Smart Energy

AN OFFICIAL **SMART ENERGY COUNCIL** PUBLICATION

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CoalKeeper and erasing duty of care
Why net zero? Why not: averting climate catastrophes
Smart Energy Council's Global Summit: The Race to Zero
Showcasing the scale of state ambitions and advances
Major economies commit to renewables
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SMART ENERGY COUNCIL

FRONT COVER *Australia leads the world in distributed energy resources and smart systems delivering optimum benefits. Image Alpha ESS*

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Smart Energy was first published in 1980 as *Solar Progress*. The magazine aims to provide readers with an in-depth review of technologies, policies and progress towards a society which sources energy from the sun rather than fossil fuels.

Smart Energy is published quarterly.

SMART ENERGY COUNCIL

SPECIAL FEATURES

RENEWABLE HYDROGEN

INDUSTRY ROUND-UP

SMART ENERGY INNOVATORS

IN PICTURES AND WORDS

WELCOME

John Grimes, Chief Executive
Smart Energy Council

TIME TO CUT THE GAS

COAL HAS RECEIVED the lion's share of attention for its destructive role in climate change caused by its substantial contribution to greenhouse gas emissions, but the focus on coal has allowed the other highly polluting Australian fossil fuel – gas – to fly under the radar.

For decades the gas industry has played a sophisticated game of greenwashing this destructive fossil fuel, marketing it as 'natural gas' (as if 'natural' equals 'good'). But this 'natural' gas, which is predominantly methane gas, is 25 times more potent than carbon dioxide as a greenhouse gas. Methane leaks in the distribution system are common, and carbon emissions created from burning gas are significant.

In a massive sleight of hand, the fossil fuel industry is playing a pea and thimble trick on a grand scale. Focus on coal. Don't make eye contact with gas. Gas generation can not only be allowed to continue but also undergo expansion.

In the United States the gas fracking industry has boomed.

And in Australia things are dire. The federal government has put gas at the heart of its plans for a post-COVID economic recovery. Now we learn the federal government is backing a plan to make capacity payments to new and existing coal- and gas-fired generators ostensibly to ensure sufficient generation capacity is available to meet electricity demand at all times.

These payments could cost taxpayers up to $7bn a year, which is a staggering $400 per household per year. The effect will be to encourage existing and new gas generation to come online, and to keep emissions-intensive coal plants in the system for as long as possible.

It is time for a concerted campaign to put a stop to fossil fuel gas. Full stop. As UN Secretary General Antonio Guterres said, the IPCC Report is a 'Code Red' for humanity and "this report must sound a death knell for coal and fossil fuels, before they destroy our planet".

Amen.

IN MY VIEW

Cristina Talacko is Chair,
Coalition for Conservation

CLIMATE ACTION AND CONSERVATISM ARE NOT MUTUALLY EXCLUSIVE

WE'VE ALL HEARD that climate change is a global challenge that requires a global solution and that it's imperative that global forces combine to collectively reduce emissions to secure a viable future for the next generations.

But it is also time to show the global community that conservatives take climate change seriously. For this reason, Coalition for Conservation has joined forces with international organisations like the UK Conservative Environment Network and the American Conservation Coalition to host the first-ever Global Conservative Climate Summit (GCCS) alongside COP26 in Glasgow this November.

Our summit will be an important platform that unites conservatives from across the world to collaborate and pursue market-based solutions for the ever-growing environmental challenges society faces.

This discussion will be facilitated by thought leaders and prominent lawmakers, aiming to enhance policy that will strengthen our economies while protecting the planet.

Climate action and conservatism are not mutually exclusive: protecting our planet, achieving net zero-emission targets, and strengthening our economy must occur simultaneously. Conservative values were born from a desire to achieve individual freedom, a free market, and equal opportunity and the key to providing security to people and maintaining a prosperous economy is a healthy stable environment.

Climate change poses a major threat to financial stability and national security, and there is no question that the global community is becoming increasingly concerned.

The good news is that technological advancements and market mechanisms can enable a climate-friendly free market and help to reduce emissions. The strong economic case for clean technologies continues to grow, and renewables are the perfect example that it can be done in an economically viable way. If we diversify energy supply, economic development will follow, and jobs will be created while we also generate energy that produces no greenhouse gas emissions. That is why conservatives must incentivise innovation while encouraging responsible corporations and individuals to embrace nature-based solutions.

Conservatism must also pursue growth for both Australia and poorer countries by licensing our climate-change technology and encouraging private investment and free trade.

Finally, Australia is very well placed to set out a clearly articulated pathway committing to net zero emissions by 2050 and renewables as well as international collaboration will play a pivotal role. Business and technological ingenuity are already here, all we need now is political will and the support of our conservative leaders.

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INDUSTRY DEVELOPMENTS

GET REAL The Smart Energy Council has written to all State and Territory Energy Ministers urging them to reject the Morrison Government's pro-coal, anti-solar agenda. The agenda incudes an annual $7 billion CoalKeeper subsidy to prop up unprofitable, ageing, polluting coal-fired stations and a new SolarStopper tax on solar farms (Congestion Management Model).

Acknowledging the UN's IPCC climate report provides the starkest warning yet to stop funding coal projects and instead boost renewable power, John Grimes said "These are the worst possible policies at the worst possible time… the world is literally burning and the Morrison Government is fuelling the fire." He suggests prior to the critical COP26 climate change meeting in November, the federal energy minister develops an energy and climate change policy for the 21st Century.

The **WESTERN GREEN ENERGY HUB** is destined to become the world's biggest renewable energy hub. Costing $100bn and with 50GW* wind and solar capacity it will generate 3.5m tonnes of green hydrogen or 20m tonnes of green ammonia each year. See page 35 for more on the proposal by InterContinental Energy, CWP Global and Mirning Green Energy Limited.

**Current generation capacity of coal, gas and renewables plants in the NEM sits at 54GW.*

POLLUTING OIL AND GAS GIANT CHEVRON has failed to capture the greenhouse gas emissions it vowed at its Gorgon oil and gas project which is the world's largest CCS project and the leading test case for carbon capture technology.

Gorgon was attempting to capture four million tonnes of carbon dioxide annually, or 80 per cent of the carbon extracted from its reservoir gas, yet recorded capture of just 30 per cent. Environmental group Sustainable Energy Now says it's a shocking failure of one of the world's largest engineering projects, already $60 million of taxpayer's money has been spent on the $3.1 billion CCS project. Clearly time the oil and gas industry recalculates its net zero forecasts.

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RECYCLED CONTENT RENEWABLE ENERGY FOREST MANAGEMENT CHLORINE FREE MANAGEMENT SYSTEMS CARBON NEUTRAL CERTIFICATION AUSTRALIAN MADE

BEYOND ZERO EMISSIONS' independent review has found the Renewable Energy Industrial Precincts in Gladstone and the Hunter Valley will add a windfall $13 billion to the economy and 45,000 ongoing jobs by 2032, delivering an exciting future for the regions.

Energy Ministers from Queensland and NSW addressed the future energy markets of their States at Smart Energy Council's State Energy Summits, see page 18 and visit www.smartenergy.org.au for recordings.

ARENA is providing $2 million to ClimateWorks to assist with the next stage of the Australian Industry Energy Transitions Initiative which brings together most of the nation's' largest industrial energy users to reduce emissions across their supply chains. The initiative is focused on iron and steel, alumina and aluminium, lithium, copper and nickel, LNG, and chemicals including plastics, fertilisers and explosives. Companies that have signed on including BHP, BlueScope, and BP Australia account for about a fifth of Australia's industrial emissions.

IMAGE COURTESY ARENA

PROGRAM AZ FOREST Global pharmaceutical giant AstraZeneca which has pledged net zero carbon emissions by 2025 and carbon negative by 2030 has committed to planting 50 million trees around the world. Around half of all these trees will be planted in Australia on account of the Black Summer fires. The global project will result in around 20,000 hectares planted and 4.25 million tonnes of carbon dioxide sequestered over the next 25 years.

IMAGE BY TERRI SHARP FROM PIXABAY

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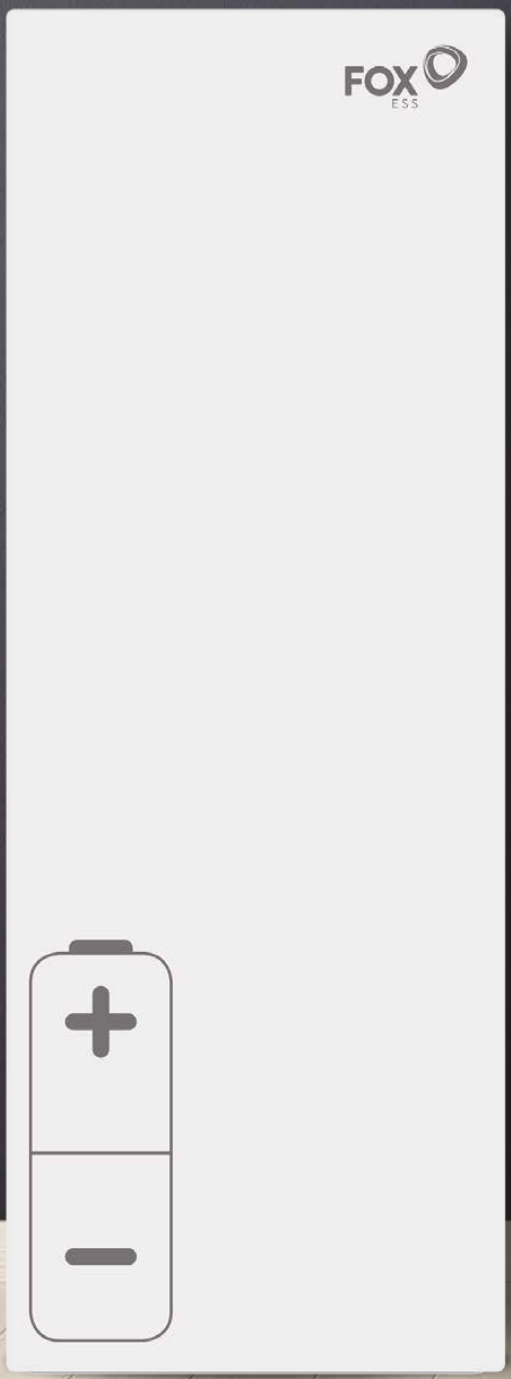

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INDUSTRY DEVELOPMENTS

MOST VOTERS WANT MORE RENEWABLE ENERGY, NOT NEW GAS AND COAL: ACF Australia's biggest ever climate poll reveals voters in all the nation's 151 federal electorates – including those held by the National Party – believe the Morrison government should be doing more to tackle climate change. The YouGov poll conducted for the Australian Conservation Foundation found **no electorate with majority support for government's new gas and coal-fired power. Instead, of the 15,000 surveyed 67 per cent stated the government should be doing more to address climate change.**

JAPAN plans to double its renewable energy target for 2030 and halve its use of gas, which sends a signal to proponents of Australia's "gas led recovery". Renewables should account for 36-38 per cent of power supply in 2030, double that of 18 per cent in March 2020. The Climate Council notes Japan is one of Australia's biggest export markets for LNG and this development is at odds with the federal government's support of tens of millions of dollars for new gas earmarked for export. Japan's move to decarbonise matches pledges and targets set by the US, UK and Europe but Australia falls well behind in the absence of a net zero emissions target or higher ambitions on its 2030 goal.

REVVING UP EVs Five recipients including Chargefox will share $24.55 million to construct more than 400 new EV charging points around Australia. The funding has been allocated through the first round of ARENA's Future Fuels Fund.

The chargers will be installed across eight regions covering 14 of Australia's biggest cities. The projects have a total value of nearly $80 million and will deliver a seven-fold increase in the number of fast charging stations across Australia's most populated cities and regions.

IMAGE COURTESY ARENA

POWER MELBOURNE The City of Melbourne is calling on the private sector and government to join its scheme to install renewable energy batteries in existing council infrastructure around the city in a bid to deliver more renewable energy to the grid and encourage the take-up of green power.

The City Council hopes to encourage a new wave of innovation in the mid-scale battery sector and build a capacity of 5MW by 2024.

IMAGE BY ROLF LOOSLI FROM PIXABAY

GREEN IS COOL Readers may have spotted the curious case of a review of solar PV performance atop two separate office buildings at Sydney's Barangaroo which concluded cooler panels – in this case situated among foliage – generate more energy. The eight-month UTS and City of Sydney study recorded performance improved by as much as 20 per cent during peak times and by 3.6 per cent over the length of the experiment which translated to an additional 9.5MWh or $2,595 worth of renewable energy.

READING MATTER Those with a broad interest in climate change might like to dip into *Sold Down The River* co-authored by Scott Hamilton, a Smart Energy Council senior advisor. This book "exposes how Wall Street traders and robber barons cornered the market," he said of the book that addresses climate change issues traversing water and energy.

For more of Scott's insights tune in to his weekly segment *Ticker Climate* co-hosted by Holly Stearnes featuring interviews with high-profile identities including Malcolm Turnbull, Alex Hewitt of CWP Global, Chris McGrath of 5B, Greg Combet and more. Available via tickerNEWS, co channel and a free app as well as other platforms including LinkedIn and Twitter and iHeartRadio on Mondays at 4.30pm.

SOLAR VICTORIA is funding a free Business Mentoring and Support Service for registered retailers, installers and plumbers participating in the Solar Homes and Solar for Business Programs.

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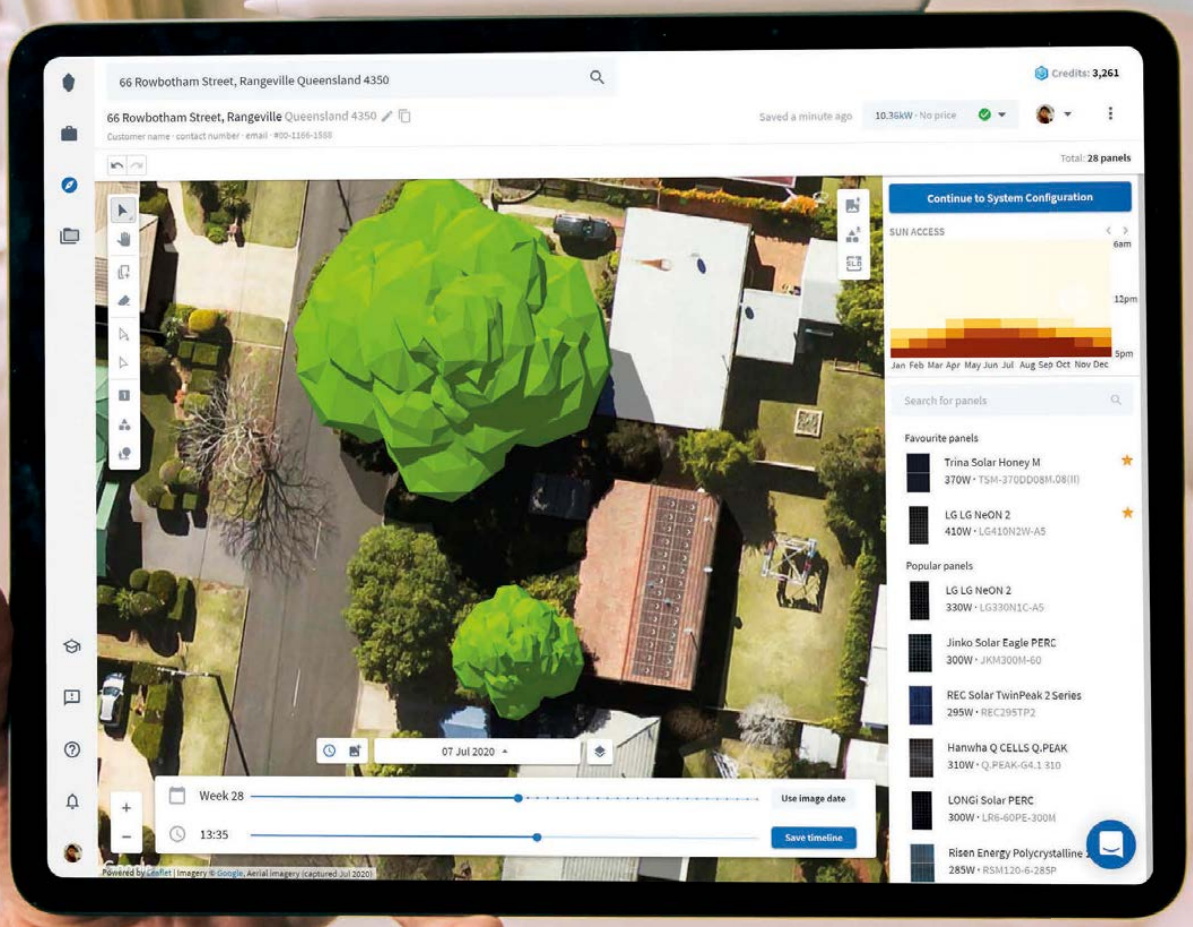

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SEARING STATISTICS AND DASTARDLY DENIALS

The past month has delivered a raft of regressive policies as the federal government doubles down on actions that support ageing, polluting coal and gas plants in contempt of climate science.

SOME CALL IT a sobering message, others a wake-up call, an apocalyptic vision, yet the latest climate report delivered by the UN's IPCC perhaps confirms what we already feared: the globe is warming ever faster. Unless immediate, rapid and large-scale reductions in greenhouse gas emissions are put into effect, limiting warming to close to 1.5°C or even 2°C will be beyond reach.

It's a Code Red warning the IPCC tells us, time is nearly up, change direction or else.

The 'else' is already visible. All of earth's continents are experiencing the profound and catastrophic effects of climate change. Ferocious hurricanes, biblical rainstorms, and fires in regions never seen before: Siberia is better known for its frozen tundra. Abnormal, it's called. Rain at the highest point in Greenland's ice sheet might not sound like a big deal yet it's a first, and the ice sheet is melting at an alarming rate.

The faster we change the better and pledges are being made: the US plans to halve its emissions by 2030, the EU will cut emissions 55 per cent by 2030 on 1990 levels, and the UK 78 per cent by 2035.

No similar intent, however, from Australia. Despite the UN delivering the starkest warning yet that we must stop funding coal projects and instead dramatically increase support for solar the federal government is heading in the exact opposite direction, says John Grimes.

Former UN Secretary-General Ban Ki-moon, US Deputy Climate Chief Johnathan Pershing, and Shadow Minister for Climate Change and Energy Chris Bowen declare Australia's targets are inadequate, net zero by 2050 is not sufficient, and strong short-term targets to 2030 are necessary to avoid catastrophic climate change

"The Morrison Government has no climate policy, no electric vehicle policy and the same emissions reduction target of 26-28 per cent cuts by 2030 that it had under the Abbott Government in 2015, and no net zero goal for mid-century."

Could it be any worse? Absolutely. For starters, a gas-led recovery; a shift in the remit of the Australian Renewable Energy Agency enabling funds to support technologies such as CCS, soil carbon, hydrogen production from fossils fuels; a new SolarStopper tax on solar farms (also known as the Congestion Management Model); and a solar tax for consumers sending clean energy to the grid.

Topping all of that is the insidious CoalKeeper guarantee.

