

BOC Limited

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Re: BOC response to the proposed Hydrogen Production Tax Incentive

BOC (a member of Linde PLC.) is a global leader in industrial gas applications and has been operating in Australia for more than 100 years. BOC Limited has international and local experience in decarbonising and establishing pathways for net zero emissions with customers in the hard to abate steel, cement and mobility sectors. BOC provide hydrogen, oxygen and other gases to replace carbon molecules or reduce carbon emissions through better burning technologies in the steel and other manufacturing sectors.

BOC continues to invest in Hydrogen production and refuelling infrastructure to support the decarbonisation of the transport sector in Australia with key projects including the Toyota EcoPark in Altona, Hydrogen refuelling infrastructure in Brisbane, the Christmas Creek FMG bus hydrogen program and zero emission bus hydrogen supply in Victoria, South Australia and Tasmania. BOC are looking to further invest in hydrogen projects from mobility to chemical sector decarbonisation and metals processing.

Internationally Linde operates more than 160 hydrogen production plants, 200+ hydrogen Refuellers as well as over 170 tonnes per day of liquid hydrogen production. Recently commissioned projects include the Yarra 24 MW electrolyser for ammonia production in Norway as well as a hydrogen hub in Leuna (Germany) showcasing use cases from industrial decarbonisation to liquid hydrogen for ferries.

Please see below BOC feedback on the proposed Hydrogen Production Tax Incentive.

Yours' sincerely,

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1. Please provide any feedback on the impact this incentive may have on your community, facility or industry.

BOC believes the impact of the incentive plan will be positive and will directly support the commencement of new projects. It will enable the establishment of green hydrogen use cases from mobility to large scale ammonia and other derivative production. This incentive will allow for domestic uses cases to be implemented quicker which build the range of skills required to support growth into exports in the future. While this incentive is not on a par with the detail and impact of the US IR Tax credit, its simplicity is however to be celebrated.

Any incentive must be sensitive to support a range of social licence issues which impact key regions for example housing during construction. Some of those which need to be considered in relation to larger scale projects are the: creation of wider skills, resources and education. In addition to this community housing needs must be an important consideration too.

2. Please provide any feedback on the proposed eligibility criteria.

The announcement and funding of the Hydrogen Production Tax Incentive (HPTI) signals the confidence of the Australian Government in the hydrogen and derivatives industries and provides a recognition that clean molecules and fuels will be needed if Australia is to achieve whole-of-economy decarbonisation.

- The 10MW and above eligibility criteria may limit the ability for smaller projects which BOC believe need the benefit of this scheme to reach FID in the short term. This would limit the development of regional mobility and remote power generation applications. On that basis BOC believes 1MW and above would be appropriate to ensure additional projects can progress.
- The boundary limits set, for the 0.6kg of CO₂ per kg of hydrogen, must be able to be validated as part of the GO scheme. This number is low when compared to international schemes and may limit the ability of projects to become eligible for non-electrolysis production technologies that are also low carbon intensity. These include waste to hydrogen as an example. A value around 1.5kg of CO₂ per kg of hydrogen may be more appropriate.
- Projects involving hydrogen project of the sizes being considered are typically run over approximately 15 years. On this basis we propose the tax credit be available for up to 15 years for an eligible project according to application of the current definition up to 2040.

3. What key factors would need to be accounted for in a definition of an eligible facility for the purposes of the HPTI?

Simple but transparent criteria will be a key factor in supporting future projects to reach a Final Investment Decision (FID). Without question BOC FID's will require this tax production credit as a condition precedent.

We believe the tax credit should also be indexed to inflation. This would ensure that any benefit from the tax credit does not reduce over time which will dilute a business case.

The key factors which should be included in the definition of an eligible facility need to be minimum capacity, emissions intensity (carbon dioxide per hydrogen produced) including GO Certification Boundary Limits and community benefit criteria. Any other criteria to be included must be clear and not complicated to support successful implementation of the HPTI within industry.

4. What key factors would need to be accounted for in a definition of Final Investment Decision (FID) for the purposes of the HPTI?

