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January 06, 2023

Maximillian Baylor
Director General
Business Income Tax Division
Tax Policy Branch
Finance Canada
James Michael Flaherty Building
90 Elgin Street
Ottawa ON K1A

Dear Mr. Baylor,

Re: Canadian Hydrogen and Fuel Cell Association (CHFCA) comments to the Consultation on the Clean Hydrogen Investment Tax Credit

Thank you for the opportunity to participate in the consultation process for the implementation of Canada's Clean Hydrogen Investment Tax Credit.

The Canadian Hydrogen and Fuel Cell Association (CHFCA) represents over 170 world-leading Canadian organizations that provide solutions and technologies at all stages of the hydrogen value chain: end users, producers, distributors, equipment, technology, utilities, and service providers. Our members have exported their clean technologies to 42 countries, which account for 65 percent of the world population.

According to a recent report by EY,[1] hydrogen's total Canadian annual market potential could reach $100 billion and create up to 350,000 jobs by 2050. And that is in addition to the Government of Canada's estimate that the sector will assist with reducing Canada's emissions by 45 million metric tonnes annually by 2030, and by up to 190 million metric tonnes annually by 2050.

In 2021, CHFCA members reported:[2] • Total revenues of $527 million • $412 million in revenues from product sales • $98 million in revenues from the provision of services • $17 million in revenues from research and development contracts and other sources • RD&D expenditures of $125 million • Employment of 4,291 full-time employees.

With a 100-year legacy of industry and research expertise, Canada's hydrogen and fuel cell sector has, until recently, been a global leader. The government of Canada has provided strong leadership and support through initiatives such as the development of the Canadian Hydrogen strategy, and the launch of funding programs such as Strategic Innovation fund (SIF), the Net Zero

[1] Hydrogen Future POV_2021-10-22.pdf (ey.com)
[2] Canadian Hydrogen and Fuel Cell Sector Profile

Accelerator, the Clean Fuels Fund (CFF), and others. But competition for this leadership position has become much fiercer.

Countries around the world have rolled out policies and funding for the advancement of their domestic hydrogen and fuel cell industry. One of these policies – the United States' Inflation Reduction Act (IRA) – became a threat to Canada's competitive advantage for hydrogen. This triggered government measures under the recently released Fall Economic Statement, including the introduction of a Clean Hydrogen Investment Tax Credit (ITC). We are pleased to have this opportunity to work with Finance Canada, other industry associations, and stakeholders and rightsholders to develop and implement a tax credit for investments in clean hydrogen production in Canada.

The announcement of the Clean Hydrogen Investment Tax Credit is an important step to enabling Canada's hydrogen sector to reach the scale needed to be globally competitive. This credit would not only provide a financial incentive for companies to invest in clean hydrogen technology, but it would also help to position Canada as a leader in this field.

However, the key to the success of the clean hydrogen ITC will rely on the details. At a high-level we recommend:

1. The Clean Hydrogen Investment Tax Credit should not be a copy of the USA IRA, since our landscape is not identical to that of our neighbours to the south.

2. The design and implementation of this credit must be simple and straightforward to apply, and with reasonable processing times. This will require applying tax credits comprehensively to all assets within the scope of production and ensuring a smooth transition between the cleantech and hydrogen ITCs.

3. The Carbon Intensity thresholds must enable the speedy scaleup of the Canadian hydrogen sector and allow all clean hydrogen pathways – existing and emerging – to compete. This will allow regions across Canada to leverage their own strengths and resources while supporting national equity.

4. When developing the Clean Hydrogen ITC, consider in the "big picture" how the ITC interacts with other policies and funding initiatives such as the Canada Growth Fund mechanisms, the Canada Infrastructure Bank (CIB), Strategic Innovation Fund (SIF), future iterations of the Clean Fuel Fund (CFF), and others. CHFCA recommends that these different mechanisms be stackable with the Hydrogen ITC.

5. As Finance Canada advances in the implementation of the ITC, CHFCA would be pleased to continue contributing to this endeavour. CHFCA recommends the creation of a small task force comprised of industry associations, industry representatives and other stakeholders and rightsholders, to partner with the Government of Canada in the next steps of the deployment and optimization of the Clean Hydrogen ITC.

