

Smart Energy

AN OFFICIAL SMART ENERGY COUNCIL PUBLICATION

GREAT EXPECTATIONS FOR HYDROGEN

AEMC: moving with the times
Energy, emissions and exports
Fast lane for EV chargers
Lighter panels, lighter work
Solar Cutters and shapers
Smart Energy members in niche markets



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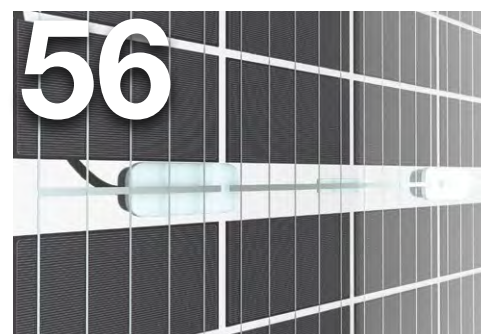
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John Grimes, Chief Executive, Smart Energy Council

AN UNSETTLING WORRY for the public is “if we don’t dig up things like coal, and sell it overseas, how will our economy survive?”

For much of our history Australia has been an energy exporting superpower, and our North Asian customers have been critical to our economic success.

That is why two things collide to provide Australia with a unique economic opportunity.

The first is that Korea and Japan have both laid out plans to become hydrogen based economies.

Hydrogen (or hydrogen derivatives) for industry, electricity generation and transportation.

The second is that by happy coincidence, the mining centres of Australia are based in some of the sunniest and windiest parts of the world.

That makes hydrogen production via renewable energy more economically competitive here than just about anywhere else on the planet.

Better still, the bulk export facilities, rail, and ports are already in place.

By moving quickly Australia could set the bar on global prices for renewable hydrogen production, and outcompete others globally.

Australia, powering the economies of North Asia just like we have always done – only this time with emissions free, cheap fuel.

Actually, it is the only sensible path forward for Australia, because not moving could be the very thing that brings us down.

The world is moving away from coal.

Do we want to be the country that got ahead of the curve, and capitalised on our good fortune, or the last suckers playing musical chairs when the music stops and all the chairs are gone?

I want the last boatload of coal to be surrounded by an entire fleet of boats shipping renewable hydrogen and derivatives to the world.

Titanium
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In my view ...

Ready Set Go!

LIKE MANY OTHERS, I can’t wait for the hydrogen industry to take off.

I’m looking forward to the hydrogen industry being a significant contributor to economic growth, employment and regional development across Australia.

We’ve seen key export partners put significant markers in the ground: Japan and South Korea have recently announced their hydrogen strategy.

We are also seeing activity on the global stage with the second Hydrogen Energy Ministerial Meeting taking place in late September in Japan. In the lead up, Japan, Europe and the USA released a joint statement signalling cooperation and affirming their “shared desire to strengthen trilateral cooperation on hydrogen and fuel cell technologies” which flags the signing of a Memorandum of Cooperation.

One of our key export markets is finding dance partners. The global Hydrogen Council is made up of 60 corporations and counting. Their mission statement describes them as “a global initiative of leading energy, transport and industry companies with a united vision and long-term ambition for hydrogen to foster the energy transition”.

I don’t see large Australian corporations in their list of members as yet, however there has been significant groundwork – COAG discussion



Vanessa Sullivan is a Non Executive Director, Energy, Water and Sustainability

papers; a handful of pilot projects, some State Government funding announcements and government policy.

With a vision for the future, the Smart Energy Council has joined forces with the Australian Association of Hydrogen Energy to form Hydrogen Australia, the voice for advocacy and action to support the development of Australia’s emerging hydrogen industry.

Is Australia ready to drive the policy settings to lead to not just a significant export industry, but one that we squeeze as many flow on, sustainable jobs and economic and environmental benefits from?

Australia’s LNG industry came in a strong wave that provided robust growth and exports, but there are some things we might have done differently to increase our global competitiveness and improve the lasting benefits.

The opportunity exists to take these learnings and apply them now to an industry that we think has as much, if not more, potential.

Let’s push hard to get strong policy markers and market development outcomes that lead to long term sustainable economic development and a leading role rather than a bit part on the global hydrogen stage.





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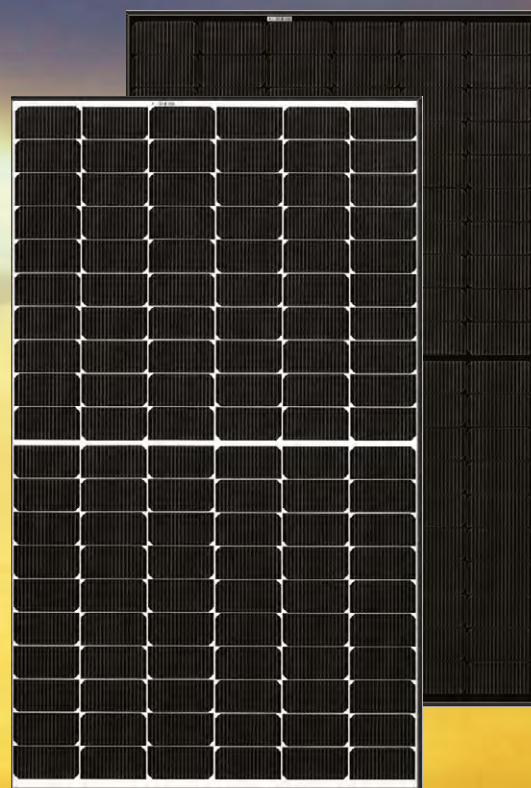
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LOCAL and GLOBAL NEWS

MIND BOGGLING Discussions are underway for a \$20 billion 10 GW 'Sun Cable' project to export renewable solar power from Australia's top end to Singapore. The 15,000-hectare ground-mounted solar array near Tennant Creek would be supported by a 20-30 GWh storage plant and come on line in 2027 to power Darwin and export electricity through a high-voltage direct current cable to Singapore. Australian company 5B are slated to supply their rollout 'Maverick' modular technology with its prefabricated solar arrays that speed up installation.



GREEN HYDROGEN A \$3.1 million pilot project for renewable hydrogen production and refuelling will involve the installation of a 220 kW electrolyser and a 100 kW solar array at BOC's Bulwer Island gas facility in Queensland. The plant will produce green hydrogen via electrolysis and have the capacity to produce 2400 kilograms of hydrogen each month. ARENA has committed \$950,000 toward the project.



IN ANOTHER FIRST Agnew Gold mine in Western Australia will be the first mine to be powered by a wind, solar, battery and gas microgrid. ARENA is kicking in \$13.5 million to the renewable hybrid microgrid now under construction with five wind turbines delivering an 18 MW wind farm, a 4 MW 10,000 panel solar farm and a 13 MW/4 MWh Battery Energy Storage System underpinned by a 16 MW gas engine power station.



PHES ARENA has also pledged \$40 million to fast-track the deployment of South Australia's first Pumped Hydro Energy Storage project. The successful funding recipient will have at least 200 MW in capacity, and must reach financial close by 30 June 2020.



SPEEDY CHARGERS Evie Networks is receiving \$15 million in ARENA funding to roll out the largest ultra fast battery electric vehicle charging network. The 42 charging sites, all powered by renewable energy, will be seen at roadside service centres connecting Adelaide, Melbourne, Canberra, Sydney and Brisbane. The network complements Chargefox's ultra fast charging network of 22 sites being developed – also powered solely with renewable energy – from Adelaide to Brisbane, around Perth and in Tasmania.

Read more on page 26.



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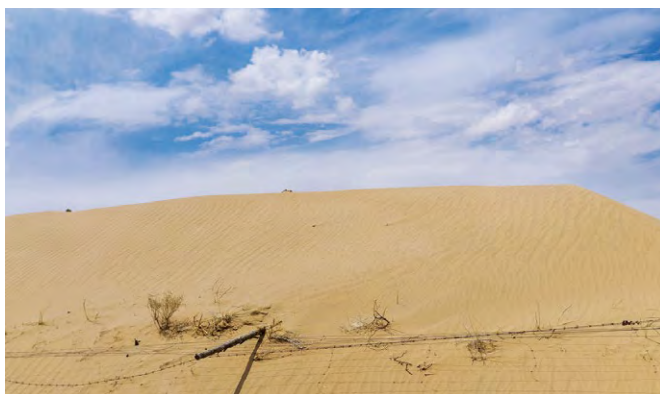


LOCAL and GLOBAL NEWS

AUSTRALIAN SUPERMARKET GIANT COLES and UK-based renewables developer Metka are joining forces to construct three large-scale solar farms totalling 260 MW in capacity in regional NSW. Under the 10-year deal Coles would purchase 70 per cent of the 220 GWh of electricity generated, enough to meet a tenth of its needs. Coles has already installed solar PV on 30 outlets, and plans to add 38 more stores. Coles Group says the increased use of renewable energy is a major part of the company's commitment to "be the most sustainable supermarket in Australia".

(Whaaat? Aren't we forgetting the mountain of plastic and paper generated by the Little Shop 2.0 frenzy.)

EXPANDING DESERTS Temperatures over the world's land areas are warming at about twice the global rate, contributing to desertification and land degradation and threatening food security. Land areas have warmed by about 1.8 degrees, and global mean temperatures by 1.1 degrees. Mark Howden of the ANU said the Intergovernmental Panel on Climate Change (of which he is vice-chair), presents a "warning flag" about the threats of greenhouse gas emissions.



STUDENTS across the globe who are fearful of the future they will inherit are demanding change, and have set the date of Friday 20 September for the next global climate strike.

Australia's student organisers are demanding: 100 per cent renewable energy generation, and clean energy exports [only] by 2030; no new coal, oil and gas projects, including the Adani mine; and funds for a just transition and job creation for people who work in the fossil fuel industry.



GOOD GRIEF – THE REEF Gradual increases to sea temperature and marine heat waves caused by the escalation of climate change have downgraded the long-term outlook for the Great Barrier Reef from 'poor' to 'very poor'.



2020 VISION Next year, as part of its Integrated Systems Plan which sets out a blueprint for the future grid, AEMO will publish details of how to almost completely decarbonise Australia's power grid by 2050.

What can we expect? Rational conclusions based on sound research mindful of the imperative to transition to a low carbon economy.

Tune in to www.aemo.org.au for the latest news and insights from AEMO.

A \$75 MILLION INITIATIVE combining 20 separate projects will ensure La Trobe will have net zero emissions by 2029, becoming the first Victorian university to achieve this. More than 7,000 solar panels are being installed on 27 buildings across the University's Melbourne campus.



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LOCAL and GLOBAL NEWS



BHP chief executive Andrew Mackenzie who says the risks linked to the world's dependence on fossil fuels may be "existential" has endorsed drastic action to combat the emerging crisis of global warming, which he calls "indisputable".

"The planet will survive. Many species may not ... this is a confronting conclusion." Under its decarbonisation plan BHP is setting goals for its customers to cut greenhouse gas emissions targeting shippers, steel mills and power plants.

ARENA HAS APPROVED up to \$9.41 million in funding to Hazer Group for the construction and operation of a groundbreaking hydrogen production facility in Munster, just south of Fremantle in Western Australia.

Hazer plans to build the \$15.8 million, 100 tonne per annum facility to demonstrate the conversion of biogas from sewage treatment into hydrogen and graphite.

The system creates an alternate hydrogen pathway to the traditional approaches of steam methane reforming and electrolysis.

Hazer has entered into a Memorandum of Understanding with WA Water Corporation for the supply of biogas and to provide the project site for construction, with plans to complete the facility by December 2020 and begin operations in January 2021.

ARENA's Darren Miller said Hazer's project represents a new and innovative way to produce renewable hydrogen, which aligns with ARENA's new investment priority focussed on accelerating hydrogen.

"Renewable hydrogen is typically produced by splitting water molecules using renewable electricity. However, Hazer's process represents an alternative way to produce hydrogen using biogas sourced from wastewater treatment plants. If successful, this project will offer opportunities to replicate the technology across other treatment plants and landfill sites across Australia," he said.

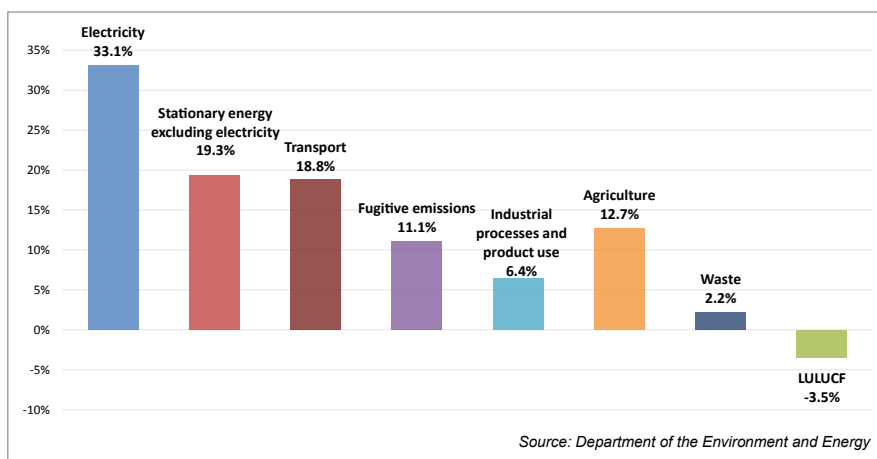
EMISSIONS CREEP... Australia's carbon emissions rose 0.6 per cent in the year to March, on the back of the LNG export industry, whose emissions rose 4.7m tonnes over the year. Carbon dioxide emissions from electricity generation decreased 2.1 per cent thanks to solar and wind energy but it was not enough to cancel out the growth in emissions related to LNG exports which leapt 18.8 per cent. Total national emissions have increased each year since the government abolished a national carbon price in 2014.

Minister for Emissions Reductions Angus Taylor hailed Australia's LNG exports and pointed out that in the last three quarters, emissions had twice decreased on a seasonally adjusted basis.

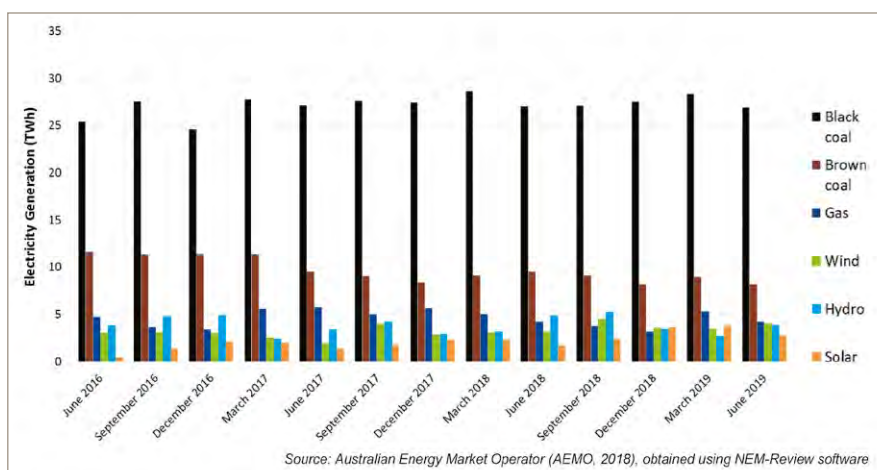
All too obscure? Turn to page 32.

