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Hope and hydrogen – Australia's hydrogen export charade

Current industrial hydrogen use in Australia is 500,000 tonnes per year. The Commonwealth Government is budgeting for green hydrogen production of around 500,000 tonnes per year into the 2040s. Given the first users of green hydrogen will be existing industrial users of fossil hydrogen, this leaves no hydrogen for export from Australia.

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INTRODUCTION

The Australian Government has put great emphasis on developing a hydrogen industry, both for domestic use and for exports that would make Australia an energy 'superpower'. According to Australian Government ministers, this is important not just for Australia's prosperity, but also for that of our trading partners, particularly Japan:

> Green hydrogen is at the heart of our vision for Australia as a prosperous, self-reliant nation in a net zero future; as a renewable energy superpower; and as a country that makes things.
>
> Minister for Climate Change and Energy, Chris Bowen.[1]

> Ministers reaffirmed the importance of the hydrogen and ammonia sector in securing clean energy and other related trade and investment opportunities, and recognised the importance of working together towards mutual recognition of carbon intensity based hydrogen certification schemes to accelerate clean hydrogen trade.

[1] DCCEEW (2023) *State of hydrogen 2022*, https://www.dcceew.gov.au/energy/publications/state-of-hydrogen-2022

Joint Australian and Japanese ministerial statement.[2]

Despite the lofty goals for the future of Australian hydrogen production hard numbers are much more difficult to find. How much hydrogen does Australia currently produce? How much is expected to be produced in the future? How much will subsidies cost? Just how realistic are the claims of becoming a prosperous renewable energy superpower on the back of hydrogen exports?

Recent government documents provide some answers to these questions and suggest that the potential of hydrogen exports is limited.

HYDROGEN PRODUCTION TAX INCENTIVE

The Australian Government intends to incentivise the production of hydrogen through the Hydrogen Production Tax Incentive (HPTI). The HPTI will see the Government subsidise eligible production by $2 per kilogram of hydrogen produced. The value of this subsidy on a per kilogram basis sits between the lower European incentives and US incentives at USD $3/kg.[3]

The Commonwealth Budget outlines the estimated cost of the HPTI:

> The Hydrogen Production Tax Incentive [will operate] from 2027–28 to 2040–41 for producers of renewable hydrogen to support the growth of a competitive hydrogen industry and Australia's decarbonisation, at an estimated cost to the budget of $6.7 billion over ten years from 2024–25 (and an average of $1.1 billion per year from 2034–35 to 2040–41)[4]

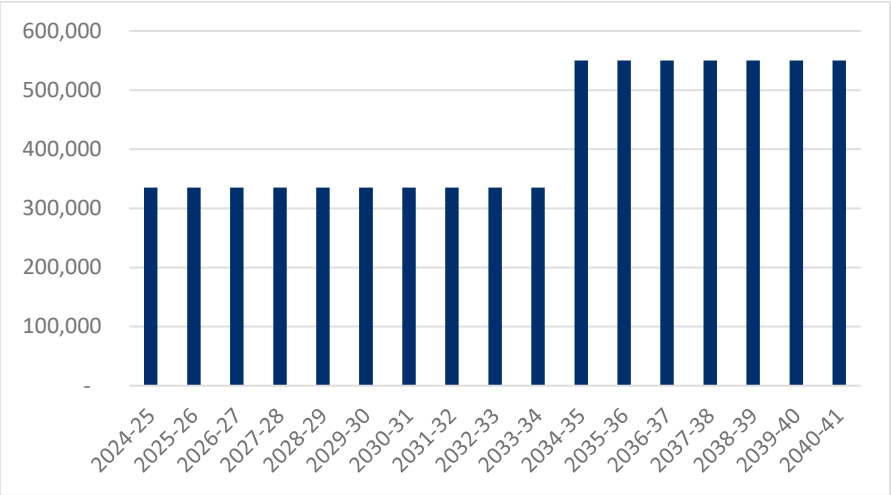
Dividing the cost of the program by the $2 per kilo subsidy gives an estimate of the volume of hydrogen that the Government is budgeting for. This is summarized in Figure 1 below:

[2] Farrell (2023) *Australia-Japan Ministerial Economic Dialogue Joint Ministerial Statement*, https://www.trademinister.gov.au/minister/don-farrell/statements/australia-japan-ministerial-economic-dialogue-joint-ministerial-statement

[3] IEEFA (2024) *Local ammonia production the ideal early adopter for green hydrogen*, https://ieefa.org/resources/local-ammonia-production-ideal-early-adopter-green-hydrogen

[4] Commonwealth Government (2024) *Budget Paper No. 2: Budget measures*, p68

Figure 1: Commonwealth Budget – implied renewable hydrogen production



Source: Commonwealth Government (2024) *Budget Paper No. 2: Budget measures*

Figure 1 shows that the Commonwealth Government expects to subsidise an average of 335,000 tonnes of hydrogen production to 2033-34, after which production is expected to average 550,000 tonnes per year.