In summary, we must focus on rapidly deploying a fully functional and clear ITC, with clear guidelines in terms of boundaries, eligibility criteria, processing timing and how these credits will interact with other programs. This will give investors and project proponents much-needed clarity as they develop their projects and secure financing.

We have included more detailed feedback to the questions included in Finance Canada's consultation document below. We urge Finance Canada to consider our recommendations and move forward with the implementation of this important credit and remain available to discuss our comments at any time.

Thanks again for the opportunity to participate in this consultation process. We look forward to working with your team in the implementation of the Clean Hydrogen Investment Tax Credit.

Sincerely,

Ivette Vera-Perez

Ivette Vera-Perez

President and CEO

CC. The Right Honourable Justin Trudeau, Prime Minister of Canada

The Honourable Chrystia Freeland, Deputy Prime Minister and Minister of Finance

The Honourable Jonathan Wilkinson, Minister of Natural Resources of Canada

Maude Lavoie, Associate Assistant Deputy Minister, Tax Policy, Finance Canada

Miodrag Jovanovic, Assistant Deputy Minister, Tax Policy, Finance Canada

Glenn Purves, Assistant Deputy Minister, Economic Development, Finance Canada

Bud Sambasivam, Director of Policy, Office of the Deputy PM and Minister of Finance

Blake Oliver, Senior Policy Advisor at Office of the Deputy Prime Minister, and Minister of Finance

Consultation Questions Responses

1. What clean hydrogen production pathways can be expected going forward? What are expectations for future hydrogen demand (e.g., by 2030)? What are potential hydrogen opportunities in Canada?

The CHFCA expects the primary clean hydrogen production pathways going forward to be electrolysis (from grid sources or directly coupled to renewable energy sources such as wind and solar), biomass gasification & reformation (biomass either gasified or in its original form), methane pyrolysis (various types), Steam Methane Reforming with Carbon Capture and Utilization or Storage (SMR+CCUS), and Autothermal Reforming with Carbon Capture and Utilization or Storage (ATR+CCUS). However, as the hydrogen sector evolves, other pathways will emerge.

There is a wide breath of research on the expectations for future hydrogen demand. The International Energy Agency (IEA), in its Global Hydrogen Review 2022, disclosed that global hydrogen demand was nearly 94 million tonnes (Mt) in 2021, a 5 percent increase from the previous year. The IEA projects that demand will grow to 180 million tonnes in 2030 in their net-zero scenario. A joint Hydrogen Council/McKinsey paper from November 2021 used the IEA's conservative projection of 140 million tonnes in 2030 and apportioned 25 million tonnes to North America that year. A January 2022 report from IRENA (International Renewable Energy Agency) pegs the US and Canada at 11.3 and 2.5 million tonnes of hydrogen demand, respectively, in 2020. A 2021 report from Energy Partnership reports hydrogen consumption of 0.22 million tonnes in Mexico in 2020. [3]

Using the above sources, the total demand for hydrogen in North America in 2020 is approximately 14 million tonnes, and we can infer a compound annual growth rate of 78 percent to 2030 using the Hydrogen Council/McKinsey projection of 25 million tonnes. Hydrogen demand in Canada would then be expected to be at least 4.5 million tonnes in 2030. This is aligned with the Hydrogen Strategy for Canada, which estimated that the overall demand for low Carbon intensity hydrogen in Canada could be 4 MT by 2030.[4]

This demand is only growing in Canada as our partners in the Indo-Pacific and Europe look to Western Canadian and Atlantic Canadian clean hydrogen projects as safe, clean energy sources. In addition, Churchill Manitoba has the potential to enable exports from Western Canada as well, opening new opportunities for economic development in the region.

[3] Global Hydrogen Review 2022 (windows.net)
Hydrogen - Fuels & Technologies - IEA
Hydrogen-for-Net-Zero.pdf (hydrogencouncil.com)
Geopolitics of the Energy Transformation: The Hydrogen Factor (irena.org)
Hydrogen_EP_volume_VII.pdf (energypartnership.mx)

[4] Hydrogen Strategy for Canada

Potential for hydrogen opportunities in Canada

Potential hydrogen opportunities in Canada include decarbonization in oil refining/upgrading, natural gas (hydrogen injection), ammonia and methanol production, steel and cement production, power generation, transportation, and industrial heat.

