Monday, 16 December 2024

Senator Jess Walsh
Chair, Senate Standing Committees on Economics
Australian Government
Parliament House
Canberra ACT 2600

Dear Senator Walsh,

Re: Future Made in Australia (Production Tax Credits and Other Measures) Bill 2024 [Provisions]

Thank you for the opportunity to make this submission to this important piece of legislation. We write, principally, to appeal for a reduction of 10MW being the minimum cut-off for electrolyser (or similar technology) to receive the $2/kg tax offset to produce green hydrogen. To give this appeal context, we will make some broader comments about the state of the hydrogen sector in general, and where we believe the orthodox thinking about hydrogen is wrong.

Note: within this submission, where we use the term "hydrogen," we mean "green," or "clean" hydrogen.

About Star Scientific Ltd

Star Scientific Ltd is a privately funded research and development facility located at Berkeley Vale on the NSW Central Coast. We are a member of the Australian Hydrogen Council (AHC). We have developed the Hydrogen Energy Release Optimiser, or HERO®, catalyst, which chemically re-bonds hydrogen and oxygen into water, and in the process releases significant amounts of usable heat (up to eight hundred degrees Celsius in approximately 3 minutes). There are no CO2 inputs our outputs, nor any other GHGs. HERO® is a "true catalyst," which means it does not wear out. It is made of common materials and is not toxic. HERO® is globally patented and has won or been a finalist in several global awards.

Where the orthodox thinking about hydrogen is wrong

Hydrogen has been the recipient of negative commentary in recent months, yet this is not the fault of hydrogen nor of genuine hydrogen industry stakeholders. It is, instead, the fault of unrealistic expectations, incorrect assumptions, poor policy, irrational analysis, and rent-seeking.

The role of hydrogen in our transition is being complicated by competing aims, leading to frustration and cynicism. The first aim is the laudable wish of many in our community, and in the Parliament, to decarbonise the economy. The second aim is to build a sustainable hydrogen industry. These two aims should be complementary – they should be "one and the same," however, they are not. They have been decoupled from each other.

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Governments were optimistic about the role of hydrogen in the transition and have signalled their willingness to spend taxpayer's dollars to facilitate it. Their motivation is for hydrogen to decarbonise large sections of the economy in a short amount of time. Unsurprisingly, given there was a taxpayer incentive attached, large companies such as fossil fuel corporations and iron ore producers, who are otherwise facing major social license issues and investor and customer push-back, grasped hydrogen like a drowning man grasps a straw. They and their hired consultants assured governments that they could deliver on the governments' aims, with, of course, taxpayer help.

And so, the vision of Australia as a "green hydrogen export super-power" was born. Fossil-fuel companies could not conceive of hydrogen being anything other than another cheap commodity to be exported from Australia to the world, just as they have always done. This was to be done through long, thin capital-intensive supply chains which they would dominate, just as they have always done.

This is, however, irrational. This thinking encumbers the expensive to produce and relatively rare molecule of green hydrogen with the added costs of bulk storage, transport to and from ports, seaborne export and refining. To expect it to compete with other forms of fuel on a cost basis makes no sense.

This is compounded by false thinking about the terminal use of hydrogen. For example, the burning of hydrogen to release its energy is a wasteful and problematic use of its potential. A simple search will find, for example, the myriad of issues associated with the burning of hydrogen in turbines, not to mention their water use.

Indeed, we have a live example here in Australia. When in opposition, the now South Australian Government promised a "200 MW hydrogen power station". The wording, over time, has changed to "hydrogen capable," which means, at best, it will be a 5% blend with gas, ramping up over time, (while still producing NOX and other GHG emissions). There are no 100% hydrogen combustion power stations continuously and commercially operating in the world today.

Thankfully, with the development of HERO®, we have the technology to release the energy of hydrogen without wasting it and without the technological problems associated with burning it. We estimate that HERO® is three times more efficient at extracting the energy from hydrogen, in the form of usable heat.

Nevertheless, Hydrogen has a key role to play in the transition.

Notwithstanding these criticisms of the orthodox thinking of hydrogen's role in our energy transition, hydrogen nevertheless has a critical role to play. It is our view that with the correct policy settings, the hydrogen economy will be developed organically from the "ground up" rather than by "top-down" direction from government and corporate interests pushing it too hard, too quickly, and monopolising the resource. We believe that a sustainable hydrogen economy will develop through many and diverse uses across large, medium, and small businesses, often operating in self-supporting ecosystems.

For example, one of the key uses will be in process heat. Much of Australia's industry, and especially our primary export sector, is on a path to electrification. However, there are many industrial processes that are unable, or exceedingly difficult to electrify. Much of this relates to the requirement for steam, hot water, hot air and hot oils for growing, processing, and cleaning. Many of these businesses are in the agriculture and food industries and associated industries such as packaging, brewing, distilling and pulp and paper. There is a strong focus in these sectors on finding

replacements for fossil fuels to power heat exchangers and boilers. HERO® will supply process heat from green hydrogen for many of these applications.

Hydrogen will also play a role in energy generation, but not through the burning of it in "hydrogen turbines."

