide greater clarity on application requirements for an exploration licence and a storage reservoir licence. We understand relevant regulations are currently being drafted. Industry and Indigenous consultation work for these regulations was completed in Spring 2023.

4.2 Permitting Requirements

With the changes in legislation proposed hydrogen projects will be regulated by the BCER, with TSBC responsible for safety of some components. The BCUC will also play a role in regulating projects that are considered a public utility⁹.

The BCER has regulatory authority as established under the ERAA with specified enactment authority under the *Forest Act*, *Heritage Conservation Act*, *Land Act*, *Environmental Management Act*, and *Water Sustainability Act*. As with the former BC OGC's regulation of oil and gas projects, the BCER will regulate the full life cycle of hydrogen projects, from exploration to decommissioning. It will also consider engineering design, safety, waste discharge, emergencies and incidents, environmental protection, and compliance. The

⁹ A public utility means a person, or the person's lessee, trustee, receiver, or liquidator, who owns or operates in British Columbia, equipment, or facilities for the production, generation, storage, transmission, sale, delivery or provision of electricity, natural gas, steam or any other agent for the production of light, heat, cold or power to or for the public or a corporation for compensation (BCUC 2022).

BCER fulfills the Crown's obligation to consult with Indigenous groups prior to authorizing the activities for which it is the responsible decision maker.

Permitting and regulatory requirements relevant to the proxy projects are summarized in Table 9 below. For larger capital projects that require an EA (see Section 3.0), a regulator will not grant permits and approvals under project permitting until an EA decision is reached (i.e., the EAC is issued). Regulators may require additional information during application development to make sure they are comfortable with issuing the permit.

The *Safety Standards Act* and its regulations are likely to apply to many hydrogen projects, regardless of design or location. The remaining regulatory triggers can be categorized into design-based triggers and site location-specific triggers that may apply. Specifically, design-based regulatory triggers based on physical layouts, process inputs, production methods, and production outputs that could apply to hydrogen projects include:

- » *Water Sustainability Act* water licences (Section 9)
- » *Environmental Management Act* waste discharge approvals for air emissions and effluent discharge
- » *Utilities Commission Act* approvals for public utilities for rates, construction of projects, operation of projects, or energy supply agreements
- » *Railway Safety Act* for certifying railway operators
- » ERAA permits for the construction and operation of pipelines, wells, facilities, and/or related activities defined under the Act
- » BC Hydro connection approval process

Location-based regulatory triggers that could apply to proxy projects include:

- » *Water Sustainability Act* changes in and about a stream (Section 11)
- » Contaminated Sites Regulation release notices
- » *Wildlife Act* permits
- » *Heritage Conservation Act* investigation and alteration permits
- » *Land Act* permits for temporary and permanent use of Crown land
- » *Forest Act* cutting permit for cutting timber on Crown land
- » *Agricultural Land Commission Act* for an application for non-farm use of the Agricultural Land Reserve

The list of regulatory requirements, permits, and approvals identified in Table 9 is not exhaustive of all specific regulatory requirements for a project to operate. The list of permits focuses on the main approvals anticipated for hydrogen development projects in BC, particularly those with longer application and approval timelines. The specific list of permits and approvals required for any given project should be confirmed based on unique project design and specific location-based regulatory triggers.

Table 9 Anticipated Provincial Permitting Requirements

Permit, Authorization or Approval	Agency	Description	Timeline	Applicability to Proxy Projects	Proxy 1	Proxy 2	Proxy 3	Proxy 4	Proxy 5	Proxy 6
<i>Energy Resource Activities Act (ERAA)</i>	BCER ^a	The ERAA will regulate energy resource activities, including oil and gas projects as well as hydrogen, methanol, ammonia, and carbon storage projects and related activities in BC. The regulatory framework will also include wells, facilities, oil refineries, natural gas processing plants, pipelines, and roads, through permits, authorizations, orders, and regulations.	Various	Most components of all proxy projects would be regulated under the ERAA, including facilities, pipelines, storage wells, roads, and some related activities, such as powerlines.	✓	✓	✓	✓	✓	✓
<i>Water Sustainability Act (WSA)</i>	BCER ^a	The WSA regulates the licencing, diversion, storage, and use of fresh water and makes provision for the alteration of natural watercourses or sources of water supply. The Act does not apply to marine waters. Provisions within the WSA pertain to any activity that could affect either the volume of water flowing within a watercourse (e.g., water use) or channel morphology (e.g., installation of a culvert or intake structure, infilling/realignment of a creek channel, or stabilization of a stream bank with rip rap). Key aspects to the WSA and regulations applicable include: <ul style="list-style-type: none"> Section 6 prohibits the diversion or use of surface water and groundwater unless authorized Section 9 allows for the issuance of a licence authorizing the diversion or use of water for one or more water use purposes Section 10 allows for the issuance of an approval to divert or use water for a term not exceeding 24 months Section 11 allows for the issuance of an approval authorizing changes in and about a stream 	6 months to 2 years ^b	All proxy projects may require the short-term use of freshwater for construction activities (e.g., dust control or the hydrostatic testing of pipelines) and some proxy projects may require long-term diversion of freshwater for electrolysis or other industrial uses (e.g., cooling water). The application for short-term water diversion (Section 10 of the WSA) or long-term water licencing (Section 9 of the WSA) requires a water supply demand analysis with an accompanying analysis of environmental flow needs for the watercourse or waterbody. Authorization under section 11 of the WSA would be required for proxy projects with linear infrastructure, such as pipelines and powerlines that cross watercourses and/or wetlands. These are site-specific requirements and could apply to all proxy projects, depending on the location of the project and infrastructure. Although the WSA can currently authorize water diversion and use for hydrogen production, proponents may benefit from additional guidance.	✓	✓	✓	✓	✓	✓

Table 9 Anticipated Provincial Permitting Requirements

Permit, Authorization or Approval	Agency	Description	Timeline	Applicability to Proxy Projects	Proxy 1	Proxy 2	Proxy 3	Proxy 4	Proxy 5	Proxy 6
<p><i>Environmental Management Act</i> (EMA)</p> <p>Air Quality Management Bylaw No. 1082, 2008</p>	<p>BCER^a: or Greater Vancouver Regional District (Metro Vancouver)</p> <p>or MECCS</p>	<p>The EMA and its associated regulations are the legislative framework used by BC to regulate waste disposal, including air emissions. Section 14 allows for permits authorizing the introduction of waste into the environment, including air emissions. Under the EMA, Metro Vancouver has the authority to manage the discharge of air emissions within their jurisdiction.</p> <p>The discharge of air emissions requires authorization from industries, trades, businesses, activities, or operations prescribed under the EMA or accompanying regulations. Air emissions include contaminants that have potential to have effects on human health, the environment, visibility, material physical discomfort, or damage to property. GHG emissions (CO₂) are not considered a contaminant under EMA.</p> <p>Authorization involves filing an application to the regulator. The application includes project and process descriptions; evaluation of existing air quality near proposed facility, including ambient monitoring; assessment of effects of project emissions on air quality near the proposed facility, including dispersion modelling; best achievable technology assessment; development and implementation of mitigations to improve air quality, if needed; and public and Indigenous nation engagement.</p> <p>MECCS would be the decision maker for a federally regulated pipeline and its connected works.</p>	12-24 months	<p>Proxy Projects 1 and 2 do not require a permit under EMA as emissions of O₂ and H₂ are benign and are not pollutants of concern listed under EMA.</p> <p>Proxy Project 3 involves the creation of H₂ via methane reforming. The natural gas feed requires cleaning (i.e., removal of natural gas liquids and sulphur). It is assumed for Proxy Project 3 acid gases (H₂S, CO₂) would be captured via CCUS. Additionally, Proxy Project 3 requires a fired heater, which includes the combustion of natural gas for heating requirements. This type of project would also include a flare system that would combust excess natural gas and acid gas in an event such as a process upset. The combustion of natural gas will create CACs including NO_x, CO, PM_{2.5}, and SO₂. The discharge of CACs will require authorization under the EMA.</p> <p>Proxy Project 4 involves the production of H₂ via pyrolysis. The natural gas feed requires cleaning (i.e., removal of natural gas liquids and sulphur). This proxy project will require disposal of acid gas via thermal oxidization. This creates emissions of mostly SO₂, and lesser amounts of H₂S, NO_x, PM_{2.5}, and CO. This type of project will also include a flare system that will combust excess natural gas and acid gas in an event such as a process upset. The discharge of CACs will require authorization under the EMA.</p> <p>Proxy Project 5 is the production of ammonia using 'low carbon H₂'. The production of H₂ would not have emissions requiring authorization under the EMA assuming the production of ammonia is using the well-known Haber-Bosch process, which requires high temperature and pressure. High temperatures would require a natural gas-fired boiler or heater. The combustion of natural gas will create CACs including NO_x, CO, PM_{2.5}, and SO₂. The discharge of CACs will require authorization under the EMA. The high-pressure requirements are assumed to be provided via electric compressors and therefore, will have no emissions. Ammonia is a toxic substance and leads to the secondary formation of PM_{2.5}; for these reasons, the management of fugitive and vented ammonia emissions would also require authorization under the EMA.</p> <p>Proxy Project 6 includes the production of methanol using 'low-carbon H₂', potentially capturing CO₂ in the CO₂ hydrogenation process. This process is still in development stages and not used in production yet. The CO₂ hydrogenation process involves the chemical reaction of mixing CO₂ with H₂; it is understood that this reaction occurs at low pressure and temperature. Therefore, this demand can be achieved using electric compressors, pumps, and heaters. On this basis, there would be no emissions requiring authorization under the EMA.</p>	-	-	✓	✓	✓	-

Table 9 Anticipated Provincial Permitting Requirements

Permit, Authorization or Approval	Agency	Description	Timeline	Applicability to Proxy Projects	Proxy 1	Proxy 2	Proxy 3	Proxy 4	Proxy 5	Proxy 6
EMA Effluent Permitting	BCER ^a or MECCS	<p>The EMA also regulates the discharge of effluent and solids under Section 14.</p> <p>The EMA regulates prescribed industries, trades, and businesses listed in Schedule 1 and Schedule 2 of the Waste Discharge Regulation.</p> <p>MECCS would be the decision maker for a federally regulated pipeline and its connected works.</p>	24 months ^b	<p>Production of hydrogen or carrier chemicals such as ammonia and methanol (Proxy Projects 5 and 6) would meet the definition of chemical and chemical products industry (item 10 in Table 1 of Schedule 1) under the EMA. "Chemical and chemical products industry" means establishments—except home-based businesses, educational facilities, and establishments of hobbyists or artisans—engaged in manufacturing industrial organic or inorganic chemicals, fertilizers, pesticides, plastics, synthetic resins, or moulding compounds, and includes establishments manufacturing food supplements, vitamins, or pharmaceuticals, except pharmaceuticals referred to in the definition of "biotechnology industry."</p> <p>Any effluent waste to the environment would require authorization. The regulatory authority for the discharges currently falls with the jurisdiction of the Environmental Protection Division via EMA 14, 15, and 16 subject to the BCEAA.</p> <p>The requirements for a waste discharge authorization would depend on specific project design details. It can be assumed that any wastes from water treatment would be taken to an approved waste facility. Similarly, it is assumed that oxygen produced during the hydrogen electrolysis process would be captured at the facility for other uses. However, if wastewater requires discharge to the environment, then an authorization would be required.</p> <p>Storage of petrochemicals (e.g., methane Proxy Project 3) could require a waste discharge authorization (item 6, Table 1 of Schedule 2), although the facility may be able to operate under the Petroleum Storage and Distribution Facilities Storm Water Regulation for quantities of less than 100,000 liters.</p>	-	-	✓	✓	✓	✓

Table 9 Anticipated Provincial Permitting Requirements

Permit, Authorization or Approval	Agency	Description	Timeline	Applicability to Proxy Projects	Proxy 1	Proxy 2	Proxy 3	Proxy 4	Proxy 5	Proxy 6
EMA – Contaminated Sites Regulation (CSR)	BCER ^a or MECCS	<p>The CSR, under the EMA, establishes a regime for identification, assessment, and clean-up (“remediation”) of contaminated sites. These principles include liability for contaminated sites with certain exceptions, both current and former owners and operators of sites are considered absolutely, retroactively, and jointly and separately liable for remediation costs, which include site investigation costs.</p> <p>In BC, a contaminated site is defined as an area of land in which the soil or underlying groundwater, soil vapour, or sediment contains a prescribed substance in quantities or concentrations exceeding prescribed risk-based or numerical criteria, standards, or conditions. Specific provisions are set out in the CSR, which is the enabling regulation of the EMA with respect to contaminated sites.</p> <p>If a candidate site (i.e., one being considered for redevelopment) has been used for industrial or commercial purposes listed in Schedule 2 of the CSR, it could be contaminated and those contaminants must be investigated and potentially removed from the site before redevelopment. If the site has been used for any of the purposes listed in Schedule 2, a proponent will be required to submit a site disclosure statement, unless the site qualifies for an exemption, to the municipality, who then is required to forward to the MECCS.</p> <p>In most cases, submission of a SDS triggers requirements in the EMA and the CSR to freeze the permit application and complete site investigations, which can take the form of a Stage 1 (e.g., desktop review and site visit) and 2 (e.g., assessment of soil, groundwater, and/or vapour media). If a site historically had a Schedule 2 use on the site, and is found not to be contaminated, a Determination application can be submitted to MECCS. However, if contamination is identified, a remedial plan can be developed and executed. Following the completion of a remedial program, a Certificate of Compliance Application can be submitted to MECCS. In both cases, once the Instrument is issued, the MECCS will notify the municipality that the requested permit can be released.</p>	Release notice 4-6 months ^b (depending on complexity)	The trigger for the CSR is site-specific and could potentially apply to any of the proxy projects developed on a redeveloped brownfield site (i.e., Proxy Projects 1 and 3-6).	✓	✓	✓	✓	✓	✓

Table 9 Anticipated Provincial Permitting Requirements

Permit, Authorization or Approval	Agency	Description	Timeline	Applicability to Proxy Projects	Proxy 1	Proxy 2	Proxy 3	Proxy 4	Proxy 5	Proxy 6
<i>Wildlife Act</i> Section 19 and Section 2 of the Permit Regulation	Ministry of Forests	Authorizations under the <i>Wildlife Act</i> are required where nest removal and/or direct handling, trapping, or control of wildlife and fish may be required. The application process must include information provided by a wildlife specialist for handling species or a management plan for removing or working near protected nests.	2-6 months ^b	The requirement for a permit under the <i>Wildlife Act</i> is site-specific and could apply to all proxy projects and is usually assessed by a qualified environmental professional. Site-specific triggers for a permit can include adjacent habitat for amphibians, likely disturbance of amphibian or reptile habitat, work within a watercourse inhabited by fish, and work that will affect a year-round protected nest. We have assumed that <i>Wildlife Act</i> permitting could apply to all proxy projects, although it is possible that a project in an urban area with limited wildlife habitat may not require <i>Wildlife Act</i> permits.	✓	✓	✓	✓	✓	✓
<i>Heritage Conservation Act</i> Permit	Archaeology Branch Ministry of Land, Water and Resource Stewardship or Heritage Conservation Program BCER ^a	<p>The <i>Heritage Conservation Act</i> specifies that a person (or corporation) must not “damage, excavate, dig in or alter, or remove any heritage object” from an archaeological site unless conducted under the authority of a permit issued under section 12 of the Act.</p> <p>An archaeological overview assessment (AOA) should be undertaken to determine if an archaeological impact assessment (AIA) is required for the project. The AOA is intended to determine if the proposed project conflicts with any recorded archaeological sites or is within an area deemed to have the potential for archaeological resources.</p> <p>If the AOA determines an AIA is required, the AIA would be completed under a <i>Heritage Conservation Act</i> inspection permit and involves an archaeological site inventory, site significance evaluation, and a determination of expected level of impact (impact assessment) based on the proposed development. The permit application process includes a mandatory 45-day review period by affected Indigenous communities. It is recommended that the AOA and AIA also be conducted under applicable First Nation Heritage Permits.</p> <p>The BCER under Section 8.1 of the ERAA to issue alteration permits under Section 12.4 of the <i>Heritage Conservation Act</i>. In northeast BC, specifically the Fort Nelson, Peace, and Mackenzie Natural Resource Districts, the BCER advises oil and gas sector proponents and manages archaeological impact assessments under Section 12.2 inspection permits, which are issued by the Archaeology Branch and referred to the BCER for comment along with Indigenous groups.</p>	3 months to a year ^b (includes a 45-day Indigenous review period) First Nation Heritage Permits can take up to 8 weeks ^b to obtain.	Any ground disturbance should be reviewed by a qualified archaeologist for the potential to affect a heritage site. Could potentially apply to all of the Proxy Projects 1-6.	✓	✓	✓	✓	✓	✓

