WWF

AUSTRALIA

BEHIND THE SCORECARD - TECHNICAL REPORT

THIRD EDITION - DECEMBER 2022

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Behind the Scorecard – Third Edition

Introduction

This technical report has been produced to support the third edition of the WWF Renewable Superpower Scorecard, published in December 2022.

Part 1 describes the methodology used to produce the third scorecard including the overarching approach, development of the quantitative and qualitative indicators, research and scoring process, and expanded detail of the results found in the Scorecard. An explanation of any changes from the second edition (published in November 2021) are also highlighted throughout the report.

Part 2 presents a model of one scenario for achieving an ambitious renewable energy target of 700% for Australia by 2050. Where 700% renewables is understood to mean electricity that would be required to support decarbonisation of the grid, electrification of the economy and powering export opportunities. The trajectory described in this scenario was used to determine the scoring scale for several of the quantitative indicators in the scorecard. There have been no changes to Part 2 since the first edition of this report, however future editions are likely to include updates as new publicly available studies emerge reporting the level of new build renewable generation and storage capacity required to meet 100% renewables and beyond.

Important Note: As the WWF Renewable Superpower Scorecard is a snapshot in time, it is important to note that some significant policy announcements were made after the data cut-off date (5th Nov.) will not be included within the scoring process until the next version of the Scorecard.

For example, the scoring process for the third version of the Scorecard was finalised before the outcome of the Victorian election, which meant that policy announcements such as Victoria's increased renewable energy target were not included and will be scored in following versions.

Furthermore, several governments have announced significant budget commitments that were made after their 2022-23 budgets. As such, will be included within the next version of the Scorecard when they are included within the 2023-24 budgets.

Part 1: Methodology & Results

Overarching approach

Governments were assessed across 11 categories which covered 22 indicators (See Table 1).

Scores for each indicator were applied and aggregated to provide an overall category score. Each indicator carries a maximum score of 5 where the total maximum score achievable is 110. Changes to the categories and indicators since the second edition are discussed below.

Table 1: Scoring System

#	Categories & Indicators	Points
1	**Strong Renewable Energy Targets and Policy**	**15**
1a	***Short-term Renewable Energy Targets:*** *What is the government's 2030 renewable energy target?*	*5*
1b	***Long-term Renewable Energy Targets:*** *What is the government's renewable energy target beyond 2030?*	*5*
1c	***Policy to deliver renewable energy targets:*** *Is there an effective policy mechanism to deliver the jurisdiction's renewable energy targets?*	*5*
2	**Rolling out renewable energy**	**10**
2a	***Renewable energy deployment:*** *How much new renewable energy was deployed in the last 2 years?*	*5*
2b	***Renewable energy percentage:*** *What percentage of the jurisdiction's electricity generation was from renewables?*	*5*
3	**Renewable Energy Zones and transmission**	**10**
3a	***Development of Renewable Energy Zones:*** *Is the government supporting the development of Renewable Energy Zones or their equivalent?*	*5*
3b	***Expediting transmission projects:*** *Is the government working to expedite other electricity transmission projects?*	*5*
4	**Renewable Energy Industrial Precincts**	**5**
4a	***Developing Renewable Energy Industrial Precincts:*** *Is the government developing Renewable Energy Industrial Precincts?*	*5*
5	**Developing a renewable hydrogen industry**	**10**
5a	***Renewable hydrogen industry investment****: Is the government investing in the renewable hydrogen industry?*	*5*
5b	***Support for hydrogen from fossil fuels:*** *Is the government supporting hydrogen from fossil fuels?*	*5*
6	**Ensuring equitable benefits of the energy transition**	**20**

6a	***First Nations communities:*** *Are there effective mechanisms for working collaboratively with First Nations communities to ensure they are actively included within the opportunities and outcomes of the energy transition?*	*5*
6b	***Regional energy workers:*** *Are there effective policy mechanisms to ensure that affected regional energy workers are included in, and benefit from, the energy transition?*	*5*
6c	***Regional communities:*** *Are there effective policy mechanisms to ensure that affected regional communities are included in, and benefit from, the energy transition?*	*5*
6d	***Consumers:*** *Are there effective policy mechanisms to ensure the energy transition delivers better outcomes and equitable benefits to consumers, particularly low-income households?*	*5*
7	**Renewable Export Industry Strategy**	**10**
7a	***Comprehensive Renewable Export Strategy****: Does the government have a comprehensive Renewable Export Strategy that plays to a jurisdiction's strengths?*	*5*
7b	***Supporting new renewable export industries, products or services:*** *Is the government supporting production of potential new renewable export industries, products or services?*	*5*
8	**Energy storage and balancing the grid**	**10**
8a	***Grid balancing technology deployment:*** *How much energy storage, demand management, etc has been deployed in the last 2 years?*	*5*
8b	***Policy support to balance the grid:*** *Is the government supporting energy storage, demand management or other tools to balance the grid?*	*5*
9	**Growing demand for renewable energy & exports**	**10**
9a	***Demand for renewable export products and services:*** *Is the government helping to grow local and international demand for renewable export products and services?*	*5*
9b	***Policy to displace fossil fuels:*** *Is there an effective policy mechanism to encourage fuel-switching from oil and gas to clean electricity?*	*5*
10	**Investment in renewable energy initiatives**	**5**
10a	***Renewable sector investment:*** *Is the government investing in renewable energy initiatives?*	*5*
11	**Mitigating the impacts**	**5**
11a	***Recycling and the circular economy:*** *Is the government supporting recycling programs that capture the benefits of the circular economy across the renewable energy sector?*	*5*
	MAXIMUM SCORE	***110***

Focus on Government Policy

Governments at the state and federal level have a crucial role to play in enabling new renewable export industries. Government responsibilities include:

- ensuring Australia does its fair share of addressing climate change in the speed science indicates is required,
- delivering essential infrastructure,
- coordinated planning,
- providing financial incentives or direct investment,
- establishing trade, bilateral and multilateral agreements to facilitate exports,
- supporting research and development, and
- ensuring the energy transition is managed in a way that's fair for First Nations communities, regional energy workers and communities and consumers.

That is why this scorecard focuses on assessing policies, commitments and actions taken by governments across Australia, rather than commercial decisions made by business and industry. Of course, private companies and commercial markets will play an enormous role, however, they are not the focus of this scorecard.

Energy market reforms implemented through market bodies including AEMC, AER and AEMO are not assessed as they are independent decision makers.

Developing the categories and indicators

The research team developed the initial set of categories and indicators based on WWF's policy agenda and a deep understanding of the different aspects of public policy required for domestic energy sector decarbonisation and to accelerate Australia to be the world's leading renewable export nation. These included aspects of the transition to clean energy that have been on the policy agenda for many years and those that have been newly developed in the last three years by WWF's Renewables Nation campaign.

A mix of policy assessment indicators (qualitative) and indicators that assess the real-world impact of these policy measures (quantitative) were chosen.

When establishing the categories and indicators for the first edition of the scorecard, WWF aimed to set a transparent 5-year policy agenda, ensuring the goal posts are not changed on governments over time. However, as stated in the first technical report, we expect some degree of iteration as feedback is received and the methodology is refined to more fairly assess governments' actions to support Australia to become a renewable superpower.

WWF-Australia undertook and internal review and consulted with a range of organisations and experts to gain a deeper perspective into any emerging policy areas that may not have been included in the previous versions of the Scorecard.

Subsequently, the set of categories and indicators for the third edition of the Superpower Scorecard includes the following changes, compared to the second scorecard:

- 6b: Scorecard splits the previous category 6b into affected energy workers (6b) and regional communities (6c). This change ensures that the Scorecard can appropriately assess the support mechanisms for both regional energy workers and regional communities affected by the transition to renewable energy.
- 7a: Rename to “Does the government have a comprehensive Renewable Export Strategy that plays to a jurisdiction’s strengths?”
- 10: Rename to “Investment in renewable energy initiatives”
    - This category has been retained for the third edition of the Scorecard to monitor the actions of jurisdictions to accelerate the transition to become a renewable export superpower through investment.

The third Superpower Scorecard also includes a new category: Mitigating the Impacts. The first indicator to be included under this new category covers recycling and the circular economy across the renewable energy sector. Although the waste created by renewable energy generation is a fraction of what’s created by coal and gas generators, it’s important to put in place policies and systems to manage renewable technology waste such as used solar panels at the end of their 25–30-year productive life.

Research and scoring process - qualitative indicators

Of the 22 indicators, 15 are qualitative indicators associated with policies implemented by each jurisdiction, where policy is defined as - laws, regulation, plans, programs, policy, etc.

Research process

The data gathered for the first and second scorecards were considered in assessing scores for the third edition, alongside new and updated data. Thus, the scoring for the third edition builds on results from the first and second scorecard.

For the third edition, updated desktop research was undertaken by WWF using publicly available information up until the cut-off date of 5 November 2022 for new data.

Information was gathered from federal, state/territory government websites, legislation, budget papers, company websites, reports and news websites. This process provided a new evidence baseline for the scorecard assessment before conducting stakeholder engagement and a peer review to obtain additional data and methodology validation.

As this version of the scorecard includes both a new metric (11a) and splits 6b into two metrics, historical evidence was collected considered to ensure the scoring process considered robust

Each government and experts in each jurisdiction were provided an opportunity to submit additional information using a feedback form provided by WWF. WWF did not pre-fill the form however, the evidence base for each metric was included as well as a description of each piece of evidence. For transparency and efficiency the results from the previous scorecard assessment, which are publicly available, were also included.

The data from the previous scorecards and the updated desktop research was combined with the additional information gathered throughout the stakeholder engagement process to undertake the scoring and finalise the report findings.

Note: As the cut-off date for new data was before the results of the Victorian 2022 election, any policy commitments made in the leadup to the election were not included and will be included in the next version of the scorecard.

Setting scoring levels

The qualitative indicators were scored against either a five-point:

- Policy effectiveness scale,
- Support/action scale, or
- A bespoke scale designed for that indicator.

To determine the level of effectiveness or support/action, the mix of policies and actions taken by a government were assessed across a range of criteria including Impact, Economic, Feasibility/Delivery, Timely & Continuing, Certainty or other (see Table 2 for considerations).

Table 2: Qualitative Indicators Rating Scales – Areas of Effectiveness

Impact	Is there a clear and demonstrable impact as a result of the policy? (i.e. is it working?) And where the policy is new has that type of policy proven effective in other contexts, and as such there is a high degree of confidence it will deliver the desired impact?
Economic	What level of financial support is involved? Note this does not have to be through investment or funding, but could be through something like a trading mechanism like a certificate scheme.
Delivery	Is there a delivery mechanism and a body to deliver it? Is there more than one delivery mechanism?

Timely & Continuing?	Is it timely and ongoing, to the end of the target period?
Certainty	Does it provide certainty? E.g., is it legislated?

Table 3: Qualitative Indicators Rating Scales – Effectiveness & Support/Action

Score	RATING SCALE - Effectiveness	RATING SCALE - Support/Action
0	No policy mechanisms	No support/action
1	Not effective	Very low level of support/action
2	Slightly effective	Low level of support/action
3	Somewhat effective	Moderate level of support/action
4	Very effective	High level of support/action
5	Extremely effective	Very high level of support/action

Scoring process

The research team and peer reviewers were invited to participate in the scoring process. Alongside the research team consisting of six contributors, two energy and policy experts scored all quantitative metrics besides category 6 which was scored by a separate specialist group.

