CLIMATE COUNCIL

STATE OF SOLAR 2016: GLOBALLY AND IN AUSTRALIA

CLIMATECOUNCIL.ORG.AU

Thank you for supporting the Climate Council.

The Climate Council is an independent, crowd-funded organisation providing quality information on climate change to the Australian public.

Published by the Climate Council of Australia Limited

ISBN: 978-1-925573-17-6 (print)
978-1-925573-16-9 (web)

—

Image credit: Cover Photo "20110917_182402" by Flickr user Team Massachusetts 4D licensed under CC BY 2.0.

This report is printed on 100% recycled paper.

facebook.com/climatecouncil
info@climatecouncil.org.au
twitter.com/climatecouncil
climatecouncil.org.au

Petra Stock
Energy Systems Researcher
Climate Council

Andrew Stock
Climate Councillor

Greg Bourne
Climate Councillor

Contents

Key Findings

1

Globally, solar photovoltaic (PV) power is surging on the back of scaled-up production and continually falling costs.

- 70GW (projected) of new solar power capacity was added globally in 2016, breaking last years' (2015) record of 50GW capacity added.
- China (34.2GW), the United States (13GW) and Japan (10.5GW) continued to lead with the most solar PV capacity added.
- The solar sector employs 2.8 million people globally, outnumbering coal jobs. In the United States, solar now provides twice as many jobs as coal.

2

Solar costs are now so low that large, industrial-scale solar plants are providing cheaper power than new fossil and nuclear power.

- Solar costs have dropped 58% in five years and are expected to continue to fall by a further 40-70% by 2040.
- Electricity prices from new coal power stations could rise to A$160 per megawatt hour, while solar parks are around $110 per megawatt hour and are expected to come down significantly in price over time.

3

Australia remains a world leader in household solar.

- The cost of solar power is now well below the retail power prices in Australian capital cities, and continues to fall. The exception is the Australian Capital Territory which has the lowest retail prices in Australia.
- Australia adds more solar power every year than the combined capacity of South Australia's (recently closed) Northern and Playford coal-fired power stations.
- Over 8,000 Australians are now employed in solar and solar has the potential to create thousands more jobs as it grows.

4

2017 will be a huge year for large-scale solar in Australia.

- Large-scale solar PV installations are already taking off in Australia - on airports, mines, healthcare facilities and businesses.
- In 2017 over 20 new large-scale solar projects will come online. A further 3,700 MW of large-scale solar is in the development pipeline (roughly equivalent to three coal-fired power stations).
- Australia is expected to reach over 20GW of solar PV in the next 20 years, equivalent to about a third of Australia's current total power generation capacity.

5

A range of energy storage technologies will complement the growth of solar power providing secure, flexible power.

- Solar and battery storage for households and businesses is already gaining traction in Australia – with more than 6,500 households installing the technology. Uptake is expected to triple in 2017.
- Large-scale developments such as the Lakeland solar and battery storage project and the Kidston solar and pumped hydro project (both in North Queensland) are demonstrating the potential of combining large-scale solar and energy storage technologies.
- The Victorian Government is seeking expressions of interest to build a large-scale battery storage facility in western Victoria to improve grid stability.

GLOBAL SOLAR STATS

2016 SET TO BE ANOTHER RECORD BREAKING YEAR

SOLAR PV ADDED
= over
70GW

GLOBAL TOTAL
= around
300GW

2015 RECORD BREAKING YEAR FOR SOLAR PV

SOLAR PV ADDED
= over
50GW

GLOBAL TOTAL
=
227GW

TOP 3 COUNTRIES FOR SOLAR ADDITIONS IN 2016

1ST CHINA
2ND US
3RD JAPAN

2.8 MILLION
SOLAR PV JOBS
and growing

SOLAR PV COSTS
DOWN 58%
in 5 years **and still falling**

Emissions avoided due to global solar PV **every year** are equivalent to

3/4 OF AUSTRALIA'S ANNUAL CO_2 EMISSIONS

Figure 1: Global Solar Stats. **Sources:** IRENA 2016a,b; REN21 2016; SEIA 2016; BNEF 2017a.

1. Globally, Solar PV Breaking Records Year in, Year Out

Globally, solar photovoltaic (PV) power is surging on the back of scaled-up production and continually falling costs. The amount of new solar power capacity has increased dramatically across the globe, led by China, the United States and Japan. Prices continue to fall, meaning power from new solar plants is now cheaper than new coal plants. Solar power paired with energy storage technologies such as batteries and pumped hydro provides a reliable and flexible source of power.

2016 was a record year for the solar photovoltaic (PV) industry, with at least 70GW of new capacity added, eclipsing the 2015 record of 50GW (BNEF 2017a; Figure 1).

This represents over 40% growth on the solar PV capacity record set in 2015 (Mercom Capital 2016; BNEF 2017a).

Additions in 2016 have taken global solar PV capacity to around 300GW – equivalent to five times Australia's total power generation capacity (Australian Government 2015) - or enough solar to power around 60 million homes (SEIA 2016; Figure 2).