Table 9 Anticipated Provincial Permitting Requirements

Permit, Authorization or Approval	Agency	Description	Timeline	Applicability to Proxy Projects	Proxy 1	Proxy 2	Proxy 3	Proxy 4	Proxy 5	Proxy 6
<i>Land Act</i> Licence of Occupation	BCER ^a or Ministry of Forests	Temporary or long-term use of Crown land requires a disposition from the BC Government administered through the <i>Land Act</i> . Temporary use of Crown land requires a licence of occupation under Section 39, and permanent infrastructure (e.g., pipeline) can be approved under Section 40. These dispositions do not grant exclusive use of Crown land. Long-term leases can also be requested for long-term tenure of Crown land (e.g., facilities). An application for using Crown land depends on the type of activity proposed. For example, the Government of BC has specific policies and guidance for clean energy projects. If components of a project are not considered associated with the energy resource activity (e.g., wind farm), then this project component's use of Crown land would be regulated under the <i>Land Act</i> by the Ministry of Forests.	12-18 months ^b	The use of Crown land is likely to be required for projects proposed outside urban areas (e.g., Proxy Projects 2 and 3), but could be applicable to all projects. Associated linear infrastructure may occur on Crown land.	-	✓	✓	-	-	-
<i>Forest Act</i> Permit Licence To Cut	BCER ^a or Ministry of Forests	Removing timber from Crown land requires a permit under the <i>Forest Act</i> . If components of a project are not considered associated with the energy resource activity (e.g., wind farm), then this project component's use of Crown land would be regulated under the <i>Forest Act</i> by the Ministry of Forests.	2-3 months ^b	A cutting permit is required for removing timber from Crown land, so proxy projects that are likely to occur on greenfield sites outside urban areas will most likely require cutting permits (e.g., Proxy Project 3). Similarly, any new linear infrastructure associated with the proxy projects that occur on Crown land could require tree cutting (e.g., new pipelines).	-	✓	✓	-	-	-
<i>Agricultural Land Commission Act</i> Application for Non-Farm Use of Agricultural Land Reserve (ALR)	BCER ^a or ALC	The Agricultural Land Reserve Use Regulation identifies uses of ALR land. ALR landowners who wish to pursue other uses or to subdivide their property must make an application under the <i>Agricultural Land Commission Act</i> and secure approval from the ALC or the BCER, for oil and gas projects. The Agricultural Land Reserve General Regulation sets out application procedures. The BCER has been delegated certain authorities by the ALC related to oil and gas activities specifically. At time of writing this delegation has not been expanded to include hydrogen. If components of a project are not considered associated with the energy resource activity (e.g., wind farm etc.), then this project component's use of ALR would be regulated under the <i>Agricultural Land Commission Act</i> by the ALC.	2-3 months ^b	If projects are located in the ALR, the project will need to apply for non-farm use. Not required if not located within ALR land.	✓	✓	✓	✓	✓	✓

Table 9 Anticipated Provincial Permitting Requirements

Permit, Authorization or Approval	Agency	Description	Timeline	Applicability to Proxy Projects	Proxy 1	Proxy 2	Proxy 3	Proxy 4	Proxy 5	Proxy 6
Connection to BC Hydro	BC Hydro	BC Hydro has an approvals process for industrial connections (defined as greater than 5,000 kW). Connection to the distribution system requires preliminary investigation, a feasibility and options study phase, and a detailed design phase. BC Hydro has technical guidelines and standards that must be followed (BC Hydro 2022).	1-year ^b	Any project involving an industrial connection to a BC Hydro transmission or distribution system would require approvals by BC Hydro. Therefore, it is assumed that all proxy projects, except for off-grid hydrogen production (Proxy Project 2), would require some BC Hydro approvals. The higher electricity demand (e.g., Proxy Project 1) would presumably require more time to develop and approve the application.	✓	-	✓	✓	✓	✓
<i>Safety Standards Act</i>	TSBC	The <i>Safety Standards Act</i> sets out the general requirements for the defined regulated work, including the legal requirements for permits and qualifications. Regulations under the <i>Safety Standards Act</i> apply to regulated work.	8-10 weeks ^d	TSBC would regulate the electrical and pressure system of facilities, so the <i>Safety Standards Act</i> would likely apply to all proxy projects. Given BCER's new mandate, the process of regulation of hydrogen projects with TSBC is unclear at the time of writing.	✓	✓	✓	✓	✓	✓
<i>Utilities Commission Act</i> Certificate of Public Convenience and Necessity (CPCN)	BCUC	The <i>Utilities Commission Act</i> grants the authority to the BC Utilities Commission to protect the interests of the BC Public through setting controls on rates paid for utilities. Any project that will involve costs being transferred to BC rate payers will require a CPCN. This certificate is needed to justify the project and to justify transferring the costs to utility customers. The <i>Utilities Commission Act</i> defines the structure of the BCUC and details the regulation of public utilities. Further, the <i>Utilities Commission Act</i> defines the work of the BCUC, which includes approving rates, approving the construction and operation of facilities, accepting energy supply agreements, and supervising the activities of public utilities for the safety and convenience of the public.	12-18 months ^b	Required for any projects that intend to sell hydrogen products directly to rate payers (e.g., Proxy Projects 1-4); the BCUC would regulate the rate-setting process. The <i>Utilities Commission Act</i> would only apply to proxy projects that have provision of energy to light, heat, cold, or power to or for the public or a corporation for compensation.	✓	✓	✓	✓	-	-
<i>Railway Safety Act</i>	TSBC	The <i>Railway Safety Act</i> provides the authority for the establishment and governance of railways operating solely within BC. The <i>Railway Safety Act</i> provides authority in BC to adopt the technical regulations, rules, and standards of the federal <i>Railway Safety Act</i> . Numerous provincial and federal regulations apply to rail operation and transportation of various goods on railways ^e . Railway operators in BC are required to become certified and obtain an operating permit.	Unknown	If any of the proxy projects require construction of a dedicated railway for hydrogen transportation this may apply, but it is assumed this would not be necessary. Would only apply to projects developing storage on railway land or land leased by a railway company.	-	-	-	-	-	-

Table 9 Anticipated Provincial Permitting Requirements

Permit, Authorization or Approval	Agency	Description	Timeline	Applicability to Proxy Projects	Proxy 1	Proxy 2	Proxy 3	Proxy 4	Proxy 5	Proxy 6
Transportation of Dangerous Goods Act (BC) (TDGA [BC])	Ministry of Transportation and Infrastructure	The TDGA (BC) regulates the transportation of dangerous goods within BC, including stipulating additional powers to municipal councils to regulate transportation of dangerous goods within their boundaries. The Transportation of Dangerous Goods Regulation under the Act adopts requirements under the TDGA (Canada). The Act requires that all applicable and prescribed safety measures are in place and containers, road vehicles, and rail cars comply with applicable safety standards. The TDGA (BC) Regulations apply to the handling and transportation of dangerous goods within the province on highways, as defined in the <i>Motor Vehicle Act</i> , and on rail vehicles that are within the provincial jurisdiction. The federal regulations would apply to federal areas of jurisdiction such as marine transport. Further, the Act and the Regulations apply to all modes of transport and to any quantity of dangerous goods. Special exemptions in the Regulations exclude certain situations or limit the requirements. Specific conditions are often associated with these special cases.	N/A	Would apply to the transport of hydrogen, ammonia, or methanol in the province via road or rail as they are classified as dangerous goods under the Act. The key requirements for proponents include training, preparation of documents, registration of vehicles and storage, implementation of appropriate signage, preparation of documents such as shipping papers, selection of appropriate containment (packaging), emergency response assistance plans, and reporting incidents. Table 10 provides further information relevant to the federal requirements.	✓	✓	✓	✓	✓	✓

NOTES:

- ✓ Potential to apply depending on project location and design configuration.
- ^a MEMLI is currently in the process of reviewing and updating enactments so they can be applied to hydrogen, ammonia and methanol projects. This work is anticipated to be substantially complete in 2023.
- ^b Estimated timeline. Timelines are not mandated and are subject to change based on regulator capacity and consultation requirements. Timelines do not include preparation and submission of an application.
- ^c <https://www2.gov.bc.ca/gov/content/industry/crown-land-water/crown-land/crown-land-uses/clean-energy>
- ^d Estimated timeline after submission of design package
- ^e See <https://www.technicalafetybc.ca/railways/regulations>

CAC criteria air contaminant
 CCUS Carbon Capture, Utilization and Storage

CO₂ carbon dioxide
 CO carbon monoxide
 H₂ hydrogen
 H₂S hydrogen sulfide
 Ha hectare
 kW kilowatt
 NO_x nitrous oxides
 O₂ oxygen
 PM_{2.5} fine particulate matter
 SO₂ sulphur dioxide

5 Federal Permitting Framework

5.1 Permitting Requirements

Federal permits and approvals that could potentially apply to the proxy projects, depending on specific design components and the location of each project, are provided in Table 10 below; these include requirements under the:

- » *Impact Assessment Act / Canada Marine Act*
- » *Canadian Energy Regulatory Act*
- » *Canadian Environmental Protection Act, 1999*
- » *Canadian Navigable Waters Act*
- » *Fisheries Act*
- » *Species at Risk Act*
- » *Aeronautics Act*
- » *Transportation of Dangerous Goods Act*
- » *Migratory Birds Convention Act*
- » Ammonia Code of Practice

Like the provincial process, federal regulators will also not grant permits and approvals under project permitting until a positive decision statement is published for the federal environmental impact assessment, if required.

Table 10 Federal Permitting Requirements

Permit, Authorization or Approval	Agency	Description	Timeline	Applicability to Proxy Projects	Proxy 1	Proxy 2	Proxy 3	Proxy 4	Proxy 5	Proxy 6
Impact Assessment Act / Canada Marine Act Project Review	Relevant Port Authority (e.g., Vancouver Fraser Port Authority, Prince Rupert Port Authority, and Nanaimo Port Authority)	<p>Canada Port Authorities oversee their federal responsibilities, including permitting of physical works and activities on federal lands and waters partially or wholly within a Port's jurisdiction under the <i>Canada Marine Act</i> and <i>IAA</i>. If a proposed project type is identified as a Designated Project under <i>IAA</i>, a federal impact assessment administered by the Agency is required.</p> <p>Port Authority review of projects are conducted in accordance with Section 82 of <i>IAA</i>, which includes provisions related to the posting of information and public notice periods, the ability of federal government to review a project, and the federal review of decisions made by a port authority. Port Authorities review project applications, including required studies, and assess the technical merits of an application prior to making a project permit decision. The specific timeline for review, technical studies, public and stakeholder engagement, and Indigenous consultation would depend on the nature of the proposed project and the Port Authority with jurisdiction. Depending on the size and complexity of projects assessed, factors include:</p> <ul style="list-style-type: none"> • Effects on biophysical environment • Changes to traffic and transportation • Impact of noise, lighting, views, and other effects on communities • Effects on the rights and interests of Indigenous groups 	Dependent on jurisdiction and category of project (e.g., Category D Projects under Vancouver Fraser Port Authority are subject to 170 Business Day review)	A Port Authority project and environmental review would apply to any proposed hydrogen project with project components (e.g., marine terminal) on federal lands or waters within a Port Authority.	✓	✓	✓	✓	✓	✓

Table 10 Federal Permitting Requirements

Permit, Authorization or Approval	Agency	Description	Timeline	Applicability to Proxy Projects	Proxy 1	Proxy 2	Proxy 3	Proxy 4	Proxy 5	Proxy 6
<i>Canadian Energy Regulatory Act</i> Certificate of Public Convenience and Necessity (CPCN)	Canada Energy Regulator (CER)	The CER has jurisdiction over the construction of international and interprovincial powerlines and pipelines established through the <i>Canadian Energy Regulatory Act</i> . A CPCN is required to construct and operate a pipeline or powerline system that crosses provincial or international boundaries. The CER reviews applications factoring in economic, environmental, and social considerations for the life cycle of a project to provide a recommendation on whether a project is in the Canadian public interest. Applications for smaller pipelines (generally those less than 40 km in length) are assessed within 10 months. Applications for longer pipelines are assessed by the CER within 15 months. The federal Cabinet decides, based on the CER recommendation, whether a CPCN should be issued. If a project is designated under IAA, such as pipeline projects with more than 75 km of new right-of-way, it will go through an integrated review process led by the Agency with the support of the CER. Federal Cabinet makes the final decision on whether these projects should be approved.	10 months for projects < 40 kms (minor) 15 months for projects > 40 kms	Would apply to any proposed hydrogen project with an interprovincial pipeline as component (Proxy Projects 1-4) Pipelines which lie completely within the borders of a single province are regulated by that province's regulatory body.	✓	✓	✓	✓	-	-
<i>Canadian Energy Regulatory Act</i> Export Licence	Canadian Energy Regulator (CER)	The CER also has jurisdiction over the import and export of oil, gas, and electricity, and also regulates the export of natural gas through either long-term or short-term orders. Long-term licences can be issued for up to 25 years, subject to Governor in Council approval. Short-term orders for a maximum period of two years can be issued.	6 months ^a	Currently <i>Canadian Energy Regulatory Act</i> only governs the export of natural gas, liquefied natural gas, oil, and electricity; therefore, the Act would not apply to the export of hydrogen projects at this time.	-	-	-	-	-	-
<i>Canadian Environmental Protection Act, 1999</i> Emergency plan for scheduled substances	Environment and Climate Change Canada	Permits or authorization are issued under the <i>Canadian Environmental Protection Act</i> , 1999, for emissions of ozone-depleting substances and halocarbon alternatives, disposal at sea, permits of equivalent levels of environmental safety, and transboundary permits. The Environmental Emergency Regulation, 2019, under the <i>Canadian Environmental Protection Act</i> , 1999, requires preparation of an environmental emergency plan for scheduled substances above specified thresholds.	Various	Hydrogen is included in Schedule 1 of the Environmental Emergencies Regulation as a Hazard Category E (explosion hazard) substance and an environmental emergencies plan is required if the quantity exceeds 4.5 tonnes. This is likely to be required for Proxy Projects 1-4.	✓	✓	✓	✓		

Table 10 Federal Permitting Requirements

Permit, Authorization or Approval	Agency	Description	Timeline	Applicability to Proxy Projects	Proxy 1	Proxy 2	Proxy 3	Proxy 4	Proxy 5	Proxy 6
<i>Canadian Environmental Protection Act, 1999</i> Disposal at Sea Authorization	Environment and Climate Change Canada	The Disposal at Sea Regulations require a sampling program, reviewed, and approved by Environment and Climate Change Canada, to assess particle size and levels of potential contaminants (mercury, cadmium, other metals, hydrocarbons, polychlorinated biphenyls, and dioxins and furans if there is a potential source) in the material to be disposed. The disposal at sea application must also include an alternatives assessment to demonstrate that ocean disposal is the most suitable option for the dredged material. If the material meets the screening criteria, and an application is approved, the material can then be disposed of at an approved disposal site.	120 days ^a	Would apply to any proxy project potentially requiring dredging for a marine terminal to dispose of dredged material, if any, at sea.	✓	✓	✓	✓	✓	✓
<i>Canadian Navigable Waters Act (CNWA)</i> Approval	Transport Canada	The CNWA applies to all navigable water in Canada. The CNWA protects the public's right of navigation by regulating works that may interfere with navigation. Work is defined as any structure, device, or other thing, whether temporary or permanent, that is made by humans that is in, on, over, under, through, or across navigable water in Canada. This includes dumping of fill into, dredging, or removing of materials from the bed of a navigable water. Ministerial approval is required for any major work that interferes with navigation on any navigable water, including Scheduled and non-Scheduled waters. The Major Works Order designates dams, bridges, causeways, and aquaculture facilities. The CNWA allows for designated specific work in the Minor Works Order. Minor works include docks and boat ramps, slipways and boat-launching ramps, and pipelines and cables when built in accordance with established criteria (the Minor Works Order) are pre-approved under CNWA on any navigable water. Minor works require submission of information describing the activity and its locations, as well as public notice.	120 days ^a	Approval under the Navigation Protection Programme would be required for all proxy projects with a marine component classified under the Act as Major works, such as the development of a marine terminal. Under the CNWA, works may be considered minor works (e.g., upgrading a wharf) and no further action would be required providing requirements of the Minor Works Order are met.	✓	✓	✓	✓	✓	✓

