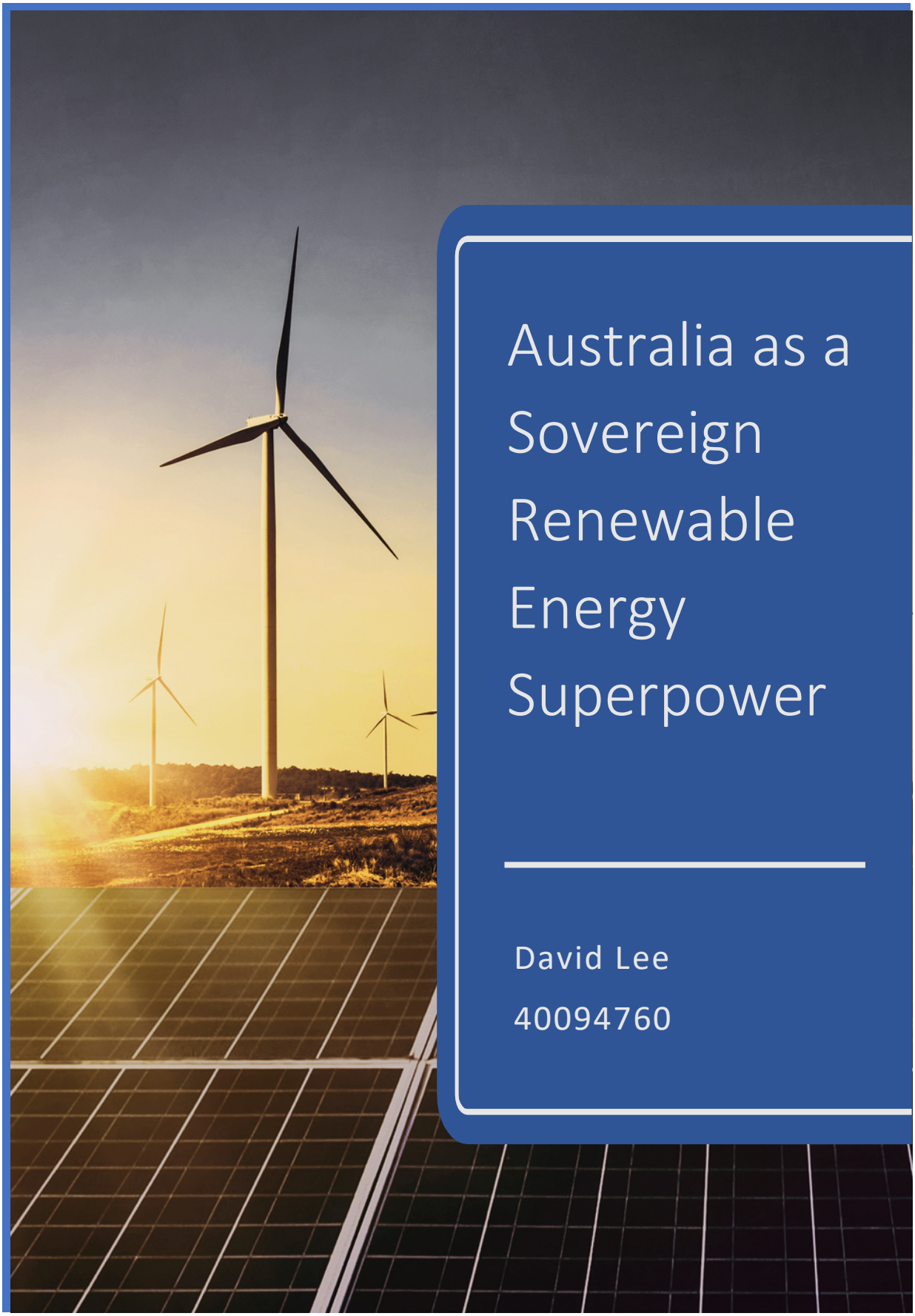

Australia as a Sovereign Renewable Energy Superpower

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AUSTRALIA AS A SOVEREIGN RENEWABLE ENERGY SUPERPOWER

INTRODUCTION

The Australian government has committed considerable funding in the 2023-24 budget under the Powering Australia plan [1] to address climate change and boost renewable energy. However, the current funding still falls short of the Government's desire to become a renewable energy superpower [2]. This policy brief outlines a suite of policies that could address this gap whilst creating more jobs and economic growth.

HYDROGEN DEMAND

As the world attempts to decarbonise in accordance with the Paris Agreement, it is estimated that "Hydrogen demand by 2050 could vary from 150 to 500 million metric tonnes per year" [3]. Although hydrogen can currently be produced for "between $6 and $9 per kilogram" [4], if we are to use the target price of $2 per kilogram [4], the demand for hydrogen would still equate to $300 billion to $1 trillion per year. The green hydrogen sector is therefore a great pathway for Australia to continue its economic growth as we continue to decarbonise our future to address climate change [5] [6].

THE GAP

Under the current plan, the Government has committed over $40 billion to the Powering Australia plan [2]. This commitment is in alignment with AEMO's 2022 Integrated System Plan's (ISP) [5] Optimal Development Path (ODP), which would help Australia meet its commitment to the Paris Agreement of less than 2°C (RCP2.6) [7]. However, the ODP was based upon the Step Change scenario being the "most likely scenario to play out" [5], and did not include any energy consumption required to export green energy.