Projections for 2016 indicate China, the United States and Japan (Figure 3) led the global solar PV additions.

Solar power is cheaper than new coal plants.

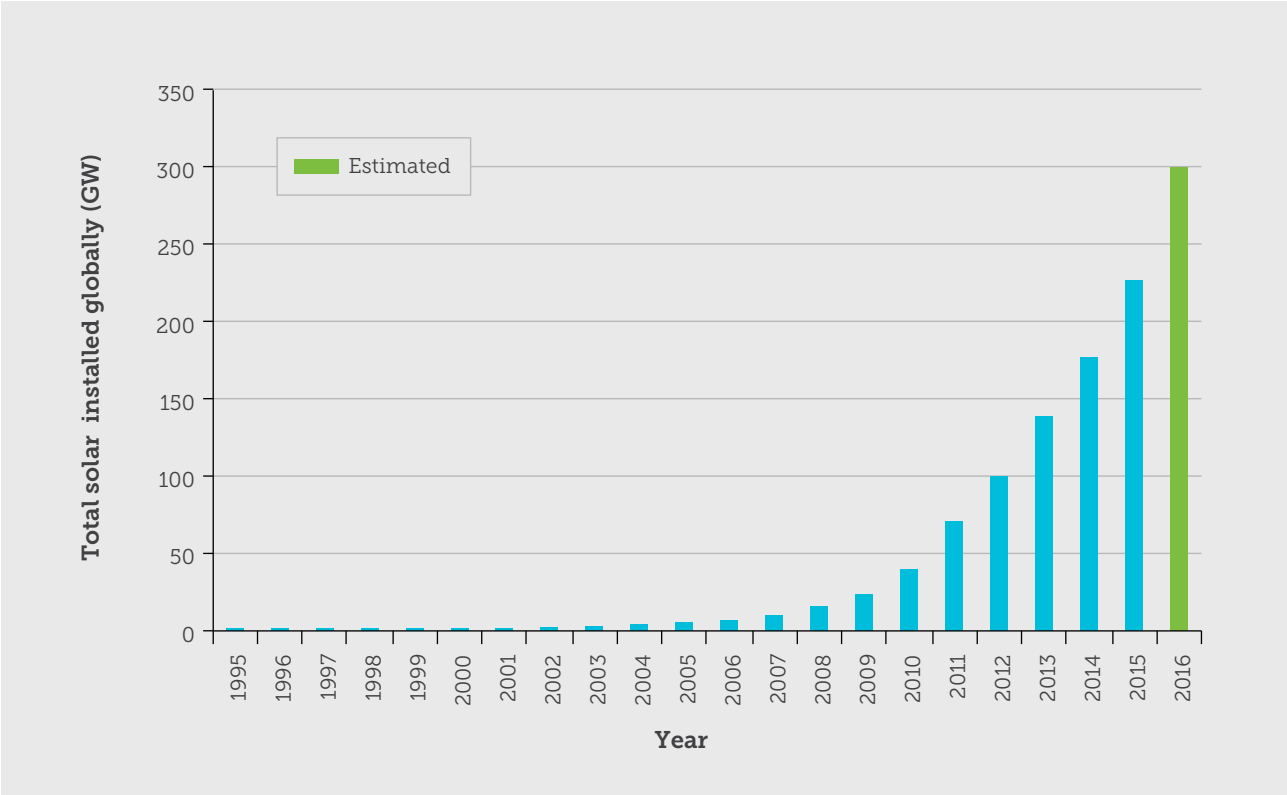

Figure 2: Global solar PV capacity. **Sources:** REN21 2014; REN21 2015; Mercom Capital 2016; REN21 2016; PV Magazine 2017.

2016 was a record year for new solar PV.

Table 1: Countries adding the most solar PV capacity in 2015 and 2016.

2016	2015
China (34.2 GW) US (13GW, projected) Japan (10.5GW, projected) India (4.2GW, projected) (doubling 2015 additions, capacity additions predicted to double again in 2017) UK, Germany and France (more than 1GW each, projected)	China (15GW) Japan (11GW) United States (US) (7.3GW) EU (7.5GW), eg. › UK (3.6GW) › Germany (1.3GW) › France (1GW) India (2GW)
Sources: Mercom Capital 2016; PV Magazine 2017	**Source:** IEA 2016

China, the United States and Japan added the most solar PV capacity in 2016.

Figure 3: Solar plant in Okinawa, Japan.

Falling costs and increased global production is continuing to drive record solar PV installations year on year.

Solar costs have fallen 58% in five years (2010 - 2015) (IRENA 2016b) and are expected to continue to fall by a further 40-70% by 2040 (IEA 2016).

As a result of these falling costs, 2015 saw record low bids for power from large-scale solar plants in many countries and cities:

- Dubai USD 58.5/MWh
- Peru USD 48/MWh
- Mexico USD 45/MWh
- US USD 36-60/MWh (REN21 2016).