Table 10 Federal Permitting Requirements

Permit, Authorization or Approval	Agency	Description	Timeline	Applicability to Proxy Projects	Proxy 1	Proxy 2	Proxy 3	Proxy 4	Proxy 5	Proxy 6
<i>Fisheries Act</i> Request for Review/ Authorisation	Fisheries and Oceans Canada (DFO)	<p>The <i>Fisheries Act</i> prohibits the killing of fish and the harmful alteration, disruption, or destruction of fish habitat unless it is authorized by the Minister under paragraph 35(2)(b) of the Act.</p> <p>The <i>Fisheries Act</i> includes a new category of designated projects, as well as a prohibition against carrying on any work, undertaking, or activity that is part of a designated project unless the proponent has an authorization issued under paragraph 35(2)(b) <i>Fisheries Act</i>. The information to be provided in the application is identified in the Authorizations Concerning Fish and Fish Habitat Protection Regulations.</p> <p>If a paragraph 35(2)(b) authorization for the permanent alteration or destruction of fish habitat is required, the application should be consistent with Applications for Authorization under Paragraph 35(2)(b) of the Fisheries Act Regulations and Authorizations Concerning Fish and Fish Habitat Protection Regulations: SOR/2019-286. A detailed offsetting plan will likely be required, and baseline studies and conceptual offsetting plans should be included in the impact assessment.</p>	<p>Paragraph 35(2)(b) 150 days^a</p> <p>For planning purposes, allow 12-18 months for a <i>Fisheries Act</i> Authorization (if required)</p>	<p>For projects near water that do not fall within the standards and codes of practice for the <i>Fisheries Act</i>, a Request for Review (RfR) can be submitted to DFO. DFO will either recommend that a <i>Fisheries Act</i> authorization application be submitted, or that certain works can proceed under a Letter of Advice that includes details on the avoidance and mitigation measures to be implemented. Technical studies supporting the Request typically include field surveys of potentially impacted fish habitats and design information on the anticipated project activities (e.g., footprints, construction methods).</p> <p>An authorization would be required for any permanent alteration or destruction of fish habitat associated with construction of a facility and/or infrastructure. May apply to all hydrogen projects with marine terminal components, etc.</p> <p>It may be possible to carry out certain activities such as wharf upgrades and any associated dredging activities under a letter of advice following a RfR, rather than a paragraph 35(2)(b) authorization.</p>	✓	✓	✓	✓	✓	✓
<i>Species at Risk Act</i> (SARA) Authorization	Environment and Climate Change Canada - Canadian Wildlife Service	<p>SARA is the primary federal legislation intended to protect animal and plant species at risk in Canada. The primary purposes of SARA are to prevent the extinction or extirpation of species in Canada and to outline actions deemed necessary for species recovery. Authorization may be required if Project activities or components affect a Schedule 1 species or any part of its critical habitat on federal land. Authorization is required for relocation of species at risk or destruction of a residence.</p>	<p>90 days Authorization</p>	<p>While section 58(1) of SARA protects critical habitat on federal land, and of fish and migratory birds on all lands within Canada, it is Stantec's understanding that the Government of Canada is only exercising this section of the Act on federal lands.</p> <p>Authorization may be required if any hydrogen project activities or components affect a Schedule 1 species or any part of its critical habitat on federal land.</p>	✓	✓	✓	✓	✓	✓

Table 10 Federal Permitting Requirements

Permit, Authorization or Approval	Agency	Description	Timeline	Applicability to Proxy Projects	Proxy 1	Proxy 2	Proxy 3	Proxy 4	Proxy 5	Proxy 6
<i>Aeronautics Act</i> , Airport Zoning Regulations Clearance	Transport Canada	Aeronautical obstruction clearance would be required for tall structures that have the potential to interfere with air navigation; this may include any flare stacks as part of a proposed facility.	90 days	Required for all proxy projects that include tall structures that have the potential to interfere with air navigation; this may include flare stacks and loading arms from marine terminals.	✓	✓	✓	✓	✓	✓
<i>Transportation of Dangerous Goods Act</i> (TDGA [Canada])	Transport Canada	The TDGA (Canada) applies to all modes of transportation of dangerous goods in Canada, including transportation, importing, manufacturing, shipping, and packaging dangerous goods. The purpose of the TDGA (Canada) and Regulations is to promote public safety when dangerous goods are being handled, offered for transport, or transported by road, rail, air, or water (marine), in addition to establishing specific safety requirements. Regulations under the Act outline requirements for classification, documentation and labelling, vehicle markings, managing specific hazards, notifications, reporting, and training requirements. Specific standards for containers used in road, marine, air, and rail transportation are outlined.	-	Would apply to the transport of hydrogen, ammonia, or methanol. As described in Table 9, the provincial requirements parallel the federal regulations and would mostly apply to transport within the province. The federal regulations would apply to marine transport. The key requirements for proponents include training, preparation of documents, registration of vehicles and storage, implementation of appropriate signage, preparation of documents such as shipping papers, selection of appropriate containment (packaging), emergency response assistance plans, and reporting incidents.	✓	✓	✓	✓	✓	✓
<i>Migratory Birds Convention Act</i>	Environment and Climate Change Canada	Protects and conserves migratory bird populations and individuals and their nests in Canada. Section 6 of the <i>Migratory Birds Regulations</i> prohibits the disturbance, destruction, or taking of a nest, egg, nest shelter, eider duck shelter, or duck box of a migratory bird, or possession of a migratory bird, carcass, skin, nest, or egg of a migratory bird without authorization. Since there are no authorizations to allow construction-related effects on migratory birds and their nests, best management practices will be followed to comply with the <i>Migratory Bird Convention Act</i> .	-	There are no applicable project triggers for approvals under the <i>Migratory Bird Convention Act</i> ; however, the proponent must follow guidelines to reduce risk to migratory birds such as clearing outside of migratory bird windows or conducting nest sweeps to avoid incidental take of bird nests.	✓	✓	✓	✓	✓	✓

Table 10 Federal Permitting Requirements

Permit, Authorization or Approval	Agency	Description	Timeline	Applicability to Proxy Projects	Proxy 1	Proxy 2	Proxy 3	Proxy 4	Proxy 5	Proxy 6
Ammonia Code of Practice	Agrichemical Warehousing and Standards Association	<p>The Ammonia Code of Practice was developed to provide a streamlined set of standards, requirements, and guidelines for all ammonia producing and handling facilities, as well as storage vessels and transportation requirements. All ammonia facilities in Canada currently used for fertilizer development are regularly audited for compliance to the Ammonia Code of Practice. Under this code, no ammonia is transported from an approved ammonia facility to another handling facility unless the receiving facility has been audited and approved under the code. The code provides preferred standards for design, build, and manufacturing, including:</p> <ul style="list-style-type: none"> • CSA B51 Boiler, Pressure Vessel, and Pressure Piping Code • CSA B620 Highway tanks and TC portable tanks for the transportation of dangerous goods • CSA B622 Selection and Use, Handling, filling, and unloading of highway tanks and TC portable tanks for transportation of dangerous goods in Class 2 • Canadian Registration 	Variable – depending on how long it takes to get all equipment built, registered, and audited	This would apply to Proxy Project 6, which includes ammonia production from hydrogen. Permitting for low-carbon ammonia is expected to follow this established Code of Practice, which has already set the requirements and standards for production, storage, and transport of ammonia products.	-	-	-	-	✓	-

NOTES:

✓ Potential to apply depending on project location and design configuration

^a Legislated timeline or timeline guided by government policy, does not include proponent time to prepare an application

6 Municipal Permitting Requirements

Municipal authority is established through the provincial *Local Government Act* and Community Charter, which grant municipalities the power to regulate, prohibit, and impose requirements including land use, protection of the natural environment, and buildings. For projects in industrial areas or those located near water, additional information is often required to be submitted for municipal review to ensure the environment will be protected; this often includes environmental assessments and geotechnical studies. Under Division 6 of the *Local Government Act*, this additional information is not required for “Reviewable Projects” under the BCEAA. In situations where there is regulatory overlap with a provincial agency, such as the BCER, a municipality typically works with the senior level of government for review and approval. It may be a challenge for the municipality to review and provide approval for technical industrial aspects of hydrogen projects. If a suitable review cannot be provided, an independent third-party to peer review Project designs may be required. The uncertainty around this process could add additional constraints to a project’s permitting schedule.

6.1 Official Community Plans

The overall guiding bylaw utilized by municipal authorities is their Official Community Plan (OCP), which is used to identify a vision for the community, set objectives, and guide decision-making. OCP bylaws cover a variety of topics such as provision of services as well as land use management. The OCP also identifies requirements for Development Permits, Temporary Use Permits, and other types of permits. The policies outlined in the OCP are further implemented through the adoption of subsequent regulatory bylaws, which focus on more specific topics such as land use (e.g., Zoning Bylaw), environmental management (e.g., Tree Management Bylaw), and nuisances (e.g., Noise Regulation Bylaw, Nuisance Bylaw, Controlled Substance Bylaw).

To obtain approvals for development (Proxy Projects 1-6) a project must conform to both a community’s OCP and Zoning Bylaw. If required, bylaw amendments must be undertaken prior to any permitting that would be

associated with the construction of a facility (e.g., tree cutting permit, soil removal permit, building permit, storage tank installation/removal permit, noise variance permit, etc.).

The specific municipal planning and permitting requirements for hydrogen projects developed within municipality boundaries will depend on the location of a project and the associated municipality. An indicative overview of the types of permits, authorisations, or approvals that may apply depending on the project, location and municipality is provided in Table 11.

Table 11 **Indicative Overview of Municipal Permitting**

Permit, Authorization, or Approval	Description
OCP Amendment	OCP Amendments may be required depending on whether a development meets the future use of a site in accordance with a municipality's OCP (e.g., from general use to industrial)
Pre-Application Review	Depending on the municipality, pre-application meetings are often required to discuss specific permitting requirements
Zoning Bylaw Amendment	May be required to address land use redesignation for storage and production of hydrogen
Development Permit	Could be required in accordance with specific development permit areas
Building Permit	Required for buildings to confirm compliance with the 2012 British Columbia Building Code
Tree Removal Permit	Could be required depending on site location and configurations
Soil Removal/Deposit Permit	Could be required depending on site location and configurations
Sediment Control	Could be required depending on site location and configurations
Noise Variance	Could be required depending on construction/operation
Electrical/Plumbing Permits	Required prior to construction
Storage Tank Installation/ Removal	Required prior to construction

Under the *Local Government Act*, municipalities are given the authority to evaluate applications at a detailed level and require higher standards when considering Zoning Bylaw amendments, Development Permit Applications, or Temporary Use Permits by requiring additional application information. For projects in industrial areas or those located near water, additional information is often required to be submitted for

municipal review to ensure the environment will be protected; this often includes EAs and geotechnical studies.

Building Permits will be required for the development of structures on projects to ensure compliance with the 2012 British Columbia Building Code, but municipalities often do not have the appropriate level of expertise to review and approve the specific technical industrial components of a project, such as those related to developing a hydrogen production facility. We understand that TSBC would regulate hydrogen system design components, while the municipal authority would issue building permits and review electrical systems if they are delegated to do so. However, since hydrogen is a new emerging industry, municipal authorities may receive concerns from the community and stakeholders about the hydrogen components, even though this aspect of the project would be outside their jurisdiction.

Ten municipalities in BC are delegated portions of the *Safety Standards Act* and they can issue electrical and/or gas permits and perform assessments. However, this delegation does not apply to hydrogen (as well as propane and methane) (TSBC 2022). Therefore, a hydrogen facility within a municipality with delegated authority under the *Safety Standards Act* could be regulated under this Act by the municipality for the electrical systems and TSBC for the hydrogen gas systems.

As described in Section 4.1.1.4, hydrogen projects may be developed in areas where the new BCER regulatory framework overlaps with municipal jurisdictions. Further work will be required to understand how BCER will work with municipalities to regulate hydrogen projects.

From a land use perspective, municipalities in urban areas may not have enough industrial land zoned in Official Community Plans and Zoning Bylaws for hydrogen development, given high residential and commercial development pressure.



7 Indigenous Consultation

Indigenous consultation¹⁰ is the duty of the Crown. This common law duty to consult is based on judicial interpretation of the obligations of the Crown in relation to potential or established Indigenous or Treaty rights that are recognized and affirmed in section 35 of the *Constitution Act, 1982*. This duty does not distinguish between federal or provincial levels of government; however, both levels of government have differing approaches to meeting this obligation (and how procedural aspects of the duty to consult are delegated to proponents). Both levels of government will incorporate a proponent's level of consultation efforts and records, as well as on the other level of government's consultations.

Indigenous governing bodies are beginning to enter into consent-based decision-making agreements specifically related to EAs with the BC Government which was enabled by the *Declaration on the Rights of Indigenous Peoples Act* (DRIPA) that provides for greater collaboration between the BC Government and Indigenous governments. These agreements and their enabling legislative provisions reflect the BC Government's efforts to respect and integrate the concept of "free, prior, and informed consent" in the EA process. Key provisions of these types of agreements include establishing a collaboration team that seeks consensus and promotes greater collaboration between the BC Government and the Nation.

While the federal and provincial governments cannot delegate their obligations to consult and, if necessary, accommodate, the Crown and its officials can rely on project proponents to carry out procedural aspects of a consultation process (e.g., information sessions or consultations with Indigenous groups, mitigation measures, and other forms of accommodation). The information collected during these processes can be used by the federal and provincial governments in meeting their consultation obligations.

If future projects do not trigger a federal impact assessment under the IAA or a provincial EA under the BCEAA, consultation requirements will be met through specific permitting processes, particularly through the BCER's permitting process. Federally, if a paragraph 35(2)(b) *Fisheries Act* authorization is required, it will be

¹⁰ As defined by the BC OGC, consultation refers to the legal obligations of the Crown when Indigenous interests (rights and title) may be adversely affected by a crown decision, whereas engagement aims to build relationships with Indigenous groups by exchanging information in the absence of legal consultation obligations (BC OGC 2022b).

necessary to consult/engage Indigenous groups on impacts and offsets. Provincially, Indigenous engagement would be required as part of the provincial permitting process under the new ERAA, the *Heritage Conservation Act*, the *Water Sustainability Act*, and the *Environmental Management Act*. It is best practice to provide opportunities for Indigenous groups to participate in any technical field work that is needed to support the various permit applications that will be required for a project. In addition, to requirements for proponent led Indigenous engagement, community and stakeholder consultation may also be necessary depending on the approval required.

7.1 Provincial Requirements

The BC Government and the Government of Canada have a legal duty to consult and, where required, accommodate Indigenous groups whenever a decision or activity could adversely impact Treaty rights or asserted or established Aboriginal rights and title. In 2016, the Government of Canada endorsed the United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP). On November 28, 2019, the BC Government passed the *Declaration on the Rights of Indigenous Peoples Act* (DRIPA), which requires provincial legislation to be consistent with UNDRIP. In December 2020, the Government of Canada introduced implementation legislation, and on June 21, 2021, Bill C-15: *An Act Respecting the United Nations Declaration on the Rights of Indigenous Peoples* received Royal Assent.

