

# Renewable energy in Australia

## **Market and industry overview**



Lawyers

**McCullough  
Robertson**

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# About McCullough Robertson

McCullough Robertson is a leading independent Australian law firm with four offices across the country. For more than 90 years, major Australian and foreign owned corporations, financial institutions, governments, private enterprises and high net worth individuals have trusted our advice on their most critical legal challenges.

Our whole-of-project approach ensures seamless legal services are on hand from the project approval and development phase, through to project financing, operation and expansion. Our specialist lawyers bring expertise, experience and in-depth knowledge of the renewables industry, having worked on solar, hydro, wind, biomass and geothermal renewable energy projects in Australia and overseas.

Key highlights of our experience include:

- advising on the delivery of a solar power station at Alice Springs Airport in the Northern Territory for Ingenero;
  - advising various wind farm operators, energy utilities and banks on the development of wind farms and on the regulation of the renewables and electricity industry;
  - advising on the redevelopment of the abandoned Kidston Gold Mine by Genex into a hydropower facility for the northern Australian electricity market. The Kidston Project will be the first in the world to use two disused mine pits for hydroelectric power generation;
  - advising on all aspects of the development and delivery of Mackay Sugar Limited's bagasse cogeneration facility at its mill in Mackay, Queensland;
  - acting for Mackay Regional Council in relation to a landfill gas management and energy utilisation project at Hogan's Pocket and Bayersville landfill sites;
  - acting for Ergon Energy to provide advice for the geothermal power station at Birdsville, Australia's only commercial geothermal power plant; and
  - advising on market design and competition law issues in this space.
- We understand the opportunities and challenges facing those in the renewables sector and provide commercial, outcomes focused advice on the full range of issues confronting participants in this field.

# Note from **the editors**

The increasing global demand for energy presents both opportunities and challenges for Australia. Australia is well known for its abundance of renewable energy sources and has not fully capitalised on them to date. However, as renewable energy projects become more cost competitive, and local demand for renewable energy soars, domestic policy is developing to help drive local and international investment in renewable energy projects.

The Australian Renewable Energy Target (RET), for example, is a federal mandate to create a supportive environment for long-term investment in Australia's renewable energy industry. The RET has set a target of 23.5% of Australia's total power to come from renewable energy by 2020.

The Renewable energy in Australia three part series provides some insights into the issues you will face, and how best to overcome them, in proceeding with a renewable energy development in Australia.

It provides:

- an overview of the current state of the Australian renewable energy industry, its key players, trends and priority areas for future development;
- an examination of the challenges and opportunities in the renewable energy industry; and
- an in-depth guide to navigating the legal framework in Australia, including potential legal hurdles that investors face or are likely to face when doing business in the Australian renewable energy sector.

We will step you through the funding opportunities, structuring and corporate considerations, national electricity regulations and preferred project delivery methods.

While we cannot delve into every detail in this guide, please contact any of our experts should you have any specific queries – we would be more than happy to help.



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# Market **overview**

**A market that is poised for growth.**

In June 2015, the Federal Government set a new RET of 33,000GWh of renewable energy generation capacity by 2020. This target requires Australia to double its current renewable energy generation capacity and ensure that 23.5% of Australia's total electricity generation will be from renewable sources by 2020.<sup>1</sup>



The legislative implementation of the RET in June 2015 was significant because it signalled the first instance of bipartisan political agreement on the RET.

In conjunction with the Federal RET legislation, individual State governments have also implemented their own targets, which will affect the direction of renewable energy investment among States.

The effects of the widely supported RET reform and a more stable renewable energy policy contributed to 3,150MW of new generation capacity and \$6.9 billion being invested nationally in clean energy projects set to go to construction in 2016.<sup>2</sup> This represents the biggest year for clean energy investment in Australia. Half of the remaining 14,500GWh of additional generation required to meet the RET is expected to be under construction in 2017, most of which will be delivered within a single year.<sup>3</sup> The industry is confident that the RET is clearly within reach by the 2020 deadline.

## An abundance of resources

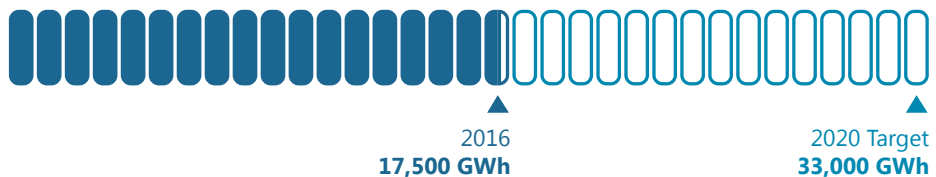
Australia has the highest concentration of solar radiation per square metre on Earth, making it environmentally ideal for solar power generation. There is incredible potential for solar energy generation in Australia, given that Australia receives an average of 58 million picojoules of solar energy per year – 10,000 times more than the country's total energy consumption.<sup>5</sup>

Australia is also home to some of the most favourable conditions for wind energy generation in the world in terms of average wind speed and conducive topography.

The high potential yield for wind and solar energy production make them the two most important renewable energy sources in the years to come.

Both the Clean Energy Finance Corporation (CEFC) and the Australian Renewable Energy Agency (ARENA) have identified wind and solar as priority areas for both research and development investment and for project development.

## Energy generation versus 2020 target



## Renewable energy generation technology



### Solar

The output of rooftop solar PV installations reached over 3% of the National Electricity Market's (**NEM**) electricity requirements in 2016. The amount of solar powered energy in the NEM is expected to dramatically increase over the next decade due to reducing solar technology costs.



### Wind

Wind generators accounted for 7.5% of capacity and generated 6.1% of output in 2015–16. Overall, wind generation rose by 12% in 2015–16. The announcement of a record number of new large-scale wind farms in 2016 will see a strong rise in the capacity of wind powered energy in the NEM.



### Hydroelectric

Hydroelectric generators accounted for 17% of registered capacity in the NEM in 2015–16, supplying 10% of electricity generated. The bulk of Tasmanian generation is hydroelectric. NSW, Victoria and Queensland also have hydroelectric generation.



