

# NSW Renewable Energy Action Plan

## Implementation Summary – 2013-2018

### GOAL 1: Attract Renewable Energy Investment

Action	Status	Summary of Activities	Results
<b>1. Improve the process of network connections</b>	Completed	<ul style="list-style-type: none"><li>Reviewed the network connection process in collaboration with NSW network businesses and identified reform opportunities to facilitate connections by large and small scale renewable energy developers.</li></ul>	<ul style="list-style-type: none"><li>Government and networks are coordinating through the NSW Networks Working Group to implement changes identified in the review process. The changes are consistent with the Energy Networks Association's national Distributed Energy Resources (DER) Grid Connection Guidelines Framework and Principles.</li></ul>
		<ul style="list-style-type: none"><li>Supported a Council of Australian Governments (COAG) submission in 2013 to the Australian Energy Market Commission (AEMC) that encouraged network businesses to look for low cost alternatives to infrastructure investment for addressing network system constraints (amending the Demand Management Incentive Scheme).</li></ul>	<ul style="list-style-type: none"><li>NSW network businesses have increased use of demand management and distributed generation to manage system constraints. For example, in 2018 TransGrid tendered for 20 megawatts (MW) of demand management to meet peak demand during the 2018/19 summer, to defer investment in new transmission infrastructure.</li></ul>
		<ul style="list-style-type: none"><li>Supported changes to Chapter 5 and 5A of the National Electricity Rules to reduce barriers for connecting generators to distribution networks. Partnered with the AEMC to host a workshop to communicate the changes to industry.</li></ul>	<ul style="list-style-type: none"><li>The AEMC amended the rules in November 2014. A Climate Works report from 2015 showed a high level of compliance with the rule change leading to reduced timeframes for network connections in NSW.</li></ul>
		<ul style="list-style-type: none"><li>Convened a working group of utility and industry stakeholders to amend the Service and Installation Rules, the code used by network companies when connecting a customer to the distribution network.</li></ul>	<ul style="list-style-type: none"><li>Amended Rules were released in June 2015 and have reduced uncertainty and increased consistency for installers and network companies in their treatment of new technologies, making it easier for customers to connect.</li></ul>

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		<ul style="list-style-type: none"> <li>Funded the development of the Network Opportunity Mapping project which includes interactive maps showing where energy demand is expected to outstrip supply.</li> </ul>	<ul style="list-style-type: none"> <li>Maps were released in October 2015 on the Australian Renewable Energy Mapping Infrastructure (AREMI) platform. The maps are a valuable resource to help industry identify opportunities for distributed generation and other demand-side measures to address network constraints as a lower-cost alternative to network upgrades.</li> <li>Additional data added in October 2017 shows how much new generation such as new solar and wind farms – can be connected to the grid in each area, making it faster and easier for communities and renewable energy investors to locate and size new projects.</li> </ul>
		<ul style="list-style-type: none"> <li>Provided \$450,000 in funding support, along with the Australian Renewable Energy Agency (ARENA), to support TransGrid to undertake a feasibility study on a potential renewable energy network connection hub in the New England region.</li> </ul>	<ul style="list-style-type: none"> <li>TransGrid delivered a public knowledge sharing report as part of the study. The report identified that the project would save proponents \$20 million in combined connection costs by accessing economies of scale, but that commercial barriers hinder the coordination by generators to develop hubs. The study informed findings in the Independent Review into the Future Security of the National Electricity Market (Finkel Review) including the recommendation that the Australian Energy Market Operator (AEMO) investigate 'Renewable Energy Zones'.</li> </ul>

