Record-breaking Aussie renewables

2018 was a record-breaking year for Australia's renewable sector. For the first time, more than 20% (in fact, 21%) of our end-use electricity was renewably sourced, which is enough power to run every Australian household. 39 projects were completed to bring 2.3GW into the grid, and the renewables industry currently provides 20,000 jobs nationwide, often in rural and regional Australia. Hydro power makes up 35%, wind 33%, solar almost 25% and bioenergy around 7%. Over 2 million homes are now solar powered, with an average national installation size of 7.13kW.

Projects worth $24.5 billion are under construction or have financial commitment for 2019, representing over 13,000 jobs. Rooftop solar alone will add 2GW of capacity this year, with 480MW installed in the year's first quarter. This puts solar on track to replace New South Wales' Liddell Power Station when it goes offline in 2022. Victoria's solar rebate has driven a surge in the state's installations. bit.ly/CECCEAR; greenmarkets.com.au

Renewables can dominate world energy by 2050

According to a report from Energy Watch Group (Germany) and LUT University (Finland), the most efficient way to meet the Paris climate targets is to electrify global energy systems and feed the grid with solar and other renewables. The 4½ year study predicts that 100% of energy can be supplied by renewables, with 69% from solar and 18% from wind, with overall electricity climbing to 150,000TWh. A total of 63,380GW of solar power will be required, compared to the current global capacity of 500GW. The team's modelling shows energy-sector emissions reduced to zero by 2050 and a total of 35 million sector jobs worldwide.

These results are similar to those in a new report from the International Renewable Energy Agency (IRENA). By increasing electric vehicle use and powering heating and cooling with renewable sources, IRENA predicts that electricity could provide 86% of global energy and increase its market share from 20% to 50% by 2050. Energy-related emissions would thus decline by 70% compared to today's levels, while simultaneously boosting the global economy by 2.3% and energy-sector jobs by 0.2% worldwide. The renewables sector must grow six times faster than current rates to meet this demand, and provide 75% of global needs. bit.ly/EWG_GES; bit.ly/IRENA_GET

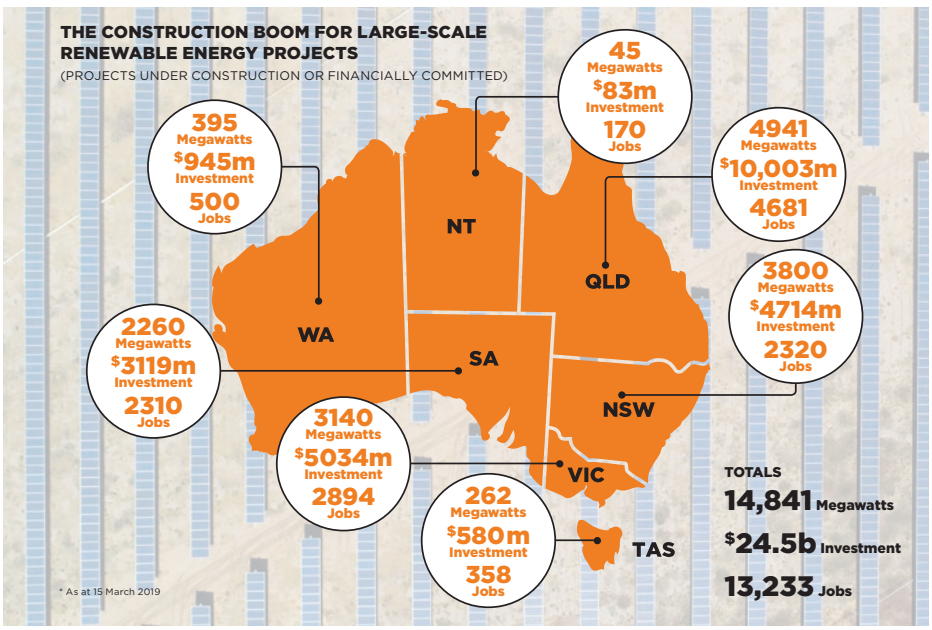


Image: Clean Energy Council

The construction boom for large-scale renewables in 2018 is yielding jobs and contributing to 20% renewable end-use electricity.

Big business makes eco changes

Westpac has entered a 10-year power-purchase agreement with Spark

Infrastructure's Bomen Solar Farm. The 120 MW installation is located 10 km from Wagga Wagga and plans to supply the grid by mid-2020. Westpac has committed to purchase 25% of the farm's energy output, supplying 45% of its consumption by 2021. By 2025, the bank aims to source the equivalent of 100% of its global electricity consumption from renewables. The agreement with Spark is aligned with Westpac's recent membership of the RE100, a global initiative of influential companies which have committed to 100% renewable energy. It is led by The Climate Group in partnership with CDP.

