Renewable Energy Index

December 2017



Green Energy Markets, January 2018

Key highlights

Wind farm construction exceeds 10,000 job mark as Victoria surges past NSW in renewable energy construction jobs

- There are now 4,417 megawatts of renewable energy projects currently under construction in Australia, up by almost 500 megawatts on the prior month. These will create enough jobs to employ 15,691 people full-time of which wind farms represent 11,217 of those jobs.
- Victoria has now surged past NSW to take second place in renewable energy project construction jobs, behind Queensland. Victoria's construction job count leapt from 2,459 to 4,791 jobs, thanks in large part to the commitment to construction of Australia's largest ever wind farm - the 530 megawatt Stockyard Hill development.
- While many Australians proudly think of the Snowy Hydro Electric Scheme as a great construction and power engineering achievement, its power generation is now dwarfed by wind power. The wind farms under construction at present will produce twice as much power per annum as the Snowy Hydro scheme. When combined with wind farms already in operation, wind will supply fives times more electricity per annum than that of the Snowy Scheme.

The level of investment commitments to new utility-scale renewable energy capacity in 2017 has dwarfed prior years, blasting away doubts about what Australia could achieve.

- The wind and solar farms committed in 2017 will generate more than 10,000GWh per annum, equal to all the electricity consumption of Tasmania or half of WA's main grid.
- If we just maintained this level of capacity investments for another ten years, there would be enough renewable energy capacity installed to generate almost two-thirds of Australia's expected 2030 electricity consumption.

Rooftop solar installs set new record - exceeding a gigawatt in 2017, delivering \$2 billion in power bill savings over next 10 years

- Over 2017, Australia installed 1,078 megawatts of rooftop solar systems which managed to break the previous annual record set back in 2012. December installs were 114 megawatts which fell slightly short of the all-time record amount installed in November, but given the far lower number of working days the installation rate remains at exceptional levels.
- The combined capacity installed over the entirety of 2017 is estimated to deliver \$2 billion in electricity bill savings over the next decade, with the 16,247 systems installed over December delivering \$209m.
- These 16,247 of system installs in December are estimated to have supported 5,477 full-time jobs in system design, installation and sales.



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About this report

The Green Energy Markets' Renewable Energy Index tracks on a monthly basis the amount of renewable energy Australia relies on, the jobs it's creating, the power bill savings it is delivering for Australian households, and the environmental benefits of the rising use of clean power.

This edition covers the period of December 2017.

The Renewable Energy Index is funded by GetUp! to provide a reliable, up-to-date record on renewable energy's contribution to Australia.

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What renewable energy is contributing to the grid



1. Renewables made up 16.3% of the electricity generated in Australia's main grids



Figure 1: Renewable energy power generation by fuel & market share for west & east coast power grids – December 2017





2. Enough renewable energy to power 6.9 million homes

Figure 2: Renewable energy power generation December 2017 in terms of number of households' power consumption by state





Figure 3. CO2 pollution avoided by renewable energy generation over December 2017





4. Renewable energy avoided 8 million cars' worth of CO2 pollution

Figure 4. Number of cars' CO2 pollution avoided by renewable energy generation over December 2017



Large-scale renewables construction activity



5. 4,417 megawatts of large-scale renewables currently under construction



Figure 5: Megawatts of large-scale renewable energy projects under construction by state and fuel at end of December 2017





6. Enough work to employ 15,691 people

Figure 6: Job-years created by renewable energy projects currently under construction by state and fuel - as at end of December 2017





7. 2017 investment commitments in new capacity dwarfed prior years, putting us on track to achieve 2020 Renewable Energy Target

Figure 7: Investment commitments in new renewable energy capacity by year



8. If Australia kept up the 2017 level of commitments for a further 10 years, renewable energy would approach two-thirds of Australian electricity supply

Figure 8: Share of Australia's 2030 electricity supply that could be met with renewable energy compared to fossil fuels if 2017 level of capacity commitments maintained for another 10 years.



9. Power generation from wind farms already operating now three times larger than the Snowy Hydro scheme and will soon be five times larger



Figure 9: Estimated average annual power generation from operating and under construction wind farms in Australia compared to average of Snowy Hydro-Electric Scheme from 2000-2017



Rooftop solar installation activity



10. 16,247 small-scale solar systems installed in December



Figure 10: Small-scale solar PV systems installed by state - December 2017





11. Rooftop solar employed 5,477 people in December

Figure 11. Number of full-time equivalent jobs by state in the installation and sale of rooftop solar PV systems installed over December 2017



12. Enough rooftop solar installed in December to power 29,730 homes

Figure 12: Expected generation from solar systems installed over December in terms of number of households' power consumption





13. Rooftop solar installed in December will deliver \$209 million in bill savings

Figure 13: Power bill savings (in \$millions) over next ten years from rooftop solar systems installed in December 2017



Notes on sources and methodology

Figure 1 – Data sourced from the Australian Energy Market Operator (AEMO) and via NEM Review for all power except rooftop solar PV generation in the WEM. Rooftop solar PV generation in the WEM is derived from an estimate of the cumulative installed capacity in WA multiplied by a generic capacity factor for each month derived from AEMO's 2017 WA Electricity Statement of Opportunities with a discount to align it with Clean Energy Regulator estimates for solar PV annual average generation.