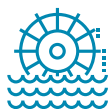
### Geothermal

Utility-scale geothermal power generation is not expected to be commercially viable until 2020. Birdsville, in Queensland, is host to Australia's only commercial geothermal power plant.



### Bioenergy

Bagasse (e.g. sugar cane waste) is the most common form of Australian bioenergy generation. Biomass can also be converted to liquid fuels (biofuels) for energy generation. Bioenergy makes up 1.7% of the total generation capacity in the NEM.



### Marine

There is enormous potential to harness the power of waves, tides and currents for electricity generation. Marine energy remains at an embryonic stage of development across the world. The Carnegie Wave Energy Project, based in Perth, was the first array of wave power generators to be connected to an electricity grid, worldwide.



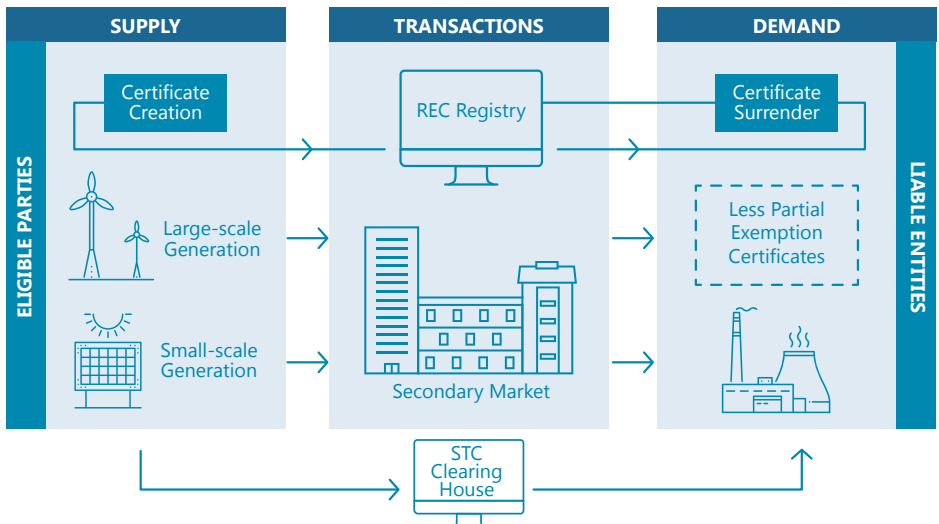
## Renewable generation contribution to NEM electricity supply



Note: Rooftop solar PV generation is not traded through the NEM. Electricity generated from this source acts to reduce the demand for grid supplied electricity.

Source: Australian Energy Market Operator, Energy Update: June 2016 (May 2017) – see [6]

## Renewable energy framework



Source: Clean Energy Regulator, About the Renewable Energy Target: How the Scheme Works (29 March 2017) – see [7]

The RET drives investment in the renewable energy sector by allowing electricity generators to create tradeable certificates for every MW that is generated or displaced from renewable sources. These certificates are then purchased by wholesale purchasers of electricity (predominantly electricity retailers), who sell the electricity to customers. The certificates act as a financial incentive for the use of renewable energy sources, as retailers must submit the certificates to the Clean Energy Regulator (**CER**) to demonstrate their compliance with the RET scheme's annual targets.

The RET is split into two parts: the Large-Scale Renewable Energy Target and the Small-Scale Renewable Energy Target.

The Large-Scale Renewable Energy Target creates financial incentives for the establishment or expansion of renewable energy power stations and has been designed to deliver the majority of the RET.

The Small-Scale Renewable Energy Scheme is targeted at small household level renewable installations such as domestic solar photovoltaic (**PV**) and solar hot water.

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## Electricity market framework

### THE NEM

The NEM is a wholesale electricity market in which generators sell electricity and retailers buy it to onsell to consumers. There are over 100 generators and retailers participating in the market, so it's highly competitive and therefore an efficient way of maintaining relatively competitive electricity prices in the wholesale market.



#### THE NEM, THE GRID AND THE FINANCIAL MARKET WORK TOGETHER



#### THE FINANCIAL MARKET

The financial market sits alongside the NEM and involves retailers and generators entering into the hedging contract to buy and sell electricity. These contracts set an agreed price for the electricity and help to manage the risk of price volatility.



#### THE PHYSICAL SUPPLY SYSTEM 'THE GRID'

The transmission and distribution networks deliver electricity from power stations anywhere in the system to homes and business 24/7.

The Australian electricity market is broadly divided into two key sectors, the NEM which services Queensland, New South Wales, Victoria, South Australia, Tasmania and Australian Capital Territory, which provides roughly 85% of Australia's total electricity consumption, while most of Western Australia is serviced by the Wholesale Electricity Market (**WEM**), which provides roughly 8% of Australia's total electricity consumption.<sup>9</sup> The remaining 7% of the Australian electricity market is made up of a variety of small scale markets that cover the Northern Territory and remote Northern regions of Western Australia.<sup>10</sup>

Under the NEM, electricity generated by registered generators must be sold through a mandatory pool arrangement, managed and administered by the Australian Energy Market Operator (**AEMO**).<sup>11</sup> Generators must submit the price at which they wish to sell their energy through the pool and AEMO assesses these offers according to demand in order to determine the regional clearing price, which all generators in the region will receive.<sup>12</sup> The NEM in Australia, unlike in many other OECD countries, is an 'energy-only' market in which electricity generators are paid for the energy they produce but not the capacity they make available.

Renewable energy generators participate in these markets and share in the same customer base as non-renewable energy generators.<sup>13</sup>

As the contribution of renewable technologies to Australia's energy mix continues to grow, the integration of such technologies presents challenges to the power system and the NEM in its current form.

The Australian electricity market is also regulated by:

- the Australian Energy Market Commission (**AEMC**), which creates and amends the National Electricity Rules (**NER**);<sup>14</sup>
- the Australian Energy Regulator (**AER**), which is responsible for enforcing and monitoring compliance with the NER as well as the economic regulation of electricity transmission;<sup>15</sup> and
- the Council of Australian Governments (**COAG**) Energy Council, which oversees the governance and regulatory framework and policies that apply to the Australian electricity market.<sup>16</sup>

# State of play **in Australia**

Australia has been slower in its uptake of renewable energy compared to many of its international peers. However, market trends particularly over the previous year, show that the Australian renewable energy market is now experiencing a period of unprecedented growth as the country shifts away from its reliance on conventional energy sources.