The two main clean hydrogen production pathways are both high potential areas for growth in Canada. Most of the interest in hydrocarbon-based hydrogen is in Alberta, in light of its inexpensive natural gas. Most of the interest in renewable hydrogen is on the coasts and in provinces with hydroelectricity access. Both pathways are in their infancy in terms of building commercially economical projects and need financial support to scale.

It is important to note that one overarching goal of the clean hydrogen ITC is to enable the hydrogen sector to reach the scale it needs to become globally competitive. **To achieve this, the CHFCA recommends that the ITC remains technology agnostic for all hydrogen pathways, both existing and emerging.** This will allow regions across Canada to leverage their own strengths and resources while supporting national equity. Jointly, all pathways to clean hydrogen will enable the scaleup of the hydrogen sector.

Hydrogen production coupled with carbon capture and storage (CCS)

The Hydrogen Strategy for Canada states that one of the major pathways to produce large-scale clean hydrogen in Canada in the near-to-medium term will be using hydrocarbons (natural gas) as feedstock coupled with CCS.

Hydrogen produced through hydrocarbons or biomass coupled with CCS is a key production pathway and has an important role in the energy transition. Canada's natural resource strengths include of an abundance of natural gas and CCS-compatible geological formations. When paired with the strong skills and talent pool, and built infrastructure from our existing energy industry, Canada is well positioned to use this hydrogen production pathway to economically and rapidly build-up the low carbon hydrogen economy nationwide. This allows Canada to take full advantage of the environmental, economic, and social benefits of the energy transition.

The ability of Canada to produce CCS-optimized low carbon intensity hydrogen is a key factor to effectively scale up the hydrogen economy in Canada.

Canada as an exporter of cleantech solutions

In addition to producing hydrogen as an energy carrier, the development of the sector creates an opportunity to become a major exporter of made-in-Canada cleantech solutions for the hydrogen space. Canada has a declared goal to capture a sizable part of the global market for cleantech. This market was expected to exceed $2.5 trillion in 2022. The federal goal is to triple the value of Canada's annual exports to $20 billion per year by 2025 from $7.8 billion in 2017. For clean technology and environmental products and services to be among Canada's the top five exports by 2025, exports will have to grow by an average of 11.4 percent per year.

In 2022, 79 percent of the CHFCA members identified the European Union as their export market expected to be the fastest growing over the next five years. The United States and China were expected to be the next fastest growing export markets, followed by Japan.

2. What would constitute appropriate carbon intensity tiers in the Canadian context? What makes such tiers appropriate?
3. Under what carbon intensity tiers are the different clean hydrogen production pathways in Canada expected to be found?
4. what levels of support would be appropriate for each carbon intensity tier, including the proposed top rate of at least 40 percent?

Carbon Intensity tiers and corresponding credit rate scales

Defining carbon intensity tiers in the Canadian context is a complex endeavour. There is no national or international consensus of how to define low carbon hydrogen. However, most published thresholds range from approximately 20-40 g-CO2e/MJ (0.14 – 6.7 kg CO2e / kg H2), though some are as low as 5 g-CO2e/MJ. Prior Canadian Government programs such as the Clean Fuels Fund (CFF) used 36 g-CO2e/MJ, broadly in line with most thresholds and closely aligned with the European CertifHy standard of 36.4 g-CO2e/MJ (a commonly cited reference)[5].

In the US IRA the lowest tax credit rate is eligible for hydrogen projects with carbon intensities of up to and including 4 kg CO2e / kg H2. The greatest incentives are given to projects with carbon intensities under 0.45 kg CO2e / kg H2.

CHFCA recommends that the upper bound of the hydrogen ITC be equivalent to 36 gCO2e/MJ (~5 kgCO2e/kg-H2) as this would be equivalent to the "low carbon intensity" of eligible gaseous clean fuels under the NRCan's recent Clean Fuels Fund program. This will ensure that project proponents work with the same carbon intensity metric across all government programs.

For simplification, **CHFCA recommends that the smallest figure in the table be rounded from 0.45 to 0.5 kg CO2e / kg H2**. We recommend that below this upper threshold the tax credit should scale linearly from 30% to 40%. Using a linear scale instead of tiers will incentivize producers to generate the lowest emitting hydrogen, while enabling the large-scale launch of the sector. With a tiered approach, producers would only be incentivized to reduce emissions to the nearest tier.