Detailed instructions of how to score each qualitative indicator plus the policy evidence compiled for each indicator and each jurisdiction were sent to the peer-reviewers. They then scored each jurisdiction across the qualitative indicators independently using the instructions provided.

The scores from each scorer were then collated and averaged to find a final score. Where there was significant divergence in scores between the research team and the peer reviewers, the research team reached out to the peer reviewers for additional information. In assessing policy action and effectiveness a level of expert judgement is required. This independent scoring process was undertaken as a way to minimise individual bias and ensure the scoring process is robust and defensible.

Research and scoring process - quantitative indicators

The remaining seven indicators are quantitative and were similarly scored against a five-point scale (See Table 4 below). To achieve the maximum score of 5, a government was required to

demonstrate significant success when compared against a trajectory to 700% renewables (see Part 2), domestic governments or international benchmarks.

Table 4: Quantitative Indicators Rating Scales

Quantitative Indicators	Sources	Unit	Score 1	Score 2	Score 3	Score 4	Score 5
1a. What is the government's 2030 renewable energy target?	State and territory websites and information	% Renewables	50%	75%	100%	125%	150%
1b. What is the government's renewable energy target beyond 2030?	State and territory websites and information	% Renewables (see Section 6 for detailed regional breakdown)	100%	150%	200%	500%	700%
2a. How much new renewable energy was deployed in the last 2 years?	Clean Energy Regulator, ABS	kW/per capita	0.05	0.09	0.12	0.32	0.46
2b. What percentage of the jurisdiction's electricity generation was from renewables?	OpenNEM; Australian Energy Statistics	% Renewables	20%	40%	60%	80%	100%
5a. Is the government investing in the renewable hydrogen industry?	State and territory websites and information	$/GDP(GSP)	0.001%	0.026%	0.051%	0.075%	0.100%
8a. How much energy storage, demand management, etc has been deployed in the last 2 years?	AEMO, Clean Energy Regulator	kWh/per capita	0.02	0.04	0.05	0.14	0.21
10a. Is the government investing in renewable energy initiatives?	State and territory websites and information, ABS	$/GDP(GSP)	0.10%	0.25%	0.50%	0.75%	1.00%

The current research to underpin quantitative indicators is based on publicly available information and data sets. The data gathered for the previous editions of the scorecard was replaced with the most recent available data wherever possible. Where there are data gaps, assumptions have been made based on the best available information. The scoring spreadsheet was automated to assess the data for each state and provide an associated score.

Detailed methodology & results for each indicator

Indicator 1a. Short-term Renewable Energy Targets

What is the government's 2030 renewable energy target?

Purpose: A mid-term indicator of the scale of renewables ambition governments are aiming for.

Data: 2030 percentage or gigawatt renewable and storage targets made in governments statements, documents or legislation. Note a mechanism underpinning the target is not required to score well in this indicator, policy or mechanisms underpinning targets are assessed in Indicator 1c.

- New South Wales:
    - For NSW the 12GW renewable and 2GW storage target legislated in 2020 was converted into a percentage target based on current electricity usage.
- Federal Government:
    - Although the Federal Government has not legislated an updated renewable energy target, they have increased their 2030 emission reduction target and repeatable stated that to achieve the target Australia's renewable energy market share will be 82% by 2030.
- Western Australia:
    - The Western Australia Government announced that it would close all government owned coal fired power stations by 2030 and replace the capacity with renewable energy. Our analysis estimated this would result in the SWIS being 72% renewables and has been used as a proxy.
    - Hydrogen Minister Alannah McTiernan has previously highlighted the WA government has set a goal for WA to have a 12% global share of the green fuel market by 2030 and could host 100GW of new wind and solar capacity by 2030, doubling by 2040. Since the last Scorecard, the WA Government has included this goal within government documents and as such have included the goal within metrics 1a and 1b.
    - Our analysis estimates that replacing government owned coal fired generation with renewables and achieving the ambitious GW of new wind and solar capacity would result in a renewable energy target for the state of approximately 600% by 2030 and 1200% by 2040 and would be the most ambitious renewable energy target anywhere in the world.
- Victoria:
    - At the time of scoring, the 2022 Victorian election has not taken place and therefore no policy taken to the election to increase renewable energy targets were considered.

Scoring methodology: Australia is currently on track to exceed 50% renewables by 2030, as such this was set as the minimum target to achieve 1 point. The maximum target (150%) to

score 5 points was set based on the 700% renewables by 2050 trajectory, detailed in Part 2 of this paper. A linear extrapolation was used to set interim scores (2-4).

Score	0	1	2	3	4	5
Target	No Target	50%	75%	100%	125%	150%

Results:

	Federal	NSW	VIC	QLD	SA	WA	TAS	NT	ACT
Percentage target	82%	67%	50%	50%	100%	600%	150%	50%	100%
Score	2	1	1	1	3	5	5	1	3

In the discussion for indicator 2b below, Figure 2 compares each jurisdiction's renewable energy target for 2030 with the actual percentage of renewable generation for that state in 2020.

Indicator 1b. Long-term Renewable Energy Targets

What is the government's renewable energy target beyond 2030?

Purpose: A long-term indicator of the scale of renewables ambition governments are aiming for and whether it is commensurate with becoming a renewable superpower.

Data: Post-2030 (typically 2040 or 2050) percentage or gigawatt renewable and storage targets made in official governments statements, documents or legislation. Note a mechanism underpinning the target is not required to score well in this indicator, policy or mechanisms underpinning targets are assessed in Indicator 1c. A number of jurisdictions have adopted an emissions reduction target of net-zero by 2050. Although this could be taken to imply a future increase in renewable energy uptake, there are multiple paths for achieving net-zero over the timeframe, so emissions targets beyond 2030 were not accepted as a proxy renewable energy target for this indicator.

- We have considered the previous South Australian Government's 500% aspirational target within this version of the Scorecard as the new SA Government are yet to announce if they will or will not commit to this target. The next version of the Scorecard will not consider the 500% aspirational target if no announcement has been made.
- As highlighted above, this version of the Scorecard has included the Western Australian Government's assessment that it could host 100 GW of new wind and solar capacity by 2030 and 200 GW by 2040 to reach its goal of becoming a significant contributor to the global green fuel market. Future versions of the Scorecard will consider if these target are still valid based on the available evidence made in official governments statements, documents or legislation

Determining technical potential for each jurisdiction: The technical potential of each region to contribute to renewable energy exports is different due to the level of renewable resources and export pathways. As such, the second edition of the scorecard allocates the national task (to achieve the renewable export trajectories of 500% and 700%[1]) between the jurisdictions based on their technical potential to meet the respective target. To achieve the national 700% renewable energy target, we have estimated Australia will need to develop 873.5 GW of new renewable generation capacity and 218 GW of storage (see Part 2 of the Behind the Scorecard Technical Report.

To estimate the technical potential of each region in Australia, a literature review of publicly available sources was undertaken as well as an analysis of other methods to consider including population size, economy size and land size.

The technical potential of rooftop PV, utility-scale solar PV projects and onshore wind projects were considered when determining the allocation of the national renewable deployment task by jurisdiction, however offshore wind was not included in the current analysis. As more studies into the technical potential emerge, the current analysis will be updated to include new findings.

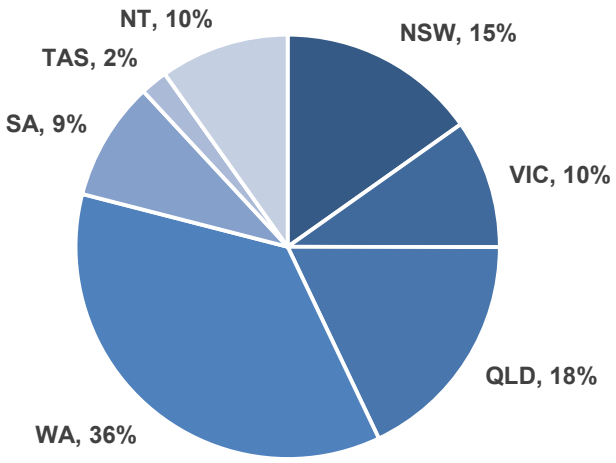
The rooftop PV data[2] used was complete for each jurisdiction however, the utility scale solar and wind technical potential data was either grouped by the Australia South and East (NEM)[3], or WA and NT[4]. It was found that 42 per cent of the technical renewable generation potential was in the NEM states where the remaining 58 per cent was in WA and NT.

Using the Renewable Energy Zone technical potential for each of the NEM regions reported by AEMO as a baseline, the remaining 58 per cent for WA and the NT was calculated. Land area of WA and NT was then used to allocate the utility scale solar PV potential and 90 per cent of the utility scale wind technical potential was allocated to WA given their greater wind resource.

The results of this analysis can be seen in Figure 1 below, where Western Australia represents the region with the largest technical potential for renewable technology deployment at 36 per cent followed by Queensland at 18 per cent.[5]

[1] These percentages are measured against the baseline of 2020 electricity demand – so 700% means seven times the demand level in 2020.
[2] Roberts, M.; Nagrath, K.; Briggs, C.; Copper, J.; Bruce, A.; McKibben, J. How Much Rooftop Solar Can Be Installed in Australia? Report Prepared for: Clean Energy Finance Corporation and Property Council of Australia, Instituute for Sustaiable Futures (ISF), Sydney, Australia. 2007.
[3] 2020 ISP Appendix 5. Renewable Energy Zones. Australian Energy Market Operator Limited, July 2020
[4] Teske, S.; Giurco, D.; Morris, T.; Nagrath, K.; Mey, F.; Briggs, C.; Dominish, E.; Florin, N. Achieving the Paris Climate Agreement Goals—Global and Regional 100% Renewable Energy Scenarios with Non-Energy GHG Pathways for +1.5 C and +2 C; Teske, S., Ed.; Springer: Cham, Switzerland, 2019; ISBN 9783030058425.
[5] More detail into our analysis of the technical potential used for this indicator is available upon request

Figure 1: Percentage Allocation of 700% Task



Scoring methodology: The first step was to align the score levels with the national trajectory required to reach 700% by 2050 (see Part 2). The minimum score of 1 was aligned with 100% renewables and the maximum score of 5 aligns with the target of 700% renewables. An approximate S-curve extrapolation was used to set interim scores (150% = 2, 200% = 3, 500% = 4).

The second step involved adjusting these scoring levels for each individual jurisdiction to better reflect each region's technical potential (as shown in Table 5 below).

- All jurisdictions can score a one, two or three points for setting renewable energy targets of 100%, 150% and 200% beyond 2030 – with the exception of the ACT
- To score four points a jurisdiction must either have:
    - A target of 500% renewables (or greater) or
    - A lower target more reflective of their technical potential
- To score five points a jurisdiction must set a target that reflects the region's full technical potential, as calculated above.
- Since the ACT has the lowest technical potential, its target for beyond 2030 has been set at 200%, the level required to replace oil and gas consumption with renewable electricity and zero-emissions fuels. The low technical potential coupled with no direct export pathways justify the ACT not being ranked on this metric in the scorecard.

Table 5: 1b. Scoring Methodology [6]

Score (Trajectory)	1 (100%)	2 (150%)	3 (200%)	4 (500%)	5 (700%)
Fed	100%	150%	200%	500%	700%
NSW	100%	150%	200%	300%	400%
VIC	100%	150%	200%	250%	350%

[6] Technical potential was rounded to the nearest whole number.

