BULLETIN

23 March 2023

ESG focus: greenhouse gas emissions
States looking towards net zero facing a formidable challenge

Reducing greenhouse gas emissions is central to addressing the threats posed by climate change. The Australian government set out revised Paris Agreement commitments in June last year that target a reduction in emissions to 43% below 2005 levels by 2030 and to net zero by 2050. Needless to say this will require significant adjustment across much of the economy. This article looks at how emissions, targets and challenges compare across Australia's states.

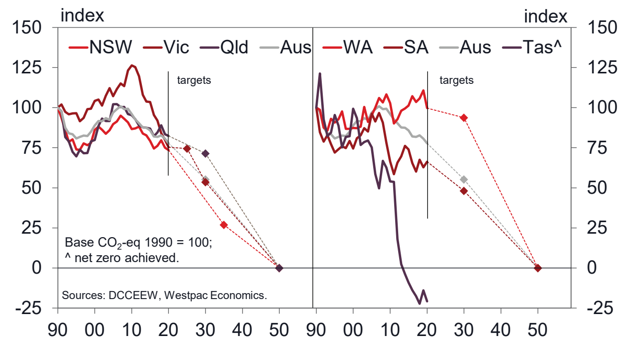
Target-wise, all states have committed to achieve net zero emissions by 2050. Notably, Tas has already been achieving net zero since 2015, due to an increase in carbon 'sinks' relating to the reduction in native forest harvesting. Most state interim targets are also broadly consistent with the 43% target nationally: NSW aiming for a 70% cut in emissions by 2035; Vic and SA aiming for a 50% cut by 2030; and Qld aiming for a 30% reduction by 2030. WA is the main exception with its interim target aiming to reduce emissions from government operations only (including publicly-owned electricity generators) by 80% of 2020 levels by 2030 – this equates to a 6% reduction in state-wide emissions vs 2020 levels which is a 2% decline relative to 2005 levels.

Looking at trends in emissions over time, most states have achieved material reductions in emissions over the last decade. If we exclude the COVID-affected read in 2020, emission declines over the ten years to 2019 range from –13% in Qld to –17% in NSW, –20% in SA and –35% in Vic (although compared to the 2005 'baseline', SA has seen the largest cumulative reduction of –35%). WA is again a notable contrast with relatively little change showed in emissions over the years, the energy requirements of a strongly growing mining sector clearly a factor. More generally, some of the variation in trends across states will reflect differences in underlying growth. Population gains for example have been much slower in SA (+10% over 10yrs) compared to the other major states (+17% on a combined basis over the same period).

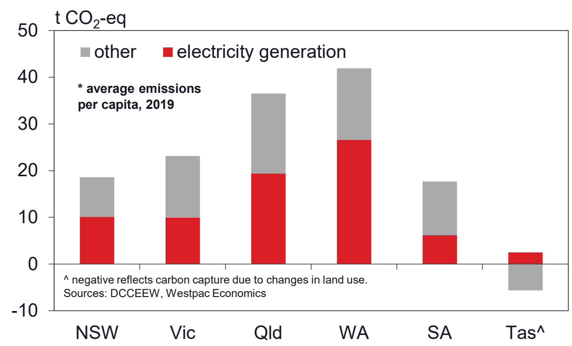
Breaking down the emissions rate per capita by state and again looking at pre-pandemic levels in 2019, WA and Qld stand out as the highest emitters (at 35 and 32.3 tonnes of CO_2-eq per person respectively) the high concentration of mining production clearly a factor. In terms of the mix, emissions associated with electricity generation were the largest contributor in all states, accounting for 60% of emissions in NSW and Qld, 72% in Vic, 76% in WA and a noticeably lower 45% in SA. Other emissions showed a fairly similar mix across states, transport as the second highest source of per capita emissions, agriculture and land use the next biggest in most states (Tas's land use carbon 'sink' again a notable exception), and emissions from industrial processes a little more prominent in NSW.

The detailed state comparison of emissions highlights the role natural endowments play in dictating a state's dominant industries and hence the level and sectoral shares of emissions. The 'mining states' of Qld and WA clearly have more intensive energy requirements for production. Conversely, states with more developed service sectors such as NSW and Vic tend to have lower requirements.

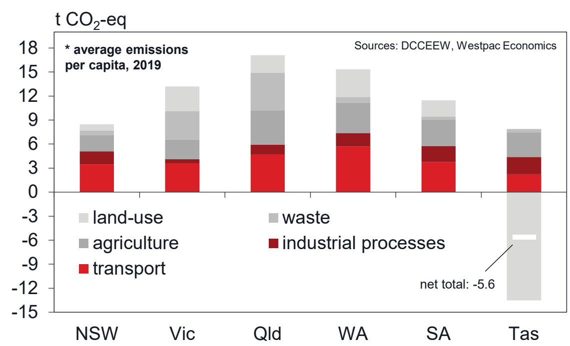
Greenhouse gas emissions and targets: by state



Emissions: electricity and other sources



Emissions excl. electricity: components



Natural endowments also account for some of the major variations in the composition of electricity generation by state. Those with abundant supplies of cheap fossil fuels tend to use these more heavily while those with other forms of generation more readily available, particularly hydro, have a mix with much lower emissions. Again looking at 2019 data, the larger states rely more strongly on non-renewable sources for electricity generation, renewables accounting for just 10% of generation in WA, 13% in Qld, 19% in NSW and, 21% in Vic. SA and Tas have much higher shares at 50% and 94% respectively – SA having a relatively high concentration of wind and solar generation and Tas getting over 40% of its electricity from hydro.