Figure 2 – This chart is calculated by dividing the amount of renewable energy produced in each state by the average annual electricity consumption of households in that state which are sourced from the Australian Energy Market Commission's 2016 Residential Electricity Price Trends publication.

Figure 3 – This chart is calculated by multiplying the amount of renewable energy produced in each state by the average emissions intensity of grid power in that state sourced from the Australian Government's National Greenhouse Accounts Factors – August 2016. Readers should note this is an approximate measure because estimating abatement precisely depends on a complex array of factors. The method employed in the Index is highly likely to underestimate abatement delivered by renewable energy in Tasmania and South Australia while potentially overestimating abatement in Victoria and to a lesser extent other states.

Figure 4 – This chart is calculated by dividing the estimated tonnes of CO2 avoided by renewable energy generation by the average emissions of an Australian passenger car. The average annual emissions of an Australian passenger car was derived by dividing the total CO2 emissions of Australia's passenger cars sourced from the Australian Government's 2016 Emissions Projections by the number of passenger vehicles in Australia as estimated in the Australian Bureau of Statistics' 2016 Motor Vehicle Census (31 Jan 2016).

Figure 5 – This data is sourced from <u>Green Energy Markets</u>' Power Plant Register which tracks information on every renewable energy project in the country that is currently registered or likely to register under the Large-Scale Renewable Energy Target.

Figure 6 – This chart is calculated by multiplying the number of megawatts under construction by an estimate of the job years (a person employed full-time for a year) involved in constructing renewable energy projects by fuel type sourced from ROAM Consulting report to the Clean Energy Council –RET Policy Analysis, dated 23 May 2014. Readers should note that job estimates provided by individual project proponents may not align due to inconsistent definitions of how to measure job creation that are not necessarily reported in job-years.



Figure 7 - Capacity illustrated is for year that projects were committed to construction and is sourced from <u>Green Energy Markets</u>' Power Plant Register which tracks information on every renewable energy project in the country that is currently registered or likely to register under the Large-Scale Renewable Energy Target.

Figure 8 - Estimates of power production from non-rooftop renewable energy capacity are based on a combination of historical generation patterns and projections from project owners tracked by each power station from <u>Green Energy Markets</u>' Power Plant Register. Estimates of rooftop solar generation are taken from the Australian Energy Market Operator's 2017 Statement of Opportunities. Estimates of total overall electricity consumption are taken from the Australian Government's Department of Environment's 2017 Emissions Projections.

Figure 9 - Snowy Hydro Scheme average output sourced from Australian Energy Market Operator via Global Roam's NEM Review software. Wind farm generation data is sourced from <u>Green Energy Markets</u>' Power Plant Register which tracks information on every renewable energy project in the country that is currently registered or likely to register under the Large-Scale Renewable Energy Target. Estimates of power production are based on a combination of historical generation patterns and projections from project owners.

Figure 10 - Data sourced from <u>Green Energy Markets' Solar Report</u> produced using data extracted from the Clean Energy Regulator's register of Small Scale Technology Certificates.

Figure 11 – This chart is calculated by sorting solar PV systems into different kilowatt size categories using information sourced from the <u>Green Energy Markets Solar Report</u> using data extracted from the Clean Energy Regulator's register of Small Scale Technology Certificates. These are then multiplied by estimates of the average person-hours involved in selling, designing and installing such sized systems based on a Green Energy Markets' survey of solar PV industry participants which is then converted into full-time equivalents working a 37.5 hour work week.

Figure 12 - This chart is calculated by using data on the number of small-scale technology certificates within the Clean Energy Regulator's registry as a proxy for the expected average annual power generation from solar PV systems installed in each state. This is then divided by the average annual electricity consumption of households in that state which are sourced from the Australian Energy Market Commission's 2016 Residential Electricity Price Trends publication.

Figure 13 - This chart is calculated by using data on the number of small-scale technology certificates within the Clean Energy Regulator's registry as a proxy for the expected average annual power generation from solar PV systems installed in each state. To determine how much of this generation is displacing imported power from the grid at retail rates or exported to the



grid where it receives a feed-in tariff tied to wholesale electricity prices, systems are sorted into different kilowatt size categories using information sourced from the <u>Green Energy Markets</u> <u>Solar Report</u> using data extracted from the Clean Energy Regulator's register of Small Scale Technology Certificates. The amount exported by solar power systems rises from 50% for 2 kilowatts systems up to 90% for 8-10kW systems based on advice received from the Alternative Technology Association. Systems larger than 15kW are assumed to only avoid or receive an electricity rate equal to the export feed-in tariff we estimate for residential customers in each state. The imported retail rate of electricity and the export feed-in rate is based on an average of the AGL, Origin and EnergyAustralia lowest post-discounted published offer for the capital cities in the states of QLD (Energex), NSW (Ausgrid), VIC (Citipower) and SA (SA Power Networks). For Tasmania, WA, ACT and NT we use the regulated and standard feed-in tariff rates of the Government-owned retailer in each state.