Greens climate change spokesperson Adam Bandt says Australia is on a collision course with climate disaster and "The only way to get our pollution under control, meet our international obligations under the Paris agreement and avoid a climate catastrophe is to urgently begin the phase out of coal and gas."

Share of total emissions, by sector, for the year to March 2019



Electricity generation in the NEM, by fuel, by quarter, June 2016 to June 2019



HOW NOT TO DO THINGS Thousands of people gathered to witness the demolition of Britain's "third worst eyesore": three power station cooling towers in Oxford. The explosion however blew up the power substation and managed to set fire to nearby power lines, leaving thousands of homes without electricity. The 2,000 megawatt station operated until 2013, when new EU reduced emissions rules were introduced.

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POWER AND PERSISTENCE

HARD FOUGHT CAMPAIGNS don't always produce the desired results but the outcome of the crusade over Victoria's Solar Homes scheme is something that is worth celebrating.

The industry that was looking down the barrel at more job losses and business closures has won a reprieve, with rebate quotas for the month of September tripled to 9,750. Numbers of rebates between now and the end of 2019 have been doubled to factor in pent-up market demand and seasonal factors.

During the first half of 2020 the number of rebates will also increase by almost 50 per cent, delivering 23,000 additional rebates for the 2019/2020 financial year.

Further remodeling will result in fortnightly rebate releases and a more streamlined approvals process.

The changes that address many of the industry's concerns were delivered just in time to avoid more job losses and business closures that had plunged Victoria's solar industry into crisis.

Since April the program had caused widespread damage with hundreds of job losses and many business closures, with no reprieve in sight.

Amid the escalating crisis the Smart Energy Council staged rallies on the steps of parliament house and outside the Premier's office, and took concerns to the media. High-level meetings were held with the Victorian Government.

Responding to pressure from the Smart Energy Council and action by members, the Victorian government agreed to substantial changes under the Solar Homes Program.

"We called on Victoria's Premier and Energy Minister to take immediate and decisive action to fix the problem and they listened. The changes to the Solar Homes Program help put the industry back on track," John Grimes said following the breakthrough announced with Victoria's Solar Homes Minister Lily D'Ambrosio.

"Quotas have been lifted to better reflect market demand. This is a big win for the Victorian solar industry. It also reflects a genuine desire by the government to respond to industry concerns.



“The changes to the Solar Homes Program help put the industry back on track ... quotas have been lifted to better reflect market demand.”

"We know this won't fix all our problems immediately but getting the industry back to work, and preventing more company closures in the short term was a key objective... Overall the agreement is a step in the right direction," John Grimes said.

Modelling by SunWiz reveals that during the months from October 2018 to May 2019 the rooftop PV industry registered a monthly average of 5,300 residential installations, peaking in March with 6,272.

Given that 1,600 installations proceeded without a rebate each month, SunWiz calculates that the industry needs to achieve 3,700 rebates monthly to achieve a 'steady state'.

Based on the government's revised allocation of 5,000 to 6,500 rebates each month, this should be sufficient to meet market demand.

"This forward loading will help the industry recalibrate after many months on a starvation diet. But it's going to take all of September, October's and November's extra rebates to compensate for revenues lost during the May/June famine and the starvation diet of July/August," says Warwick Johnston, adding "It's not hard to imagine demand for rebates exceeding 5,000 a month in the first half of 2020."

Minister Lily D'Ambrosio who commented the scheme was always subject to assessment declared "We're strengthening this landmark program, which has already helped 35,000 households put a power station on their roof, saving them hundreds of dollars a year on their energy bills.

"We've listened to Victorians and to the solar industry about how we can make Solar Homes even better. These measures provide a shot in the arm for the industry."





Image: Schneider Electric

The Labor Government's \$1.3 billion Solar Homes Program aims to install solar panels, hot water or batteries on 770,000 homes over the next ten years allowing Victoria to nudge closer to its target of 50 per cent renewable energy by 2030 and reduce carbon emissions.

NSW empowers more homes

A similar scheme is planned for NSW under its Empowering Homes Program that supports the installation of up to 300,000 solar-battery systems across the state over the next 10 years.

The program will provide interest-free loans of up to \$9,000 for a battery system or up to \$14,000 for a solar-battery system to eligible NSW residents with household incomes under \$180,000.

In the process the state will unlock up to \$3.2 billion in clean energy investment and add 3,000 MWh of storage. All being well, the first battery or solar-battery systems will be available for installation during the summer months.

The Smart Energy Council, which has participated in meetings with NSW departmental staff to discuss the Empowering Homes sounding paper, describes the program as "all positive ... an incentive that will boost the uptake of battery storage in NSW and drive jobs and investment in the sector."

Sonnen's Nathan Dunn told *Smart Energy* "It's about time the NSW government started to look into these sorts of incentives and programs for the benefits of the state.

"They represent a huge opportunity to drive the community toward energy storage."

➤ **Read more about the NSW Empowering Homes Program on page 30.**

Plans to unlock up to \$3.2 billion in clean energy investment NSW is significant given the state is falling behind on the pathway to net zero emissions from the power sector by 2050. According to Green Energy Markets data released mid-year, renewables in NSW need to grow to around 46 per cent of its overall electricity consumption by 2030 which means an additional 5,000 MW of new renewable energy project commitments by 2030. Positive signs are now emerging.

Recent initiatives by the newly formed NSW Coalition for Conservation have seen NSW Energy Minister Matt Kean double down on his commitment to ramp up decarbonisation of the electricity grid, foreshadowing a NSW energy policy to address the issues of reliability and affordability of energy supply.

The C4C initiative is designed to lay the groundwork for the bipartisan support for action on climate change to fill the void in Australian politics which currently stands at a crossroads on climate change.

"The most economic form of reliable generation is firmed renewables and that is driving the biggest change in our electricity system's history," Minister Kean said.

Bloomberg New Energy Finance's outlook puts renewable generation at nearly 78 per cent by 2040, up from the 25 per cent of today. Coal currently generates about 60 per cent of the National Electricity Market's power but by 2040 is expected to generate only about 14 per cent.

The sunshine state

Moves are afoot in Queensland where, during the three months to June, almost half of the 1,500 MW renewable energy projects along Australia's east coast were located.

Although Queensland boasts the largest solar generation output and number of solar jobs, the sunny state is falling significantly short of its target of 50 per cent renewables by 2030, with current commitments and rooftop solar growth to deliver a little over 29 per cent.

The state requires around another 4,500 MW of projects to stay on track and will be steered by government clean energy project arm CleanCo.

Around the nation

According to market analyst GEM, Victoria is close to achieving its target of 40 per cent of Victorian power generation from renewables by 2025 and within striking distance of the 2030 target for 50 per cent renewables, requiring about 2,000 MW more projects.

South Australia is on track towards generating renewable energy equal to 73.5 per cent of its consumption by 2030, up from 53 per cent



The Clean Energy Finance Corporation's portfolio of investment commitments was almost \$6.6 billion at 30 June 2019, after allowing for repayments, amortisation and cancellations on almost \$7.2 billion in total commitments made since inception.

Through these commitments, the CEFC has deployed more than \$5 billion to projects Australia-wide since 2012, of which almost \$560 million has been repaid and is available for new investments.

Each dollar of CEFC commitments has been matched by more than \$2 in private investment, a clear demonstration of progress in drawing additional finance into clean energy solutions.

Questionable actions

Despite the trajectory, moves are underway by a federal government-appointed panel to review use of \$2 billion of public money to prop up ageing, inefficient coal fired power stations.

The 'Climate Solutions Fund' is the rebadged Emissions Reduction Fund whose Assurance Committee is determining which projects will be allocated funds for activities aimed at reducing greenhouse gas emissions. Two coal-fired power stations have registered under the process in which Emissions Reduction Minister Angus Taylor will have the final say.

The Climate Council points to the irony of Climate Solutions Fund being the closest semblance to a climate policy this government currently has, and "It is concerning that some of our biggest emitters could potentially access public money from a fund which is designed to reduce emissions."

Moving away from coal

A recent IEEFA report states Australia will struggle to seek alternative markets for its thermal coal as a declining Japanese market increasingly turns towards cheaper renewable energy solutions.

The report *Japanese Thermal Coal Consumption Approaching Long Term Decline: Australia's Biggest Export Destination to Transition Away from Coal* examines the momentum away from thermal coal in Australia's key export market.

Japan accounted for 45 per cent of all NSW thermal coal exports in 2018. However its thermal coal imports will decline at an average annual rate of 1.1 per cent each year to 2024, and other major markets China, South Korea and Taiwan will follow suit with fewer coal imports.

IEEFA director of energy finance Tim Buckley who co-authored the report with Simon Nicholas says well over 100 significant global financial institutions have ceased lending to, or investing in, thermal coal and coal-fired power plants.

"Japan's influential trading houses are reflecting that growing trend by recently announcing a cessation of coal plant development and divestment from thermal coal mine investments, including in Australia," Buckley explained.

"With demand for imported thermal coal in NSW's big four export destinations continuing to decline, the market is set for long-term oversupply, lower prices and lower royalties.

"Stopping new thermal coal mine approvals represents a rational economic step in the face of a declining market."

➤ **Read what AEMC has to say about energy market dynamics on page 24.**

➤ **Hydrogen to the fore? See page 14.**

in 2018. To achieve the government's target of 100 per cent renewables it needs another 1,300 MW of capacity.

Tasmania needs no further projects to achieve its target of 100 per cent renewables by 2022 as it has been close to generating 100 per cent renewables as a proportion of consumption well before the government announced its target.

Across the nation, renewable energy construction increased by more than \$9 billion over the past three years, significantly more than road construction which increased by \$3 billion, rail construction by \$6 billion and commercial building by \$8 billion.

"The extraordinary boom in the renewables sector is currently the largest contributor to overall growth in construction in Australia," Macromonitor economist Natalie Keogh says.

"Solar projects, in particular, combined with wind and storage projects, are driving solid growth in overall utilities sector construction, despite falling levels of work on the NBN and weak activity in water, gas and the non-renewable segments of electricity."

Air quality

Despite advances in the renewables sector, Australia's overall emissions continue to rise. The question is: What action can or will the Minister for Emissions Reductions take and what signals is he delivering to tackle the spiraling problem?

A Myth Busting fact sheet presented by the Climate Council reveals:

- Australia is not on track to meet its Paris target; greenhouse gas emissions have been rising consistently for five years.
- Australia has the highest emissions per capita in the developed world and is the second biggest exporter of thermal coal and LNG, both of which are polluting.
- In terms of all of the fossil fuels that Australia extracts, it is the fifth biggest polluter in the world.
- Emissions from electricity production account for 33 per cent of total emissions and although emissions from electricity are down, there has been a bigger rise in emissions from other sectors, such as transport and fugitive emissions.

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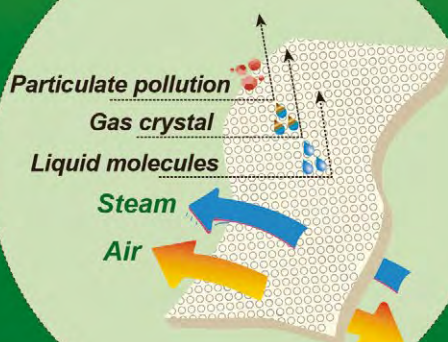
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Hunger for HYDROGEN

From drawing board to streets and houses: the falling cost of renewable energy is fuelling the development of green hydrogen for use to power homes and industry, as well as cars, trucks, ships and planes.

"I BELIEVE THAT WATER will one day be used as a fuel, that the hydrogen and oxygen it contains, used alone or simultaneously, will provide an inexhaustible source of heat and light of an intensity that coal cannot have," wrote Jules Verne in his novel *The Mysterious Island*. The year was 1874.

Fast forward 145 years and the world is on a precipice, or in the words of another great thinker, at the edge of the third industrial revolution in which the internet, renewable energies and hydrogen can address the triple challenge of global economic crisis, energy security, and climate change.

The European Parliament formally endorsed the views of US economist Jeremy Rifkin and China reportedly incorporated his ideas into its thirteenth Five-Year Plan.

The more we read about the potential for hydrogen which is inexhaustible, ubiquitous and infinite, the more fascinating it becomes. But what will it take for clean hydrogen to become more widely made and used? Frustration about the pace of development in hydrogen was expressed by Dan Ariely

who said "A Hydrogen economy is like teenage sex: everyone talks about it, nobody really knows how to do it, everyone thinks everyone else is doing it so everyone claims they are doing it."

Max Hewitt of Hydrogen Australia agrees there's been a lot of talk about hydrogen's wide applicability, but the stage is now set to transition from 'blue' to 'green' hydrogen.

Currently more than 95 per cent of hydrogen is produced from fossil fuels, mostly natural gas, but falling wind and solar energy costs are boosting the case for renewables-based electrolysis.

"This is really the first time that there have been favourable conditions for the 'hydrogen revolution' to drive the development of this into something much greater than what it has ever been before," he said.

"The need to decarbonise and fight climate change is the main driver and the increasing economic favourability of renewables as well as advancements in electrolyser technology have pushed green hydrogen production into a space where it

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is almost economically viable as a replacement fuel when produced at scale,” Max said.

“In combination with the research that has been conducted to date, we are now at a point where commercial hydrogen technologies will soon be emerging, and uptake will develop from there.”

The transition is indeed underway.

Australian advances

Researchers at the CSIRO have produced a National Hydrogen Roadmap for the development of a hydrogen industry in Australia, and the nation’s energy ministers formed a National Hydrogen Strategy Taskforce to consider the “tangible next steps” in the potential of hydrogen, including the highly promising export market.

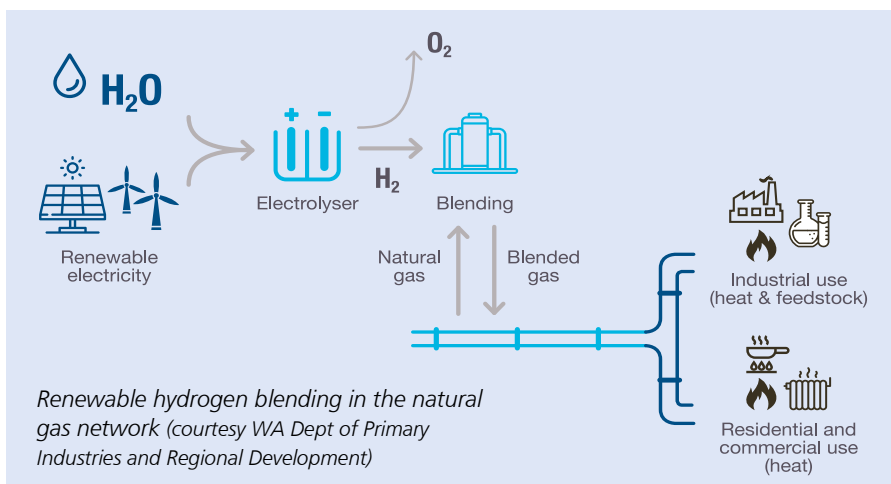
Chief Scientist Alan Finkel who leads the Hydrogen Strategy Taskforce commented “We’ve produced hydrogen in large volumes for more than a century, for use as a feedstock in industry, and it’s been shipped and stored with an exemplary safety record for all that time. Now hydrogen is surging to the top of the global decarbonisation agenda. [It’s] A fuel for the twenty-first century [and] Australia is a prime contender to be a dominant supplier.”

