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The Department of Finance Canada
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CONSULTATION ON THE CLEAN HYDROGEN INVESTMENT TAX CREDIT

The Canadian Chamber of Commerce welcomes the opportunity to respond to Finance Canada's Consultation on the Clean Hydrogen Investment Tax Credit. As Canada's largest business organization, representing companies of all sizes in all sectors and regions of the country, we are staunch supporters of net zero—and we believe that how we get there matters.

In conjunction with members of our Net Zero Council, the Chamber believes that Canada should increase overall net zero funding and do more to de-risk and address barriers to private sector investment. Overall expenditures on decarbonization technologies and clean energy production needs to substantially increase in order to reach net zero greenhouse gas emissions by 2050. Moreover, continued investments are required in order to shore up Canada's economic competitiveness. The recent *Inflation Reduction Act* includes major incentives for qualifying US-based facilities in sectors like hydrogen production, biogas and CCUS. Canada should look to match or exceed these incentives to avoid being perceived as less attractive to internationally mobile capital.

Investment tax credits (ITCs) can support hydrogen production by offsetting the initial costs of installing production equipment. The credits can help reduce the cost of producing hydrogen and make it more competitive with other forms of energy. To that end, the proposed ITCs for hydrogen serve as a good start for improving Canada's ability to attract capital and lead global net zero transitions.

There are a variety of factors that influence the operating costs for hydrogen production. Production costs can vary significantly depending on the type of technology used, the source of the energy input, and the scale of production. In addition, the cost of transporting and distributing hydrogen can be significant. Accordingly, the Chamber encourages the Government of Canada to examine creating funding supports for long-term operating costs as well as initial capital outlays. This would align with the Inflation Reduction Act, which includes both production tax and investment tax credits.

The high potential of hydrogen to facilitate Canada's decarbonization and economic development ambitions warrants material investment in multiple hydrogen pathways. At a minimum, Canada should aim to match the provisions within the *Inflation Reduction Act* to grow our hydrogen sector and move towards net zero.

The Chamber believes that the Government of Canada should work with industry to incentivize decarbonization investments and transition to low carbon emitting energy across all sectors of the Canadian economy. A strong investment environment requires stable federal programs and policies. Moreover, clarity is needed on how new ITCs will interact with other incentives and ITCs, such as the carbon capture, utilization, and sequestration ITC.

To support Canada's economic development and net zero ambitions, the Chamber asserts that the proposed hydrogen ITC should:

- Be clear and uphold administrative simplicity, plainly articulating eligibility requirements;
- Be technology neutral, enabling the pursuit of various clean-hydrogen opportunities;
- Be accompanied by a production tax credit;
- Include a product market price objective;
- Reduce initial capital investment costs;
- Support initial development and deployment costs; and,
- Prioritize projects that produce hydrogen for domestic use and create value-added benefits.

We welcome the opportunity to respond to the following consultation questions.

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?

There are many pathways for clean hydrogen production. The three primary pathways are thermal (i.e., reforming and gasification through natural gas and biomass), electrolytic (i.e., using electricity to split water into hydrogen and oxygen), and photolytic (i.e., using solar to split water into hydrogen).

Hydrogen production methods vary in cost and efficiency. Some methods of hydrogen production produce less emissions, some methods of hydrogen production are more expensive than others. By producing hydrogen using a variety of methods, we can reduce emissions and promote the use of clean energy across different geographies and sectors. Moreover, by ensuring that multiple methods are available, we can create more resilient hydrogen infrastructure that is less susceptible to disruptions.

As for the potential hydrogen opportunities in Canada, the Chamber believes the main prospects stem from: (1) producing hydrogen from natural gas, biomass, and renewable sources; (2) deploying hydrogen infrastructure to decarbonize the transport sector (particularly through widespread integration into heavy transport); and (3) storing energy from renewable energy infrastructure.

2. What would constitute appropriate carbon intensity tiers in the Canadian context? What makes such tiers appropriate?

The Chamber believes that carbon intensity tiers should be linear for two primary reasons.

First, the proposed tiers included in this consultation will result in few, if any, companies receiving an ITC of 30%. Therefore, Canada's ability to compete for major capital investments in the hydrogen sector will be restricted given the substantial provisions[1] with the *Inflation Reduction Act*.

Second, the mechanism for determining the ITC rate should be fair and proportionate. A linear model would ensure that the carbon dioxide equivalent per kilogram of hydrogen produced will correspond to a

[1] The *Inflation Reduction Act* introduces credits and stackable credit multipliers for several products. For hydrogen, the headline rate of $0.60 per kilogram can be increased by up to 500% if wage, apprenticeship, and other requirements are satisfied. If these provisions are met, there would be a $3.00 USD credit per kilogram of clean hydrogen. The incentives are not applicable to Clean Hydrogen imported into the USA, this would notionally place Canadian clean hydrogen manufacturers at a disadvantage.

more specific ITC rate. Under the currently proposed tier system, a technology slightly over the 0.45 kg threshold will only qualify for a 10% (rather than 30%) ITC rate. In effect, the current structure does not promote lower carbon intensive forms of hydrogen production – it only promotes the *lowest* carbon intensive forms of production. This will limit investments in more readily deployable and economically viable hydrogen technologies.

3. Under what carbon intensity tiers are the different clean hydrogen production pathways in Canada expected to be found?