CoalKeeper

The Energy Security Board has recommended a plan as part of its post 2025 reforms to pay coal generators to guarantee future capacity, known as a type of capacity market or physical retailer reliability obligation. A proposal that will only boost the income and delay the exit of ageing coal and gas generators.

It will also worsen already distorted market signals, preventing new clean energy investments by major local and international investors says Simon Corbell, chief executive of the Clean Energy Investor Group.

John Grimes describes the proposal as "the last gasp of keeping unprofitable, polluting coal-fired power stations open in Australia by giving them payments just for being there. This will slow down the transition to renewables and transfer wealth from electricity consumers to coal-fired power stations. It's blatant and completely unacceptable."

Under CoalKeeper consumers will be subsidising old coal plants to the tune of $430 annually to fund the system-wide cost of $6.9bn, according to Green Energy Markets and as former chief of CEFC Oliver Yates quipped: "We are about to start paying coal companies to pollute so they can damage the environment even more."

The Smart Energy Council has urged all state and territory governments to reject the Morrison Government's multi-million dollar pro-coal CoalKeeper subsidy.

"The planet is overheating yet the coalition government is throwing more coal on the fire. This is a disastrous proposal and must be rejected by energy ministers who run the National Electricity Market," John Grimes said.

The Victorian government has since stated the capacity mechanism would have to align with the state's ambition to lower emissions by 45-50 per cent of 2005 levels by 2030, which is almost double that of the Morrison government.

We wait and see the response from other jurisdictions about the government announcements to prop up coal that were delivered, incongruously, hot on the heels of the Code Red IPCC warning and on the virtual eve of climate talks at COP26.

Deflation

The general direction is causing a deep sense of despair among Australian scientists, environmental groups, renewable energy associations, investors, students and more. A recently staged Better Futures Forum heard from Former UN Secretary-General Ban Ki-moon, US Deputy Climate Chief Johnathan Pershing, and Shadow Minister for Climate Change and Energy Chris Bowen who jointly declared Australia's targets are inadequate and stated strong short-term targets to 2030 are necessary to avoid catastrophic climate change.

Subsequently 90 key groups, individuals and organisations including the Smart Energy Council joined forces to urge the Prime Minister to match international allies and at least halve carbon emissions this decade.

According to Rennie Partners, Australia needs 51GW of renewable energy generation by 2042 to meet its commitments under the Paris Climate agreement yet only 3GW of new wind and solar projects have been committed, leaving a 48GW shortfall. And all the while emissions continue to rise.

Churning and burning

Official Australian government data shows national emissions from burning fossil fuels increased more than 6 per cent between 2005 and 2019.

The Australia Institute's report *Back of the Pack* notes that despite the government's spurious claims that it's "leading the world in achieving climate targets and transitioning to renewable energy", emissions continue to rise, while productivity and decarbonisation rankings fall.

Since 2005 Australia has maintained, if not slipped further behind, its OECD counterparts when it comes to the energy transition according to report author Hugh Saddler.

"The Australian economy has, with the exception of Poland, the most emissions intensive energy system among OECD countries. It is arguable that, based on the combination of the level of the non-fossil fuel share and the increase in that share from 2005 to 2019, Australia has performed worse than any of the other 23 countries at reducing its dependence on fossil fuel generation," he writes. A breakdown reveals:

- Australia was one of only three countries in which emissions from energy use actually increased between 2005 and 2019,
- Despite a growing population and good economic growth, in 2019 Australia ranked second last on energy emissions per capita

and per GDP, behind the USA and Russia respectively, and

- Australia also performed poorly in terms of transport emissions per capita (22nd out of 24) and has only reduced these emissions by one per cent since 2005, placing it 17th out of 24 in this regard.

"Altogether, Australia's electrification performance is the worst of the twenty-four countries, just as its decarbonisation performance has also been amongst the worst," Saddler said.

"This paper indicates that Australia's so-called 'gas-fired economic recovery' runs absolutely counter to the needs of Australia's energy system transition, and would worsen, not improve Australia's emissions reduction performance," Hugh Saddler said.

Gas recovery delivers more toxic methane into the atmosphere, it has a 'warming potential' more than 80 times that of CO_2 and experts advise methane reductions are "probably the only way to avoid more than a 1.5ºC rise in average global temperatures above pre-industrial levels."

John Grimes observes we are handcuffing ourselves to the fossil fuel past, like the tobacco industry which was all about profits, coal and gas are the same thing. Making a few shareholders rich to the detriment of the whole planet. We are stopping the transition.

But what constitutes serious damage appears to be in the eye of the beholder.

Erasing duty of care

The prime minister was enraged over the "vandalism" caused by extinction rebellion protesters who spray-painted parliament house with the words 'Climate Duty of Care' to coincide with the IPCC code red warning, highlighting the catastrophes wrought by raging bushfires, droughts and flooding. The prime minister determined speedy action was necessary, not on climate but to remove the offending (yet not life threatening) text.

Readers can be the judge of which needs more urgent action.

Meantime federal environment minister Sussan Ley has argued in an appeal against a landmark court ruling that she does not have a duty of care to protect Australian children from climate harm caused by the potential expansion of a coal mine.

But legal precedents are being set. In late August Bushfire Survivors For Climate Action gained a landmark win after the NSW Land and Environment Court ruled that the NSW Environment Protection Authority had a duty to take serious action on greenhouse gas emissions and climate change.

It is the first time that an Australian Court has ordered a government to take meaningful action on climate change. And there are glimmers of hope elsewhere.

Australian Energy Market Operator chief Daniel Westerman has reinforced the need for Australia's main grid to be able to handle 100 per cent renewables by 2025. AEMO has delivered a new report, with planning scenarios including net zero by 2050 and development of a hydrogen industry superpower status which echo stakeholder calls for rapid decarbonisation of the energy sector and pathways to net-zero emissions.

And a small win for households over the solar export tax, with regulators assuring a 'free option' under which people will not face any cost. PV generation won't be a 'chargeable offence'!

Should voters put faith in the ALP at the next election there'll be a seismic shift in climate and energy policies. Speaking at the Smart Energy Council's Energy Summit, Shadow Minister for Climate Change and Energy, Chris Bowen delivered a powerful view of a future driven by renewables, and development of an energy export powerhouse with offshore wind part of the mix.

"Decarbonisation of the global economy is the greatest economic transformation since the industrial revolution," he said. "Transformation will take time and the longer we leave it, the harder it will be to take advantage of the opportunities.

"We can't begin in 2049, the 2030 target needs to be informed by the climate science and by the economics of what we need to do now to achieve net zero by 2050."

Performance ranking of Australia against 23 other countries for key energy transition indicators in 2005 and 2019

	Indicator	Australia ranking 2005 (of 24)	Australia ranking 2019 (of 24)	Improved?
1	Primary energy consumption per capita	19th	21st	Worse
2	Primary energy productivity	18th	21st	Worse
3	Total energy combustion emissions per capita	23rd	23rd	No change
4	Total energy combustion emissions per $ of GDP	23rd	23rd	No change
5	Emissions intensity of primary energy consumption	23rd	23rd	No change
6	Non-fossil fuel share of electricity generation	19th	22nd	Worse
7	New renewables share of electricity generation	13th	14th	Worse
8	Transport emissions per capita	22nd	22nd	No change

Chart courtesy Hugh Saddler, The Australia Institute's 'Back of the pack' report

FAST AND EFFECTIVE RELIEF... AN ASPIRIN FOR THE PLANET

The International Renewable Energy Agency (IRENA) has issued an upbeat blueprint for the future:

- Accelerating energy transitions on a path to climate safety can grow the world's economy by 2.4 per cent over the expected growth of current plans within the next decade
- A 1.5°C pathway foresees the creation of up to 122 million energy-related jobs in 2050, more than double today's 58 million. Renewable energy alone will account for more than a third of all energy jobs employing 43 million people globally
- The annual investment of US$4.4 trillion needed on average equals around five per cent of global GDP in 2019, and
- By 2050, a total US$33 trillion of additional investment is required into efficiency, renewables, end-use electrification, power grids, flexibility, hydrogen and innovations.

Climate sceptics and rogue parliamentarians take heed: Benefits of these actions greatly exceed the costs of investments: air pollution, human health and climate change externalities are factored in, and the payback is even higher with every dollar spent on the energy transition adding benefits valued at between US$2 and US$5.5, in cumulative terms between US$61 trillion and US$164 trillion by the mid-century.

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THE POWER AND POPULARITY OF HOME-MADE ELECTRICITY

Australia can proudly lay claim to being a global leader in rooftop PV uptake and there is no slowing of momentum. Here we shine the light on smart technologies and developments that are driving the fast-paced evolution of distributed energy resources which are reshaping the energy market.

THANKS TO A HAPPY COMBINATION of factors not least of which are the financial and environmental benefits of rooftop PV and increasing appeal of battery storage, along with ever smarter monitoring systems that optimise the value of home energy systems, the decision to install PV these days is something of a no brainer. And you could say the 'family' of distributed energy resources which also includes EVs and appliances are collectively and successfully putting the 'smart' into the energy market.

That makes for a clever nation, for Australians are world leaders with more households per capita, nearly three million homes or one in four homes, investing in home energy generation by the end of calendar year 2020. Despite the limitations imposed by the COVID-induced lockdowns of last year, 378,451 new systems were installed adding 3GW of small-scale solar capacity, along with almost 24,000 small-scale batteries with an aggregate capacity of 238MWh. And the thirst continues, helped along in no small measure by appealing finance options including 'Buy now, pay later' offered by the likes of Humm, Brighte and Plenti.

Rooftop solar systems sized from 1kW through to 5MW equalled 13.8GW of renewable capacity by the end of 2020. This year, rooftop PV installed was tracking toward 3.5-4GW but COVID lockdowns in NSW and Victoria might change that. Still, numbers are impressive. According to the Clean Energy Regulator rooftop solar could realise an additional 20GW by 2025. In short, solar homeowners are fundamentally and irrevocably transforming the energy market. And that is causing a shake-up among regulators, generators and policy makers.

Addressing Smart Energy Council's NSW Smart Energy Summit, leading DER specialist **Gabrielle Kuiper** said "Rooftop solar is small but mighty, it's more than double that of large-scale capacity and by the end of 2020 more than $4 billion worth of households' and businesses' capital had flowed into rooftop solar generation alone, that's not even counting battery storage or smart appliances."

As **Jon Dee** of RE 100 illustrates, the boom in commercial solar indicates we are nowhere near the peak. Also significant is the New South Wales government's support for electric vehicles which is an incredibly important part of decarbonisation infrastructure, Gabrielle said, that will also help us manage the electricity grid into the future.

So much so that policymakers now need to consider the ability of EVs or 'batteries on wheels' to provide significant support in two-way charging for grid support, she said, mobile batteries [EVs] need more policy and financial focus.

SMART ENERGY COUNCIL

"Beyond that we need to electrify everything which means getting households off gas by electrifying hot water, cooking and heating which will save households money and reduce greenhouse gas emissions."

The main message is to establish the right policies and settings for the integration of distributed resources; however a series of challenges have arisen not least of which is AEMO's intent to switch off household solar at the bottom of the lunchtime duck curve when there is minimum system demand.

Happily, Gabrielle's critique of AEMO's mechanism delivered a positive response with a new approach to minimum system load through a series of levels and thresholds, and businesses and households being paid to decrease or increase generation, with solar cut-offs only activated as an absolute last resort.

"This is an example of getting the basics of DER integration right," said the IEEFA Australia strategist whose former role with the Energy Security Board specialised in the integration of distributed systems.

Another stumbling block for solar systems is the 'solar export tax' which Gabrielle characterises as "two steps forward, one leap backwards" for electricity consumers and an unhelpful solution to a problem that's already been solved.

The absence of modern-day standards also needs to be addressed and good governance of those standards, said the Smart Energy Council senior adviser who is promoting the crucial need for technical integration and increased focus on EVs. She also highlighted the opportunities for standalone distributed energy resources and microgrids that are not dependent on poles and wires for increased resilience during bushfires.

"DER delivers all round benefits and these need to be taken in to account in all deliberations over the energy market future including the vital need to address the significant level of emissions currently generated by the energy sector," Gabrielle said.

If **Ben Hutt** gets his way, coal will get an early retirement. The Evergen CEO's stated mission is to "kill coal plants as rapidly as possible" and he's optimistic, saying "the truth is the planet is heating up much faster than anyone wants to believe, however humanity is likely to get its act together quickly and we are seeing the transition to renewables in parts of the world scale up fast and that's exciting."

"The digitalisation of infrastructure will assist in the energy transition by enabling participation and putting power and independence in the hands of consumers."

Savvy software systems

Ben's one of several at the cutting edge of smart software technologies that are paving the way for the smooth integration of more renewables. Evergen's key role lies in enabling smarter energy systems that generally involve batteries, either in standalone sites or more commonly now in large fleets or VPPs.

"Batteries of all sizes are going to be a much bigger part of the global energy system. In addition to the thousands of small batteries we deal with, we're working on projects that involve roughly 500MW of storage – really big batteries around the place – in front of the meter and behind the meter," he said.

"We are seeing disruption of the energy system on a range of different fronts at the moment. We are being as collaborative as possible with regulators and policy makers … resilience and system security as an example is a key priority in transitioning from the old world to the inevitable future world which is 100 per cent renewable, and smart software can really help with that," he told *Smart Energy*.

According to BloombergNEF Australia is home to the world's most decentralised energy system and consumer research reveals people genuinely want to participate in the future, they are increasingly conscious of the choices they make. The digitalisation of infrastructure will assist in the energy transition by enabling participation, and putting power and independence in the hands of consumers, he said.

"There are many changes that would enable the system to evolve faster. As an example, everyone should have a smart meter irrespective of whether they have rooftop PV because it would allow us to make much better decisions.

"We should have a separate body to deal with storage and a regulatory framework that allows for certainty around investment. It's inevitable that we will get to a 100 per cent renewable grid, navigating the regulatory framework for orderly retirement of coal is challenging but not impossible." Ben said. "It must be a priority that we accelerate and remove all barriers. It's not optional."

Collaboration is key

Andrew Mears of energy management software SwitchDin agrees and is optimistic over what he says is industry's collaborative response that is enabling flexible coordination of rooftop solar to work with the electricity systems.

The Newcastle-based business is gaining lots of traction working with Energy Queensland, Horizon Power, AusNet, AusGrid and large electricity retailers Simply Energy and Origin Energy.

"The more proactive distribution networks are now engaging in new technologies to help them solve the problems, and electricity retailers are connecting with the interests of customers who want to be more engaged in the energy market and in some cases now presenting VPPs as a standard retail offer.

"There is already enough maturity in the market that those options are seen as being key value enablers which will ultimately reduce electricity costs for all," he told *Smart Energy*.

"With reasonably simple changes we can really increase the amount of renewables in the system, for example in South Australia

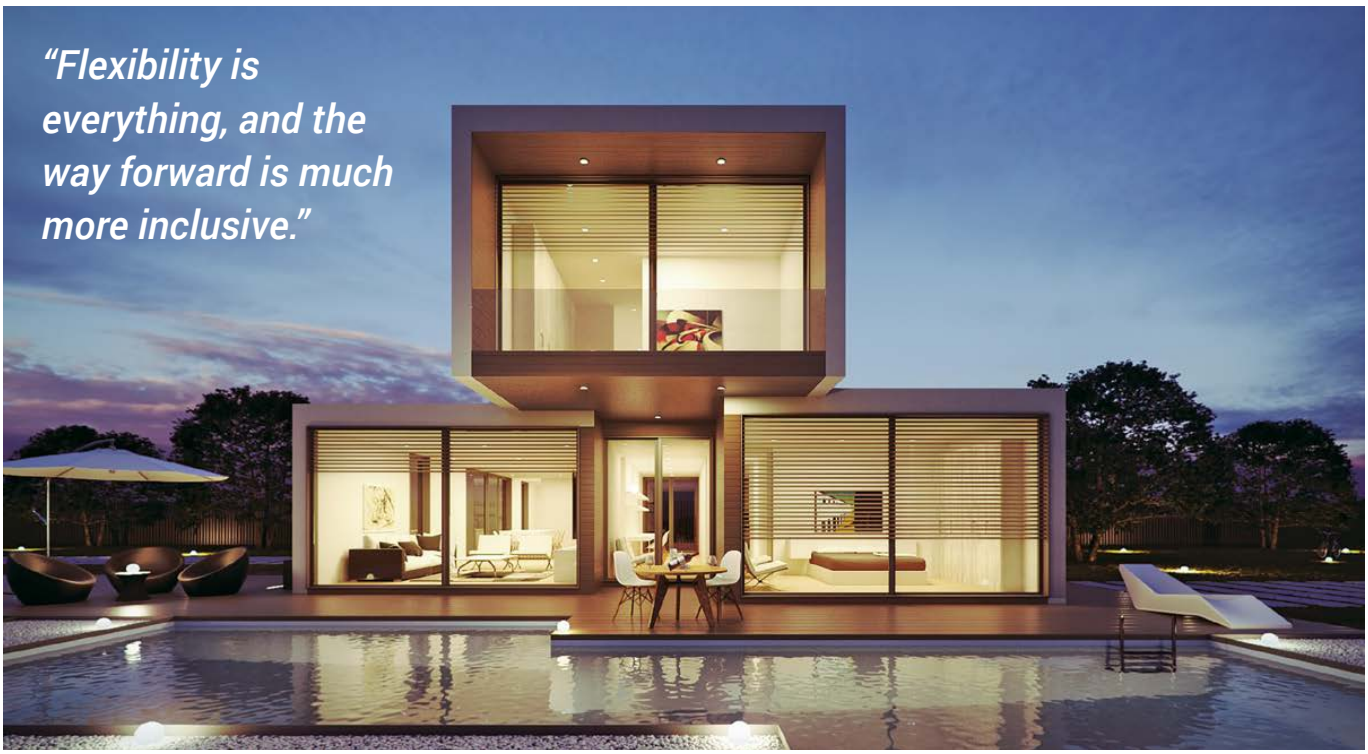


IMAGE BY GIOVANNI GARGIULO FROM PIXABAY

the flexible export system is trebling the amount of renewables we can have in the system.

"Flexibility is everything, and the way forward is much more inclusive."

It's also an important hook for consumers, says **Nigel Morris** of Solar Analytics which is successfully achieving its goal of making solar systems more efficient and delivering on the company's promise to "get more from your solar" through its digital solar service delivery tools.

"Essentially, it is the best way for consumers to save more and the key is access to home data via the monitoring service," Nigel Morris told *Smart Energy*. "Net feed-in tariffs (as distinct from gross) mean that self-consumption is the name of the game for best economic outcomes, and to understand that you need to examine and understand energy use patterns."

Consumption metering now features in the majority of installations and dividends are widespread: smart software services are boosting the uptake of PV by providing greater value, and installers are more easily able to describe the benefits. Hence the popularity among solar businesses.

"Beyond that we have looked at more value-adds for our 25,000 customers such as the best energy plan, and have launched Plan Optimiser which will catapult us and is part one of a suite. We are looking at VPPs, EVs and battery optimisers down the track," he explained.

"I'm eternally optimistic about solar. Despite the federal government's intransigence and political opposition to renewables, you cannot stop momentum. Solar is now mainstream.

"The future is looking very bright indeed," Nigel said. "We are excitedly watching that with batteries – and EVs are next."

