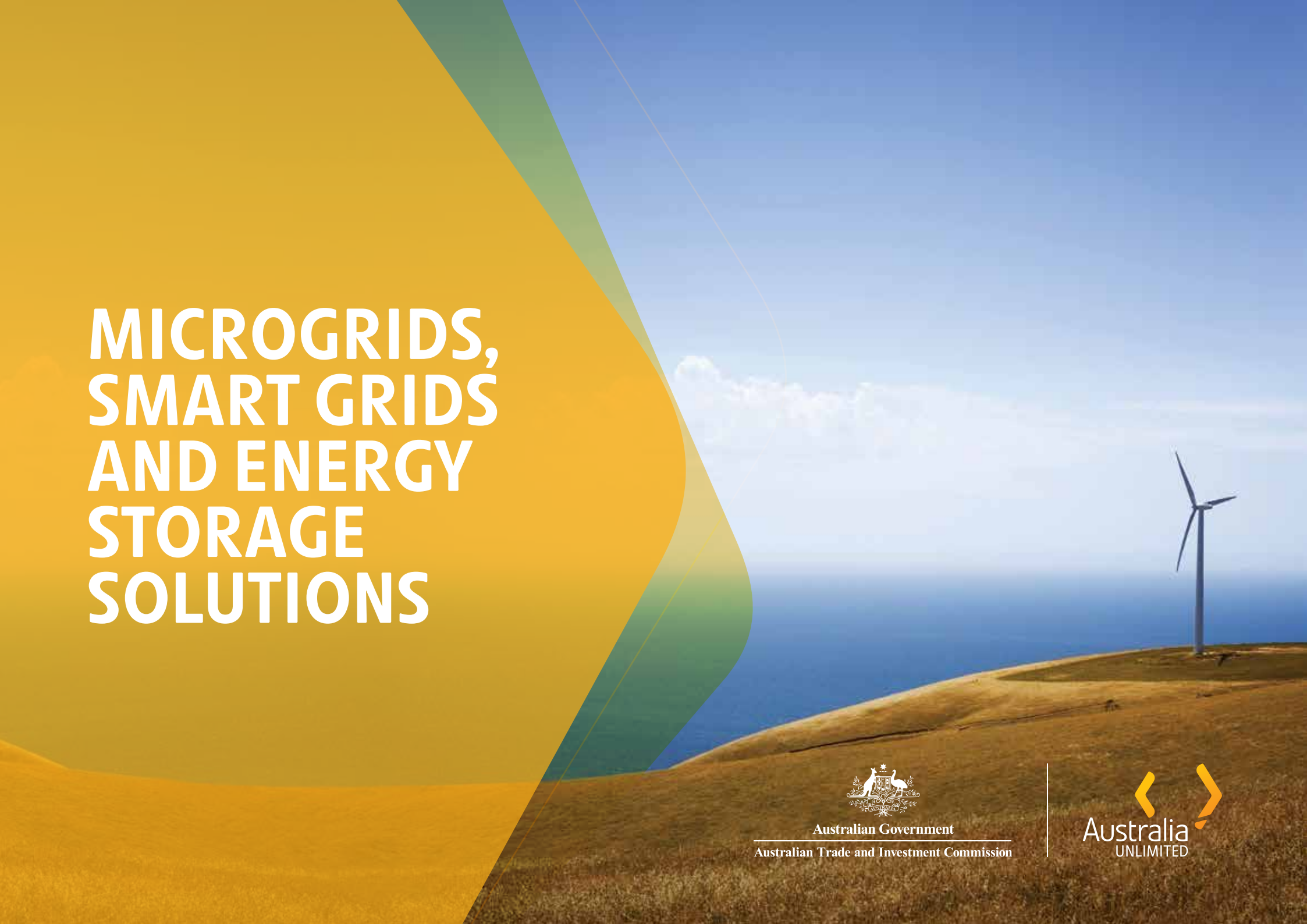
MICROGRIDS, SMART GRIDS AND ENERGY STORAGE SOLUTIONS



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AUSTRALIAN EXPERTISE MEETS GLOBAL ENERGY NEEDS

INDUSTRY OVERVIEW

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Australia has a proven track record of creating innovative energy generation, storage and management solutions to suit a wide range of needs. Today, Australian expertise is in demand around the world to help meet current and future energy challenges.