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		<ul style="list-style-type: none"> <li>In November 2018, the NSW Government launched the Transmission Infrastructure Strategy to unlock private sector investment in priority energy infrastructure projects, which can deliver least-cost energy to customers to 2040 and beyond</li> </ul>	<ul style="list-style-type: none"> <li>The Transmission Infrastructure Strategy aims to:               <ul style="list-style-type: none"> <li>Boost our interconnection with Victoria, South Australia and Queensland, and unlock more power from the Snowy Hydro Scheme.</li> <li>Increase NSW's energy capacity by prioritising Energy Zones in the Central-West, South West and New England regions of NSW, which will become a driving force to deliver affordable energy into the future.</li> <li>Work with other states and regulators to streamline regulation and improve conditions for investment.</li> </ul> </li> </ul>
<b>2. Consider a more strategic and integrated approach to assessment of renewable energy projects</b>	Completed	<ul style="list-style-type: none"> <li>Streamlined the Secretary's Environmental Assessment Requirements for large-scale solar projects and introduced case manager roles for major infrastructure projects to monitor assessment timeframes, including for solar.</li> </ul>	<ul style="list-style-type: none"> <li>Since 2013, the NSW Government has approved 48 solar and wind projects.</li> </ul>
		<ul style="list-style-type: none"> <li>Developed a new planning requirement to promote energy security and reliability as part of the Secretary's Environmental Assessment Requirements for State significant energy projects.</li> </ul>	<ul style="list-style-type: none"> <li>The new requirement encourages upfront consideration by proponents of how new electricity projects can contribute to system security and reliability, for example by installing battery storage or smart inverters.</li> <li>As of November 2018, eight large-scale solar projects have been approved with the option for on-site battery storage.</li> </ul>

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<b>3. Remove technology-specific barriers to investment</b>	Completed	<ul style="list-style-type: none"> <li>In 2015, the Energy from Waste Policy Statement was released to set out the framework that apply to facilities in NSW proposing to thermally treat waste or waste-derived materials for the recovery of energy.</li> </ul>	<ul style="list-style-type: none"> <li>Ensured clarity for industry and community regarding energy from waste projects and better outcomes for the environment.</li> </ul>
		<ul style="list-style-type: none"> <li>In 2014, two additional types of biomaterials received an exemption to allow for burning to generate electricity under the <i>Protection of the Environment Operations (General) Regulation 2009</i>.</li> </ul>	<ul style="list-style-type: none"> <li>Regulatory barrier to bioenergy removed making it easier for industry to develop bioenergy projects in NSW. The position supported the Commonwealth Government's amendment to the Renewable Energy Target.</li> </ul>
<b>4. Create an online information portal that provides information to investors</b>	Completed	<ul style="list-style-type: none"> <li>Launched a new 'Energy NSW' online portal, which includes information for households, businesses and investors, at <a href="http://energy.nsw.gov.au">energy.nsw.gov.au</a>.</li> </ul>	<ul style="list-style-type: none"> <li>The online portal provides information to consumers and businesses on how to save money on their energy bills, and opportunities for investors, including the government's latest clean energy initiatives.</li> </ul>
		<ul style="list-style-type: none"> <li>Developed and published renewable energy resource maps, including an interactive online version.</li> </ul>	<ul style="list-style-type: none"> <li>The maps help to educate investors, researchers and the community about renewable energy opportunities in NSW. The data was also shared with the Australian Renewable Energy Mapping Initiative (AREMI) to ensure wide distribution.</li> <li>The maps were provided to schools in NSW to educate students about renewable energy resources across the state.</li> </ul>

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<b>5. Promote and facilitate investment opportunities with the appointment of a Renewable Energy Advocate</b>	Completed	<ul style="list-style-type: none"> <li>Appointed Australia’s first Renewable Energy Advocate to work with industry, research institutions and communities to facilitate greater levels of electricity generation from renewable energy sources in NSW.</li> </ul>	<ul style="list-style-type: none"> <li>The Renewable Energy Advocate, Ms Amy Kean, provided support to 51 large-scale renewable energy generation projects in NSW, worth around 6,500 MW and \$9.9 billion from July 2013 until October 2018 and led the implementation of the Renewable Energy Action Plan.</li> <li>The Advocate’s work to drive uptake of renewable energy in the state was acknowledged with a NSW Green Globe Award for Public Sector Leadership.</li> </ul>
		<ul style="list-style-type: none"> <li>Provided focused support for the eight NSW projects shortlisted under ARENA’s \$100 million Competitive Round for Large-scale Solar. This included helping the proponents to secure agreements to connect to the network and informing them about the requirements for planning assessment to ensure they met the funding application deadline.</li> </ul>	<ul style="list-style-type: none"> <li>ARENA provided \$34.9 million to five of the projects, with total capacity of over 160 MW. In November 2018, four of the projects are operational and one is in the final stages of commissioning.</li> </ul>
		<ul style="list-style-type: none"> <li>Negotiated the government’s first direct renewable energy purchasing agreement with Dubbo Solar Hub. The NSW Government will buy Large-scale Generation Certificates from the project to help meet the Renewable Energy Target.</li> </ul>	<ul style="list-style-type: none"> <li>This initiative helped the Dubbo Solar Hub reach financial close. The project is now operational and generating enough electricity to power almost 10,000 NSW homes.</li> </ul>