Storage batteries are the core mission of Reposit Power whose tantalising tagline "No electricity bill for five years" is optimising the uptake of battery systems linked to solar systems and delivering 'Genius for your Solar Battery'.

Driving mass adoption: finance for renewable energy systems

Finance providers are proving pivotal to the uptake of renewables by pumping millions into the sector, driving confidence and popularity up while driving emissions down. Industry has much to be thankful for in the likes of Plenti (previously RateSetter) which has provided more than $130 million of finance for clean energy products in the home, and Plenti executive Louis Edwards cites renewables as a key market segment in which they can make material difference,

Brighte is likewise "on a mission to make every home both comfortable and affordable, without compromise… and not have to wait until tomorrow". Brighte – the sixth-fastest growing technology company in Australia – has approved more than $600 million in finance for about 75,000 households, allowing them to install energy products such as solar panels and batteries, as well as helping fund home improvements.

Late last year Brighte raised $100 million in capital funding led by Mike Cannon-Brookes' injection of $78m. Ever on the move, Katherine McConnell is now steering Brighte as an energy gentailer, both the generator and retailer of energy.

Buy Now Pay Later provider humm (previously flexigroup) has to date financed a phenomenal $2.2bn worth of solar systems, 265,000 at last count that are delivering an impressive 1GW (1 billion watts) of electricity generation capability representing 1.7m tonnes of CO_2 offset.

Chief executive Rebecca James has identified VPPs and energy trading as the dominant vehicle for solar and battery sales, and partnered with LG Energy to tap into the VPP market that she says will effectively render solar and battery systems installed on houses free of charge.

LG Energy's Philip Crotty believes the virtual network and energy storage market potential sits at more than 10,000 homes by 2023 and he is keen to help create the largest residential VPP network in Australia.

We have an interesting idea to flatten the duck curve.

Distributed energy resources placed randomly onto the grid are making the duck curve worse.

Studies show* that a Local Energy Market run with Powerledger trading reduces the head and belly of the duck by up to 20%.

This could save huge amounts of infrastructure spend in the future.

Talk to us today to ask about running a pilot scheme. And together we could discover how flat the curve could get.

Powerledger

www.powerledger.io

*Source: Powerledger

The now vertically integrated Canberra-based installer business designs, supplies and installs the smart Reposit-controlled system and takes responsibility for electricity bill fees, charges and taxes, and who can resist the low cost, ease and convenience?

Unsurprisingly, sales are 'insane' **Dean Spaccavento** says.

"Our hands are very full with leads and we are making lots of sales because it's a great sales proposition and easy for customers to calculate benefits. We take all the risk and they get no bills. There's no guilt over carbon emissions or dread from a large bill after a hot spell. No solar tax worries or system maintenance, we do it all, they literally don't have to worry about anything.

"Our mission is to make energy limitless and free, and we consider our no-bill product to be the first step in this."

To date Reposit has installed nearly 23,000kW.

The brains of the offering stems from the software the Reposit team spent eight years developing which is reliably reducing the costs from networks and wholesale markets.

"We participate in seven grid services and earn revenue on long-term contracts, and we make enough money from using the batteries and recover any residual expenses incurred in providing electricity to our customers," Dean explained.

"Our focus is on DER because it provides the best economics for controlled megawatt of any firming source in the grid, and the market dictum is that the most economic will win," he says.

"Distributed assets will inevitably form the majority of electricity service providing capital in the future grid, and for anyone to try and ignore it and hope it will go away is in contravention of the national electricity objective."

Jemma Green of Power Ledger concurs and, back in 2016, foresaw the need to disrupt traditional energy to make way for new energy markets to track and trade energy through flexibility trading platforms that allow households, organisations and the grid itself to trade with each other. AKA blockchain technology of which Power Ledger is a supremo with its suite of platforms that facilitate or address VPPs, carbon market trading, building-to-building trading, PPAs, trading across the renewables grid and more.

It's all about the democratisation of energy, Jemma maintains.

Reflections and projections

Long-term industry participant Nigel Morris vividly recalls all the "scoffing and scepticism in board rooms over rooftop solar [ever] generating into the grid" of three decades ago.

"Admittedly all the economics were wrong at that stage, but since then we have gone through all the phases from early adopters to uneconomic systems followed by momentum with solar systems quickly paying for themselves.

"Now we are well and truly into the phase of mass adoption… look where we are with around three million PV rooftops and about 300,000 more being installed each year.

"Growth has been phenomenal; I call it the solar snowball."

A snowball, perhaps, that is gathering enough momentum to eventually obliterate coal plants.

Distributed Energy Resources Laboratory

The DER Lab is a $1.5 million project funded by the ACT Government and supported by the ANU, ITP Renewables, UNSW, and Evoenergy examining safe testing of new technologies such as monitoring and communication devices, smart controllers, aggregation (eg VPP) and market participation software. Researchers also look into other innovative new products under development, in a multi-platform environment that simulates real-world conditions prior to roll-out.

The DER Lab mirrors the electricity network with transformers, batteries, and solar generators on the roof connected to EV chargers, where researchers and industry can work together to design technology for the future energy system.

THE BIGGER PICTURE

POWERING UP

>75% OF EFFORTS to cut emissions in the next 9 years falls to the energy sector

DEPLOYMENT OF WIND POWER needs to increase 5x on 2020 totals to >500GW pa to 2030

SOLAR PV needs to treble to 455GW pa

BATTERY STORAGE needs to increase 26x to 245GWh pa

ELECTRIC VEHICLES need to increase 11x to 35 million vehicles pa

SUSTAINABLE AVIATION FUELS need to comprise 18% of aircraft fuel by 2030

RECYCLING OF ALUMINIUM AND PLASTICS must double, and

18 MILLION HEAT PUMPS will be needed each year.

BloombergNEF's latest New Energy Outlook

SAGE INVESTMENT

GLOBALLY, US$501 billion (A$683 billion) was invested in clean energy* in the last financial year

UP 9% over the previous year, setting a new high

THE RENEWABLE ENERGY SEGMENT (predominantly wind and solar) led with US$303 billion (A$413 billion)

ACCOUNTING FOR 60% of total investment committed to global low carbon energy transition.

Institute for Energy Economics and Financial Analysis (IEEFA) report 'Global Investors Move into Renewable Infrastructure'

**Clean energy includes all zero-emissions industry investment (including renewables and grid, batteries and EV)*

BAD BOOKS

AUSTRALIA'S FINANCIAL SUPPORT for fossil fuels increased by 48% over the 5 years to 2019

TOTALLING A$52 BILLION this was the biggest increase in fossil fuel subsidies among G20 nations

BloombergNEF Climate Policy Factbook

NO SMALL MEASURE

QUEENSLAND'S $1.7 BILLION COPPERSTRING 2.0 – the new 1,100km high voltage network – will unlock a minimum $60 billion of investment over two decades

$35.8bn IN UTILITY SCALE generation and storage

$8.1bn TRANSMISSION network

$7.7bn IN HYDROGEN generation and transmission, and

$6.0bn IN DISTRIBUTED generation, and

FOR EVERY $1 INVESTED, the project would deliver $4.54 in benefits for Australia (ACIL Allen modelling)

THE GREATEST EVER EXPANSION of the NEM runs from Townsville to Mt Isa and connects 106,000 sq km of "immensely productive Queensland" to the main grid.

Copperstring chief Joseph O'Brien speaking at the Smart Energy Council's Queensland Summit

RISE OF ROOFTOP PV

AUSTRALIA COULD HIT 4GW of rooftop PV this year, despite COVID-19 restrictions

THIS FOLLOWS THE 22% GROWTH in rooftop solar in 2019, with 2.2GW installed; and

3.3GW OF ROOFTOP PANELS during 2020 with a further 30% rise in volume in the first half of this year

4GW OF ROOFTOP SOLAR IN AUSTRALIA = 600W of solar per person, per day, nationwide

Smart Energy Council President Steve Blume addressing the Washington DC-based Global Solar Council

SCALING THE SUMMITS

During July and August, the Smart Energy Council staged virtual Energy Summits in Queensland and NSW that showcased the fundamental shift in energy markets taking shape over vast landscapes. Ambitious actions and strategies are underpinned by 50 per cent renewables targets by 2030.

Here we provide a snapshot of the state Summits featuring 50 high profile speakers and delivered free of charge. Videos of key presentations are available at www.smartenergy.org.au

Queensland: A grand vision

Kicking off the Queensland Smart Energy Summit was Minister for Energy, Renewables & Hydrogen **Mick de Brenni** who is steering economic growth through affordable renewable energy while growing Queensland's manufacturing sector.

The Minister portrays smart energy as reshaping the approach to renewable supply chain procurement and aspiring to domestic build of components: solar panels, wind towers, electrolysers and more, driving "a massive re-industrialisation of the Australian economy".

The creation of new renewable energy zones in the state includes plans for a $2 billion Queensland Renewable Energy and Hydrogen Jobs Fund.

Maia Schweizer of CleanCo elaborated on Queensland's steep growth trajectory by listing the portfolio of low emissions energy assets that have increased from one gigawatt to now close to two gigawatts once the projects in the pipeline come online. "Ultimately, our target is to get to about two-and-a-half GW by 2025 and then more after that," she said.

Big bold transformational visions are also found in Copperstring's $1.7 billion 1100 kilometre high-voltage transmission line connecting the resources-rich region spread across 106,000 square kilometres in the state's northwest to the national grid south of Townsville, **Joseph O'Brien** explained that this will unlock multi-GW of clean electricity. "The ecosystem is there, what we need to do is build… we can call that $60 billion of investment over the next 20 years."

"Electrification is the vaccination for climate change and like COVID you have to go hard and you have to go early."

– SAUL GRIFFITHS

NSW: Addressing climate action

NSW Energy Minister **Matt Kean** set the pace for the SEC's NSW Summit delivering the state's suite of renewable energy policies and programs mindful of the inevitable retirement of coal plants. The impetus lies in preparing for the low emissions future and tapping into the state's bountiful resources and the potential for green hydrogen at scale.

Matt Kean's address was complemented by the heartfelt words of NSW Transport Minister **Andrew Constance** whose first-hand experience of the devastating Black summer bushfires brought home the stark reality of climate caused catastrophes. His commitment to addressing the crisis is driving his work, with speedy results. Under his much lauded $500m Electric Vehicle Strategy to accelerate the uptake of zero emissions vehicles, all NSW trains will be powered by renewable energy by 2025 and smaller Sydney Harbour ferries retrofitted with electric engines.

Chloe Hicks of the NSW Department of Planning, Industry and Environment outlined NSW's far reaching action plan and the extraordinary scope of the Renewable Energy Zones.

Shadow federal energy minister **Chris Bowen** also joined the NSW Summit to present the ALP's game-changing energy and climate plan for the nation should his party gain power.

Leading businesswoman **Lucy Turnbull** addressed the parallels in responding to COVID and climate, on which **Saul Griffiths** later declared "electrification is the vaccination for climate change and like COVID you have to go hard and you have to go early". The inventor and entrepreneur ended the NSW Summit on a high. His complementary roles with NFP Rewiring America and Otherlab are dedicated to widespread electrification as a means of fighting climate change and advising government agencies and Fortune 500 companies on transformational technologies and mobilising forces toward 100 per cent decarbonisation.

Summing up the State Summits **John Grimes** declared "We can reindustrialise this nation; we have all the answers, technologies and resources we need – solar, wind, batteries – to turbo charge Australia into an energy superpower.

"The scale of action and ambitions shown at state levels reveal the disconnect between states that are driving low emission technologies and the federal government which is steeped in fossils and mired by the past, and which has no national energy policy, climate policy or EV strategy."

A reminder that transcripts and videos can be found at www.smartenergy.org.au

What next for members and the sector?

RACE TO ZERO: Don't miss the **Global Smart Energy Summit 2.0** taking place on October 20 and 21 in the build-up to COP26. *See page 22.*

SMART ENERGY COUNCIL

MATTERS OF (DIRE) CONSEQUENCE

and holding those responsible accountable

John Grimes presents an update on significant issues being addressed by the Smart Energy Council on behalf of its members and the renewables industry.

What the Smart Energy Council stands for

Starting for us is the 'why' and that was brought into sharp focus with the most recent IPCC report, a Code Red warning on climate change which everybody has already seen for themselves. Climate change is accelerating and what we have experienced to date is just a small taste of what the future has in store for us.

Climate action remains a key driver for everything that the Smart Energy Council does.

We also know there are fantastic business opportunities in transitioning to a safe climate; we can have a strong economy and a safe climate at the same time, provided we transition to a low carbon economy based on renewable energy and adopt more sustainable practices.

Unfortunately we continue to battle a federal government that is ideologically opposed to any meaningful action on climate and that is creating some very serious barriers to the uptake of the cheapest cleanest technology. That's what we face in Australia, and we are dedicated to advocating boldly on behalf of our members.

Some examples of what the federal government is proposing in its comprehensive pro-coal, anti-solar agenda that we believe requires bold advocacy include:

- A new solar tax that will slug Australian families to export their solar power to the energy grid;
- A $3.2 billion 'CoalKeeper' subsidy that will allow unprofitable, ageing, polluting coal-fired stations to operate well beyond their lifespan;
- A new tax on solar farms (the inelegantly named Congestion Management Model); and
- Illegal legislative changes to the *Australian Renewable Energy Agency Act* that will force the renewable energy agency to fund fossil fuel projects.

These policies are both confounding and confronting. This shows that the coalition government continues at every opportunity to push back against any meaningful movement on climate and any significant incursion of the renewables industry into the entrenched best interests of fossil fuel industries that currently dominate our political system.

We called on all state and territory governments to reject the Morrison Government's pro-coal, anti-solar agenda at the recent Energy Ministers' meeting and discussions continue.

State action and enterprise

We are also addressing many issues at a state level. Many people would have tuned in to our recent Queensland and New South Wales Summits which highlighted the advances being made and our involvement in some ambitious, progressive agendas. *(See facing page.)*

Next we are staging our **Global Race To Zero Summit** on **October 20 and 21** which brings together global leaders in the movement toward a strong zero carbon and strong economic future. It's a significant global event with an Australian accent.

Our Global Summit of last year attracted over 6,600 delegates and we are aiming to grow that to more than 10,000 delegates.

We want as many people possible to join us for this important two-day online Global Summit. More details soon.

Strength in numbers: an invitation to step up

Finally, we would like to encourage people to register with the Smart Energy Council so we can grow our database and our engagement with the wider industry and service people well by providing the right information that can help them in their business, in their research and in their policy making.

In order to shape a cleaner, better, smarter energy future we need to band together and benefit from our collective knowledge, resources and determination.

Visit www.smartenergy.org.au

John Grimes with Queensland Energy Minister Mick de Brenni (left)

"The federal government is proposing a comprehensive pro-coal, anti-solar agenda that we believe requires bold advocacy on behalf of our members."

ANOTHER DAY, ANOTHER DISASTER

Death, destruction, disaster and denial: What global warming? Why net zero by 2050? Tell me how we do it. Tell me what it costs.

Let's flip the scales and demonstrate the "cost" – aka disaster, death and destruction – wrought by global warming of 1.2 degrees.
We'll do it in pictures which simply and effectively portray the scale of disaster unfolding and that will only worsen in the absence of concerted action toward a carbon neutral economy in which the world is powered by renewable energy.
Just some of the catastrophic scenarios of late:

- Extreme heat and extensive fires and on west coast US
- Unprecedented flooding in Germany, Belgium, the Netherlands
- Devastating mud slides in Japan
- Once in a thousand-year flooding in China
- Devastating loss of wildlife in drought-torn Turkey

Extensive flooding in Germany: worst natural disaster in more than half a century
Hundreds dead or displaced, villages swept away. "Everything is completely destroyed. You don't recognise the scenery." entire communities cut off from power and communications. Billions of Euros in reconstruction costs.
Climate and meteorology researchers agree that extreme weather contributed to the widespread flooding in western Europe and that this will become commonplace due to global warming.
Nigeria and Uganda also experienced massive, destructive flooding in recent weeks.

Landslide
Heavier than normal rains in early July triggered a massive destructive mudslide in Japan.

Fiery hell
The catastrophic wildfire in Oregon, west coast US, continues to rage and to spread, razing houses and displacing communities. At last count the fire covered 1,210 square kilometres and smoke was billowing from the west to the east coast of the US
Described as one of the state's largest blazes in modern times due to extremely dry conditions and heat waves tied to climate change have rendered the West coast much warmer and drier in the past 30 years and created more ferocious wildfires that are harder to fight.
Worse lies ahead in the warming climate.

Freakish downpour
Three days of intense rain in China's Henan province matched a level seen only "once in a thousand years", and equalled the region's annual rainfall. Cataclysmic it may be yet such extreme weather is a taste of what is to become more frequent in the future as global temperatures rise.
Hundreds of thousands of residents had to relocate to safer pastures and no fewer than 94 million people were beset due to transport closures as seen in haunting images of commuters trapped in train carriages with rising water levels. Thousand of acres of crops swept away along with livelihoods. Millions upon millions of dollars lost production.

The burnt country: counting the enormous cost

Cost of Australian summer 2019/2020: bushfires searing the east coast: more than $103 billion. That's nine times as much as the average of the previous 19 years.
The carnage: Approximately 18,636,079 hectares (46,050,750 acres) burnt. 400 premature deaths, 3200 hospital admissions for circulatory and respiratory conditions, and over 1500 emergency attendances for asthma, increased use of mental health services or loss of work productivity due to sick leave. And tragically nearly three billion animals – mammals, reptiles, birds and frogs killed or displaced. Thousand of acres of crops swept away along with livelihoods. Millions upon millions of dollars lost production.

Unseasonal events all year round

Siberia in the Arctic Circle reaching 47 degrees Celsius and Antarctica 21 degrees; fires burning in the Amazon rainforests are becoming all too common.

"We're already seeing dramatic consequences with 1.2 degrees. Imagine the doubling. To contemplate doubling that is to invite catastrophe," says John Kerry who is Special Climate Change Envoy to US.

"[Yet] the fundamental truth of the Paris Agreement is that even if every country fulfilled its initial promises – and many are falling short — the temperature of this planet would still rise by upwards of 2.5 or 3 degrees centigrade.

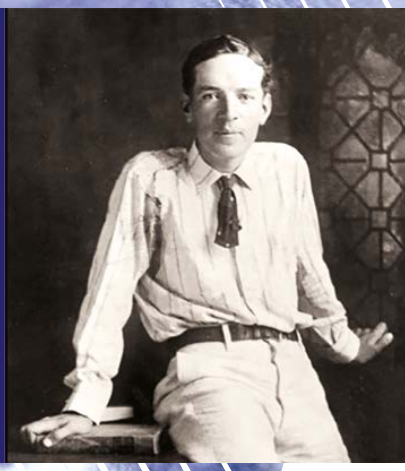
"It costs more not to respond to the climate crisis than it does to respond. And it is, without exaggeration, about survival.

"I do believe in science. Two and two is four. It's still four, despite the fact that some politicians want you to debate whether or not it's five, and chew up all our time and energy."

BUT THERE IS THIS:

"It is difficult to get a man to understand something, when his salary depends on him not understanding it!"