Australia has over a century of experience in managing variable energy demands, supplying electricity to remote locations, incorporating renewable energy sources into electricity grids and planning for the future.

With a relatively small population spread across vast and remote geographic areas, electricity grids in Australia must cover long distances. Consequently, many regional communities have their own microgrids. Extremes of temperature, including periods of very hot weather, also place highly variable loads on grids.

Responding to these challenges has seen many Australian companies develop solutions for microgrids, smart grids, peak shaving and energy storage. With intermittent generation sources such as wind and solar energy playing a growing role in supply, these capabilities are appearing in new applications and are shaping Australia as a global leader in designing electricity grids of the future.

Australia is predicted to be among the first countries with widespread energy storage deployment and this is set to drive further innovation in network design and operation.

Leading Australian energy technology companies are now integrating renewable energy into existing networks. Their smart grid solutions manage network data, provide demand and capacity management solutions and deliver optimised energy solutions for households, factories, suburbs and remote communities. Companies are also exploring hybrid solutions where renewable energy can be seamlessly integrated into legacy generation systems, allowing changes to be implemented more gradually.

The need to service remote communities and industry means off-grid solutions are also well developed in Australia, and these solutions are now being deployed to island and remote communities worldwide. These are evolving as energy storage technologies develop with the ability to provide less expensive but highly reliable systems.

The energy needs of Australia's regional and remote communities are very different from those of the cities and for decades Australian ingenuity has made it possible to supply reliable, economic off-grid energy to these communities. Many of the companies involved in these domestic projects are now providing solutions to emerging economies globally, where low-cost, low-maintenance renewable energy systems play a crucial role in lifting people out of poverty.

Companies such as IT Power Australia are now delivering projects in the Pacific Islands, Southeast Asia and Africa, applying Australian solutions to solve local challenges and benefit communities.

Other companies are addressing different challenges in remote communities, such as Barefoot Power, which provides affordable solar-powered lighting and phone-charging products to low-income populations with no access to electricity, and has to date supplied over two million people across 22 countries worldwide.

MICROGRIDS

As renewable technologies become more cost-competitive and emerging economies increasingly favour sustainable solutions in their infrastructure development pathways, the renewable energy sector will continue to grow rapidly. Globally, one out of two newly added megawatts of power comes from renewable sources and by 2030, 50 per cent of all electricity generated is predicted to be from renewable energy.[1]

Microgrids are autonomous grids which can operate off-grid or connected to existing grids and which can combine different assets and loads. As more countries incorporate renewable sources into their energy systems, microgrids are becoming increasingly important. In Australia, they offer a means of addressing challenges such as rapidly rising electricity costs, ageing infrastructure and the need to serve a large geographic area.[2,3]

Recent advances in microgrids in Australia mean more options for energy distribution via solar, wave, wind and energy storage projects. These are now appearing in many different settings, including islands, off-grid and grid-connected communities.

Projects such as ABB's hybrid microgrid, installed by Horizon Power in the remote inland town of Marble Bar in Western Australia's Pilbara region, maximise use of solar power by combining it with diesel generation and a flywheel storage system. The solar component of the system is capable of supplying up to 65 per cent of the daytime demand, reducing diesel use and emissions while ensuring that the town has a reliable supply of power.[4]

Image courtesy of Horizon Power

Horizon goes the distance across Western Australia

Case study

"*We also have a world champion here in WA: Horizon, who are providing resilient minigrids to remote communities. The knowledge they have on how to do that is probably the best in the world – how to deliver renewables to smaller systems.*" Michael Liebreich, Chairman, Advisory Board, Bloomberg New Energy Finance.

Horizon Power is a state government-owned, commercially focused corporation that provides safe, reliable power to about 100,000 residents and 10,000 businesses in regional and remote Western Australia. Its 46,000 customer connections are dispersed across an area of over 2.3 million square kilometres.

Horizon manages 38 systems: 34 microgrids in regional towns and remote communities, the smaller connected network between Kununurra, Wyndham and Lake Argyle and the larger North West Interconnected System (NWIS) in the Pilbara.

To meet the challenges of delivering a reliable power supply to such a huge geographic area, Horizon Power uses a combination of diesel or gas and renewable energy sources (wind, solar and hydro). Several of the sites incorporate a large proportion of renewable energy into their systems. High renewable energy penetration systems include Kununurra (99 per cent), Denham (45 per cent), Marble Bar and Nullagine (both 34 per cent). The total load is 275MW, with a total renewable energy generation of 48MW and a hosting capacity of 88MW.