Engineering studies have shown that coal-fired power stations can be retrofitted to run on green hydrogen, with HERO® providing the heat to generate steam. Star Scientific has already produced super-saturated steam at our Berkeley Vale facility. However, the volume of hydrogen required is not available at present.

Instead, energy can be generated by mating HERO® to super-critical $_sCO_2$ turbines, which are far smaller than orthodox turbines and are thus easier to deploy for off-grid energy systems. The demand-drivers for these systems are those places across the globe that do not enjoy connection to an electricity grid, such as much of Africa, Indonesia, the Philippines and, indeed, the Australian outback.

A further demand-driver is the exponential increase in energy demand from the data-driven economy, especially data centres. A source of zero-emissions off-grid, stable, 24/7/365 energy is much in demand by owners of data centres.

The hydrogen supply chain needs to be light, nimble, local and on-demand.

Instead of large, complex, capital intensive and costly processes dominated by a few entities lucky enough to receive government support, Star Scientific believes the quickest path to a sustainable hydrogen industry is by encouraging ecosystems of multiple users across all three levels of business. This will encourage a "hive mind" of activity, learning and relationships that will organically build hydrogen hubs.

The principles of this model are:

- Hydrogen will be produced as close to its terminal use as possible, either on-site or in a collective of multiple users.
- It will be produced on-demand for industrial purposes, obviating the added costs of long-distance transport and bulk storage.
- Reduced costs will be further supported by emerging technologies in the generation of green electrons and the production of hydrogen.
- These technologies will be light, simple, mass-produced and recyclable.
- Rather than exporting the commodity, it will be used to decarbonise domestic output and exports.
- Government support is required with the provision of a regulatory environment.
- Government financial support should be broad-based, technology neutral and relatively easy to access.

This model will lead to an organically expanding hydrogen economy, encouraging further investment and encouraging further domestic business to decarbonise using hydrogen technologies. Consumers will recognise that decarbonising the economy using hydrogen is simple and accessible and will increasingly push back against those products and services which choose to ignore this opportunity. A market dynamic will take over that will further accelerate the uptake of and investment in green hydrogen.

This will build a more stable hydrogen sector on which larger and more energy-intensive uses such as steel, concrete and chemicals can decarbonise. It will also realign the twin goals of building a sustainable hydrogen industry with decarbonising the economy.

A 10MW minimum limit is too large and counterproductive.

It is critical, therefore, that the Parliament removes the 10MW minimum limit on electrolysers or similar technologies. A 1MW limit would be more sustainable, however it would better if there were no limit.

If the 10MW limit to remain, it would be counterproductive by stifling technological innovation smothering the light, nimble, local and on-demand model described above.

We believe that the HPTI should in principle be available to all projects – that is, not limited to use, site or size. There will be a need to demonstrate capacity and seriousness of intent of course, to maintain legitimacy of the initiative and not reflect an unnecessary administrative burden for the government.

There is a need to address multiple sites within a specified region (noting these may or may not add to more than 10MW). At the least, there is a need to provide for facilities that have had to spread beyond one specific site due to land use constraints but are demonstrably within the same industrial or operational zone.

In addition, changes to the rules should also accommodate broader corridors for transport. The industry has been trying to get the distributed production of hydrogen for local or single facility use (including for heavy vehicle refuelling) off the ground for several years, largely in the absence of any demand stimulus measures or tax incentives. The eligibility criteria for the HPTI locks these smaller (less than 10MW per site) projects out, even though they reflect important decarbonisation opportunities, such as those anticipated through the Australian Government's Transport Sector Decarbonisation Plan.

These changes are necessary to incentivise investment in broader domestic decarbonisation opportunities. Smaller, decentralised, projects such as diesel replacements for electricity generation for remote communities, or refuelling for heavy freight transport, will provide opportunity to develop experience and capability and may even support future scalability. In other cases, smaller projects can support key mid-sized industries, such as farm operations and food processing.

If smaller and multi-site projects are excluded, it is likely they will be considered less attractive as investment propositions and will find it increasingly difficult to attract private capital. This will flow on to impact regional and domestic decarbonisation efforts, as well as on government funding programs that will increasingly be relied upon to progress these smaller projects.

Star Scientific therefore believes that the removal of the 10MW is critical.

We also note that the proposed incentive is not indexed for inflation, and strongly recommend that the Australian Government reconsiders this decision.

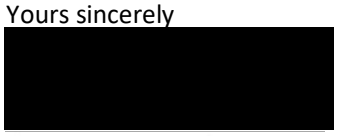
A lack of inflation adjustment for the HPTI means the real value of the tax offset will have declined more than 10 per cent by the time the HPTI comes into effect (i.e., $1.80/kg in 2027), and by

around a third by the time it expires (i.e., $1.34/kg in 2040). This is based on Commonwealth Budget 2024-25 CPI inflation forecasts.

It is the industry standard for electricity power purchase agreements (PPAs) to be indexed to inflation or CPI. Not indexing the HPTI would be inconsistent with industry standards and expectations and reduces the effectiveness of the HPTI in influencing the business case for investing in Australian projects.

Thank you for the opportunity to make this submission. We are, of course, happy to provide further information.

Yours sincerely



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