– Upton Sinclair



GLOBAL RACE TO ZERO

VIRTUAL SUMMIT

20 – 21 OCTOBER 2021

SMARTENERGY.ORG.AU

GLOBAL RACE TO ZERO SUMMIT

CODE RED *"Climate change is widespread, rapid, and intensifying. Many of the changes observed in the climate are unprecedented in thousands, if not hundreds of thousands of years. Stabilising the climate will require strong, rapid,* ***and sustained reductions in greenhouse gas emissions, and reaching net zero CO_2 emissions."***

– IPCC

The IPCC has delivered its starkest warning yet: act now or suffer increasing catastrophes and the upending of life as we knew it. Now, in the lead up to COP26, the Smart Energy Council is staging its biggest event to date:

RACE TO ZERO GLOBAL SUMMIT
WEDNESDAY AND THURSDAY 20 – 21 OCTOBER 2021

Over two days world-leading decision makers and activists will spell out the crucial role of renewable energy in delivering a low carbon economy to preserve life and land.

The action-packed **Global Race to Zero Summit** will feature:

- An overview of climate induced catastrophes and the IPCC's dire warnings
- Developed nations' ambitions and pledges; Australia's blockages
- Overcoming hurdles to position Australia as a global energy superpower
- Local business leaders and visionaries advancing smart systems and renewable uptake

The Smart Energy Council anticipates a **world-wide audience** at this unmissable **Global Summit** that is **free to attend.**

Visit www.smartenergy.org.au for more details and to register.

LORD MAYOR'S CHARITABLE FOUNDATION

RACE TO ZERO

MOTT MACDONALD

***AND** don't forget to set aside 4 – 5 May 2022 for the Smart Energy Council's Annual Conference and Exhibition at the ICC in Sydney*

SMART ENERGY COUNCIL

PYLONTECH

This year marks the **8th** anniversary of Pylontech Residential BESS in Australia.

Thank you for being with us always
Happy Anniversary to US

GLOBAL REGENERATION

***Tim Buckley** compares local and global commitment to renewable energy policies, programs and funding and, despite some glaring anomalies, concludes much of the world is finally heading in the right direction.*

"All of Australia's key global trading partners are rapidly ratcheting up their pledges to decarbonise … the Australian government must catch up."

– TIM BUCKLEY

ANYONE WITH A STAKE in a low carbon economy and healthy, liveable climate – and let's face it that is most Australians – could easily become disheartened by stubborn political attitudes. The harsh reality is the nation's leaders are failing to focus on the climate science or the need for a rapid decarbonisation of the economy.

Instead, the Federal government is bizarrely trying to provide new capacity payment subsidies to extend the life of antiquated coal plants and is funnelling tens of millions of dollars into new gas exploration, despite the reluctance by companies themselves to invest. The government is also determined to overturn bi-partisan support for an ongoing ban on nuclear power.

Australia's failure to take the lead on renewable energy matters is out of step globally, with many countries around the world now pledging to decarbonise to address the overwhelmingly obvious signs that extreme weather events are becoming more frequent and more extreme with deleterious effects on economies and communities.

Global corporate and financial institutions are likewise responding by curtailing finance to new fossil fuel projects and Australian institutions are following suit, recognising that Australia is very much a trade-exposed economy and its financial system is inextricably linked to international markets.

Despite the Federal government's decade-long energy policy chaos, Australian consumers are taking energy security into their own hands with more and more investing in rooftop PV systems, comfortable in the knowledge they are generating their own renewable energy.

Industry highs

It appears 2021 will be another record year for rooftop solar installations of over 3.5 gigawatts (GW) according to the Clean Energy Regulator, building on the 40 per cent growth in the total capacity of installs in 2020 of 3GW. Over the past decade the average system size being installed has trebled to over 8 kilowatts (kW).

Australia is now well ahead of Green Energy Markets' forecast for rooftop solar to reach over 50GW by 2050, half of the total grid capacity. And behind-the-meter batteries and batteries-on-wheels will rapidly follow.

Households have clearly taken the energy transition in hand.

Now Australia's key trading partners are accelerating global effort to respond to the global climate crisis.

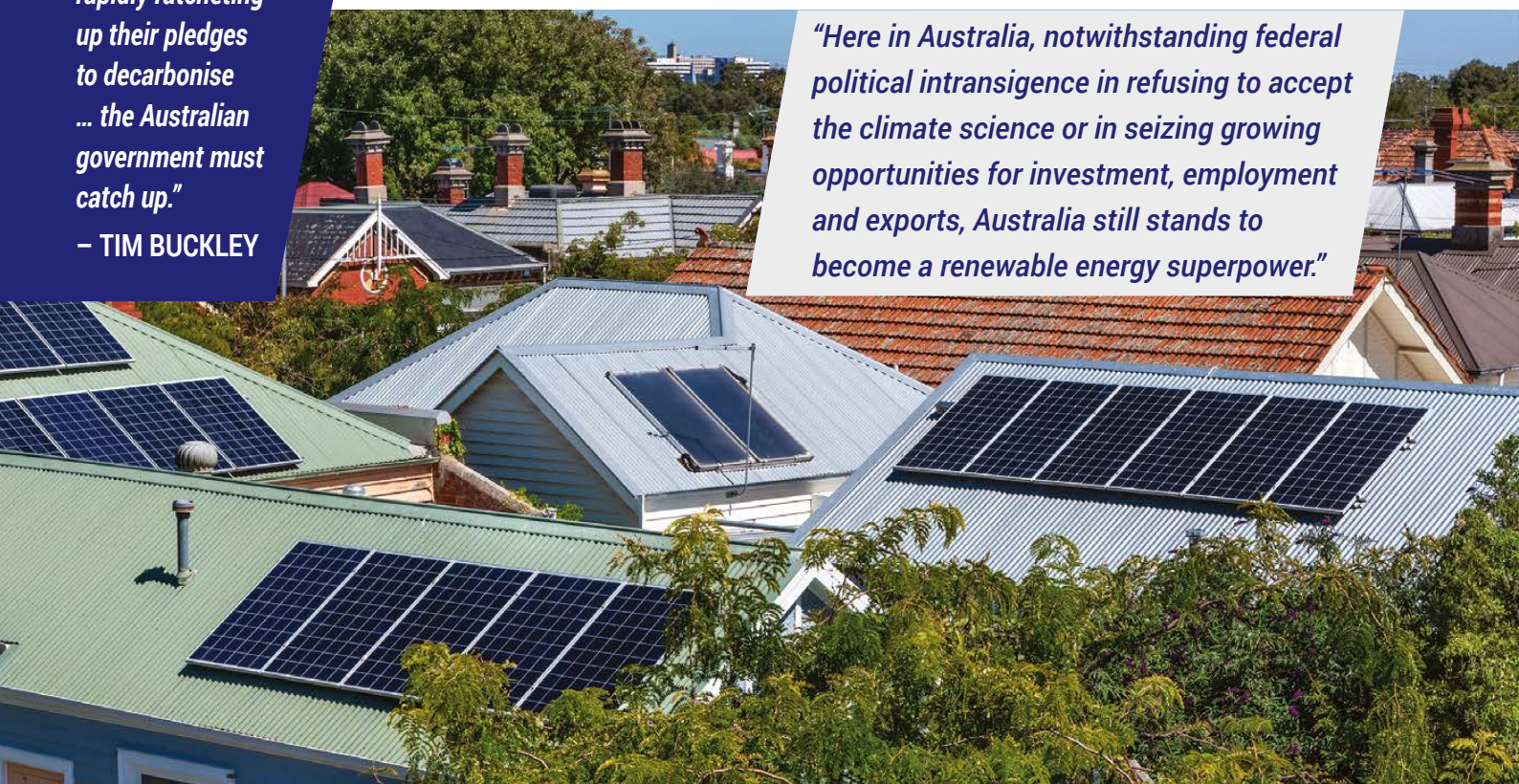
Global policy shifts and their impact on Australia

China has pledged to peak emissions by 2030. Its key power and steel sectors have committed to play a leading role in peaking by 2025, with the steel emissions reduction plan proposing an audacious 30 per cent cut from 2025 to 2030.

This implies a dramatic and significant policy shift for Australia whose two largest exports are iron ore and coking coal to China.

Japan's new energy plan for 2030 was approved in July 2021, consistent with Prime Minister Suga's surprise pledge in April to cut country emissions by 46 per cent by 2030. The plan confirms the Ministry

"Here in Australia, notwithstanding federal political intransigence in refusing to accept the climate science or in seizing growing opportunities for investment, employment and exports, Australia still stands to become a renewable energy superpower."



Japan's Prime Minister Suga made a surprise pledge in April to cut country emissions by 46 per cent by 2030

of Economy, Trade and Industry's (METI) endorsement of the ambition laid out by Japanese firm JERA in late 2020 to shift its entire coal power fleet to 100 per cent green ammonia by 2040, with a 20 per cent co-firing interim step set for 2030.

Japan's new electricity plan likewise has profound implications for Australian fossil fuel exports as the plan calls for a 46 per cent reduction in thermal coal use this decade, and an even more dramatic 51 per cent reduction in LNG use.

South Korea has also committed to net zero emissions by 2050, and President Moon Jae-in has set an interim 2030 country target to cut emissions by 40 per cent.

South Korea is on track to install over 4GW of solar in 2021, equal to its 4.1GW record of 2020. And in May 2021, it announced the world's largest (to-date) proposed floating offshore wind project of an enormous 6GW capacity costing A$40bn.

Europe's push to introduce the Carbon Border Adjustment Mechanism from 2023 continues to gain momentum, with growing expectation that other key Australian trade partners will follow suit.

Meanwhile, the EU emissions trading scheme is going from strength to strength, with carbon emissions' pricing now consistently exceeding €50/t in 2021.

The return of the US to climate leadership has been building momentum week by week during 2021.

In April 2021 President Biden confirmed his target for the US electricity grid to be carbon free by 2035, an amazingly ambitious target that would require not only a total coal power exit but also the likely closure of 500GW of gas-fired power capacity (diametrically opposite to Australia's 'gaslit recovery').

And in August 2021 President Biden announced the US target for a 50 per cent share of new car sales to be electric vehicles by 2030 as key to the reintroduction of long-term fuel efficiency and emissions standards for the sector.

Andrew Forrest, Chair of Fortescue Metals Group, announced in 2020 his commitment to decarbonisation and he is devoting the next decade of his life to green hydrogen with plans to build up to 1,000GW of renewable infrastructure

IMAGES COURTESY FORTESCUE METALS GROUP

Gathering momentum

August 2021 also brought Indian Prime Minister Modi's announcement of a National Hydrogen Mission as part of India's target of energy independence from fossil fuel imports by 2047.

The global financial industry has also pivoted phenomenally in 2021 with Brookfield's Mark Carney chairing the industry-led and UN-convened Financial Alliance for Net Zero, pledging a 1.5°C alignment as part of its net zero emissions by 2050 target, with interim targets. This shifts the goalposts profoundly versus the less than 2.0°C Paris alignment previously pledged.

The International Energy Agency (IEA) followed this up in May 2021 with its Net Zero by 2050 roadmap, confirming the 1.5°C pledge effectively prohibits any new greenfield coal, oil or gas developments with immediate effect.

The global financial pivot to accept climate science is clear.

By July 2021, the Financial Alliance for Net Zero representing firms with a collective US$70 trillion of assets grew 25 per cent to US$88 trillion.

BlackRock founder Larry Fink's "seismic reallocation of capital" forecast is transpiring at amazing speed, with environmental, social and governance (ESG) investment flowing into funds at record highs.

Australian corporates that fail to heed this global trend are clearly now on notice, irrespective of any new fossil fuel subsidies the Federal government proposes or supports.

Possibly the most significant announcement this year is from India's Reliance Industries.

Chairman of Reliance Industries Mukesh Ambani who is the richest man in Asia has pledged net zero emissions by 2035 and set a target to invest US$10bn in zero emissions manufacturing facilities across India in the next three years. This looks likely to propel India onto the centre stage globally, and is 100 per cent aligned with Prime Minister Modi's dual pledges of 450GW of renewables by 2030 and Self-Reliant India targets.

As the largest oil and gas firm in India, this has seismic implications of its own.

Downunder but not down beaten

Here in Australia, notwithstanding federal political intransigence in refusing to accept the climate science or in seizing growing opportunities for investment, employment and exports, this country still stands to become a renewable energy superpower. Renowned economist Ross Garnaut is a prominent advocate of Australia's potential as an energy superpower and many others are championing the cause.

Not a week passes without a global energy giant announcing plans for world-leading zero emissions industry development in Australia, be that of BP in wind, solar and green hydrogen or Rio Tinto's majority-held Tomago Aluminium's ambition to switch to a predominantly renewable power supply by 2029.

Australian billionaire and chair of Fortescue Metals Group Andrew Forrest in 2020 announced his commitment to decarbonisation and is devoting the next decade of his life to green hydrogen with plans to build up to 1,000GW of renewable infrastructure.

Repeating – a mighty 1000GW of renewable infrastructure!

A briefing in July 2021 by Fortescue chief executive Elizabeth Gaines revealed the company now employs 400 staff on its decarbonisation projects globally, and the firm is set to quadruple annual investment in green hydrogen to some US$600m in the current year.

Announcing memorandums of understanding and proposals stretching from Russia to Brazil, Papua New Guinea to New Zealand, and Tasmania's Bell Bay to Western Australia's Pilbara, Fortescue appears to be moving at light speed to capture a world-leading stake in the green hydrogen supply chain, forecasting it will be the largest seaborne-traded energy commodity in the world by 2050.

Global progress

The world is belatedly accepting the climate science and recognising concerted global effort is required to solve this global existential threat.

And despite the political denialism of this 'downunder', all of Australia's key global trading partners are rapidly ratcheting up their pledges of combined action to decarbonise economies.

Global financial institutions are aligning as well, acknowledging the growing stranded asset risks of continued investment in new fossil fuels, as well as realising there is a massive new investment opportunity globally to deliver on the solutions required.

With the richest men in India and Australia now vying to lead this global movement, IEEFA is increasingly confident the weight of money globally has pivoted in 2021. Belatedly, but decisively.

The Australian government must catch up.

Tim Buckley is Energy Finance Analyst, IEEFA
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SOUTH STREET ENERGY

STRENGTHENING THE CASE FOR HYDROGEN

STATES AND INDUSTRIES now committed to net zero emissions by 2050 are developing ever more ambitious plans and committing eye-watering budgets to fund green hydrogen production and provide a basis for those targets.

High environmental standards are being pledged too, and most States and Territories have now signed up as Founding Partners in the Smart Energy Council's Zero Carbon Certification Scheme which is designed to authenticate the 'green' element in hydrogen production. (Details page 34.)

Queensland Minister for Renewable Energy and Hydrogen **Mick de Brenni** declared "We are sending a very clear message Queensland is serious about decarbonising and that our hydrogen can be produced to the highest environmental standards."

Speaking at the Smart Energy Council's Queensland State Summit de Brenni, who has been charged with the task of developing the state's Ten-Year Energy Plan, said his government's $2 billion Renewable Energy and Hydrogen Jobs Fund formed part of the significant funding to support new Renewable Energy Zones in the state that will be the key driver in green hydrogen development and all the benefits that will flow.

With its stated focus on the development of renewable hydrogen, the Queensland government-owned Stanwell Corporation is building a 3,000MW renewable hydrogen production facility outside Gladstone in partnership with Japan's Iwatani Corporation.

"In Queensland, our hydrogen production to energy will be powered by renewable wind and solar energy because, quite frankly, there isn't really a domestic or international market for energy produced by anything else. We're committed to a low emission, ethically produced, hydrogen supply chain," de Brenni told the Summit.

NSW is also setting the pace.

State Energy Minister **Matt Kean** recently highlighted hydrogen's incredible potential as an energy source from both industrial and environmental perspectives.

"A clean hydrogen industry can help us reach net zero emissions by 2050 and has enormous economic potential in decarbonising global markets," he said at the Smart Energy Council's NSW Energy Summit, outlining plans to replace grey hydrogen with green to drive an energy boom.

"Accelerating that process is one of the key goals of the net zero industry and innovation program, which is our $750 million plan to help industry to reduce emissions and help businesses to prosper in a low carbon world."

The program includes multi-million dollar hydrogen hub developments in the Hunter and the Illawarra, which, he said "is all about positioning ourselves as an energy source and driving a clean industrial revolution that will help us to become a world leader in clean energy exports… as well as helping to ensure we meet our commitment to go to net zero carbon emissions by 2050."

Tim Stock of the NSW Planning, Industry and Environment Department, who is leading the development of New South Wales' hydrogen strategy and responsible for the delivery of the $70 million hydrogen hubs program, spelt out the ambitions at the Summit.

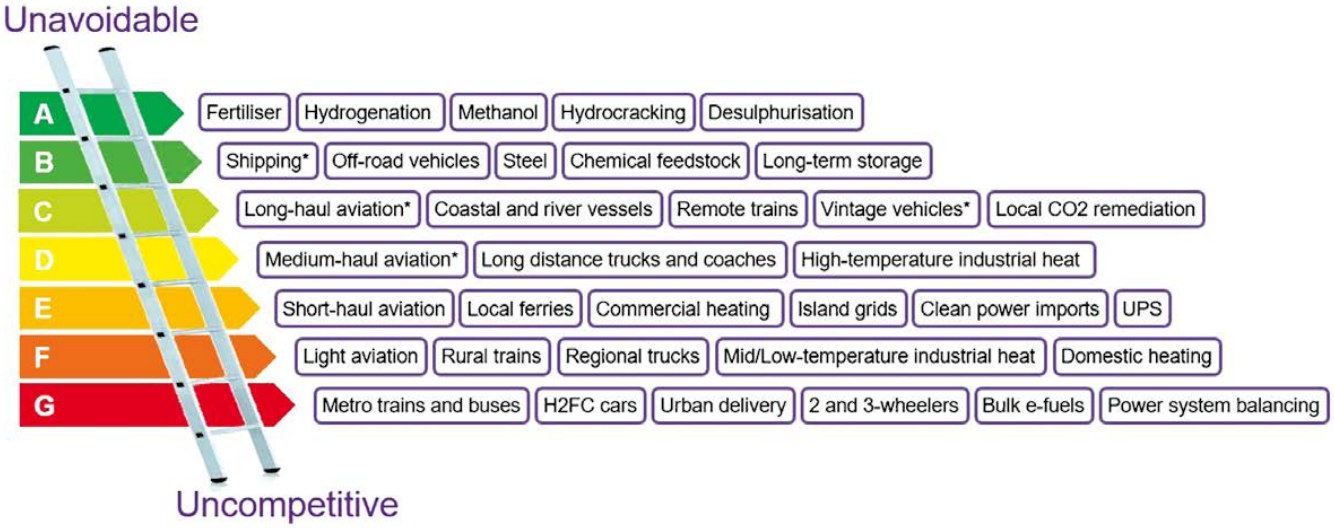
The video recordings of the Summits are available at www.smartenergy.org.au

Bold vision

Andrew Horvath of Star Scientific which has developed the award-winning HERO – Hydrogen Energy Release Optimiser, a zero-emissions hydrogen energy and heat solution – and he has a bold message for industry.

LIEBREICH'S LADDER

Michael Liebreich: "Back by popular demand is Version 4.0 of my Clean Hydrogen Ladder. If you're new to this, it's my attempt to put the use cases for clean hydrogen - be it green, blue, pink, turquoise or whatever - into some sort of merit order, because not all uses of clean hydrogen are equally likely to succeed."