Coal generation accounts for a particularly high share in NSW, Vic and Qld. Interestingly, Vic's heavier reliance on brown coal, which produces more emissions than black coal due to its higher moisture and lower carbon content, largely negates the higher share of gas and renewables in its generation mix compared to NSW with similar total emissions per capita from electricity across the two states.

Transitioning electricity generation towards lower-emitting renewable sources is clearly key to achieving Australia's Paris targets. According to BloombergNEF Australia had $5.6bn worth of renewables investment underway in 2019, or 0.4% of GDP. That looks to be a higher rate than in the US (0.26% of GDP), the UK (0.19%), Japan (0.32%) and India (0.3%) but well behind the global leader at the moment, China (0.58% of GDP or $83.4bn). That said, investment is likely to rise sharply from here, particularly in the US where the Inflation Reduction Act passed in 2022 has provided $67bn in funding and a range of other incentives to encourage clean energy investment.

Domestically, more specific data on the project pipeline shows renewables projects are dominating in the electricity generation space, accounting for all major projects in NSW, Qld, WA and Tas, 96% of work in Vic and 82% in SA (all figures as at December 2022). If we include projects outside of the generation space (mostly hydrogen-related), as at December, Qld had the highest level of renewables investment at $36.6bn while NSW and WA followed closely behind at $27.9bn and $19.7bn respectively. Note that the pipeline is categorised into three groups: 'under construction', 'committed' and 'under consideration/possible'. Across the states, definite projects made up 38% of the pipeline in Qld and 26% in NSW, 27% in Vic, but only 8% in WA and SA. A significant proportion of 'under consideration' and 'possible' projects clearly need to proceed for investment to ramp up.

Large-scale investment will clearly be central to lowering emissions. However, small-scale shifts by individual consumers and businesses will also play a part in reducing emissions. On this front, two key areas of change – the take-up of small-scale solar generation, and of electric vehicles (EVs) – show a wide variation in performance to date.

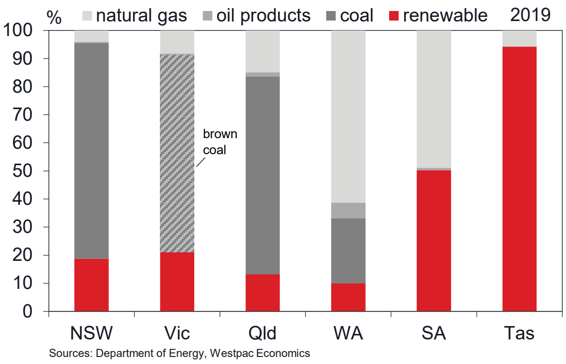
Small-scale solar PV energy generation has risen strongly across all states, in most cases nearly tripling over the six years to 2019. In terms of generation per 100,000 persons, WA and Qld have the highest rates of use with 83GWhs and 65GWhs respectively compared to 33GWhs in NSW and 29GWhs in Vic. Variations will reflect differences in climate across states – the 'sun-belt' across Qld and WA particularly suited to solar generation.

The take-up of EVs has been noticeably slower. While sales are rising sharply, they remain relatively small. BloombergNEF figures indicate there were 39k EV sales in Australia in 2019, accounting for about 5% of all vehicle sales (state data on take-up is not available). That is comparable to the 5.8% share in the US but well behind the 22% of sales in China and 23% in Europe where EVs account for over half of new sales for some 'early adopters' such as the Netherlands, Sweden and Norway. Aside from direct policies, the lack of charging infrastructure looks to be large factor behind the slow take-up of EVs in Australia. And of course, transitioning electricity generation to lower emissions is a key prerequisite for enhancing the degree to which EVs reduce aggregate greenhouse gas emissions.

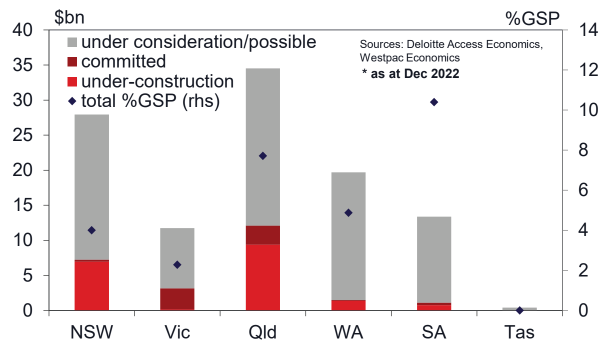
Overall, despite a clear down-trend in emissions the change required to achieve our obligations under the Paris Agreement still looks formidable. Starting points and conditions differ state-by-state but most face significant challenges with a clear need to accelerate both large-scale investment and small-scale shifts.

Matthew Hassan, Senior Economist and Rea Dcosta, Graduate

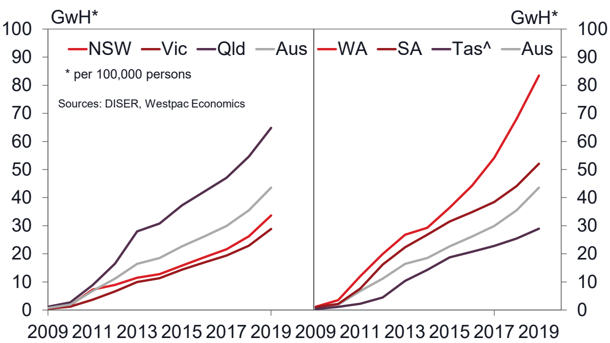
Electricity generation by source



Renewables investment projects



Small-scale solar PV generation: by state



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