Rio Tinto has also announced new environmental steps in its April 'Industry associations and climate change' document. After selling its last coal assets in August 2018, Rio Tinto says it recognises Paris Agreement targets and considers climate change "a critical global challenge". The corporation will "publicly [argue] against subsidies for coal" and calls on fossil-fuel lobby groups to conduct all media in relation to renewables, decarbonisation and carbon pricing in a technology-neutral way. It committed itself to "recognise the valuable contribution that renewables make in reducing emissions, and not undermine the role they have in the energy mix", and said it would reconsider its membership in industry associations not aligned with these principles.
there100.org; bomensolarfarm.com.au; bit.ly/RTIAACC

Coal-fired power changes rainfall patterns

A 15-year international study has found that ultrafine particles (UFPs, smaller than 100 nanometres) emitted from coal-fired power stations are changing rainfall patterns up to 1000 km away. The joint research has been conducted in Australia, Europe, Mexico, China and Mongolia by Airborne Research Australia (ARA), affiliated with Flinders University, and Germany's Karlsruhe Institute of Technology. The team used small aircraft—a motorglider in Australia and winged 'trike' in Germany—that measure dust particles, trace gases, temperature, humidity, wind and energy balances.

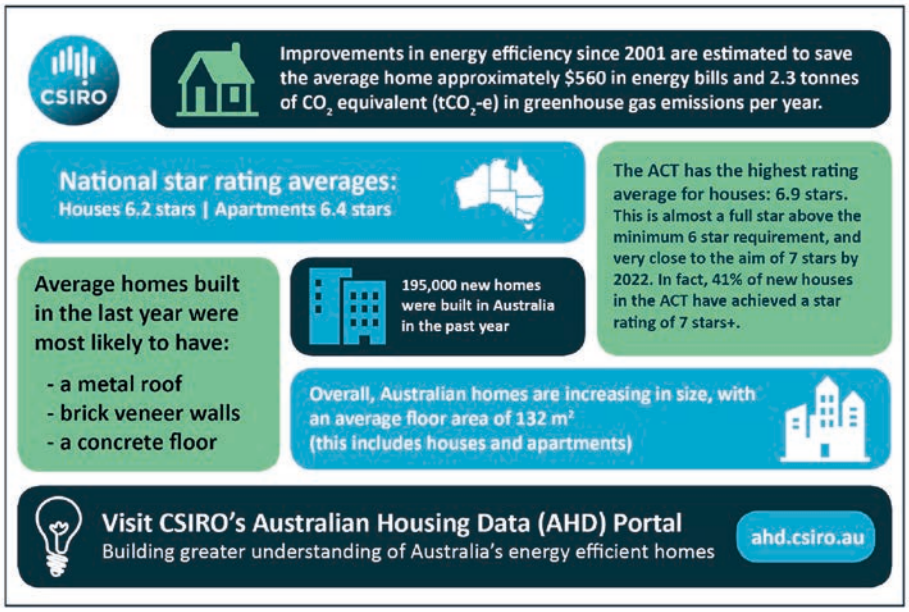
The results show that, despite filtration systems, coal-fired stations emit more harmful UFPs than urban road traffic worldwide. Although difficult to detect, UFPs have been linked to increased respiratory issues. Natural events such as bushfires, dust storms and volcanic eruptions do emit fine particles, but these are generally not as small as the nanometre range.

UFPs are emitted from smoke stacks at around 200 m to 300 m above sea level, from where they can easily spread several hundred kilometres in the lower troposphere. They have an immense impact on meteorological systems, affecting cloud formation and rainfall events. This creates persistent downpours in areas further from the power station, while drying up others nearby—pointing to their influence on drought events. Before Port Augusta's coal-fired station closed in 2016, researchers were able to show it was the source of elevated levels of UFPs in Chinchilla, Queensland, 1400 km to the north-east.

Another ARA project has begun to investigate methane plumes emitted by coal-seam gas extraction via fracking in south-east Queensland and soon in north-west Western Australia. Methane has a large impact (causing approximately 25% of human-induced climate change according to US Environmental Defense Fund analysis), and over a 100-year period has an impact 34 times higher than CO_2. In the first 20 years after its release into the atmosphere, methane is 84 times more potent than CO_2.
airborneresearch.org.au

Housing data supporting bigger and better homes

CSIRO has just announced the launch of an Australian Housing Data portal, designed to track energy efficiency data on new residential buildings. Most of its data is sourced from the Nationwide House Energy Rating Scheme (NatHERS), a federal measurement and compliance system for energy efficiency. The site will support future sustainable housing efforts by providing information for decision making, training and awareness.



CSIRO's new housing data portal provides information on new Australian homes using data sourced from NatHERS.

With around 12% of carbon emissions currently attributed to households, the data gathered in the portal can help progress the COAG Energy Council's goal of zero energy (and carbon) homes in Australia. To date, it shows that while house floor areas are growing, so are their Star ratings, especially in Tasmania and the ACT. The data can be compared across states and climate zones, and allows variable searching of kind of dwelling, floor area, construction materials, fixtures and appliances. Dashboards will be updated monthly.
ahd.csiro.au; bit.ly/COAGTLEB

The particle inlet tube on an underwing pod, used to check ultrafine particle emissions from coal-fired power stations.