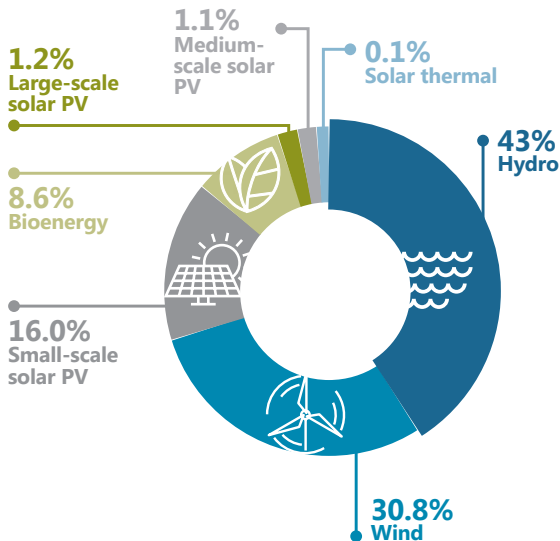
## Current state of the market

The Australian energy market continues to be dominated by conventional sources of energy, mainly coal and gas.

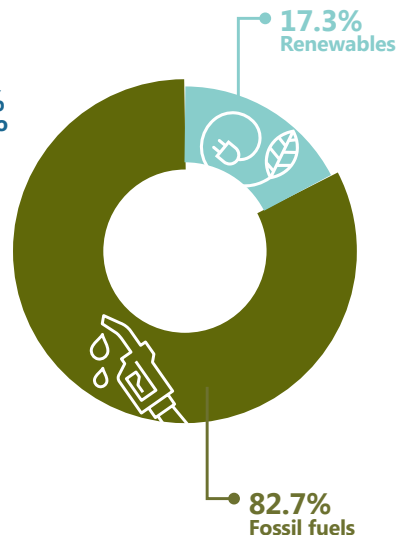
The current policy landscape largely continues to favour mature technologies which present the lowest investment risk at the expense of emerging options which may present greater efficiency and emissions reduction gains.

In 2016, the contribution of each energy source to Australia's total electricity generation is shown in the diagram below. Overall, renewable energy supplied 17.3% of Australia's total electricity in 2016, a significant rise on the 14.6% generated by renewable energy the previous year.<sup>19</sup>

Renewable generation technology type



Annual electricity generation in 2016

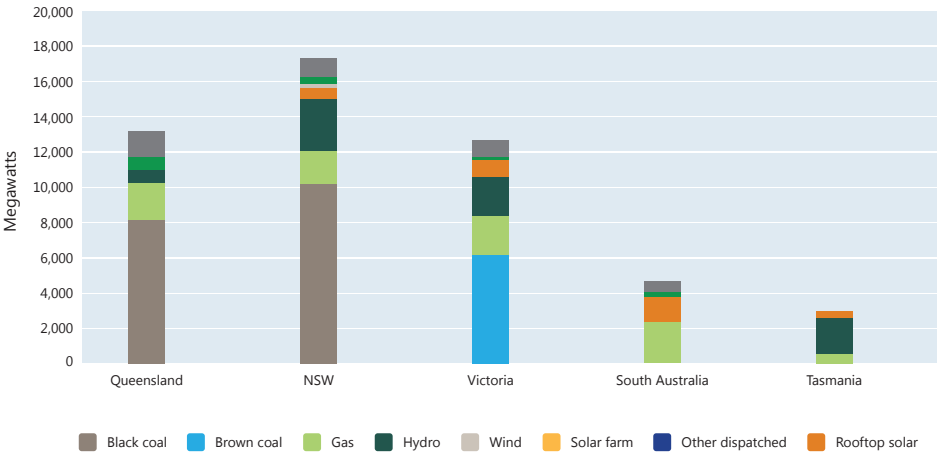


Source: Clean Energy Council, Clean Energy Australia report 2016 (May 2017) – see [20]

Victoria, New South Wales and Queensland are heavily reliant on coal, whereas South Australia is more reliant on gas powered generation and variable renewables.

Tasmania remains the leader in its use of renewable energy, with renewable energy supplying over 90% of its electricity, largely due to its hydro power plants.

Generation capacity in the NEM, by region and fuel source, 1 January 2017



Note: Rooftop solar generation is not traded through the NEM. Electricity generated from this source acts to reduce the demand for grid supplied electricity.

Source: Australian Energy Market Operator, Energy Update: June 2016 (May 2017) – see [21]



## Key trends

Australia's energy industry is undergoing an unprecedented transformation. Recent market shifts reveal a number of key trends that will continue to affect Australia's future energy mix. Overall demand for electricity from the grid has declined, due to a reduction in industrial demand and price-conscious consumers.

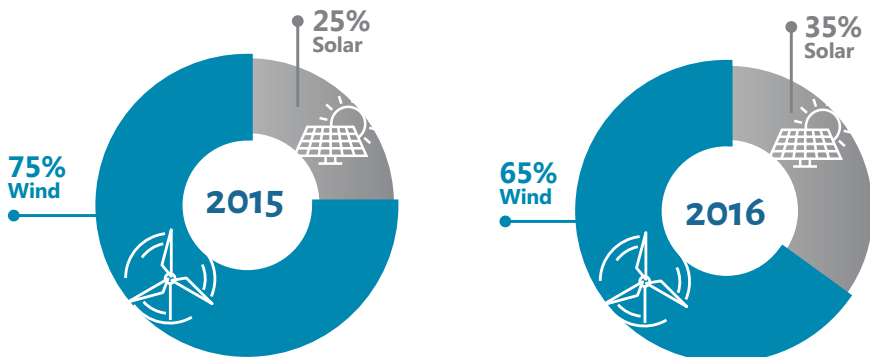
AEMO forecasts that rooftop PV installations will increase by 350% and contribute to around 11% of the NEM's energy requirements by 2035–36.<sup>22</sup> Forecasted strong growth in rooftop PV electricity will contribute to the further flattening demand for electricity supplied from the grid.<sup>23</sup> While domestic rooftop remains the predominant part of Australia's solar power generation, there has been a continuing shift

towards large-scale solar power stations in 2016. A number of large, high-voltage, grid-connected solar farms are now operational at Moree, Nyngan and Broken Hill with more planned or currently under construction.<sup>24</sup>

The large-scale projects that were successfully funded in 2015–2016 were primarily wind and solar PV projects. Approximately 35% of new capacity financed during 2016 was solar.<sup>26</sup> The ongoing development of those technologies has resulted in lower levelised costs of electricity (LCOE) which are now on par with conventional fossil fuel technologies.