Record low and falling costs for large-scale solar PV means solar power is cheaper than new coal plants, and increasingly competitive with wind (EIA 2016; RenewEconomy 2016a; Bloomberg New Energy Finance 2017; Table 2).

Solar PV is also leading a "global shift" in ownership of electricity generation (IRENA 2016a).

Communities, households, small to global-scale corporations, airports, utilities and others are all adopting solar PV as a means to control their energy costs and loosen their reliance on expensive grid electricity. In Australia, like in other parts of the world (eg. the United States and many European countries) solar PV provides a cheaper source of electricity to households and businesses compared to retail electricity prices.

Solar costs have fallen 58% in five years.

Table 2: Cost of new power generation.

Energy supply	Levelised cost of energy (AUD /MWh)
Solar	$78-140
Wind	$61-118
Ultra super critical coal	$134-203
Coal with carbon capture and storage	$352

Source: BNEF 2017b.

In 2016, global investment in solar PV fell despite record installations – reflecting the falling cost of the technology.

Investment

In 2016, global investment in solar was USD 112.4 billion, down about a third on 2015 investment in large part due to falling costs of production (BNEF 2017c). Investment in solar made up about 46% of all investment in renewable energy for 2016 (BNEF 2017c).

Solar Employment Rising

Employment in solar PV (2.8 million full-time equivalent jobs) comprised more than a third of worldwide renewable energy jobs (8.1 million jobs) (REN21 2016). Globally, jobs in renewable energy outnumber jobs in the coal industry (Rutovitz and Harris 2012).

In the United States, the solar industry now provides twice as many jobs as the coal industry, adding over 73,000 new jobs in 2016 (Forbes 2017).

Solar PV Reducing Greenhouse Gas Emissions

Solar PV is making a significant contribution to reducing global greenhouse gas emissions, avoiding emissions of between 200-300 $MtCO_2$ per year – equivalent to three quarters of Australia's annual carbon dioxide emissions (IRENA 2016a; Global Carbon Project 2016).

2. Australian Solar Capacity Update

In 2015, Australia scraped into the top ten countries for total solar capacity (in tenth place behind India and the United Kingdom). Australia's total solar PV capacity is 5.44GW, across over 1.58 million installations (by December 2016; APVI 2016). Australia now has the equivalent of more than one solar panel per person installed (REN21 2016).

This represents a significant change in Australia's electricity mix in the last decade and has been driven primarily by Australian households.

Australia adds more solar power than the capacity of South Australia's (recently closed) Northern and Playford power stations every year (Flinders Power 2017). In 2015, Australia added 0.9GW of solar PV (REN21 2016). Australia installed a similar amount of solar PV in 2016 (Mercom Capital 2016; APVI 2016a).

Rooftop Solar

Australia is a world leader in rooftop solar (Australian Energy Council 2016a).

South Australia and Queensland are competing for top solar state, with both states reaching around 30% of households with solar (APVI 2016; Table 3; Figure 4). 24% of Western Australian households have solar PV systems, followed by Victoria and New South Wales on 15% (APVI 2016b).

The current average small-scale solar system size is 5.34kW (APVI 2016).

Figure 4: Solar rooftops in South Australia.

Queensland and South Australia continue to lead the states for the greatest proportion of solar households.

Table 3: Australian solar PV statistics by state and territory (1 December 2016).

State / Territory	Installations	Percentage dwellings	MW
QLD	485,794	30	1,602
SA	200,213	30	690
WA	211,091	24	645
VIC	294,815	15	968
NSW	343,930	15	1,314
ACT	17,185	14	77
TAS	27,836	13	98
NT	6,253	10	50
	1,587,117		

Source: APVI 2016b.

Figure 5: Solar panels on Clare Valley winery in South Australia.

Large-scale Solar

While households have dominated Australia's solar market over the last decade, today commercial (100kW - 1MW) and industrial scale (large-scale systems 1MW or more) solar PV installations are taking off on airports, mines, healthcare facilities and businesses (Figure 5). Large-scale solar plants can drive investment in regional locations; provide a cheap source of power to the electricity grid; can maximise generation in high solar resource areas; and can offset the major electricity costs of commercial and industrial electricity users.

The 56MW Moree Solar plant in NSW was Australia's largest solar PV installation of 2016.

Table 4: Australian large-scale solar installations in 2016.

Installations in 2016 1MW or more	
Karratha Solar Power, WA	1MW
Darwin International Airport, NT	4MW
Yulara Solar, NT	1.825MW
DeGrussa Solar, WA	10.56MW
Moree Solar, NSW	56MW
Mugga Lane, ACT	13MW
Barcaldine Community Solar, QLD	25MW

Installations in 2016 500kW - 1MW	
IKEA Tempe, NSW	990kW
Baxter Healthcare, NSW	535kW
The Pines, Elanora, Queensland	636kW
Dobinsons Spring and Suspension	518kW
Barangaroo PV Power Station	529kW

Source: AEMO 2016; APVI 2016c; RenewEconomy 2016b.