** Via ammonia or e-fuel rather than H2 gas or liquid*

Source: Liebreich Associates (concept credit: Adrian Hiel/Energy Cities)

"Hydrogen does not need to be shackled to the grid," he says, "We have the tools at our disposal to take industry off the grid – even suburbs and cities off the grid.

"My message is this: forget the grid and make green hydrogen, in the long run it will be much more profitable for you."

Horvath cited the words of Malcolm Turnbull at the Smart Energy Council's May Conference and referred to Joe Biden's call to "go big with hydrogen… go for moonshot".

"We need to set a big target for green hydrogen and go after it hard," he said.

Addressing the SEC's Smart Energy Summit Horvath presented advice for governments, stating there are plenty of small innovators in the hydrogen space who are asking 'Why is the government funding big listed companies to drive CCS [carbon capture and storage] when I struggle to get noticed?'

"The government should not fall for the false narrative from the gas companies that hydrogen will only be ready when CCS is. A better direction for taxpayer funding in my view would be to set a bold structure target for green hydrogen

"Provide broad-based financial incentives for them to meet just as we did with solar and wind, that works… we should democratise the production of green hydrogen and set a broad-based incentive and set the target, then let the market set in and do its job."

There is no technical impediment to stop moving to the green hydrogen future now with big, bold and urgent steps. All we need, he says, is bold vision to massively ramp up supply, and support from policy leaders and the regulatory framework to let it happen.

Andrew Horvath of Star Scientific

Horvath – whose company Star Scientific is a Founding Partner of the Zero Carbon Certification Scheme – also stressed the need to move rapidly on global standards and regulations for the storage, handling and use of green hydrogen.

The cost and efficiencies of green hydrogen production at scale, and guesstimates over the timeframes for 'tipping points' are subject to much conjecture. In order to capture an indication of the industry's potential and its trajectory, the CEFC commissioned the *Australian Hydrogen Market Study.*

The green hydrogen market

The CEFC's extensive market study into the competitiveness of green hydrogen versus

incumbent energy technologies in Australia across 25 industry sectors found that green hydrogen is already approaching cost competitiveness for heavy trucking, buses and remote power.

The study, prepared by global energy analysts Advisian (part of the Worley Group) found green hydrogen has the potential to become commercially viable across further sectors of transportation as early as 2030.

The *Australian Hydrogen Market Study* reported that advances in production and distribution costs, coupled with the ongoing technology evolution, will accelerate the commercial attractiveness of green hydrogen.

Large-scale development would be critical to driving down installation and commissioning costs, similar to the accelerated development experienced by Australia's large-scale renewable energy sector.

Green hydrogen is already approaching cost competitiveness for heavy trucking, buses and remote power.

Although hydrogen was closest to achieving commercial parity as an alternative to petroleum products, displacing natural gas provides a potential transitional use to reach scale at pace.

CEFC chief executive Ian Learmonth said: "Our experience in developing the solar and wind sectors shows that prices decline rapidly as a new industry reaches scale and technical proficiency. It is encouraging to see a similar trajectory for the exciting hydrogen sector."

Importantly, the study cited the introduction of a Guarantee of Origin certification scheme as an important regulatory development to accelerate the development of the Australian hydrogen industry.

Competitive factors

The report cites key drivers for competitive green hydrogen costs including:

- **Electrolyser capital cost trends:** Advisian forecasts that current electrolyser capital costs of around A$1.1 million per megawatt would decline to around $0.5 million per megawatt by 2050, fully installed.
- **Renewable energy costs:** The continued dramatic decline in solar and wind generation costs as an input is key to lower hydrogen production costs. High utilisation rates (or load factors) of electrolysers will drive the lowest-cost hydrogen for the foreseeable future, requiring large amounts of low-cost solar and wind supplied from the grid. This will rely on the continued decarbonisation of the grid, including the roll-out of Renewable Energy Zones.

The flexibility of hydrogen production may also play an important role in demand shifting, which can help integrate renewables into the grid.

- **Installation and operational efficiencies will be needed:** Electrolyser equipment costs currently make up approximately 50 per cent of total electrolyser capital cost, with the balance of plant and installation each making up approximately 25 per cent of the initial installation and commissioning costs. As electrolyser equipment costs decline over time, the balance of plant and installation costs will likely make up a higher proportion of total costs. Pathways to drive installation efficiencies will be critical to expanding the industry. Operational efficiencies will also be required as larger scale projects are delivered. The cost declines in large scale solar developments in Australia provide a comparable model here.
- **Other factors will drive the competitiveness of green hydrogen:** it could be further accelerated as a result of broader market factors, such as: the levelised costs of hydrogen being lower than forecast; oil, gas and coal prices being higher than forecast; and the willingness of energy users to pay a premium for a clean energy alternative as part of their broad emissions commitments.

CEFC investment

The CEFC's major focus on hydrogen forms part of its role to increase investment in new technologies to drive down emissions and its Advancing Hydrogen Fund will be investing up to $300 million in the growth of a clean, innovative, safe and competitive Australian hydrogen industry. Projects across the broad spectrum of hydrogen use cases being considered include hydrogen transportation, supply chain optimisation, demand aggregation and vehicle availability.

In June, the CEFC made its first hydrogen-related investment, alongside lead investor IP Group. CEFC's Clean Energy Innovation Fund is investing $750,000 in the early commercial development of Hysata innovative electrolyser production technology developed by a team of researchers at the University of Wollongong. To date Hysata has raised $5 million to accelerate its development.

Michael Molinari, IP Group Australia Managing Director said: "We have been looking globally for new technology that can unlock the trillion-dollar opportunity in hydrogen.

"The CEFC has a strong focus on hydrogen-related investments, and we are actively pursuing large-scale investment opportunities through our new $300 million Advancing Hydrogen Fund. As expected, these large-scale investments can take time to develop, and we are looking forward to reaching financial close on our first large-scale transaction."

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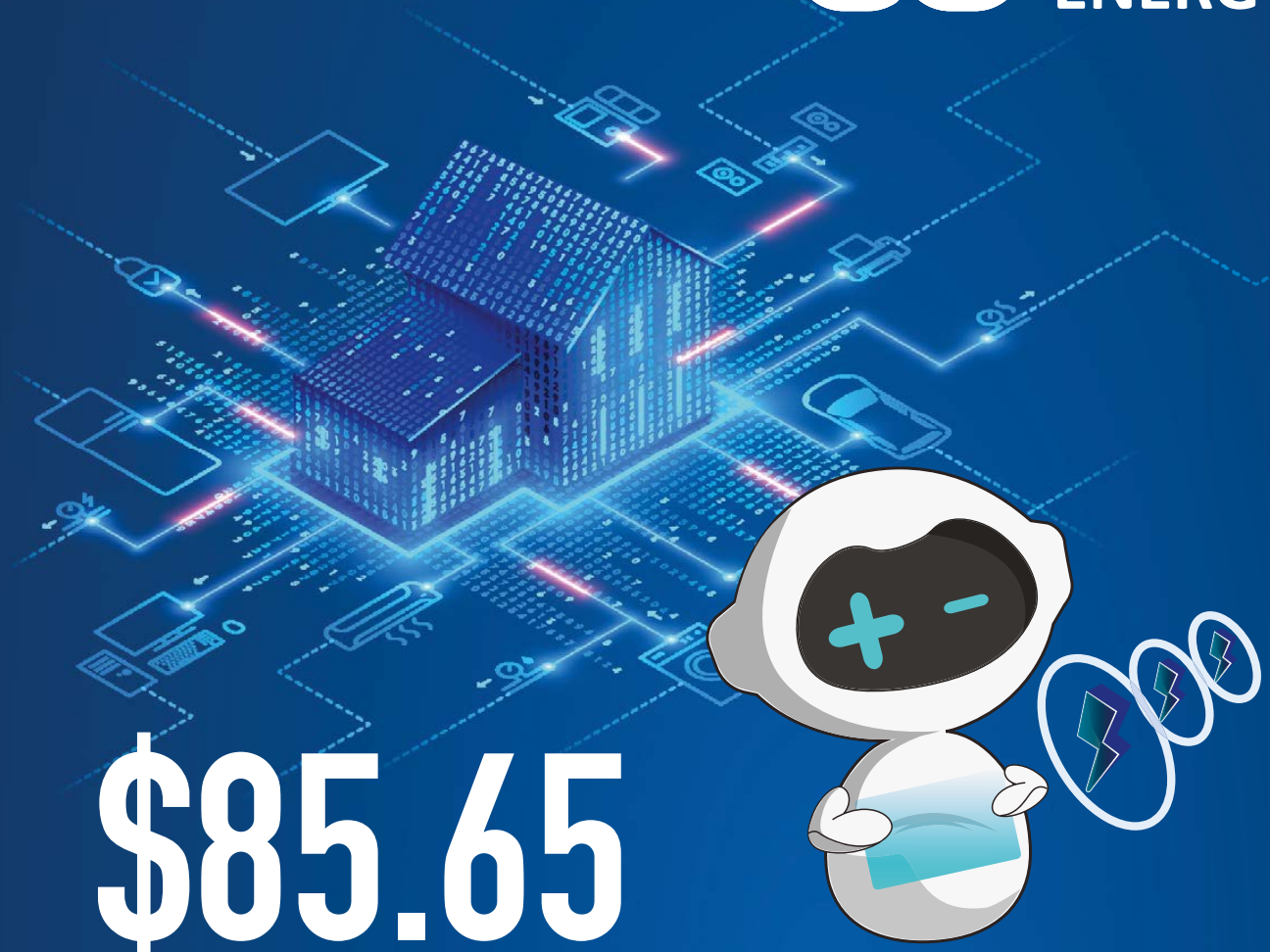

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DID SOMEONE SAY GIGA?

Highways to green hydrogen

Each year about 70 million tons of hydrogen is produced, of which green hydrogen production is less than three per cent. But as the world marches to a low carbon future, green hydrogen is being hailed as holding enormous potential, to the tune of trillions of dollars globally. A number of global conglomerates are poised for action.

By late last year the world's gigawatt-scale green hydrogen projects came in at 13 totalling 50GW, out of a global pipeline of 80GW. Since then there's been an exponential rise: by mid 2021 projects had doubled to 26, with a pipeline of 260GW.

These numbers highlight the pace of development in an industry that is on a course to displace grey hydrogen which is largely used in the production ammonia fertiliser and oil refining, and emits about 830 million tonnes of carbon dioxide in the process.

The world's largest green-hydrogen project in the pipeline is HyDeal Ambition's 67GW of sites across Western Europe, powered by 95GW of solar across multiple locations to power 67GW of electrolysers.

The second largest project, still in the very early stage, is less than half that at 30GW. The plant slated for Kazakhstan has a power source: 45GW of wind and solar to produce about three million tonnes hydrogen each year.

Australia then takes the stage with the 28GW Western Green Energy Hub in south-east Western Australia listed as the third most ambitious plant, with a power source: 50GW of wind and solar to produce up to 3.5 million tonnes H_2 per year (or 20 million tonnes of green ammonia). The consortium includes InterContinental Energy and CWP Global.

See more on page 34.

CWP is the global developer behind the fourth largest project, the 16-20GW in Aman for Northern Mauritania, power source: 30GW of wind and solar. The planned use of hydrogen is in the making of green steel, long-distance shipping, and decarbonising ammonia fertiliser nationally and internationally

Not on the above list yet noteworthy too is the 100GW of green hydrogen projects across the world planned by Twiggy Forrest, of which 40GW will be in Australia.

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ZERO CARBON CERTIFICATION SCHEME GATHERS MOMENTUM AND PARTNERS

THE SMART ENERGY COUNCIL'S ZERO CARBON CERTIFICATION SCHEME launched in late 2020 continues to gain momentum, with many strategic companies and state governments recognising the importance of jumping on board as Foundation Partners.

The pioneering industry-led Guarantee of Origin style scheme promotes the uptake and distribution of renewable hydrogen, green ammonia and renewable metals in Australia and around the world.

By late August the Queensland, Victorian, ACT and Western Australian Governments had joined as Founding Partners in the Zero Carbon Certification Scheme, along with 11 major entities with a stake in the development of green hydrogen.

Zero Carbon Certification Scheme Partners to date

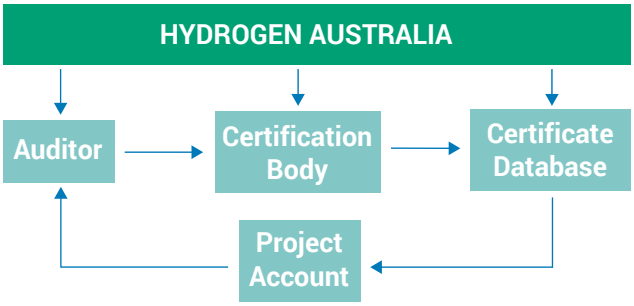
The ACT Government
The Victorian Government
The Western Australian Government
The Queensland Government
Ammonia Energy Association: a non-profit membership organisation that has been promoting the use of ammonia in a sustainable energy economy since 2004
COP26 High Level Champions for Climate Action who connect the work of governments with the many voluntary and collaborative actions taken by cities, regions, businesses and investors
CWP Global: One of the lead developers on the 26GW Asian Renewable Energy Hub project and 50GW Western Green Energy Hub
Energy Web: a global nonprofit organisation accelerating a low-carbon, customer-centric electricity system by unleashing the potential of open-source, decentralized technologies
HydroREC: deploying the blockchain capabilities of its technology research and development partner Smart Trade Networks (STN) in the energy, water and renewable hydrogen certification space
Power Ledger which develops software for clients and partners that allows consumers and producers to track, trace and trade every kilowatt of energy
Star Scientific: creator of unique catalyst which reacts with hydrogen and oxygen to create heat, or HERO – the Hydrogen Energy Release Optimiser, a zero-emissions hydrogen energy and heat solution
Yara: The Pilbara fertilisers plant is one of the largest ammonia production sites in the world and exports ammonia to domestic and global markets
Evoenergy: The part of ActewAGL that operates and maintains the ACT electricity and gas network; Evoenergy and the Canberra Institute of Technology (CIT) have partnered to build a first-of-its-kind hydrogen test facility at CIT's Fyshwick campus
ACT Renewables Hub which fosters industry developments and networks in the nation's capital
Gasbot designs and deploys low-cost 'bots' for metering, monitoring and tracking industrial commodities, putting the 'Internet of Things' into smart energy.

Accountability

The Zero Carbon Certification Scheme seeks to certify all renewable hydrogen, renewable ammonia, renewable metals projects, and to account for derivative products. The scheme will assess the embedded carbon content of the products to ensure that renewable production is maintained and becomes the primary form of production.

The scheme will only consider those products which are created with renewable energy, ensuring that the carbon content is kept below an agreed standard.

In the initial stages of the scheme, allowances will be made for LGC/REC certifications to be used to fulfill the criteria of the scheme. This allowance will be periodically revised to review the impact of potential greenwashing.



Landmark projects

The first project to be certified under the Zero Carbon Certification Scheme was the ActewAGL hydrogen refuelling station in Fyshwick, Canberra – Australia's first public hydrogen refuelling station.

The ACT Government will also use the station to service Australia's first government fleet of 20 hydrogen vehicles, as the government continues to transition 100 per cent of its passenger fleet to zero emissions vehicles.

Hydrogen Australia appointed Clean Energy Regulator approved greenhouse auditor Point Advisory to certify the refuelling station, which gained the tick of approval in August 2021.

Next cab off the rank for certification is Yara's ARENA-funded renewable ammonia project in the Pilbara.

For more information contact Max Hewitt at Hydrogen Australia max@smartenergy.org.au

IMAGE COURTESY ACT GOVERNMENT

GREEN HYDROGEN IN THE NEWS

NO SHORTAGE OF SCALE OR AMBITION: WESTERN GREEN ENERGY HUB

It's big news in Australia and gaining much attention worldwide: the mighty ambitious, mighty large Western Green Energy Hub destined for coastal region of Esperance, Western Australia, that will emerge as one of the largest energy projects anywhere on the planet.

The consortium of InterContinental Energy, CWP Global and the Mirning People is looking toward 50GW wind and solar capacity and 28GW of electrolyser capacity to produce up to 3.5 million tonnes of green hydrogen or 20 million tonnes of green ammonia annually.

The build cost is an unsurprisingly hefty $100 billion for the site spanning 15,000 km^2 (half the area of Belgium and just 5,000 km^2 short of Wales) with an FID (Final Investment Decision) target of 2028.

Big numbers don't deter CWP and Intercontinental who expect the green hydrogen sector to become a $US2.5 trillion market by 2050.

The project marks the largest ever commercial partnership with First Nations Land Owners. The Mirning People will hold a permanent seat on the board.

Western Australia's hydrogen minister Alannah MacTiernan whose government is a founding partner in the Smart Energy Council's Zero Carbon certification scheme reiterated WA's intent to become a major contributor to global decarbonisation and deliver a strong economic future for the state.

THE VICTORIAN GOVERNMENT IS INVESTING

$6.2 million through the Renewable Hydrogen Commercialisation Pathways Fund and committing $1 million in businesses support for hydrogen projects as part of the Renewable Hydrogen Business Ready Fund.

The two grant programs are funded as part of the $10 million Accelerating Victoria's Hydrogen Industry package.

Victoria is also leading significant research through the Australian Hydrogen Centre (AHC); working with National Energy Resources Australia (NERA) to support the development of Regional Hydrogen Technology Clusters; and partnering with hydrogen leaders across the sector.

WHERE DO YOU WANT TO GO IN THE WARREGO?

Australian car maker H2X Global has unveiled its Pick-Up Warrego, the tough versatile, all-terrain vehicle powered by hydrogen fuel cells that can be used in construction sites, mining locations and many other extreme scenarios.

The H2X Pick-Up Warrego will be one of the first such vehicles launched to market, a van and taxi MPV will follow and are intended to "complement the existing and upcoming hydrogen projects around the world, working as a proof of concept for hydrogen vehicles and their multiple uses".

H2X Global is considering public listing in a bid to raise $500 million in coming years.

FIVE HYDROGEN-POWERED HYUNDAI NEXOs

have taken to Queensland's roads as the state heads for a "zero-emissions travel revolution". This brings the government's fleet of zero-emission vehicles to 60 of a planned 144 electric vehicles by year's end.

Hydrogen Minister Mick de Brenni commented transport is Australia's second largest emitter after the electricity sector and "every zero emissions car we can put on the road is another customer for Queensland's home-grown renewable energy".

"Queensland has what it takes to produce renewable hydrogen at scale… these vehicles grow demand for renewable hydrogen, which grows demand for renewable energy, which in turn means we can reindustrialise our economy through cheaper, cleaner power."

Sunshine Coast's H2H Energy has developed a refuelling station at the Redlands research facility which is home to the Queensland University of Technology's research and development work into the hydrogen economy.

GREEN HYDROGEN IN THE NEWS

IN LATE JULY HYZON MOTORS, supplier of hydrogen-powered fuel cells to the commercial transport sector, successfully listed on the NASDAQ with a $2.8 billion market capitalisation.

"This exciting step marks the starting line for Hyzon Motors," said chief executive Craig Knight. "Our public listing will foster greater awareness that the future of commercial transportation – hydrogen fuel cell-powered vehicles – is today's reality.