The growth of renewable powered energy is expected to cause a decline in gas powered generation by 60% by 2020 compared with 2015 levels.<sup>27</sup>

### Change in percentage of technology mix for estimated MW capacity



Coal and gas plants continue to be shut down or mothballed in South Australia, Queensland, New South Wales, Victoria and Tasmania. The closure of the Hazelwood power station in Victoria in March 2017, Australia's most emissions intensive power station, removed 1,600MW of brown coal generation from the NEM. The power plants had become increasingly unprofitable due to rising competition from renewable energy generation and rising maintenance costs. AGL Energy plans to retire its 2,000MW Liddell plant in NSW in 2022.<sup>28</sup>

Emerging electricity storage technologies are set to fundamentally change the way in which energy is stored and used. Such technologies enable excess energy captured during the day to be stored for later use, rather than feeding the excess back into the grid. By 2035–36, 3,800MW of total rooftop PV generation is expected to have integrated battery storage.<sup>29</sup>

Renewable energy investment stagnated during 2014/15 due to uncertainty created by the Abbott Government's review of the RET in 2014.

The last of the lingering uncertainty from the review had washed out of the industry's system by the end of 2016. As of March 2017, the projects set to go to construction during the year added up to more than 3,725 direct jobs, \$6.9 billion in investment and 3,150MW of new generation capacity.<sup>30</sup>

Confidence has returned to the sector, bolstered by State and Territory initiatives to encourage investment in renewable energy projects.

The Federal Government's game changing announcement of its plans for a major expansion to the Snowy Hydro Scheme by as much 50% demonstrates its renewed commitment to a cleaner energy mix for Australia. New investment funds are also emerging, greenfield project power purchase agreements (PPAs) are being struck and there is increased interest from corporates.<sup>31</sup> These activities are boosting confidence in the market's ability to meet the RET, increasing liquidity in financing markets and providing alternative off-take arrangements.

*As of March 2017, the projects set to go to construction during the year added up to more than 3,725 direct jobs, \$6.9 billion in investment and 3,150MW of new generation capacity.<sup>30</sup>*

## Market snapshot



The market share of renewable energy currently accounts for roughly **17.3%** of Australia's total electricity generation and is expected to reach **23.5%** by 2020<sup>32</sup>

**MORE THAN 30** major renewable energy projects

are already under construction or have secured funding and will start in 2017, delivering a program of work which is expected to create:



**Coal fire generators are being retired and not being replaced,** removing significant capacity from NEM and leaving a tighter supply-demand balance.



**\$6.9** billion in investment



**3,725** jobs



and build **3,150** MW of capacity<sup>35</sup>



**MORE THAN DOUBLE** new large-scale renewable energy power stations were accredited in 2016 than in 2015.<sup>34</sup>



**Grid consumption rose by 2% in 2015-16**

reversing several years of declining consumption. The rise was apparent in all mainland regions. Queensland recorded the strongest growth, reflecting the rising energy requirements of its liquefied natural gas industry.<sup>33</sup>



which is enough to power 500,000 additional homes.



**HIGH GAS PRICES**

due to tighter supply, rising production costs and regulatory restrictions on exploration are contributing to high electricity prices.

The Government provided an initial estimate of roughly \$2 billion to cover the cost of the expansion, demonstrating a clear commitment to long-term renewable energy generation. The announcement should also **strengthen investor confidence and encourage further investment** in the Australian renewable energy sector.



An aerial photograph of a turbulent ocean surface, showing deep turquoise water with intricate white foam patterns from breaking waves. The texture is highly detailed, with swirling eddies and frothy crests.

# Key industry **factors**

The Federal Government must build on recent successes and rising confidence to ensure Australia is one of the most enticing places to invest in renewable energy. In particular, market and regulatory reform is required to effectively integrate renewable electricity generators into the electricity grid and to recognise incentives for new services and solutions.

## Policy and investor confidence

One of the most significant impediments to policy stability has been the susceptibility of the RET to political change. Historically, policy uncertainty and increased politicisation of climate change (both domestically and overseas) has undermined the stability of Australia's renewable energy industry and damaged investor confidence.

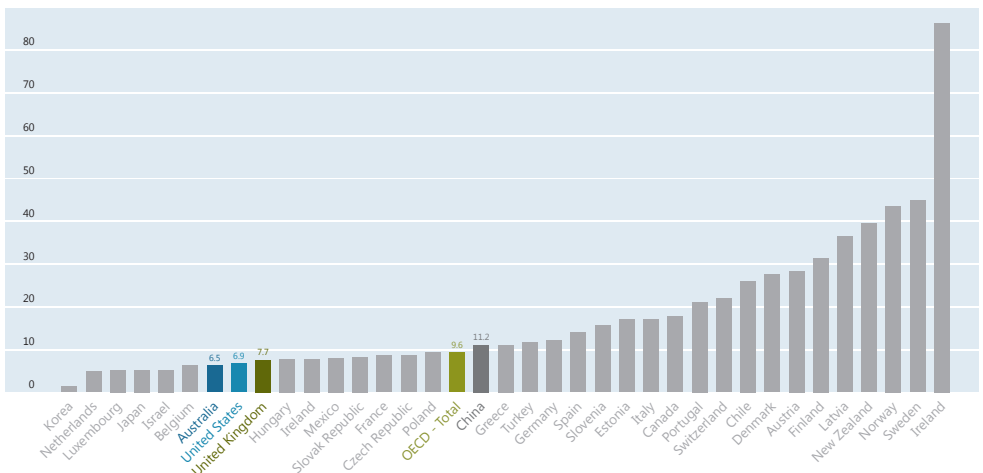
Now that the RET has achieved years of continued success and stability, the next challenge will be clarity around the Federal Government's National Energy Guarantee (NEG). The NEG is a new energy policy announced

on 17 October 2017 as part of the Federal Government's long awaited final response to the Independent Review into the Future Security of the National Electricity Market delivered by a panel led by Dr Alan Finkel AO (**Finkel Review**).