The Taskforce plans to deliver its strategy by the end of 2019 with a blueprint for government and industry to implement an export strategy from 2020.

Work within ARENA

Last year, ARENA, which is contributing to the National Hydrogen Strategy, awarded \$22.1 million to 16 hydrogen research projects including Toyota’s Hydrogen Centre at the former car assembly factory at Altona in Melbourne.

The agency funded \$1.66 million of the Western Australia gas giant ATCO’s \$3.3



million Clean Energy Innovation centre and hydrogen microgrid hub in Perth that was opened in July and is powered by a 300 kW rooftop solar system, a 250 kW battery energy storage system, and a 150 kW electrolyser to produce renewable hydrogen.

The plan is to demonstrate the use of hydrogen gas within the domestic market, with testing in household appliances designed for natural gas such as a cooker.

Smart Energy Council President Steve Blume explained that one of the key technical barriers to hydrogen is the inability for it to be pumped through existing gas pipelines at more than 10 per cent of the mix.

Modifications to gas network infrastructure and appliances are therefore necessary, and ATCO Head of innovation Samuel Lee Mohan says these could be completed within five to eight years.

“There are two key challenges ... one is understanding the engineering and technical challenges of producing and injecting hydrogen into the gas network. The second is economics, understanding the cost and time of changing appliances and some network upgrades,” he said.

It’s a gas

In a related project, energy infrastructure company Jemena has confirmed the purchase of a 500 kW electrolyser in Western Sydney to use renewable energy – solar and wind power – to create carbon-neutral hydrogen gas for use in cooking, heating and hot water in NSW where it could be introduced within the next five years.

The \$15 million ‘green gas’ trial being co-funded by ARENA is significant: as of 2018, there were more than five million homes connected to natural gas. A switch to green gas enables millions of households to become far more sustainable.

More in the pipeline

The scope of opportunities for ARENA-funded renewable hydrogen to fast track an Australian hydrogen economy was brainstormed at a gathering of 50 hydrogen industry experts in Brisbane in early August.

The lengthy list included concepts for a >10 MW electrolysis project to produce renewable hydrogen using electricity, Hydrogen Fuel Cell Electric Vehicle (FCEV) bus and passenger vehicle fleets, a remote and off grid

“Imagine a zero-emissions fuel that exists on earth in abundance, can be easily extracted using basic chemistry and offers jobs and investment in Australia for decades to come. That substance exists: it’s called hydrogen.”
Alan Finkel

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The South Korean government's roadmap to revitalise the hydrogen economy is pushing for the expansion of vehicles and power generation infrastructure using hydrogen fuel

area power project that would include hydrogen storage and a large scale power-to-gas grid injection project.

"A lot of the focus at the moment is on the longer term opportunity. Our focus is on what do we do in the immediate future to get there, what is the next step or the first step?" said ARENA chief executive Darren Miller who describes the potential for Australian hydrogen as a "moonshot opportunity".

Over in the west

To further support the development of the state's hydrogen production capacity, the Western Australia government has launched a \$10 million Renewable Hydrogen Fund, and a new Renewable Hydrogen Strategy to help realise the growing hydrogen export market and facilitate private sector investment in the industry.

WA is well placed; it's rich in renewable energy resources and within proximity to Asia and its vast population whose governments are strategically moving towards emissions reductions targets.

There has been strong interest in expanding Western Australia's hydrogen export capabilities, including CWP Renewables' plans to establish a \$30 billion, 15 GW solar and wind project in the Pilbara to support the production and export of renewable gas.

Projections

Forecasts suggest by 2050 the world will be using 667 million tonnes of clean hydrogen a year. It will take about 44,000 TWh of solar to make that, or 180 times Australia's total energy generation in 2018. All up, that's about 400,000 square km of panels. "Which, on a global scale, is not that much," says Alan Finkel.



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"There is big potential for Australia to be transforming to hydrogen as an export ... to do that would take a lot of time but it's a chicken and egg — the more we invest in a technology, the better we get at making it, the cheaper it becomes, and the more demand for it grows."

Gus Nathan, University of Adelaide

The International Energy Agency's World Energy Outlook projects that Australia could easily produce 100 million tonnes of oil equivalent of hydrogen which would equate to 3 per cent of today's global gas consumption.

If that scenario were realised, Australia could forge an export industry worth \$1.7 billion by 2030, with 2,800 related jobs.

ARENA commissioned a report by ACIL Allen Consulting *Opportunities for Australia from Hydrogen Exports* which calculated that global demand for hydrogen exported from Australia could be over three million tonnes each year by 2040 and worth up to \$10 billion each year to the economy by that time.

John Grimes, chief executive of the Smart Energy Council and newly formed Hydrogen Australia says "Green hydrogen is smart energy. It's the low emissions energy source that will help power and transport Australia in the 21st Century."

"Green hydrogen and its downstream fuels and chemicals will be critical to Australia's energy future, providing jobs, investment and export opportunities.

"Very soon, we will start to see hydrogen being exported from Australia to Japan, South Korea, Singapore and other nations. It's really exciting."

The International Energy Agency report for the G20 meeting held in Japan in June highlighted Australia's ideal position with its abundant solar and wind resources and potential to export clean hydrogen and hydrogen-based fuel to "energy-hungry cities" thousands of kilometres away.

Japan and South Korea which are among Australia's large customers of LNG exports are already investing heavily in hydrogen technologies. Japan wants to set an example on the global stage by powering the bulk of the 2020 Tokyo Olympics with hydrogen fuel.

The IEA cites the challenges to widespread use of clean hydrogen in the global energy transition as the relatively high cost of producing hydrogen from low-carbon energy and slow pace of development of hydrogen infrastructure which is holding back widespread adoption.

Among the IEA's seven key recommendations to scale up hydrogen were the stimulation of commercial demand for clean hydrogen, support for R&D to bring down costs and the elimination of unnecessary regulatory barriers.

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Developments overseas

The New Oil: The Arabian Gulf Cooperation Council of Bahrain, Kuwait, Oman, Qatar, Saudi Arabia and the United Arab Emirates is developing a roadmap for green hydrogen produced from desalinated water.

Producing 1 kilogram of hydrogen requires 50 kWh of electricity, and the low cost of solar energy in the Gulf at around 3 ct/kWh would put the energy cost to produce hydrogen at \$1.50/kg.

An electrolyser costs approximately \$600,000 per MW, however costs are anticipated to fall to \$400,000 within a few years.

Based on calculations of annual production of 160,000 kg of hydrogen, with a 10-year plant life and linear depreciation, 0.25 \$/kg would be added to the cost of the hydrogen, bringing overall cost of green hydrogen in the Gulf to \$1.75/kg.

Heading east now to South Korea, which boasts the 50 MW class secondary hydrogen fuel cell power plant that on completion will be the largest in the world. The government's roadmap to revitalise the hydrogen economy is pushing for the expansion of vehicles and power generation infrastructure using hydrogen fuel.

And in Europe

Denmark's Orsted – the world's largest offshore wind developer which now plans to increase its installed capacity from 5.6 GW to 15 GW by 2025 – is developing green hydrogen projects as part of its bid for projects in the Netherlands.

In Germany, Shell and European partners are developing the world's largest hydrogen electrolysis plant at the Rhineland refinery. The 10 MW

Did you know?

One kilogram of hydrogen releases:

- 4.1 times more energy than 1kg of coal
- 2.8 times more than 1kg of gasoline
- 2.4 times more than 1kg of natural gas

Fifty years ago the Apollo missions to the moon used a fuel cell, which combined hydrogen and oxygen to generate electrical power and water for the spacecraft. The water was used by the astronauts for drinking. The Apollo Service Modules carried three such fuel cells.

Rehyne hydrogen plant will be able to produce 1,300 tons of hydrogen per year and is due online in 2020.

In mid September the f-cell international trade event for the hydrogen and fuel cell industry exhibition takes place. This year's focus is on hydrogen's role in making the transport sector more climate-friendly, with the inaugural "24-Hour Hydrogen Challenge" rally in Germany.

Staying in Europe, Clean tech floating laboratory Energy Observer is a striking-looking vessel that is demonstrating the ability of renewable energies and carbon-free hydrogen to power sea-going voyages and many ship owners are starting to seriously consider hydrogen for newly built vessels. Interest in maritime bulk hydrogen will continue to grow as regulatory bodies throughout the world call for stricter emissions across all transportation sectors.

The same could be said of the aviation industry ... but that is a whole new chapter.

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Optimising the energy transition

By Tim Nelson, Executive General Manager of AEMC and Associate Professor, Griffith University

The AEMC has identified five areas of strategic focus to maximise the benefits to consumers during the technology transition in energy generation and distribution.

AUSTRALIA IS AT THE FOREFRONT of the transition sweeping through electricity systems around the world.

New disruptive technologies are fundamentally changing the way in which electricity is produced, consumed and stored.

At the same time, governments and civil society are committing to greenhouse gas emission reduction targets which are also changing attitudes towards technology and investment.

It has never been more important to embrace the proposition that energy policy should be in the long-term interests of consumers.

The Australian Energy Market Commission (AEMC) has recently provided an update to its guide on how to interpret the National Energy Objectives (NEO), which relate to the long-term interests of consumers.

The update includes an assessment of how climate change mitigation and adaptation risks manifest through the NEO.

The AEMC has also announced five areas of strategic focus to maximise the benefits to consumers of the technology transition underway.

We will be working closely with our stakeholders on furthering understanding of the issues raised by these priorities.

The AEMC welcomes rule change requests from our stakeholders that seek to address these matters.

Generator access and transmission pricing

Electricity generation was historically concentrated in regions with access to coal such as the Hunter and Latrobe Valleys.

But with the rapid decline in technology costs associated with new renewable technologies, changing patterns of electricity demand and investor concerns about carbon risk, there has been a surge in investment in new renewable technologies and significant interest in

complementary gas-fired generation, pumped hydro and energy storage.

In fact, around 8,000 MW of new power generation is currently under construction or at financial close.

In the coming years, this should place downward pressure on prices.

This shift in the technology investment mix has led to policy makers considering how best to ensure that the transition is implemented in the long-term interests of consumers.

The Integrated System Plan, completed by the Australian Market Operator (AEMO), provides a useful starting point for thinking about what the grid may look like in the future.

We are moving from a small number of large geographically concentrated generators to a large number of small geographically dispersed generators. Within the AEMC, we are considering how coordination of generation and transmission investment can maximise consumer benefits.

Our Coordination of Generation and Transmission Investment (CoGATI) program is considering how to use pricing signals and access rights to ensure where possible that market participants, rather than consumers, manage the investment risk and opportunity associated with this transition.

System security

Australian energy companies have embraced renewable technologies.

The South Australian region of the NEM is one of only three markets in the world to be in the most advanced stage of renewable energy integration according to the International Energy Agency (the other two being Denmark and Ireland).

Around half of South Australia's electricity is now sourced from renewables.

This is presenting new challenges for ensuring the system is secure.

“Smart, digitally-enabled technologies allow households and businesses to take advantage of demand response as an alternative to building infrastructure to service peak electricity demand for only a few hours a year.

“It has never been more important to embrace the proposition that energy policy should be in the long-term interests of consumers.”

The AEMC is working in close collaboration with AEMO to make sure that the requisite technical system services that were once provided for free by thermal plants are being provided to keep the electricity system secure.

Integrating distributed energy resources

Behind the meter, there has been a surge in embedded solar PV and battery storage adoption.

More than two million homes are now energy producers as well as consumers. Unfortunately, networks still largely charge for energy and not necessarily the capacity consumers require.

But with the increased cost competitiveness of battery storage, there is an opportunity to consider concepts of access pricing and cost-reflective or customer reward pricing.

Adoption of these types of pricing principles would allow consumers to benefit by shifting energy production from the middle of the day into their evening consumption.

In turn, this would allow all consumers to benefit by lowering the average costs to serve all consumers.

The AEMC is considering these issues through our Electricity Networks Economic Regulation Frameworks (ENERF) Review.

Digitalisation of energy supply

The increased use of digital technologies in our homes and workplaces is creating significant opportunities for consumers to self-manage their energy in a way that was previously impossible.

Using smart, digitally-enabled technologies allows households and businesses to take advantage of demand response as an alternative to building infrastructure to service peak electricity demand for only a few hours a year. The Commission is actively considering demand response, embedded networks and stand-alone power systems in this context.

Aligning financial incentives with the physical needs of the system

The lowest cost form of energy production within the Australian electricity system is now solar PV with costs of sub \$50/MWh. But variable renewable generators cannot choose when to operate, they simply operate as long as the price is greater than their opportunity cost of operation, which is close to zero.

If the fuel is available (i.e. it is sunny or windy), they generally run.

Because they do not choose when to operate, they tend not to enter into financial derivative contracts.

At times when renewables are not available, there is a need for complementary capacity to be available.

The types of capacity best suited to complementing variable renewable technologies are fast-start gas plants, discretionary hydro plants and battery or physical storage, such as pumped hydro.

Australia's incumbent coal-fired generation is ageing with more than three-quarters of the thermal fleet beyond its original design life.

Therefore, there will be a need for the generation stock to be renewed in the coming years. It is therefore important that electricity markets provide financial incentives for investment that match the physical needs of the system.






The AEMC is working with the Energy Security Board (ESB) on these issues as part of the ESB's post 2025 market design review.

Concluding thoughts

New technologies and business models are fundamentally reshaping Australia's electricity markets. It is important that regulatory frameworks continue to evolve to ensure that consumers maximise the benefits from this technology transition.

We are working hard with our counterparts at AEMO, the ESB and the Australian Energy Regulator (AER) to ensure the transition occurs in a manner that meets the National Energy Objectives – the long-term interests of consumers.

A work program for the future

1.	Generator access and transmission pricing		Shift from large geographically concentrated to small geographically dispersed generation
2.	System security		Services previously provided for free not necessarily provided by new generation
3.	Integrating distributed energy resources		Increased adoption of small-scale solar and energy storage technologies
4.	Digitalisation of energy supply		Increased adoption of digital technologies
5.	Aligning financial incentives with the physical needs		More variable demand and supply creating volatility

Leading the charge

Jet Charge is playing a significant part in the roll-out of electric vehicle charging technology across Australia, making it easier for drivers of EVs to recharge and travel between destinations. In turn that makes EVs more appealing to potential buyers.