Life Cycle GHG Emissions Intensity (kg CO2e / kg H2)	Investment Tax Credit Rates
5	30%
< 0.5	40%

[5] HOME - CERTIFHY. The European Union's (EU) CertifHy™ Low-Carbon Hydrogen threshold is 36.4 gCO2e/MJ, inclusive of direct and indirect upstream emissions.

Grid- based electrolysis

For projects to be feasible, electrolyzer-based hydrogen production will need to utilize grid electricity and meet offtake demand for reliable and constant hydrogen supply. Canada's clean electricity grids are an advantage that Canada can leverage to enable this. However, the cost of power and the cost of transmission are often prohibitive to the economics of a project.

For example, British Columbia, Manitoba, and Quebec have some of the cleanest power in the world (above 95 percent hydroelectric apiece). However, using the Government of Canada's Fuel Life Cycle Assessment Model, we have estimated that hydrogen produced from this grid power would have a carbon intensity well above the 0.45 kg threshold and as high as 2.2 kg. At this carbon intensity, the suggested US IRA ITC rates of 7.5 percent to 10 percent would be immaterial to project economics.

While some provinces have more carbon intensive grids today, the federal Clean Electricity Regulations are intended to bring all grids to relative parity on carbon intensity by 2035. Grid-based electrolysis projects that are developed in provinces that have less access to clean power today should still be eligible for the ITC to encourage further clean energy development. Allowing all provinces to participate in producing grid-based electrolytic hydrogen will be an important element of fairness and will contribute to developing economies of scale in the sector.

The CHFCA recommends that all grid-based electrolysis projects developed in regions where the provincial government has a goal to decarbonize their grid should automatically be eligible for the minimum 30 percent ITC, but not the upside unless proven eligible.

5. What equipment is required at clean hydrogen production facilities? Is there equipment that is external to the facility that may be needed to support clean hydrogen production and how should the government consider eligibility for that equipment under the clean hydrogen investment tax credit or other investment tax credits?
6. What are the most common methods used to prepare clean hydrogen for transportation, including the various forms that hydrogen could take (e.g., compressed gas, liquid, or intermediate "hydrogen carrying" products like ammonia or methanol)? What stationary infrastructure is required to prepare hydrogen for transportation, either domestically or internationally?

The equipment required at clean hydrogen production facilities is dependent on the hydrogen production pathway. At a high level, each pathway comprises of the following elements:

- Core industrial process equipment used to produce hydrogen;
- Sub-systems supporting one or more of the following inputs: electricity, water, air, and natural gas; and,

- Sub-systems supporting one or more of the following outputs: hydrogen, heat, water, oxygen, gaseous carbon oxides, solid carbon.

Below is a non-exhaustive list of equipment expected in different hydrogen production facilities:

- Renewable hydrogen facilities: The core of a renewable hydrogen production plant is the electrolyser. This plant will generally include ancillary systems such as water purification systems, cooling systems, gas compression, hydrogen liquefaction equipment, hydrogen storage tanks, transfill equipment, metering & controls equipment, and potentially site electrical upgrades.
    - Additionally, the plant would include upstream power generation (behind the meter), and downstream synthesis equipment. Sub-surface hydrogen storage may also be part of the downstream facilities. For example, salt caverns and/or geological reservoirs.
- By-product hydrogen facilities: May require unique equipment not included in the above such as gas cleanup equipment (e.g., driers, pressure swing adsorption (PSA) equipment, de-oxy systems, etc.)
- Hydrogen production based on SMR or ATR with CCUS**:** Equipment required at fossil hydrogen production facilities include natural gas handling infrastructure, hydrogen production infrastructure (either SMR or ATR as described in Q1), carbon capture and sequestration infrastructure including flue gas carbon capture, CO2 compression, and CO2 storage facilities.
- Hydrogen production based on methane pyrolysis**:** additional equipment for handling of solid carbon and transportation of the carbon for sale or disposal. In addition, some methane pyrolysis pathways that are more electricity intensive could require electrical upgrades as described above for electrolysis.

It must additionally be noted that a clean hydrogen project will have balance-of-plant upstream and downstream components extending beyond the core production, where the cleantech ITC should apply.