Horizon Power's Onslow system is set to be the home of Australia's largest and most advanced distributed energy microgrid, aiming to supply more than 50 per cent of energy needs with renewable power.

The remote microgrid market is expected to increase to over A$20 billion annually by 2024. Horizon Power is examining its core business components and extending its products and services to take advantage of opportunities and ensure long-term sustainability.

horizonpower.com.au

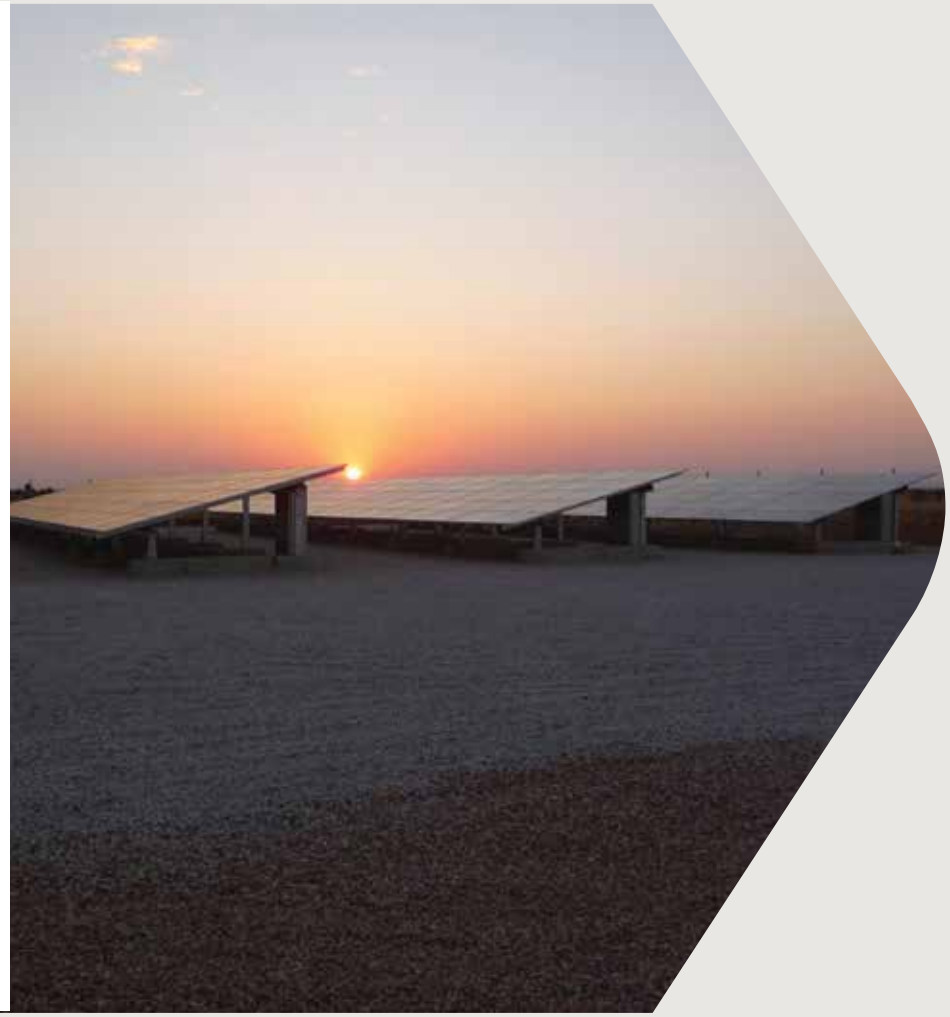

Image courtesy of Horizon Power

Carnegie crests the innovation wave

Case study

Carnegie Clean Energy Limited is the developer and owner of CETO wave energy technology, which converts ocean swell into zero-emission renewable power and desalinated fresh water. Over $100 million has been invested to develop CETO, designed to be the simplest and most robust wave technology globally.