The announcement represents a rejection by the Federal Government of the Finkel Review's proposal for a nationwide Clean Energy Target (CET).

The NEG, recommended by the new Energy Security Board (ESB), is made up of two parts – a reliability guarantee and an emissions guarantee.

## Renewable energy as a percentage of primary energy supply in 2015



Source: OECD, Renewable energy (indicator) (2017) – see [37]

## *Recent investment and project development trends demonstrate increasing momentum in renewables in Australia, which will continue to strengthen over the next few decades.*

The **reliability guarantee** will require that electricity retailers source a yet to be specified part of their energy mix from 'dispatchable energy' such as coal, gas, pumped hydro and battery technology. It is referred to as 'dispatchable' because it is not subject to environmental intermittency risk, such as solar and wind. This will be regionalised.

The **emissions guarantee** has even less detail, but is said to contribute to Australia being able to comply with its international obligations. The suggestion is that emissions from electricity generation will have to contribute proportionately to Australia's 26-28% Paris emission reduction target to be reached by 2030.

While the details of the NEG are still to be provided, the driving force behind this move away from the Federal Government's preference for renewable energy to fuel neutrality is the need for consistent and reliable energy to keep the lights on, full stop.

The inevitable reality is that there is a strong global trend towards transitioning to a future driven by clean energy. The renewables sector in Australia is not as developed compared to its international peers – the above graph identifies Australia as being behind its international peers in terms of renewable energy as a percentage of primary energy supply in 2015.

However, recent investment and project development trends demonstrate increasing momentum in renewables in Australia, which will continue to strengthen over the next few decades.

Australia's return to the top ten most attractive countries to invest in new renewable projects also demonstrates rising confidence in the sector.<sup>38</sup>

Given the short timeframe left to achieve the 2020 RET, indications are that the industry is set for a big 2017/18 financial year and considerable commercial opportunities are anticipated over the next few years.

### **Grid connection**

The complete integration of renewable energy sources into the existing NEM grid network poses significant technical, legal and regulatory challenges. Electricity supply relies on sophisticated interlocking technologies which balance the supply and demand of electricity without damaging electricity lines.<sup>39</sup>

Renewable energy sources, such as wind and solar, that are intermittent in nature can pose considerable technical challenges to the ability of the grid network to integrate them. A further challenge to such integration is the fact that many renewable energy resources are often located in remote areas that are currently inaccessible or costly to connect to the existing grid.



If Australia is to utilise a high percentage of renewable energy resources, careful planning and reform of the energy market will be required to successfully integrate intermittent renewable energy to the grid. In particular, legal and regulatory frameworks for the NEM will need to be reformed to encourage investment in large-scale transmission expansion and upgrades and to facilitate the introduction of battery storage technologies so that power systems can access remote renewable resources and deliver efficient and reliable renewable energy. International experience and capability in engineering demonstrates that this is entirely feasible.<sup>40</sup>

The Finkel Review has recognised the need to modernise the NEM to ensure an orderly transition to a reliable and low emissions electricity system – one of the three key pillars of the Finkel Review recommends improved system planning

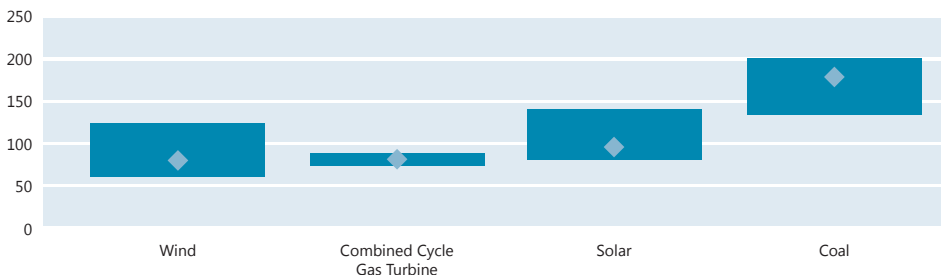
to facilitate the efficient development and connection of renewable energy zones across the NEM.<sup>41</sup>

### Falling costs of renewable energy generation

Renewable energy generation in Australia is becoming continuously more cost efficient. Technological advances in renewable generation, most noticeably in wind and solar, has made renewable generation more cost competitive against its conventional rivals.

According to Bloomberg New Energy Finance, renewable energy is now the cheapest form of new energy generation that can be built in Australia. The cheapest renewable energy projects are now below the cost of gas, which continues to struggle with securing affordable fuel supplies, and well below the cost competitiveness of new coal.<sup>43</sup>

#### 2017 levelised cost of energy for new build technologies in Australia \$AU/MWh



Source: Clean Energy Council, Clean Energy Australia report 2016 (May 2017) – see [42]

The increased efficiency and technologically driven savings that have already materialised are also likely to be supplemented in the future by savings generated by the increased take up of renewable energy generation sources. Increased market competitiveness, innovation and economies of scale that come with increased usage are all expected to contribute to falling costs.

### **Reliability of renewable energy**

Renewable energy (especially wind and solar) suffers from a perception of being unreliable when compared to traditional fossil fuel sources. The source of this perception can be traced back to one simple question: what happens when the sun does not shine or the wind does not blow?

Historically, proponents of renewable energy have struggled to answer this basic question, and this has been a contributing factor to the slow take up in Australia of renewable energy sources that are seen as intermittent (i.e. wind and solar for large-scale generation).

Revised market designs and structures coupled with recent technological advances in the storage of generated solar electricity are set to drastically improve the reliability of intermittent renewable energy sources.

If the challenges of integrating renewable energy into the existing grid can be overcome, Australia is well positioned to take advantage of its geographical vastness to produce a highly-distributed renewable electricity system with an interconnected network of generators to fill gaps in electricity demand.