It is anticipated that electrolytic and photolytic forms of production will be found at lower carbon intensity tiers of CO2-equivalent per kilogram of hydrogen produced (<2.5kg); whereas thermal reforming will dominate higher carbon intensity tiers (>2.5kg).

The Chamber encourages the Government of Canada to promote all forms of hydrogen production, as creating hydrogen using a variety of methods will help ensure a reliable and sustainable supply of hydrogen while maximizing the economic and environmental opportunities associated with sector growth and the transition to a low carbon economy.

4. What levels of support would be appropriate for each carbon intensity tier, including the proposed top rate of at least 40 percent?

As noted in question #2, the Chamber believes that the Government of Canada should adopt a linear carbon intensity tier system for establishing ITC supports. This would allow for faster deployment of hydrogen technologies and a stronger investment attraction environment relative to the *Inflation Reduction Act*.

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?

The specific equipment needed at a clean hydrogen production facility will vary depending on the technology used. This may include the use of electrolyzers to produce hydrogen from water and reformers to produce hydrogen from natural gas or biomass. Common pieces of equipment include turbines, compressors, and heat exchangers. There may also be external equipment needed to support the production of clean hydrogen, such as electricity from renewable sources or hydrogen storage facilities. Consideration should also be given to creating ITCs for fuel cells, which convert hydrogen into electricity.

The Government of Canada should also consider the eligibility of all types of equipment needed to support clean hydrogen production for ITCs while leveraging existing clean energy sources, such as natural gas. Significant focus should also be directed towards developing energy production and distribution infrastructure, inclusive of nuclear.

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 most common forms used for transportation include compressed gas, liquid, and intermediate "hydrogen carrying" products like ammonia or methanol. However, "blue" ammonia is proposed to be the primary form of ammonia that will be used to transport hydrogen in Western Canada given its lower production costs and ease in transport compared with liquified hydrogen. In Nova Scotia and Newfoundland, on the other hand, largescale green ammonia projects are advancing.[2] [3]

The infrastructure required to transport hydrogen domestically or internationally includes a means to produce, store, and transport the hydrogen. Compression and transport of hydrogen typically requires high-pressure cylinders, trailers, or transport ships.

7. **Life cycle carbon intensity calculation:**
    - **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?**
    - **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?**
    - **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?**

Canadian life cycle assessment calculation methods (e.g., GHGenius) have been complicated to use. Newer and more practical Canadian methods have promise in being easier and more cost effective to deploy. It is key that these tools are aligned with international standards such as ISO, CSA, and others for performing analysis and representing data for life cycle analysis tools.

Further, it is important to note that carbon intensity for electricity is not calculated the same way in Canada as it is in the USA. The GREET model used in the USA attributes all forms of renewable electricity—including nuclear—a carbon intensity value of 0. Conversely, ECCC's Clean Fuel Standard ascribes a higher carbon intensity across a spectrum of electricity production. For instance, where ECCC gives CANDU power a carbon intensity value of 6.2 g/CO2eg/kwh, the project would receive a carbon intensity score of 0 under the USA's methodology.

In developing the ITC, the Chamber encourages Finance Canada to either work with ECCC to harmonize the carbon intensity calculations of electricity with USA standards or revise the tier levels to reflect the grid intensity of electricity production in Canada attributed by ECCC. Without revision, it is unlikely that any hydrogen project in Canada would be able to achieve the highest tier of ITC support.

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**

[2] https://worldenergygh2.com
[3] https://www.everwindfuels.com

hydrogen production pathways, what ongoing monitoring and calculations are done to measure carbon intensity once a clean hydrogen facility begins production?

It is anticipated that carbon intensity would be constant over time for a given plant. However, there are a number of considerations, for example:

- Carbon intensity of clean hydrogen production may change as grid electricity, natural gas / renewable natural gas, and feedstock carbon intensity changes.
- As many clean hydrogen projects are covered under ECCC's Clean Fuels regulations, hydrogen producers will recalculate their carbon intensity annually using a standardized approach.
- There is a risk that carbon intensity may be higher or lower due to plant operational facility and even feedstock quality.
- Newly commercialized projects may take longer to achieve optimization.

Though these factors may create short periods where carbon intensity is higher than anticipated, project developers will continue to reduce carbon intensity to ensure lower operating costs and higher project returns. Monitoring would be conducted via typical life cycle analysis parameters and variables such as incoming energy use, incoming materials, emission factors, waste materials, associated management and handling carbon emission factors, along with the recognized local carbon dioxide emission factors.

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

Once operational, clean hydrogen producers could use the Clean Fuel Regulation quantification methodology to verify the carbon intensity of the produced hydrogen. These facilities will likely use this quantification methodology to determine the number of Clean Fuel Regulation credits generated by their hydrogen. To ensure consistency and ease of administration burden, it would make sense to carry out verification functions for the purpose of the ITC through the quantification methodology.

Verification of carbon intensity could be proffered by an independent, certified external auditor on an annual or biannual basis with a plant being required to keep operating data records, materials inventory, invoices shipping data and other financial data to support lifecycle assessment.

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?**

The service life for a clean hydrogen production facility is not well defined, though it is anticipated that the typical service life of a clean hydrogen production facility is approximately 15-25 years. However, there is always the risk that a hydrogen project may not operate through to the end of its useful life. This could be due to several factors, such as a decrease in demand for hydrogen, a change in government policy or regulations, or a decline in the economy that makes the project no longer financially viable.

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