Large-scale solar PV will receive a major boost in Australia in 2017 with over 20 projects totaling over 1GW of capacity likely to reach financial close this year and a total of 3.7GW of large-scale solar in the development pipeline (RenewEconomy 2017a).

In 2016, the Australian Renewable Energy Agency (ARENA) announced funding for 12 large-scale solar projects - totaling 482MW of new capacity and over $1 billion in new investment - across Queensland, New South Wales and Western Australia in 2016 (Brisbane Times 2016; RenewEconomy 2016c; Figure 6).

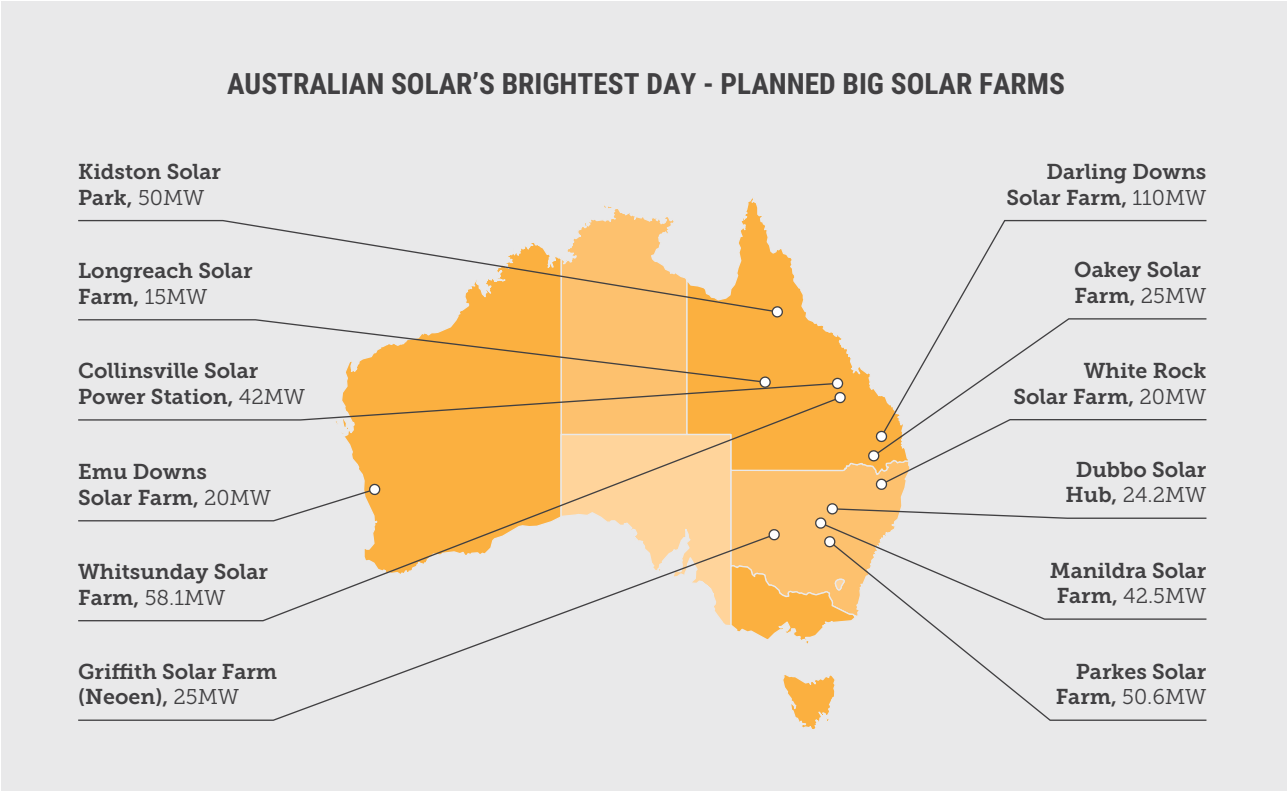

Figure 6: ARENA large-scale solar grants.

Other recent large-scale solar announcements include:

- Construction is currently underway on the Longreach Solar Farm (15MW) in Queensland (ABC 2016).
- Two world-leading large-scale solar plants with battery storage are well progressed in Queensland - the 10.8MW solar PV plant with 5.3MWh lithium-ion battery storage near Lakeland in far North Queensland has achieved financial close (Conergy 2016) and the Cook Shire 33MW solar and 5.4MWh battery storage plant is expected to commence operating in 2017 (Lyon Infrastructure 2017).
- The 100MW Clare Solar Farm located near Ayr in north Queensland also achieved financial close (Queensland Government 2016).
- The 116MW SunMetals Solar Farm to power a zinc refinery south of Townsville, North Queensland will begin construction early in 2017 (RenewEconomy 2017b).
- A 300MW solar power plant located on Queensland's Western Downs, between Miles and Chinchilla (Courier Mail 2017).
- ENGIE, owner of the (soon to close) Hazelwood Power Station in Victoria has called for proposals for large-scale solar in Australia (RenewEconomy 2017c).
- The Victorian Government announced it will build 75MW of new large-scale solar to power Melbourne's tram network (Premier of Victoria 2017).