The Perth Wave Energy Project, which operated at Western Australia's Garden Island throughout 2015, achieved a number of world-firsts for Carnegie Clean Energy. The project was the first demonstration of a complete grid-connected CETO system anywhere in the world. It is also the only wave project to consist of three units operating together in an array for 12 months, and the only wave project to produce both power and fresh water. Carnegie is now designing the world's first renewable energy microgrid to integrate wave energy, solar photovoltaic (PV)V and energy storage technologies, also to be located at Garden Island. The $7.5 million project integrates 2MW of solar PV and a 2MW/0.5 MWh battery storage system with Carnegie's patented CETO 6 off-shore wave technology and an existing desalination plant.

The Garden Island facility, off HMAS Stirling, Australia's largest naval base, is one of two ocean test sites operated by Carnegie. The other is a nursery site at Carnegie's Wave Energy Research Facility in Fremantle, Western Australia.

CETO 6 is being designed to meet the needs of the utility-scale market and the island market. In 2014, Carnegie commenced its first international project, to be installed at the UK's WaveHub facility in Cornwall. The project will consist of a 1MW CETO 6 unit, followed by a 15MW commercial array at the same site. For the island market, Carnegie's Mauritian Wave and Microgrid Design Project is focused on high penetration renewable energy microgrids that incorporate wave energy.

carnegiece.com

Image courtesy of Carnegie Clean Energy

SMART GRIDS

Energy industry predictions are for a shift away from large centralised power plants and towards greater numbers of smaller generation units using solar, wind and other renewable energy sources, either on the distribution network or concentrated in large facilities such as offshore wind farms.

Smart grid technology will play a crucial role in integrating demand-side management into power system operation, making it possible to monitor and integrate diverse energy sources into power systems while facilitating and simplifying their interconnection. [5]

Smart grids are already an important part of the Australian energy sector, with a number of companies gaining international recognition as leaders in using ICT solutions to provide system operators and residential photovoltaic (PV) owners with better information and tools to manage and operate systems more efficiently. Operators and owners can track performance, perform health checks, troubleshoot and send alerts, present data on screens and support planning for further investments.

Wattwatchers puts real-time energy data at users' fingertips

Case study

Until recently, Australian households have had little visibility of their energy use. This lack of data limits the ability to manage energy effectively, whether the purpose is to save money, improve operations or reduce environmental impact. Australia also has the world's highest uptake of residential solar power, with over 18 per cent of homes now generating energy from their rooftops, driving new need for better data. More distributed generation – and also distributed on-grid storage, with home battery and electric vehicle technologies growing – means more and more householders and grid operators are looking for accurate real-time data for energy management.

Managing Director of Australian company Wattwatchers, Gavin Dietz, says that real-time data, owned by consumers themselves and available independently of utility billing systems, is a fundamental requirement for energy use in the Internet of Things (IoT) era. 'Not having energy flow data for your home or business is like not having dashboard instruments for your car. You just have to guess how fast you are going, what it's costing you, and whether something might be overheating. Wattwatchers provides the data building blocks for the equivalent of an energy dashboard from behind the utility meter.'

To meet the fast-growing demand for data, Wattwatchers has created an 'IoT for Energy' solution which combines real-time metering, switching for remote control of electrical circuits and equipment and fast bidirectional communications to connect with the cloud and data analytics services. This information on energy flows helps users maximise energy efficiency and minimise costs.

The Wattwatchers solution is being adopted for an expanding range of home, business and utility applications. It can be used for residential, commercial and industrial applications, with minimal modifications to suit local conditions.

wattwatchers.com.au

Image courtesy of Wattwatchers

GreenSync provides the software behind Melbourne mini-grid trial

Case study

Unique software from GreenSync is being used to manage a solar and storage inverter-based community mini-grid trial in Melbourne. The project, an Australian first, is being sponsored by electricity network provider AusNet Services and will test the effect on the network of 80 per cent renewable energy on the feeder.

Each home participating in the trial will have at least 3kW of solar capacity and a 10kWh battery storage system. GreenSync's technology is intended to optimise power flows across the mini-grid and provide demand management support to the network via a cloud-based control platform. Each household will have a GreenSync Peak Response Unit (PRU) installed, a communications and control device that allows GreenSync to monitor power flows remotely and send commands at the individual household and mini-grid level.

The project's technical backbone is GreenSync's MicroEM™ control platform, which samples and utilises real-time data on household electricity consumption, PV generation, storage capacity and network requirement. AusNet Services will use this information to determine when and at what rate to charge and discharge batteries.