*Revised market designs and structures coupled with recent technological advances in the storage of generated solar electricity are set to drastically improve the reliability of intermittent renewable energy sources.*



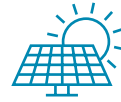
### **Pump storage hydroelectricity**

Pump storage has attracted increased investment due to its energy storage capabilities and subsequent ability to balance the intermittency of solar and wind generated power. Enhanced dam construction techniques and more effective engineering designs have improved the energy capacities of pump storage power plants.



### **Wind**

Technological advances in wind power such as improved micro-siting of turbines, more efficient blades and control systems and predictive, smart maintenance models all help increase the generational output of both offshore and onshore wind energy generation models. The global average wind power cost is expected to drop 13.5% by 2025, compared with 2015 levels.



### **Solar**

Technological developments in solar plants are improving efficiencies each year, resulting in higher operating temperatures, decreased thermal storage costs and solar PV module advances leading to reduced panel surface area requirements for each watt of power generated. The global average of solar costs is predicted to fall 57% by 2025, compared with 2015 costs.

*Source: IRENA, The power to change: solar and wind power cost reduction potential to 2025 (June 2016) – see [44]*

# Glossary

Definitions provided here are not comprehensive definitions and are only intended to assist the reader with the context of that term, which may be used in this guide.

<b>ACCC</b>	Australian Competition and Consumer Commission
<b>ACCU</b>	Australian Carbon Credit Units
<b>ACL</b>	Australian Consumer Law
<b>AEMC</b>	Australian Energy Market Commission
<b>AEMO</b>	Australian Energy Market Operator
<b>AER</b>	Australian Energy Regulator
<b>ANZ</b>	Australia and New Zealand Banking Group
<b>APRA</b>	Australian Prudential Regulation Authority
<b>ARENA</b>	Australian Renewable Energy Agency
<b>ASIC</b>	Australian Securities and Investments Commission
<b>ASX</b>	Australian Securities Exchange
<b>BOOT</b>	Build, own, operate and transfer
<b>CBA</b>	Commonwealth Bank of Australia
<b>CCA</b>	<i>Competition and Consumer Act 2010</i> (Cth)
<b>CEC</b>	Clean Energy Council
<b>CEFC</b>	Clean Energy Finance Corporation
<b>CEIF</b>	Clean Energy Innovation Fund
<b>Centre</b>	Critical Infrastructure Centre
<b>CER</b>	Clean Energy Regulator
<b>CET</b>	Clean Energy Target
<b>CETO</b>	Technological system to create electricity and desalinated water from ocean wave energy
<b>COAG</b>	Council of Australian Governments
<b>Corporations Act</b>	<i>Corporations Act 2001</i> (Cth)
<b>DIBP</b>	Department of Immigration and Border Protection
<b>EKF</b>	Denmark's Export Credit Agency
<b>EPC</b>	Engineer, procure and construct
<b>EPCM</b>	Engineer, procure, construct and maintain
<b>ERF</b>	Emissions Reduction Fund
<b>ESB</b>	Energy Security Board
<b>ESI Companies</b>	Early stage innovation companies
<b>Finkel Review</b>	Independent Review into the Future Security of the National Electricity Market delivered by a panel led by Dr Alan Finkel AO (9 June 2017)

<b>FIRB</b>	Foreign Investment Review Board
<b>GST</b>	Goods and Services Tax
<b>GWh</b>	Gigawatt hours
<b>ICS</b>	Integrated Cargo System
<b>ILUA</b>	Indigenous Land Use Agreement
<b>ITAA 97</b>	<i>Income Tax Assessment Act 1997</i> (Cth)
<b>JV</b>	Joint venture
<b>Kyoto Units</b>	Carbon equivalent emission units that are traded on international compliance markets established under the Kyoto Protocol
<b>LGCS</b>	Large-Scale Generation Certificates
<b>LNG</b>	Liquefied natural gas
<b>LOCE</b>	Lower levelised cost of electricity
<b>MIS</b>	Managed investment scheme
<b>MW</b>	Megawatt
<b>NAB</b>	National Australia Bank
<b>Native Title Act</b>	<i>Native Title Act 1993</i> (Cth)
<b>NEG</b>	National Energy Guarantee
<b>NEL</b>	National Electricity Law
<b>NEM</b>	National Electricity Market
<b>NER</b>	National Electricity Rules
<b>NGO</b>	Non-governmental organisation
<b>PPA</b>	Power purchase agreement
<b>PPP</b>	Public private partnership
<b>PV</b>	Photovoltaic
<b>QIC</b>	Queensland Investment Corporation
<b>R&amp;D</b>	Research and development
<b>RET</b>	Renewable Energy Target
<b>SDPWOA</b>	<i>State Development Public Works and Organisation Act 1971</i> (Qld)
<b>SPA</b>	<i>Sustainable Planning Act 2009</i> (Qld)
<b>SPV</b>	Special purpose vehicle
<b>STCS</b>	Small-Scale Technology Certificates
<b>TNSP</b>	Transmission Network Service Provider
<b>WEM</b>	Wholesale Electricity Market (in Western Australia)