It will be challenging to come to an objective definition of FID that will be of value to the HPTI process. It may be possible to agree upon a checklist of minimum requirements aligned with the requirements by bodies such as ARENA via the Hydrogen Headstart criteria for final investment, the CEFC, NAIF, or EFA. However, the execution or implementation of processes associated with FID vary across companies, boards and investors. We recommend that whatever is chosen should be tested and agreed with public and private lenders as being a sensible minimum standard.

Alignment with the ARENA and or Hydrogen Headstart programs processes should be easily supported by the HPTI.

5. How long do you expect it will take for projects to reach first production following FID?

The time frames on which projects reach first production after FID are dependent on the project size or maximum capacity. BOC estimates our Port Kembla Hub project, for example, (which involves a 10MW capacity electrolyser) will reach first production after approximately 18 months post FID. Changes in legislation or regulations could impact the correlation between start of FID and first production.

We understand larger projects, in the realm of 200MW+, could take up to 3 years to reach first production. The complexities of offtake arrangements may further delay some larger projects such as export projects.

BOC has observed delays in the European Union for the first moving projects and gained significant learnings around how to reduce start up timeframes moving forward and this is now proving an important aspect of our project plans moving forward.

6. For foreign investors, do you currently encounter any impediments to investment in projects that would be eligible?

BOC, as a Linde company, has identified a key impediment with projects internationally is demand risk. In our experience the key to mitigating this risk, is to successfully build in contracted offtake. Without this we believe there is a risk of emerging sectors not developing as quickly as expected and delays in achieving the economies of scale to drive further investment that is unsubsidised. An example of this is the slow emergence of H2 FCEV trucks.

7. Please provide any feedback on the proposed emissions intensity threshold of 0.6kg of carbon dioxide equivalent up to the production gate.

It would be useful for the proposed emissions intensity threshold to include worked examples of how this could be applied which might show system boundaries and proposed inclusions/exclusions (for example scope 3 emissions related to purchased water used within the electrolysis process). It should be made very clear to proponents what methodology will be used to calculate the emissions intensity (i.e. a standardised/recognised approach) as this is an established criteria for eligibility. BOC have supported the GO scheme development by sharing data from our existing plants and we understand a simple site-based solution is likely to proceed.

The final boundary limits of the GO scheme need to be defined before this emissions intensity threshold is legislated as it may be too low and unintentionally rule out other non-electrolysis hydrogen production processes.

This proposed threshold of 0.6 kg of carbon dioxide equivalent is low when compared to international schemes and may limit the ability of projects to become eligible for non-electrolysis production technologies that are also low carbon intensity such as waste to hydrogen as an example. A value around 1.5kg of CO₂ per kg of hydrogen may be more appropriate.

8. Other than electrolysis, what production processes would meet this emissions intensity threshold now or before 2030?

There are several emerging technologies that should be included for consideration in the program including waste to hydrogen, biogenic hydrogen from biomethane and gasification technologies. BOC believes these alternate production processes should be assessed against the emission intensity threshold criteria and a hydrogen volume produced criteria (against the electrolysis production equivalent).

Biogenic derived hydrogen could meet the emissions threshold. Depending on the calculation methodology proposed to be used may result in a negative emissions intensity value. Some biogenic processes are commercially mature and already operating at scale. These processes are all worth consideration if able to meet emissions intensity thresholds.

As a principle, the projects that comply with the GO scheme and meet the intensity threshold should also be eligible for the HPTI. If there is any internal inconsistency between the two schemes (for example, to prohibit certain methods of production) they should be resolved and clearly stated in the legislation.

9. Please provide feedback on the proposed minimum capacity requirement (equivalent to 10 MW electrolyser)?

It is important when considering proposed minimum capacity requirements, the context that the industry in Australia is still in its infancy. Given this, we support minimum capacity requirements for projects which are 1MW and above as they will best support pilots and deployments that may otherwise be delayed by insufficient customer offtake required for larger scale plants in the short term.

Significant learnings have been created for the Australian industry based on our experience and success in this space. BOC view a criteria which sets out a minimum of 1MW as being the most appropriate way to help ensure development for regional and remote power generation projects are

not disadvantaged. In other cases, smaller projects can support key mid-sized industries, such as farm operations and food processing to decarbonise.