IF YOU DRIVE an electric vehicle, the chances are that when you charge it you will be using a unit installed by Jet Charge. The nationwide specialist EV installation business founded by Tim Washington in 2013 commands the lion's share of the charging market across all sectors from individual homes to high density apartments, commercial and industrial sectors and corporate/government fleets and car dealerships.

And if you have travelled along the east coast and beyond in your EV you may have been relieved to pull up at one of the Chargefox ultra-fast charging stations. Jet Charge is a founding shareholder of the next generation EV charging station software management platform in Australia and New Zealand.

To date six of these petrol-style stations that can fully charge an EV in 15 minutes have been completed, with another 22 ultra-rapid charging stations to be deployed before year's end. The project gained a welcome boost from ARENA's \$6 million injection to spur the network spanning highways from Adelaide to Brisbane and at sites in Perth and Tasmania.

"We were about the third in the world to offer a 350 kW charging port, and this was world leading when we launched" said Tim, who blended his background in energy and resources law and keen interest in technology to found Jet Charge.

Ultra fast development

Pinning Tim down for an interview is no easy feat given his hectic interstate travel commitments – the

client list includes AGL, DHL, Melbourne Water, Coles, Energy Queensland, Woolworths, Horizon Power, Mirvac and more.

But with two hours to spare between flights, he told the story of how Jet Charge steered the site design, supply and installation of charging station infrastructure across 89 Nissan dealerships around Australia, using products sourced from one of their several suppliers including Schneider, Delta and Rolec. The job was completed in just three months and in time for the rollout of the new Nissan Leaf.

More than 11 other vehicle manufacturers including Audi, Renault, Kia, Volvo, Hyundai, Tesla and Mercedes-Benz have selected Jet Charge as their national recommended EV charger and by year's end another three vehicle brands are likely to be added to the list.

"Our B2B business model involves less aggressive marketing than solar PV installer companies," he told *Smart Energy*. "And we are on track to grow our client list. Our aim is to reach 100 installations a day, up from the five of today, and modelling of the EV market supports our aspirations.

"By 2023 there will be much greater demand for charging points around the country. Our goal is to accelerate EV uptake by eliminating EV charging as a barrier."

The number of EVs in Australia sits at around 8,000, however third party research forecasts suggests sales of new EVs will reach about 100,000 by 2024-2025



“ Developers constructing commercial or residential buildings now need to think about what people will be driving and how they power their vehicles in 15 years time... ”



based on price parity with traditional models, according to Tim. The Electric Vehicle Council – which he Chairs – has a higher estimate.

Patterns of demand

On a per capita basis the ACT clocks up the greatest demand for EVs thanks to the stamp duty waiver and the territory's preparation of ACT government's fleet transition. Jet Charge has so far installed 44 charging stations across multiple sites in the territory.

Total EV sales are strongest in NSW, followed by Victoria and Queensland, but the nation is woefully short of incentives for motorists to transition from petrol driven vehicles.

“My view is that we should incentivise people to drive low emissions vehicles,” Tim said. “Not necessarily just in the form of direct financial incentives but in matters such as encouraging workplaces and rural and regional councils to provide chargers and include them in infrastructure builds.”

More direct incentives for everyday car owners could include a discount off the capital cost of the vehicle to help bridge the gap between EVs and petrol-fuelled vehicles, and Tim drew attention to New Zealand's rebate scheme which taxes drivers of more polluting vehicles, and puts the money collected towards subsidies for low emissions vehicles.

Other enticements could take the form of permitting EVs in bus lanes and car pool lanes for an easier commute.

Tim says there is also an important role for property developers, and issued the warning: “If you are constructing commercial or residential buildings now you want to think about what people will be driving and how they power their vehicles in 15 years time ... any opportunities for developers to go down that [EV charger] road should be investigated.

“Whatever your views on EVs now there are few who doubt that most of us will be driving EVs in about 15 years.”

Gearing up

Some councils are more proactive in their support for EVs. Among the frontrunners are Newcastle Council which recently commissioned 12 charging stations, however the largest project to date can be found in Adelaide 46 Upark car parks, all of which operate on Chargefox.

Charging stations located in high density apartments can demand a fair amount of power – the average daily plug-in and recharge is 60 to 90 minutes – which has prompted a push by electricity retailers for greater visibility on charging stations to better manage power supplies.

Not all plain sailing

Not all jobs are gladly accepted. Jet Charge had to turn down one private customer with plans to install a charging station near his front gate because he lacked off-street parking.

“He wanted to unwind the cable at night, put it across the footpath, then charge his car. We refused to do so because of the potential tripping and safety hazards, despite his assurances,” Tim chuckled.

Some electric cars come with quirky plug/unplug procedures, which can result in supposed ‘faults’ and some charging stations can also be sensitive to the order of procedures, he said. “But we think all of this will be ironed out over time as the industry progresses.”

One of the more colourful jobs involved a 70-year-old woman's request for a portable charger to allow her to navigate 20,400 kilometres of road around Australia in her Tesla S75.

Job done – with the cost of electricity during the epic road trip coming in at just \$151.

Renewable energy

An important matter that is often raised is the source of the electricity used in the national network of ultra-fast charging stations being developed. And the good news is that all the charging stations, which are being developed with ARENA's support, are powered by renewable energy. That's a win for renewables and a win for the environment.

The Smart Energy Council welcomes Jet Charge as a new member. Got an interesting story to tell? Email editor@smartenergy.org.au



Electric Vehicles in the slow lane

DURING THE FIRST HALF OF 2019 sales of hybrid and electric vehicles doubled when compared to the same period last year, however the numbers are still low.

In 2018, electric car sales came in at just 670 (in contrast with 385,000 sales of petrol driven cars), and in the six months to the end of June 2019, EV sales reached 1277 (petrol driven: 347,000).

Accurate data on the number of EVs traversing Australia's roads are difficult to come by, with estimates varying from 6000 to 8000.

Tesla vehicles are rarely included in EV statistics – the company sells direct to customers and strictly guards its privacy – however Australian sales over the past six years are estimated to be in the region of 2000.

Petrol and diesel vehicles still form the vast majority, 97 per cent, of Australia's market.

Winding the clock forward to 2030, there could be as many as 125 million electrical vehicles in the world, according to the International Energy Agency.

Demand for battery driven vehicles will be strongest in China, France and the Netherlands. More than 1.3 million electric and hybrid vehicles were sold in China last year on the back of Government incentives toward low emission vehicles.

Today, the highest numbers of plug-in hybrid cars can be found in Japan, Sweden and the UK.



Did you know?

Australians average a 40 km round trip during their daily commute.

The cost of electricity in Australia averages \$0.30 per kW.

EVs need about 18kW to travel 100 kilometres so the cost average cost would come in at \$5.40, in contrast to \$16.65 in bowser costs for petrol driven cars or \$7.50 for those running on diesel, according to ABS data.

Because EVs don't need spark plugs, engine oil and filters they are also lighter on maintenance and service costs.

Taking the base level of 1340 EVs in 2019, should sales in Australia double each year they would reach 86,000 by 2025 and 686,000 by 2028.

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NSW Empowering Homes Program

NSW plans to unlock up to \$3.2 billion in clean energy investment and add 3,000 MWh of storage.

- The NSW Empowering Homes Program is being developed to support the installation of up to 300,000 solar-battery systems across the state over the next 10 years.
- The program will provide interest-free loans of up to \$9,000 for a battery system or up to \$14,000 for a solar-battery system to eligible NSW residents with household incomes under \$180,000.
- All being well, the first battery or solar-battery systems will be available for installation during the summer months.

The Smart Energy Council, which has participated in meetings with NSW departmental staff to discuss the Empowering Homes sounding paper, describes the program as 'all positive'.

"Structured properly this incentive will boost the uptake of battery storage in NSW and drive jobs and investment in the sector," Government Relations Manager Wayne Smith said.

"Victoria's Solar Homes program has many parallels with the NSW proposal and we have successfully ironed out many of the issues that were plaguing the industry and causing job losses. This demonstrates the importance of extensive consultation with industry – and all signs so far suggest the fundamental elements are in place to deliver the optimum outcome in NSW.

"If the scheme is executed as planned, benefits will include reduced energy prices for all users, due to a reduction in peak demand and, down the track, less need for network upgrades and all the costs that brings.

"Importantly, it sends a message of confidence to the community that solar PV with battery storage is a real and viable option."

sonnen steps up

Smart Energy asked sonnen's Nathan Dunn what characteristics underpin a successful scheme, given sonnen's extensive experience in several state subsidy programs. "My impressions of the NSW scheme are favourable, given the amount of consultation taking place which is in contrast with other programs rolled out that have slowed things down," he said.

Lessons have been learnt from Victoria's Solar Homes schemes and "There needs to be a degree of fluidity in the numbers being touted to allow NSW consumers to understand the offer and allow the market to take advantage without restricting the business processes of any of the industry."

"Clearly we need to avoid a situation of first-across-the-line in 90-minutes."

Turning to market demand – what are the chances of seeing enough applications for loans of \$9000 to \$14,000?

"We are optimistic but see it as a process of education. Not everyone understands the benefits, there is still a mountain load of education and information to pass on about what to look out for.

"Some of the difficulties in schemes implemented during the past 24 months highlight why education is important."

Using South Australia's scheme as an example he said the focus is on getting 40,000 homes to take on any energy storage device, but the lowest common denominator, and major factor, then becomes price as consumers don't fully understand how to maximise their energy portfolio.

"We need to steer customers to full information on all products to enable comparisons and the best choice, with an emphasis on full disclosure: product performance, technical data and power levels which could be supplied.

"Detailed third party validation should be readily available and form part of the qualification to participate in schemes," Nathan stated.

Overall, renewable energy incentive programs initiated by the states are great if they are executed properly, educate consumers on the benefits, help raise awareness and are managed correctly.

"It's about time the NSW government started to look into these sorts of incentives and programs for the benefits of the state.

"They represent a huge opportunity to drive the community toward energy storage."

<https://energy.nsw.gov.au/media/1766/download>



Nathan Dunn, CEO
APAC of sonnen

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*TERMS & CONDITIONS APPLY: VISIT SMARTENERGY.ORG.AU
In November 2017, the Australian Solar Council & Energy Storage Council
became the Smart Energy Council



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Energy, exports and emissions

Reality checks:

Australia's carbon footprint

- **Third-biggest exporter** of CO₂ from fossil fuels in the world.
- Mining **~57 tonnes of CO₂** potential per person each year
- **10 x** global average (per capita)
- Exports **7% of the world's fossil fuel** CO₂ potential

Source: The Australia Institute
referring to IEA and IPCC data



Emissions

- **By 2030**, Australia's Scope 3 (all indirect) emissions + completed coal and natural gas projects will generate **12% to 17% of global emissions**

Source: The Australian Conservation Foundation

- Berlin based Climate Analytics estimates are similar, Australia's domestic and export gas, oil and coal will generate **13% of Paris Agreement** global CO₂ emissions in 2030.

And yet...

- Australia deploys **world's highest levels** of renewable energy generation per person
- **5 GW** of renewable capacity installed in **2018** (including 1.5 GW rooftop PV) up from 2.2 GW in 2017

Accredited large-scale projects

- **2018** = 3455 MW (record high) • **2017** = 1113 MW
- **2019** expectations = 4000 MW of large-scale generation coming on-line

Rise in output

- 22,000 GWh in **2018** • 30,000 GWh in **2019**
- 40,000 GWh in **2020**

Source: Clean Energy Regulator *The Acceleration in Renewables Investment 2018*

Aspirations

- Australia could produce **100 million tonnes** of oil equivalent of hydrogen = 3% of global gas consumption today

Source: IEA World Energy Outlook

- Australia could export **\$1.7 billion worth of hydrogen** per annum by 2030 and generate 2,800 jobs

Chief Scientist Alan Finkel



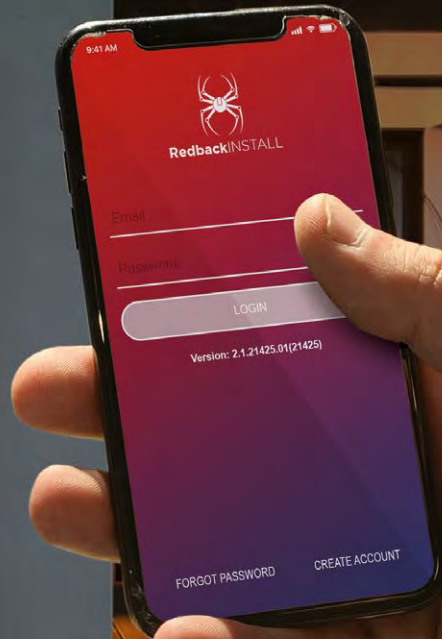
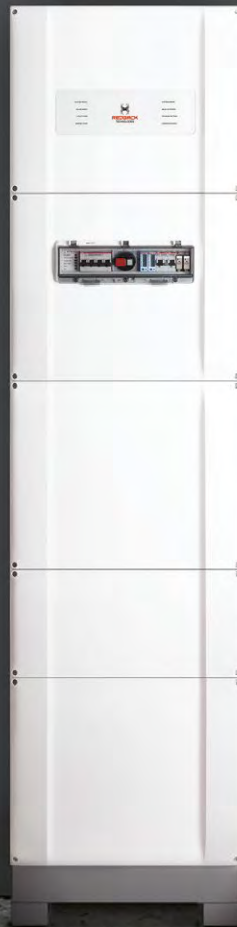
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Bright outlook for SunMan's lightweight panels

SunMan's eArche lightweight glass fibre reinforced plastic panels are filling a niche in the market.

The Australian National Maritime Museum at Darling Harbour is powered by lightweight eArche panels

'THE WEIGHT IS OVER' is not the SunMan slogan, however it's a fitting tagline for a company that is making light-weight solar PV panels that are the answer to buildings with slender roofs and a need for rooftop PV.

The potential is massive.

According to SunMan which channeled a portion of the investment by ARENA and the Bank of China into market research, 40 per cent of the industrial commercial properties built in Australia 10-15 years ago were not designed to take the weight of glass panels that typically weigh 20 kilograms each.

"There's 500 MW of potential in agricultural buildings alone – structures that were not built with the weight of glass solar panels in mind," SunMan's Thomas Bell said.

"The eArche [pronounced 'ee-ark', short for energy architecture] panel that weighs 3.8 kilograms per square metre installed is ideal for these applications. That is our core point of difference. Installed, our panels are 70 per cent lighter."

By his estimates each of the 4000 accredited installers in this country has had to walk away from one or more projects because of weight constraints, and eArche would fit the bill perfectly.

"Our key competitive advantage is locating all those properties wanting solar PV but are held back by weight restrictions," Bell told *Smart Energy*.

Instead of using racking, most panels are installed using a structural grade silicon, and in many cases are bonded directly to roofs which reduces installation time by 40 per cent. A time-saving bonus comes from installers' ability to carry up to three panels at once.