2017 will see a big boost in large-scale solar projects.

Solar Costs in Australia

Australia has some of the cheapest small-scale solar in the world. Household solar in Australia is significantly cheaper than in the United States and Japan (Lawrence Berkeley National Laboratory 2013).

Electricity prices from household-scale solar continue to fall (Solar Choice 2017). The cost of solar power is now well below the retail power prices in almost all Australian capital cities (the one exception being the smallest solar systems in Canberra which have the lowest retail prices in the country) (Australian Energy Council 2016b).

In recent years, actual costs for new large-scale solar projects have been cheaper than for new coal and nuclear projects. However, despite Australia's world-class solar resource, reported costs for new large-scale Australian solar plants have tended to be higher than in other countries. Reasons for higher costs for large-scale solar in Australia are likely due to higher financing and construction costs and Australia's relative lack of large-scale solar development experience compared to other countries (AiGroup 2016; AFR 2017; Figure 7). As the large-scale solar industry expands in Australia and increasingly compete for contracts through reverse auction processes, these prices may come down.

Electricity prices from new coal power stations could rise to A$160 per megawatt hour, while solar parks are around $110 per megawatt hour. The cost of solar is expected to come down to perhaps $50 by 2025 (BNEF 2017b).

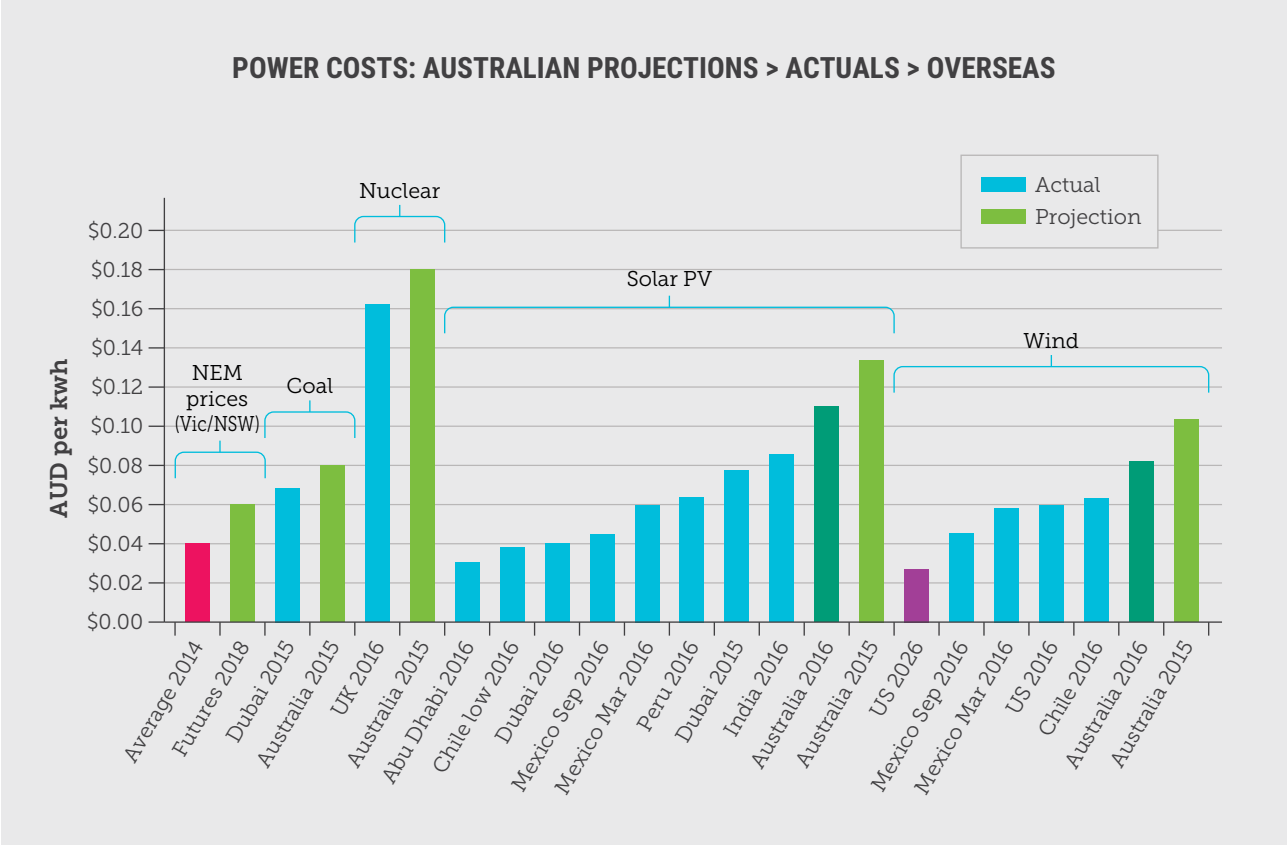

Figure 7: New solar power plants cheaper than new coal and nuclear plants. **Source:** Ai Group analysis of announced projects and the Australian Power Generation Technology report 2016.