The trial will build understanding of household energy generation and usage patterns to optimise the value of solar and storage assets for customers and networks. It will allow AusNet Services to assess the technical performance and viability of a grid-connected mini-grid community model, as well as informing payment structures and tariffs.

GreenSync works with companies and large energy users to help electricity grids become more flexible and responsive, enabling the seamless control of distributed loads and renewable generation.

greensync.com.au

Redback helps users maximise solar savings with IoT technology

Case study

Queensland-based technology company Redback is using the internet of things (IoT) and cloud technologies to help residential and commercial users maximise their use of the solar energy they generate on-site; reducing costs, payback times on solar panels and reliance on fossil-based energy.

Redback's solutions incorporate power electronics, cloud system control and related switchgear into a streamlined design, allowing for rapid integration and thus low installation costs. Its recently released second-generation smart hybrid solar inverter is matched with a proprietary cloud-enabled intelligent system which can analyse and control energy generation and consumption in real time.

The Smart Hybrid uses machine learning to gather intelligence over time, learning from user preferences as well as drawing data from external factors like the weather.

For example, in the case of a blackout, the system can respond by enabling battery power and operating off-grid to avoid loss of power. It can also help users reduce electricity costs by switching on heavy consumption devices such as pool pumps during the solar window, or to make the home self-sufficient during peak times. The system automatically decides how to best use the energy, however there is the option to override this and operate the system manually.

Redback has formed partnerships with a number of other organisations including the University of Queensland, Sonepar, EnergyAustralia and Microsoft.

redbacktech.com

Image courtesy of Redback

ENERGY STORAGE

Energy storage is a vital enabling technology for renewable energy, improving competitiveness and renewable penetration by smoothing out energy supply on grids, allowing delivery at peak times, reducing peak load and allowing providers to better manage supply and demand. The global market for grid-connected residential photovoltaic (PV) solar installations, coupled with energy storage, is predicted to grow tenfold, to reach more than 900 megawatts (MW) in 2018, up from just 90 MW in 2014.[6]

Energy storage technologies range from systems that can deliver power within fractions of a second (such as flywheels and capacitors), to batteries that store and release electricity over minutes or hours, through to large-scale power storage technologies (such as pumped hydro or compressed air energy storage) that can meet peak demand similar to conventional power plants.

The energy storage sector in Australia is constantly seeing new chemistries and applications emerge as companies develop innovative solutions to the challenges of energy storage. As a result, Australian companies can offer a diverse range of technologies and solutions. These range from well-established technologies such as solar hot water, to evolving solutions such as new battery chemistries. New developments include the use of solar power to generate hydrogen from water via electrolysis, allowing the hydrogen to become a vehicle for storing energy and conversion into transportable and exportable forms.

Australian capability and ingenuity is creating new energy storage solutions across the country and internationally. As part of a global partnership, CSIRO has developed the Ultra Battery, which combines the best features of two forms of energy storage: the lead-acid battery, which is the type traditionally used in cars, and a supercapacitor, which is used to power devices like camera flashes. The result is a battery that is economical, has long-life power and is super-fast charging. The Ultra Battery has now been commercialised by energy storage solution company Ecoult and is being used by Honda in its new Odyssey hybrid model.[8]

Energy storage technologies

Mechanical	Electrical	Electrochemical	Chemical	Thermal
Pumped hydro	Capacitors	Conventional batteries (lead-acid, NiCd, NiMh, Li)	Hydrogen	Molten salts
Compressed air energy storage	Superconductors	Flow batteries (redox flow, hybrid flow)	Methane	Chillers
Flywheels				

Source: ARENA[7]

Image courtesy of Magellan Power

Genex transforms a disused mine into a cutting-edge energy project

Case study

Genex Power has developed an innovative design to respond to peak periods of electricity demand through combined renewable energy production and storage, using the mine pit of a former goldmine as the site of a huge pumped hydroelectric power station located underneath a 270MW solar farm.

In Australia there is a significant gap between low and high-energy demand periods, which is exacerbated by intermittent renewable energy production. Solar and wind resources without storage cannot provide a consistent and reliable supply of electricity, particularly during periods of high consumer demand (typically early morning, and late afternoon to evening). To address this challenge, Genex has proposed an integrated energy hub, located in Kidston, Queensland. The hub will consist of a 250MW Pumped Storage Hydro Project, a 50MW Solar Project (Phase One) and an additional 270MW Solar Project (Phase Two).

