FACT CHECK:
ANU Study "Australia, the renewable energy superstar"

Australia National University's claim that the "electricity sector is on track to deliver Australia's entire Paris Emissions reduction targets five years early" does not stack up.

Summary

A briefing note published by the ANU[1] and its website introducing the workshop *"Australia: The renewable energy superstar"* claims that the rate of growth of renewable energy supply sources in the power sector will lead to Australia meeting its Paris Agreement targets by 2024, five years early[2].

This indeed would be very good news, but it turns out to be incorrect, due to oversights in the ANU briefing note, and contradicts all previous assessments of Australian government policy in relation to meeting the Paris Agreement goals.

To achieve a 26% reduction below 2005 levels in national emissions - the lower end of Australia's Paris Agreement target - would require about a 75% penetration of renewables in the power sector by 2024, whereas the ANU scenario projects 50%. There is no way that a 26-28% reduction in national emissions can be achieved by 2030 with only 50% of the power sector renewable. The main explanation for the anomalous finding that the Paris Agreement can be met with present renewable

[1] Study: Australia: the renewable energy superstar 8 February 2019 http://re100.eng.anu.edu.au/publications/assets/100renewables.pdf Press release: https://www.dropbox.com/s/hf0fxqjseuso6sp/8%20FEBRUARY%20-%20RENEWABLE%20MR.docx?dl=0 *"The electricity sector is on track to deliver Australia's entire Paris emissions reduction targets five years early, in 2025..."*

[2] "Australia's emissions will start falling from 2019 at a rapid rate, due to displacement of black coal burning by wind and solar PV. Australia is on track to meet its Paris targets five years early" http://energy.anu.edu.au/news-events/australia-renewable-energy-superstar

trends five years early is what appears to be a substantial underestimation of the 70% of national emissions outside of the power sector.

The ANU briefing paper inadvertently creates the impression that continuation of recent rate of renewable energy deployment all this would happen by itself. The present large and increasing rollout in the utility sector is driven by the renewable energy target. Given that that expires in 2020, that specific economic incentive will disappear.

While the low cost of new renewable supply is also a clear a driver, market barriers are already in evidence, along with grid connection issues that require active intervention. There is no doubt that Australia could reach close to 100% renewables by 2030 in the power sector, but it will require significant intervention to get there.

Introduction

The claim that Australia will meet its Paris Agreement goals five years early has received widespread publicity in Australia. The ABC, for example, has given it very high prominence under headlines like "Australia on track to meet Paris Agreement targets five years earlier than expected, research finds". The government has also sought to use the ANU briefing note to reinforce its claim that it will meet its 2030 Paris Agreement five years early:

> *"According to research undertaken by Australian National University (ANU) Professor Andrew Blakers, the electricity sector is on track to deliver Australia's **entire** Paris emissions reduction targets by 2025.*
>
> *The ANU research confirms the Government's position: that we will meet our Paris target in a canter."*

The ANU briefing note has surprised, if not shocked, nearly everyone in the expert and analytical community with detailed knowledge of Australia's climate and energy policy. Numerous international and national efforts to examine Australia's climate and energy policy have all concluded that the government will not reach, on present policy settings, the 26-28% reduction from 2005 levels by 2030 it has put forward under the Paris Agreement. The government's own projections, updated most recently in December 2018, with present policies, show emissions rising by 2030 from 2018 levels about 12% below 2005 levels to only 7% below 2005 levels.

Analysis

The ANU briefing paper has adopted a simple scaling approach to estimate likely introductions from scaling up of renewable energy in Australia's electric power sector. It argues that an overall reduction of emissions of 10 -11 $MtCO_2e$ per year from 2018 would reach the Paris Agreement target in 2025, which turns about to be a significant under-estimate.

Based on the 2018 government projections and data, rate required to reduce emissions by 26-28% from 2005 levels (605 $MtCO_2e$) by 2024 and 2025 is approximately 14.4-16.4 and 12.3-14.0 $MtCO_2e$ per year respectively. This is significantly greater than assumed in the ANU briefing paper and outside of reasonable uncertainty bounds for this kind of analysis.

The next step in this analysis is consideration of the emissions outside the electricity sector: direct combustion, transport, fugitives, agriculture, industrial processes, waste, and land use and forestry (LULUCF). This is important as the power sector accounts for about 34% of national emissions (and declining), and overall emissions from these sectors are growing.