If a proxy project meets the requirements for a provincial EA under the BCEAA (potential thresholds identified in Section 3.0), the application of DRIPA in BCEAA is achieved by the BC EAO's focus on seeking consensus with Indigenous groups during the EA process. The BC EAO must seek to achieve consensus with Indigenous groups on all key decisions in the assessment process including:

- » Acceptance of the DPD, readiness decision, participating Indigenous groups, Process Order, acceptance of final Application, BC EAO's draft assessment report, EAC conditions, BC EAO recommendations to the Ministers, and Ministers' decision
- » EAC extension or amendment decisions
- » Type of assessment (e.g., class, regional, strategic assessment)
- » Substitution under the IAA
- » Indigenous-led assessment

7.1.1 Consultation with Single Window Regulator (BCER)

The new BCER is expected to continue to fulfill the Crown's obligation to consult with Indigenous groups for all activities where it is the decision maker. The BCER will approach consultation with flexibility based on varying requirements of Indigenous groups and agencies (including consultation package requirements and timelines). The process is less prescribed than the EA process, and execution of consultation can vary from project to project depending on the needs identified by the proponent and the Indigenous groups involved. For the BCER-regulated projects requiring consultation, when a project is applied for, an application package containing project details and how they may overlap with Indigenous rights and title will be provided to the affected Indigenous groups. The BCER requires proponents to continuously engage in a dialogue with affected Indigenous Nations when planning their activities (BCER 2023).

In other situations, it has been helpful to set up tripartite discussions between the BC Government, the Indigenous group, and the proponent. The course of action for communication during consultation is determined on a case-by-case basis to suit the needs of the Indigenous groups and the project. The BCER has established consultation processes with some Treaty 8 Indigenous groups, which are documented in publicly available consultation protocols. During the consultation process, the BCER often relies on the proponent to provide responses to comments and information requests provided by Indigenous groups.

The typical timeline for Indigenous groups to provide their responses to an application package during consultation is 30 days, although this is often extended at the request of Indigenous groups. The process starts with the original provision of the application package to Indigenous groups, and the first set of responses triggers the start of a new timeline for addressing any concerns. Timelines to close consultation can vary dramatically based on the existing relations between the government, the proponent, and the Indigenous groups involved. If there is a situation where an Indigenous group cannot support the project due to fundamental disagreements with its execution, the BCER eventually must decide whether the consultation was sufficient and can be closed, though they prefer all issues to be settled prior to issuing an approval.

The BCER has a series of "tools" as a regulator to avoid or mitigate impacts (e.g., regulations, guidance, and permit conditions), in addition to enhancing community capacity to engage and support collaborative opportunities. These "tools" are central to not only meeting the duty to consult and accommodate, but also advancing reconciliation and building Government to Government relationships.

7.1.2 Other Provincial Regulators

In addition to the EA process, Indigenous engagement is required as part of the provincial permitting processes under the provincial legislation relevant to hydrogen projects in BC listed in Table 9: the *Heritage Conservation Act*, WSA, EMA, the *Land Act*, *Wildlife Act*, and the *Forest Act*. The BCER makes decisions under these provincial acts when oil and gas activities are being permitted. As detailed in the *Updated Procedures for Meeting Legal Obligations When Consulting First Nations* (Province of British Columbia 2010), the nature and extent of consultation will vary with the circumstances, including the potential to impact Aboriginal rights and interests. It is Stantec's understanding that each agency of government may have internal guidance for consultation, but that these can also vary depending on the complexity of the project and Indigenous groups' concerns. The decision maker for each permit or approval can also determine the proponent's role in the consultation process.

7.2 Federal Requirements

The Government of Canada must consult and, where appropriate, accommodate Indigenous groups when the Crown contemplates conduct (issuance of a permit) that might adversely impact potential or established Aboriginal or Treaty rights within areas of federal jurisdiction. Outside of the IAA consultation mostly occurs within the permitting processes under the *Canadian Navigable Waters Act* and the *Fisheries Act*. In Stantec's experience, the primary focus of the Government of Canada's consultation process is the understanding of any impacts that may arise from the construction or operation of the specific aspect of the development related to the permit application on an Indigenous group's ability to continue exercising a right such as hunting, fishing, gathering, or using Crown land for traditional purposes. Any potential interference with the exercise of Aboriginal rights must be accommodated, most commonly through design modifications, mitigation or avoidance measures implemented by the proponent. In practice, the federal department responsible for the consultation will provide written notice of an application and provide each potentially affected Indigenous group 30-45 days to respond. This timeline can be extended upon request of an Indigenous group. For more complex projects, the responsible federal department may schedule face-to-face or virtual meetings with representatives of an Indigenous group to discuss an application.

Similar to provincial process, while the Government of Canada cannot delegate its duty to consult and, if necessary, accommodate, the Crown and its officials can rely on industry, to carry out procedural aspects of a consultation process (e.g., information sessions or consultations with Indigenous groups, mitigation measures, and other forms of accommodation). The information collected during these processes can be used by the Government of Canada and its officials in meeting its consultation obligations.

If a project is not expected to be a designated project under the IAA, federal consultation requirements could be met through specific permitting requirements under CNWA, and the *Fisheries Act*, as applicable, including:

- » *Fisheries Act* Paragraph 35(2)(b) – Consultation and/or engagement on impacts and offsets, in addition to opportunities for Indigenous groups to engage in technical field work to support the application.
- » CNWA, s.5(1) – Direct consultation with all Indigenous groups with traditional territories that overlap with a project or activity. Concerns raised by Indigenous groups will be incorporated into Transport Canada's decision process.
- » *Canada Marine Act* – Port authorities oversee their federal responsibilities including permitting of physical works and activities on federal lands and waters. If a proposed project was located in port authority lands the port authority would lead consultation efforts on behalf of the Crown.

7.3 Role of the Proponent

Proponents are strongly encouraged to engage Indigenous groups early in the project planning process, regardless of the project type (Government of British Columbia 2018). Proponents are in the best position to meaningfully engage Indigenous groups during project planning and to provide accurate and timely project information. A proponent is also well-placed to propose feasible mitigation measures in response to Indigenous groups' feedback and concerns about a project.



8 Stakeholders and the Public

The current provincial, federal, and municipal regulatory frameworks that would apply to hydrogen projects often have a requirement to notify or consult with landowners, rights holders, stakeholders, and/or the general public. The process for consultation and notification and the triggers and requirements for either type of engagement (and with whom) is prescribed in the specific federal, provincial, and municipal permit or approval. It is expected that the Requirements for Consultation and Notification Regulation formerly under OGAA that define the activities requiring consultation or notification and who must be consulted with or notified will be carried over to hydrogen projects under the new legislation. If future hydrogen projects do not trigger a federal impact assessment under the IAA or a provincial EA under the BCEAA, interactions with stakeholders and the public would occur primarily through the BCER permitting process.

9 Literature Review of Canadian and Other International Jurisdictions

9.1 Overview

There is unprecedented momentum worldwide from a growing number of countries pursuing hydrogen strategies and policies that incentivize hydrogen industries (IEA 2019). This section of the report provides an overview of developments in hydrogen strategies and policies in the following jurisdictions: Ontario, Alberta, Australia, the United Kingdom, the Netherlands, Germany, and the United States (California and Texas). Given the emerging nature of the low-carbon hydrogen industry, the review is limited to high-level information available at the time of writing and does not include developments that may be currently under consideration.

9.2 Other Canadian Provinces

9.2.1 Ontario

In April 2022, Ontario released its Low-Carbon Hydrogen Strategy (Ontario Strategy), which sets out a vision for a low-carbon hydrogen economy in the province. The Ontario Strategy outlines eight concrete and immediate actions to enable production and expand the low-carbon hydrogen economy in the province (Ontario 2022). These include:

- » Launching the Niagara Falls hydrogen production pilot
- » Identifying Ontario's hydrogen hub communities
- » Assessing the feasibility of hydrogen opportunities at Bruce Power
- » Developing an interruptible electricity rate, supporting hydrogen storage and grid integration pilots
- » Transiting industry through the use of low-carbon hydrogen
- » Consulting on an Ontario carbon sequestration and storage regulatory framework
- » Supporting Ontario hydrogen research

The Ontario Strategy identifies that the development of an economically sustainable low-carbon hydrogen sector in Ontario requires working with industry, the federal government, municipalities, Indigenous communities, academic institutions, and other key stakeholders (Ontario 2022). As identified in the Ontario Strategy, work is required to address regulatory barriers and gaps for the generation and use of hydrogen in the province (Ontario 2022).

As per Ontario Regulation (O.Reg) 116/01, a new hydrogen production facility does not trigger an EA; however, associated infrastructure including transmission lines and transformers can trigger EA requirements. O.Reg 116/01 identifies electricity project types and the associated EA stream they are to comply with. It is anticipated that infrastructure associated with hydrogen project facilities would fall either under a Category B (as defined under O.Reg 116/01) or be subject to the Minor Transmission Facility Class EA. Streamlined/Class EAs are approved under the Ontario *Environmental Assessment Act* to pre-approve certain classes of projects that have predictable and mitigable environmental effects. Precedent has been set in the province for dual fuel (hydrogen plus natural gas) generation facilities subject to both O.Reg 116/01 EA requirements (for facilities greater than 5 MW) as well as the IAA requirements (facilities greater than 200 MW).

In addition to EA requirements, proposed hydrogen projects may also be subject to Environmental Compliance Approval permits related to air, noise, and industrial sewage. Other permits and approvals may include archaeology, water extraction, endangered species, conservation authority regulated areas, and municipal planning, depending on the location and nature of the development. Currently, there is no single regulator taking a leading role in the regulation of hydrogen in the province. Government agencies with current mandates to regulate certain aspects of hydrogen include the Ontario Energy Board, which is an independent energy regulator of the natural gas and electricity sector, and the Technical Standards and Safety Authority (TSSA), who regulate technical safety components of projects.

There are proposed changes being considered to the *Oil, Gas and Salt Resource Act* and the *Mining Act* to clarify the regulatory framework under which carbon storage is permitted and allow the Ministry to grant authorizations to use Crown land for carbon storage activities (Ontario 2022; Environmental Registry of Ontario 2022). The proposed amendments would increase regulatory clarity and remove barriers that inhibit Ontario from advancing new concepts and technologies, such as projects that require the geologic storage of carbon dioxide; many of these types of projects are not currently subject to the *Oil, Gas and Salt Resources Act* framework (Environmental Registry of Ontario 2022).

Ontario's regulatory framework for fuels has already enabled a pilot project to blend hydrogen into natural gas pipelines, as approved by the Ontario Energy Board with support from the TSSA (Ontario 2022). In addition, the Government of Ontario and the TSSA have jointly developed regulations and codes to support the safe adoption and use of hydrogen (Ontario 2022). Their work includes updating the Operating Engineer regulation (O. Reg. 219/01) to adopt a risk-informed framework to enable the use of modern technology (Ontario 2022). In 2007, the Government of Ontario, in collaboration with the TSSA, also adopted the Canadian Hydrogen Installation Code (Ontario 2022).

9.2.2 Alberta

The Government of Alberta published the Hydrogen Roadmap (Alberta 2021) in November 2021, under the Alberta Emissions Reductions Programs Initiative, to identify policy actions to support clean hydrogen production in the province. The Roadmap (Alberta 2021) recognizes hydrogen as an emerging sector that requires a concrete effort on behalf of industries, governments, and consumers to resolve several knowledge gaps and challenges, including:

- » Gaps in hydrogen export supply chain logistics (e.g., constructing critical infrastructure, including distribution systems)
- » Gaps in hydrogen technology (e.g., for production and deployment applications)
- » Barriers related to regulatory efficiency, codes, and standards

Alberta is the first jurisdiction in Canada with an established regulatory and risk management framework in place for large-scale CCUS projects (Alberta 2021). In 2011, the Carbon Sequestration Tenure Regulation was enacted, and several other acts were amended to clarify pore space ownership, the acceptance of long-term liability to the province, and to establish a post-closure stewardship fund (Alberta 2021).

Regulation of the hydrogen industry in Alberta is currently reliant on existing oil and gas and energy regulatory requirements rather than new legislation. Hydrogen production is currently not listed under mandatory or exempted activities in the Environmental Assessment (Mandatory and Exempted Activities) Regulation (Alberta Regulation 111/1993). Further, there are no provincial EA triggers for pipelines or carbon capture and storage projects.

Permitting for hydrogen production in Alberta is currently regulated under the chemical manufacturing industry by Alberta Environment and Parks. The Alberta *Environmental Protection and Enhancement Act* is applicable for approval to construct and operate hydrogen production facilities. CO₂ and natural gas supply pipelines may also require an Approval under *Environmental Protection and Enhancement Act*. The *Responsible Energy Development Act* by the Alberta Energy Regulator and the corresponding *Oil and Gas Conservation Act* regulate CO₂ injection and storage in an approach similar to other oil and gas developments. Allocation of pore space tenure would also require approval under the *Mines and Minerals Act*, as amended by the *Carbon Capture and Storage Statutes Amendment Act, 2010* and the Carbon Sequestration Tenure Regulation, administered by Alberta Energy.

Alberta's Hydrogen Roadmap focuses on policy actions up to 2030 that will ensure public safety, regulatory harmonization across the supply chain, and supporting the development of national and provincial codes and standards (Alberta 2021). Other pending initiatives include removing roadblocks under the *Gas Utilities Act* and the *Gas Distribution Act* to allow the blending of hydrogen into natural gas distribution systems.

9.3 Australia

The Australian Government released a national hydrogen strategy in 2019 (Australian Strategy) to provide a framework for government and industry to promote development of Australia's hydrogen industry (Australia Government 2022). The Australian Strategy outlines 57 joint actions to be undertaken across Australia to achieve this goal (Australia Government 2019). These include advancing research and development, assessing infrastructure needs, establishing a guarantee of origin scheme for the source and type of technology used to manufacture hydrogen, creating clean hydrogen industrial hubs in regional Australia, building community awareness and knowledge, and improving hydrogen regulation (Australia Government 2022).

Development of an effective hydrogen-specific regulatory framework is recognized as a key element of the Australian Strategy. The Australian Strategy recommends that the federal government and each state and territorial government review regulations and standards that affect the hydrogen industry, identify regulatory barriers, and recommend options to address barriers (Australia Government 2022).

A preliminary review of the regulatory framework commissioned in 2019 identified 730 pieces of legislation and regulation and 119 standards (including 71 Australian standards and 48 international standards) relevant to the hydrogen industry (Clayton Utz 2019) Further, this preliminary review (Clayton Utz 2019) identified several gaps for further consideration, including:

- » Development of national technical safety standards for the hydrogen industry to ensure alignment of regulatory models critical to ensuring safety and consistency and public confidence in the hydrogen industry
- » Streamlining interstate connections and interfaces to limit unintended barriers or disincentives to the development of a national hydrogen industry
- » Prioritization of regulatory responses to those technologies and approaches that are closer to full scale commercialization and/or which potential applications or approaches are likely to be adopted by the hydrogen industry

Standards Australia is currently working with stakeholders, government and industry working groups tasked with overseeing and developing hydrogen standards in the following areas (Standards Australia 2022):

- » Production, handling, and storage
- » Pipeline and gas distribution networks
- » End use utilization
- » Fuel cell applications
- » Mobility applications

9.4 United Kingdom

The UK Hydrogen Strategy, published in 2021 (UK Strategy), identifies the role hydrogen can play in meeting the UK's net-zero emissions reduction targets by 2050. The UK Strategy takes a “whole-system approach” to developing and scaling the hydrogen economy, setting out how government and industry can coordinate and deliver activity on a value chain basis (UK Government 2021). The UK Strategy sets ambitious targets in terms of growing hydrogen production capacity, financial commitments to support innovation, and policy that will

develop over time (UK Government 2021). The need for a coordinated regulatory framework that encourages the growth of demand for hydrogen and removes roadblocks to hydrogen production and use is also identified (UK Government 2021).