Pumped storage hydro is currently the most efficient and effective means of large-scale electrical energy storage worldwide. By storing large amounts of water in an upper reservoir and releasing this down through turbines and generators, production of energy can be initiated instantly to meet high electricity demand during peak periods. The Kidston Pumped Storage Hydro Project will utilise the existing mining voids and infrastructure left from an abandoned gold mine to minimise construction and environmental impact. Additionally, it will use the energy produced from the co-located 270MW Kidston Solar Project to pump water back from the lower to the upper reservoir during the day, in combination with pumping during low demand periods at night.

This project will be the first of its kind in Australia to integrate renewable energy production and energy storage on a large scale.

genexpower.com.au

Image courtesy of Genex Power

Redflow batteries help remote communications weather the storm

Case study

Energy storage specialist Redflow provides on-grid and off-grid solutions for customers who have no grid access or only access to poor grid supplies. It has developed the world's smallest flow batteries for stationary energy storage applications, from the ZCell home battery to the ZBM range for commercial, telecommunications and grid-scale deployment.

Redflow batteries are now providing mobile network customers in the Dominican Republic with a more reliable service from a remote telecommunications tower. Located in tough terrain three hours from the city of Santo Domingo, the tower only has access to an intermittent grid, with an average of 2-3 outages per day which results in frequent site downtime. Outages often last six hours, and sometimes over 20 hours, with customers of the mobile network operator (MNO) suffering continual phone and wireless downtime.

Redflow replaced a bank of 24 outdated lead-acid batteries with two zinc-bromide flow batteries which now provide 20kWh of energy to the telecommunications tower by storing grid energy for use in times of outage. The MNO was able to monitor battery performance online, eliminating the need for costly site visits. Despite constantly high ambient temperatures, uptime went from 55.4 per cent with the previous lead-acid batteries to 96.4 per cent with the ZBM solution. Even tropical storm Erika, which caused a 21.5 hour grid outage, did not affect the system, which supported the telecommunications tower and MNO customers, enabling emergency phone calls and wireless access.

Redflow operates R&D facilities in Australia as well as offices in the US and Europe, with its high energy density batteries sold, installed and maintained by a global network of system integrators.

redflow.com

Image courtesy of Redflow

Magellan keeps the power flowing

Case study

Magellan Power has built a reputation for AC and DC backup power systems and grid-supporting energy storage equipment designed to withstand the extremes of the Australian climate and its remote locations. Its systems are able to be used with renewable as well as conventional energy-powered sites.

As well as hundreds of installations across Australia in facilities such as electricity substations, power stations, oil rigs, hospitals, petrochemical plants, ships and mines, Magellan equipment and solutions are used globally in sites such as electricity substations in Fiji and Kansanshi mining in Zambia.

A recent high-profile installation was the Perth Stadium project, a 60,000 seat sports and entertainment facility for national and international events.

Magellan also designed and manufactured the 100kW/400kWh Utility Scale Energy Storage System for TransGrid NSW, the owner and operator of one of the largest high-voltage transmission networks in Australia. The system is being used for the utility's i-Demand project, a hybrid energy project designed to facilitate research into development of demand management opportunities in NSW. The project, at TransGrid's Western Sydney (Eastern Creek) site, also includes 98kW of solar panels and high-efficiency LED lighting.

The Magellan Grid Power Support System utilises 400kWh lithium polymer batteries and a bidirectional inverter that uses rugged IGPT power circuitry with the latest microprocessor hardware and software. It stores large amounts of electrical energy in batteries and supports the connected grid by providing peak demand and power quality services such as reactive power compensation.

magellanpower.com.au

Image courtesy of Magellan Power

1414 Degrees makes silicon a hot option

Case study

Named after the melting point of silicon, Adelaide-based company 1414 Degrees is attracting international attention with a thermal energy storage solution (TESS) that has the potential to be significantly cheaper than lithium ion battery technologies.

1414 Degrees has its origins in CSIRO research into silicon energy capture and recovery. It has worked with the University of Adelaide and received AusIndustry funding in recent years to develop and engineer the technology into commercial modules. Pure silicon, a by-product of metal quartz ore smelting, is inexpensive and readily available, is stable at its 1414 degrees Celsius melting point and can hold heat for 1-2 weeks if insulated or part of a system that is charged and discharged daily. These characteristics make it an ideal energy storage option to complement renewable energy sources such as solar or wind generation.