QLD	100%	150%	200%	350%	470%
WA	100%	150%	200%	500%	1500%
SA	100%	150%	200%	500%	1100%
TAS	100%	150%	200%	250%	350%
NT	100%	150%	200%	500%	3600%
ACT	100%	100%	150%	200%	200%

Results:

	Federal	NSW	VIC	QLD	SA	WA	TAS	NT	ACT
Percentage target	No Target	No Target	No Target	No Target	500%	1200%	200%	No Target	200%
Score	0	0	0	0	4	4	3	0	5

Indicator 1c. Policy to deliver renewable energy targets

Is there an effective policy mechanism to deliver the jurisdiction's renewable energy targets?

Purpose: A policy indicator to identify the level of government support, commitment and capacity to deliver the targets set out in 1a and 1b.

Data: For a broad description, see the section "Research and scoring process - qualitative indicators" on pages 8-9 above.

A wide range of effective policy mechanisms were recognised for this indicator including: legislated renewable energy targets; reverse auctions (or contract-for-difference arrangements); delivery via government owned corporations; grants and financial incentives for new renewable generation; a clear policy roadmap for the jurisdiction's transition to renewable energy; and other similar government initiatives.

Scoring methodology: The bespoke scale used to assess this indicator is set out below.

Score	Rating scale
0	No Target
1	Aspirational Target/no target but some policy and/or funding
2	Aspirational target with some supporting policy and/or funding
3	Legislated target Or Aspirational target with strong supportive policy and/or funding

4	Legislated target with some supporting policy and/or funding
5	Legislated with substantial supporting policy and/or funding

Results:

	Federal	NSW	VIC	QLD	SA
Level of policy	Legislated target Or Aspirational target with strong supportive policy and/or funding	Legislated with substantial supporting policy and/or funding	Legislated with substantial supporting policy and/or funding	Legislated with substantial supporting policy and/or funding	Legislated target Or Aspirational target with strong supportive policy and/or funding
Score	3	5	5	5	3

	WA	TAS	NT	ACT
Level of policy	Aspirational target with some supporting policy and/or funding	Legislated target with some supporting policy and/or funding	Legislated target Or Aspirational target with strong supportive policy and/or funding	Legislated with substantial supporting policy and/or funding
Score	2	4	3	5

Indicator 2a. Renewable energy deployment

How much new renewable energy was deployed in the last 2 years?

Purpose: A quantitative indicator to assess how policy is translating into real-world deployment of renewables. This is a momentum indicator.

Data: Clean Energy Regulator data on large and small-scale renewables both commissioned and committed and for FY2020-21 and FY2021-22. ABS data for population figures for each jurisdiction.

Note: For the ACT, renewable capacity contracted by the ACT Government in the last two years but located in other states was allocated to the ACT.

Scoring methodology: The scoring levels were set in line with renewable capacity deployment trajectories to achieve the corresponding post 2030 target. These trajectories (see Part 2 for a detailed methodology for establishing the 700% renewables trajectory) set out annual GW targets for renewables between 2020 and 2050. That is, this indicator assesses which target

level each jurisdiction is on track to achieve, based on the average renewable deployment over the past two years.

These trajectories and associated targets are national, to fairly apportion them to each jurisdiction, the annual renewable capacity deployment has been turned into a per capita indicator. To account for the lumpy deployment of utility-scale renewables, the average deployment over the past two years was used.

Future versions of the scorecard will allocate the national task of achieving the renewable deployment trajectories between the jurisdictions based on their technical potential as highlighted in the methodology for 1b above.

Score	***1***	***2***	***3***	***4***	***5***
Renewable target trajectory	*100%*	*150%*	*200%*	*500%*	*700%*
Renewables deployed per person (kW per capita)	*0.05*	*0.09*	*0.12*	*0.32*	*0.46*

It should be noted that between 2020 and 2030 the annual gigawatt targets associated with each trajectory increases every year. As such the average quantity of renewables deployed over a two-year period in jurisdictions will have to increase to achieve the same score in future versions of the scorecard.

Results:

	Federal	NSW	VIC	QLD	SA	WA	TAS	NT	ACT
Average Renewables deployed (GW)	8.71	2.68	1.55	2.93	0.69	0.60	0.16	0.04	0.05
Average Renewables deployed (kW per capita)	0.34	0.33	0.24	0.56	0.38	0.22	0.28	0.16	0.11
Score	4	4	3	5	4	3	3	3	2

Indicator 2b. Renewable energy percentage

What percentage of the jurisdiction's electricity generation was from renewables?

Purpose: A quantitative indicator to assess how policy is translating into real-world generation of renewables as a percentage of overall electricity generation in FY2021-22. This is an absolute indicator.

Data: Data was taken from OpenNEM for NEM states and Department of Industry, Science, Energy and Resources, Australian Energy Statistics, Table O, April, 2022

Note: OpenNEM data for FY2021-22 was used for NEM connected states and WA and therefore only includes grid connected generation. In consultation with the NT government, we are using a figure of 12% as highlighted in their Darwin Katherine Electricity System Plan. This is to ensure the NT is considered fairly in line with the other regions that account for only grid connected data. The first version of the scorecard used the Australian Energy Statistics as this was the only available data at the time. Total renewable energy consumption was forecast for the ACT based on the renewable share of electricity supplied which was reported in the ACT Greenhouse Gas Inventory.

Scoring methodology: For approximately a decade Australia's renewable energy target nationally has been 20% renewables by 2020, as such this was taken as the minimum level a jurisdiction should be expected to achieve and thus scores a 1. While 100% renewable electricity was set at the maximum level one should expect for a jurisdiction in 2021 and thus receives a score of 5. A linear extrapolation was used to set interim scores (2-4).

Score	**0**	**1**	**2**	**3**	**4**	**5**
% Generation from Renewables	0%	20%	40%	60%	80%	100%

Note governments should expect that in future iterations of this scorecard the percentage targets for this indicator may increase, consistent with the 700% trajectory.

Results:

	Federal	**NSW**	**VIC**	**QLD**	**SA**	**WA**	**TAS**	**NT**	**ACT**
Percentage renewables achieved	33.2%	27.2%	33.2%	19.7%	68.3%	33.4%	100%	12%	100%
Score	1	1	1	0	3	1	5	0	5

Indicator 3a. Development of Renewable Energy Zones

Is the government supporting the development of Renewable Energy Zones or their equivalent?

Purpose: This policy indicator assesses to what extent governments are planning to ensure new renewable capacity can be brought online into the future and consistent with the scale required to become a renewable export powerhouse. This includes energy system planning (from a security and reliability perspective), transmission, land-use, social license, skills, infrastructure and other planning requirements. A Renewable Energy Zone has been identified as the most efficient way to achieve this – by focusing future renewable deployment in geographical clusters.

In addition to REZ's, this indicator also includes off-grid mega-generation and export projects such as the SunCable, Asian Renewable Energy Hub and the Western Green Energy Hub. It should be noted that while REZs are a NEM construct, WWF believes they will be needed across Australia and not just in major grids like the SWIS. For example, the focus on solar deployment around Alice Springs could and should be considered a REZ.

Data: For a broad description, see the section "Research and scoring process - qualitative indicators" on pages 8-9 above.

Scoring methodology: The support/action scale set out in Table 3 was used to assess this indicator.

Results:

	Federal	NSW	VIC	QLD	SA
Level of policy	High level of support/action	Very high level of support/action	High level of support/action	High level of support/action	Moderate level of support/action
Score	4	5	4	4	3

	WA	TAS	NT	ACT
Level of policy	Low level of support/action	Moderate level of support/action	Moderate level of support/action	N/A
Score	2	3	3	N/A

Indicator 3b. Expediting transmission projects

Is the government working to expedite other electricity transmission projects?

Purpose: This policy indicator assesses the level of action being undertaken by governments to support greater transmission capacity, particularly interconnection.

Interconnection has been shown in a series of high-penetration renewables research studies[7] to reduce the overall cost of the renewables transition, as it involves greater geographical diversity of renewables, tapping into different weather patterns, and also allows for greater sharing of renewable capacity and potentially renewables overbuild.

While this predominantly relates to the NEM, it is very fair to say that Australia does not yet have the transmission capacity required to become a renewable superpower and thus policy, planning and funding support is required in all jurisdictions, even where existing transmission capacity exists.

Data: For a broad description, see the section "Research and scoring process - qualitative indicators" on pages 8-9 above.

Scoring methodology: The support/action scale set out in Table 3 was used to assess this indicator.

Results:

	Federal	NSW	VIC	QLD	SA
Level of policy	Very high level of support/action	Very high level of support/action	Very high level of support/action	Very high level of support/action	High level of support/action
Score	5	5	5	5	4

	WA	TAS	NT	ACT
Level of policy	High level of support/action	Very high level of support/action	Moderate level of support/action	N/A
Score	4	5	3	N/A

[7] Lu, B., Blakers, A., Stocks, M., Cheng, C., and Nadolny, A. (2021). A zero-carbon, reliable and affordable energy future in Australia. Australian National University & Riesz, J., Elliston, B., Vithayasrichareon, P., and MacGill, I. (2016) 100% Renewables in Australia: A Research Summary. University of NSW

Indicator 4a. Developing Renewable Energy Industrial Precincts

Is the government developing Renewable Energy Industrial Precincts?

Purpose: WWF has identified the development of a Renewable Energy Industrial Precincts (REIPs) as a key step in the critical path to Australia becoming a renewable superpower and thus a policy priority for our Renewables Nation Program.

A Renewable Energy Industrial Precinct supports a cluster of manufacturers powered by 100% renewable energy (electricity, heat and feedstock). These precincts could be existing industrial centers or greenfield sites. They are either located within Renewable Energy Zones or connected to renewable energy generation through high-voltage transmission lines. They also have access to clean heat and renewable hydrogen production, skills development and export infrastructure, including good transport links. Some jurisdictions are developing hydrogen export hubs – if these include powering local industry with hydrogen (as well as exports) then they are considered to be de-facto REIPs.

This policy indicator assesses the level of policy activity undertaken by each jurisdiction towards establishing at least one Renewable Energy Industrial Precinct in their jurisdiction.

Data: For a broad description, see the section "Research and scoring process - qualitative indicators" on pages 8-9 above.

Note, while the term Renewable Energy Industrial Precinct is now widely used, other developments and policy activities that also support clusters of manufacturers to move to renewable energy have been taken as evidence of a government supporting Renewable Energy Industrial Precincts, even if they are not named as such.

Scoring methodology: The support/action scale set out in Table 3 was used to assess this indicator.

Results:

	Federal	NSW	VIC	QLD	SA
Level of policy	Moderate level of support/action	High level of support/action	Very low level of support/action	Moderate level of support/action	Moderate level of support/action
Score	3	4	1	3	3

	WA	TAS	NT	ACT
Level of policy	Moderate level of support/action	Moderate level of support/action	Moderate level of support/action	N/A
Score	3	3	3	N/A

Indicator 5a. Renewable hydrogen industry investment

Is the government investing in the renewable hydrogen industry?

Purpose: A quantitative indicator to assess the level of government support for renewable hydrogen both to date and committed.