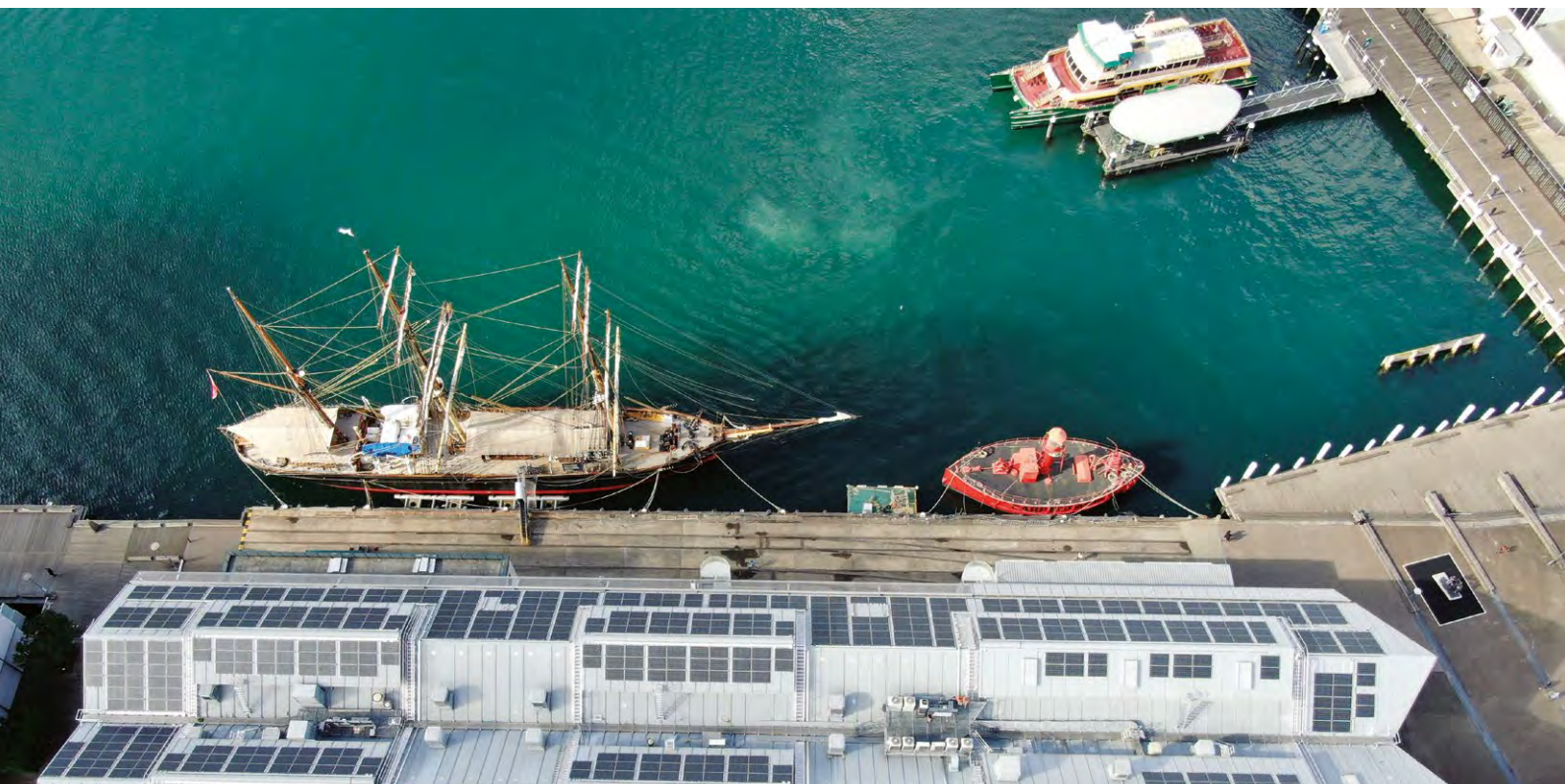
Compelling characteristics

eArche modules offer the same durability and performance as standard glass modules with crystalline silicon cells. In addition to the protective layers on the front and rear sides, the panels are laminated on both sides of the solar cells with multiple layers of waterproof polymer composites and offer a conversion efficiency of around 18 per cent.

The composite material used in eArche has its roots in the aviation industry; the inside of a plane's window is made from a plastic composite fibreglass reinforced material. SunMan was the first to market with this composite material.

"It's been extensively used in the aviation industry for decades but solar pioneer Dr Zhengrong Shi (best known as the founder of Suntech, the world's largest module manufacturer) repurposed that material and built a manufacturing base around it," Bell explained.

When Dr Zhengrong Shi established SunMan in 2014 he recruited his long-term colleague Thomas Bell – who worked





for Suntech Power Australia for three years from 2011– to help set up the platform for market testing of eArche.

“Dr Rhett Evans of UNSW is conducting an independent review of our third party testing and we are preparing a document for the Australian market that he will assess, and benchmark that to results for conventional technology to reassure the market the panels are built to a certain quality and durability standard,” Bell said.

The panels were the first to be IEC 61215 Certified, and have been certified by a local engineer to withstand cyclonic wind conditions up to 317kph.

Greater coverage

Product applications extend well beyond slender roofs. Up to 25 per cent of residential market will never buy solar due to aesthetics, according to Bell who says “Some deem solar PV ugly, but our thin lightweight panel can create the illusion of integration.

“eArche panels are super thin so when seen from the ground you cannot distinguish the roof from the panel. We feel we can secure the market where aesthetics is a challenge.”

Another potential target is households with an existing 5 kW rooftop solar PV system wanting to add capacity and accommodate battery storage. “They would need systems between 8 and 10 kW but in many cases rooftop space is limited; however

many homes have a carport, pergola or patio and we can use these support structures, eArche will facilitate this.

“Think of eArche too as a solar skin, we could use all building surfaces to make energy ... if it is cost effective enough and easy to install there is nothing stopping eArche which is only 3mm thick being bonded to many surfaces.”

eArche in action

To date 1 MW of eArche capacity has been deployed in Australia.

The flagship installation in Australia is, fittingly, found at the National Maritime Museum at Darling Harbour which was originally destined to feature conventional glass panels but the roof was unable to take the weight.

Another notable installation can be seen on the popular Byron Bay train that trundles three kilometres between Sunrise Beach and Byron Beach and is powered by the 6.8 kW eArche system. The much anticipated world first solar train was officially launched in late 2017.

Global deployment sits at 50 MW of which 45 per cent is found in China. The factory capacity is 100 MW per annum but operations can be scaled up to meet demand in the US and Asia, and also European markets that were recently opened up.

“Product uptake is growing at a rapid rate of knots,” Thomas Bell said. “If we can continue the current sales trajectory over the next 24 months we will have a supply chain that can deliver this product at the same price as conventional technology.”

He commented that Australia is a great place to test ideas because of regulations and strong local standards, saying “If we can make a product successful in such a regulated market as Australia it is a good spring board for global distribution.”

SunMan recently joined the Smart Energy Council.

Have you got a great story to tell about an innovative product or service? We are always on the lookout for good stories. Contact editor@smartenergy.org.au



Polyglot Group's GREEN DRIVE

Polyglot Group fills an important niche in the market, recruiting staff for renewable energy and storage projects across Australia. Over the years growing demand in overseas markets had led to the group successfully expanding operations to establish a global footprint spanning nine time zones.

Jan Reiche (centre) with Daman Cole of Enphase which turned to the Polyglot Group as preferred partner to assist with the company's needs during its period of rapid growth across Europe and Latin America

OCTOBER 2019 marks six years of operations for Polyglot Group's Renewable Energy & Energy Storage division created by Jan Reiche who foresaw the growth of the industry and burgeoning demand for a range of 'green collar' staff.

Business quickly took off, and the group was instrumental in delivering one of Australia's inaugural large-scale solar PV projects, the Moree Solar Farm, sourcing on-site and FIFO white-collar staff from health and safety supervisors, project managers, electrical, civil and mechanical engineers, commissioning managers and logistics coordinators.

Job done, plant up and running! But how does the Group find the right staff at the right time and place?

We asked Liz Floyd who in 2015 was appointed Renewable Energy & Environment Senior Manager, and clearly, the group is well structured to deliver just what developers need to get a job off the ground whether it's in a remote rural location or city based office.

"Polyglot Group's three key divisions are Talent Acquisition, HR Advisory and Payroll Outsourcing which provide HR Due diligence, recruitment of the entire local management team for the project, as well as employment contract outsourcing which pretty much covers the entire spectrum of recruitment needs," Liz explained.

"The business sectors we service include product manufacturers, utility scale renewable energy developers, engineering and environmental consulting organisations, EPC companies, asset management and O&M businesses, commercial

solar businesses, financial/investment institutions and advisory firms – pretty much anything related to renewable energy. The whole gamut."

Liz reeled off the range of Polyglot services which include help in registering a business, compliance with federal and state regulations, minimising associated administrative tasks from taking care of back-office support requirements including bookkeeping, insurances, banking, telephone, relocation, and sourcing local directors where needed.

"We have built a solid network across regional Australia – both individuals providing referrals as well as local employment networks for unskilled labourers required for solar farm construction phases.

"And if needs be we can tap into the group's international offices, we have established processes enabling us to sponsor work visa holders, and then on-hire them to businesses."

The Group is experienced in recruiting across major capital cities, as well as regional towns and remote locations for utility scale solar construction and operations and maintenance phases of projects.

Hunting for talent

But she admitted it's not always easy for Polyglot Group's specialist recruitment team of eight staff who boast professional qualifications and complementary skills.

"The team sometimes faces challenges in sourcing suitable talent, particularly when the required experience is in huge demand across the industry or there are skills shortages.

"These occur in areas such as grid connection engineering and management and sales and business development professionals with experience in corporate PPA negotiations," she said.

Some shortages also exist of professionals with utility scale battery storage and asset management experience.

Expansion and market trends

Polyglot Group has been instrumental in assisting renewable energy and storage businesses to expand into new markets in Europe (hiring specialist consultants based in Germany and Spain), South Africa and the US.

The rapid acceleration has been a result of the growth in the industry, Liz said, and that includes growth down under.

"There is no doubt that the Australian market in renewable energy and energy storage is buoyant, and this is primarily being driven by the economics and state-based incentive schemes.



“There are still substantial regulatory barriers to operations in the Australian market, as well as the obvious Federal policy vacuum.

“Australia is certainly seen as one of the most attractive markets for a lot of global renewable energy businesses ... many are looking to expand into Australia, mostly thanks to Australia having one of the highest uptakes of rooftop and commercial/industrial solar per capita, as well as [needing to eventually replace the many] aging coal fired-power station fleets across the country.

“That said, there are still substantial regulatory barriers to operations in the Australian market, as well as the obvious Federal policy vacuum.

“These two key factors are prohibiting the Australian renewable energy market from growing even faster than it already is.”

What about the next phase of development?

Liz foresees the continued growth in the utility scale renewable energy sector across the whole lifecycle - development, construction, operations and maintenance, and highlights two particularly promising markets.

“We believe that future growth will come from the electric vehicle infrastructure and hydrogen export markets,” she said, “Although a lot still needs to be done from both a policy and economics perspective to achieve this growth.”

www.thepolyglotgroup.com.au



Liz Floyd with Jan Rieche (R)

Polyglot's reach and influence

The Polyglot Group was established in Sydney by Corinne Bot in 1995 and has grown to a staff of 60 across Australia and in Barcelona, Madrid, Paris, San Francisco and Cape Town.

If the name Jan Rieche is familiar, it could be because he also founded and manages Spark Club, the Sydney based think tank supporting start-up businesses and like-minded people in the energy industry who exchange ideas, tips, tricks and survival techniques and provide a support network to those in the energy industry “trying to carve a way forward and bring an energy business to life”.

Did you know? Polyglot translates to “speaker of many languages”.

VARTA Home Battery



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Solar Cutters and shapers

Solar Cutters is a unique group that is nurturing industry talent while building a solar community that values quality and integrity. Consumers are among the beneficiaries, and as we found out from the tireless solar philanthropists driving the group, the status of the industry will only improve.

IN THE TWO YEARS since Jack 'Longy' Long and Kosta Bourandanis co-founded Solar Cutters with a mission to grow, build and support the Solar Cutters community they have managed to achieve even more than they intended, and momentum continues at a pace.

The group of like-minded individuals has evolved at a rapid rate and developed a strong following, with thousands of installers benefitting through constructive collaboration and a robust support network.

The group has laid out its 'Ten Cutter Commandments' that centre on quality and integrity of workmanship, and in October each year hundreds of installers eagerly attend the Solar Cutter Awards night to learn who is a cut above the rest. During the year the group hosts Networking drinks where many can be seen donning T-shirts, stubby holders, caps, hoodies, embroidered patches or sunnies bearing the Solar Cutters emblem which is a whimsical reference to the infamous Simpsons stone cutters episode.

The core of the business however lies in knowledge sharing over solar installations, tech specs, equipment and more through various social media channels, some of which have between 5000 and 7000 followers.

Discussions take place day and night with thousands of individuals interacting on various pages such as 'Solar Cutters Working Together' with constructive feedback and hearty debate.

Smart Energy spoke to Solar Cutters media representative Eliot Davenport who said "People in various social media groups post messages and photos if they have issues and can

expect constructive comment, feedback or advice within a reasonable time.

"We also provide tech support and advice where it is needed to help promote quality among wholesalers, retailers and installers. And we are also promote what we call 'cutter spec', the idea is to highlight what is the ideal solar installation and how it should be done."

He says the Solar Cutters mission is broad and designed "to help the industry as best we can and that includes holding people accountable for dodgy installations.

"We share a vision with the Smart Energy Council and have similar goals that we pursue in different ways ... but the Council is more political and operates on a larger level."

All things technical

The job of technical support falls primarily in the lap of Stone Cutters co-founder and Director Jack Long whose industry experience spans more than a decade.

"Jack works full-time in the solar industry for a large motoring organisation but also manages to attend all installer nights as well as manufacturer or supplier launches and training workshops, which is how he stays right up to date on all developments," Eliot explained.

"That level of commitment guarantees Jack has a pretty decent understanding of all the equipment being used out there!"

Solar Cutter Committee's commitment

Jack is backed up by the Committee of 15 solar professionals from across Australia – between them clocking up more than 150 years of experience – who also freely provide advice on a range of solar industry issues.

Committee member Sam Craft said "I believe Solar Cutters is at the forefront of installer advocacy, they bring like-minded and passionate individuals together to accelerate the transition to renewables.

"It's a place where competitors can come together to help one another to drive the industry forward which is really refreshing. This 'respectful collaboration' is the type of industry we want to encourage and belong to."

The group strives to deliver continuous improvements. One of the current projects underway is a handy 'How to' guide for customers that contrasts and compares industry products and services.

Want to delve more into the Solar Cutter community or receive the digital newsletter?

E: info@solarcutters.com, visit www.solarcutters.com and also see them on LinkedIn, YouTube, Facebook and Instagram.