Molten silicon systems can deliver energy as electricity or heat, a major potential advantage for cold climate countries, where up to half of all energy consumed is for heating. The company is developing a 10 MWhr commercial module at a hydroponic site, where the system stores energy from wind generation and then provides both heat and electricity for the site's operations. Discussions are currently under way to confirm the site for a 200 MWhr installation.

With significant funds already raised ahead of its planned IPO this year, and a number of international bodies expressing interest, 1414 Degrees is looking to play a major role in the future of energy storage and the increasing integration of renewable sources into everyday energy supplies.

1414degrees.com.au

Dr Kevin Moriarty, Executive Chairman, and Mr Matthew Johnson, Executive Director and Chief Technical Officer, 1414 Degrees.

Image courtesy of 1414 Degrees

OFF-GRID SOLUTIONS

In Australia, projects providing greater than 10 kW which are not connected to a large-scale electricity grid are classified as off-grid.

Off-grid comprises both domestic and commercial users, including households, farming operations, pumping and irrigation, tourist locations, remote and indigenous communities, mining operations, island communities and industrial installations.

As in many other countries, most off-grid power systems in Australia currently rely on diesel fuel for energy generation. However rising diesel fuel costs, as well as the cost of transporting fuel long distances and environmental considerations, are making renewables an increasingly attractive option for off-grid projects.

Solar and wind power are the dominant renewable energy sources used for off-grid projects because they suit most locations in Australia and are readily combined with battery systems or energy storage solutions.

Hydro power and geothermal power are also options for off-grid projects, but are limited by the need for specific site conditions.

Several promising wave and tidal energy technologies are emerging which have potential for off-grid installations on island communities, such as Hydro Tasmania's award-winning King Island Renewable Energy Integration Project (KIREIP).[9]

Hydro Tasmania puts renewable energy to work on King Island

Case study

The King Island Renewable Energy Integration Project (KIREIP) is a world-leading hybrid off-grid power system capable of supplying 65 per cent of King Island's annual energy needs using renewable energy. The system is capable of 100 per cent renewable operation - the only megawatt class off-grid system with this capability in the world.

KIREIP is an initiative of Hydro Tasmania, with assistance from the Australian Renewable Energy Agency (ARENA). A remote island, King Island is not connected to either Tasmania or mainland Australia for its electricity supply. Electricity on the island was traditionally generated entirely from diesel fuel via the 6 megawatt (MW) power station, serving 12 gigawatt hours (GWh) of annual customer demand, peaking at 3.2MW.

As the owner and operator of the King Island power system, Hydro Tasmania developed an integrated solution comprised of wind and solar generation, supported by a range of innovative enabling technologies and coordinated by its proprietary hybrid control system. Installed over several earlier phases of development were 2.45MW of wind generation and 470kW of solar PV.

When conditions are suitable KIREIP delivers 100 per cent of King Island's power from renewable sources. Recently the KIREIP system reached a milestone of 4000 hours of 'diesel-off' operation, including periods of several days with no use of diesel generation, a world record for a grid of this scale. The project, inclusive of prior renewable investments, has resulted in a reduction of over 21 million litres of diesel for power generation purposes, representing savings of more than $30 million and the prevention of emission of over 55,000 tonnes of CO^2 thus far.

The project was awarded the Energy Supply Association of Australia (ESAA) Innovation Award 2013 and the United Nations Association of Australia World Environment Day Award 2014.

hydro.com.au

Image courtesy of Hydro Tasmania

CAT Projects helps bring solar power to rural Nepal

Case study

Australian company CAT Projects is helping to deliver electricity in Nepal. Currently 24 per cent of Nepal's population, around 7 million people, live without access to electricity. Living mostly in rural areas, they use kerosene lamps for lighting. The rest of the population experiences daily blackouts.

Decentralised renewable energy-based mini-grids offer a cost-effective means of addressing this energy gap, particularly in rural areas, and local companies are developing business models to leverage this opportunity. Gham Power has recently installed solar PV mini-grids in three remote communities in the Khotang District with technical and financial assistance from the Asian Development Bank (ADB) and others.

Managed by Gham Power on a commercial basis with equity investment from the local communities, these systems provide power to around 25 businesses, over 100 households and two telecommunications towers.