Note: Between them, the Scorecard categories assess policies related to all six types of renewable export products identified by WWF as holding great potential for Australia (see Renewable Superpower Scorecard Report p.11). However, Government support for the renewable hydrogen industry has been given a category of its own because hydrogen is a major part of the current Australian energy policy conversation and this versatile renewable fuel will have a huge role to play in decarbonising hard-to-decarbonise nations and sectors such as steel globally. For more information see WWF Australia's Hydrogen Position Paper.

Data: Sources included budget statements, government websites, and information the governments had the opportunity to provide feedback on related to their level of spending.

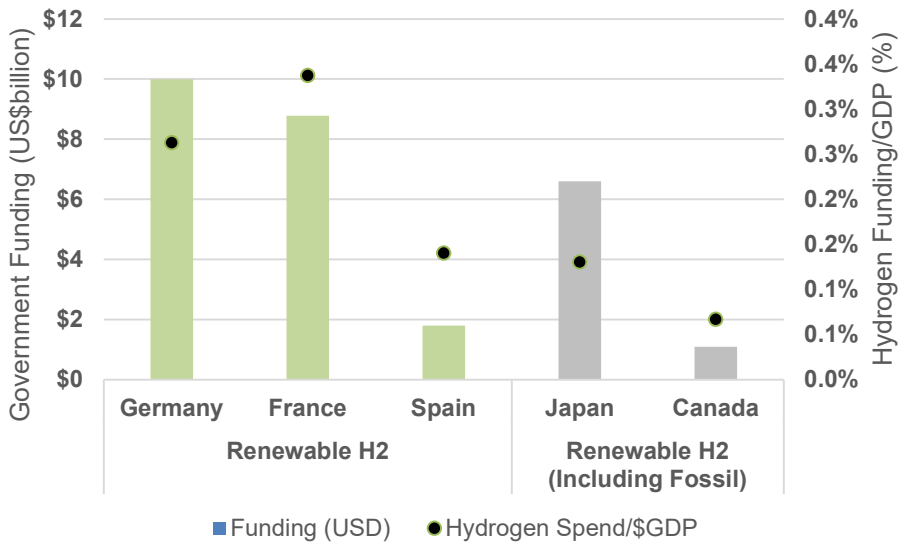
For international benchmarking, data was sourced through desktop research of publicly available data including hydrogen spending from the International Energy Agency (IEA) and Energy Policy Tracker.

Scoring methodology: Total announced budget funding for initiatives were used for this indicator rather than forward estimates to compare the scale of funding against ambition from leading governments from around the world. Funding announced but not included within budgets will be included once the commitments are present within the jurisdictions budget.

To assist in creating the scoring levels 1 to 5, an international analysis of renewable hydrogen spending was undertaken. To compare the findings between regions, the data was converted into $ per GDP or GSP.

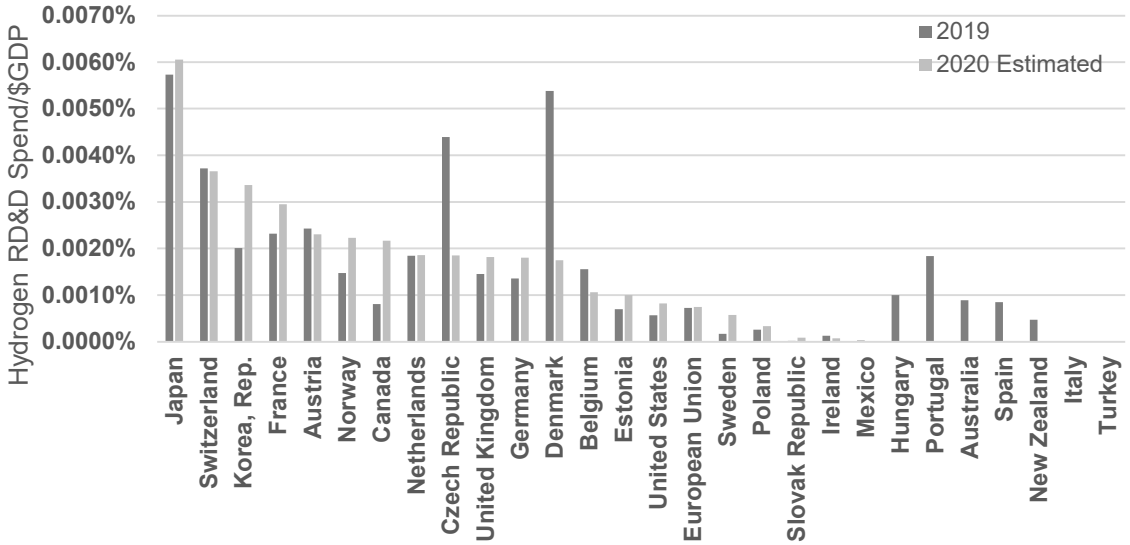
On the high end of the scale, recent renewable recovery initiatives by government around the world for renewable hydrogen were greater than 0.1% of GDP as can be seen in Figure 3 below. For example, Germany has committed $10 billion for hydrogen industry development which represents over 0.2% of GDP. Commensurate with global leaders, Australian jurisdictions that commit 0.1% of GDP/GSP in on-budget measure to support renewable hydrogen will score a 5.

Figure 2: World Leading Government Hydrogen Funding



To determine the low end of the scale, the findings from the IEA research which revealed very low government spending historically was used to determine the level 1 scores (see Figure 4 below).

Figure 3: Hydrogen Spend/$GDP – Adapted from IEA with GDP Figures from the World Bank



Based on this analysis the following scoring levels were set:

Score	***1***	***2***	***3***	***4***	***5***

Government hydrogen spending total ($/GDP(GSP))	*0.001%*	*0.026%*	*0.051%*	*0.075%*	*0.10%*

Results:

	Federal	NSW	VIC	QLD	SA	WA	TAS	NT	ACT
Total gov investment in renewable hydrogen ($b)	$1.3	$3.1	$0.05	$0.28	$0.66	$0.21	$0.07	$0.03	N/A
Gov investment in renewable hydrogen as a percentage of GDP/GSP	0.066%	0.484%	0.012%	0.075%	0.571%	0.064%	0.191%	0.010%	N/A
Score	3	5	1	4	5	3	5	1	N/A

Figure 4: Government Investment in the Renewable Hydrogen Industry

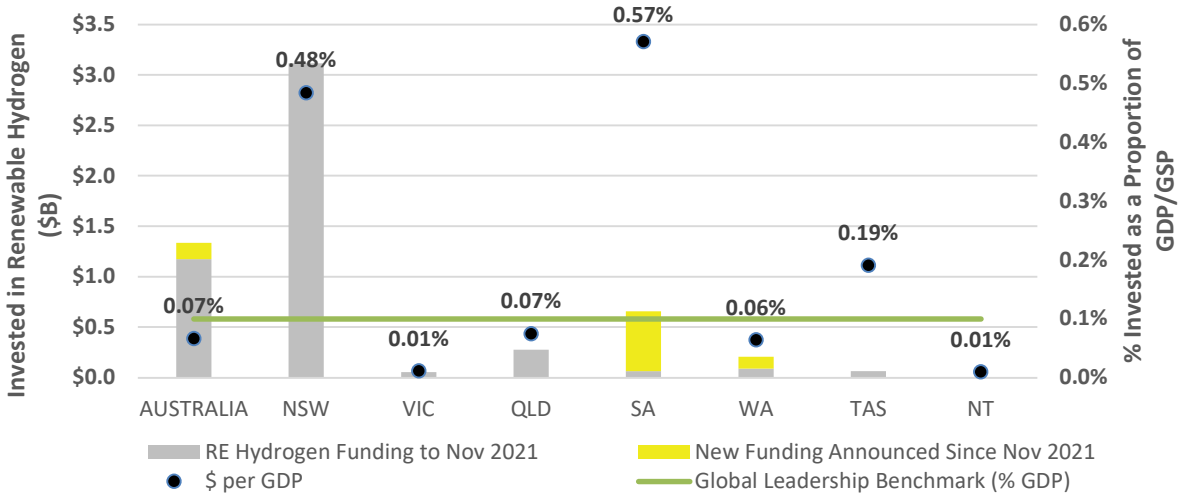


Figure 5: This graph shows the total amount invested in renewable hydrogen by each government as announced within budgets, and the total as a proportion of Gross State or Domestic Product (GSP or GDP). Note some government funded programs may also allow financial support for non-renewable hydrogen (eg. the Australian Government's Low Emissions Technology Roadmap). WWF has assumed a proportional split between renewable hydrogen and fossil hydrogen funding and attributed just the renewable hydrogen share for this indicator.

Indicator 5b. Support for hydrogen from fossil fuels

Is the government supporting hydrogen from fossil fuels?

Purpose: As outlined in WWF-Australia's Hydrogen Position Paper, WWF supports renewable hydrogen since it is the only guaranteed hydrogen production method that is zero carbon. Hydrogen from coal and gas contributes to climate change and distracts from renewable hydrogen-based industries that are essential to the decarbonisation of the global economy. This qualitative indicator assesses the extent to which government policy and programs are consistent with WWF's position on this issue.

Data: For a broad description, see the section "Research and scoring process - qualitative indicators" on pages 8-9 above.

Scoring methodology: The bespoke scale was used to assess this indicator is set out below.

Score	Rating scale
0	Yes the government is funding and supporting hydrogen from fossil fuels
1	The government has funded hydrogen from fossil fuels in the past but no announcement of future support, promotion or funding
2	The government is not funding hydrogen from fossil fuels, but is promoting it
3	No the government is not currently supporting hydrogen from fossil fuels
4	The government is not currently supporting hydrogen from fossil fuels and is publicly advocating for renewable hydrogen
5	The government has legislated that it will not support hydrogen from fossil fuels

Results:

	Federal	NSW	VIC	QLD	SA
Support for fossil hydrogen?	Yes the government is funding and supporting hydrogen from fossil fuels	The government is not currently supporting hydrogen from fossil fuels and is publicly advocating for renewable hydrogen	The government has funded hydrogen from fossil fuels in the past but no announcement of future support, promotion or funding	The government is not currently supporting hydrogen from fossil fuels and is publicly advocating for renewable hydrogen	The government is not funding hydrogen from fossil fuels, but is promoting it
Score	0	4	1	4	2

	WA	TAS	NT	ACT

Support for fossil hydrogen?	Yes the government is funding and supporting hydrogen from fossil fuels	The government is not currently supporting hydrogen from fossil fuels and is publicly advocating for renewable hydrogen	Yes the government is funding and supporting hydrogen from fossil fuels	The government has legislated that it will not support hydrogen from fossil fuels
Score	0	4	0	5

Indicator 6a. First Nations communities

Are there effective mechanisms for working collaboratively with First Nations communities to ensure they are actively included within the opportunities and outcomes of the energy transition?

Purpose: WWF Australia is committed to respecting First Nations Peoples' human and development rights and recognising the importance of conserving their cultures and recognises the importance of First Nations and Traditional Owner engagement and leadership in the energy transition. WWF recognises that the energy transition will take place on traditional lands and needs to respect and incorporate the experience and knowledge of First Nations peoples and ensure that the benefits and opportunities are shared. This qualitative indicator assesses whether governments are addressing these issues.

Data: For a broad description, see the section "Research and scoring process - qualitative indicators" on pages 8-9 above.

Scoring methodology: The support/action scale set out in Table 3 was used to assess this indicator.