Upstream components may include renewable energy projects such as wind, solar or geothermal, the cost of connections to the electric grid, natural gas production, etc. Downstream elements may include purification systems, fueling station facilities all the way to the spigot, port facilities, hydrogen, and ammonia storage equipment, etc.

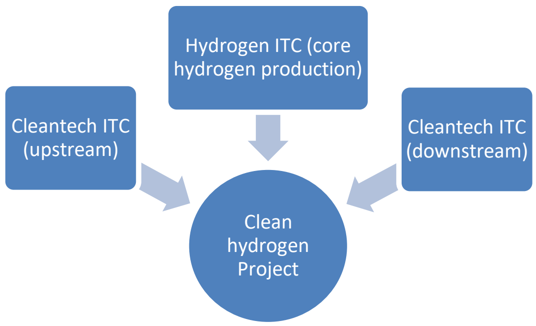
As it pertains to the interaction between the proposed cleantech and hydrogen ITCs, the CHFCA encourages consideration of the following:

- Since the cost of renewable hydrogen is mostly in the cost of the renewable electricity or biomass used as a feedstock, upstream renewable electricity and biomass equipment should be eligible through the Cleantech ITC.
- Although downstream equipment is mature, and the cost of the equipment is unlikely to decrease at the same rate as electrolysis equipment over time, it can be a large component of the overall plant cost and a large contributor to the lifecycle cost of the produced molecule. Therefore, it should also be considered as eligible.

- In addition to all the equipment required for a project, all design, construction, and civil work in a project should be considered eligible.

Concerning eligibility of equipment under the ITC and other investment tax credits, we propose seamlessly connecting the cleantech ITC and the hydrogen ITC.

CHFCA recommends that a clear boundary be drawn between what is covered between the two ITCs, while ensuring that all project related costs are covered by one or the other, and that there are no gaps in such project costs.



Clean hydrogen transportation

The methods used to prepare clean hydrogen for transportation are primarily as follows:

- Compression: Compressed hydrogen is often transported at extremely high pressures, so that it can be transferred to refueling stations. Due to the low density of hydrogen and the energy requirements for compression, this method is normally suitable for transportation over small distances, typically by road.
- Liquefaction: Hydrogen can be liquefied, much like natural gas. However, the temperatures required are extremely low, making it a significant cost to the hydrogen system.
- Synthetic Fuels: Ammonia is the primary synthetic fuel being discussed for long-distance, long duration hydrogen shipping. It is synthesized using the well-established Haber Bosch process in which gaseous hydrogen is combined with nitrogen taken from the air (air is about 80 percent nitrogen) under high temperature and pressure. Ammonia synthesis, storage and transportation is a well-established process and large amounts of infrastructure exist globally for ammonia handling. The use of ammonia as an energy storage medium rather than a feedstock has emerged recently as a way of addressing the transport and storage of hydrogen issue.

Methanol is also a strong candidate for hydrogen storage and transport. Methanol is a liquid at room temperature and there is a large amount of existing infrastructure in place to handle it. Methanol is synthesized from hydrogen in a chemical process that uses carbon dioxide as a main ingredient, which makes methanol a good candidate for the use of captured CO2 from industrial processes and from biological origins, e.g., wood waste or other organic waste. When derived from a biological source, methanol is considered E-methanol.

The stationary infrastructure to prepare hydrogen for transportation includes compressors, storage (either on the surface or in underground caverns), and downstream processing, including liquefaction and synthetic fuels synthesis.

While these technologies are well established, they will be an integral part of any clean hydrogen production, storage, transportation, and receiving infrastructure, and therefore as discussed above should be considered as part of an overall clean hydrogen plant for the purposes of the ITC. There are also new innovations under development such as low-pressure solid-state hydrogen storage and, as a key principle, the ITC should stimulate the growth and commercialization of such Canadian hydrogen innovations.

7. Life cycle carbon intensity calculation:
    a. Are there any concerns with using the Government of Canada's Fuel Life Cycle Assessment Model for calculating the life cycle carbon intensity of clean hydrogen production?
    b. What additional guidance or support could be provided to help with the calculation of life cycle carbon intensity of clean hydrogen production with this model?
    c. What should be included in the scope of the life cycle carbon intensity calculation? How could this extend to clean hydrogen that is produced alongside co-products, or as a by-product of an industrial process?