CAT Projects was asked by the ADB to provide technical assistance to the project. Services provided included technical review of designs, procurement advice and assistance in structuring the proposed business model and finance package.

CAT Projects also conducted post-commissioning visits to inspect the installations for the ADB. This involved verification and documentation of the works and providing independent constructive feedback to Gham Power to assist in effective maintenance of the system into the future.

A private consulting firm based in Central Australia, CAT Projects provides specialist engineering and project management services and advice on remote area power and infrastructure projects. It provides advisory services and technical support to international agencies and the Australian Government.

catprojects.com.au

Image courtesy of CAT Projects

Photon Energy Australia powers the tower

Case study

A vital radio tower in Muswellbrook, regional NSW, runs on renewable energy 24 hours a day thanks to an off-grid solution designed and delivered by Photon Energy Australia from Australian and imported components. The tower, serving over 50,000 people over a 500km radius, is used for broadcasting, radio and critical emergency services.

Traditionally, off-grid telecommunication infrastructure has relied on diesel generators, which create pollution, are expensive to run and leave operators vulnerable to volatility in fuel prices. Photon Energy Australia installed a solar power plant and battery backup, combined with a proprietary smart control and monitoring system.

The system's 72 batteries can store 215kWh of power, producing enough solar energy to run the Muswellbrook transmission system for up to 43 hours and taking just over 5.5 hours to charge at full efficiency. The existing 15kVA diesel generator was retained as a backup.

Running the tower on renewable energy allows the operator, Broadcast Australia (BAI), to save money and reduce carbon emissions.

'As a service provider that relies heavily on external market forces, it's exciting to think that we'll be able to generate much of our own power. The longer-term outcome of this project will prove beneficial for our customers in many ways, as we'll be able to provide them with a lower carbon footprint, more cost certainty and improved reliability against the grid in remote locations,' said Jim Hassell, CEO of BAI Group.

Photon Energy Australia is part of Netherlands-based Photon Energy, which specialises in providing energy savings and reliable solar on-site energy production, solar power solutions, battery storage, off-grid and hybrid power systems and solar water treatment. The group's local investment has seen Photon Energy Australia deliver approximately 50 MWp of PV solar installations in five countries across two continents.

photonenergy.com.au

Image courtesy of Photon Energy Australia

FURTHER INFORMATION

The following are some of the organisations involved in the Australian renewable energy sector. Contact your local Austrade representative about connecting with Australian renewable energy organisations.

INDUSTRY ASSOCIATIONS AND RESEARCH ORGANISATIONS

The Australian Energy Council represents 21 major electricity and downstream natural gas businesses operating in competitive wholesale and retail energy markets. These businesses collectively generate the overwhelming majority of electricity in Australia and sell gas and electricity to over 10 million homes and businesses.
energycouncil.com.au

ARENA is the Australian Renewable Energy Agency. Established in 2012, its objectives are to improve the competitiveness of renewable energy technologies and increase the supply of renewable energy in Australia.
arena.gov.au

The Clean Energy Council is the peak body for the clean energy industry in Australia. It represents and works with hundreds of leading businesses operating in solar, wind, energy efficiency, hydro, bioenergy, energy storage, geothermal and marine along with more than 4000 solar installers.
cleanenergycouncil.org.au

Commonwealth Scientific and Industrial Research Organisation (CSIRO) uses science to solve real issues. Its research makes a difference to people, industry and the planet.
csiro.au

Energy Networks Australia is the peak national body representing gas distribution and electricity transmission and distribution businesses throughout Australia. **ena.asn.au**

Industry Capability Network (ICN) is a business network that introduces Australian and New Zealand companies to projects large and small. It is an independent organisation financially supported by Australian, New Zealand, state and territory governments.
icn.org.au

The South East Region of Renewable Energy Excellence (SERREE) is an initiative to establish the south east NSW-ACT as an exemplar region of renewable energy excellence. SERREE is led by Regional Development Australia (RDA) ACT, and is currently funded and supported by the Australian Renewable Energy Agency (ARENA), the NSW and ACT Governments, RDA ACT and Southern Inland and SERREE Corporate (Business and Industry) members.
serree.org.au

Image courtesy of Carnegie Clean Energy

ABOUT AUSTRADE

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- helping you to identify and contact Australian suppliers

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