"It's the beginning of a new chapter in the history of Hyzon as we accelerate the transition to hydrogen commercial transport worldwide and advance our commitment to reducing carbon emissions in a sector that is one of the largest contributors to climate change."

Hyzon has also secured a second Australian hydrogen fuel cell-powered vehicle supply agreement. Coregas has ordered two prime movers for its NSW operations and the anticipated 2022 delivery from Hyzon's Netherlands facility will see the first hydrogen-powered heavy vehicles operating in Australia which will halve Coregas' truck emissions.

IMAGE COURTESY HYZON MOTORS

Craig Knight said "This partnership reflects two truths about the energy transition: first, that the technology is ready to be deployed now; second, that collaborative efforts are integral in accelerating this shift."

FORTESCUE FUTURE INDUSTRIES is exploring green hydrogen prospects in India and, together with JSW Future Energy, is considering opportunities for use in green steel making, hydrogen mobility, green ammonia and other "mutually agreed industrial applications" in India. FFI's stated goal is to become the world's leading fully renewable energy and green products company.


IMAGE BY DAVID MARK FROM PIXABAY

ORIGIN ENERGY which has a net zero emissions target by 2050 has an eye on the renewable hydrogen pie with its Bell Bay project in Tasmania aiming to produce at 420,000 mt/year renewable ammonia and Townsville project ramping up to 800 mt/day of renewable liquid hydrogen from 2030.

A third project is green gas in Sydney considering hydrogen as a transport fuel.

The company claims it has committed to exiting coal-fired generation by 2032 or earlier and increasing renewables in its portfolio.

SEVEN TEAMS HAVE BEEN SELECTED to take part in the OZ Minerals' Think & Act Differently accelerator program as part of the Hydrogen Hypothesis challenge aimed at identifying experiments that can demonstrate the safe and effective use of hydrogen in a mining context and providing insights into how hydrogen can be used to support zero or low carbon processes.

Selected team projects include hydrogen powered lighting towers; safe hydrogen transport and storage at atmospheric temperature and pressure; ultra efficient ceramic engine; hydrogen-powered drone; hydrogen highway; high pressure electrolyser; and clean metal products from concentrate using green hydrogen.

CSIRO IS LEADING a two year $5m hydrogen research, development and demonstration program to support collaborations domestically and internationally and encourage the local research community and industry to find 'transformative' clean hydrogen industry solutions.

The program is a part of CSIRO's $68 million Hydrogen Industry Mission launched in May.

IMAGE COURTESY CSIRO

BLOOMBERG NEF FORECASTS A DOUBLING of global shipments of hydrogen electrolyser technologies in 2021 and quadrupling in 2022 to 1.8GW. By 2040, the cumulative installations of electrolysers could reach 40GW.

"Nearly everything has doubled already this year in the world of clean hydrogen, and we expect the momentum to continue," a spokesperson said, noting "More than 40 countries have now published a hydrogen strategy or are developing one. More than 90 projects are being planned worldwide to use hydrogen in industry. Electricity generators have almost doubled their planned hydrogen-fired turbine capacity since January."

BloombergNEF also forecasts a massive green hydrogen global glut and recommends governments ratchet up efforts to boost the use of green hydrogen.

OVERSEAS NEWS

A FLICKER OF GREEN – green hydrogen (generated from solar power and mixed with propane) made its Olympic debut in the Olympic cauldron at Tokyo 2020, marking the Olympic Movement's commitment to a more sustainable world and replacement of LPG or natural gas.

The cauldron normally consumes 41.6 litres of propane per hour, or 16,000 litres over the 16 days of the games. Japanese energy giant ENEOS supplied the green hydrogen for the games which included supplying 500 fuel cell vehicles. Some of the hydrogen is being produced at a research centre in Fukushima which is touted to be the world's largest hydrogen production facility, using about 20MW of solar power.

STAYING IN JAPAN, where Panasonic recently established an 18 hectare slice of Tokyo – part of the Olympic village – to develop a future-focussed town complete with the latest in IoT technology (mainly smart monitoring and energy management systems), alongside new hydrogen technology to support clean energy generation.

The HARUMI FLAG concept is 'a town committed to environmental and social sustainability' that leverages the technology of hydrogen power to supply fuel cell vehicles for Rapid Transit and city bus services. Subsurface pipelines will deliver hydrogen to hydrogen fuel cell generators that will also power common-use spaces of the dwellings.

INDIA'S NATIONAL HYDROGEN MISSION Indian Prime Minister Narendra Modi has announced an intention to secure a piece of the $13 trillion green hydrogen pie with domestic production and export of green hydrogen and has set a deadline of 2047 to achieve self-reliance in energy. "Green hydrogen will give India a quantum jump in achieving its climate targets," PM Modi said in his Independence Day speech. "For India to progress... energy independence is necessary." The year 2047 also marks India's 100th year of Independence.

SHIPPING IS TOUGH ON THE CLIMATE AND HARD TO CLEAN UP

THESE INNOVATIONS CAN HELP CUT EMISSIONS

By Jing Sun, Professor and Department Chair, Naval Architecture and Marine Engineering, University of Michigan

SHIPS CARRY MORE THAN 80 per cent of world trade, and they rely heavily on some of the least environmentally friendly transportation fuels available.

There are no cheap, widely available solutions that can lower the shipping industry's planet-warming carbon emissions – in fact, shipping is considered one of the hardest industries on the planet to decarbonise – but some exciting innovations are being tested right now.

As a professor of naval architecture and marine engineering, I work on ship propulsion and control systems, including electrification, batteries and fuel cells. Let's take a look at what's possible and some of the fuels and technologies that are likely to define the industry's future.

Shipping's climate problem

Shipping is the cheapest way to move raw materials and bulk goods. That has given it both an enormous economic impact and a large carbon footprint.

The industry emits roughly 1 billion metric tons of carbon dioxide per year – nearly 3 per cent of global emissions, according to the International Maritime Organisation, a specialised UN agency made up of 174 member nations that sets standards for the industry. If shipping were a country, it would rank between Japan and Germany as the sixth-largest contributor to global carbon dioxide emissions. Moreover, nearly 70 per cent of ships' emissions occur within 250 miles (400 kilometres) of land, meaning it also has an impact on air quality, especially for port cities.

Technological innovation, in addition to policies, will be crucial for achieving low-carbon or zero-emission shipping. Academic research institutes, government labs and companies are now experimenting with electrification; zero- or low-carbon fuels such as hydrogen, natural gas, ammonia and biofuels; and alternative power sources such as fuel cells and solar, wind and wave power. Each has its pros and cons.

"If shipping were a country, it would rank between Japan and Germany as the sixth-largest contributor to global carbon dioxide emissions."

Global shipping emissions in millions of tonnes of carbon dioxide

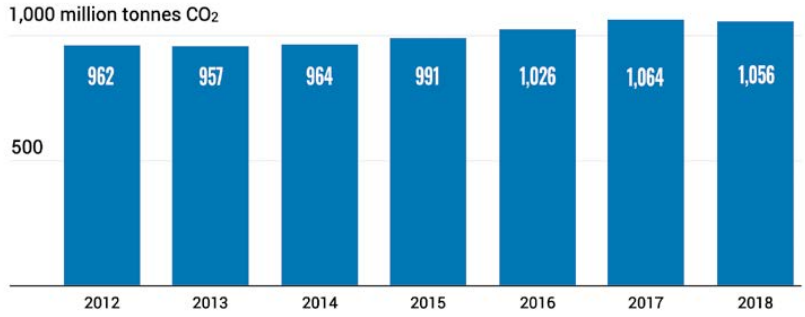


Chart: The Conversation/CC-BY-ND • Source Fourth IMO Greenhouse Study, 2020

Why electrifying ships matters

Just as on land, electrification is one key to cleaning up the industry's emissions. It allows engines operating on fossil fuels to be either replaced by alternative power generation technologies, or downsized and modified for low-emissions operation. It also allows ships to connect to electric power while in port, reducing their emissions from idling.

Ship electrification and hybridization are significant trends for both commercial and military vessels. Electrifying a ship means replacing its traditional mechanical systems with electrical ones. Some fleets have already electrified propulsion and cargo handling. Hybrid power systems, on the other hand, integrate different power-generation mechanisms, such as engines and batteries, to leverage their complementary characteristics.

I see deeper electrification and broader hybridisation as a core strategy for achieving green shipping.

Tremendous opportunities also exist for improving the operation of the existing fleet – and reducing fuel use – through automation and real-time control. Advanced sensors, artificial intelligence and machine learning can help ships to 'see', 'think' and 'act' better to improve efficiency and reduce emissions.

Greener fuels for ocean voyages

Shifting to cleaner and greener fuel sources will be essential for decarbonising the shipping industry.

Most of the power plants on today's ships are based on internal combustion engines that use cheap heavy fuel oil. Innovations in marine diesel and gas turbine engine design and treatment of exhaust gas have lowered harmful emissions. However, most of the "low-hanging fruit" has been harvested, with little room left for dramatic improvement in traditional power sources.

The focus now is on developing cleaner fuel sources and more efficient alternative power generation technologies.

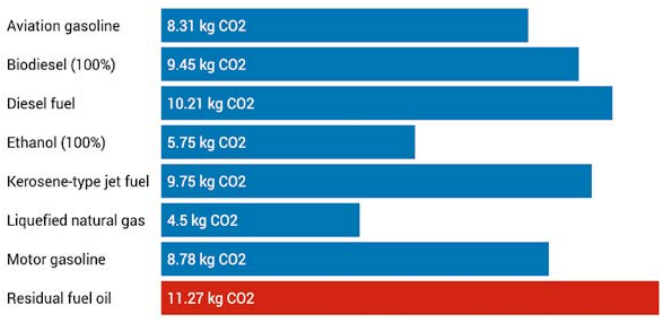
Low or zero-carbon fuels, such as natural gas, ammonia and hydrogen, are predicted to be the dominant energy sources for shipping in the future. Ammonia is easy to transport and store, and it can be used in internal combustion engines and high-temperature fuel cells. But like hydrogen, it is largely still made with fossil fuels. It's also toxic. Both have the potential to be made with water and renewable energy using electrolysis, but that zero-carbon technology is still in the early stages and costly.

These fuels have started replacing heavy diesel fuels in some marine segments, primarily as demonstration projects and at a slower rate than needed. Cost and infrastructure remain major barriers.

Renewable energy sources, such as wind, solar and wave energy, are also promising. Integrating renewable sources as cost-effective and reliable energy solutions for oceangoing vessels is another challenge developers are working on.

Transportation fuels' emissions per gallon

Heavy fuel oil used for maritime shipping emits more CO_2 per gallon than other transportation fuels



2021 US EPA data in kilograms of CO_2 per gallon of fuel
Chart: The Conversation/CC-BY-ND • Source EPA

Powering ships using fuel cells and batteries

Fuel cells and batteries also hold promise as alternative power generation technologies.

Through electrochemical reactions, fuel cells generate electric power in a highly efficient and clean manner, making them very attractive for transportation. Fuel cells are operated with pure hydrogen or reformed gases, except for high-temperature fuel cells that can use natural gas or ammonia as fuel.

Given the existing fuel infrastructure, most maritime fuel cell demonstration projects today have to store liquid hydrogen or use onboard systems that convert natural gas or other fuel to hydrogen-rich syngas. Infrastructure for hydrogen storage has to be developed for widespread adoption of fuel cell technology.

Battery technology is essential for electrification, even for ships with an internal combustion engine as their prime mover. It also has its own unique challenges. In addition to ensuring the batteries are safe and reliable – you don't want a fire or power outage in the middle of the ocean – ruggedness and flexibility are necessary for powering operations such as cargo handling and tugboat operations.

Investing in the future

In 2018, the International Maritime Organisation's Marine Environment Protection Committee set targets to reduce the carbon intensity of

the global fleet by at least 40 per cent by 2030 and to cut its greenhouse gas emissions in half by 2050 from the 2008 levels.

Those targets are important, but they leave the deadlines for action well into the future. At its June 2021 meeting, the IMO agreed to some small short-term targets, including lowering ships' carbon-intensity by 2 per cent a year from 2023 to 2026. It also agreed to ban the use of heavy fuel oil in the Arctic starting in 2024, but with waivers allowing some ships to continue using it there until 2029.

Countries and some shipping companies are recommending a faster transition. In early June, the governments of Denmark, Norway and the United States, along with the Global Maritime Forum and the Mærsk Mc-Kinney Møller Center for Zero Carbon Shipping, announced a new Zero-Emission Shipping Mission to try to scale up and deploy new green maritime solutions faster.

The shipping giant AP Møller-Maersk has said it could support a carbon tax of $150 per ton of carbon dioxide to encourage more innovation and a faster transition, though others in the industry argue that a tax like that would nearly double the cost of bunker fuel and make freight far more expensive, with repercussions throughout the global economy.

I believe the grand vision of zero-emission shipping can be realized if the ship design and fleet operation communities work together with policymakers, the logistics industry and the broad academic and industry technical communities to find solutions.

This is an exciting time to work in the area of energy and power solutions for shipping. The technology developed today will have a transformative impact, not only on the marine industry but also on society.

"Low or zero-carbon fuels, such as natural gas, ammonia and hydrogen, are predicted to be the dominant energy sources for shipping in the future."

Jing Sun is Professor and Department Chair, Naval Architecture and Marine Engineering, University of Michigan.

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FIMER TAKES ON ABB – AND AUSTRALIA

FIMER is one of the few inverter brands in the market that is still manufacturing in Europe. The Italian business which was founded in 1942 and has an extensive product range for residential, commercial and utility application took a step forward in March 2020 when it acquired the ABB Solar business.

Jason Venning of FIMER

MARCH 2020 sticks in the mind of many as the time that the world was realising its worst fears with the emergence of a global pandemic. For FIMER, the timing was even more momentous as the inverter manufacturer had already set in train the integration of the ABB Solar business with its nearly 1,000 employees.

The scheduling certainly presented an additional challenge, FIMER's Jason Venning told *Smart Energy*, however 18 months down the track he can look back and confidently say the integration has not only gone very well but that it's part of the evolution of the company that is also launching a suite of new products into the Australian market.

To set the scene he stepped through the existing products' technical features, saying FIMER's Italian-made string inverters come embedded with PowerGain scanning algorithm technology that ensures PV systems on a home or business will always work at optimal conditions, even in shading conditions.

This performance, he explained, is achieved without additional devices such as DC optimisers which results in reduced installation complexity and cost while improving system safety over a long period.

"The UNO-DM, REACT 2 and PVS-10/33 inverters come with a 10-year warranty, and if anything happens to the inverter in that time FIMER provides a replacement inverter and pays for the labour and transport costs to get the system back online," the Country Manager said.

The two Italian manufacturing facilities in Vimercate and Terranuova Bracciolini also manufacture electric vehicle chargers.

"Our new EV charger portfolio is certainly another part of the renewable technologies mix in the sense that greater adoption of electric vehicles in conjunction with a move to more renewable energy in our generation mix will help to improve everyone's carbon footprint."

FIMER also has a manufacturing plant in India that produces its central inverter solutions.

Testing conditions

"All our technology is tested for hash conditions and can be found in some extreme locations including Antarctica, one of the coldest and windiest places globally, and in some of the hottest places, such as Rewa in India, where temperatures regularly exceed 40°C," Venning said.

What's important, he emphasised, is that FIMER always looks to innovate and work with its customers to ensure their system is suitable for their project.

"We have tailored solutions to provide optimal performance and value to meet Australian regulations and requirements. For example the FIMER teams in Australia and Europe have developed a sub-5MW central inverter solution sized perfectly at 4.95MW.

"This solution allows utility players the opportunity to choose a central inverter solution that has ultimate generation potential and still

Peel Business Park in Perth where the FIMER team customised a solution to deliver a central inverter and battery inverter on a singular skid

Country Manager Jason Venning says FIMER's core strength is supplying customers with inverter products that support solar and battery storage projects

meets the AEMO's 5MW limit to avoid timely and costly approvals," he explained.

Australian operations

FIMER's physical presence in Australia comprises 25 employees located in Melbourne, Brisbane and Sydney which houses a dedicated warehouse, inverter repair centre and technical support team of engineers to provide 'state of the art' support for customers.

"We do not just move boxes but help customers optimise the use of our products to get the most out of their solar PV and battery installations," Venning said.

Which takes us to the future of energy supplies and the changing regulatory landscape.

Earlier this year FIMER paired up with Australian energy management software company SwitchDin to address the mandatory requirements introduced in late 2020 in South Australia, and the duo have forged an ongoing and strong partnership, mindful of the fact distribution networks are now starting to demand that Distributed Energy Resources (DER) in Australia be smart, visible and controllable.

As explained: "Using the SwitchDin droplet (that collects information from and controls inverters, battery systems and power meters and transmits data to the SwitchDin cloud via the internet) with FIMER's inverters means homes and businesses in South Australia can comply with the state's current remote disconnection and reconnection requirements.

"SwitchDin enables FIMER installers and customers a pain-free transition to be ready for the future of DER and ensure compliance with state requirements."

Acquisition of ABB

The acquisition of ABB also sits among the more significant moves by the Italian manufacturer, and according to Venning FIMER was attracted to the ABB Solar business because of its complementary product range. FIMER was already very strong in the large scale utility solar segment, he said, and the addition of the ABB Solar product range meant that we could deliver solutions for residential, commercial and industrial and utility segments.

"ABB Solar also had a large physical presence in many countries where FIMER did not operate, so in all the acquisition has allowed FIMER to become a truly global company.

"Integrating the ABB Solar business with nearly 1,000 employees in the middle of a worldwide pandemic was an additional challenge, but it has gone well and we are starting to introduce brand new FIMER products into the Australian market."

This year they launched the PVS-10/33, FIMER's new three-phase inverter, and a complete Electric Vehicle Charging portfolio.

FIMER has also announced the launch of two new platforms for the utility-scale sector: a high-power multi-MPPT string inverter and a modular conversion solution designed for decentralised and centralised applications covering 100 per cent of utility applications.

It's all part of the bigger picture

"We aim to be the leading European brand in the residential, C&I and utility markets," Venning said, "The growth of large scale solar continues unabated and our new PVS-350 and PVS-260 products are ideal solutions for the utility-solar segment and will be available in the second half of 2022.

"We are currently listening to feedback from our customers about the product features and benefits to ensure that we can provide the best in class string inverter offering for utility-scale applications."

This year the company released its first FIMER-designed inverters with the PVS-10/33kW for the commercial and industrial market.

"And in 2022 we will start to replace our existing residential inverter range with a brand new and expanded residential line-up. We are releasing new single-phase models with sizes from 2-10kW and small three-phase models from 4-8.5kW."

He explained all new residential inverters will be 'battery ready' with built-in AC backup output for when grid power is lost. They will also be compatible with FIMER's brand new modular residential battery solution, which will be expandable up to 48kWh.

Virtual tour

Despite lockdown-induced travel restrictions, in July this year people from across the globe could 'visit' the Italian Head Office and two manufacturing facilities Italian plant – virtually of course. Viewers were able to virtually visit FIMER's Italian operation and see firsthand what happens behind the scenes in making FIMER's inverter and electric vehicle products for home, business, or utility application.