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		<ul style="list-style-type: none"> <li>Developed a renewable energy procurement process for the Sydney Metro Northwest rail system to enter into a power purchase agreement with a large-scale renewable energy project.</li> </ul>	<ul style="list-style-type: none"> <li>In 2018, the government realised its commitment to fully offset the entire operational electricity needs of the new \$8.3 billion Sydney Metro Northwest railway – approximately 134,000 MW hours a year. Part of the electricity produced by the new Beryl Solar Farm in central western NSW will offset 100 percent of emissions on this next generation metro railway for Sydney.</li> </ul>
		<ul style="list-style-type: none"> <li>Supported establishment of the Renewable Energy Buyers Forum in NSW.</li> </ul>	<ul style="list-style-type: none"> <li>The Buyers Forum has run for two years and has increased the understanding of renewable energy purchasing among major corporates and organisations, encouraging the uptake of corporate power purchase agreements (PPAs). In 2018, the University of New South Wales (UNSW) announced that it will enter into a PPA with the Sunraysia Solar Farm in NSW.</li> </ul>
		<ul style="list-style-type: none"> <li>Provided funding to the World Wild Life Fund, Norton Rose Fulbright and Energetics to develop materials that explain how business executives can benefit from ‘corporate power purchase agreements’.</li> </ul>	<ul style="list-style-type: none"> <li>The NSW Guide to Corporate Power Purchase Agreements was released in October 2018. The Guide informs business executives on how to purchase renewable energy directly from offsite renewable energy projects, as well as manage risks and save money on their energy bills.</li> </ul>
		<ul style="list-style-type: none"> <li>Provided \$150,000 in seed funding to the Business Renewables Centre Australia, which is based on a successful model from the United States for supporting businesses to procure renewable energy, by sharing lessons from first movers.</li> </ul>	<ul style="list-style-type: none"> <li>The Business Renewables Centre Australia, located in Sydney launched in October 2018. The Centre will help connect ‘buyers’ and ‘sellers’ of electricity to accelerate the purchase of renewable energy by Australian businesses.</li> </ul>

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		<ul style="list-style-type: none"> <li>Engaged with WaterNSW to investigate how state-owned water assets could be used to support investment in energy projects.</li> </ul>	<ul style="list-style-type: none"> <li>The Expression of Interest process attracted significant interest from the private sector. WaterNSW received a large volume of quality submissions from leading players, both local and international, across a range of technologies, including proposals for pumped hydro energy storage.</li> </ul>
		<ul style="list-style-type: none"> <li>Supported amendments to the <i>Crown Land Management Regulation 2018</i> that mean that perpetual Western lands leaseholders do not need to seek approval from Crown Lands to install renewable energy generation under 5 MW.</li> </ul>	<ul style="list-style-type: none"> <li>The amendments have simplified approval processes for small to medium scale renewable energy development in far western NSW.</li> </ul>
<b>6. Request IPART to estimate a benchmark range for a fair price for small-scale generated solar energy</b>	Completed	<ul style="list-style-type: none"> <li>The Minister for Energy and Utilities has written to the NSW Independent Pricing and Regulatory Tribunal (IPART) annually to request a fair and reasonable benchmark range for solar feed-in tariffs is provided.</li> </ul>	<ul style="list-style-type: none"> <li>In 2018, IPART set a benchmark range of 6.9 – 8.45c per kilowatt hour (kWh). The benchmark range informs consumers about what is fair and reasonable expect when negotiating their retail contract.</li> <li>Over 175,000 additional NSW consumers adopted rooftop solar since 2013, bringing the total number of households and small businesses in NSW with solar to over 410,000.</li> </ul>