The ANU paper assumes an average increase from these sectors of 2 $MtCO_2e$ per year. Government projections however indicate that this increase is likely to average around 5.4 $MtCO_2e$ per year, average to 2024 or 2025, and about 4.0 $MtCO_2e$ per year to 2030 (all from post 2018). Given the underlying lack of policy, historical growth rates and trends in efficiency improvements of emissions in these sectors, the government projections look reasonable. The reduction rates assumed in the ANU paper are far below any reasonable estimate of likely future combined growth in emissions from direct combustion, transport, fugitives, agriculture, industrial processes, waste, and LULUCF in the absence of policies.

Consideration of the reductions from scaling up of renewable energy in the power sector is the next step. The ANU paper estimates around 12-13 $MtCO_2$ reductions per year until at least 2024/25, with renewable penetration reaching about 50% of the power sector in 2024. To evaluate the economy-wide effect of this, we put the ANU's estimate of renewable penetration in the power sector in the context of the government's 2018 projections and related national emission inventory, which produces slightly different, lower results for the emission reduction rates for similar renewable energy assumptions in the power sector.

At present, according to the government's 2018 projections, the power sector output in GWh in 2018 had a 16% renewable supply from hydro, wind, large-scale solar, biothermal[3] and rooftop PV. The government projections include quite a rapid growth in large-scale solar, rooftop PV and wind, although not as rapid as in the ANU

[3] Assumed to produce zero emissions. Note there is also a significant change from 2017 estimates.

projections, and reach about 34% penetration by 2024/25. After this time, the rate of growth flattens off and penetration is only about 35% in 2030.

In relation to coal, government projections indicate about a 10% decline by 2030 relative to 2018 levels of output, which rises again after a minimum about 13% below 2018 levels in 2023. Given the situation of coal in the market today and the declining cost competitiveness of this fuel compared to renewables, a case that is made very well in the ANU briefing paper, it would seem unrealistic to expect the upward inflection in coal power output of the kind found in the government projections. It is likely that the government projections overestimate emissions from the power sector, and at least through 2024 and 2025 there is a case for a faster rollout of renewable energy than the Government projections. Nevertheless, the ANU projections for a 50% penetration by 2024 appear to be an upper bound.

The government's overall projected emission reductions in the power sector to 2024 and 2025 average about 4.1 and 3.3 $MtCO_2$ per annum respectively, and to 2030, for the reasons explained above reduced to 2.8 $MtCO_2$ per year. When applying the ANU projections of renewable energy rollout, and penetration into the power grid, using the average economy-wide emission factors implied in the national emissions inventory and government projections, we estimate an emission reduction rate of about 11 $MtCO_2e$ per year until 2024 and 2025, which increases to an average of about 12.6 $MtCO_2e$ per year by 2030. The renewable penetration rates in power generation in the ANU scenario are 50% in 2024 and about 88% in 2030 (100% in 2032). The reduction rates until 2025 are slightly lower than 12 -13 $MtCO_2$ per year assumed in the ANU paper.

The overall result in terms of emission reductions by 2024 and 2025, applying the estimates for non-electricity sector emissions above, bring overall national emission reductions of 16.9% and 18.3% below 2005 levels respectively for these years. In 2018 emissions were 11.7% below 2005 levels and the government's projections indicated expected emissions levels about 10.4% and 9.4% below 2005 levels in 2024 and 2025. As a consequence, it is clear that the 50% penetration of renewables by 2024 ANU projects, while producing a large benefit, does not reduce emissions to the Paris Agreement levels[4].

While the penetration of 50% renewables by 2024 or 2025 may be plausible in the absence of further policy developments, it is not considered plausible that close to 90% penetration could be achieved by 2030 without substantial policy action. If this were achieved then indeed the reductions would approach 29% by 2030. Such reductions would require and phasing out coal almost completely from the power sector by 2030, which is clearly not supported by the Federal Government.

[4] If the higher emission reductions estimated by the ANU until 2024 and 2025 are applied reductions would be of order 19.3% and 20.6% for these years, however such reduction would not be consistent with the present projection systems assumed emission intensities. In any event they do not reach the Paris Agreement reduction levels of 26-28% from 2005 levels.