Solar Powered Employment in Australia

In 2014-2015 there were over 8,000 jobs in solar in Australia, with solar PV making up 53% of renewable energy jobs (ABS 2016).

Types of jobs in solar include sales representatives, site assessors, electricians, roofers, installers, manufacturers, construction workers, plant operators. There are about the same number of jobs in solar in Australia as there are in coal-fired electricity generation (Climate Council 2016).

Economic modeling has shown that 50% renewable energy in Australia by 2030 would see 28,000 additional jobs created in the electricity sector nationwide. Under this scenario, solar would make up 79% of construction jobs (70% rooftop solar, 9% large-scale solar) and 15% of operations jobs in 2030 (Climate Council 2016).

Increased uptake of renewable electricity creates employment nationwide. Every state gains more jobs under 50% renewable energy by 2030 with job losses in coal-fired electricity generation more than compensated for by increased employment in the renewable energy sector (Climate Council 2016).

Economic modeling of 50% renewable energy by 2030 sees (net) additional jobs created in every state, including:

- more than 11,000 new jobs in New South Wales
- around 4,000 additional jobs in Victoria
- more than 6,000 new jobs in Queensland
- around 3,600 jobs are created in South Australia (the largest per capita jobs growth)
- almost 2,000 additional jobs in Western Australia
- more than 500 new jobs will be created in Tasmania (Climate Council 2016).

3. Australia's Solar Future

Australia is expected to reach over 20GW of solar PV in the next 20 years, equivalent to about a third of Australia's current total power generation capacity – 63GW (AEMO 2016).

As more and more solar is added to Australia's electricity grid, there is a need for complementary technologies and effective management to adapt to the changing characteristics of the electricity network (from centralised to increasingly distributed generation) (Finkel 2016). Battery storage is one such technology enabling households and businesses to maximise the use of their solar power, and benefit the grid by better balancing peak demand and generation as well as delaying or avoiding the need for network upgrades.

More than 6,500 households in Australia installed batteries in 2016, and uptake is expected to triple this year (Daily Telegraph 2017). The amount of battery storage installed by households and businesses in Australia will rapidly increase, driven by high power prices, changing retail tariffs and falling battery costs. By 2035, around 1.1 million homes will have battery storage connected to their solar PV systems (Finkel 2016).

Large-scale projects like the Lakeland solar and battery storage project in North Queensland are demonstrating the complementary potential of solar and storage technologies. The Victorian Government is seeking expressions of interest to build a large battery storage facility in Western Victoria to complement nearby current and proposed wind and solar plants and improve grid stability (RenewEconomy 2017d).

Solar power can also be combined with other forms of energy storage, such as pumped hydro to provide a source of reliable, secure power. For example, the Kidston project in Far North Queensland involves up to 330MW of solar PV (phase one 50MW, phase two 270MW), co-located with pumped hydro storage, utilising a former gold mine. Energy is stored when water is pumped from a lower reservoir to an upper water storage reservoir, and then can be released (generating electricity) at times of high demand. The project will potentially provide up to 330MW of rapid response power into the National Electricity Market. The project will commence construction in 2017 (GenexPower 2017).

Glossary / Abbreviations

Capacity:	the maximum amount of power able to be generated by a power plant or group of power plants

Capacity is measured in:

MW:	megawatt (1,000 watts)
GW:	gigawatt (1,000,000 watts)
Generation:	the amount of electricity generated by a power plant over a set period of time

Generation is measured in:

MWh:	megawatthour
GWh:	gigawatthour
US:	United States
USD:	United States Dollars

References

ABC (2016) Solar energy: Sunny western Queensland to become a hub for power farms. Accessed at http://www.abc.net.au/news/2016-11-06/queensland-biggest-solar-farm-set-to-go-online/7975060.

ABS (Australian Bureau of Statistics) (2016) 4631.0 - Employment in Renewable Energy Activities, Australia, 2014-15. Accessed at http://www.abs.gov.au/ausstats%5Cabs@.nsf/0/0BC8668DB3C26EAECA257E23001108A5?Opendocument.

AEMO (Australian Energy Market Operator) (2016) Regional generation information, NSW. Accessed at http://www.aemo.com.au/Electricity/National-Electricity-Market-NEM/Planning-and-forecasting/Generation-information.

AFR (Australian Financial Review) (2017) Solar closing cost gap with wind, conventional power. Accessed at http://www.afr.com/business/energy/solar-energy/solar-closing-cost-gap-with-wind-conventional-power-20170113-gtqw91.

AIGroup (The Australian Industry Group) (2016) Re-Powering NSW in the interest of consumers. Re-Powering NSW Conference. Innes Willox.

APVI (Australian PV Institute) (2016a) IEA Releases the 2016 International Trends in Photovoltaics Report. Accessed at http://apvi.org.au/wp-content/uploads/2016/11/APVI-Press-201611_Internatinal-PV-Trends-Report.pdf.

