Investment Tax Credit for Clean Hydrogen

Legislative Costing Note

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The Clean Hydrogen Investment Tax Credit (ITC), first announced in the 2022 Fall Economic Statement and described in Budget 2023, will provide a 15 to 40 per cent refundable tax credit for investments in projects that produce all, or substantially all, hydrogen through their production process. This measure would apply to property that is acquired and that becomes available for use on or after March 28, 2023.

The credit will be available on eligible expenses incurred for projects that produce hydrogen from electrolysis; or from natural gas with emission abated using carbon capture, utilization, and storage (CCUS).

The tax credit rate is based on the assessed carbon intensity (CI)[1] of the hydrogen that is produced. The credit is 40 per cent for a CI of less than 0.75 kg; 25 per cent for a CI greater than or equal to 0.75 kg, but less than 2 kg; and 15 per cent for a CI greater than or equal to 2 kg, but less than 4 kg. It will also extend a 15 per cent tax credit to equipment needed to convert hydrogen into ammonia for the purpose of transportation.

The clean hydrogen ITC rates will be halved in 2034 and fully phased out after 2034.

The PBO estimates that the investments that are eligible for the Clean Hydrogen Investment Tax Credit will reduce federal revenues by $5.7 billion from 2023-24 to 2027-28.

5-Year Cost

$ millions

Fiscal year	2023-2024	2024-2025	2025-2026	2026-2027	2027-2028	Total
Total cost	133	403	920	1,970	2,312	5,738

Notes

- Estimates are presented on an accrual basis as would appear in the budget and public accounts.
- A positive number implies a deterioration in the budgetary balance (lower revenues or higher spending). A negative number implies an improvement in the budgetary balance (higher revenues or lower spending).

[1] Carbon intensity is a measure of the greenhouse gas emissions per unit of energy produced. In the case of hydrogen, the carbon intensity refers to how many kilograms of carbon dioxide are released to produce a kilogram of hydrogen.

· Totals may not add due to rounding.

Estimation and Projection Method

The estimation is based on confidential project-level data obtained from Natural Resources Canada and Finance Canada on current and proposed hydrogen projects in Canada.[2] Data provided by Finance Canada included the 2021 consultations with stakeholders with detailed information such as annual spending profiles as well as estimated CI for some projects. We also utilized publicly available information, which outlined new hydrogen projects.

Based on these data, we used the annual spending profiles provided by Finance Canada and assumed a one-to-three-year delay in capital spending depending on the status of the project. For projects with missing start and/or end dates, we estimated a capital spending timeline based on the project's status, the average durations of similar projects by province, and publicly available updates. We also assumed a constant annual spending for some projects and aligned capital spending timelines to the Canadian Energy Regulator hydrogen production forecasts[3].

We used various published studies to determine the share of total project spending that will be devoted to materials and equipment and therefore eligible for the credit. For projects using electrolysis, we estimated that 40 per cent of the total capital expenditures would be eligible, which was based on the average ratio of electrolyser cost to capital cost from the Lazard's Levelized Cost of Energy Analysis (2023)[4] and adjusted to account for other minor costs. For projects using natural gas with CCUS, we used detailed cost breakdown from Finance and academic studies[5] to estimate that approximately 30 per cent of production spending would be eligible.[6]

The ITC will also extend a 15 per cent tax credit to equipment needed to convert hydrogen into ammonia for the purpose of transportation.[7] We assume that only 5 per cent of the

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[2] Due limited information, projects and their timelines are highly uncertain and those in early stages often had missing information. Assumptions were made based on industry standards to complete the dataset in cases of missing information such as capital expenditures, timelines, and spending profiles.
[3] Canada's Energy Future 2023.
[4] 2023 Levelized Cost Of Energy.
[5] Comparative assessment of blue hydrogen from steam methane reforming, autothermal reforming, and natural gas decomposition technologies for natural gas-producing regions.
[6] Production spending is estimated at 70 per cent of total capital expenditure and the remaining 30 percent is assumed to cover the CCUS part.
[7] Eligible projects should meet certain criteria described in the 2023 Fall Economic Statement, see 2023 Fall Economic Statement.

total project spending would be eligible for the credit. This assumption is based on the 2019 International Energy Agency (IEA)'s report on the future of hydrogen.[8] We also assumed that the additional 15 per cent ammonia rate will apply after a minimum of two years of spending; this is based on projects with a detailed construction schedule.

For projects where no capital spending data was provided, we estimated the capital spending using other detailed information (electrolyser's capacity, total hydrogen production), when available. For projects using electrolysis with available electrolyser's capacity, we used assumptions from Lazard's Levelized Cost of Energy Analysis (2023) to estimate the corresponding equipment costs. For projects using natural gas with CCUS and those using electrolysis without electrolyser's capacity, we used the average capital spend to total production ratio as per production technology based on other projects.

We received the estimated carbon intensity (CI) of some projects from Finance Canada. For projects where no CI was provided, we used the 2023 Global Hydrogen Review and Hydrogen Strategy for Canada[9] to estimate the CI. We assumed that projects using electrolysis with renewable electricity will receive the highest rate. For projects with an electricity source that is from grid,[10] their rate was estimated based on their province. Projects using natural gas with CCUS with a capture rate greater than or equal to 95 per cent would also receive the highest rate. When the capture rate is less than 95 per cent but greater than 90 per cent, the middle rate would apply. Lastly, when the capture rate is not available, we assigned the lowest rate to the project.

The ITC per project is derived from the estimated eligible investments under the project, the expected CI, and the applicable capital cost allowance rates.

Sources of Uncertainty

Most of the projects included in our estimation are still in a very early stage, so there is no guarantee that all projects will be carried out and qualify for the tax credit.

Clean hydrogen production is extremely limited in Canada at this time and therefore we relied heavily on corporate announcements. This may result in a possible overestimation of total eligible investment in the short-term.

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[8] See, The Future of Hydrogen. According to this report, the CAPEX is dominated by the cost of the electrolyser, while the synthesis process and other equipment components have a smaller impact (less than 5% for ammonia production).

[9] See, 2023 Global Hydrogen Review and Hydrogen Strategy for Canada.

[10] Grid electrolysis uses electricity from the provincial grid which can be fed from the mix of different sources including renewable and fuel.

Based on the deployment of electrolysers over the next decade envisaged in current announcements, the capital cost could decrease due to economies of scale and mass production,[11] which would lower the future cost of the ITC.

Another source of uncertainty is the CI assessment. The tax rate depends on the assessed CI and our analysis used the expected CI based on company declarations. It may happen that a project fails to achieve the expected CI and the ITC could be subject to a recovery.

The ITC will reduce the capital cost of the relevant capital cost allowance (CCA) classes in which the clean hydrogen investment tax credit is claimed. When adjusting for CCA, we assumed that all corporations are taxable. This may underestimate the overall cost associated with the tax credit.

Due to limited available information, the impact of the labour requirements introduced in Budget 2023 was not considered in this note.

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Data Sources

Confidential Project List
Natural Resources Canada

Confidential Budget 2021 Consultations with Stakeholders
Department Finance Canada

Public Project Lists
Alberta Projects
Hydrogen Projects Database

[11] See 2023 Global Hydrogen Review. According to this report, the cost of an installed electrolyser could go down compared to 2023 by 50 per cent by 2025 and by 60 per cent by 2030.

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