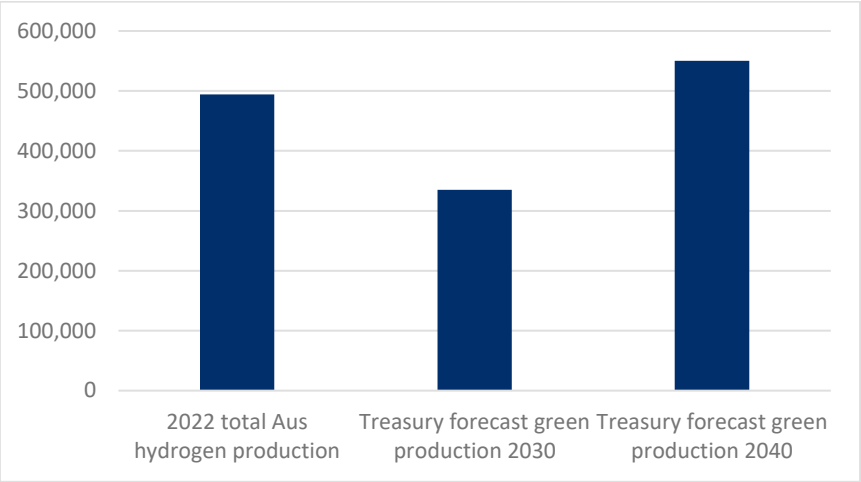
This needs to be seen in the context of Australia's current hydrogen production and use. According to the Commonwealth Government's *State of hydrogen 2022 report*, Australia produced and used 494,277 tonnes of hydrogen, for uses such as production of explosives, fertilizer, and oil refining. All of this hydrogen was produced from fossil fuels.[5] While there is little data on historic hydrogen production, this volume appears relatively representative of recent years and 'business as usual' forecasts.[6]

Figure 2 below compares the Australia's current production of hydrogen with Government forecasts of 2030 and 2040 green hydrogen production under the HPTI:

[5] DCCEEW (2023) *State of hydrogen 2022*, https://www.dcceew.gov.au/energy/publications/state-of-hydrogen-2022

[6] IEEFA (2024) *Local ammonia production the ideal early adopter for green hydrogen*; Deloitte Access Economics (2019) *Australian and Global Hydrogen Demand Growth Scenario Analysis*, https://www.deloitte.com/content/dam/assets-zone1/au/en/docs/industries/financial-services/2023/deloitte-au-australian-global-hydrogen-demand-growth-scenario-analysis-091219.pdf

Figure 2: Australian hydrogen production – 2022 actual, 2030 forecast, 2040 forecast



Source: DCCEEW (2023) *State of hydrogen 2022*; Commonwealth Government (2024) *Budget Paper No. 2*

Figure 2 shows that the Commonwealth forecast for green hydrogen production in 2030 is only around 70% of current fossil hydrogen use, while 2040 production is just 10% greater than current levels.

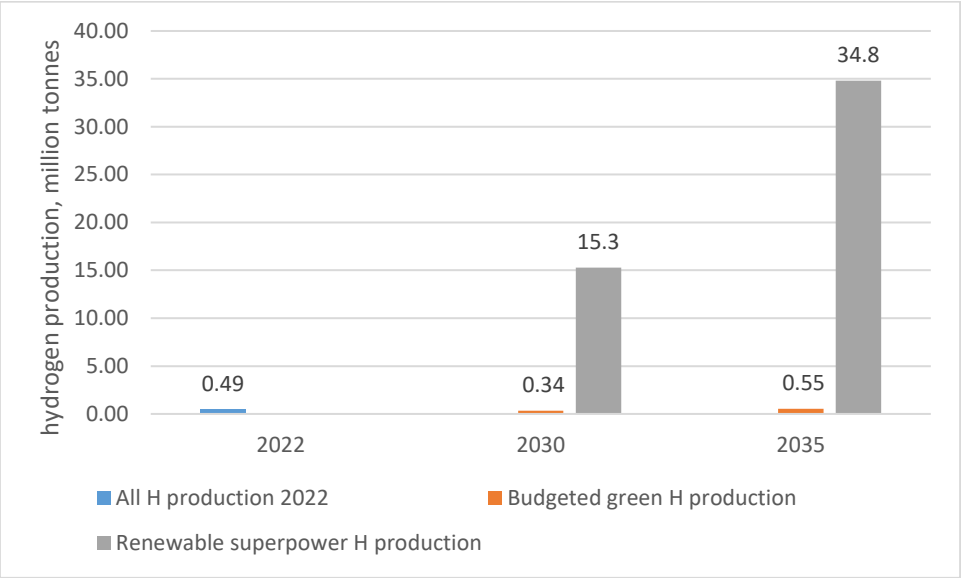
Further relevant context comes from the International Energy Agency (IEA)'s estimates of hydrogen production under its Net Zero Emissions scenario.[7] Under this scenario, the IEA estimates that global hydrogen production from low-emissions electricity will reach 116 million tonnes. If Australia is to be a renewable energy superpower, while there is no clear definition, the Government could aim for 30% of global production, similar to Australia's share of global iron ore (38%) and bauxite (28%) production.[8]