APVI (2016b) Mapping Australian Photovoltaic installations. Accessed at http://pv-map.apvi.org.au/historical#4/-26.67/134.12.

APVI (2016c) Large Scale PV Systems. Accessed at http://pv-map.apvi.org.au/power-stations.

Australian Energy Council (2016a) Renewable Energy in Australia. How do we compare? Accessed at https://www.energycouncil.com.au/media/1318/2016-06-23_aec-renewables-fact-sheet.pdf.

Australian Energy Council (2016b) Solar Report September 2016. Accessed at https://www.energycouncil.com.au/reports/.

Australian Government (2015) Energy in Australia. Accessed at https://industry.gov.au/Office-of-the-Chief-Economist/Publications/Documents/energy-in-aust/Energy-in-Australia-2015.pdf.

BNEF (Bloomberg New Energy Finance) (2017a) Record $30bn year for offshore wind but overall investment down. Accessed at https://about.bnef.com/blog/record-30bn-year-offshore-wind-overall-investment/.

BNEF (2017b) BNEF Research - New coal the most expensive form of new supply.

BNEF (2017c) Dataset: Global trends in clean energy investment.

Brisbane Times (2016) Queensland solar farms to be built with $50m in funding. Accessed at http://reneweconomy.com.au/arena-announces-large-scale-solar-grant-winners-480mw-in-total-97091/.

Climate Council (2016) Renewable Energy Jobs: Future Growth in Australia. Accessed at https://www.climatecouncil.org.au/renewablesreport.

Conergy (2016) World first to combine big solar and storage. Accessed at http://www.conergy.com.au/press-release/arena-announces-financial-close-lakeland-solar-storage-project.

Courier Mail (2017) Huge new solar farm project will make the Western Downs the 'energy capital of Australia'. Accessed at http://www.couriermail.com.au/news/queensland/huge-new-solar-farm-project-will-make-the-western-downs-the-energy-capital-of-australia/news-story/f63f29cbc6ef5a53eda1c3dee073dc3a.

Daily Telegraph (2017) The battery storage industry expects rising power prices to spark a tripling of household conversions to PV-storage systems in Australia. Accessed at http://www.dailytelegraph.com.au/news/the-battery-storage-industry-expects-rising-power-prices-to-spark-a-tripling-of-household-conversions-to-pvstorage-systems-in-australia/news-story/7acbdf3d8d92433ce2c777d98957c281?csp=0391a1274a049998ab606989b4436d88.

EIA (US Energy Information Administration) (2016) Levelized Cost and Levelized Avoided Cost of New Generation Resources in the Annual Energy Outlook 2016. Accessed at http://www.eia.gov/outlooks/aeo/pdf/electricity_generation.pdf.

Finkel (2016) Independent Review into the Future Security of the National Electricity Market.

Flinders Power (2017) Augusta Power Stations. Accessed at http://flinderspower.com.au/augusta-power-stations/.

Forbes (2017) New job numbers show bright future for solar energy. Accessed at http://www.forbes.com/sites/katiesola/2017/02/10/new-job-numbers-show-bright-future-for-solar-energy/#688b4d8b3cde.

FraunhoferISE (2016) Photovoltaics Report. Accessed at https://www.ise.fraunhofer.de/de/downloads/pdf-files/aktuelles/photovoltaics-report-in-englischer-sprache.pdf.

GenexPower (2017) GenexPower. Accessed at http://www.genexpower.com.au/.

Global Carbon Project (2016) Global Carbon Atlas. Accessed at http://www.globalcarbonatlas.org/en/CO_2-emissions.

IEA (International Energy Agency) (2016) World Energy Outlook 2016. Executive Summary 2016. Accessed at https://www.iea.org/publications/freepublications/publication/WorldEnergyOutlook2016ExecutiveSummaryEnglish.pdf.

IRENA (2016a) Letting in the light. How solar photovoltaics will revolutionise the electricity system. Accessed at http://www.irena.org/DocumentDownloads/Publications/IRENA_Letting_in_the_Light_2016.pdf.

IRENA (2016b) The power to change: solar and wind cost reduction potential to 2025. Accessed at http://www.irena.org/DocumentDownloads/Publications/IRENA_Power_to_Change_2016.pdf.

Lawrence Berkeley National Laboratory (2013) Tracking the Sun VI. Accessed at https://emp.lbl.gov/sites/all/files/lbnl-6350e.pdf.

Lyon Infrastructure (2017) Cook Shire Solar + Battery Storage + Systems Management. Accessed at http://www.lyoninfrastructure.com/cooktown.html.

Mercom Capital Group (2016) Solar Market Update. Accessed at http://store.mercom.mercomcapital.com/mercoms-global-solar-installation-forecast-november-2016./.

NREL (National Renewable Energy Laboratory) (2016) NREL Report Shows U.S. Solar Photovoltaic Costs Continuing to Fall in 2016. Accessed at http://www.nrel.gov/news/press/2016/37745.

