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Hydrogen Production Tax Incentive

Consultation paper

Response by Enosi Australia Pty Ltd

1. Introduction

We welcome the opportunity to provide feedback about the proposed Hydrogen Production Tax Incentive (HPTI).

About Enosi

Enosi Australia is a company that develops software for proof of provenance of renewable electricity and pricing of energy sourced from renewables. Our Powertracer technology has been deployed with energy suppliers in Australia, Singapore, UK and Europe. We are also the technology provider to the TRUZERO research program led by UNSW under the RACE for 2030 CRC, that delved into the feasibility and benefits of 24/7 renewable matching and certification for commercial projects.

Our traceability technology has been used by major energy consumers Google, Canva, Mirvac, Port of Brisbane, local governments and many others. We have agreements in place to certify renewable energy supply to hydrogen projects being developed by Countrywide Hydrogen, Sunshine Hydro, North Queensland Hydrogen and the Hunter Hydrogen Network. Given our global business model and in-depth experience in the design and use of 24/7 energy certification, we are uniquely positioned to share our understanding of the impacts of specific approaches and policies in this domain.

Unintended Consequences

We welcome the Federal Government announcement of the HPTI and believe that it is the right type of support that the Australian industry needs to become a globally competitive 'renewable energy superpower'.

However, as we explain below the design of the subsidy as proposed will very likely lead to **unintended adverse consequences** with respect to Australia's overall emissions, and leakage of subsidies outside of Australian borders.

The US Treasury looked very closely at this issue with respect to their IRA Section 45V tax incentive (similar to the HPTI) and concluded that high standards are essential. A key input to their decision making was the highly detailed research cited below from Princeton University and TU Berlin. When they reviewed the equivalent scenario contemplated by the HPTI, Princeton concluded:

(Under this scenario) The 45V PTC (tax credit) itself appears to be the primary driver of unfavorable emissions outcomes from grid-based hydrogen production in the US.

That is to say that a tax credit proposed under weak certification rules would incentivise deployment of massive electrical loads that would strongly increase emissions! This perverse outcome is diametrically opposed to the intent of both this legislation and Australia's broader emission reductions plans.

We are happy to provide further information and welcome a discussion on the topics related to our submission.

2. Key Issues

The proposal **sets a very low bar for certification of green hydrogen** which could be **negative for both Australian taxpayers and the climate**.

1. Rather than contribute to our net zero ambitions, the loose standards mean that 'green' hydrogen production in Australian will likely **add significantly to our overall carbon emissions.** This worsening of emissions was proven by the detailed studies undertaken by Berlin Technical University and Princeton University (and confirmed by a related study by UNSW) that led to both the USA and the EU setting a **3 Pillar Policy** for green hydrogen (below).

2. By not adopting the same high standards as the EU, the UK and the USA, Australia may find itself **locked out of international green hydrogen markets**, and/or subject to Carbon Border Adjustment Mechanisms for its exports. This has consequences right across the 'green economy' supply chain as green products (eg steel, fuels etc) produced with low quality hydrogen also becomes subject to CBAMs.

3. The **HPTI will work directly against the recent Capacity Investment Scheme** which aims to incentivise investment in renewable supply that operates when and where it is needed. The HTPI instead encourages huge increases in demand at any time of day met only with oversized solar plant and pushing up demand for fossil fuel energy at night.

4. This not-so-green hydrogen is to be subsidised by the Australian taxpayer to the tune of **$6.7 Billion - money now likely to be wasted for no emissions reduction and a non-competitive industry.**

The key issues with the lax standards are set out below:

1. It allows for electrolysers to be powered by electricity generation which does not satisfy the **3 pillars**.
   It may be:

    1. **Not additional** - meaning that enormous additional electrical load will be added to the grid without a guarantee of equivalent renewable generation. Hydrogen producers will buy existing Renewable Energy Certificates meaning that the demand of existing grid users is not met with renewables and will need to be supplied with **additional fossil fuel generation**.

    2. **Not matched in time** - meaning that electrolysers will be allowed to operate 24/7 and rely on certificates produced by (for example) solar farms that operate only in daylight hours. The purchase of such certificates 'takes the credit' for renewables actually used by other grid users during the day, while **fossil fuel generation is required to actually power the electrolysers overnight**.

    3. **Not even on the same grid** - the paper asks respondents to comment on whether the energy supplied to the electrolysers needs to even be on the same grid. Such an outcome is facilitated by certificates being tradeable entirely separately from the energy itself. The potential emissions impact is self-evident as electrolysers can attach to a high emissions grid, while buying offsets from renewables produced on another grid - meaning that **other electricity users cannot meet their emissions reduction goals** on that other grid.