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<b>7. Develop an information package for small-scale solar photovoltaic (PV), solar hot water and wind generation</b>	Completed	<ul style="list-style-type: none"> <li>Released the NSW Home Solar Battery Guide to help households make informed decisions when buying and owning a battery system.</li> </ul>	<ul style="list-style-type: none"> <li>The Guide's webpage has been viewed 21,000 times since it was released in July 2017, informing NSW consumers about what to consider when buying a home energy solution.</li> <li>In 2018, Energy Consumers Australia reported that 22 per cent of NSW homes are considering installing a battery.</li> </ul>
		<ul style="list-style-type: none"> <li>Implemented the Clean Energy Strategies for Business Program, which provided \$200,000 in funding support to 20 businesses to help them adopt renewable energy and be more energy efficient.</li> </ul>	<ul style="list-style-type: none"> <li>Lessons learned will be shared in consumer resources including seven case studies about participating businesses and a how-to guide for businesses to develop a clean energy strategy.</li> </ul>
		<ul style="list-style-type: none"> <li>Rolled out the Clean Energy Knowledge Sharing Initiative, which provided \$300,000 to businesses to share stories, break down barriers and directly support clean energy projects.</li> </ul>	<ul style="list-style-type: none"> <li>The initiative supported five demonstration projects and five feasibility studies, which will test and trial innovative clean energy solutions. Case studies, videos and other information on supported projects will be made available in 2019 to share learnings from supported projects with industry and communities.</li> </ul>
		<ul style="list-style-type: none"> <li>Released the Solar Systems Fact Sheet and Hot Water Guide on the new 'Energy NSW' online portal.</li> </ul>	<ul style="list-style-type: none"> <li>These resources provide clear guidance to households and businesses on how to save money on their energy bills by adopting solar and hot water technologies.</li> </ul>

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<b>8. Support mid-scale solar PV to enable uptake of solar technologies where they are most cost effective</b>	Completed	<ul style="list-style-type: none"> <li>Commissioned a study by the Australian Photovoltaic Institute (APVI) on availability of roof space for solar panels in Sydney, which is now being expanded across NSW.</li> </ul>	<ul style="list-style-type: none"> <li>The APVI study found that at least a quarter of existing roof space in the inner City of Sydney is available for solar panels, demonstrating significant potential remains for more installations. The study was widely reported in the media and raised awareness about the significant opportunities for solar in Sydney.</li> </ul>
		<ul style="list-style-type: none"> <li>Established a panel of preferred suppliers for a whole-of-government solar power purchase agreement program to enable agencies to install solar PV on government sites.</li> </ul>	<ul style="list-style-type: none"> <li>Launched the NSW Government Solar PPA Suppliers Panel at a trial stage, which will be followed by a full roll-out across government. The electricity from these PPAs is typically 20 per cent cheaper than existing contract rates, delivering strong value for money for government.</li> </ul>
		<ul style="list-style-type: none"> <li>Developed the \$50 million Smart Energy for Homes and Businesses Program that will bring together smart energy technologies to form a 'distributed' power plant with a demand response capability of up to 200 MW.</li> </ul>	<ul style="list-style-type: none"> <li>The Program will provide grants for customers who invest in smart energy technologies and agree to contribute or reduce their energy at times of peak demand, such as on the hottest summer days.</li> </ul>
<b>9. Engage with the Commonwealth Government to facilitate construction of the Solar Flagships Program</b>	Completed	<ul style="list-style-type: none"> <li>NSW Government committed \$64.9 million towards construction of two large-scale solar plants in Nyngan (102 MW) and Broken Hill (53 MW) as part of the Solar Flagships project.</li> </ul>	<ul style="list-style-type: none"> <li>Both solar plants were commissioned in 2016 and were the first major solar farms to come online in Australia.</li> <li>Together the solar plants generate enough electricity to power 60,000 NSW homes and have developed supply chains and learnings that have reduced costs for solar farms in NSW.</li> </ul>