Results:

	Federal	NSW	VIC	QLD	SA
Level of policy	Moderate level of support/action	High level of support/action	Moderate level of support/action	Moderate level of support/action	Low level of support/action
Score	3	4	3	3	2

	WA	TAS	NT	ACT
Level of policy	Low level of support/action	Very low level of support/action	Moderate level of support/action	No support/action
Score	2	1	3	0

Indicator 6b. Regional energy workers

Are there effective policy mechanisms to ensure that affected regional energy workers are included in, and benefit from, the energy transition?

Purpose: WWF Australia is committed to a just and fair energy transition, particularly for regional energy workers in carbon intensive industries such as coal. This qualitative metric assesses the extent to which government policy and programs are proactively enabling a just transition and workers to share in the benefits of new renewable energy projects.

Data: For a broad description, see the section "Research and scoring process - qualitative indicators" on pages 8-9 above.

Scoring methodology: The action scale set out in Table 3 was used to assess this indicator.

Results:

	Federal	NSW	VIC	QLD	SA
Level of policy	Moderate level of support/action	High level of support/action	High level of support/action	Moderate level of support/action	Low level of support/action
Score	3	3	4	4	2

	WA	TAS	NT	ACT
Level of policy	Moderate level of support/action	Low level of support/action	Very low level of support/action	Low level of support/action
Score	3	2	1	2

Indicator 6c. Regional communities

Are there effective policy mechanisms to ensure that affected regional communities are included in, and benefit from, the energy transition?

Purpose: WWF Australia is committed to a just and fair energy transition, particularly for the communities that host renewable energy projects and associated infrastructure. This qualitative metric assesses the extent to which government policy and programs are proactively enabling a just transition and regional communities to share in the benefits of new renewable energy projects.

Data: For a broad description, see the section "Research and scoring process - qualitative indicators" on pages 8-9 above.

Scoring methodology: The action scale set out in Table 3 was used to assess this indicator.

Results:

	Federal	NSW	VIC	QLD	SA
Level of policy	Moderate level of support/action	High level of support/action	High level of support/action	High level of support/action	Low level of support/action
Score	3	4	4	4	2

	WA	TAS	NT	ACT
Level of policy	Very low level of support/action	Low level of support/action	No support/action	Low level of support/action
Score	1	2	0	2

Indicator 6d. Consumers

Are there effective policy mechanisms to ensure the energy transition delivers better outcomes and equitable benefits to consumers, particularly low-income households?

Purpose: WWF Australia supports the principle that all Australians should have access to affordable electricity. This qualitative metric assesses the extent to which government policy and programs are consistent with policy priorities identified by the Australian Council of Social Services.

Governments should ensure that policies to accelerate the transition to renewable energy also improve access and affordability for disadvantaged Australians.

Data: For a broad description, see the section "Research and scoring process - qualitative indicators" on pages 8-9 above.

Scoring methodology: The support/action scale set out in Table 3 was used to assess this indicator.

Results:

	Federal	NSW	VIC	QLD	SA
Level of policy	Moderate level of support/action	Moderate level of support/action	Moderate level of support/action	Moderate level of support/action	Low level of support/action
Score	3	3	3	3	2

	WA	TAS	NT	ACT

Level of policy	Moderate level of support/action	Moderate level of support/action	Very low level of support/action	High level of support/action
Score	3	3	1	4

Indicator 7a. Comprehensive Renewable Export Strategy

Does the government have a comprehensive Renewable Export Strategy?

Purpose: WWF has identified the development of a Renewable Energy Export Industry Strategy as a key step in the critical path to Australia becoming a renewable superpower and thus a policy priority for our Renewables Nation Program.

South Australia was the first jurisdiction to develop a hydrogen strategy, this in turn became a national process and now every jurisdiction not only has a hydrogen strategy but is actively supporting the development of a renewable hydrogen industry. This process needs to be applied to the full range of Australia's renewable export opportunities.

As such, this policy indicator assesses the level of policy activity undertaken by each jurisdiction towards all of the six renewable export opportunities WWF has identified, that are relevant to that jurisdiction. The six opportunities are:

- Renewable Hydrogen
- Direct Electricity Transfer
- Renewable Powered Products and Commodities
- Australian Expertise
- Clean Energy Components and Recycling
- Software and Services

Data: For a broad description, see the section "Research and scoring process - qualitative indicators" on pages 8-9 above.

Scoring methodology: The bespoke scale used to assess this indicator is set out below.

Score	Rating scale
0	No renewable export industry strategy
1	A hydrogen strategy
2	A hydrogen strategy + a strategy for one other export opportunity/initial scoping of broader export opportunities
3	A hydrogen strategy + a strategy for multiple other export opportunity/more scoping of broader export opportunities

4	A renewable export industry strategy
5	A comprehensive and well-resourced Renewable Export Industry development strategy

Results:

	Federal	NSW	VIC	QLD	SA
Level of policy	A hydrogen strategy + a strategy for multiple other export opportunity/more scoping of broader export opportunities	A hydrogen strategy + a strategy for one other export opportunity/initial scoping of broader export opportunities	A hydrogen strategy	A hydrogen strategy + a strategy for one other export opportunity/initial scoping of broader export opportunities	A hydrogen strategy
Score	3	2	1	2	1

	WA	TAS	NT	ACT
Level of policy	A hydrogen strategy + a strategy for multiple other export opportunity/more scoping of broader export opportunities	A hydrogen strategy + a strategy for one other export opportunity/initial scoping of broader export opportunities	A hydrogen strategy + a strategy for one other export opportunity/initial scoping of broader export opportunities	N/A
Score	3	2	2	N/A

Indicator 7b. Supporting new renewable export industries, products or services

Is the government supporting production of potential new renewable export industries, products or services?

Purpose: This policy indicator assesses whether a government is supporting the establishment of the production supply chains required for new renewable export industries. This could include battery manufacture, green steel, renewable hydrogen, export cables to other countries etc.

Data: For a broad description, see the section “Research and scoring process - qualitative indicators” on pages 8-9 above.

Scoring methodology: The support/action scale set out in Table 3 was used to assess this indicator.

Results:

	Federal	NSW	VIC	QLD	SA
Level of policy	High level of support/action	High level of support/action	Moderate level of support/action	Moderate level of support/action	Moderate level of support/action
Score	4	4	3	3	3

	WA	TAS	NT	ACT
Level of policy	High level of support/action	Moderate level of support/action	Moderate level support/action	N/A
Score	4	3	3	N/A

Indicator 8a. Grid balancing technology deployment

How much energy storage, demand management, etc has been deployed in the last 2 years?

Purpose: A quantitative indicator to assess how policy is translating into real-world deployment of storage. This is a momentum indicator.

Storage is a critical type of technology for moving to high penetrations of renewable energy and momentum is required to ensure Australia is building its storage industry at a fast enough pace to match the renewables momentum. Storage in this indicator covers batteries at all scales (household, community and large-scale) and pumped hydro, and in future iterations will include battery storage in electric vehicle capacity.

Data:

Utility-scale storage - AEMO's NEM Generation information 2022 was used to find the nameplate storage capacity in MWh for utility scale storage projects as well as desktop research for other regions.

Small-scale storage - Postcode data for small scale installations from the Clean Energy Regulator was used to determine the number of PV systems with concurrent battery storage capacity (This data is based on voluntarily disclosed data for batteries that were installed at the same time as the solar PV system and is likely to significantly understate the number of battery installations). The number of battery systems were then multiplied by the average battery size calculated using the AEMO DER data dashboard.

Pumped hydro - AER data is used to assess current hydro and pumped hydro capacity.

Note the scorecard does not make any assessment on the mix of different duration storage required.

Scoring methodology: As with indicator 2a, the storage scoring levels were set in line with storage capacity deployment trajectories to achieve the corresponding post 2030 target. These trajectories (see Part 2 for a detailed methodology for establishing the 700% renewables trajectory) set out annual GW targets for storage between 2020 and 2050. The studies and modelling that the 700% trajectory is based on show that approximately 20% of total capacity needs to be storage or dispatchable generation for Australia to achieve 100% or 200% renewable status. To get a two-year figure, the kW per capita figures were doubled.

With scoring levels set in line with renewable deployment trajectories, the current method allocates the task for each jurisdiction based on population. Although the size of the population correlates to the task to develop renewable capacity and supporting storage to achieve domestic demand from renewables, this adjustment does not relate to the opportunity to develop export scale projects. Therefore, future versions of the scorecard will consider allocating the national task to achieve the storage deployment trajectories between the jurisdictions based on their technical potential.

An adjustment factor was applied to slow the ramp-up of storage deployment to reflect the market adoption of storage projects relative to renewable generation deployment where the reduced amount will be added to future years targets as the market matures. Furthermore, due to the early stage of the energy storage market, utility-scale storage projects falling outside the two-year cut off were included. These include the Hornsdale battery which began operations in 2017 and the Mt Newman and Dalrymple North batteries which both began operations in 2018. Utility-scale batteries that were being constructed at the time of data collection and were due to become operational within 2021 were also included. Small-scale storage was included from 2019 to 30 June 2022.

Score	***1***	***2***	***3***	***4***	***5***
Renewable target trajectory	*100%*	*150%*	*200%*	*500%*	*700%*
Storage deployed per person over two years (kWh per capita)	*0.02*	*0.04*	*0.05*	*0.14*	*0.21*

For this indicator, if any region has demonstrated that over 40% of their generation comes from dispatchable renewable generation such as hydro or storage they automatically score 5.

Results:

	Federal	NSW	VIC	QLD	SA	WA	TAS*	NT	ACT
Storage deployed (MW)	**1,050**	**99**	**426**	**137**	**284**	**74**	**-**	**15**	**11**
Storage deployed (kW per capita)	0.041	0.012	0.065	0.026	0.157	0.027	-	0.060	0.025
Score	1	0	3	1	4	1	5	2	0

* Tasmania's generation is 87% from hydro and as such more than meets the requirements to score a 5.

Indicator 8b. Policy support to balance the grid

Is the government supporting energy storage, demand management or other tools to balance the grid?

Purpose: A policy indicator to identify the level of government support and commitment to delivering storage, demand response programs and other tools to balance the electricity grid.

Data: For a broad description, see the section "Research and scoring process - qualitative indicators" on pages 8-9 above.

Scoring methodology: The support/action scale set out in Table 3 was used to assess this indicator.

Results:

	Federal	NSW	VIC	QLD	SA
Level of policy	High level of support/action	Very high level of support/action	Very high level of support/action	Very high level of support/action	Very high level of support/action
Score	4	5	5	5	5

	WA	TAS	NT	ACT
Level of policy	High level of support/action	High level of support/action	Moderate level of support/action	High level of support/action
Score	4	4	3	4

Indicator 9a. Demand for renewable export products and services

Is the government helping to grow local and international demand for renewable export products and services?

Purpose: A policy indicator to assess the scale of government activity to support the growth in demand for renewable export product, commodities and services both in Australian and international markets.

Too often policy focuses on supply side solutions. However, stimulating and ensuring there are markets and market demand for renewable exports is critical to the success of these export opportunities. In addition, this indicator considers both domestic and international markets, because typically (though not exclusively) the growth of a domestic market it the best way to build capacity to establish an export industry, that is by scaling up a domestic industry.

Data: For a broad description, see the section "Research and scoring process - qualitative indicators" on pages 8-9 above.

Scoring methodology: The support/action scale set out in Table 3 was used to assess this indicator.