The CHFCA supports using the Government of Canada's Fuel Life Cycle Assessment Model ("LCA Model"). The LCA Model must account for GHGs in a way that respects the North American market. If Canada's model differs from that of the United States and the carbon intensity of different hydrogen production pathways differs due to carbon accounting, Canadian projects might be at risk.

Furthermore, the CHFCA has concerns about the specifications used for LCA Model calculations. The specifications will dictate how the model is used to calculate the life cycle carbon intensity of clean hydrogen production, including specific instructions and rules.

As a reference point, Environment and Climate Change Canada (ECCC) released Specifications for LCA Model CI Calculations for the Clean Fuel Regulations (CFR).[6] The CFR specifications document provides instructions on how to model electricity input in the case of Electricity from Power Purchase Agreements or RECs used to Produce Hydrogen (Section 4.6.5, Case 6, on page 43).

[6] Clean Fuel Regulations: Specifications for Fuel LCA Model CI Calculations, Version 1.0, July 2022. Posted online here: Link

CHFCA recommends that new specifications be developed to support the administration of the proposed clean hydrogen ITC. These specifications for the proposed tax credit should differ from the CFR in the following ways:

- **Allow all low-carbon electricity, including nuclear and geothermal energy not just hydro, solar, or wind; and,**
- **Remove the requirement for generation to have commenced on or after July 1, 2017.**

The suggested changes will allow for wider investment in and deployment of clean hydrogen. This includes allowing a more even playing field for all Canadian provinces including Ontario which has abundant nuclear energy, and B.C., Quebec, and Manitoba which have significant renewable sources commissioned before July 1, 2017.

In addition, the **CHFCA recommends that the LCA Model for hydrogen production should only consider the carbon intensity within the production plant boundary and upstream feedstock supply.** Most facilities making merchant hydrogen won't know exactly where the hydrogen will be delivered nor how it will be used, so it is difficult to include emissions impact for distribution and use in the LCA calculation.

Finally, the CHFCA recommends that:

- **Organizations be granted ongoing access to up-to-date training and support in using the LCA Model. There should be training videos or documentation provided on how to calculate the LCA of clean hydrogen via each pathway that is included in the ITC program.**
- **From experience with the Government of Canada's Fuel LCA Model to date, there is no pathway for by-product hydrogen. This is an important pathway for the Canadian hydrogen sector and should be included as soon as possible.**
- **The ability to register pathways should be simple, straight forward and have a short and clear process for approval.**

8. Once hydrogen is being produced, by how much would the carbon intensity differ from the carbon intensity that was expected based on the design of the plant? Does this differ by production pathway? Is it possible to ensure that the carbon intensity of the clean hydrogen produced will be within a certain band and would this change over time? For the different clean hydrogen production pathways, what ongoing monitoring and calculations are done to measure carbon intensity once a clean hydrogen facility begins production?

Given a system where carbon intensity comprises Scope 1, 2 and 3 emissions, producers can only report Scope 1 emissions with any certainty. For Scope 2 and Scope 3 emissions, producers must rely on a commonly agreed set of data and measurement tools that provide insight into the carbon intensity of the electricity supply and upstream natural gas emissions.

Carbon intensity would differ by production pathway. In the case of some clean hydrogen pathways, the total emissions are dominated by upstream natural gas emissions which are outside of the control of the production plant, or by the carbon intensity of the grid, which, as we highlighted earlier, can, and will, change over time. In Canada it is expected that to meet our net-zero goals, the electricity carbon intensity of all grids will decrease. Therefore, the CHFCA recommended above that all grid-based electrolysis projects should qualify for the minimum ITC of 30 percent.

In the case of dispatchable hydrogen production by electrolysis where the grid is used to supplement renewable power, the overall carbon intensity of the hydrogen production is going to depend on both the carbon intensity of the supplemental grid power and the specific grid/renewable mix over time.

Changes in process efficiencies will also impact, feedstock specifications, etc. can also impact the carbon intensity of daily operations.

Verification of project's carbon intensity

Clarification on whether there will be a process to verify the anticipated carbon intensity of a proposed project once operational is important. Would the government dictate a threshold of an "acceptable" difference in the carbon intensity of the project based on engineering specifications (used to secure the incentive)? Please be aware that claw back provisions may impair the ability of a project to raise financing.