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# Endnotes

1. Department of the Environment and Energy, The Renewable Energy Target (RET) Scheme <<http://www.environment.gov.au/climate-change/renewable-energy-target-scheme>>.
2. Clean Energy Council, 'Clean Energy Australia report 2016' (Report, May 2017) 12 <<https://www.cleanenergycouncil.org.au/policy-advocacy/reports/clean-energy-australia-report.html>>.
3. Ibid.
4. Ibid.
5. Geoscience Australia, Solar Energy <<http://www.ga.gov.au/scientific-topics/energy/resources/other-renewable-energy-resources/solar-energy>>.
6. Australian Energy Market Operator, 'Energy Update: June 2016' (May 2017) 9 <<https://www.aemo.gov.au/publications/state-of-the-energy-market-reports/state-of-the-energy-market-may-2017>>.
7. Clean Energy Regulator, About the Renewable Energy Target: How the Scheme Works (29 March 2017) <<http://www.cleanenergyregulator.gov.au/RET/About-the-Renewable-Energy-Target/How-the-scheme-works>>.
8. Australian Energy Market Operator, The National Electricity Market Factsheet, 3 <<https://www.aemo.com.au/Electricity/National-Electricity-Market-NEM>>.
9. Cooperative Research Centre for Greenhouse Gas Technologies, Australian Power Generation Technology Report (Research Report, 2016), 9 <<http://www.co2crc.com.au/publication-category/reports>>.
10. Ibid.
11. Australian Energy Market Commission, National Electricity Rules (at 30 May 2017) r 3.2; Australian Energy Market Operator, An introduction to Australia's National Electricity Market (Report, July 2010), 4 <[http://www.abc.net.au/mediawatch/transcripts/1234\\_aemo2.pdf](http://www.abc.net.au/mediawatch/transcripts/1234_aemo2.pdf)>.
12. Above n 8, 2.
13. Australian Energy Market Operator, 'An introduction to Australia's National Electricity Market' (Report, July 2010), 22 <[http://www.abc.net.au/mediawatch/transcripts/1234\\_aemo2.pdf](http://www.abc.net.au/mediawatch/transcripts/1234_aemo2.pdf)>.
14. Australian Energy Market Commission, What We Do (2017) <<http://www.aemc.gov.au/About-Us/About-the-AEMC/Our-role>>.
15. Australian Energy Regulator, Our role (2017) <<https://www.aergov.au/about-us/our-role>>.
16. Council of Australian Governments, Our role (2017) <<http://www.coagenergycouncil.gov.au/about-us/our-role>>.
17. Australian Renewable Energy Agency, 'Innovating Energy: ARENA's Investment Plan 2017' <[https://arena.gov.au/assets/2017/05/AU21397\\_ARENA\\_IP\\_Document\\_FA\\_Single\\_Pages\\_LORES.pdf](https://arena.gov.au/assets/2017/05/AU21397_ARENA_IP_Document_FA_Single_Pages_LORES.pdf)>.
18. Clean Energy Finance Corporation <<https://www.cefc.com.au/where-we-invest/innovation-fund.aspx>>
19. Above n 3, 8.
20. Ibid 30.
21. Above n 6, 30.
22. Australian Energy Regulator, 'State of the Energy Market May 2017' (30 May 2017) 35 <<https://www.aergov.au/publications/state-of-the-energy-market-reports/state-of-the-energy-market-may-2017>>.
23. Australian Energy Market Operator, 'National Electricity Forecasting Report' (Report, June 2016) 3 <[https://www.aemo.com.au/-/media/Files/Electricity/NEM/Planning\\_and\\_Forecasting/NEFR/2016/2016-National-Electricity-Forecasting-Report-NEFR.pdf](https://www.aemo.com.au/-/media/Files/Electricity/NEM/Planning_and_Forecasting/NEFR/2016/2016-National-Electricity-Forecasting-Report-NEFR.pdf)>.
24. Above n 9.
25. Clean Energy Regulator, 'Tracking Towards 2020: Encouraging renewable energy in Australia' (2016) 52 <<http://www.cleanenergyregulator.gov.au/About/Accountability-and-reporting/administrative-reports/tracking-towards-2020-encouraging-renewable-energy-in-australia>>.
26. Ibid 50.
27. Australian Energy Market Operator, 'National Gas Forecasting Report' (December 2015) 19 <<https://www.aemo.com.au/-/media/Files/PDF/2015-National-Gas-Forecasting-Report-v20--2-March-2016.pdf>>.
28. Above n 22, 40.
29. Ibid 37.
30. Above n 2, 6.
31. Ernst & Young, 'Meeting the Renewable Energy Target: Innovative approaches to financing renewables in Australia' (Report, 2016), 8 <<http://www.ey.com/au/en/industries/power---utilities/ey-meeting-the-renewable-energy-target>>.
32. Above n 2, 6.
33. Above n 22, 22.
34. Above n 25, 29.
35. Above n 2.
36. Department of Environment and Energy, 'Independent Review into the Future Security of the National Electricity Market' (9 June 2017) <<http://www.environment.gov.au/energy/national-electricity-market-review>>.
37. OECD, Renewable energy (indicator) (2015) <<https://data.oecd.org/energy/renewable-energy.htm>>.
38. Ernst & Young, 'Renewable energy country attractiveness index (RECAI)' (Report, Issue 47, May 2016) 10.
39. Above n 13, 3.
40. Clean Energy Council, 'Recommendations for the Reform of Australia's Energy System' (Report, August 2016), 11 <<https://www.cleanenergycouncil.org.au/policy-advocacy/reports.html>>.
41. Above n 36, 5.
42. Above n 2, 19.
43. Ibid.
44. IRENA, 'The power to change: solar and wind power cost reduction potential to 2025' (June, 2016) 10 <<http://www.irena.org/menu/?mnu=Subcat&PrMenuID=36&CatID=1418&SubcatID=2733>>.
45. Origin Energy, '2017 Half Year Results: Half year ending 31 December 2016' (Report, 16 February 2017), 25 <<https://www.originenergy.com.au/content/dam/origin/about/investors-media/senate-submission-carbon-risk-disclosure-160331/Half%20Year%20Results%20Presentation.pdf>>.
46. The Honourable Mark Bailey, Minister for Energy, Biofuels and Water Supply, 'Queensland powers ahead with another renewable energy project' (Media Release, 31 January 2017).
47. EnergyAustralia, 'Agreements worth \$1.5bn to underpin renewables development' (Media Release, 6 February 2017).
48. Anita Stadler, Looking to hedge energy contracting risks in 2017? Consider a corporate renewable power purchase agreement (9 February 2017) Energetics <<http://www.energetics.com.au/resources/latest-news/climate-change-matters/managing-energy-contracting-risks-in-2017-with-cor>>.
49. Commonwealth Bank of Australia, Transparently: Make transparent and balanced decisions <<https://www.commbank.com.au/cr-report2016/cs-transparently.html>>.
50. AGL, Powering Australian Renewables Fund <<https://www.agl.com.au/about-agl/what-we-stand-for/sustainability/powering-australian-renewables-fund>>.
51. Clean Energy Finance Corporation, 'CEFC Investment Policies' (Report) <<https://www.cleanenergyfinancecorp.com.au/media/40383/cefc-investment-policies.pdf>>.
52. Australian Renewable Energy Agency, 'General Funding Strategy 2015/16-2017/18' (Report) <<https://arena.gov.au/about/funding-strategy-investment-plan/>>.
53. Clean Energy Council, New renewable energy projects point to biggest year for industry since Snowy Hydro (11 February 2017) <<https://www.cleanenergycouncil.org.au/news/2017/February/2017-renewable-energy-projects-snowy-hydro.html>>.