Results:

	Federal	NSW	VIC	QLD	SA
Level of policy	Low level of support/action	Moderate level of support/action	Low level of support/action	Moderate level of support/action	Moderate level of support/action
Score	2	3	2	3	3

	WA	TAS	NT	ACT
Level of policy	Moderate level of support/action	High level of support/action	Moderate level of support/action	Low level of support/action
Score	3	4	3	2

Indicator 9b. Policy to displace fossil fuels

Is there an effective policy mechanism to encourage fuel-switching from oil and gas to clean energy?

Purpose: A policy indicator to identify the effectiveness of government policy in supporting fuel switching away from fossil fuels to renewable electric or other renewable fueled alternatives in the transport, building and industry sectors.

This fuel switching or electrification indicator grows demand for Australia's renewable electricity and is critical to achieving the decarbonisation of Australia's total energy system or 200% renewables – a key element of becoming a renewable superpower.

Data: For a broad description, see the section "Research and scoring process - qualitative indicators" on pages 8-9 above.

This indicator includes support for:

- Electric cars and zero emission buses,
- Houses and commercial buildings to move away from gas through technologies such as heat pumps and electric stoves, and
- Industry to move to more energy efficient and renewable forms of heat and renewable or zero carbon feedstocks.

Scoring methodology: The policy effectiveness scale set out in Table 3 was used to assess this indicator.

Results:

	Federal	NSW	VIC	QLD	SA
Level of policy effectiveness	Slightly effective	Somewhat effective	Very effective	Slightly effective	Somewhat effective
Score	2	3	4	2	3

	WA	TAS	NT	ACT
Level of policy effectiveness	Slightly effective	Slightly effective	Not effective	Very effective
Score	2	2	1	4

Indicator 10a. Renewable sector investment

Is the government investing in renewable energy initiatives?

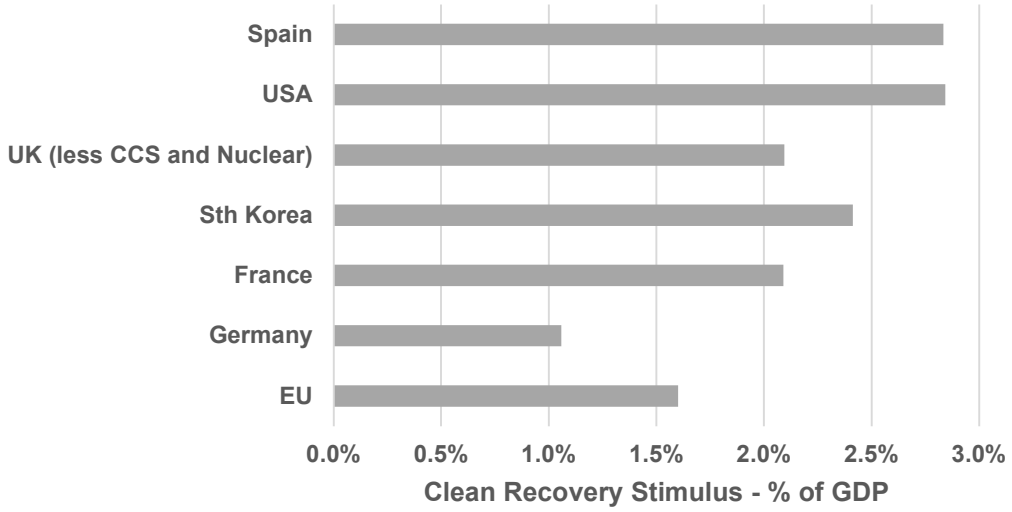
Purpose: A quantitative indicator to assess the level of government support for a renewable sector investment over the forward estimates as the country establishes itself as a renewable export superpower.

Data: Renewable sector investment initiatives were only considered if reported in the 2020-21, 2021-22 or 2022-23 budgets for each jurisdiction and are only calculated over the forward estimates period (five years).

Renewable sector investment measures are those related to energy or clean manufacturing and industry, including energy efficiency measures that were newly announced or significantly upscaled in 2020, 2021 or 2022 budgets, as compared to previous years.

Scoring methodology: To assist in creating the scoring levels 1 to 5, an international analysis of renewable recovery initiatives was undertaken. To compare the findings between regions, the data was converted into $ per GDP. Data was sourced through desktop research of publicly available data including hydrogen spending from the Centre for Policy Development and Energy Policy Tracker. As can be seen in Figure 7 below, a range of global leaders have committed clean recovery stimulus of at least 1% of GDP, thus was used as the benchmark to score a 5.

Figure 5: Clean Recovery Stimulus - % of GDP



Based on this analysis the following scoring levels were set:

Score	*1*	*2*	*3*	*4*	*5*
Government renewable recovery spending total ($/GDP(GSP))	*0.01%*	*0.25%*	*0.5%*	*0.75%*	*1.0%*

Results:

	Federal	NSW	VIC	QLD	SA	WA	TAS	NT	ACT
Total gov renewable sector investment ($m)	$17,157	$7,322	$3,021	$1,213	$840	$419	$67	$86	$341
Gov renewable sector investment as a percentage of GDP/GSP	0.85%	1.6%	0.65%	0.33%	0.73%	0.13%	0.20%	0.33%	0.79%
Score	4	5	3	2	3	1	1	2	3

Figure 6: Renewable Sector Investment – Budget Commitment vs. $ per GDP(GSP)

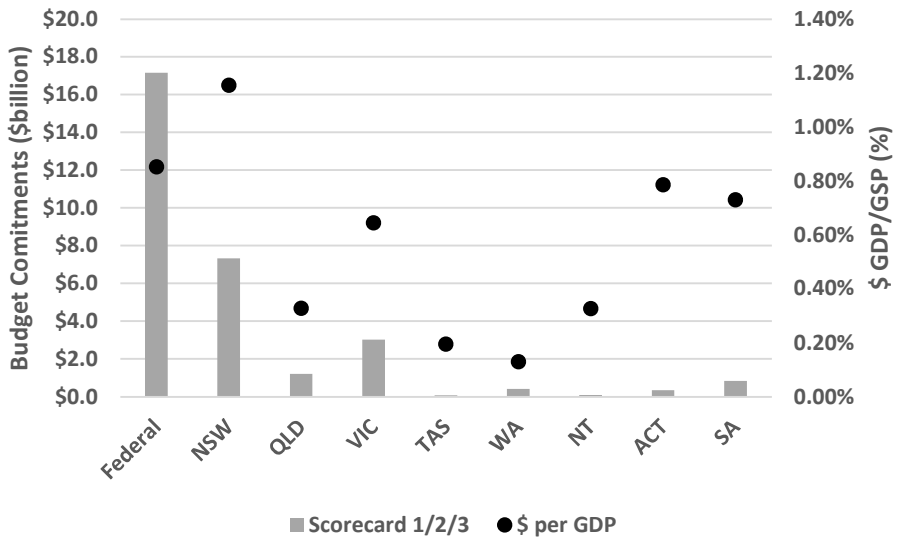


Figure 8: This graph shows both the total amount of renewable sector investment by each government over budgeted forward estimates, and the total as a proportion of Gross State or Domestic Product (GSP or GDP).

Indicator 11a. Recycling and the circular economy

Is the government supporting recycling programs that capture the benefits of the circular economy across the renewable energy sector?

Purpose: A policy indicator to identify the effectiveness of government policy in supporting recycling programs that capture the benefits of the circular economy across the renewable energy sector.

Data: For a broad description, see the section “Research and scoring process - qualitative indicators” on pages 8-9 above.

As this is a new metric, data was collected on policies that covered the timeframes of the three scorecards to ensure the evidence was robust and all policy actions were considered.

Scoring methodology: The policy effectiveness scale set out in Table 3 was used to assess this indicator.

Results:

	Federal	NSW	VIC	QLD	SA
Level of policy	Very low level of support/action	Very low level of support/action	Low level of support/action	Very low level of support/action	No support/action
Score	1	1	2	1	0

	WA	TAS	NT	ACT
Level of policy effectiveness	No support/action	No support/action	No support/action	Low level of support/action
Score	0	0	0	2

Part 2: 700% Renewables Trajectory

Authors: Michael Lord, Daniel Zelcer, Nicky Ison, March 2021

Introduction

With abundant renewable resources and proximity to key export markets, including Asia, Australia has a significant potential to ramp up the deployment of renewable generation capacity and become a renewable superpower. In this research paper, we model a scenario to achieve an ambitious renewable energy target of 700% for Australia by 2050 to highlight a pathway beyond the complete electrification of the country with renewable energy.

Previous research was analysed to:

- Set a baseline for a 100% renewable *electricity* target, and
- Set a renewable *energy* target for the complete electrification and decarbonisation of Australia's energy usage.

A scenario that covers a range of different renewable export opportunities - renewable hydrogen and ammonia, embodied renewable energy in products like steel and aluminium and undersea HVDC cable exports - was developed. These baseline targets and the renewables deployment required to achieve this renewable export scenario were then extrapolated to set a renewable deployment trajectory to achieve 700% renewables by 2050.

To achieve this ambitious target, Australia would need to significantly ramp up the deployment of renewable generation technology and energy storage over the next two decades.

Why 700%?

In 2019, Darren Miller, CEO of the Australian Renewable Energy Agency (ARENA), was the first person to **publicly raise the concept of 700%** renewables for Australia, saying this achievable goal would deliver a similar amount of energy to what we currently export through Australia's LNG industry.

WWF-Australia believes that Australia should be aiming for a renewable industry at least as big as our LNG industry, if not bigger. Indeed, the analysis in this paper shows that if we move to 700% renewables and storage (or seven times the amount of electricity we currently generate across Australia) and invest in associated upstream and downstream manufacturing, we can more than replace all the jobs in and revenue from Australia's current fossil fuel export industries.

Setting a baseline: Calculating 100% renewables

How much renewable & storage capacity is required to reach 100% renewables in Australia?

There have been at least 16 studies into 100% renewables, near 100% and 200% renewables in Australia. This paper draws on evidence from the studies published in the last three years, as they represent the most up to date technology costs and thus the most likely technology mix and thus capacity.

The most recent studies have focussed on the National Electricity Market (NEM), rather than the whole country. Table 5 summarises six of these studies.

Table 5: Recent analyses of 100% (or close to 100%) renewable National Electricity Markets

Organisation	Study/Scenario	PV	Wind	Hydro + bio	Other	Storage	Total RE	Total wind/PV
AEMO[8]	ISP Step-change 94%RE	66	35	7	8	16	131	101
ITP (OpenCEM)[9]	100%RE	51	45	7	1	30	133	96
ANU[10]	200%RE	108	63	8		55	234	171
ANU	200%RE+transmission	80	65	8		46	199	145
ANU	200%RE+transmission+demand management	93	60	8		38	199	153
Windlab[11]	94%RE (2020 version)	51	38	7	6	26	128	89

Notes on Table 5

Table 5 shows there is reasonable consistency in the overall capacity required for 100% renewable grid. But there are large differences in the *balance* of components (solar, wind and storage).

Differences between models partly reflect different, but equally valid, assumptions about the future. For example, addition al inter-state transmission and demand management is likely to lead to lower capacity requirements. On the other hand, if a model assumes lower costs for wind, solar and storage, it may prioritise higher capacity above transmission. Energy mixes with higher wind generation are also likely to have lower capacity and storage requirements. There is no single best method of projecting the capacity requirements of a 100%RE grid.