Solar Cutters' Jack 'Longy' Long and Eliot Davenport

INTRODUCING ENPHASE IQ

The most advanced microinverter yet.



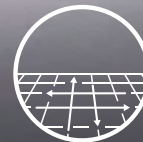
Faster to install

•



Even more efficient

•



Versatile and smart
grid ready

The **Enphase IQ** offers all the advantages of Enphase's previous microinverters, with even faster installation. Compatible with 72-cell modules of 400W and more, the **Enphase IQ** is lightweight and smart grid ready.

Enphase IQ Enphase's fully-integrated solar, storage and energy management solution.



Enphase IQ
Lighter. Faster. Stronger. Better.

ENPHASE.
enphase.com/au

The many hats of **SAM CRAFT**

Where to begin when introducing Sam Craft? She's a New York trained lawyer who is now a director of a bustling, successful solar business, plays a key role with installer advisory group Solar Cutters, and earlier this year was elected to the board of the Smart Energy Council. Despite all her daily pressures, Sam found time to tell us about her vision for the industry.

SAM CRAFT'S SOLAR JOURNEY is a little different to most. It begins with a Bachelor of Law and Legal Practice from Flinders University and a Certificate of Human Rights from Fordham University (New York) followed by a series of internships at law firms. Now Sam is fully committed to the development of the solar energy industry, and has added a Diploma of Management and Leadership to her qualifications which is coming in handy with her string of advisory positions.

Smart Energy Council: *Let's first take a look at your role with Adelaide based solar and storage installer NRG Solar.*

Sam Craft: I initially started part-time at NRG Solar helping out with administration duties. After learning everything I could about solar, I moved into the role of Operations Manager to help create and implement processes to ensure every customer has a positive solar experience and all installs and jobs completed to exacting standards. I was tasked with building our installer team and warehouse management teams from scratch, building team's skills and creating processes.

My role as a Director is to help develop and implement key strategic initiatives to strengthen and encourage professional, valuable and customer focused experiences.

SEC: *What consumer trends are you picking up on regarding solar system sizes and storage?*

SC: These days more customers are optimising their roofspace and where possible installing larger PV systems – generally between 6 kW and 8 kW – to future-proof their system for batteries or electric vehicles.

In terms of getting the most value from systems, I believe that solar system monitoring is and will be the key for taking control of energy needs; the first step towards better self-consumption, transparency and home automation. It allows customers and ourselves to make sure their solar solution is producing just what we expected.

SEC: *How do NRG activities dovetail with the work of Solar Cutters?*

SC: At NRG Solar we strive for high level of service and quality, while thinking about what tomorrow will bring in terms of innovation and new technologies. We aim to be at the forefront of technology to ensure we're always future-proofing and creating a sustainable business and solutions for our clients.

We are engaged in the Solar Cutters movement daily as our staff share support, ask for advice and share work they are proud of with the online Cutter community.

SEC: *Congratulations on your appointment to the board of the Smart Energy Council, how does this complement all your other roles?*

SC: I've been pleased to provide feedback and practical advice on a number of SEC initiatives during meetings. This consultancy work ties in well with my role as a Solar Cutters Committee member



“ I have only been in the solar industry for four years but I look forward to doing as much as I can to bring about positive change and support the industry.



“ My end goal is to ensure the transition to renewables is sustainable, safe and achievable. ”

and Director at NRG Solar given my end goal is to ensure the transition to renewables is sustainable, safe and achievable.

In a broad sense I look at how we can eliminate issues in the industry and across the supply chain and industry.

Additionally, I have worked with SAPN (SA Power Network) on a number of issues and initiatives, for example ‘Power of Choice’ entering South Australia. I helped form a group of like-minded SA companies together to assist in the transition. I also assisted with Applications for Solar (SEG forms) and High grid voltage messaging to consumers.

As a company director I also try to keep a dialogue open with the local state government, for example we recently presented feedback on SA’s Home Battery Scheme.

As an advocate of equal opportunity, I welcome and applaud the industry for encouraging women like myself to be involved at all levels and help shape the future of the industry.

SEC: What will the average household energy system will look like in a decade?

SC: I see the future of energy in collaboration, by which I mean everyone working together to achieve a sustainable future. That includes trading electricity with friends and family, being able to share excess solar with your Mum (for example) so she can run her air conditioning at no cost to her using your excess energy.

I also foresee Australia trading renewable electricity internationally. If Australia has excess energy I hope we can supply this to countries in need of it but less blessed with natural resources!

In just over a decade electric vehicles will be the norm, with every home eventually having an electric vehicle.

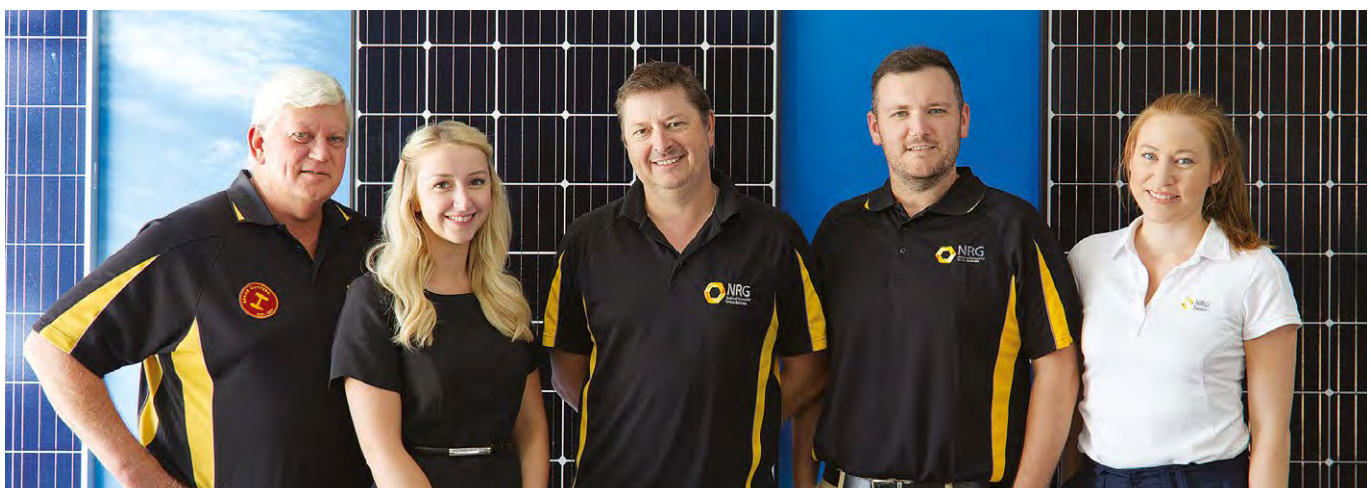
Also home automation and smart appliances will be universal, enabling citizens to make the most of their energy, and there will be dynamic import and export.

SEC: Finally, how positive do you feel about the future of Australia’s renewable energy industry?

SC: It is an exciting and challenging time for renewables as the energy industry is always changing. We will see holistic energy bundles, like Kooee Energy, changing the way customers think and use their energy.

Rebates are always tricky – we need to make sure that key objectives are being achieved in order for them to work for both the consumer and the companies that install and support that consumer.

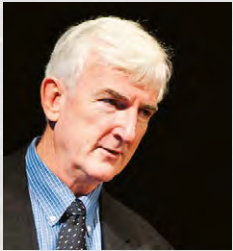
Lastly, I think some changes to the grid infrastructure are necessary to support the future supply of energy.



RENEWABLES RULE

"The extraordinary boom in the renewables sector is currently the largest contributor to overall growth in construction in Australia. Solar projects, in particular, combined with wind and storage projects, are driving solid growth in overall utilities sector construction."

Macromonitor economist Natalie Keogh



"Don't tell the coal-huggers, but Australia's investment in renewable energy is keeping our economic growth ticking over."

Michael Pascoe of TND

"The economics of renewables are impossible for oil to compete with when looked at over the cycle ... if we were building out the global energy system from scratch today, economics alone would dictate that at a minimum the road-transportation infrastructure would be built up around EVs powered by wind- and solar-generated electricity."

Mark Lewis, BNP Paribas Asset Management



"Australia has a number of competitive advantages as a hydrogen exporter: expertise and infrastructure we can leverage to develop hydrogen export energy supply chains, proximity to markets in Asia and well-established trading relationships, an abundance of renewable energy ..."

Chief Scientist Alan Finkel

"The potential for Australia with hydrogen is a "moonshot opportunity".

ARENA CEO Darren Miller



RESULT!

"I'm an ordinary person who joined an Extinction Rebellion blockade ... It was way out of my comfort zone, but as a scientist I can tell you that the climate emergency is much more terrifying ... nonviolent civil disobedience can bring rapid and sweeping changes, the aim is to make people pay attention, and they're much more likely to do so when it impacts their daily lives."

Anonymous Australian scientist

The UK government adopted a climate emergency resolution following London's Extinction Rebellion blockades.



DARK MATTER

"Use of emissions-intensive products from the resource industry have contributed significantly to global warming ... our dependence on fossil fuels could pose an "existential" threat to the planet. All emitters, resource

companies, customers, consumers must play their part together with governments to meet the climate challenge."

Andrew Mackenzie, BHP

"I look forward to getting on with the job of lowering power prices for Australian families and businesses, and ensuring we stay on track to meet our 2030 emissions reduction target."

Angus Taylor, Minister for Energy and Emissions Reduction in the Coalition Government



NOTE: Australia's emissions have increased over the past four years and rose 0.9% in the year to September 2018, reaching record highs in many sectors.



"After six years, we still don't have a national energy policy or a national climate change policy but yes, of course, the nuclear inquiry can begin immediately."

Wayne Smith of Clean Economy Services

YOUR GATEWAY TO THE NEM

**YATES ELECTRICAL SERVICES
CAN BRIDGE THE GAP BETWEEN
YOUR LARGE-SCALE GENERATING
ASSET AND THE ENERGY MARKET.**



Yates Electrical Services are a licensed Small Generation Aggregator, meaning we can provide that vital link between the energy market and large-scale energy generating assets. With an advanced understanding of the National Electricity Market, established relationships with all relevant participants and a portfolio of over 60 grid-connected generation assets, we can assist in the financial settlements between the developers of commercial-scale energy generating projects up to 30MW A/C and the Australian Energy Market Operator.

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Out and about with the



In the media

John Grimes chats to ABC talk-back host Jon Faine, and appears on Sky News to discuss the damage dealt by Victoria's Solar Homes program



Rallying for members

The heat was on in Victoria where installers protested against the Solar Homes rebate scheme that was destroying solar businesses and jobs



Advocacy

A round table discussion with stakeholders in a bid to resolve the vexed issue of Queensland's impending electrical regulations

Smart Energy Council

Information

Webinars to update members on serious issues impacting the industry.
Recent webinars concentrated on Victoria's Solar Homes program



Installer training road shows

New Battery Rules Training Workshops led by Glen Morris and held in city centres across Australia. Images: SEC staffers Luke Shavak and Brett Thompson

sonnen marks the 1000th unit rolling off the assembly line (top picture). John Grimes of the Smart Energy Council travelled to Adelaide to meet sonnen's Marc Sheldon, COO of APAC (L), and Craig Johnston, Production Supervisor and former Holden production employee (R). sonnen Australia Chief executive Nathan Dunn told Smart Energy "sonnen is proud to be driving the growth of cleantech manufacturing at the former Holden premises at Elizabeth, South Australia. The sonnenBatterie eco 9.53 hybrid is our first accredited battery to carry the Australian Made logo."



Member visits



Patrick Matweew (R)
of Brisbane-based
Redback talks business
with John Grimes



B.One Hub's smart controls

The smart home automation market is still at its nascent stage. Companies are experimenting with various value propositions and the market is fragmented with multiple systems operating in their own silos. Not so B.One Hub which is a single unified solution explains B.One Hub Australia chief executive Anup Raghavan.

What's behind the name B.One Hub?

B.One Hub is a smart home automation hub where users can connect multiple types of smart devices. It operates as a gateway between a home devices and the internet, allowing users to monitor and control their devices remotely from anywhere using a single mobile app, providing greater control over a home and increasing the safety, accessibility and efficiency of it.

B.One Hub's single app solution allows users to operate a multitude of technologies and products under one platform. In a growing world of multiple smart technologies, B.One is able to integrate and operate thus giving greater flexibility and control to the average consumer.

It also enhances user comfort by automating various aspects of a home, like cooling, heating and

home entertainment through a Retrofit Wireless Solution that could save thousands of dollars in installation costs.

What is your point of difference?

One of the key differences of B.One Hub is that, unlike other companies that limit home devices to lighting and entertainment, we provide a single platform for connecting multiple types of smart devices ranging from IR (infrared) remotes to Z-Wave devices.

B.One Hub can communicate with multiple smart home wireless protocols like IR, Bluetooth, WiFi, Zigbee and Z-Wave thus giving users greater flexibility and choice to use their favourite brands.

Another key differentiator is that we have local technical and sales support across Australia, enabling speedy services to installers and consumers.



B.One Hub Australia saw the opportunity to engage in the energy-saving aspect of smart home technology through a simple and affordable unified smart home platform

Energy management

Feature-wise, B.One has a strong passion for energy management and optimisation. We have a built-in smart Energy Management System that allows users to check the energy consumption across the entire home in real-time through the cloud and create routines to manage it more efficiently.

We collaborated with Wattwatchers over the delivery of the EMS.

To use B.One's Energy Management System, customers will need to have solar PV and batteries installed in their home/workplace.

For more complex setup, customers will need to install multiple Z-Wave devices like sensors, dimmers and switches. This will allow users to control lighting, window blinds/shutters, fans, ACs, and manage the energy and security of their home.

Our target market is solar installers and energy consultants.

The product has been installed for over 12 months and received positive feedback from installers and end-users which include homes, cafes, offices, warehouse, medical centres and farming projects.

What existing systems do users need before investing in B.One Hub?

Good smart home experience begins with a reliable internet connection and wi-fi setup. Users will get maximum value from the integration of their existing split air conditioners, TVs, AV and other entertainment systems such as Foxtel, etc. Users can also sync Google Home or

Amazon Alexa smart voice technologies with the hub and extend their experience using voice commands.

B.One Hub users can now make their legacy device(s) a smart device that can be managed through smart automation at no additional cost than the hub itself.

The cheapest B.One Hub is the B.One Eazy.

Who developed the B.One technology?

Blaze Automation Inc, USA whose 100 staff continue to refine the software, hardware, design, manufacturing and marketing capabilities.

B.One is available across India, USA, Australia and Japan. B1 Hub Australia operates under a master distribution opportunity across Australia and New Zealand.

Our core business involves distribution, product development, technology integration, education and training, and we provide services where we consult with customers and businesses to design their smart home automation project.

Does the technology come in one bundle?

We sell the hardware and the software comes with it. Our mobile app is compatible with both iOS and Android.

B.One products are purchased through distribution partners (in-store and through Amazon and eBay online stores).