Using the Government's December 2018 emissions projections, and assuming that the projections in other sectors are not significantly affected by the increase in renewable energy penetration in the power sector, we calculate that a 50% penetration of renewables would result in about a 16% reduction of total emissions below 2005 in 2024. Such a level of renewable energy penetration into the power sector is not implausible on this timeframe: the government projects around a 33-34% penetration by 2024, which is probably too low. Nevertheless, if achieved, it would still not meet Australia's 2030 Paris Agreement target.

For the power sector alone, to bring national emissions to 26-28% below 2005 by 2030, the Paris Agreement target year, a renewables penetration of about 82-86% would be needed.

As the ANU briefing note argues - and as is shown in peer reviewed studies (including by the authors of the briefing note) - achieving renewable energy penetration rates in the power sector at this scale by 2030 is technically and economically feasible. However, there is a consensus in the expert community that these levels of penetration will not be achieved without further policy and grid development. An effective exit of coal from the power sector in Australia by 2030 would be one of the necessary steps in achieving this.

Three other important factors should not be overlooked in this issue.

- The Paris Agreement targets put forward by the Government are insufficient to meet the agreement's 1.5°C long-term temperature goal. The Paris Agreement would require reductions of 45- 60% by 2030 for the whole economy.
- The power sector is only about 30% of national emissions (see Table 1), and hence eliminating emissions from that sector still leaves rapid growth in other sectors.

Table 1 Key data from "Australia's emissions projections 2018"

	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Total GHG emissions	555	557	554	545	543	544	546	551	554	557	560	563	563
Power sector emissions	182	178	170	161	159	157	158	159	160	161	162	164	163
% GHG emissions from power sector	32.8 %	31.9 %	30.7 %	29.6 %	29.3 %	29.0 %	28.9 %	28.9 %	28.9 %	28.9 %	29.0 %	29.1 %	29.0 %
% RE in power sector	15.7 %	20.7 %	26.0 %	30.8 %	32.5 %	33.3 %	33.5 %	33.8 %	34.1 %	34.3 %	34.4 %	34.4 %	34.8 %
Reduction from 2005	-8.2%	-7.9%	-8.5%	-9.8%	-10.3 %	-10.1 %	-9.7%	-8.9%	-8.4%	-7.9%	-7.5%	-6.9%	-6.8%

Source: http://www.environment.gov.au/climate-change/publications/emissions-projections-2018

- There is a very important role for renewable energy in the non-power generation sectors, such as industry, mining and agriculture. While the recent growth rate of renewables in Australia's power sector has been high by world standards, it is also true that the penetration of renewable energy into Australia's total primary energy supply has not progressed rapidly and is relatively stagnant. This would need to change for Australia to meet the Paris agreement goals, and as a further major opportunity for the renewable industry.

Finally, the Government's claim that the ANU briefing note shows it will achieve the Paris Agreement targets "at a canter" is manifestly false. The rapid and continued rollout of renewable energy into the power sector assumed in the ANU briefing paper is something that the Australian government actually opposes. The government's policies are aimed at slowing the renewable energy rollout, and in particular maintaining coal in the power sector at any scale, which essentially contradicts the premises of the ANU paper.