Three ANU models have been included as they usefully distinguish scenarios with extra transmission and demand management. The ANU modelling is for a 200% renewable NEM (actually 198%) as it includes electrification of buildings, land transport, and industry. To calculate the averages in Table 5, the ANU's capacity figures have been halved.

All scenarios in Table 5 include 7GW hydro and 1GW biomass which already exist on NEM. In reality, non-NEM generation may need to contain a higher proportion of solar and storage because it would include many microgrids such as isolated towns and mines. OpenCEM now calculates higher storage than most other models as it relies predominantly on batteries since AEMO increased its estimate of the cost of pumped hydro by 40%.

Approach to calculating the baseline

To calculate a baseline for the 700% target capacity for the NEM, an average of the 100% renewables capacities from the studies in Table 5 was taken, as such for the purpose of this paper it is assumed that:

- **100% renewable NEM** = **119 GW** capacity (**96 GW** renewable generation plus **24 GW** storage)

[8] https://www.aemo.com.au/-/media/files/major-publications/isp/2020/final-2020-integrated-system-plan.pdf

[9] https://itpau.com.au/open-source-grid-integration-modelling-project/

[10] https://arxiv.org/ftp/arxiv/papers/2007/2007.09586.pdf

[11] https://www.dropbox.com/sh/qajm9vynno0dydp/AADzO1LzEu7sn-g_KCN54Iiua?dl=0&preview=3a+David+Osmond.pptx

To calculate an Australia-wide figure, the current electricity generation output of the south-western system in WA (WEM) and all other smaller grids and off-grid generation was added to the NEM and the 100% renewables figures were scaled up proportionally:

- **100% renewable Australia** = **156 GW** capacity (**125 GW** renewable generation and **31 GW** storage).

How much renewable and storage capacity is already installed across Australia?

Table 6 shows registered capacities of renewables generation and storage in the NEM as reported by the Australian Energy Regulator on 1 October 2020.[12]

Table 6: Current generation and storage installation across the NEM

	Capacity (GW)
Total Capacity	50.5
Wind	7.5
Utility-scale solar	4.2
Behind-the-meter solar[8]	12
Hydropower	8
Total renewable generation	***31.7***
Behind-the-meter battery[13]	0.5*
Utility-scale batteries[14]	0.3
Pumped hydro	2.2
Total storage	***2.9***

*estimate based on 1 GWh

Note on storage

Hydropower is not included in the above figures on storage as it is sometimes used for bulk energy generation, particularly in Tasmania. However, as more variable renewable energy enters the system, the main use of all hydropower is likely to be for dispatchable energy, and it will make sense to categorise it as energy storage.

Capacity for Pumped hydro is included in the 8 GW for Hydro - it is not additional. Existing pumped hydro consists of three sites in NSW and QLD, all of which are all under-used as explained here. Demand for the pumping capacity of these sites is likely to increase as more variable renewables enter the system.

Establishing stronger targets

How much renewable & storage capacity is required to decarbonise total energy use in Australia?

Total energy use includes, in addition to electricity generation and use, the energy used for transport, to heat buildings and in industrial processes, particularly heating and cooling. Typically, these applications use gas, petrol or diesel and in some cases coal to generate energy. The most likely and cost-efficient

[12] www.aer.gov.au/wholesale-markets/wholesale-statistics/registered-capacity-by-fuel-source-regions

[13] http://www.cleanenergyregulator.gov.au/DocumentAssets/Documents/QCMR%20June%20Quarter%202020.pdf

[14] NEM Generation information 2020

pathways to decarbonise these existing non-electricity end-use applications will be through electrification and some hydrogen, where both the additional electricity and hydrogen production are powered by renewable generation.

ANU in its 2020 study, is one of the first organisations to calculate the additional electricity needed in the NEM to electrify land transport, buildings and manufacturing. **The study concludes that electrifying these sectors would roughly double electricity demand requiring a renewable target of 200%:**

- Land transport +48% more electricity generation required,
- Building heating +10% more electricity generation required, and
- Industrial heat +40% more electricity generation required.[15]

As such it is assumed to achieve total decarbonisation of energy use in Australia 200% renewables will be required (excluding aviation and shipping). This has been calculated by doubling the national 100% figures.

How much renewable energy and downstream industry capacity would be required to replace Australia's jobs and revenue from fossil fuel exports?

Table 7 shows there are 115,000 direct jobs in high-carbon products. Of these around **41,000 jobs** are in fossil exports, assuming 75% of Australian coal and gas production is exported.[16] On average across the last three financial years, the export revenue from these products was A$193 billion, nearly half of which was from iron ore. The revenue from fossil fuel exports was $107 billion.

Table 7. Australia's current high-carbon exports (including government projected revenues for 2020-21)

Export	Direct jobs	Revenue[17] (A$ Bn)	Quantity exported FY20	Energy content PJ/TWh
Thermal coal	37,000[18]	26.0 (FY19) 20.0 (FY20) *17.0 (FY21)* *Avg: 21*	210 MT	5270 / 1460[19]
Metallurgical coal		43.6 (FY19) 35.0 (FY20) *23.0 (FY21)* *Avg: 33.6*	184 MT	5420 / 1500[20]

[15] Lu, B., Blakers, A., Stocks, M., Cheng, C. and Nadolny, A., 2020. A zero-carbon, reliable and affordable energy future in Australia. *arXiv preprint arXiv:2007.09586*.

[16] Australian Energy Update 2020. https://www.energy.gov.au/publications/australian-energy-update-2020.

NB: the 16.6% of off-grid generation explains most of the discrepancy between the CER baseline & AEMO baseline - CER state GW capacity summaries include off-grid generation in each state.

[17] https://www.dfat.gov.au/sites/default/files/cot-2018-19.pdf

[18] publications.industry.gov.au/publications/resourcesandenergyquarterlyjune2020/documents/Resources-and-Energy-Quarterly-June-2020-Thermal-Coal.pdf

[19] publications.industry.gov.au/publications/resourcesandenergyquarterlyjune2020/documents/Resources-and-Energy-Quarterly-June-2020-Thermal-Coal.pdf

[20] Assuming 1 tonne metallurgical coal = 29.5 GJ www.ga.gov.au/webtemp/image_cache/GA17060.pdf

LNG	18,000*	50.5 (FY19) 49.7 (FY20) *31.0 (FY 21)* *Avg: 43.7*	79 MT	4080 / 1130[21]
Oil **		9.3 (FY19) 9.1 (FY20) *6.8 (FY21)* *Avg: 8.4*	14 MT	640 / 170[22]
Iron ore	60,000[23]	77.8 (FY 19) 102 (FY 20) *80 (FY21)* *Avg: 86.6*	860 MT	n/a
Total FFs	55,000	$106.7		
Total	115,000	$193.3		

*Includes all oil & gas extraction jobs **All figures ignore oil imports - Australia is a net importer of oil.

Table 8 presents a scenario for replacing Australia's fossil fuel exports with renewable exports. This scenario replaces 41,000 jobs related to exports of coal, gas and oil, as well as A$77 billion in export revenue. The scenario requires an additional 950 TWh of renewable electricity requiring around 450 GW of renewable and storage capacity. In addition to total domestic energy decarbonisation this would result in an estimated 760 GW of renewables and storage or approximately a 500% renewables target (on a capacity basis).

The scenario includes a mix of renewable export opportunities, specifically - hydrogen and ammonia, export of electricity via undersea HVDC cables and onshoring the refinement of iron-ore, aluminium and manganese. In this scenario, Australia exports both direct-reduced iron and steel. The scenario assumes the production of nearly 10 million tonnes of hydrogen which is split:

- 2 Mt for hydrogen exports;
- 2 Mt for ammonia projection; and
- 5.5 Mt for iron production.

Table 8: A scenario for replacing Australia's fossil fuel exports with renewable exports

Export	Quantity (MT)[24]	Percentage current global output	Energy input (TWh)	New ongoing jobs**	New revenue* ($AU bn)
Direct-reduced iron	50	3	180	6,000	13
Steel	50	3	212	20,000	26
Aluminium	10	15	140	12,000	15
Manganese	1	4	5	1,000	2

[21] Assuming 1 tonne LNG = 52 GJ: www.unitjuggler.com/convert-energy-from-MtLNG-to-GJ.html

[22] Assuming 1 barrel oil = 6GJ: www.eia.gov/energyexplained/units-and-calculators/

[23] https://miningresume.com.au/western-australia-mining/mining-companies-in-western-australia/

[24] These quantities equate to 18% of Australia's current iron ore production and about 50% of Australia's bauxite and manganese ore production.

Hydrogen	2	n/a	100	1,700	8[25]
Ammonia	11.4	6	107	2,300	3
HVDC			200	500	10
TOTAL			**944**	**43,500**	**77**

* These figures subtract revenues from existing exports of iron ore, alumina and aluminium.
** Note that this does not include the additional operation and maintenance jobs in renewable energy, which would be in the tens of thousands. (Briggs et al p. 8), nor the jobs in the manufacture of renewable energy and storage components that could be unlocked with this scale of renewables industry.

Developing a trajectory for 700% renewables by 2050

Calculating 700% renewables for Australia

The 700% renewable energy target was calculated simply by multiplying the 100% baseline by seven – see Table 9.

For the first 200% generation and storage is split using the average percentage split from the six studies aka ~20% storage. The additional 500% assumes that some industries will manage with semi-firmed renewables, because stored hydrogen will allow them to continue producing during times of lower generation. This assumption means this overbuild should enable the level of storage reduces to ~15% storage at 700% capacity.

Table 9: 700% Estimate[26]

	Total Capacity (GW)	Generation (GW)	Storage (GW)	% Renewables (net)
100% Renewable NEM	120	95	25	100%
100% Renewable Australia	155	125	30	100%
100% Renewable Australia - Electrification	310	250	60	200%
Estimated 500% renewable target for Australia	760	640	125	500%
Estimated 700% renewable target for Australia	1095	930	165	700%

Developing a 700% renewables trajectory

To achieve 700% renewables by 2050, two interim targets were set for 2030 and 2040:

- 150% renewables by 2030. This would see the demand for electricity grow by 50% over the next decade on and off Australia's main grids, as both electrification and renewable export demand starts to increase. The scale of this target from a generation perspective is consistent with deploying the current large-scale renewable energy and storage pipeline in Australia get built, the continuing the rooftop solar boom and the building the mega projects such as the Asian

[25] Hydrogen revenue assumes a delivered price of $4/kg which includes the costs of transportation. See for example, ACIL Allen. 2018. Opportunities for Australia from Hydrogen Exports; Table 4.7.
[26] These figures are based on those in Appendix 1 and have been rounded to the nearest five.

Renewable Energy Hub and Suncable and others that we know through industry conversations are early development, but are not yet publicly announced.

- 500% renewables by 2040. This would see sufficient renewable energy and storage capacity and associated upstream and downstream manufacturing to replace the jobs in and much of the revenue from Australia's current fossil fuel export industries (see 500% scenario above).

It should be noted that in this analysis 100% renewables (or net 100%), which would be achieved before 2030, equates to sufficient renewables generation to equal Australia's current electricity needs, and does not necessarily mean that there will be no fossil fuel generation in Australia's electricity mix. It is assumed that there will be significant growth in electricity demand through electrification and the establishment of renewable export projects. For example, 26GWs of the trajectory between 2020 and 2040 is associated with the Asian Renewable Energy Hub alone.