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thepolyglotgroup.com

The power of microgrids: Schneider Electric

Schneider Electric says microgrids, a collection of local, on-site distributed energy resources (DER) that work together as a single and separate version of the grid, deliver not just resilience and energy cost optimisation but also sustainability.

SCHNEIDER ELECTRIC was selected to design a system for a fruit and vegetable market in the Adelaide suburb of Pooraka that sought to reduce energy costs.

In what is touted one of the state's largest private solar PV systems, the produce market (SAPM) will install 1,600 solar panels and a large lithium-ion battery.

The \$10.5m microgrid has received a \$2.5 million State Government Energy Productivity Program grant.

Schneider designed the 'AZZO Solution' by developing the operational strategy and controls in collaboration with EcoXpert AZZO.

Schneider Electric will provide the EcoStruxure Microgrid Advisor, cloud-based optimisation and analytics platform.

The M580 PLCs, Micrologic MTZ LV breakers, ION and PowerLogic metering, SEPAM HV relays and Power SCADA Operation Edge Control software, will be embedded into the existing EcoStruxure Power Monitoring Expert platform and metering solution.

The microgrid should reduce the market's power bills by \$500,000 a year and in addition to supplying all of the market's energy needs will feed surplus power back into the grid. It will also reduce pressure on the grid and increase reliability in the event of a power outage.

Meanwhile in the paddocks ...

Australia's largest commercial industrial microgrid to date can be found at Hardwicks Meat in regional Victoria.

The abattoir's aim was to mitigate power outage impact by providing continuity of operation for the critical cold chain processes during power network events.

The team also wanted to maximise the penetration of renewable energy on site, integrating 1.5 MW solar generation and a single 2 MW/2 MWh battery storage system.

Schneider Electric fulfilled the order for the microgrid, which allows Hardwicks to benefit from an optimised energy bill, maximised on-site renewable energy usage.

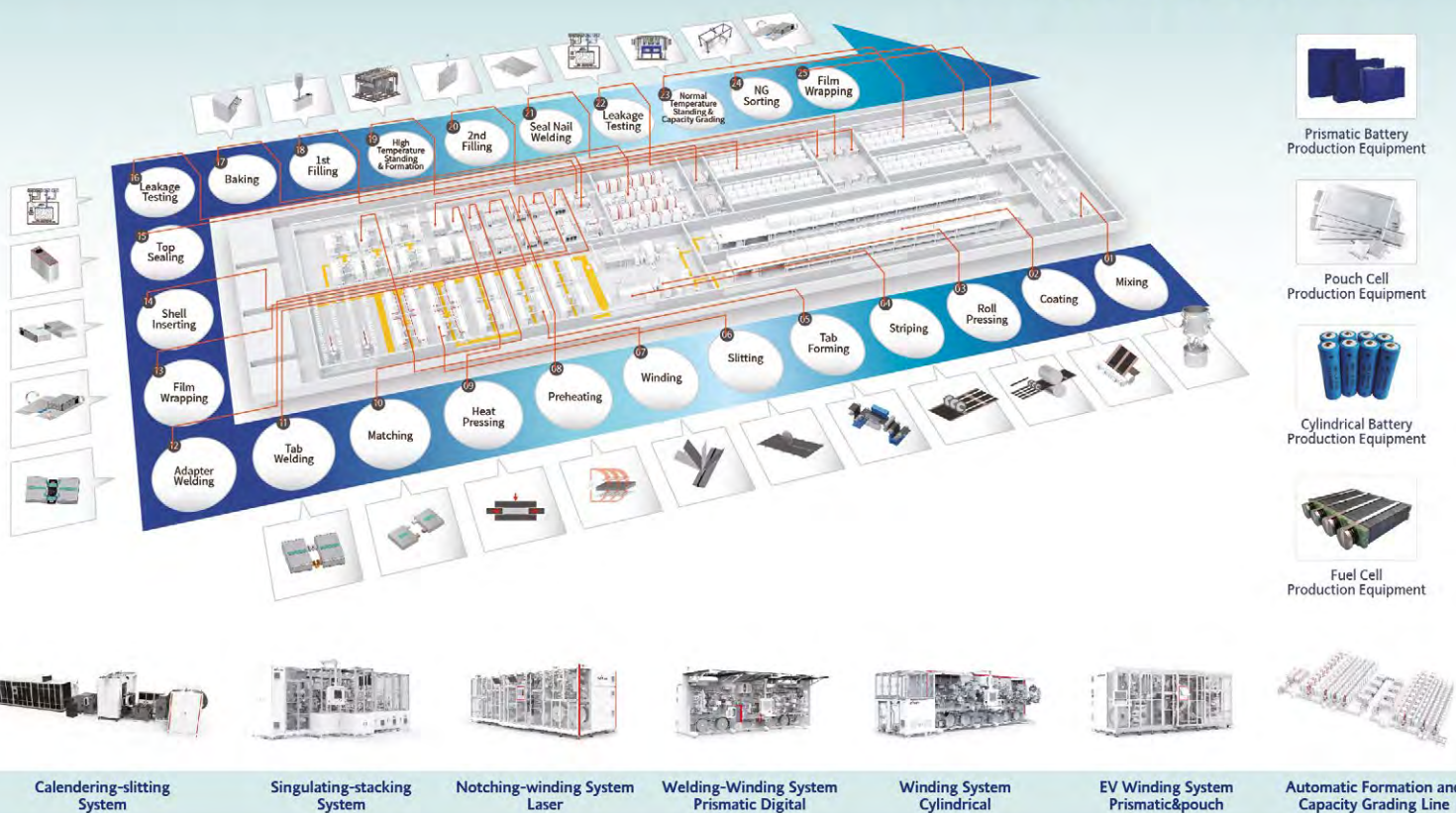
The abattoir has also reduced site demand such as peak shaving through advanced forecasting and dispatching analytics, and can operate with full energy independence from the grid should an outage occur.

The microgrid provides Demand Response for the Australian Energy Market Operator and reactive power, frequency and voltage support for local utility Powercor.

Job done!



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¹ Selecting Super 'Workplace super top 10 for fees', June 2018.

A state of vulnerability

Beautiful one day... ravaged the next

THINK OF QUEENSLAND and perhaps you picture pristine beaches, palm fringed islands and blue skies ... or else a dying reef and a parched landscape? One thing is clear, the state is one of extremes: Queenslanders are on the frontline of climate change and extreme weather impacts.

Queensland bore 60 per cent of the total economic costs of Australia's extreme weather – drought, bushfires, heatwaves, floods and cyclones – in the decade from 2007 to 2016, says the Climate Council.

Right now, almost two-thirds of Queensland is drought declared and, on an ominous note, more than 80 per cent of damages resulting from rising sea levels and storm surges in Australia are forecast to occur in the state that depends on tourism and agriculture.

The Climate Council's latest report *Welcome to Queensland: Renewable One Day, and the Next, and Next...* lists the threats facing Queensland before delving into the economic opportunities that await the state should it transition to a clean energy economy.

"Queensland needs strong local, national and international climate change action to reduce its vulnerability," the report comments.

On the upside, one-third of all households have rooftop solar and Queensland currently boasts more than 5,000 jobs in the renewables sector, the highest of any state or territory, with more large-scale solar projects under construction than any other state or territory.

Projects in the pipeline will create another 4,500 jobs in the state and deliver almost \$10 billion in investment.

North and central Queensland are home to six of the state's ten renewable energy projects under construction, and solar is supplying

“More than 80 per cent of damages resulting from rising sea levels and storm surges in Australia are forecast to occur in Queensland.



Magnificent Queensland: a mecca for tourists but for how much longer?



Almost two-thirds of Queensland is drought declared

“Queensland has much to lose or much to gain, depending on the path that it takes into the future.

one-third of the electricity needs of Townsville's Sun Metals zinc refinery, supporting 450 new local jobs.

"However, more needs to be done to unlock the enormous renewable potential and associated growth in jobs and economic opportunities. Queensland has much to lose or much to gain, depending on the path that it takes into the future," the report says.

The black matter

With the impending closure of thermal coal plants, the Climate Council is calling on communities, government, industry and unions to develop a plan to help coal mine workers find alternative, rewarding jobs.

"It is clear that the burning of fossil fuels – coal, oil and gas – must be phased out rapidly to avoid the worst impacts of climate change ... mining and burning the thermal coal in the Galilee Basin and other such deposits around the world would make the Paris target impossible to achieve.

"Global warming of 2°C would sign the death warrant of the Great Barrier Reef, a multi-billion-dollar asset supporting 64,000 Australian jobs."

Read the full report at www.climatecouncil.org.au

'Welcome to Queensland: Renewable one day, and the next, and next ...', authors: Will Steffen, Hilary Bambrick, Karen Hussey, Joelle Gergis, Greg Bourne, Louis Brailsford and Annika Dean.

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

For Our Industry



www.solarcutters.com



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Australia's energy exports increase global greenhouse emissions, not decrease them

By Frank Jotzo and Salim Mazouz

WHEN UNVEILING GOVERNMENT DATA revealing Australia's rising greenhouse emissions, federal energy minister Angus Taylor sought to temper the news by pointing out that much of the increase is due to liquefied natural gas (LNG) exports, and claiming that these exports help cut emissions elsewhere.

LNG exports, Taylor argued, help to reduce global emissions by replacing the burning of coal overseas, which has a higher emissions factor than gas.

In reality, Australian gas displaces a mix of energy sources, including gas from other exporters. Whether and to what extent Australian gas exports reduce emissions therefore remains unclear.

Meanwhile, Australia's coal exports clearly do increase global emissions.

The way Australia can help clean up world energy systems in the future is through large-scale production and export of renewable energy.

In a statement accompanying the latest quarterly emissions figures, the Department of Environment and Energy stated: *Australia's total LNG exports are estimated to have the potential to lower emissions in importing countries by around 148Mt CO₂-e [million tonnes of carbon dioxide equivalent] in 2018, if they displace coal consumption in those countries.*

In truth, the assumption that every unit of Australia's exported gas displaces coal is silly. The claim of a 148Mt saving is wrong and unfounded. The real number would be much smaller, and there could even be an increase in emissions as a result of LNG exports.

For the most part, exported gas probably displaces natural gas that would otherwise be produced elsewhere, leaving overall emissions roughly the same. Some smaller share may displace coal. But it could just as easily displace renewable or nuclear energy, in which case Australian gas exports would increase global emissions, not reduce them.

How much might gas exports really cut emissions?

Serious analysis would be needed to establish the true amount of emissions displaced by Australian gas. It depends on the specific requirements that importers have, their alternatives for domestic energy production and other imports, changes in relative prices, resulting changes in energy balances in third-country markets, trajectories for investments in energy demand and supply infrastructure, and so forth. No such analysis seems available.

But for illustration, let's make an optimistic assumption that gas displaces twice as much coal as it does renewable or nuclear energy. Specifically, let's assume – purely for illustration – that each energy unit of Australian exported LNG replaces 0.7 units of gas from elsewhere, 0.2 units of coal, and 0.1 units of renewables or nuclear.

Australia exported 70 million tonnes of LNG in 2018. A Department of Environment and Energy source told *Guardian Australia* that this amount of gas would emit 197 million tonnes of CO₂ when burned. We calculate a similar number, on the basis of official emissions factors and export statistics.

Under the optimistic and illustrative set of assumptions outlined above, we calculate that Australia's LNG exports would have reduced emissions in importing countries by about 10 million tonnes of CO₂ per year. (See the end of the article for a summary of our calculations.)

They might equally have reduced emissions by less, or they might in fact have increased these countries' emissions, if more renewables or nuclear was displaced than coal. But whatever the actual number, it's certainly a





long way short of the 148 million tonnes of emissions reduction claimed by the government.

We also should consider the emissions within Australia of producing LNG. The national emissions accounting shows that the increase in national emissions of 3.5 million tonnes of CO₂-e compared with the year before is mostly because of a 22 per cent increase in LNG exports. This means that LNG production in Australia overall may be responsible for 16 million tonnes of CO₂ emissions per year.

A full analysis of global effects would also need to factor in the emissions that would be incurred from the production of alternative energy sources displaced by Australia's LNG.

Coal exports unambiguously raise emissions

The picture is more clear-cut for coal. If there was no Australian thermal coal (the type used in power stations) in world markets, much of this would be replaced by more coal mined elsewhere. The remainder would be replaced by gas, renewables or nuclear. As for the case of gas, the precise substitution effects are a matter of complex interactions.

The crucial point is that all alternative fuels are less emissions-intensive than coal. In the substitution of Australian-mined coal for coal from other sources, there could be some substitution towards coal with higher emissions factors, but this is highly unlikely to outweigh the emissions savings from the substitution to nuclear, renewables and gas.

So, removing Australian coal from the world market would reduce global emissions. Conversely, adding Australian coal to the world market would increase global emissions.






Australia exported 208 million tonnes of thermal coal in 2018, which according to the official emissions factors would release 506 million tonnes of CO₂ when burned. On top of this, Australia also exported 178 million tonnes of coking coal for steel production.

If a similar "replacement mix" assumed above for gas is also applied to coal – that is, every unit of coal is replaced by 0.7 units of coal from elsewhere, 0.2 units of gas, and 0.1 units of renewables or nuclear – then adding that thermal coal to the international market would increase emissions by about 19 per cent of the embodied emissions in that coal. As in the case of LNG, this is purely an illustrative assumption.

So, in this illustrative case, Australia's thermal coal exports would increase net greenhouse emissions in importing countries by about 96 million tonnes per year.



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This figure does not consider the coking coal exports, nor the emissions from mining the coal in Australia and transporting it.

The real opportunity is in export of renewable energy

Thankfully, there actually is a way for Australia to help the world cut emissions, and in a big way. That is by producing large amounts of renewable energy for export, in the form of hydrogen, ammonia, and other fuels produced using wind and solar power and shipped to other countries that are less blessed with abundant renewable energy resources.

Even emissions-free production of energy-intensive goods like aluminium and steel could become cost-competitive in Australia, given the ever-falling costs of renewable energy and the almost unlimited potential to produce renewable energy in the outback. Australia really could be a renewable energy superpower.

Such exports will then unambiguously reduce global emissions, because they will in part displace the use of coal, gas and oil.

Once we have a large-scale renewable energy industry in operation, the relevant minister in office then will be right to point out Australia's contribution to solving the global challenge through our energy exports. In the meantime, our energy exports are clearly a net addition to global emissions.

Frank Jotzo is Director, Centre for Climate Economics and Policy, Crawford School of Public Policy, Australian National University. Salim Mazouz is Research Manager, Crawford School of Public Policy; and Director at EcoPerspectives, Australian National University.

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Summary of data and calculations

• LNG emissions and displacement – illustrative scenario

Emissions inherent in Australia's LNG exports of 69.5 million tonnes (in calendar year 2018) are 197 million tonnes (Mt) of carbon dioxide, based on emissions factors published by the Australian government.