## GOAL 2: Build Community Support for Renewable Energy

Action	Status	Summary of Activities	Results
<b>10. Implement NSW Wind Energy Planning Framework</b>	Completed	<ul style="list-style-type: none"> <li>Released the Wind Energy Guideline to ensure that NSW has the right settings to attract investment in wind energy, while balancing the interests of the community.</li> </ul>	<ul style="list-style-type: none"> <li>The Guideline’s principles have been applied to the assessment of four approved projects since it was released – Rye Park Wind Farm, Biala Wind Farm, Liverpool Range Wind Farm and Bango Wind Farm.</li> <li>The Department of Planning and Environment received an award for excellence from the Planning Institute Australia (PIA) for its work on the Guideline for ‘improving planning processes and practices’. The Guideline includes a newly developed method to help early identification of visual amenity impacts to improve siting and design of projects.</li> </ul>
		<ul style="list-style-type: none"> <li>Released Draft Large-Scale Solar Energy Guidelines in November 2017.</li> </ul>	<ul style="list-style-type: none"> <li>The Draft Large-Scale Solar Guideline identifies the key assessment considerations for solar farms in NSW and emphasises the importance of best practice engagement with the community and stakeholders.</li> </ul>
<b>11. Engage communities early and effectively in renewable energy projects</b>	Completed	<ul style="list-style-type: none"> <li>Implemented the Regional Clean Energy Program to cover new renewable energy regions across NSW. Regional coordinators provided on-the-ground support through workshops and information resources to support communities to adopt and participate in renewable energy projects.</li> </ul>	<ul style="list-style-type: none"> <li>18 workshops held across regional NSW informing over 450 community members about renewable energy.</li> <li>30,000 individuals and 3,000 stakeholders reached through workshops and information resources.</li> </ul>
		<ul style="list-style-type: none"> <li>Developed the Solar Powered Pumping Guide on solar irrigation solutions in partnership with NSW Farmers. Hosted workshops across regional NSW to encourage use of the Guide and engage with local farming communities.</li> </ul>	<ul style="list-style-type: none"> <li>Solar pumping has helped to reduce costs of energy for irrigation across cotton farming, hydroponics and vineyards throughout NSW.</li> </ul>

## GOAL 2: Build Community Support for Renewable Energy

Action	Status	Summary of Activities	Results
		<ul style="list-style-type: none"> <li>Commissioned and released guidance on strategic options for ownership and benefit sharing models for wind farms in NSW.</li> </ul>	<ul style="list-style-type: none"> <li>Benefit sharing models have now been adopted for the majority of NSW wind farms. Wind farms provide over \$1 million annually to regional NSW through community enhancement funds, as well as providing income streams to landowners and neighbours.</li> </ul>
		<ul style="list-style-type: none"> <li>Launched the \$35 million Regional Energy Program that will help regional households and small businesses to better manage energy costs. It will target regional areas as they generally see higher energy costs than metropolitan areas.</li> </ul>	<ul style="list-style-type: none"> <li>The Program will offer:               <ul style="list-style-type: none"> <li>Grants for community energy projects that are innovative or create dispatchable renewable energy and benefits to the local community.</li> <li>Funding for up to five community energy hubs that improve household and small business access to expert energy advice and to initiatives such as bulk buys to help regional communities reduce bills.</li> <li>Funding to regional and remote communities to install emergency backup systems for key evacuation locations, such as a town hall, to improve resilience while also reducing energy costs during regular operations.</li> </ul> </li> </ul>