The UK Strategy identifies that early projects are expected to be developed and operate within the existing regulatory regime, but over time new regulations are likely to be required to facilitate further expansion of the market (UK Government 2021). Further, the UK Strategy recognizes both the immediate regulatory barriers to initial development of the hydrogen economy and the longer-term broader regulatory framework for hydrogen; this approach is intended to enable regulatory changes to be planned and prioritized (UK Government 2021). The UK Strategy (UK Government 2021) identifies four overarching regulatory actions for the hydrogen economy that need to be addressed:

- » Address regulatory barriers facing first-of-kind hydrogen projects that can significantly hinder early project development and related innovation
- » Use regulation to unlock access to new markets for hydrogen to address regulatory barriers that limit the option of low carbon hydrogen
- » Identify the regulatory oversight required when changes are needed for an evolving market (e.g., blending hydrogen to existing gas grids) for low-carbon hydrogen as the market grows and matures
- » Ensure the potential role for hydrogen is considered in the broader review of regulation for the energy transition

Nardell et al (2021) identifies that the current planning regimes applicable to chemical and gas processing industries, power generation, and CCUS may all be relevant to hydrogen production. Depending on the size, location, and type of intended development, a hydrogen project may require:

- » Development consent under the *Planning Act*— environmental impact assessment may be required for major infrastructure projects and some smaller projects
- » Express planning permission under the *Town and Country Planning Act*
- » Consent under the *Electricity Act*
- » Environmental permitting under the Environmental Permitting (England and Wales) Regulation

Since the UK Strategy was published, a regulatory forum has been established to determine regulatory responsibilities covering environment, safety, technical standards, and planning (UK Government 2022). The UK Strategy states that the UK government aims to have appropriate planning and permitting regime in place prior to 2024 (UK Government 2021). Currently, there are substantial permitting gaps, with hydrogen projects facing a fragmented approvals path (RenewableUK 2022). Clear guidance is required on how low-carbon hydrogen projects are approved in the current planning and permitting regime as most hydrogen projects will likely involve technologies which require interaction with several planning bodies (Renewable 2022). A further gap identified is that agencies are likely unable to review projects quickly enough to enable hydrogen supply targets to be met (RenewableUK 2022).

9.5 The Netherlands

In 2020, the Dutch Government set out a National Strategy for Hydrogen Development (Dutch Strategy) embracing targets identified for hydrogen in their National Climate Agreement. The strategy recognizes hydrogen as playing a crucial role in a zero-carbon energy system for industry, transport, heat grids, and as a scalable energy carrier that can integrate with sustainable solar and wind energy (Government of the Netherlands 2020). The Netherlands is aiming to be the first European country to develop nationwide hydrogen infrastructure, through the implementation of a hydrogen backbone comprising coordinated electrolytic hydrogen production port facilities, storage, pipelines, and the electricity grid (CMS 2021a). The Dutch Government recognizes that a robust regulatory framework will play an important role in developing the hydrogen economy and transitioning from natural gas infrastructure to green gas and low carbon hydrogen (CMS 2021a).

Currently, no hydrogen-specific legislation has been adopted in the Netherlands, meaning that the existing regulatory regime would apply to potential hydrogen projects (HyLAW 2019). Electricity and natural gas are currently regulated by the Netherlands Authority for Consumer and Markets through the *Electricity Act* and the *Gas Act* (Van Doorne 2022). There is no specific legislation for hydrogen production; as such, hydrogen is considered as any other inorganic gas production facility (HyLAW 2019). This designation may place a disproportionate burden on more sustainable technology options for producing hydrogen (e.g., electrolysis) as it subjects facilities to the same requirements as industrial emission-emitting processes (HyLAW 2019). In addition, another barrier identified is that localized smaller-scale production of hydrogen is legally

categorized the same as large-scale hydrogen production, meaning the same permitting process and zoning would apply to smaller-scale projects (HyLAW 2019).

Currently, there is no single regulatory agency in the Netherlands with a mandate for regulating hydrogen projects; the following array of regulatory bodies have been identified as having varying responsibilities based on specific activities (CMS 2021a):

- » Local Authorities, Municipalities and Provinces – regulate the use of land, undertake environmental impact assessments, etc.
- » State Supervision of Mines – regulates the storage of hydrogen
- » Minister of Economic Affairs – regulates new pipelines and decommissioning of existing pipelines
- » Authority for Consumer and Markets – regulates the gas network

The Dutch legislator is currently working on a new bill, the *Energy Act*, which is intended to replace the current *Electricity Act* and *Gas Act* to provide an updated and comprehensive framework to support the energy transition in the Netherlands (Van Doorne 2022). The Netherlands has also initiated a four-year hydrogen safety program with industry to identify safety issues, solutions, and policies to address potential concerns (CSM 2021). The Authority for Consumer and Markets is permitting the implementation of pilot projects with hydrogen in the built environment, allowing network operators to participate in trial services with hydrogen to gain experience with the use of hydrogen in the context of the energy transition, prior to new legislation being in place (Fuel Cells Works 2022).

9.6 Germany

The Federal Government of Germany published their National Hydrogen Strategy in 2020 (German Strategy) outlining the key role hydrogen will play in meeting climate targets by 2030 and achieving GHG neutrality by 2050 in line with targets agreed to under the Paris Agreement (CSIS 2021). The German Strategy contains an action plan of 38 measures that will attract private investment in hydrogen generation, transport, and use of hydrogen (German Government 2020). The German Strategy identifies establishing a domestic market for the production and use of hydrogen through establishing 5 GW of generation capacity as a first step to speed up the rollout of hydrogen technology (German Government 2020).

The German legal and regulatory framework for hydrogen is not yet comprehensive; it is expected that the hydrogen network regulation will develop in alignment with European law (CMS 2021b). Current identified gaps include the lack of a comprehensive regulatory framework for carbon capture and storage necessary for the development of hydrogen production industry using natural gas, and technical rules for blending hydrogen into the natural gas grid are still under consideration (CMS 2021b).

There is no leading regulatory agency currently responsible for the regulation of hydrogen projects in Germany; hydrogen currently falls under the existing regulatory framework of gas and electricity markets with the Federal Network Agency, BNetzA, acting as the federal authority (CMS 2021b). Regulation of hydrogen networks are governed under the *Energy Act*, which was amended in 2021 with new provisions for the regulation of hydrogen networks, including defining hydrogen as an independent energy carrier alongside natural gas (CMS 2021b).

Currently, development of a hydrogen production facility would require an authorization procedure pursuant to the Federal *Emission Control Act* (CMS 2021b). This Act defines the requirements of large industrial facilities to avoid or minimize polluting emissions in the atmosphere, water, and soil and to prevent generation of waste (HyLAW 2018). A formal permit procedure with public participation is required for producing hydrogen on an industrial scale; however, there is currently no regulation (output thresholds) defining industrial scale, and assessment of projects is on a case-by-case discretionary basis (HyLAW 2018). The German *Environmental Impact Assessment Act* may also apply to construction and operation of hydrogen production projects. Currently, hydrogen projects are classified under chemical conversion on an industrial scale, and a general preliminary examination would be required for each individual case (HyLAW 2018).

Under the current framework, hydrogen production is grouped with other traditional chemical industries and would be subject to the same stringent regulatory requirements as other chemical industrial emission processes; these industries may have the potential for much greater emissions and the potential for hazardous substances (HyLAW 2018). The current legislation also does not distinguish between different methods of hydrogen production, including SMR and water electrolysis (HyLAW 2018). To reduce barriers of entry for electrolytic hydrogen production development, the HyLAW 2018 review recommends that the definition of production on an industrial scale be reviewed, and a clear exception should be implemented for electrolysis plants up to a certain capacity from the permit requirements of the Federal *Emission Control Act* and the *Environmental Assessment Act*.

9.7 United States

Regulation of hydrogen in the US occurs both at the federal and state levels, with the approaches adopted differing greatly between states. Currently, California and Texas have been identified as states that are best positioned for developing a low-carbon hydrogen industry (CMS 2021c).

9.7.1 Federal Government

In September 2022, the US Department of Energy (US DOE) released its draft National Clean Hydrogen Strategy and Roadmap, which provides a vision for hydrogen production, transport, storage, and use in the US (US DOE 2022a). In addition, the US DOE also released a draft guidance document for developing a clean hydrogen production standard (US DOE 2022b). The US DOE's Hydrogen Program is being led by the Hydrogen and Fuel Cell Technologies Office within the Office of Energy Efficiency and Renewable Energy (US DOE 2022a). The Program is working on a range of codes and standards and permitting tools¹¹ to advance the sector (US DOE 2022a). The US DOE's Hydrogen Program Plan outlines a coordinated approach to advance affordable production, transport, storage, and use of carbon-neutral hydrogen across different sectors of the economy (US DOE 2022a). Other policy related to hydrogen at the federal level includes the *Energy Policy Act* and the *Energy Independence and Security Act*.

9.7.2 California

In June 2020, the California Energy Commission published a Roadmap for the Development and Buildout of Renewable Hydrogen Production Plants in California. The roadmap cites the *California Environmental Quality Act* requirements as being a potential barrier to the development of hydrogen projects in California (California Energy Commission 2020). It suggests that state agencies could expedite project development through harmonizing local requirements, streamlining permitting processes, and the approval of program environmental impact reports (California Energy Commission 2020). The California Energy Commission and the California Governor's Office of Business and Economic Development have been actively assisting with local permitting issues for hydrogen stations, but it is now recommended that this approach should be extended to address the entire supply chain (California Energy Commission 2020).

¹¹ <https://h2tools.org/codes-standards/codes-standards-permitting-tools>

The regulatory changes implemented in the California dairy sector may serve as an example of what can be done for the renewable hydrogen sector (California Energy Commission 2020). The State was able to streamline permitting for biomethane projects through California's Climate Pollutant Reduction Strategy and through industry action (California Energy Commission 2020). The California Environmental Protection Agency spearheaded the establishment of a streamlined permitting process to help proponents navigate the permitting process in the dairy sector and approved a trade group-developed program environmental impact report (California Energy Commission 2020).

The California Energy Commission is currently developing a Green Hydrogen Roadmap and Strategic Plan, which will be published in 2023 (California Energy Commission 2022).

9.7.3 Texas

Texas has been identified as having significant potential to produce low-carbon hydrogen, due to the existing scale of energy production and the State's status as the largest current producer of grey hydrogen (e.g., hydrogen produced from hydrocarbons) (FCHEA 2022). The State has significant existing pipeline infrastructure, existing underground storage fields, and skilled expertise to occupy a leading position as a US clean energy hydrogen hub (McKinsey and Company 2022). Texas has adopted several zero-emission hydrogen policy incentives such as the Texas Commission on Environmental Quality Authorization of Governmental Alternative Fuel Fleet Grant Program, but currently no overarching statewide low-carbon hydrogen strategy was identified during this review. Further, no specific streamlining of regulations was identified, but implementing appropriate supporting policy and regulatory framework to encourage development required is identified as a potential hurdle to the industry in Texas (McKinsey and Company 2022).

9.8 Summary

This overview has identified that governments in all jurisdictions considered appear to be in the early stages of adapting regulations and new approaches to the emerging hydrogen industry. Comprehensive regulatory reviews in many jurisdictions (e.g., UK, the Netherlands etc.) are currently ongoing and some have yet to be published. In many jurisdictions, legislators are working to meet climate targets by incentivizing hydrogen development; however, projects currently would largely fall under existing regulatory regimes developed for

conventional chemical/gas manufacturing industries. As such, there may be unnecessary hurdles for new projects to navigate that may hinder early project development. In several jurisdictions (e.g., Australia, the Netherlands), governments are focused on developing nationwide approaches, developing technical codes and safety standards for the hydrogen industry, and prioritizing the regulation of hydrogen production technologies that are closer to full scale commercialization.



10 Report Findings Summary

This study has identified several gaps and barriers in the current regulatory framework that could challenge proponents considering development of hydrogen production projects in BC.

The findings identified are categorized as follows:

- » Regulatory gaps: defined as gaps in current legislation or legislated jurisdictional oversight
- » Knowledge gaps: defined as gaps in current knowledge (further engagement may be required with government and industry stakeholders to understand the process)
- » Potential risks: defined as future risks that may need to be understood and managed

Proponents often base investment decisions on their perceived ability to identify and obtain permits that have clear approval timelines and processes. The BC Government has made significant steps towards streamlining the regulatory framework for hydrogen projects by replacing OGAA with the ERAA and expanding the BCER's mandate to becoming the single-window regulator for hydrogen. We expect that the BCER and MEMLI will revise existing regulations or develop new regulations as a result of the ERAA. During the transitional period necessary to change regulations, build capacity, issue guidance, the BCER will rely on the use of permit conditions to authorize projects.

A summary of the key findings for each regulatory category is provided below, the findings have been updated to take into account the new role of the BCER in regulating hydrogen.

10.1 Regulatory Gaps

- » It is uncertain how the regulatory framework under development will be compatible with relevant provincial, federal, and international codes and standards for hydrogen production.
- » The BCER has agreements and processes in place with other regulators (e.g., ALC) in some parts of BC. It is unclear whether these agreements and processes will apply to hydrogen, methanol, ammonia, and carbon storage throughout BC.

- » It is unclear how different sizes of hydrogen production projects will be regulated and if a tiered approach to regulation will be considered.
- » It is unclear how the TSBC and BCER will regulate hydrogen projects effectively without jurisdictional overlap.
- » In some jurisdictions, a hydrogen production facility will require permitting or approvals from the BCER, TSBC, and the local municipality. It is unclear how these regulators will work together and reduce duplication and inefficiencies to streamline the process.
- » The BCUC is undertaking an inquiry to review the regulation of hydrogen energy services under the *Utilities Commission Act*. As this work is ongoing, the outcome is unclear at the time of writing.

10.2 Knowledge Gaps

- » There is uncertainty related to municipal authorities' capacity to review and approve development permits for hydrogen projects that fall within their jurisdictions and how they would work with the BCER.
- » There is uncertainty regarding the transitional period required by the BCER to change regulations, build capacity, and provide guidance.

10.3 Risks

- » The RPR under BCEAA currently groups hydrogen within a broad category of industrial projects defined within NAICS codes, which include the chemical manufacturing of poisonous/toxic chemicals. This broad grouping does not distinguish hydrogen production from other industries that may have a much larger environmental footprint.
- » The BCEAA requires that a review of the Act be initiated within five years of having come into force. A review of the BCEAA will be initiated in 2024. There is uncertainty on whether the government's climate change policies such as CleanBC, intended to incentivize and fast track projects, may influence any potential changes.
- » Indigenous groups have successfully entered into agreements with the provincial and federal governments regarding implementing their own environmental standards. While these may add

another layer of approvals needed for a project to proceed, they can also provide certainty and clarity for proponents looking to develop a project.

- » First of their kind hydrogen projects are likely to encounter unexpected barriers and an array of hurdles that could delay investment decisions and development.
- » In some urban municipalities, there may be a lack of suitably zoned industrial land within Official Community Plans and Zoning Bylaws to accommodate hydrogen developments, given the substantial residential and commercial development pressure.
- » As hydrogen is an emerging technology in BC, it is anticipated that awareness and technical knowledge of hydrogen (including potential safety risks) amongst municipalities, Indigenous groups, and the public is very low, and there could be potential risks for new developments.

11 Key Recommendations

The key recommendations of the regulatory mapping study are provided in Table 12. These recommendations have been developed based on the regulatory and knowledge gaps summarized in Section 10. The recommendations include:

- » Development of guidance to assist proponents navigating the regulatory framework
- » Review of technical codes and standards to support the regulatory framework
- » Development of agreed processes (e.g., Memorandums of Understanding) amongst regulators for effective and efficient regulation of hydrogen projects
- » Scaling the regulation of hydrogen projects in line with the nature and risks related to projects, so that small-scale hydrogen projects do not face unnecessary burdens
- » Providing local and municipal permitting support
- » Work with Indigenous groups to create partnerships
- » Providing education and further engagement

The recommendations are categorized under topic area. In addition, the lead agency, timeline for implementation, and rationale for the recommendation has also been provided.

Table 12 BC Hydrogen Regulatory Mapping Study Key Recommendations

#	Topic	Lead Agency	Recommendation	Timeline	Rationale
1	Provincial regulations	MEMLI and BCER	Consider changes to regulations and/or new regulations that can be scaled to different sizes of hydrogen projects in line with potential risks.	Near-term	The existing regulations under the former OGAA do not generally anticipate a range in project sizes in line with potential risks, complex regulatory requirements developed for larger projects may place an unnecessary burden on smaller-scale localised projects.
2		Ministry of Forests	Provide guidance to proponents on how to obtain a WSA authorization for water diversion and use for hydrogen production.	Near-term	A WSA authorization is required to divert and use water from streams or groundwater. Although the WSA can currently authorize water diversion and use for hydrogen production, and proponents can submit applications, proponents may benefit from additional guidance.
3		BCER	Provide additional guidance and support to first of their kind projects that are at the permitting stage. This could take the form of meetings, workshops, and briefing notes. Encourage proponents to engage early with Indigenous groups, municipalities, and other regulators.	Near-term	First of their kind hydrogen projects are likely to encounter unexpected barriers and an array of hurdles that could delay investment decisions and development.