Premier of Victoria (2017) Solar Trams Transporting Victoria To A Brighter Future. Accessed at http://www.premier.vic.gov.au/solar-trams-transporting-victoria-to-a-brighter-future/.

PV Magazine (2017) China claims 34.2 GW of PV installations in 2016. Accessed at https://www.pv-magazine.com/2017/01/17/china-claims-34-2-gw-of-pv-installations-in-2016/.

PV Tech (2016) IHS forecasts global solar market to top 69GW in 2016. Accessed at http://www.pv-tech.org/news/ihs-forecasts-global-solar-market-to-top-69gw-in-2016.

Queensland Government (2016) Media statement: More jobs for North Queensland as Clare Solar Farm financially closes. Accessed at http://statements.cabinet.qld.gov.au/Statement/2016/12/30/more-jobs-for-north-queensland-as-clare-solar-farm-financially-closes.

REN21 (2014) Renewables 2014 Global Status Report. Accessed at http://www.ren21.net/Portals/0/documents/Resources/GSR/2014/GSR2014_full%20report_low%20res.pdf.

REN21 (2015) Renewables 2015 Global Status Report. Accessed at http://www.ren21.net/wp-content/uploads/2015/07/REN12-GSR2015_Onlinebook_low1.pdf.

REN21 (2016) Renewables 2016 Global Status Report. Acccessed at http://www.ren21.net/wp-content/uploads/2016/06/GSR_2016_Full_Report.pdf.

RenewEconomy (2016a) Lazard: Solar PV, storage costs fall in 2016. Accessed at http://reneweconomy.com.au/lazard-solar-pv-storage-costs-fall-2016/.

RenewEconomy (2016b) Queensland's largest solar farm now feeding power to the grid. Accessed at http://reneweconomy.com.au/queenslands-largest-solar-farm-now-feeding-power-grid-47981/.

RenewEconomy (2016c) ARENA announces large scale solar grant winners, 480MW in total. Accessed at http://reneweconomy.com.au/arena-announces-large-scale-solar-grant-winners-480mw-in-total-97091/.

RenewEconomy (2017a) 2017 to mark "transformational" year for large scale solar in Australia. Accessed at http://reneweconomy.com.au/2017-mark-transformational-year-large-scale-solar-australia-38719/.

RenewEconomy (2017b) Sun Metals goes for bigger solar plant to hedge against energy costs. Accessed at http://reneweconomy.com.au/sun-metals-goes-bigger-solar-plant-hedge-energy-costs-21064/.

RenewEconomy (2017c) Hazelwood owner ENGIE seeks large scale solar power stations in Australia. Accessed at http://reneweconomy.com.au/hazelwood-owner-engie-seeks-large-scale-solar-power-stations-in-australia-56820/.

RenewEconomy (2017d) Victoria seeks to build country's biggest grid-scale battery storage. Accessed at http://reneweconomy.com.au/victoria-seeks-to-build-countrys-biggest-grid-scale-battery-storage-42518/.

Rutovitz J and Harris S (2012) Calculating global energy sector jobs: 2012 methodology. Prepared for Greenpeace International by the Institute for Sustainable Futures, University of Technology, Sydney. Accessed at http://cfsites1.uts.edu.au/find/isf/publications/rutovitzharris2012globalenergyjobsmethycalc.pdf.

Silicon Beat (2016) Report: Solar, wind on the rise in corporate America - despite Trump. Accessed at http://www.siliconbeat.com/2016/12/07/report-solar-wind-rise-corporate-america-despite-trump/.

SEIA (Solar Energy Industries Association) (2016) What's in a Megawatt? Accessed at http://www.seia.org/policy/solar-technology/photovoltaic-solar-electric/whats-megawatt.

Solar Choice (2017) Residential Solar PV Price Index - January 2017. Accessed http://www.solarchoice.net.au/blog/news/residential-solar-pv-system-prices-january-2017.

Image Credits

Cover Photo: "20110917_182402" by Flickr user Team Massachusetts 4D licensed under CC BY 2.0.

Page 4: Figure 3 "Okinawa is all about that solar power!" by Flickr user Tim Franklin Photography licensed under CC BY-NC-ND 2.0.

Page 8: Figure 4 "Solar Roofs" by Flickr user Michael Coghlan licensed under CC BY-SA 2.0.

Page 9: Figure 5 "Kilikanoon Winery 20160117_28s" by Flickr user David Clarke licensed under CC BY-NC-ND 2.0.

Thank you for supporting the Climate Council.

The Climate Council is an independent, crowd-funded organisation providing quality information on climate change to the Australian public.

CLIMATE COUNCIL

facebook.com/climatecouncil

twitter.com/climatecouncil

info@climatecouncil.org.au

climatecouncil.org.au

The Climate Council is a not-for-profit organisation and does not receive any money from the Federal Government. We rely upon donations from the public. We really appreciate your contributions.

DONATE climatecouncil.org.au/donate