2. Australia hopes to participate in global green hydrogen markets, but without standards that match the global trend, the effect of subsidies will be undone by carbon border adjustment taxes - effectively just **transferring money from Australian taxpayers to overseas governments** (or more likely just destroying Australia's opportunity to participate at all).

3. Specific Responses to Questions

Question 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?*

We find it extraordinary that any alternative to this requirement is even under consideration. If the electrolyser is not on the same grid as the renewable energy source(s), then **self-evidently**, the hydrogen is not produced using the renewable electricity claimed by surrender of certificates. All that happens is the hydrogen producer pays money to take credit for renewable energy actually used by consumers on the other grid. In turn, those consumers' reported emissions can only go up, while on the electrolyser's grid the addition of an enormous load requires the burning of fossil fuels to actually operate it.

The Princeton study (https://iopscience.iop.org/article/10.1088/1748-9326/acacb5 devotes an entire chapter "The Importance of Deliverability" to this topic. They modelled a relaxation of the 'deliverability' constraint (Supplementary figure 18) and found that while the electrolyser's 'attributed emissions' may be offset to zero by the certificates sourced on another grid, the 'consequential emissions' in the overall system increased by as much as 15 kg CO2e per kg of hydrogen (compare that to the requirement that emissions remain less than 0.6kg CO2e to qualify for the HPTI !).

A further point on this topic is that the US and European studies considered not just 'same grid' requirements, but also the impact of transmission constraints. Given the NEM's highly constrained interstate interconnectors, we believe that matching should be limited to the same NEM bidding zones (i.e. same State).

Question 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.*

These two topics are both important, and there is interplay between them, but below we have dealt with them separately.

Additionality.

Of the 3 pillars discussed in our summary (and required by US and EU rules), additionality is the most important. Put simply, if new generation is not constructed to meet these huge new electrical loads, then additional fossil fuels will be burned as the electrolysers cannibalise the existing renewable resources and other consumers forced to consume more fossil-powered electricity. Existing coal and gas plants will need to have their lives extended and utilisation increased to cover for the loss of renewables attributed to the hydrogen production. The relevant section of the Princeton study is "Section 3.5. The Need for Additionality", which states:

> *"In modeled scenarios cases where we remove each of these (*additionality*) requirements individually (see supplementary figure 19), we find that (*even*) a 100% Hourly Matching requirement loses all of its consequential impact. This is because contracts with existing or mandated clean energy resources have no causal impact on the continued operation of these*

> *resources in the electricity system as long as they are not under threat of economic retirement. Any credible implementation of the 45V PTC that allows grid-based hydrogen production to qualify for subsidies should therefore enforce strict additionality requirements,"*

The data presented at the referenced Figure 19 shows that "consequential emissions" increase by a whopping 20 kg CO2e per kg of hydrogen.

Hourly Time-Matching.

The impact of time-matching is perhaps more subtle than the obvious consequences of additionality and locational requirements. Again the key to understanding why emissions are higher without high quality rules is the difference between "attributed" and "consequential" emissions. Hydrogen producers may be able to reduce the emissions "attributed" to their operations by purchasing certificates created by generation at other times, but if consumption is not matched hourly then the "consequential" emissions can rise dramatically. This is because, in order to supply the electrolysers when renewable are not actually generating, fossil fuel plants will be required and incentivised to keep operating, extending their lifetime and increasing their utilisation. Because the demand from the electrolysers pushes up the price of power in the NEM at times of low renewable content, fossil fuel plants can economically operate for longer. No amount of solar overcapacity will compensate for these additional night-time emissions.

Again to quote the Princeton study on this topic:

> *Although a 100% Hourly Matching requirement therefore cannot guarantee zero long-run emissions impact from hydrogen production, it does lead to consequential emissions outcomes that are* ***universally superior to those under every alternative 45V PTC implementation*** *investigated in this work, and often by wide margins. In several cases, a* ***100% Hourly Matching requirement reduces consequential emissions to near-zero****.*

The relevant data in the study is shown at Figure 2 and shows hourly matching to have adverse impact on consequential emissions by amounts varying between 5 kg and 20 kg CO2e per kg of hydrogen, depending on the existing renewable mix on the different grids studied.

Finally we note that without time-matching the government will have introduced two contradictory policies - both consuming treasury resources and operating in opposition to each other. The capacity investment scheme is designed to encourage build of renewables and storage assets that 'fill the gaps', whereas the HPTI incentivises overbuild of solar by allowing offsetting any time of day or even year.