Table 12 BC Hydrogen Regulatory Mapping Study Key Recommendations

#	Topic	Lead Agency	Recommendation	Timeline	Rationale
4	Provincial regulations (cont'd)	BCER	Develop and publish a comprehensive guidance document to accommodate the regulation of hydrogen manufacturing and associated activities based on the enacted supporting regulations. This guide, as a minimum, should describe the permit application process, design, and construction of a hydrogen facility and operating requirements.	Medium-term	Guidance is required to enable proponents to understand the approval process and support decision making.
5		BCER	Modify and/or develop new agreements and processes with other regulators to enhance the “single window” approach, where appropriate.	Medium-term	The BCER has existing agreements and processes in place with other regulators for oil and gas projects and these types of agreement could also work well for hydrogen projects.
6		MEMLI	BCUC to clarify the regulation of hydrogen energy services as outcome of its inquiry.	Medium-term	The <i>Utilities Commission Act</i> does not identify hydrogen specifically as a public utility.

Table 12 BC Hydrogen Regulatory Mapping Study Key Recommendations

#	Topic	Lead Agency	Recommendation	Timeline	Rationale
7	Provincial regulations (cont'd)	BC EAO	Establish a working group to review and consider the applicability of hydrogen production threshold under the RPR in the BCEAA, as well as the possibility of excluding low-carbon hydrogen explicitly from Table 1 of the RPR.	Medium-term	The current grouping of hydrogen production under industrial projects categorizes hydrogen within a broad category of industrial projects defined within NAICS codes, which include the chemical manufacturing of poisonous/toxic chemicals. This broad grouping does not distinguish hydrogen production appropriately from other industries that may have a much larger environmental footprint.
8		MEMLI	Publish a broader permitting and regulatory framework document to capture a range of production pathways and scales of production. This should incorporate provincial, federal, and general municipal considerations and adopted technical codes and standards.	Medium- to long-term	Guidance is required to support approvals, including the BCER process, as well as other provincial, federal, and general municipal considerations.
9	Codes, design, and safety standards	MEMLI	Establish a working group to facilitate the review of technical codes and standards to support the provincial regulatory framework. This should include the CSA at the national level and consider the International Standards Organization, the International Electrotechnical Commission, the European Industrial Gases Association and the US DOE, where applicable.	Ongoing	To ensure safety, and public confidence in the hydrogen industry, the provincial regulatory framework should be supported by federal and international technical codes and standards.

Table 12 BC Hydrogen Regulatory Mapping Study Key Recommendations

#	Topic	Lead Agency	Recommendation	Timeline	Rationale
10	Local and municipal permitting	BCER / TSBC	Build capacity in the BCER and TSBC in line with the new framework to support local municipalities in reviewing and approving technical aspects of hydrogen manufacturing projects.	Long-term	Municipalities lack the expertise to review the technical aspects of hydrogen projects.
11		Union of BC Municipalities	Establish a working group for urban municipalities to consider hydrogen project development within Official Community Plans and Zoning Bylaws to ensure suitable industrial land is available.	Long-term	There may be substantial residential and commercial development pressure on industrial zoned lands within urbanized areas for hydrogen development
12		MEMLI / BCER	Work with Indigenous groups to co-develop consent-based decision-making agreements that formalize targets, commitments, and outline a process for ongoing reconciliation.	Long-term	Indigenous groups have successfully entered into agreements with the provincial and federal governments regarding implementing their own environmental standards, which adds another layer of approvals needed for a project to proceed. This is a novel approach to consultation and more Indigenous groups are realizing they could do the same and implement their own process alongside current regulations.
13	Education and engagement	MEMLI	Establish partnerships with Indigenous and non-Indigenous communities to improve awareness and technical knowledge (including potential safety risks) on BC's energy transition policy, including hydrogen; this could take the form of workshops, online resources, and meetings.	Ongoing	Indigenous group, stakeholder, and public awareness and concern regarding the hydrogen industry in BC.

12 Conclusion

This report has been prepared to identify the current regulatory framework applicable to hydrogen developments in BC. The study has focused on provincial, federal, and municipal regulatory requirements in BC that may be applicable to the proxy projects identified. The regulatory framework has recently changed in BC with the renaming of the BC OGC to the BCER and the passing of the ESAA. The regulation of hydrogen in BC is in a transition period as regulations are revised or developed and the BCER develops guidance for proponents seeking approvals for hydrogen projects.

The report provides 13 key study recommendations that could assist with the transition period. The recommendations include changes to regulations, development of guidance, review of technical standards, permitting support, and education/ further engagement.

13 Closure

This report has been prepared for the exclusive use of CICE as part of the BC Hydrogen Mapping Study. The regulatory requirements and process are based on our understanding of current hydrogen production regulatory regime at the time of the report preparation. Refinement of this information is recommended based on further consultation and continued review of the regulatory regime.

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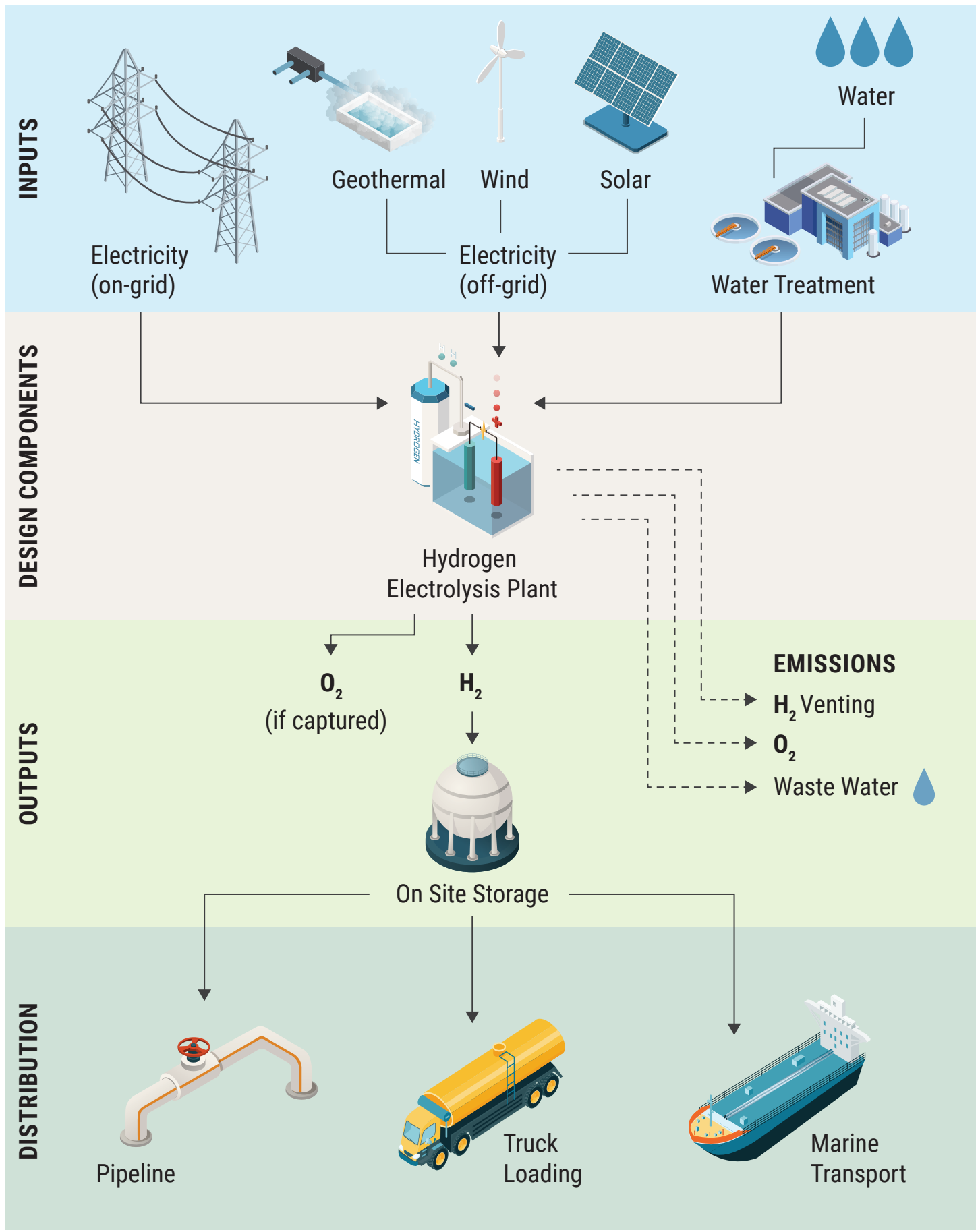
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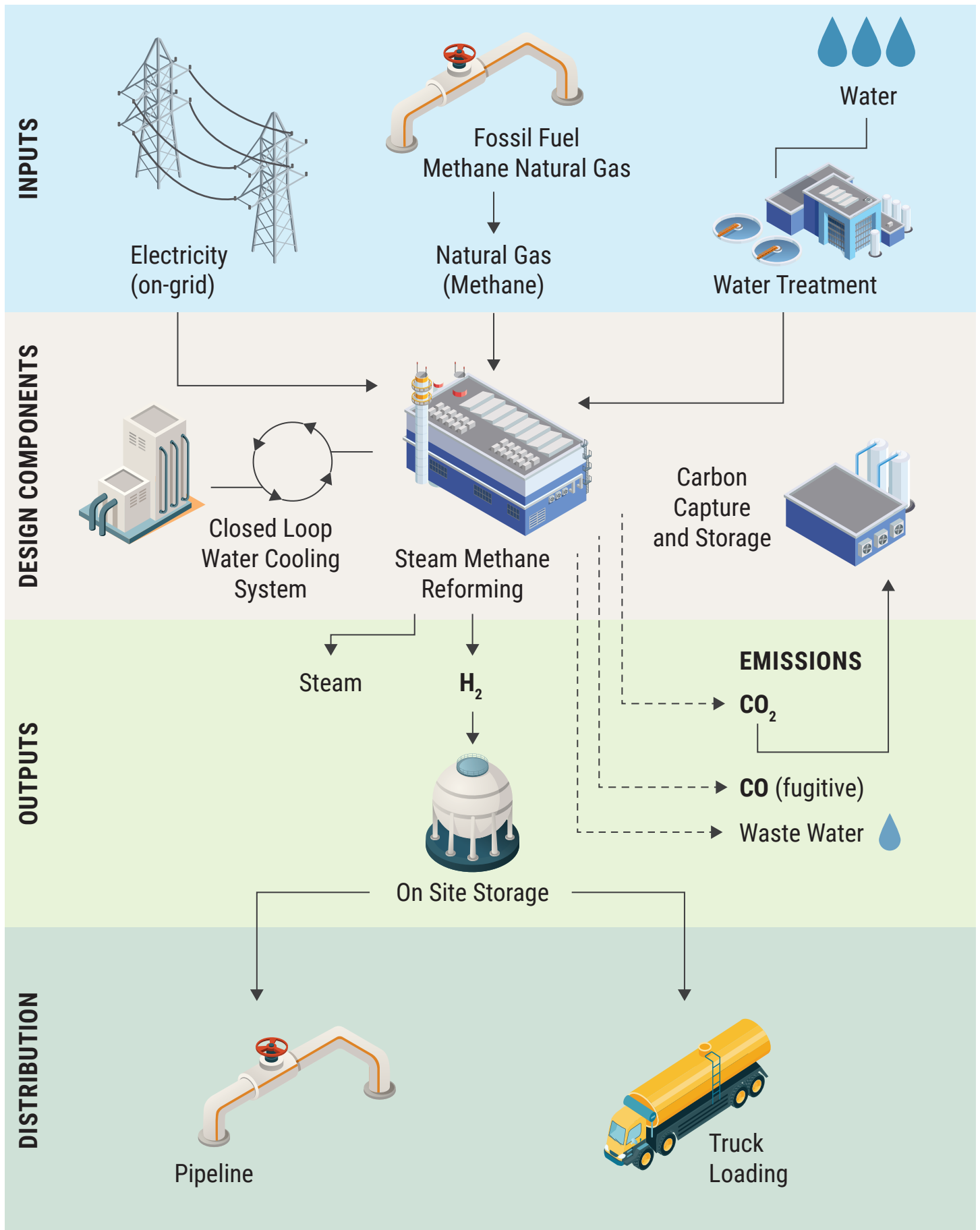
Appendices