## GOAL 2: Build Community Support for Renewable Energy

Action	Status	Summary of Activities	Results
<b>12. Facilitate community ownership of five renewable energy projects</b>	Completed	<ul style="list-style-type: none"> <li>• Early-stage funding provided to 19 community energy groups to support feasibility studies on community energy projects as part of the Growing Community Energy Grants program.</li> </ul>	<ul style="list-style-type: none"> <li>• Funding supported development of a range of innovative community energy projects across NSW, such as:                             <ul style="list-style-type: none"> <li>○ Lighthouse Community Energy – established a community finance model</li> <li>○ Tathra Community Solar Farm – Australia’s first community solar project</li> <li>○ Shoalhaven Heads Bowling and Recreation Club – 99 kW solar project</li> <li>○ Lismore Community Solar 200 kW solar systems – NSW’s first floating solar system</li> <li>○ CLEAN Cowra – bioenergy project.</li> </ul> </li> </ul>
		<ul style="list-style-type: none"> <li>• Secured a NSW Treasury loan for a 1 MW hybrid renewable energy system on Lord Howe Island to displace up to 70 per cent of the diesel-powered electricity that the island runs on.</li> </ul>	<ul style="list-style-type: none"> <li>• Leveraged \$4.5 million in ARENA funding support for the \$11.6 million project.</li> <li>• The project will serve as an example of how advanced renewable solutions can be implemented for small remote communities.</li> </ul>
<b>13. Promote the benefits to consumers of switching to GreenPower accredited renewable energy</b>	Completed	<ul style="list-style-type: none"> <li>• Launched GreenPower Connect, a low-cost product to open up the market for direct bulk purchases of renewable energy.</li> <li>• Launched new social media strategy for GreenPower including strong presence on Facebook. Leveraged sponsorship opportunities to promote the brand for example, sponsoring Vivid Festival.</li> </ul>	<ul style="list-style-type: none"> <li>• GreenPower Connect ensures the ability to purchase renewable energy over and above the Renewable Energy Target directly from large-scale renewable energy projects.</li> <li>• GreenPower is the largest energy utility Facebook page in Australia with 41,000 followers, reaching over 1 million people.</li> </ul>

## GOAL 2: Build Community Support for Renewable Energy

Action	Status	Summary of Activities	Results
<b>14. Develop a draft NSW Smart Meter Policy</b>	Completed	<ul style="list-style-type: none"><li>• Launched a market-led rollout of smart meters in NSW. The policy promotes competition in metering services and customer choice, including the ability for customers to retain their existing meters should they wish.</li><li>• Worked with retailers and customers to encourage the rollout and uptake of smart meters.</li><li>• Supported national reforms to metering rules.</li></ul>	<ul style="list-style-type: none"><li>• Regulatory barriers to uptake of smart meters reduced ahead of the introduction of competitive metering.</li><li>• The voluntary, market-led rollout of digital meters began on 1 July 2016 and from 1 December 2017 all new meters must be 'digital' or smart, following national rule changes. 188,000 digital meters have been installed in NSW as of November 2018.</li><li>• More than 75 per cent of digital meter installations under the former Solar Bonus Scheme have been completed (September 2018).</li><li>• The pool of electricians qualified to install smart meters has increased from around 2,000 to 35,000 as part of the Advanced Metering reforms, supporting customer demand for smart meters in a cost-effective and timely manner.</li></ul>

## GOAL 3: Grow and Attract Renewable Energy Expertise

Action	Status	Summary of Activities	Results
<b>15. Investigate opportunities to support renewable energy experience centres and demonstration projects</b>	Completed	<ul style="list-style-type: none"> <li>• Provided funding to support establishment of the NSW Energy Innovation Knowledge Hub. The Hub conducts programs and workshops to facilitate information exchange between businesses and research communities.</li> </ul>	<ul style="list-style-type: none"> <li>• Under the Hub, the Hunter Energy Transition Alliance delivered a Blueprint Report which outlined the longer-term opportunities to leverage the Liddell and Bayswater Power Stations and partnerships to attract investment into the Hunter Region.</li> <li>• The Hub commissioned the Australian Energy Storage Alliance to develop Australia's first map of large-scale energy storage projects, supporting knowledge sharing for the emerging storage sector and promoting the success of NSW projects. The map is linked to the US Department of Energy Global Energy Storage Database.</li> </ul>
		<ul style="list-style-type: none"> <li>• Provided seed funding to establish the South East Region for Renewable Energy Excellence (SERREE) Industry Cluster, a network that links multinational companies to regional businesses, connects local businesses with training providers and links industry with researchers to accelerate innovation.</li> </ul>	<ul style="list-style-type: none"> <li>• The world class industry cluster now has over 1,000 members. The model is now sufficiently established and successful enough to operate on a member-funded basis without NSW Government support.</li> <li>• Created business opportunities for the region, for example, one regional NSW business won a \$12 million contract on a local wind farm project as a direct result of SERREE.</li> <li>• Supported and promoted development of four new wind farms and one new solar farm in the South-East region.</li> </ul>
		<ul style="list-style-type: none"> <li>• Provided \$150,000 of funding for the University of Technology, Institute for Sustainable Futures (ISF) and the Community Power Agency to investigate Social Access Solar Garden models in NSW. A solar garden is a shared solar power system that households can buy into in return for a credit towards their electricity bill.</li> </ul>	<ul style="list-style-type: none"> <li>• Trials are being undertaken in Blacktown, Shoalhaven and Byron Bay to test models for Solar Gardens.</li> <li>• Implementing these models can help 'locked out' customers, such as renters, apartment dwellers and low income households, access bill savings and other benefits from rooftop solar.</li> </ul>