Table 1 - Capacity Required for Step Change and Hydrogen Superpower [5] [8] [9] [10]

	Distributed Photovoltaic (GW)	Variable Renewable Energy (GW)	Dispatchable Capacity (GW)	Gas (GW)	Coal (GW)
Current energy capacity	15	16	7	16	23
Step Change 2050	+54 (new)	+125 (new)	38 (total embedded energy storage)	+10 (new)	-23
Hydrogen Superpower 2050	+54 (new)	269 (new wind) + 278 (new solar)	43 (total embedded energy storage)	+10.5 (gas) +9 (hydrogen)	-23

Unfortunately, the difference in required capacity between the Step Change scenario and the Hydrogen Superpower scenario is significant as can be seen in Figure 11 of AEMO's 2022 ISP [5]. A summary of the capacity required for the Step Change and Hydrogen Superpower scenarios is provided in Table 1.

BECOMING A RENEWABLE ENERGY SUPERPOWER

Under the 2023-24 budget, the Capacity Investment Scheme will unlock $10b and 6GW of capacity [2]. Unfortunately, this represents ~1% of the additional generation capacity (590GW total) required in the Hydrogen Superpower scenario [5]. Using the current estimated capital costs of various generation types from CSIRO's GenCost 2021-22 Final Report [11], combined with the required capacity in AEMO's Hydrogen Superpower scenario, the amount of capital required for large scale PV, onshore wind and batteries (8hrs) equates to more than $1 trillion over 27 years as shown in Table 2. Pursuing green energy exports would put Australia on target with RCP1.9 [7] and ensure we do our part to keep global warming below 1.5°C.

Table 2 – Capital required to produce capacity needed for a Hydrogen Superpower

Generation Type	CSIRO's 2022 Estimated Capital Cost ($AUD/kW)	AEMO's required capacity for superpower (GW)	Cumulative capital required by 2050 $AUD b
Large Scale PV	1300	278	361.4
Onshore Wind	1915	269	515
Offshore Wind	4085 [12]	Not discussed	n/a
Battery (8hrs)	3000	43	129
Total	n/a	590	1005

Fortunately, the CEFC has an excellent track record with its renewable energy investments and has been able to achieve a capital leverage of $2.62:$1.00 CEFC capital invested [13]. **To achieve $1 trillion of capital investment in renewables, the CEFC would need $276 billion over 27 years**, to leverage an additional $724 billion from private investors.

Although this is a significant sum of money, thanks to CEFC's use of the market, the estimated cost per GW of installed capacity ($276b/590GW = $0.47b/GW) would be an order of magnitude better than that of the Snowy Hydro Scheme at ($10b/2GW = $5b/GW) [14].

SOVEREIGN MANUFACTURING

As other nations race ahead with their own attempts to capture the global hydrogen market [15], Australia may be left at the back of the queue when it comes to supply of the components used to manufacture solar PV, wind turbines and batteries. Furthermore, geopolitical conflict [5], natural disasters and/or pandemics [16] can cause additional strain on the supply chain. It is therefore of the utmost importance that Australia secure its own supply chain [5].

Since the level of recommended investment via the CEFC ($276b over 27 years) is on the same scale as the Government's decision to purchase nuclear submarines under the AUKUS deal (between $268b to $368b over 30 years [17]), it would be appropriate to **progressively ramp up the requirement for solar panels, wind turbines and batteries, including electronic chips, to be manufactured in Australia until we reach 100% Australian Industry Content by 2035.** This would simultaneously boost Australian jobs, avoid supply chain issues, increase our energy security and reduce our carbon footprint from imports.

Aside from ensuring the supply of renewable energy is available, **the Government should also stimulate demand for green hydrogen** [18]by progressively increasing the requirement for usage of green materials (steel, aluminium, cement and fertilizers), reducing iron ore exports but **increasing green steel and aluminium exports**, and **better fuel efficiency standards** for private, commercial, industrial and military vehicles, as well as shipping and aviation.

To implement such a large strategic investment, Australia will need to **conduct appropriate workforce planning**. Although the New Energy Apprenticeships program will deliver 10000 new apprentices [2], there was already an estimated shortfall of 111800 jobs in September 2023 [19]and this number would only increase with the implementation of this policy. As such, **additional consultation with Infrastructure Australia, VETs, TAFEs, universities and professional peak bodies will be required to develop upskilling and transition programs that can provide a clear transition pathway for those wanting to work in the renewable energy sector**.

Another risk that needs to be addressed is the need to secure social license [5] for the multitude of renewable energy projects that will form the future NEM. It would therefore be prudent to require that **all new projects adhere to approved codes of conduct for communication and consultation with landowners, local communities and native title holders**.

Investment returns and savings from reduced capital costs of renewable energy through economies of scale, should be reinvested into other existing Government programs such as ARENA, the $100m Australian-Made Battery Plan, the $3b National Reconstruction Fund, the $2b Hydrogen Headstart Program, and the $1.9b Powering the Regions Fund [2]. This would turbocharge Australia's economy by boosting the research, development and deployment of solar, wind, batteries, hydrogen electrolysers, green steel, green aluminium, green cement, virtual power plants, micro-grids, sustainable aviation fuels, green ammonia, and the circular economy of renewable energy (refurbishing, remanufacturing and recycling of solar PV, wind turbines and batteries as they reach their end-of-life).

POLICY RECOMMENDATIONS

To ensure that Australia becomes a renewable energy superpower able to participate in the forecasted $1 trillion per year hydrogen industry by 2050, the Government should fund the CEFC with $276 billion over the next 27 years to co-invest in renewable energy generation capacity. At the same time, the Government should progressively increase the requirement for the renewable energy supply chain to be based in Australia whilst also stimulating demand for green hydrogen through green building standards, green exports, and better fuel efficiency standards. Appropriate workforce planning will be required as well as high levels of consultation with landowners and local communities to secure social license for new projects. Investment returns and savings from reduced capital costs should be reinvested into other existing Government programs. Together, these actions will turbocharge Australia's jobs and economy whilst adapting to climate change and reducing our carbon footprint.

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