If this was the goal, Australia would produce 35 million tonnes of hydrogen in 2035 and the cost of the HTPI would reach $70 billion. This means that either Australia will not become a renewable energy superpower, or the HTPI budget needs to be increased by $69 billion dollars in the year 2035 alone. Figure 3 below compares Australian current and budgeted hydrogen production with the production that might be expected from a green hydrogen superpower.

[7] IEA (2023) *Hydrogen: Net Zero Emissions Guide*, https://www.iea.org/reports/hydrogen-2156

[8] GeoScience Australia (2022) Australia's Identified Mineral Resources 2021, p15, https://www.ga.gov.au/digital-publication/aimr2021

Figure 3: Aus hydrogen production – 2022 actual, budgeted & superpower estimate



Sources: DCCEEW (2023) State of hydrogen 2022; Commonwealth Government (2024) Budget Paper No. 2; IEA (2023) Hydrogen: Net Zero Emissions Guide

Figure 3 shows that Australia is not budgeting to become anything like a renewable energy superpower with globally significant hydrogen exports. In fact, it seems likely Australian green hydrogen will never leave the country's shores.

WHO WILL USE AUSTRALIAN GREEN HYDROGEN?

The most likely initial use of green hydrogen is to replace existing uses of hydrogen, which is ammonia for mining explosives and agricultural fertilisers. As the Institute for Energy Economics and Financial Analysis puts it:

> In Australia, the most promising applications [for green hydrogen] include green ammonia and green iron. Ammonia is a logical first mover, given that hydrogen (currently produced from methane) is already its primary chemical feedstock, and some green hydrogen can already be substituted in existing facilities.[9]

Similar sentiments are expressed by the Minerals Council of Australia:

[9] IEEFA (2024) *Local ammonia production the ideal early adopter for green hydrogen*

> The initial focus over the next decade is replacing existing fossil energy uses with low carbon hydrogen, using existing transmission and distribution infrastructure. This includes existing hydrogen use in industry, and refining…[10]

If the initial uses of green hydrogen will be replacing existing hydrogen use in industry, most likely ammonia production, the Commonwealth budget forecasts of production suggest Australia will not develop a hydrogen export industry before the mid 2040s. This includes not just exports of liquid hydrogen, but significant use of hydrogen in agriculture, iron or steel production,[11] etc.

CONCLUSION

The Australian Government does not expect green hydrogen production to significantly exceed current use of hydrogen before the mid 2040s at least. Assuming that Australian green hydrogen production goes initially to industrial users in Australia, there will not be a green hydrogen export industry, let alone one that propels Australia to renewable superpower status.

This conclusion is not an isolated one. Hydrogen targets worldwide have a history of failure, suggesting that hydrogen policies are used more as a tool for greenwash than for genuine decarbonisation and action on climate.[12]

[10] MCA (2023) *Australia's emerging hydrogen and ammonia industry*, https://minerals.org.au/wp-content/uploads/2023/02/Australias-emerging-hydrogen-and-ammonia-industry_REPORT.pdf

[11] For some basic discussion of the HPTI and steel production, see Kohler (2024) *Market failures and political failures, made in Australia*, https://www.thenewdaily.com.au/finance/2024/05/27/alan-kohler-market-failures-australia

[12] See for example, BloombergNEF (2024) *2024 Hydrogen Market Outlook: Targets Meet Reality*, https://about.bnef.com/blog/1h-2024-hydrogen-market-outlook-targets-meet-reality/; Campbell (2023) *Consultant Calamity: Alan Finkel, ACIL Allen and the hydrogen hype*, https://michaelwest.com.au/consultant-calamity-alan-finkel-acil-allen-and-the-hydrogen-hype/