### GOAL 3: Grow and Attract Renewable Energy Expertise

Action	Status	Summary of Activities	Results
<b>16. Conduct renewable energy research roundtables</b>	Completed	<ul style="list-style-type: none"> <li>Hosted the NSW State of Solar Breakfast and other roundtable events.</li> <li>NSW Chief Scientist and Engineer hosted the NSW Intelligent Grids Symposium in May 2015.</li> </ul>	<ul style="list-style-type: none"> <li>These events reached hundreds of key stakeholders and promoted NSW's leadership in renewable energy research and development, including the UNSW's breakthrough that achieved solar PV efficiency to 34.5 per cent, the highest in the world.</li> </ul>
<b>17. Promote NSW as a leader of research and innovation in renewable energy</b>	Completed	<ul style="list-style-type: none"> <li>NSW Chief Scientist and Engineer and the Renewable Energy Advocate hosted the Revolutionising Energy event at Spark Festival 2016 to educate university 'STEM' students about opportunities in the clean energy sector and promote NSW as a leader of energy research.</li> <li>Sponsored the University of Western Sydney (UWS) and UNSW to participate in the World Solar Challenge, where teams must develop an energy-efficient, solar-powered vehicle that can travel from Darwin to Adelaide in seven days.</li> </ul>	<ul style="list-style-type: none"> <li>Over 150 university students attended the event at NSW Parliament House which brought together experts from the University of Newcastle, University of Sydney, Tesla and Solar Analytics, as well as the Parliamentary Secretary for Renewable Energy.</li> <li>The Challenge brought some of the most advanced solar technologies to Australia to showcase progress in engineering and industrial design. It fostered innovation in solar photovoltaic and electric vehicle technology, capturing public interest in renewable energy.</li> </ul>



## GOAL 3: Grow and Attract Renewable Energy Expertise

Action	Status	Summary of Activities	Results
<b>18. Continue the recently created NSW Energy Innovation Prize</b>	Completed	<ul style="list-style-type: none"> <li>Awarded the prize annually to showcase innovative research by leading NSW academics.</li> </ul>	<ul style="list-style-type: none"> <li>The prize will continue into the future, raising awareness of the importance of innovation in the energy sector by scientists and engineers and encouraging careers in both fields.</li> <li>The following innovators have been awarded the prize: <ul style="list-style-type: none"> <li>Dr Xiaojing Hao, UNSW</li> <li>Dr Brett Hallam, UNSW</li> <li>Laureate Professor Kevin Galvin, University of Newcastle</li> <li>Professor Behdad Moghtaderi, University of Newcastle</li> <li>Professor Thomas Maschmeyer, University of Sydney</li> </ul> </li> </ul>
<b>19. Establish a working group to develop an advanced bioenergy initiative</b>	Completed	<ul style="list-style-type: none"> <li>Working group established to identify opportunities to support advanced bioenergy in NSW. The government has since supported work by the Australian Biomass and Bioenergy Assessment (ABBA) to address the lack of information on location, volumes and availability of biomass. The Department of Primary Industries is responsible for the biomass data collection and maintenance for NSW.</li> <li>Provided funding through the NSW Regional Growth Fund to establish the \$30 million Hunter Pilot Biorefinery, an open-access pilot-scale research, development and education facility located at Muswellbrook in the Hunter Valley.</li> </ul>	<ul style="list-style-type: none"> <li>NSW data on bioenergy has been added to AREMI platform, providing information about bioenergy potential to renewable energy investors and researchers.</li> <li>The Hunter Pilot Biorefinery will host the Ethtec Cellulosic Ethanol Pilot Plant, one of Australia's most ambitious biofuel projects.</li> <li>The project is seeking to commercialise technology that processes ethanol and other high-value fermentation products from materials such as crop stubbles, cotton gin trash, timber residues and sugar cane bagasse.</li> </ul>