Keen to take a trip to Italy? The virtual doors are always open at https://discoverus.Fimer.com/ or visit www.Fimer.com

DEALING WITH FOREIGN MARKETS

Western Union Business Solutions is a global leader of cross-border, cross-currency business payments, helping businesses of all sizes to navigate currency market volatility with greater confidence. Here, Nick Worthington outlines how Western Union Business Solutions can help those in the renewables sector to grow their global reach.

We are all familiar with the name Western Union but can you provide an overview of your reach and services?

NICK WORTHINGTON: For nearly 170 years, Western Union has been moving money across borders for families, businesses and communities. This has given us decades' worth of insights, which go beyond just building a world class network and a currency portfolio that is second to none.

Our knowledge and experience can make payments quicker and smoother by providing market insights that enable customers to make informed decisions that put them firmly in control.

Can you outline the business to business (B2B) service offered by Western Union?

NW: A depth of understanding is vital when payment needs become complex; it helps to work with dedicated experts in foreign exchange and overseas banking systems.

To that end, Western Union Business Solutions equips businesses with the solutions they need to send, receive, and manage international payments. Broadly that means helping businesses that are importers and exporters deal with the ebb and flow of foreign currency.

Our Business Solutions' digital platforms facilitate efficient and streamlined international payments on a global scale.

Solutions include locking in exchange rates on invoices and credit notes from foreign associates for up to 240 days or around eight months.

We also provide the support, market insight, and risk management services to help businesses protect profits and manage their cash flow.

It is a great source of pride for us to be able to assist businesses on their growth journey through solid, reliable service, driving efficiencies and saving our clients' money on their foreign exchange dealings.

To what extent is WU Business Solutions assisting the renewable energy sector?

NW: Much of the hardware and technology involved in the renewables industry – batteries and solar panels – is from China (also Europe) and there are significant levels of importation of raw materials and consequentially we are helping more and more businesses involved in smart energy deal with currency fluctuations.

To date our focus has been on the solar sector because our existing client base includes many importers of solar panels and related products, however we are considering how we can assist businesses in other areas of the renewables' sector.

Overall, we are committed to helping businesses that are looking to do things differently and build a better future for all of us, and our

partnership with the Smart Energy Council is helping us get our message out to different audiences.

What specialised teams and staffing levels do you operate in Australia?

NW: Western Union Business Solutions has a dedicated client facing team in Australia that is made up of business development, account managers and client service consultants.

Our teams recognise that uncertainty is always bad news, but especially when dealing with foreign currency transactions. As mentioned, negotiated prices and calculated profits can be significantly impacted if the exchange rate moves adversely on the day a payment is going through.

One of the best ways to protect bottom-line profits from currency fluctuations is to have a hedging strategy.

Our Hedging Team works closely with the Dealing Team, connecting with customers and getting to know their business and currency needs. As specialists they can explain the complexities of creating a risk strategy, and the impact of fluctuations in the markets. They can help uncover and close hedging opportunities where there is a need to protect.

What are the benefits of dealing with WU Business Solutions over one of the main banks? Are you more competitive, nimble, streamlined?

NW: We can tailor our offering depending on the needs and wants of a client's business. Our online platform is powerful and intuitive and a great tool for clients wanting to self-serve and manage currency movement online.

We also appreciate that many of our clients like to have the option to pick up the phone and speak to a person so we also have a dedicated account manager who can provide market insights and help clients build an FX (foreign exchange) strategy.

"Our teams recognise that uncertainty is always bad news, but especially when dealing with foreign currency transactions."

Western Union invests significantly in compliance measures and fraud monitoring technology; can you outline trends and developments in this area?

NW: As technology evolves, the methods used by fraudsters evolve as well, and the regulations safeguarding the financial services industry continue to increase. Western Union's Security and Fraud Investigation Team comprises a network of experienced professionals around the globe who understand the laws and regulations relevant to our business. They keep abreast of the latest developments as they happen, reacting quickly and locally.

https://business.westernunion.com/en-au/
For more information or advice contact Nick Worthington, Senior Partnerships Associate Business Solutions - Australia & New Zealand, 0410 045 598.

ENGINEERING WITH ROSIE: AN ENERGY POWERHOUSE

***She's passionate about green energy transition technologies and a whirlwind of energy analysis and explanation. And an internet sensation with close to 800,000 views and 30,000 subscribers to her popular 15-minute 'Engineering with Rosie' YouTube clips. Here we find out a bit more about what drives the dynamo* Rosie Barnes.**

SHE'S PART CATALYST-STYLE PRESENTER, part female version of Prof Brian Cox and possibly the best candidate for a TV series on renewable energy engineering and technologies. For those yet to tune in to Rosie Barnes' fun yet educational 'Engineering with Rosie' clips covering wind energy, energy storage, hydrogen, wave energy, battery storage, electric vehicle technology and more, here's the lowdown.

Inspiration for renewable energy topics?

At first my ideas came from questions that people would commonly ask, eg why do wind turbines have three blades? More recently it's usually based on topics that I want to learn more about, such as my recent video on carbon capture. I was having trouble finding out how the technology actually works and thought probably other people outside that industry would also be interested to learn. More than 20 other topics are on the shortlist!

"I believe that if the general public had a better understanding of engineering then we would make better political decisions with respect to action on climate change."

Time taken to prepare the 15-minute clips?

Between 20-60 hours to make each video. The fastest are the 'video essays' where I present my opinion on a topic that's not too technical and doesn't need much research. The ones that take the most work involve an actual engineering project or complicated analysis and lots of technical sketches. Animations take a really long time too, around half a day to make 10 seconds. The longest time I spent on a video was my gingerbread wind turbine. It was much harder to get working than I expected and I was baking and testing for over a week!

Your viewer demographics?

Spread pretty evenly from aged 25 to 65+ years, much older than is typical on YouTube. Geographically: mostly North America and Europe/UK and a smaller number from India, Australia and South Africa. Surprisingly, about 96 per cent male. I had expected and hoped that more women would want to watch.

What's in it for you?

People get in touch with speaking opportunities and leads for my consulting business Pardalote which provides services related to energy technology development.

But I love that I can get experts on pretty much any topic to spend a couple of hours explaining an interesting topic to me personally. I think one of the most appealing aspects of my channel is that I talk to real experts.

Challenges and frustrations?

One: the way that new, clean energy techs are expected to be perfect in a way that the technologies they are replacing are not. This is sometimes called the 'nirvana fallacy'. Examples include waste from wind turbines getting so much more attention than waste from coal power plants, or fires in batteries or EVs vs fires in fossil fuel power plants or petrol cars.

Two: the opposite, when a new technology is reported as being the big saviour, that all we need to do is wait for this technology and it will solve all our problems in one go, and render all our existing clean technologies useless. I call this type of reporting 'magic beans' stories.

Greatest technological potential?

1 – energy efficiency; 2 – electrification of everything possible (especially transport and heating); 3 – demand flexibility (including smart charging, smart appliances); 4 – grid interconnectors; 5 – electricity

"I think it's inevitable we will get close to net zero, simply because the vast majority of our emissions are from sectors where clean technologies are already cheaper than fossil fuel alternatives, or soon will be."

– ROSIE BARNES

storage (a mix of pumped hydro, li-ion batteries and other kinds of batteries).

We'll need all of this to be able to put in the huge amount of extra wind and solar that we need to get a clean economy. I think green hydrogen will be very important to help clean up agriculture (to make green fertiliser) and for other sectors such as steel and shipping.

Your toughest job to date?

When I was living in Denmark, working for a wind turbine manufacturer and spending a month or two each year in factories, managing prototyping or integrating new products into serial production operating 24/7; there were some long long hours spent working in the middle of the night. I was also climbing turbines a few times a year helping with commissioning, maintenance and claims.

Climate action optimist or pessimist?

I think it's inevitable we will get close to net zero, simply because the vast majority of our emissions are from sectors where clean technologies are already cheaper than fossil fuel alternatives or soon will be. So that makes me optimistic. But in some sectors clean technologies may never be cheaper than the current ones, such as aviation. Without a price on carbon or some other government intervention we probably won't ever get all the way to zero.

Your enthusiasm is infectious, will you every run out of energy?

I have several goals for the future of *Engineering with Rosie!* I want to drive some laps in a Formula E car, I want to go heli-skiing in an electric helicopter, I want to take a trip to space in a green-hydrogen-powered rocket, and I want a TV series budget to pay for all that!

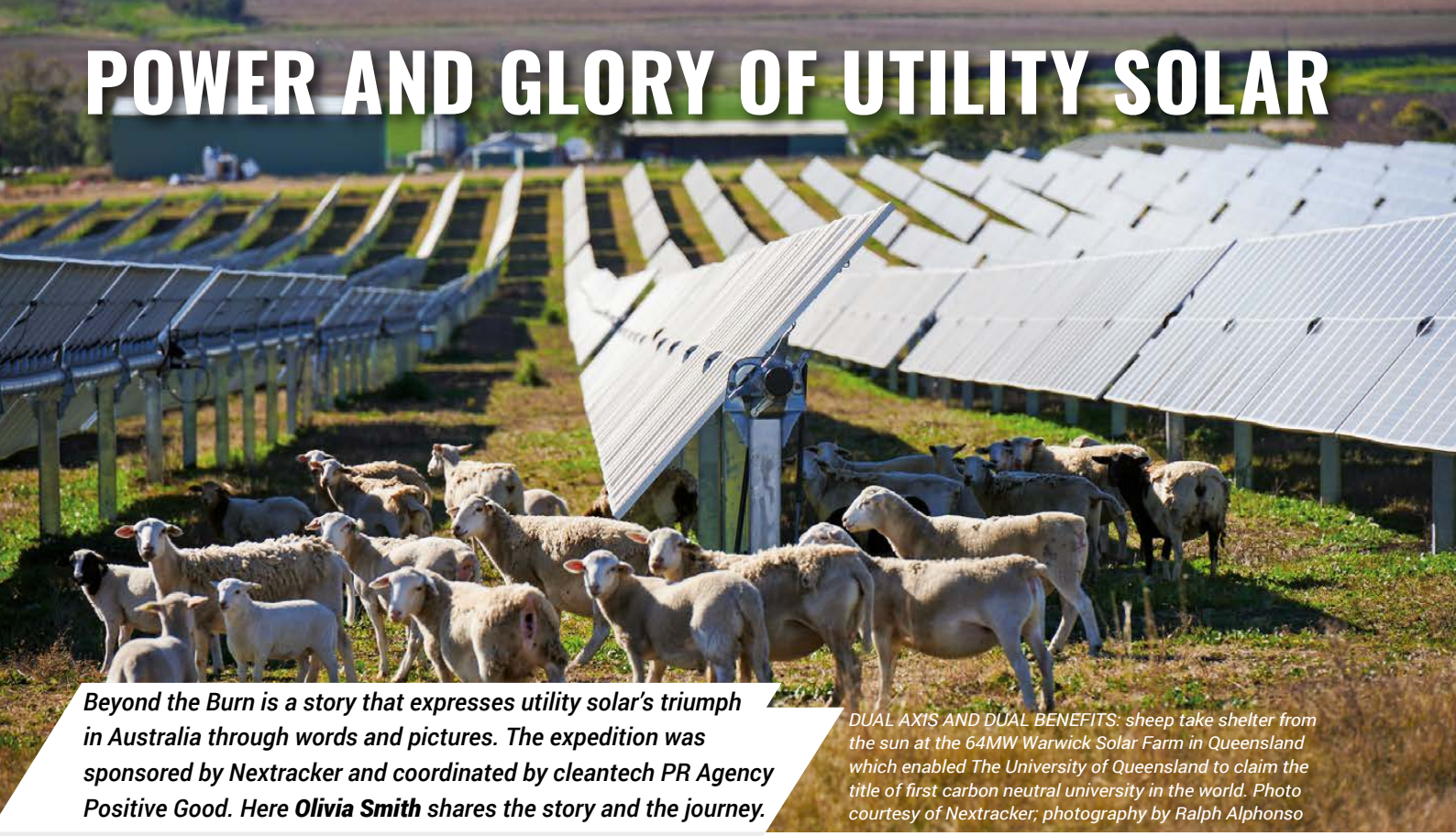
I love it when I hear from teachers that they are using my videos in the classroom! And from homeschooling parents who use the videos for remote learning and tell me how keen their kids are on engineering. That makes me very happy.

Until I build the channel a bit more and can afford to hire a professional team to take some of the load off me, it is simply too much to maintain that kind of pace.

For more, visit Engineering with Rosie on YouTube also see Facebook or LinkedIn.

Rosie Barnes is a new technology development manager, project manager and engineer specialising in complex multidisciplinary systems www.pardaloteconsulting.com

POWER AND GLORY OF UTILITY SOLAR



Beyond the Burn is a story that expresses utility solar's triumph in Australia through words and pictures. The expedition was sponsored by Nextracker and coordinated by cleantech PR Agency Positive Good. Here Olivia Smith shares the story and the journey.

DUAL AXIS AND DUAL BENEFITS: sheep take shelter from the sun at the 64MW Warwick Solar Farm in Queensland which enabled The University of Queensland to claim the title of first carbon neutral university in the world. Photo courtesy of Nextracker; photography by Ralph Alphonso

FOR 100 YEARS, we've burnt things to produce energy. But smart advanced technology and an overriding need to decarbonise our economy has set us on a new path. It's not always been easy; since the first solar farm came in 2012, utility solar has fought an uphill battle to take its rightful place in Australia's energy mix.

The story of utility-scale solar starts with a humble debut in 2012 with the construction of the 10MW Greenough River Solar Farm in Geraldton, Western Australia. The farm was saluted by proponents of renewable energy and hailed as a pioneer in the space.

The reality is that in the intervening years utility solar has faced a series of challenges within the fossil fuel-favoured policy environment: grid connection delays, export curtailments and investment uncertainty,

These and a series of policy roadblocks effectively wreaked havoc on what would otherwise have been extraordinary uptake of solar in the >5MW category, delaying the sector's ability to occupy a significant share of Australia's energy mix.

Triumph over adversity

However, according to data obtained by renowned consultancy Rystad Energy, in 2017 installations sized greater than 10MW jumped by more than 500 per cent and remained strong, despite ongoing policy and industry challenges.

The sector has surged since 2018 and today Australia boasts more than 380 large-scale PV assets amounting to 8.4GW of capacity at or beyond financial close.

By 2020, large-scale solar farms contributed as much as 10.9 per cent of Australia's renewable energy generation.

In May 2021, large-scale PV generation exceeded the average generation for gas for the first time ever (AER Q1-21 Market Report). Utility solar is now on a clear upward trajectory, driven mostly by regional communities and industries.

As many as 91 per cent of utility-scale PV plants in Australia use solar tracker systems, and since making its debut in Australia in 2016, Nextracker has supplied 79 live and committed assets.

The company is now approaching 5GW of installed capacity in Australia and capitalised on this milestone to acknowledge the underlying strength of the market. So, in partnership with our client Nextracker and a number of other industry leaders including the Smart Energy Council, Positive Good developed a special project and campaign to celebrate the rise of utility solar in Australia. Together we hit the road on a photographic expedition with leading *Australian Geographic* photographer, Ralph Alphonso, to recognise some of the many solar farms that are powering communities around Australia.

A journey into the sun

The month-long trip earlier in the year took us through rural NSW, via Bomen Solar Farm and Nevertire Solar Farm to the picturesque Warwick in Queensland which earned The University of Queensland the moniker of world first carbon neutral university.

We then continued our journey travelling south through Jemalong, back through Wagga and down to north-west Victoria visiting Bannerton, Karadoc and other solar farms in the region.

The journey can only be described as awe inspiring. And we like to think the images captured reflect the phenomenal scale and contribution of large solar plants across the country.

Companies which collaborated to make the project possible include The University of Queensland, Foresight Group, WIRSOL, Spark Renewables, Genex Power, New Energy Solar, Elliott Green Power, BayWa r.e. and Impact Investment Group. We are grateful for their interest and their support. The Smart Energy Council was also pleased to play a role backing this first-of-its-kind undertaking.

"We're proud to endorse this great expedition showcasing some of Australia's solar farms," said John Grimes, chief executive. "It's remarkable to think of how far utility solar has come in recent years.

"Indications point to the segment's underlying strength and it makes sense that it will see exponential growth with the easing of some of the challenges, and this is something the Smart Energy Council is actively pushing for."

Further illustrating the business case for large-scale solar, CSIROs GenCost 2020-21 consultation draft issued in December 2020 revealed that the levelised cost of energy (LCOE) of solar PV is far cheaper than the LCOE of new coal and gas plants, even with transmission and storage costs taken into account.

Support among landowners and workers

Two of regional Australia's most vocal proponents of renewable energy, farming and agriculture, not only stand to benefit from cheaper, cleaner power but are among those feeling the greatest impacts of climate change among Australians.

"Farming and renewable energy go hand in hand," said Anika Molesworth who is former Young Farmer of the Year, and one of the founding directors of Farmers for Climate Action.

"Solar helps reduce power prices for regional communities, gives farmers a way to diversify and offset the troughs associated with the impacts of extreme weather, and offers a means to increase land productivity by continuing farming activities while leasing land to solar developers.

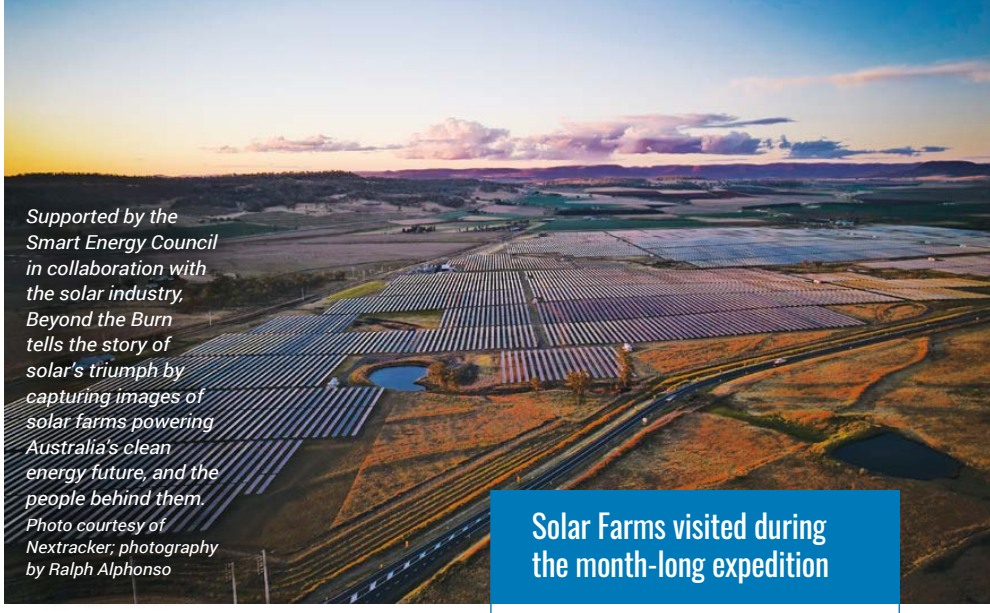
"I've put my voice behind Beyond the Burn because I'm a farmer who loves solar, I want to see more of it and the sooner Australia moves beyond fossil fuels, the better."