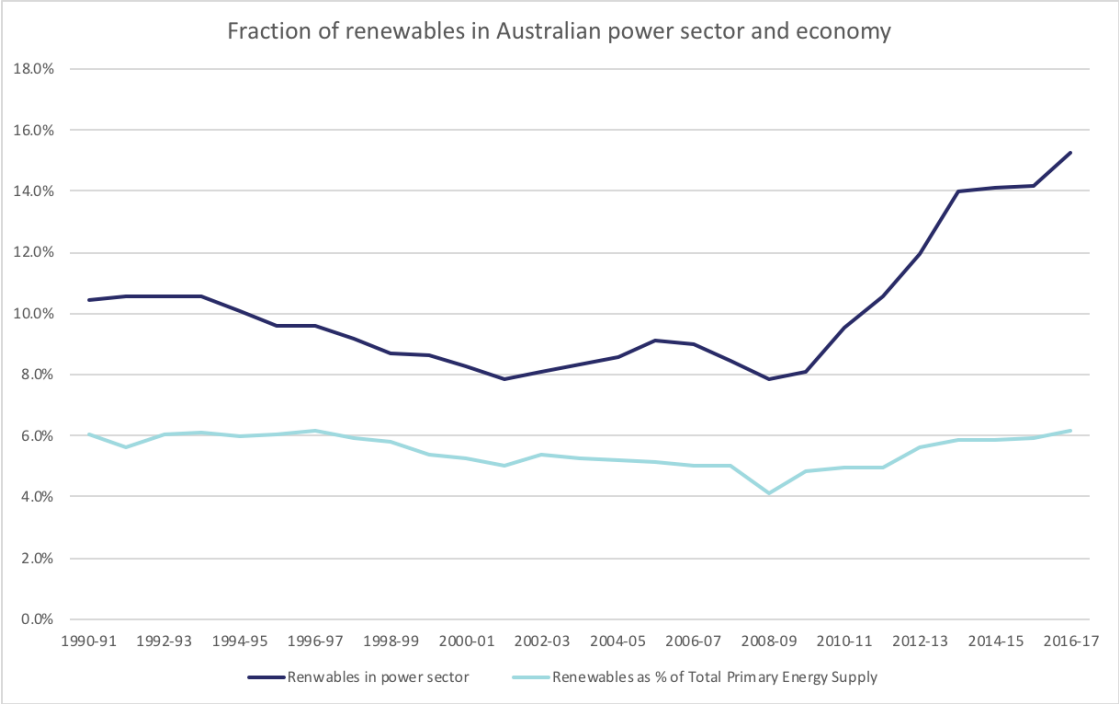

Figure 1 Comparison of penetration of renewable energy into power sector and into total primary energy supply. Date from Australian Energy Statistics, Update 2018 Tables J and O1. https://www.energy.gov.au/government-priorities/energy-data/australian-energy-statistics

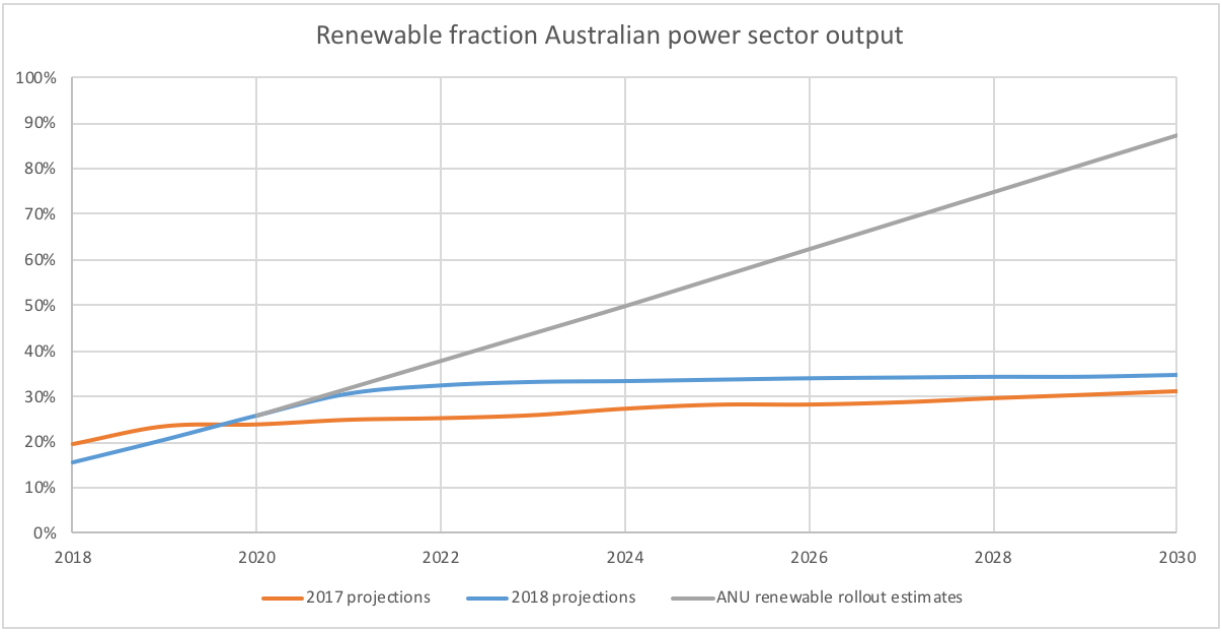

Figure 2 Comparison of Government 2017 and 2018 projections for renewable energy generation in power sector with ANU projected rollout estimates.