Another important factor to consider is that 1MW projects are of key importance for electrolyser manufacturers in Australia. This will allow local manufacturers to invest and develop capability at a manageable level before scaling up to help meet future export requirements.

Small, distributed production of hydrogen for local or single facility use (including for heavy vehicle refuelling) is a model of development that the industry has been trying to get off the ground for several years, largely in the absence of any demand stimulus measures or tax incentives. The eligibility criteria for the HPTI largely locks these smaller (less than 10MW) projects out, even though they reflect important decarbonisation opportunities. It is important too that the demand for remote power in indigenous communities, agriculture, or remote mobility are all considered and prioritised in a distributed model of production which is most likely to succeed in regional areas.

Consideration could also be given to expanding the eligibility criteria that requires eligible facilities to be on a single site, for example if several refuelling stations were part of one consortium delivering projects across multiple sites, this would enable a broader range of projects and users to build scale and demand for hydrogen and derivatives.

10. For renewable production processes other than electrolysis, is using the minimum capacity requirement of “equivalent to a 10MW electrolyser” appropriate? Is another definition of capacity required to deal with other production pathways?

There is potential for some ambiguity here when weighing up the appropriateness, as different electrolysers have different power efficiencies. This means that not all 10MW electrolyser will produce the same set amount of hydrogen.

BOC is proposing that the minimum capacity requirement should reference a minimum volume threshold regardless of the production process being considered. An example of this is if the minimum capacity requirement is 1MW electrolyser or equivalent nameplate of 400kg of hydrogen per day. This would, we believe be a more well-defined approach.

11. Should grid connected electrolyser projects be required to match their hydrogen production with electricity generated by the same electricity grid? Please provide feedback on this proposal.

Yes, grid connected electrolyser projects should be required to match their hydrogen production with renewable electricity generated by the same electricity grid. Our experience has shown us in the European Union and United States adding in renewable build outs to hydrogen projects complicates them and delays projects.

12. Please provide feedback on the proposal to not include additional requirements on renewable energy generation for access to the incentive, such as additionality and hourly time-matching with hydrogen production.

We are supportive of the proposal to not include additional requirements on renewable energy generation for access to the incentive. The chemical and industrial processes referenced in the introduction could likely operate 24/7 making hourly matching an onerous requirement.

The Australian Government could also consider a requirement for additionality to be phased in post the 10-year period covered by the HPTI, when significant additional renewable generation and storage infrastructure will have been added to the grid. This is likely to be more important for large scale export projects.

13. Please provide any feedback on the proposed administrative approach.

This process appears to have worked in other jurisdictions. The administrative approach is clear to guide operators regarding claiming the tax credits at the point of lodging a tax return. This is in most cases based also on the existing regime of GO scheme. Consideration should be given to the questions around the timing of creating a GO certificate and in which tax credits can be utilised. This feedback relates only to a timing issue and we recommend should be clarified in the future as legislation is introduced.

14. The proposed GO scheme will be used to support the registration and verification of hydrogen production. Are there any additional factors that would need to be accounted for in the proposed design of that scheme?

This is a sensible approach as the GO scheme also offers end users confidence in CO2 emissions. This confirmation is key for a potential green premium to develop over time.

15. The Government may legislate the administrative arrangements in subordinate legislation. Please provide any feedback on this proposed approach.

We support this sensible approach.

16. What obligations should be imposed on potential recipients of the HPTI to ensure the community benefit principles are met?

Community benefits from employment, training, environmental and air quality should be considered in all projects. This could include targets around local employment. Local content is a current challenge given the majority of hydrogen ready equipment is produced in the US, EU and Southeast Asia. This could be reviewed in 5 years as Australian manufacturers develop offerings in this space under the wider *Future Made in Australia Act* but would be a challenge for projects in the next 5 years at least.

17. What obligations are potential recipients of the HPTI currently subject to that might support the community benefit objectives (noting these will be finalised under the *Future Made in Australia Act*)?