If the same amount of energy was served using coal, emissions would be:

$$197\text{Mt CO}_2 + 148\text{Mt CO}_2 = 345\text{Mt CO}_2$$

Emissions under the mix assumed for illustration here would be:

$$0.7 \times 197 \text{ (LNG)} + 0.2 \times 345 \text{ (coal)} + 0.1 \times 0 \text{ (renewables/nuclear)} = 207\text{Mt CO}_2$$

That is 10Mt higher than without Australian LNG.

• Coal emissions and displacement – illustrative scenario

Australia's thermal coal exports were 208Mt in calendar year 2018. Emissions when burning this coal were 506Mt CO₂, based on government emissions factors.

Assuming typical emissions factors for fuel use in electricity generation of 0.9 tonnes of CO₂ per megawatt-hour (MWh) from black coal and 0.5 tonnes of CO₂ per MWh from gas, the emissions intensity of electricity generation under the mix assumed for illustration here would be:

$$0.7 \times 0.9 \text{ (coal)} + 0.2 \times 0.5 \text{ (gas)} + 0.1 \times 0 \text{ (renewables/nuclear)} = 0.73 \text{ tonnes CO}_2 \text{ per MWh}$$

This is 19% lower than the emissions intensity of purely coal-fired electricity, of 0.9 tonnes CO₂ per MWh.

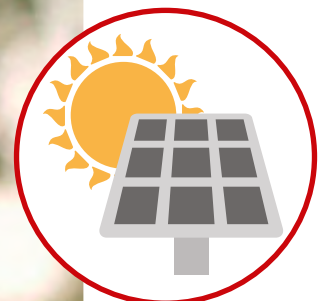
19% of 506Mt CO₂ is 96Mt CO₂.



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Technical advances

Growatt's growth

With an eye on Australia's potential for battery storage and its storage market which continues to grow, PV inverter brand Growatt plans to launch its new battery ready inverter in Australia.

To consolidate and expand its market share, Growatt has developed the future-proof PV solution, MIN 2500-6000 TL-XH, the launch of which is imminent. TL-XH series inverters are an up-to-date smart on-grid inverter for single phase residential users.

The inverter works with low voltage battery and has a battery interface which can be extended to a storage system in the future without needing additional devices or the cost of a retrofit. That means it is a more attractive proposition for consumers.

www.ginverter.com



Redflow on the apple isle

Energy storage company Redflow is supplying 27 of its ZBM2 zinc-bromine flow batteries to The Vale, a farm in Tasmania that is owned by Simon Hackett, a major Redflow shareholder.

They will form part of a renewable energy system that will initially deploy 27 ZBM2 batteries, storing as much as 270 kWh of energy, interfaced to a large fault-tolerant cluster of 12 x Victron Quattro 48/15000 inverterchargers.

The system will harvest renewable energy from a 100-kilowatt peak ground-mounted array of PV solar panels, with scope for future expansion.

Hackett's goal for the approximately \$1 million system is to create energy independence for the farm, delivering energy to power both building loads and electric vehicles.

"We already have a Tesla Model S at the property and we plan to progressively replace our existing fleet of diesel farm ATVs, utes, and tractors with electric versions as soon they become available," he said.

www.redflow.com



One Stop Warehouse signs more suppliers

Australia's largest solar distributor, One Stop Warehouse (OSW) has signed exclusive agreements with Risen Energy, ALEO Solar, and Tongwei Solar (TW Solar) to supply new products into the Australian PV markets. This is the first time TW Solar has supplied solar modules to the Australian solar market.

Eric Lee, General Manager of Risen (AU) said that the a large-scale contract with One Stop Warehouse signals Risen's intention to become one of the leading solar panel manufacturers in the rooftop sector.

OSW was ranked 24th on The Australian Financial Review's Fast 100 list of Australia's fastest-growing companies in 2018. Co-Founder and CEO Anson Zhang considers that to be one of the company's proudest achievements.

www.onestopwarehouse.com.au

sonnen snapshot

sonnen's participation in South Australia's home battery scheme has seen sales more than double during the past 12 months.

As part of the home battery scheme all those signing up will be part of the sonnen VPP and 'sonnen flat system'. "Once they are installed we can connect them and start to operate a sonnen VPP in SA," Nathan Dunn said. "The process is to ensure customers understand their requirements and energy usage."

To deploy the VPP sonnen is looking to aggregate 1 MW based on 200 to 500 installed devices in the range of 5 kWh to 20 kWh.

Commenting more generally about the residential battery market, Nathan Dunn said "Any benefit we would have seen from economies of scale in terms of cost reductions for battery cells is not available as the market has not grown at the rate we anticipated. Economies of scale are still being met, however we have not progressed as far as we would have liked at this stage."

Shell and sonnen: "By late 2017 Shell was already an investor in sonnen and understood exactly what sonnen was trying to achieve with its global perspective, and what they want to do now having acquired the business is to get on with it and do what we had originally set out to do when we constructed the organisation."

"It's a hands off proposition with business as usual where we continue to deliver against our expectations."



Milestone: Late July saw the 1000th unit roll off the assembly line at sonnen's Adelaide manufacturing plant.

"Internally this was a significant achievement. We set up a manufacturing facility in Australia that was operational at the end of 2018 and we got to the 1000th unit in just eight months."

"We developed a world class operation and you would be hard pressed finding a better team and manufacturing facility as we have evolved."

www.sonnen.com.au

Selectronic steps up

Hot on the heels of the recent release of the SP PRO Series 2i range, Selectronic has added the new SPMC480 3.5 kW model for smaller applications that still require high quality.

The new model caters for a growing demand for smaller scale battery storage systems, with a continuous output of 3.5 kW in a bid to outperform competing brand equivalents on the market.

The SPMC480 can also deliver 5.25 kW for 30 minutes, 6 kW for 1 minute and a peak output of 8.4 kW for 30 seconds.

The new model is also capable of charging batteries from an AC Source at up to 73A DC or 3.5 kW. Up to 7 kW of managed AC Coupled PV can be connected, or an unlimited amount of DC Coupled PV. Performance statistics, says the company, which make the SPMC480 a market-leading inverter charger, when compared accurately with all other brand offerings.

The SPMC480 offers all the features of the SP PRO Series 2i range up to 20 kW, including Selectronic's new AC Coupling Recovery mode, which allows a black start with AC Coupled PV.

Dual phase or Three phase systems can be achieved by adding additional units for off-grid or grid-connected applications, as well as catering for any battery chemistry, including Lithium battery brands such as BYD, LG Chem and many more.

This is backed up with up to a 10-year warranty and Victoria-based after sales support from the Australian-owned manufacturer of 55 years.

www.selectronic.com.au



Technical advances

LONGi's 20pc conversion efficiency

LONGi chose Melbourne for the mid-August premiere of its breakthrough shingled module technology Hi-MO X, the high-efficiency module using mono PERC technology and a shingled layout to achieve a leading front-side module conversion efficiency of 20%.

Suitable for all roof-top installations, it is available in 400 W (72-cell) and 350 W (60-cell) peak power variants.

Now being produced in volume manufacturing, the Hi-MO X has advanced features, high-density power and a sleek appearance.

An innovative design eliminates power losses caused by solder strip shading and a novel cell series-parallel circuit design increases power generation performance in shaded conditions.

According to the company's media statement additional benefits are provided by the low working current brought about by a cell string circuit design that reduces hot spots and effectively reduces hot spot

temperatures. LONGi selected the Tedlar backsheet material produced by DuPont. At present, LONGi has 50 shingle patents granted and more than 72 pending.

LONGi has welcomed three official Australian distributors, BayWa Australia, SolarJuice and SolarGain, who have immediate access to the new product.

In related news, LONGi Solar achieved top-performing AA-rating status in new PV ModuleTech Bankability rankings. It is just one of four solar PV module suppliers that qualifies within the top-performing rating category of AA across the sector.

LONGi's cell and module capacities will reach 10 GW and 16 GW respectively by the end of 2019, and are expected to reach 15 GW and 25 GW by the end of 2020.

<http://en.longi-solar.com>



Pylontech's new warranty terms

Pylontech is implementing the new warranty term for its Pylontech US-series LFP (lithium ferrophosphate) battery in Australia.

The new warranty of 10 years commenced from August 1, 2019 and batteries installed before that date are subject to the old warranty term.

In an email circulated to the industry, the company stated the stability of its battery system in the past five years verifies commitment to continual battery performance improvements.



Pylontech commented on the importance of the Australian market to its business model.

www.pylontech.com.cn

JinkoSolar developments

Bifacial technology: JinkoSolar's newly launched Swan bifacial series with a transparent backsheet has been introduced to address the issue of weight. The 25% lighter alternative is estimated to reduce labour costs by 20 per cent compared to conventional double glass bifacial. Conventional bifacials are 30 per cent heavier than the mono-facial module requires trackers to be stronger and piles to be deeper, leading to 15 per cent extra in mounts costs and 5 per cent greater operations and maintenance cost.

Compared with bifacial dual glass, Swan bifacial with transparent backsheet is proved to reduce approximately 3 per cent balance of system (BOS) costs.

The Swan series uses the Tedlar PFV film-based backsheet. Adaptation of bifacial modules is expected to boost generation of Solar PV Plants substantially. JinkoSolar's Swan module can generate up to 415 Wp from the front side and 5 to 25 per cent extra power gain from the rear side.

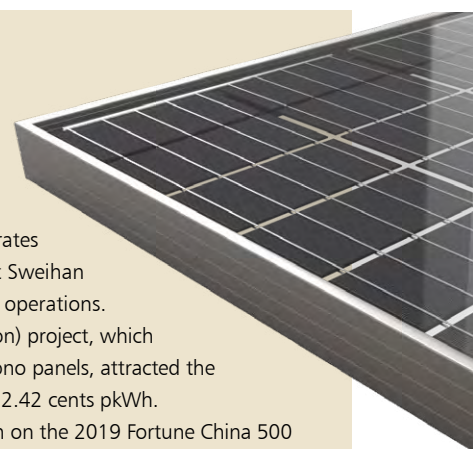
The Swan bifacial panel is a major pillar of JinkoSolar business going forward. According to PV InfoLink the share of bifacial modules in China increased from 2 per cent in 2017 to 10 per cent in 2018.

Over in Abu Dhabi: In early July the world's largest solar plant of 1,177 MWp, which was jointly developed by JinkoSolar, Japan's Marubeni Corp. and Emirates Water and Electricity Company at Sweihan in Abu Dhabi started commercial operations. The AED3.2 billion (AU\$1.25 billion) project, which uses JinkoSolar's high efficient mono panels, attracted the world's most competitive tariff of 2.42 cents kWh.

JinkoSolar was ranked 340th on the 2019 Fortune China 500 list, and first among solar module manufacturers. This marks the fifth consecutive year that the company has featured in the Fortune China 500 list.

The Company kicked off the year with a strong start as module shipments increased 50.7 per cent year-over-year to 3,037 MW during the first quarter of 2019. JinkoSolar anticipates total solar module shipments for 2019 will be in the range of 14 GW to 15 GW.

www.jinkosolar.com.au



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www.all-energy.com.au

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bit.ly/MasterclassSingapore

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www.thebig5solar.ae

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www.intersolar.in

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www.bisgrp.com/event/smart-solar-pv-forum-data-analytics-and-iot-4th-edition

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Contact Brett on
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If you would like to speak to any of these companies or find out more about membership with the Smart Energy Council please contact Luke Shavak, Membership Sales Manager on 0499 345 013 or email luke@smartenergy.org.au

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Australian All Energy Solutions	CSA Services	Governance Insight	Rainbow Power Company	Solar Wholesalers	WINAICO Australia
Aztech International	Ecoul	Helios Renewable Energy	RedEarth Energy Storage	Solargain	ZAPD Energy
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- Creates valuable networking and introductions
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- Promotion of your business and brand

We represent companies across the Smart Energy spectrum including: solar, solar hot water, storage, energy management, electric vehicles, hydro, wind energy, hydro, bioenergy, ocean energy, geothermal, hydrogen, co- and tri-generation and hybrid and enabling technologies.

We also represent smart energy customers and consumers and provide expert advice to governments and the public.

As the national voice for smart energy the Council is committed to high-quality, long-term smart energy solutions for all Australians.

“We find the industry connections the Smart Energy Council has very valuable for market intelligence and effective lobbying.”

— Jamie Allen, LG Chem Australia Pty Ltd.

Become a Member Today

Don't sit on the sidelines. Become a Member and play an active role in driving industry quality, safety, and smart national energy policy.

For further information please contact:

Luke Shavak, Membership Sales
Email: luke@smartenergy.org.au
T: 0499 345 013

Learn more smartenergy.org.au



Solar industry Positive Quality™

THE SMART ENERGY COUNCIL'S Positive Quality™ program sets rigorous standards that ensure manufacturers who achieve and maintain high standards are singled out and recognised.

Prominent panel maker **JinkoSolar** meets those high standards and proudly displays the Positive Quality™ logo, a symbol of manufacturing excellence, which sends a signal of confidence to consumers.

Participating manufacturers are fully recognised, consumers enjoy peace of mind and the industry's reputation is strengthened, delivering **Positive Quality™** for all. Australian consumers and businesses can have confidence in the quality of the solar panels they are installing by looking out for the **Positive Quality™**.



The Smart Energy Council developed the program because the generic appearance of panels makes it difficult to determine good from bad, unless an identification mark denotes otherwise. A logo that signifies superior quality.

The **Positive Quality™** program admits and endorses manufacturers that are independently tested and verified through plant visits. The initial assessment consists of a company's entire manufacturing processes undergoing independent and intensive inspection and testing.

This is carried out by the Smart Energy Council's specially appointed **Positive Quality™** specialists in a three step process: Certification check and compliance with IEC and Australian standards; Factory inspection with a 60-point check; and a Product quality check: appearance, IV, EL, Hi-Pot, and leakage current.

Positive Quality™ participants' premises are then inspected at random every 12 weeks to ensure the continuity of those high standards. All solar PV manufacturers of high quality can participate.

Contact Positive Quality™ Manager Brett Thompson on 0402 181 250, email brett@smartenergy.org.au or visit www.smartenergy.org.au



POSITIVE QUALITY™
Continuous Quality Assurance

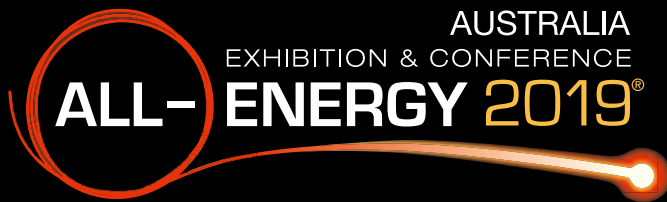
By displaying the Positive Quality™ logo solar companies convey high standards in panel manufacturing to industry and consumers

JinKO Solar
Building Your Trust in Solar

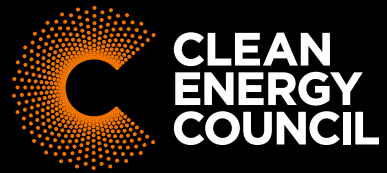
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