## GOAL 3: Grow and Attract Renewable Energy Expertise

Action	Status	Summary of Activities	Results
<b>20. Support research and development in advanced bioenergy applications at the University of New England</b>	Completed	<ul style="list-style-type: none"> <li>In collaboration with Rural Climate Solutions, the Department of Primary Industries has led the development of the National Research, Development and Extension Strategy for Primary Industries in the bioenergy sector.</li> </ul>	<ul style="list-style-type: none"> <li>The Department of Primary Industries will continue to work on collaborative and aligned projects with the University of New England, where practical and feasible.</li> </ul>
<b>21. Support research into applications of geothermal assisted power generation</b>	Completed	<ul style="list-style-type: none"> <li>NSW Chief Scientist and Engineer supported a project to improve exploration, discovery and characterisation of geothermal targets by applying modern statistical machine learning and data fusion methods to geothermal data. The project team was made up of partners from four Australian universities who worked with geothermal companies and research organisations.</li> </ul>	<ul style="list-style-type: none"> <li>The project was awarded \$1.9 million from ARENA's Emerging Renewables Program and was completed in June 2014.</li> <li>Building upon the outputs of this project, the NSW Government partnered with Data61 to develop more sophisticated groundwater models.</li> <li>Professor Behdad Moghtaderi at University of Newcastle co-invented the GRANEX™ heat engine that generates electricity from geothermal sources.</li> </ul>
<b>22. Identify opportunities to support the integration of geothermal projects and coal-fired power stations</b>	Completed	<ul style="list-style-type: none"> <li>The University of Newcastle has lodged a patent application for geothermal assisted coal-fired power generation.</li> </ul>	<ul style="list-style-type: none"> <li>The patented technology can improve the thermal efficiency of coal-fired power stations by as much as 30 per cent. The patent is a tangible outcome of work undertaken collaboratively between the University of Newcastle and the NSW Government.</li> </ul>

## GOAL 3: Grow and Attract Renewable Energy Expertise

Action	Status	Summary of Activities	Results
<b>23.Support research and development in wave and tidal technologies</b>	Completed	<ul style="list-style-type: none"> <li>Supported the development of the CSIRO Wave Energy Atlas to allow the public to assess the feasibility of wave power projects off Australian shores and the Renewable Energy Advocate was a member of the project steering committee.</li> </ul>	<ul style="list-style-type: none"> <li>The Atlas has been made available on the NSW Renewable Energy Map and on the AREMI platform.</li> <li>The Atlas helps to assess the feasibility of wave power projects, by offering data from weather mapping, satellites, measuring stations and a variety of other sources.</li> </ul>
<b>24.Continue to support research and deployment of smart grid technologies</b>	Completed	<ul style="list-style-type: none"> <li>Released a discussion paper on stand-alone power systems and embedded networks to better understand barriers to innovative energy systems and smart grid technologies.</li> <li>Provided funding to the University of Technology Sydney, ISF's Networks Renewed project that piloted a 'virtual power plant' in regional NSW to use smart solar technology to improve the reliability of the local electricity network.</li> <li>Thirty-nine customers in Collombatti and Bellingen, on the NSW mid North Coast, are participating in the project.</li> </ul>	<ul style="list-style-type: none"> <li>The NSW Government and national energy market bodies are progressing a range of further work, informed by submissions on the discussion paper. This includes the AEMC's 2018 review of regulatory arrangements for stand-alone power systems and embedded networks.</li> <li>Early results from the pilot in NSW saw over 50 kW of electricity generated from 25 trial systems and a 1.73 per cent improvement in local voltage.</li> <li>The trials are now being expanded to market-scale in NSW, targeting voltage improvement of 5.5 per cent.</li> <li>The project will support increased opportunities for distributed generation, like rooftop solar by demonstrating how smart solar technologies can improve the stability of the grid.</li> </ul>