54. Queensland Government, Solar 150: Queensland's large-scale solar investment program (Fact Sheet, 2016) <<http://www.qldrepanel.com.au/about-the-study/documents/42575/download>>.
55. Ibid.
56. Australian Energy Market Operator, Participant categories in the National Electricity Market (2017) 2 <[https://www.aemo.com.au/-/media/Files/Electricity/NEM/Participant\\_Information/Participant-Categories-in-the-NEM.pdf](https://www.aemo.com.au/-/media/Files/Electricity/NEM/Participant_Information/Participant-Categories-in-the-NEM.pdf)>.
57. Australian Energy Market Operator, Transmission and distribution in the NEM – process overview (2016) <<https://www.aemo.com.au/Electricity/National-Electricity-Market-NEM/Network-connections/Transmission-and-distribution-in-the-NEM--process-overview>>.
58. Australian Energy Market Operator, AEMO completion (2016) <<https://www.aemo.com.au/Datasource/Archives/Archive1260>>.
59. *Renewable Energy (Electricity) Act 2000* (Cth) s 17(1).
60. Clean Energy Regulator, Eligibility Criteria (31 October 2016) <<http://www.cleanenergyregulator.gov.au/RET/Scheme-participants-and-industry/Power-stations/Eligibility-criteria>>.
61. Above n 2, 9.
62. Mark Ludlow, 'State-based renewable schemes to push RET', Australian Financial Review (online), 29 January 2017 <<http://www.afrc.com/business/statebased-renewable-schemes-to-push-up-ret-20170127-gu077a>>.
63. Department of Environment and Energy, Review of Australia's climate change policies <<http://www.environment.gov.au/climate-change/review-climate-change-policies>>.
64. RepuTex Carbon, Industry to the fore? Meeting Australia's 2030 target without an emissions intensity scheme (30 January 2017) <<http://www.reputex.com/research-insights/industry-to-the-fore-meeting-australias-2030-emissions-target-without-an-eis/>>.
65. For further information on reverse auctions in the ACT, see Environment, Planning and Sustainable Development Directorate – Environment (ACT), How do the ACT's renewable energy reverse auctions work? <<http://www.environment.act.gov.au/energy/cleaner-energy/how-do-the-acts-renewable-energy-reverse-auctions-work>>.
66. Above n 2, 21. Climate Council of Australia, 'The Australian Renewable Energy Race: Which States are Winning or Losing?' (Report, 2014) <<http://www.climatecouncil.org.au/uploads/ee2523dc632c9b01df11ecc6e3dd2184.pdf>>.
67. Above n 2, 9.
68. Ernst & Young, Power transactions and trends: 2015 review and 2016 outlook (Report, 2015) <[http://www.ey.com/Publication/wwLUAssets/EY-power-transactions-and-trends-q4-2015/\\$FILE/EY-power-transactions-and-trends-q4-2015.pdf](http://www.ey.com/Publication/wwLUAssets/EY-power-transactions-and-trends-q4-2015/$FILE/EY-power-transactions-and-trends-q4-2015.pdf)>.
69. State of NSW and Office of Environment and Heritage, 'Climate Change Fund: Draft Strategic Plan 2017 to 2022' (Report, 2016) <<http://www.environment.nsw.gov.au/resources/climatechange/Environmentalfuturefundingpackage/draft-climate-change-fund-strategic-plan-160438.pdf>>.
70. Clean Energy Council, 'Clean Energy Australia report 2015' (Report, 2016) 15 <<https://www.cleanenergycouncil.org.au/policy-advocacy/reports.html>>.
71. Northern Territory Government, 'NT Government's Renewable Energy Panel holds first meeting' (Media Release, 16 December 2016) <<https://nt.gov.au/news/2016/december/nt-governments-renewable-energy-panel-holds-first-meeting>>.
72. Queensland Government – Department of Energy and Water Supply, 'Powering Queensland Plan' (5 June 2017) <[https://www.dews.qld.gov.au/\\_data/assets/pdf\\_file/0008/1253825/powering-queensland-plan.pdf](https://www.dews.qld.gov.au/_data/assets/pdf_file/0008/1253825/powering-queensland-plan.pdf)>.
73. Ibid 5.
74. Ibid.
75. Above n 54.
76. Above n 22.
77. Above n 2, 23.
78. Above n 70, 50.
79. City of Adelaide, 'Carbon Neutral Strategy' 2015-2025' (2015) 5.
80. Government of South Australia, 'Our Energy Plan' (Report, March 2017) <<http://ourenergyplan.sa.gov.au/assets/our-energy-plan-sa-web.pdf>>.
81. Above n 2, 23.
82. Ibid.
83. Environment, Land, Water and Planning – Victorian State Government, Victoria's renewable energy targets <<https://www.energy.vic.gov.au/renewable-energy/victorias-renewable-energy-targets>>.
84. Daniel Andrews MP 'Victorian Green Bonds an Australian and World First', (Media Release, Victorian Government, 20 July 2016).
85. Energy Matters, Western Australia's Election – What Now For Renewable Energy (13 March 2017) <<http://www.enenergymatters.com.au/renewable-news/western-australia-renewables-em5947/>>.
86. PwC, 'Construction, operation, regulatory and bankability issues for utility scale renewable energy projects' (Report, January 2017), 12 <<http://www.pwc.com.au/legal/assets/investing-in-infrastructure/iif-11-construction-operation-regulatory-feb16-4.pdf>>.
87. Utility Magazine, Utility scale solar takes off (17 February 2016) <<http://www.utilitymagazine.com.au/utility-scale-solar-takes-off/>>.