Based on these interim targets a trajectory has then been developed (see Figure 6). Below is the seven step methodology that was followed to produce the 700% trajectory, and subsequently apply the growth rate to achieve the other targets (100%, 150%, 200% and 500%).

Step 1 - Set RET in target years to achieve 700% RET by 2050

Step 2 - Set a plausible replacement level of renewable generation and storage capacity for 2050 of 25GWs per year or ~2% of total capacity. That is the amount of renewable and storage capacity that will need to be built every year to replace aging solar, wind and storage system. This would ensure the creation of a sustainable long-term market, and not see huge contraction and loss of jobs in just 1-2 years in 2050 as a 700% renewables target is achieved.

Step 3 - Linear Interpolation to reach generation capacity by target year

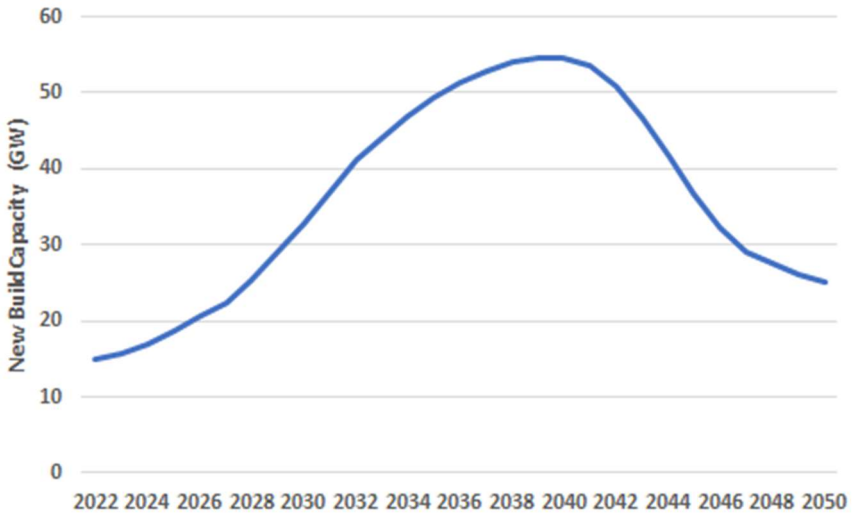
Step 4 - Smooth curve using polynomial trendline

Step 5 - Adjust results to reach generation capacity by target year

Step 6 - Determine growth rates

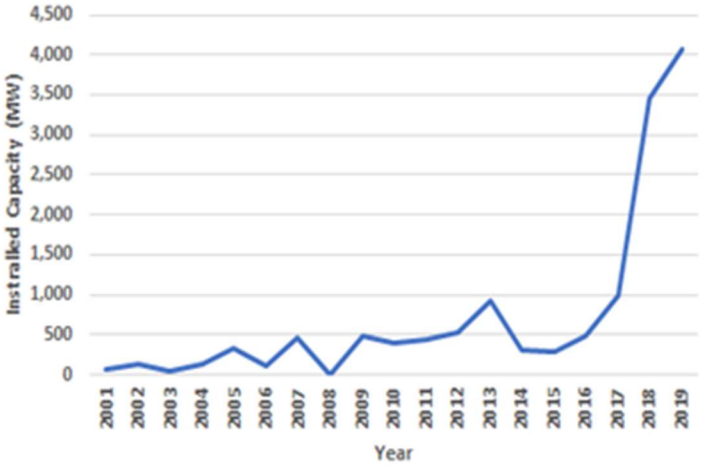
Step 7 - Adjust annual generation capacity to reach set RET by 2050

Figure 6: Estimated New Build Capacity per Year to meet 700% Target (GW)



This trajectory reflects the fact that Australia's renewable energy deployment has seen significant step changes in deployment rate in the past, and there is no reason these step changes or an exponential increase in renewable and storage deployment isn't possible.

Chart 2: Accredited Large-scale Wind and Solar PV Installed Capacity (MW)[27]



The slow growth rate in the next five years reflects the fact that new transmission is urgently required and will take time to build. While the export scale projects such as Suncable also have many more years in development before construction begins.

The very large annual deployment of renewables between 2030 and 2040 is reflective of the likely timeframe to establish a renewable export industry and for technologies and processes such as those to produce green steel and ammonia-based shipping to be proven, piloted, commercialised and upscaled. That is, we are likely to see mass market scale-up of renewable hydrogen, ammonia, steel and other metal refining in the 2030s globally, creating significant additional demand for renewable electricity that Australia can contribute to.

The 700% trajectory and associated targets are meant to be indicative of the scale and rate of renewables deployment required to become a renewable export powerhouse. More detailed analysis will be required in order to ensure sufficient transmission and distribution and finance is available to achieve 700% by 2050.

27 http://www.cleanenergyregulator.gov.au/RET/About-the-Renewable-Energy-Target/Large-scale-Renewable-Energy-Target-market-data/large-scale-renewable-energy-targetsupply-data/historical-large-scale-renewable-energy-target-supply-data

Appendix 1 - 700% Trajectory Summary Data

Table 10: Summary of Results for each Step

Workings	1	2	3	4	5	6				
Year	RET	Linear Interpolation		Annual Deployment - 700%	Growth Rate	100%	150%	200%	500%	700%
2021		41		41		41	41	41	41	41
2022		57		14.9		2	3	4	10	15
2023		74		15.6	28%	2	3	4	11	16
2024		90		16.9	24%	2	3	4	12	17
2025		107		18.7	21%	2	3	5	13	19
2026		123		20.6	19%	2	4	5	14	21
2027		140		22.5	18%	2	4	6	15	22
2028	100%	156		25.3	17%	3	5	7	17	25
2029		195		29.0	17%	3	5	7	20	29
2030	150%	234		32.6	16%	4	6	8	23	33
2031		273		37.0	16%	4	7	10	26	37
2032	200%	312		41.1	15%	4	8	11	28	41
2033		369		44.1	14%	5	8	11	30	44
2034		426		46.9	13%	5	9	12	32	47
2035		482		49.3	12%	5	9	13	34	49
2036		539		51.3	11%	6	9	13	35	51
2037		596		52.9	10%	6	10	14	36	53
2038		653		54.0	10%	6	10	14	37	54
2039		709		54.6	9%	6	10	14	38	55
2040	500%	766		54.6	8%	6	10	14	38	55
2041		799		53.5	7%	6	10	14	37	54
2042		831		50.9	7%	6	9	13	35	51
2043		864		46.6	6%	5	9	12	32	47
2044		896		41.6	5%	5	8	11	29	42
2045		929		36.7	4%	4	7	9	25	37
2046		962		32.4	3%	4	6	8	22	32
2047		994		29.2	3%	3	5	8	20	29
2048		1,027		27.5	3%	3	5	7	19	27
2049		1,059		26.1	3%	3	5	7	18	26
2050	700%	1092		25.0	2%	3	5	6	17	25
						156	234	312	766	1,092

Smooth curve using polynomial trendlines

Appendix 2 – THIRD SUPERPOWER SCORECARD - DETAILED RESULTS

Scorecard Indicators	Federal	NSW	VIC	QLD	SA	WA	TAS	NT	ACT
1. Strong Renewable Energy Targets	5	6	6	6	10	11	12	4	13
1a. Short-term Renewable Energy Targets: What is the government's 2030 renewable energy target?	2	1	1	1	3	5	5	1	3
1b. Long-term Renewable Energy Targets: What is the goverment's renewable energy target beyond 2030?	0	0	0	0	4	4	3	0	5
1c. Policy to deliver renewable energy targets: Is there an effective policy mechanism to deliver the jurisdiction's renewable energy targets?	3	5	5	5	3	2	4	3	5
2. Rolling out renewable energy	5	5	4	5	7	4	8	3	7
2a. Renewable energy deployment: How much new renewable energy was deployed in the last 2 years?	4	4	3	5	4	3	3	3	2
2b. Renewable energy percentage: What percentage of the jurisdiction's electricity generation was from renewables?	1	1	1	0	3	1	5	0	5
3. Renewable Energy Zones and transmission	9	10	9	9	7	6	8	6	0
3a. Development of Renewable Energy Zones: Is the government supporting the development of Renewable Energy Zones or their equivalent?	4	5	4	4	3	2	3	3	0
3b. Expediting transmission projects: Is the government working to expedite other electricity transmission projects?	5	5	5	5	4	4	5	3	0
4. Renewable Energy Industrial Precincts	3	4	1	3	3	3	3	3	0
4a. Developing Renewable Energy Industrial Precincts: Is the government developing Renewable Energy Industrial Precincts?	3	4	1	3	3	3	3	3	0
5. Developing a renewable hydrogen industry	3	9	2	8	7	3	9	1	5
5a. Renewable hydrogen industry investment: Is the government investing in the renewable hydrogen industry?	3	5	1	4	5	3	5	1	0
5b. Support for hydrogen from fossil fuels: Is the government supporting hydrogen from fossil fuels?	0	4	1	4	2	0	4	0	5
6. Ensuring equitable benefits of the energy transition	12	14	14	14	8	9	8	5	8
6a. First Nations communities: Are there effective mechanisms for working collaboratively with First Nations communities to ensure they are actively included within the opportunities and outcomes of the energy transition?	3	4	3	3	2	2	1	3	0
6b. Regional energy workers: Are there effective policy mechanisms to ensure that affected regional energy workers are included in, and benefit from, the energy transition?	3	3	4	4	2	3	2	1	2
6c. Regional communities: Are there effective policy mechanisms to ensure that affected regional communities are included in, and benefit from, the energy transition?	3	4	4	4	2	1	2	0	2
6d. Consumers: Are there effective policy mechanisms to ensure the energy transition delivers better outcomes and equitable benefits to consumers, particularly low-income households?	3	3	3	3	2	3	3	1	4
7. Renewable Export Strategy	7	6	4	5	4	7	5	5	0
7a. Comprehensive Renewable Export Strategy: Does the government have a comprehensive Renewable Export Strategy that plays to a jurisdiction's strengths?	3	2	1	2	1	3	2	2	0
7b. Supporting new renewable export industries, products or services: Is the government supporting production of potential new renewable export industries, products or services?	4	4	3	3	3	4	3	3	0
8. Energy storage and balancing the grid	6	5	8	6	9	5	9	6	5
8a. Grid balancing technology deployment: How much energy storage, demand management, etc has been deployed in the last 2 years?	2	0	3	1	4	1	5	3	1
8b. Policy support to balance the grid: Is the government supporting energy storage, demand management or other tools to balance the grid?	4	5	5	5	5	4	4	3	4
9. Growing demand for renewable energy & exports	4	6	6	5	6	5	6	4	6
9a. Demand for renewable export products and services: Is the government helping to grow local and international demand for renewable export products and services?	2	3	2	3	3	3	4	3	2
9b. Policy to displace fossil fuels: Is there an effective policy mechanism to encourage fuel-switching from oil and gas to clean electricity?	2	3	4	2	3	2	2	1	4
10. Investment in renewable energy initiatives	4	5	3	2	3	1	1	2	4
10a. Renewable sector investment: Is the government investing in renewable energy initiatives?	4	5	3	2	3	1	1	2	4
11. Mitigating the impacts	1	1	2	1	0	0	0	0	2
11a. Recycling and the circular economy: Is the government supporting recycling programs that capture the benefits of the circular economy across the renewable energy sector?	1	1	2	1	0	0	0	0	2
Scorecard results	59	71	59	64	64	54	69	39	50