Appendix A Proxy Project Flow Diagrams

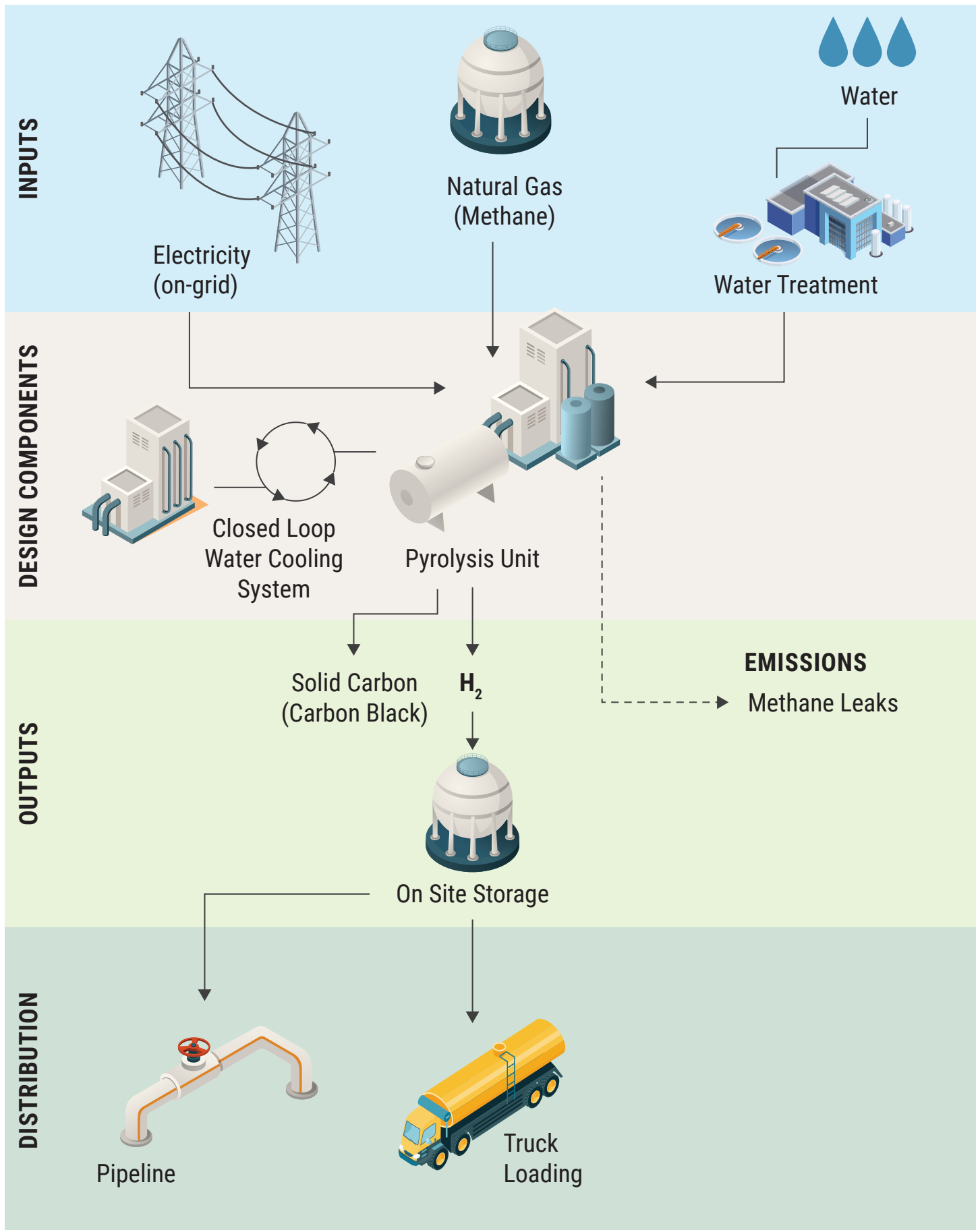
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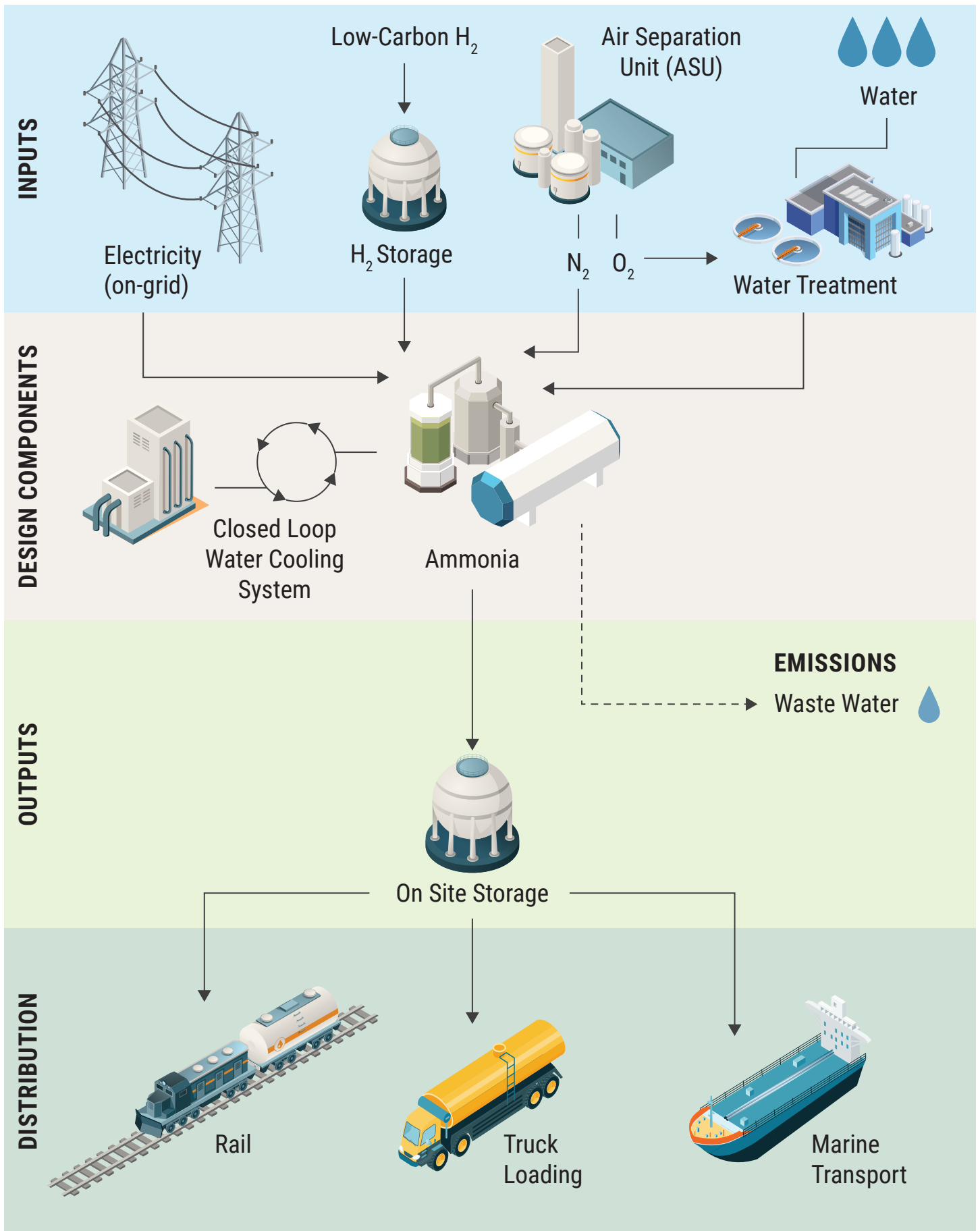
Proxy Project 3 Hydrogen Produced From Natural Gas with Carbon Capture Utilization and Storage



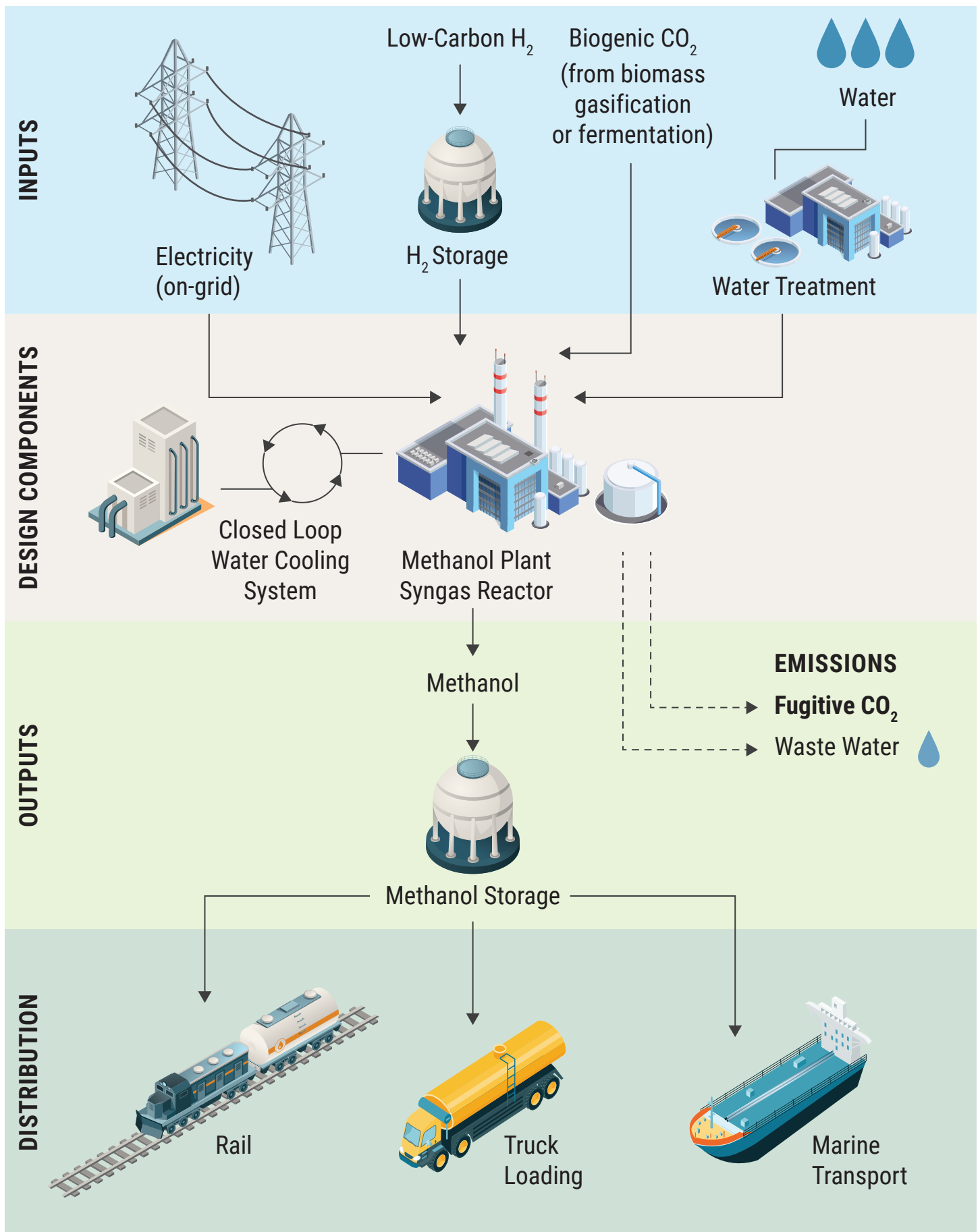
Proxy Project 4 Hydrogen Produced From Methane Pyrolysis



Proxy Project 5 Ammonia Produced From Low-Carbon Hydrogen



Proxy Project 6 Methanol Produced From Low-Carbon Hydrogen



Appendix B Overview of the BCEAA Environmental Assessment Process

Table B.1 BCEAA Environmental Assessment Process Summary – Source: Stantec 2022

Phase	Description	Indigenous or Public Participation	Deliverables		Timelines
			Proponent	BC EAO	
Early Engagement	The Early Engagement phase is initiated when the proponent submits an Initial Project Description (IPD) and Engagement Plan to the BC Environmental Assessment Office (EAO). The Engagement Plan will identify the recommended activities to be undertaken by the Proponent during the early engagement phase with Indigenous groups, provincial and federal government agencies, local governments, and the public. Based on feedback and consultation on the IPD, the EAO will prepare a Requirements Letter outlining information requirements the proponent must provide in the Detailed Project Description (DPD).	<ul style="list-style-type: none"> Indigenous groups must identify if they intend to be a participating Indigenous nation within 80 days of publication of the IPD. It is expected that local governments will provide comments to the EAO on the IPD within a similar timeline. The IPD will be subject to a minimum 30-day public comment period and the EAO will also conduct outreach to local communities and stakeholders. 	<ul style="list-style-type: none"> Initial Project Description Engagement Plan Detailed Project Description 	<ul style="list-style-type: none"> Requirements letter 	<ul style="list-style-type: none"> Within 90 days of accepting the IPD and Engagement Plan, the BC EAO must provide a Summary of Engagement to-date, and any requirements that the proponent must address in the DPD. The proponent then has up to one year to prepare and submit the DPD to the BC EAO.
EA Readiness Decision	The Readiness Decision phase begins when the DPD is accepted and ends when a Notice of Decision is published, documenting the decision made to either: <ul style="list-style-type: none"> (i) Exempt a project from the assessment (i.e., make a determination that an environmental assessment is not required and can proceed to permitting); (ii) Start the environmental assessment process; (iii) Revise and resubmit the Detailed Project Description; or (iv) Terminate the assessment process because the project does not meet the Province of British Columbia's policies or legislation. 	<ul style="list-style-type: none"> BC EAO will seek consensus with participating Indigenous groups on EA readiness. 	<ul style="list-style-type: none"> None 	<ul style="list-style-type: none"> Notice of Consent 	<ul style="list-style-type: none"> No statutory timelines; however, the BC EAO anticipates that an exemption request or termination recommendation can take 90 days. A decision to start the EA process is expected to take less time.

Table B.1 BCEAA Environmental Assessment Process Summary – Source: Stantec 2022

Phase	Description	Indigenous or Public Participation	Deliverables		Timelines
			Proponent	BC EAO	
Process Planning	<p>The Process Planning phase begins when the EA process commences (i.e., upon receipt of the Notice of Consent) and ends when a Process Order is issued. During this phase, a project-specific Process Order is developed by the BC EAO, seeking consensus with participating Indigenous groups. The Process Order will specify the scope of the project; the assessment plan, including the engagement plans for participating Indigenous groups, the public, stakeholders, and local governments; and the information required from the proponent.</p> <p>This phase of the assessment process is the latest point at which the BC EAO would establish a Technical Advisory Committee (TAC) for the assessment (it is likely it would be formed in an earlier phase). The TAC will be composed of experts from federal and provincial government agencies that can provide advice to the BC EAO on the potential issues and effects of the project, in addition to representatives from participating Indigenous groups. External experts may also be retained to sit on the TAC when unique technical issues that cannot be addressed by agency staff are encountered. During this phase, the BC EAO may also establish a Community Advisory Committee if there is sufficient local interest. The Community Advisory Committee will be composed of community members potentially affected by a project and will advise the BC EAO on the effects of the project on the community. Members of the TAC could also be on the Community Advisory Committee.</p>	<ul style="list-style-type: none"> The draft Process Order will be subject to a 30-day public comment period. BC EAO will seek consensus with participating Indigenous groups on details of the Process Order. Participating Indigenous groups will be invited to participate in the TAC. The BC EAO may establish a Community Advisory Committee. 	<ul style="list-style-type: none"> None 	<ul style="list-style-type: none"> Process Order 	<ul style="list-style-type: none"> The BC EAO must issue a final Process Order within 120 days from EA commencement.

Table B.1 BCEAA Environmental Assessment Process Summary – Source: Stantec 2022

Phase	Description	Indigenous or Public Participation	Deliverables		Timelines
			Proponent	BC EAO	
Application Development and Review	<p>The Application Development and Review phase begins when the Process Order is issued and ends when the BC EAO determines that the technical information and assessment requirements included in the proponent’s draft Application adequately address the requirements of the assessment plan; at this point, the BC EAO formally directs the proponent to prepare/submit a final Application for an EAC.</p> <p>During development of the draft Application the BC EAO will be encouraging proponents to seek reviews and feedback on their assessment in stages (e.g., modeling studies, effects assessment chapters).</p> <p>Once the draft Application is submitted, the BC EAO, TAC, and Indigenous groups will review and provide feedback. The proponent will incorporate this feedback, as well as feedback received during the public comment period, and prepare the final Application.</p> <p>The final Application must assess the following:</p> <ul style="list-style-type: none"> • Effects of the project on Indigenous groups and rights recognized and affirmed by section 35 of the <i>Constitution Act, 1982</i> • Positive and negative direct and indirect effects and adverse cumulative effects of the project, including environmental, economic, social, cultural or health effects • Risks and uncertainties associated with those effects, including the results of any interaction between effects • Risks of malfunctions or accidents • Disproportionate effects on distinct human populations, including populations identified by gender • Effects on current and future generations • Effects on biophysical factors that support ecosystem function • Consistency with any land use plan of the government or an Indigenous nation if relevant to the assessment and any regional or strategic assessment conducted under the Act • Greenhouse gas emissions, including the potential effects on the province being able to meet its targets under the <i>Greenhouse Gas Reduction Targets Act</i> • Alternate means of carrying out the project that are technically and economically feasible, including through the use of best available technologies, and the potential effects, risks, and uncertainties of those alternatives • Potential changes to the project that may be caused by the environment • Other prescribed matters 	<ul style="list-style-type: none"> • The draft Application will be subject to a 30-day public comment period. • Indigenous groups will review the draft Application and provide their feedback to the BC EAO. 	<ul style="list-style-type: none"> • Draft Application • Final Application 	<ul style="list-style-type: none"> • BC EAO direction to prepare Final Application 	<ul style="list-style-type: none"> • The draft Application must be submitted to the BC EAO within three years of issuance of the Process Order. • The BC EAO has 180 days to advise the proponent on technical issues that must be addressed in the final Application and direct the proponent to prepare the final Application.