There are a variety of ways for the government to place thresholds and requirements for the project to disclose certain information or data, or for independent third parties to conduct audits or evaluations of the project's performance.

Based on previous data for similar projects, the government could dictate a threshold of what constitutes an acceptable difference in the carbon intensity of the project based on engineering specifications.

Furthermore, while claw back provisions can help to ensure that projects are held accountable for their performance, they may also pose a risk to a project's ability to raise financing, as lenders may be hesitant to provide funding if there is a risk of the government seeking to recover these funds. It is important for project proponents to carefully consider the potential impact of claw back provisions and other performance requirements when seeking funding for their projects.

9. How could life cycle carbon intensity calculations at the stage of plant design, and once a plant has actually started operations, be verified?

At the stage of plant design, Scope 1 emissions can be self-reported based on internal modeling of the hydrogen production process. Carbon intensity estimates can be verified by a third party. Third party verification of LCA is commonplace and can be done by a certified third party who reruns a lifecycle assessment based on the plant design inputs provided by the proponent.

Once a plant has started operations, lifecycle carbon intensity (LCI) calculations can be verified through the collection of data on the plant's actual performance. This may include data on energy inputs, emissions, and hydrogen production. The data can be used to recalculate the LCI of the plant and compare it to the original estimates. At this stage, a third party or government audit would complete the verification.

As it is the case with a typical GHG reporting facility, it will be important to develop and follow consistent accounting standards and have certified groups validate the emissions calculations.

10. What is the typical service life of a clean hydrogen production facility and what are the risks that a project may not operate through to the end of its useful life?

Commercial hydrogen production facilities have a planned service life of 20 to 30 years, as is typical for current hydrogen production equipment and industrial equipment in general.

The greatest risk associated with a project not operating through to the end of its useful life cycle is if certain performance metrics fail to be satisfied or if operation and maintenance costs become unmanageable. Specifically:

- For hydrogen pathways using primarily common industrial equipment, risk is low
- For hydrogen pathways using primarily newer technology, risk is higher
- Risks may be technology-based, which could lead to downtime or reduced efficiency, or regulatory-based, with regulatory risks such as changes in regulations or policies that may affect the operation of the facility, including changes to emissions standards or requirements for renewable energy use.

11. Hydrogen ITC in the "big picture" of Canadian policy, and how we differ from IRA

While the US IRA has presented to the world a uniquely sound and comprehensive industrial policy piece, the CHFCA believes Canada can, and should, do better. We must be cautious about copying provisions from the US ITC that may not be necessary or applicable in Canada, or which could in fact be counterproductive for our country.

The IRA provides excellent supply incentives for hydrogen through many stackable options and its production incentives. However, demand side enabling in the IRA is less strong. Canada's hydrogen ITC, when looked at in conjunction with other policies, can also help incentivize Canadian domestic consumption.

Some examples of demand side incentives are:

- Fuel switching mandates
- Blending mandates
- Federal-provincial coordination on carbon pricing to ensure that such provincial schemes advance hydrogen developments

- Additional customer benefits to the adoption of hydrogen

The CHFCA supports putting in place certain minimum wage, apprenticeship, and labour requirements in order to access favourable ITC rates. However, it is important that these qualifications be developed for the Canadian landscape and not be directly copied from the US IRA.

Although we are aware of the ongoing simultaneous consultation on these labour provisions, we believe the direct impact on the clean hydrogen ITC and overall project capacity will be significant enough to raise the following:

- Canada already has much stronger wage requirements than the US. If conditions are too stringent and difficult to meet, it will create delays in deploying projects. Simplicity in the design of any labour conditions, their measurement and reporting will be crucial to avoid additional costs and project delays.
- The unavailability of apprentices should not penalize a project's eligibility. Canada has a much smaller labour market than the US. Provisions to recognize "Good Faith Efforts" will be essential if labour conditions are to be viable.

When looking at the Clean Hydrogen ITC in the "big picture" of Canadian policies, CHFCA reiterates that federal policies cannot be looked at in isolation, or they will run the risk of working at cross purposes. We should consider how federal policies and regulations such as the Green Building Strategy, Green Electricity Regulations, and the Clean Fuels Regulations, among others, complement and elevate each other, and enable the general direction Canada has established to become a world class leader in the hydrogen space.