Image: Professor Jorg Hacker, Flinders University

E-waste progress

E-waste is any garbage with a plug or battery, and in 2016 it made up 44.7 million tonnes of global rubbish. Only 20% was recycled appropriately—a loss of AU$80 billion in raw materials. Each year, Australians import around 9.3 million new mobile phones and 35 million electronic devices (televisions, computers, printers and computer accessories). This consumption plus our hoard of 25 million old mobiles makes Australians the world's fourth-highest generators of e-waste per capita.

Components such as palladium, gold, silver and plastics can be recycled, accounting for up to 90% of a phone, TV or computer. Australia currently has some noteworthy e-waste initiatives such as the National Television and Computer Recycling Scheme, which has recycled around 42% of TV and computer waste since 2011. Mobile Muster also collected and recycled 1.2 million mobiles and batteries in 2018.

However, despite these programs and Victoria's forthcoming ban on e-waste in landfill (from 1 July 2019), Australia's policies have been slow and limited. They don't include small appliances, power tools and PV panels, for example. In response, a new thinktank called Ewaste Watch launched in April. Together with its research partner, the Institute for Sustainable Futures at University of Technology Sydney, its aims include pushing for circular e-waste solutions and training consumers to stem the e-waste tide with a simple slogan: Buy less, choose well and make it last. Ultimately, they want to move from increasing recycling to making e-waste more benign.

ewastewatch.com.au; mobilemuster.com.au; sustainability.vic.gov.au/campaigns/ewaste

Carbon limit on your credit card

Doconomy is a Swedish financial-tech company that aims to tackle climate action through daily finances. It is soon to launch the mobile-banking app DO together with its premium credit card, DO Black. The app will be linked to a climate-savings account in association with partner bank Ålandsbanken, although customers can keep their own accounts. The credit card will limit purchases to both credit and carbon limits, based on carbon emissions linked to the reduced consumption levels required to meet the Paris agreement. The app will track and measure the CO_2 emissions of your purchases using the Åland Index, which tallies financial industry, environmental, social and governance data. The app and card are responses to Sustainable Development Goal 12, which seeks to "ensure sustainable consumption and production patterns."

DO Black is being issued with UNFCCC support. Users can offset their carbon footprint by contributing to UN-certified projects, and 'DO credits' from allied stores can be channelled into further climate 'compensation' or investments. The physical card is also a world-first, being bio-sourced and biodegradable, without a magnetic strip, and printed with Air Ink derived from recycled air pollution. The system will initially be open to Swedish nationals, with a plan to make it available globally.

doconomy.com; bit.ly/BSP_AI

Image: Johan Pihl, Doconomy

NEM chat: Corporate PPAs—a new market for wind and solar

by Jonathan Prendergast

Solar and wind projects go through a development phase, when the developer secures the land, performs concept engineering work and seeks planning and network connection approval. Once a project is 'shovel ready', the developer looks to lock in a contractor to build it, a project finance loan and end equity owners of the asset.

Solar and wind farms, and all generators, receive revenue that varies each week and year, depending on the wholesale pool price. Power purchase agreements (PPAs) provide a steadier revenue stream, making it easier to get a loan to finance the project. Signed by the developer and an 'off-taker', the PPA will include a set rate that the off-taker agrees to pay for every megawatt-hour of generation.

Historically, PPAs have been signed with retailers who are seeking to build their portfolio of generation assets and meet their renewable energy target obligations. However, the past two years has seen the rise of the corporate PPA, where instead a large energy user becomes the off-taker for a new wind or solar farm.

Signing a PPA can be like owning the solar farm, but without having to develop, finance, build and operate the project. A PPA reduces these risks compared to owning a plant, as the off-taker only pays per megawatt-hour produced. The off-taker agrees to pay a 'strike price' for the contract term, typically 10 to 15 years. In return, it receives the LGCs (large-scale generation certificates) and varying revenue depending on the wholesale pool price.

Some months and years, the wholesale pool price is above the strike price, so the off-taker receives payments from the wind or solar farm. Other times, the wholesale pool price is lower than the strike price, and the off-taker pays the wind or solar farm.

Off-takers are driven to enter into a PPA for reasons including sustainability leadership, hedging their risk and reducing costs. If a large customer enters into a PPA and the wholesale price goes up, they pay higher bills for the electricity for their operations, but receive net revenues from their PPA. If the wholesale price reduces, they have to make payments for their PPA, but their electricity bills reduce. This sees greater balance over time for their electricity costs, reducing budget volatility.

There have already been 35 corporate PPA deals done in Australia, by corporates, universities and government organisations. These PPAs have bought the equivalent of 1937 MW of capacity, supporting a total of 4830 MW of wind and solar projects so far. See Table 1 for a sample of corporate PPAs in place now. For more, see Facebook group NEM Watch.

Jonathan Prendergast is the green infrastructure project manager at UTS and technical director of Business Renewables Centre Australia.

Organisation	Project	State
Telstra	68 MW Emerald Solar Farm	QLD
UTS	32 MW Walgett Solar Farm	NSW
Bluescope Steel	175 MW Finley Solar Farm	NSW
Telstra, Melbourne Uni, ANZ, Coca Cola, Monash Uni	429 MW Murra Warra Wind Farm	VIC

Table 1. Just a selection of the 35 corporate PPAs now in place in Australia.