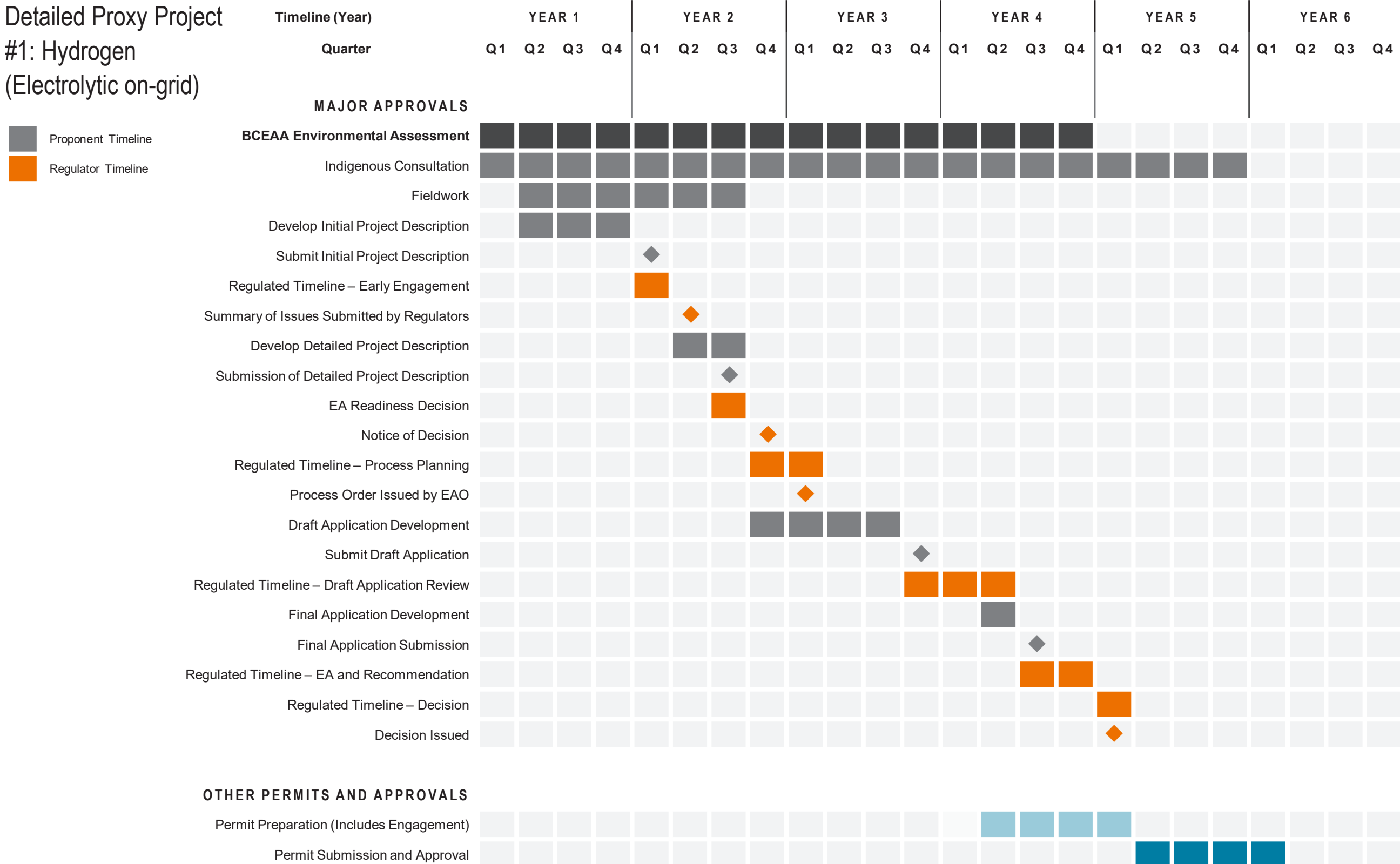
Table B.1 BCEAA Environmental Assessment Process Summary – Source: Stantec 2022

Phase	Description	Indigenous or Public Participation	Deliverables		Timelines
			Proponent	BC EAO	
Effects Assessment and Recommendation	<p>This phase begins with the acceptance of the final Application and ends with the referral to Ministers as the provincial decision-makers. This phase of the assessment process is primarily internal to the BC EAO and its project-specific committees. There may be clarification or information requests for the proponent to respond to during this time.</p> <p>The EAO will complete its assessment of the project and develop an Assessment Report, in accordance with the process described in the Process Order, seeking consensus with participating Indigenous groups and engaging the TAC. The BC EAO will then develop a draft EAC that includes certificate conditions and project description.</p>	<ul style="list-style-type: none"> The draft Assessment Report and draft EAC will both be subject to a 30-day public comment period. The draft conditions are developed by seeking consensus with participating Indigenous groups, where applicable. 	<ul style="list-style-type: none"> None 	<ul style="list-style-type: none"> Draft Assessment Report Draft EAC Final Assessment Report Final EAC 	<ul style="list-style-type: none"> The BC EAO has a maximum of 150 days to submit its referral package to the provincial Ministers.
Decision	<p>This phase begins when the BC EAO submits its referral package to the provincial Ministers and ends when Ministers decide whether to issue an EAC, and issue reasons for their decision. Ministers must consider the participating Indigenous groups' decision and other decision factors, including the Assessment Report and recommendations, sustainability and reconciliation, and other matters they consider relevant to the public interest.</p>	<ul style="list-style-type: none"> None 	<ul style="list-style-type: none"> None 	<ul style="list-style-type: none"> Decision Statement, includes Ministers decision as well as the reasons for the decision 	<ul style="list-style-type: none"> Maximum of 30 days
Post-Certification	<p>If issued an EAC, the project will be monitored to ensure it complies with certificate conditions. Post-Certification includes amendments to EACs, compliance and enforcement, effectiveness evaluation and audit, and EAC administration.</p>	<ul style="list-style-type: none"> Dependent on details of conditions 	<ul style="list-style-type: none"> Various compliance reporting requirements as stipulated in the project's EAC and conditions 	<ul style="list-style-type: none"> None 	<ul style="list-style-type: none"> Various; generally, there will be pre-construction, construction, operation, and decommissioning requirements.

Appendix C Indicative Proxy Project Approval Timeline

Indicative Project EA / Permitting Schedule

Detailed Proxy Project
#1: Hydrogen
(Electrolytic on-grid)



Assumptions:

- Indicative timelines only, detailed scheduling would be project specific
- Additional time should be incorporated into EA planning for Indigenous dispute resolution processes
- Environmental assessment process can typically take between 3.5 to 5 years to complete, but may take longer

Appendix D Overview of the *Impact Assessment Act*

Table D.1 *Impact Assessment Act* Review Process Summary— Source: Stantec 2022

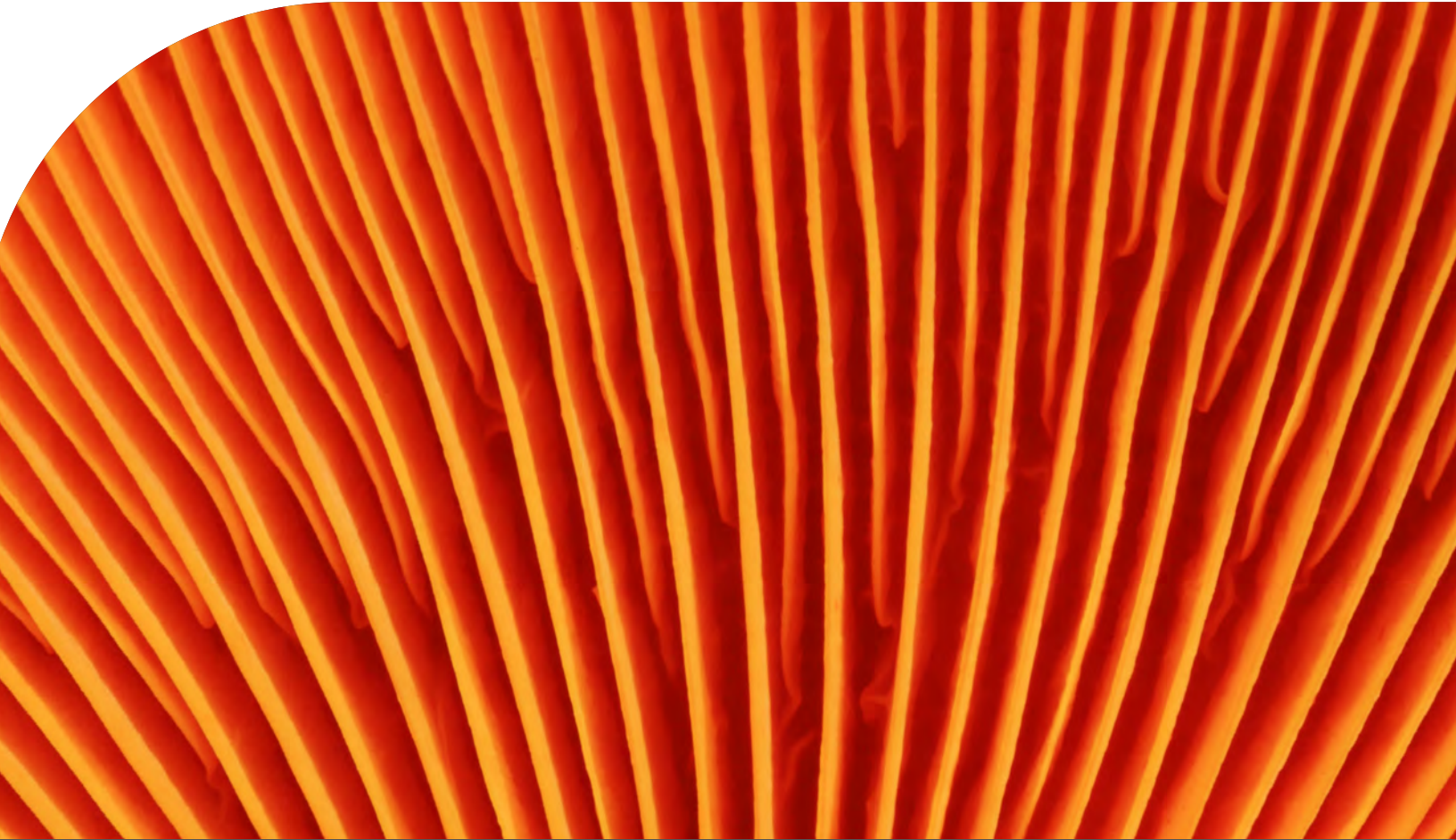
Phase	Description	Indigenous or Public Participation	Deliverables		Timelines
			Proponent	Agency	
Planning Phase	<p>The Planning Phase provides a time-bound process in which to determine whether an impact assessment of a designated project is required, and if so, to support early engagement and assessment planning. The legislated 180-day timeline for this phase commences once the proponent provides the Impact Assessment Agency (the Agency) with an Initial Project Description (IPD), containing information required in the Information Requirements and Time Management Regulations, and ends either when the Agency provides the proponent with a notice of the commencement of the impact assessment of the project or when the Agency makes a decision to substitute the assessment with the provincial process. Before the end of the Planning Phase, the Minister, if requested, may approve the substitution of the process of another jurisdiction for the impact assessment.</p> <p>The notice of commencement sets out the information or studies that the Agency considers necessary for it to conduct the impact assessment, and documentation such as the Tailored Impact Statement Guidelines and Permitting Plan.</p> <p>Following engagement on the IPD, the Agency will prepare a summary of the issues that it considers relevant to the assessment, informed by consultation feedback. The Agency will provide the proponent with a Summary of Issues and the proponent will then provide responses, indicating how the issues might be addressed. At the same time the proponent will also provide an updated Project Description which addresses the issues raised.</p> <p>The Agency will then make a determination on whether an impact assessment is required, considering factors set out in Section 16 of the <i>Impact Assessment Act</i> (IAA), including the potential for adverse effects within federal jurisdiction.</p> <p>If an EA is required and the assessment is not substituted, the Agency will prepare the following documents during this period to guide the assessment: Tailored Impact Statement Guidelines, Cooperation Plan, Public Participation Plan, and Permitting Plan. The objective of these plans is to provide transparency and certainty by making all requirements clear from the start. If substitution is granted, these documents are not prepared, and the assessment follows the provincial process outlined in Appendix B from this point forward until the BC EAO has prepared their Assessment Report and the federal process resumes at the Decision Making phase outlined below.</p>	<ul style="list-style-type: none"> Indigenous peoples, stakeholders, other jurisdictions, and the public will review and provide feedback on the Initial Project Description and Tailored Impact Statement Guidelines. The Agency will work with Indigenous peoples to develop the Indigenous Engagement and Partnership Plan. The Agency has a Participant Funding Program to assist the public and Indigenous peoples in participating in the federal impact assessment. 	<ul style="list-style-type: none"> Initial Project Description Detailed Project Description 	<ul style="list-style-type: none"> Summary of Issues. Cooperation Plan. Indigenous Engagement and Partnership Plan. Public Participation Plan. Permitting Plan. Notice of Impact Assessment Decision with Reasons. Tailored Impact Statement Guidelines. Notice of Commencement. If substitution is granted only the Permitting Plan would be issued. The Notice of Commencement and Impact Statement Guidelines would not be issued. 	<ul style="list-style-type: none"> 180 government days starting once the proponent provides the Agency with an Initial Project Description. The proponent has 1 year from receipt of the summary of issues to prepare the Detailed Project Description.

Table D.1 *Impact Assessment Act* Review Process Summary— Source: Stantec 2022

Phase	Description	Indigenous or Public Participation	Deliverables		Timelines
			Proponent	Agency	
	<p>The Tailored Impact Statement Guidelines set out the information that a proponent would need to provide to support the assessment, taking into account factors set out in section 22(1) of the IAA.</p> <p>Prior to the end of the Planning Phase, the Minister can provide a written notice detailing likely unacceptable environmental impacts (if any). This notice does not terminate the EA; however, a federal authority can advise the Minister at this time that they will not be “exercising a power” (i.e., granting a permit or authorization) in relation to the project. While this would not terminate the assessment, the project as proposed would not be able to acquire all permits needed to construct or operate.</p>				
Impact Statement Phase	<p>The proponent has three years to prepare an Impact Statement report that fulfils the requirements set out in the Tailored Impact Statement Guidelines. If the Impact Statement report is not provided within this timeframe, the Agency can terminate the assessment.</p> <p>Once the impact statement report has been submitted, the Agency, in coordination with federal expert departments, other jurisdictions, and Indigenous peoples, would review the Impact Statement and provide the proponent with information or clarification requests.</p> <p>This phase ends when the Agency determines the Impact Statement includes the necessary information to go forward with the assessment. The Impact Assessment Agency posts a notice of this determination.</p>	<ul style="list-style-type: none"> Indigenous peoples, federal authorities, and other jurisdictions will review the Impact Statement for completeness. 	<ul style="list-style-type: none"> Impact Statement 	<ul style="list-style-type: none"> Notice of Determination 	<ul style="list-style-type: none"> The proponent has three years to prepare the Impact Statement Timeline can be extended at the request of the proponent The Minister has 45 days from end of Planning Phase to refer project to Review Panel
Impact Assessment Phase	<p>The Impact Assessment phase starts when the Minister has posted a notice of determination that the Impact Statement has been accepted and ends when the Agency publicly posts the impact assessment report and provides it to the Minister. The Impact Assessment Report is drafted by the Agency and must consider a range of factors, as defined by section 22 of the IAA. During this phase the Agency, federal authorities, Indigenous groups, and the public may be involved in the development of potential conditions to be included in the Impact Assessment Report.</p>	<ul style="list-style-type: none"> The Agency is required to provide the public with meaningful participation opportunities in the Impact Assessment. Under current practice, this typically occurs via posting of information onto the Impact Assessment Registry and holding open houses. 	<ul style="list-style-type: none"> None 	<ul style="list-style-type: none"> Impact Assessment Report 	<ul style="list-style-type: none"> 300 days Authority to suspend timelines would be available for proponent-driven reasons, in accordance with criteria set out in regulation. Authority to extend timelines would be used for government activities, such as ensuring continued alignment of timelines with other jurisdictions.

Table D.1 *Impact Assessment Act* Review Process Summary – Source: Stantec 2022

Phase	Description	Indigenous or Public Participation	Deliverables		Timelines
			Proponent	Agency	
Decision-Making Phase	The Decision-Making phase starts with the referral of the Impact Assessment Report (or the BC EAO's Assessment Report in a substituted assessment) to the Minister and ends with the posting of the Minister's decision with reasons. The Minister must consider whether the project is in the public interest when making their decision. This decision is based on factors laid out in the Impact Assessment Report, including economic benefits, potential effects within areas of federal jurisdiction, the implementation of mitigation measures, potential impacts on Indigenous peoples and rights, and whether effects of the project would hinder or contribute to Canada's environmental obligations with respect to climate change.	<ul style="list-style-type: none"> None 	<ul style="list-style-type: none"> None 	<ul style="list-style-type: none"> Decision Statement 	<ul style="list-style-type: none"> 30 days The Minister may extend the decision-making timelines once for a period of up to 90 days
Follow-up, Monitoring, and Compliance & Enforcement	This phase begins once the Minister has published the decision statement. The decision statement will contain conditions, including information and time periods associated with follow-up, that the proponent must follow in execution of the project. All information collected during this phase would be available publicly, including compliance verification and enforcement actions. Once issued, the Agency has the authority to amend a decision statement, to modify project design, or add, change, or remove conditions (e.g., to remain current with project design or to provide for adaptive management), but amendments cannot be made to the decision itself.	<ul style="list-style-type: none"> None 	<ul style="list-style-type: none"> Various compliance reporting requirements as stipulated in the project's Decision Statement and conditions 	<ul style="list-style-type: none"> None 	<ul style="list-style-type: none"> N/A



We acknowledge with respect and gratitude that this report was produced on many traditional and unceded territories, covering all regions of British Columbia whose deep connections with this land continue to this day.



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