BOC is supportive of the *Future Made in Australia Act's* focus on economic and jobs growth in emerging sectors within Australia. BOC look forward to working within the *Future Made in Australia* framework but will need to complete a detailed review before any further comment. Government contributions to skills development should be continued.

18. Are there any additional objectives that you consider important? What obligations might support these?

Nothing to add.

19. Recipients of the HPTI may be subject to additional transparency and disclosure requirements in order to be eligible. What kind of requirements are appropriate? What are the key practical considerations to take into account when setting the requirements?

BOC have been involved in ARENA projects including our Hydrogen Supply Chain project in Brisbane and the Toyota EcoPark. BOC believe that the similar processes to ensure transparency worked well and this could be replicated for the hydrogen production tax credits. Requirements which are set should not be onerous and should result in extra layers of procedures to ensure compliance.

20. How should entities proposing to claim the HPTI be required to demonstrate compliance with tax obligations?

Companies should be required to show production records to demonstrate compliance with tax obligations.

21. What information do you consider important for the community that should be reported publicly on the recipients of the HPTI such as the amount of credit received?

BOC supports the publication of a list of hydrogen produced by each recipient to provide transparency to the community. BOC believe sharing evidence of where the hydrogen produced is used would allow the mapping of key applications and identify areas for future investments. Examples of applications could include mobility, chemicals, industrial heat and export.

Projects should support the development of future projects. This could be achieved through participation in “lessons from learnings” session which is currently apart of receiving ARENA funding.

22. Who should the reporting requirement be imposed on? For example, on the recipient entity, or central reporting through a regulator?

The regulator should produce basic reporting for those accessing the tax production credits. This creates transparency across the sector.

23. Please provide feedback on the proposed treatment of the interactions between the HPTI and other forms of Commonwealth, State or foreign government support.

Currently, most hydrogen projects need to combine different funding sources to be commercially viable. Hence, the ability to ‘stack’ these incentives is an excellent approach. This ability to stack funding schemes is seen in the US and EU and enables projects to achieve FID more quickly which is key to meeting Australia’s climate change targets.

24. How can the HPTI best leverage other types of support? Please provide examples relevant to your project if possible.

HPTI effectively reduces the net variable cost of hydrogen production. Some other supports available in Australia come in the form of grants for capital. Both have their place, and both incentivise the industry in different ways. HPTI will encourage recipients to produce higher volumes of hydrogen for use and into the market. In comparison grants for capital support targeted investment in infrastructure and production capability. HPTI forms a part of the funding solution and it is critical it can be “stacked” with other funding options to support more hydrogen projects to achieve FID. For example, BOC has been awarded a capital grant to develop an Illawarra Hydrogen Technology Hub. BOC has experienced challenges with the high cost of hydrogen production in securing offtake commitments from end users in the mobility sector. The HPTI will assist BOC in addressing this issue and support achieving FID on this project.

25. What are the key practical considerations with receiving support through the HPTI and the Hydrogen Headstart program simultaneously?

Ensuring similar methodology or approach to reporting obligations will reduce rework if receiving support from HPTI and Hydrogen Headstart simultaneously.

26. Are there specific interactions with other support programs that should be considered?

Some of the support programs which should be considered are the NSW Renewable Fuels scheme, ARENA capital grants and the ACCU scheme. All programs should be allowed to be combined to ensure projects meet FID and enable the start of the hydrogen market in Australia.

Supporting Documentation on Emissions internationally

Please find below some alternative CO2 emissions values used by Governments internationally.

Lifecycle GHG emissions rate per kg of produced hydrogen	Tax credit amount	Full credit amount (assuming labor requirements are met)
2.5 - 4kg of CO2e	\$0.12	\$0.60
1.5 - 2.5 kg of CO2e	\$0.15	\$0.75
0.45 - 1.5kg of CO2e	\$0.20	\$1.00
0 - 0.45kg of CO2e	\$0.60	\$3.00

Table 1: US IRA carbon emissions maxima

International Comparisons

[Comparison of the emissions intensity of different hydrogen production routes, 2021 – Charts – Data & Statistics - IEA](#)

Japan

[WEF Accenture Enabling Measures Roadmap for Low Emission Hydrogen Japan 2023.pdf \(weforum.org\)](#)