Similarly, we need to take into consideration how the Clean Hydrogen ITC will interact with other funding initiatives such as the Canada Growth Fund (CGF), the Canada Infrastructure Bank (CIB), Strategic Innovation Fund (SIF), and future iterations of the Clean Fuel Fund (CFF), among others.

The CHFCA recommends that these different funding mechanisms be stackable with the Hydrogen ITC, and that the total value of the ITC incentive be determined based on total project cost (including such funding), as opposed to only based on the industry contribution component.

Furthermore, in our written submission for the pre-budget consultations last October, the CHFCA recommended a "one window" approach for all regulatory permits and Government of Canada funding. Such one window approach would accelerate Canada's decarbonization journey. The creation of a "Canada Hydrogen Office" would be a practical way to move this idea forward. Such window could be the clearing house for all projects across governments, helping corporate clients navigate regulatory and programming channels such as the clean hydrogen ITC, and to move the needle on new projects.

We need an ITC that is effective and that meets the purpose of helping scale the hydrogen sector, is as all-encompassing as possible, and helps redirect hydrogen investments to Canada. As Finance Canada advances in the implementation of the ITC, the CHFCA would be pleased to continue contributing to this endeavour.

The CHFCA recommends the creation of a small task force comprised of industry associations, industry representatives and other stakeholders, to partner with the Government of Canada in in the next steps of the deployment and optimization of the clean hydrogen ITC. This would be focused and strategically narrowed to the right stakeholders across key sectors.

12. Other important topics to consider

Application process and turnaround timing for the refundable tax credit

How often can applicants file for the refundable credit? For example, if only once a year as a component of the applicant's tax return, projects cash flows may be affected, since applicants may be looking at 12-18 months (accounting for review process) to receive their refund. If this were to be the case, which bridge options can projects access? Would any of the Canadian funding entities in place be able to bridge this gap?

Predictability is also important. Having a late determination (i.e., post Commercial Operation Date, COD) on whether a project is eligible for the full tax credit would add a high financial risk and could render a project difficult to finance.

Duration of the refundable tax credit

The information provided in the consultation invitation indicates the intention to phase out the clean hydrogen ITC by 2030.

The CHFCA recommends that clean hydrogen ITC is eligible for a period of at least 10 years, phasing out in 2033 at the earliest, so as not to disadvantage Canadian companies. Extending the phase out date for Canada's clean hydrogen ITC will increase competitiveness and avoid ceding investment and market share of this nascent market to competing jurisdictions. For reference, the US tax incentives provided by the IRA have a duration of 10 years; the duration of the US IRA production tax credit (45V) is 10 years, and the duration of the US carbon capture credit (45Q) is 12 years.

Eligible date of equipment purchases

The CHFCA recommends that the date equipment is available for use/placed in service should be the qualifying date, so that eligible equipment purchased prior to Budget 2023 can qualify for the credit if it is placed in service after Budget 2023. This would be simpler for Government to administer than seeking records of acquisition date. While it could be considered that these investments have already been made, the impacts of continued inflation are challenging project economics.

Qualifying equipment based on the date it is placed in service would be an effective incentive to drive rapid deployment of this equipment and help balance out other higher costs that projects are facing (labour etc.).

Credit eligibility of equipment manufacturers

Currently, the majority of employment in the hydrogen economy is with equipment manufactures of electrolyizers, fuel cells, storage technology companies, etc. The ITC and the Carbon Intensity credits ranking is benchmarked against hydrogen fuel generation. However, to advance, hydrogen projects will need an array of equipment, as mentioned above under the upstream and downstream balance of plant needs.

Will capital equipment incentives be also applied to manufacturers in the hydrogen supply chain? For example, if an equipment manufacturer of storage vessels and other ancillary equipment is providing such equipment to a hydrogen project, which party is eligible for the credit? The manufacturer? The project developing entity?

The CHFCA believes that allowing companies in the hydrogen supply chain to participate in the ITC will give the industry a much-needed boost and will be an enabler to scaling hydrogen in Canada. **The CHFCA recommends that hydrogen equipment suppliers be eligible for the full credit irrespective of the CI of manufacturing their equipment, which are key elements of the hydrogen implementation, and a key element of Canadian hydrogen expertise**.