Peter Wheale, Nextracker vice president for Australia, Southeast Asia and the Pacific stated, "Between farming, agriculture, net zero emissions targets by 2030 in mining and manufacturing, green hydrogen and ammonia, regional industries and mega-projects like SunCable and the Asian Renewable Energy Hub, there are growing calls for more renewables, and it's this demand that's driving utility PV. Australians see the value in solar, are staking their bets on it and, ultimately, investing."

Indeed they are.

To help spread the good word of Beyond the Burn, Positive Good staged a complementary campaign via social media channels LinkedIn, Facebook and Twitter.

Olivia Smith is Director, Positive Good, +61 402 044 811, olivia@positivegood.com.au



Supported by the Smart Energy Council in collaboration with the solar industry, Beyond the Burn tells the story of solar's triumph by capturing images of solar farms powering Australia's clean energy future, and the people behind them. Photo courtesy of Nextracker; photography by Ralph Alphonso

Solar Farms visited during the month-long expedition

New South Wales
Bomen Solar Farm (123MW)
Manildra Solar Farm (55MW)
Jemalong Solar Farm (62MW)
Nevertire Solar Farm (132MW)

ACT
Mount Majura Solar Farm (2.3MW)

Queensland
Warwick Solar Farm (64MW)

Victoria
Bannerton Solar Farm (110MW)
Karadoc Solar Farm (112MW)
Wemen Solar Farm (110MW)

ITS TIME FOUNDATION

PAYING IT FORWARD IN THE PACIFIC
PV FOR POSITIVITY AND PROSPECTS

ITS TIME FOUNDATION is using PV to tackle a significant issue on remote Pacific Islands at schools that have no electricity or rely on dirty diesel generators.

To date the Foundation has successfully installed 20 stand-alone solar PV systems and equipment for five more systems is currently being shipped over. The PV systems provide clean, free energy for lighting and computers as well as savings on diesel fuel costs which frees up cash flow for more computers.

Thanks to PV systems made possible as a result of the generosity of Its Time supporters, the kids are getting a modern education which is literally transforming their life prospects.

Its Time is determined to maintain momentum. Earlier this year the Foundation launched a **Business Partner Program** that's attracting new supporters ranging from start-up installers to manufacturers. Its Time Founder Rob Edwards said "Businesses get involved because they want to make the world a better place by helping kids and contributing to a fairer, cleaner world. These businesses have become part of a great corporate social responsibility story to share with customers and staff."

Partners have access to a range of resources for their business and social media.
www.iitime.org/partner-list

Rob commented "Feedback on the partner program has been really positive and, fortuitously, many positive B2B interactions have resulted. These include a substantial equipment enquiry, residential solar referrals and even some website consulting. It's a great feeling that, in our small way, we can give something back in the partner relationships."

All businesses are welcome to join the Foundation's monthly Virtual Drinks.
An open invitation to a dynamic 45-minute zoom featuring:

- A short update on Pacific Island PV projects
- A 5-minute segment 'What's new in renewables' by an industry expert, and
- A 20 minute 'upskilling' presentation by a top-line business speaker.

Sessions are free and without obligation, the Foundation simply hopes that if people gain value they will share the story.
Register here: www.iitime.org/drinks

SMART ENERGY COUNCIL

WORLD WRAP

FROM PROGRESSIVE TO BIZARRE IN A WORLD ON A PRECIPICE

A cold hard decision

Greenland has taken the decision to suspend oil exploration, declaring this "a natural step because the government takes the climate crisis seriously."

BACKGROUND: Given the extent of oil reserves and the riches that would flow and enable the nation to loosen its financial dependence on Denmark, the prospect of oil exploration has long been an option for the world's largest island.

But the government of Greenland recognises the threats and its intergenerational responsibilities, declaring: "The future does not lie in oil. The future belongs to renewable energy, and in that respect we have much more to gain... we want to take co-responsibility for combating the global climate crisis."

Those left behind in the hi tech 21st century

We Care Solar sheds light on deliveries

As night falls, healthcare workers in sub-Saharan Africa are challenged by the lack of electric lighting. The situation is so dire that pregnant women from poor communities are often asked to bring extra money to buy candles for nocturnal lighting.

But thanks to non-profit organisation We Care Solar the situation has become brighter since 2015 through the provision of a Solar Suitcase to hundreds of health centres in Zimbabwe.

The simple yet effective system – a yellow Suitcase – mounts to the wall and is connected to rooftop solar panels. It includes rechargeable LED lights, USB ports, an infrared thermometer and foetal doppler to listen to babies' heart rates.

The Suitcase has facilitated 180,000 deliveries annually since introduction and significantly reduced infant mortality rates.

But it's a blip on the horizon given the country's solar potential. Last year Zimbabwe installed just 6MW of new solar energy bringing total installed capacity to 17MW, well short of its full solar potential estimated in excess of 4GW.

Precipitating a bit of geoengineering

With a mean temperature of 28 degrees Celsius and rainfall limited to 10cm annually – and falling only between December and April – Dubai faces a predicament as its population surges.

Presently 42 per cent of all water used in the UAE is derived from its 70 desalination plants, however the government's water security strategy aims to reduce demand by 21 per cent in the next 15 years. Not an easy task when the UAE's demand for water is gushing as the population tops 9.9 million and the mercury sometimes hovers at a thirst inducing 51 degrees.

Enter a team that has developed technology to trigger rainfall.

How so?

Scientists launched four drones with wingspans of about two metres which during their 40 minute flight 'zapped' clouds with electricity to cause droplets to cluster, with the larger raindrops falling to the ground rather than evaporating.

The efforts are led by a team of scientists from the University of Reading in UK under a multi-million dollar grant from the UAE Research Program for Rain Enhancement Science.

The program has considered several research projects in recent years, among them the creation of a mountain to induce rainfall, an H_2O pipeline from Pakistan, and towing icebergs from the Arctic.

If only the intense rainfall inundating Europe and China could be redirected to hot dry regions desperately in need of precipitation.

Did you know?

Latin America boasts twice the global average of renewable electricity, with a quarter of its energy from hydropower complemented by variable renewable energy sources.

Recent auctions in Argentina, Brazil, Chile, Mexico and Peru have helped accelerate the deployment of thousands of megawatts of wind and solar energy projects within the region.

OBSERVATION AND CONTEMPLATION

"Simply put: the world needs to cut emissions – greenhouse gas CO_2 emissions particularly – by at least 45 per cent by 2030 in order to be on a credible scientific path by mid century to net zero. That's what the IPCC showed us. 45 per cent – not just in some countries or some regions, but the world over. They found that 45 per cent is the minimum that the world must reduce."

And referencing countries' plans for new coal plants:

"To paraphrase Einstein – Insanity is continuing to do something that will kill you even when you know it will."

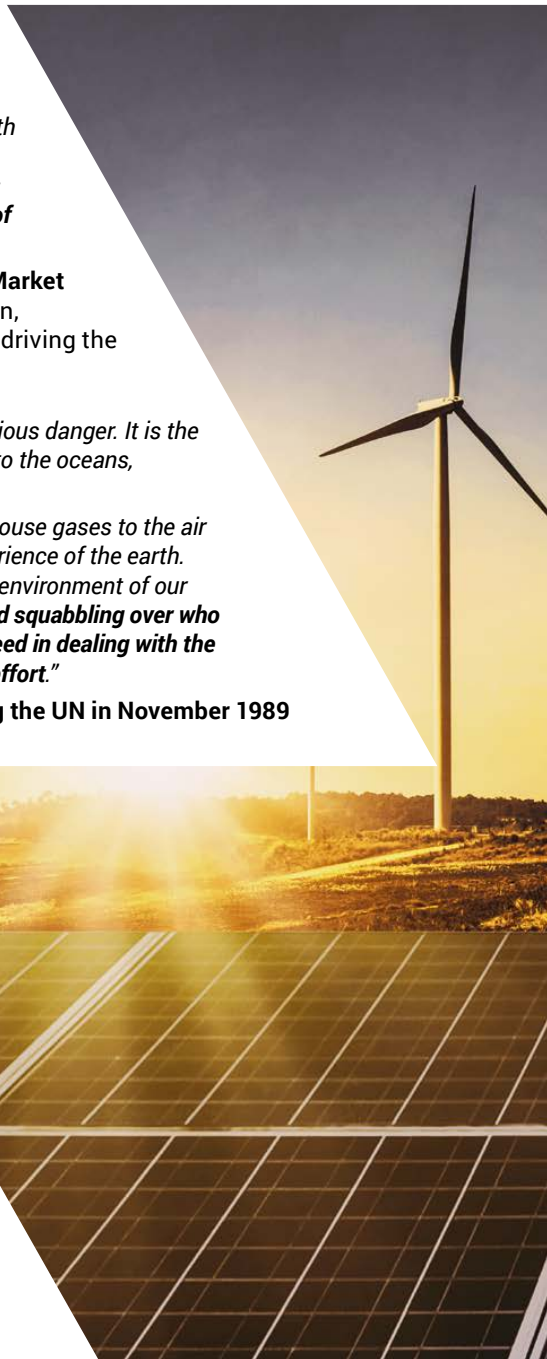
John Kerry, US Special Presidential Envoy for Climate

"If all countries adopted Australia's own climate policy it would take us towards 3 degrees. Even on present settings we are going to go over 2 degrees."

Climate scientist Will Steffen, emeritus professor at ANU

*"Under my leadership, AEMO will work closely and collaboratively with governments, industry and communities to design the affordable, reliable energy system that Australia needs. **An energy system that's capable of handling 100 per cent renewable energy, at any moment of the day, by 2025.**"*

Daniel Westerman, chief executive, Australian Energy Market Operator, noting the acceleration of technical innovation, economics, government policies and consumer choice driving the energy transition



""We have all recently become aware of another insidious danger. It is the prospect of irretrievable damage to the atmosphere, to the oceans, to earth itself.

*"What we are now doing to the world… adding greenhouse gases to the air at an unprecedented rate – all this is new in the experience of the earth. It is mankind and his activities that are changing the environment of our planet in damaging and dangerous ways. **It is no good squabbling over who is responsible or who should pay. We shall only succeed in dealing with the problems through a vast international, co-operative effort**."*

Former UK PM Margaret Thatcher, addressing the UN in November 1989

"If the world is to achieve or get close to meeting net zero by mid-century, then we need to accelerate deployment of the low-carbon solutions we have this decade – that means even more wind, solar and storage [solar PV needs to treble to 455GW a year, and battery storage ramp up to 245GWh a year solar] and electric vehicles, as well as heat pumps for buildings, recycling and greater electricity use in industry, and redirecting biofuels to shipping and aviation… there is no time to waste."

BloombergNEF chief economist Seb Henbest

"I believe that if the general public had a better understanding of engineering then we would make better political decisions with respect to action on climate change."

Rosie Barnes, Pardalote Consulting

FIMER

The PVS-10/33 is here

Available in six sizes: 10 kW, 12.5 kW, 15 kW, 20 kW, 30 kW and 33 kW

The new PVS-10/33-TL is built to give you complete flexibility.
Fuseless design with 1,100VDC maximum DC input voltage, high power density with up to 10% extra AC output power and a choice of 2-4 MPPT with a built-in DC isolator.

Optional Arc-fault detection or PID prevention functions and flexible DC wiring options for direct connection or via string combiner is also available.

Advanced communication features built-in such as dynamic feed-in control and free monitoring via FIMER's Aurora Vision monitoring platform and Energy Viewer app.

Order the PVS-10/33 today in one of its six power sizes for your next project and get the performance, flexibility and reliability you require.

fimer.com/flex

INVESTING IN THE JOBS OF THE FUTURE

RACV Solar has partnered with Victoria's Holmesglen Institute to deliver advanced renewable energy training facilities.

Solar systems generating over 1 million kWh of energy each year and commercial battery storage will be installed at two campuses in Victoria.

The installation includes a 800kW solar system, commercial battery storage, a solar-powered car park featuring EV chargers, and other commercial energy efficiency technologies.

The Victorian Government stumped up $2.1 million for the systems which are due for completion in September.

RACV Solar is also an Industry Adviser to Holmesglen's Renewable Energy programs offered as part of the electrical apprenticeship training: 'Working Safely in the Solar Industry', 'Design and Install Grid Connect PV Systems' and 'Grid Connected PV with Battery Storage'.

Andy McCarthy of RACV Solar said the burgeoning renewable energy sector offered many employment opportunities for young people and that these would only increase as more and more people switched to solar power.

"These programs will not only equip young people for the jobs of the future but also demonstrate RACV Solar and Holmesglen Institute's commitment to helping Victoria achieve its renewable energy targets by 2030," he said.

"We're also excited to see that the solar industry is attracting a diverse group of young apprentices, students and career changers. There are no barriers to a fulfilling career in solar!"

L to R: Andrew Williamson, Executive Director, International Education and Enterprise Solutions at Holmesglen Institute; Navdeep Singh and Melinda Kirton, RACV Solar apprentices; Nick Staikos, MP and Andrew McCarthy, CEO RACV Solar

Information, views and technical details on this page supplied by Smart Energy Council Member

LONGi

Hi-MO 4m

Maximize Power Density and Flexibility

Available in 3 sizes to
maximize use of rooftop space

66-cell format 72-cell format 60-cell format

www.longi-solar.com.au

CATCHING A WAVE

In other developments, RACV Solar has acquired 100 per cent of Great Ocean Solar and Electrical as part of its investment in Victoria's surf coast region.

RACV Solar's Andy McCarthy explained they had already partnered with Great Ocean Solar and Electrical to deliver key projects including Victoria's largest community solar and battery program. "This acquisition will provide positive benefits, not only to both our companies, but also to the region through local jobs and greater spend with local suppliers," he said.

http://solar.racv.com.au
www.greatoceansolarandelectrical.com.au

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SHINING THE LIGHT ON COMMUNITY SPIRIT

Sundriven, FIMER and Greentech Brisbane Airport recently banded together to donate a new solar system to help a family in need as part of Triple M Brisbane's 'Lend a Hand' program to make life better for a family in need.

The team designed and installed a brand new 6.3kW solar system using a FIMER 5.0kW UNO-DM-PLUS-Q inverter and a safe outdoor padded deck at the home of a seven-year-old who suffers ongoing medical conditions.

Sundriven initially planned to relocate solar panels from an aging solar system but settled instead on new panels, and FIMER jumped on board supplying a solar inverter. Greentech Brisbane Airport, a wholesale distributor, donated the solar panels.

The single-phase inverters are made in Italy and have power ratings from 2.0 to 6.0kW engineered into a lightweight and compact package that includes features such as Wi-Fi, a built-in DC-Isolator and FIMER's PowerGain technology for optimal energy generation.

Michael Donelly, FIMER's Queensland Sales Lead said, "FIMER is working hand in hand to support our installers in Australia and around the world to ensure we provide a better, greener world."

www.fimer.com

SPREADING LOCKDOWN GOODWILL

Selectronic's Lindsay Hart who is all too aware of the hurt caused by lockdowns has created – or should that be curated – a means of lifting spirits.

"We wanted to do something to help. So, for every SP PRO warranty registered in a state during a lockdown, we will send a Selectronic 'Lockdown Luxury Hamper'!" he stated in a recent broadcast.

"These hampers will be full of local produce, as part of our ongoing commitment to supporting Australian-made companies, and this is our little gesture of helping everyone in a lockdown get through this difficult time.

"Not only will we send one to you, the reseller, but we will also send one to your end customer, so be sure to register their correct details!"

Lindsay stressed that some warranty registrations contained inaccurate and incomplete data, in particular end customer information such as incorrect names, incomplete addresses and the occasional spelling error on email addresses.

Given such errors might 'hamper' the delivery of the complimentary gourmet hamper he recommends all information is entered accurately and in full.

Visit www.selectronic.com.au/warranty

REC GROUP LAUNCHES SECOND GENERATION N-PEAK SOLAR PANEL

REC Group is releasing its latest solar panel, the N-Peak 2 which uses 120 half-cut mono n-type cells to deliver up to 375Wp of power and can support loads of up to 7000Pa. Twin panel cell layout ensures continued energy production even when partially shaded.

Building on the success of its predecessor, production of the REC N-Peak 2 was set to start in August 2021, with customer shipments arriving from October.

REC guarantees power output in year 25 of the panel's service life of at least 92 per cent.

The new REC N-Peak 2 solar panel is REC Group's third product release in as many months and follows the launch of lead-free REC Alpha Pure Series, and the fourth generation of the popular REC TwinPeak Series.

At its release in June 2018, the REC N-Peak was the world's first solar panel to combine n-type mono half-cut cells with a twin-panel design.

www.recgroup.com

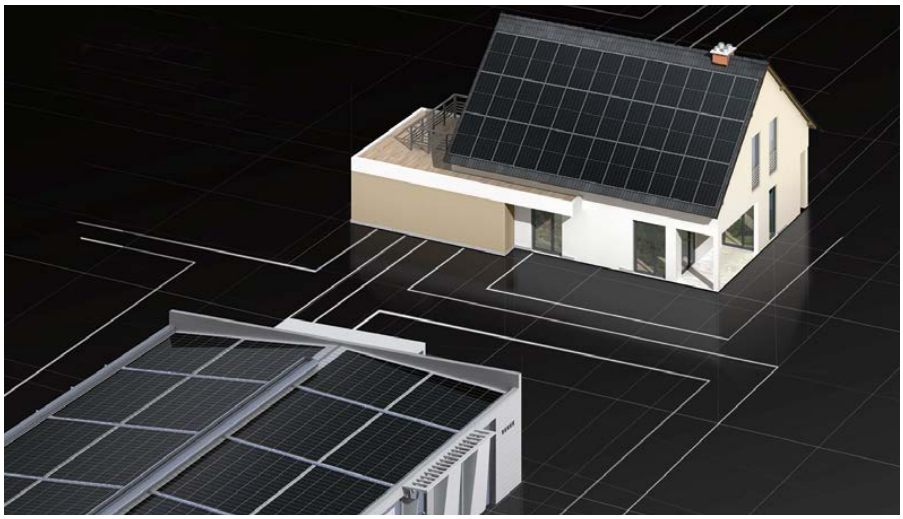
SMASHING RECORDS

LONGi has set a 25.19 per cent record for P-Type TOPCon cell efficiency. The new record, based on monocrystalline cells developed at LONGi's Cell R&D Centre, was recently confirmed in testing carried out at the German Institut für Solarenergieforschung, and raises the conversion efficiency of cells based on CZ wafers to a new level.

LONGi Cell R+D Centre broke the previous record of 25.09 per cent mid this year.

In January 2019, the conversion efficiency of mono-crystalline bifacial PERC cells reached 24.06 per cent, a record still intact today, whereas, for N-type TOPCon cells, the Centre announced in June the world's highest conversion efficiency of 25.21 per cent, certified by globally recognised testing.

www.longi-solar.com.au



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SOLAR ANALYTICS RECENTLY LAUNCHED PLAN OPTIMISER which enables energy users to find the best energy plan with minimal effort by calculating all options and comparing them with the consumer's current offer. Estimated savings are based on previous three months' energy use.

Normally such a process is confusing, frustrating and time-consuming, particularly for solar owners, Head of Business Development at Solar Analytics Nigel Morris said. "Solar owners want a simple way to know what the best energy plan is for them and Plan Optimiser does the hard work for them."

The solution will also support solar businesses in their ability to advise customers about selecting the best plan for their energy needs.

"Solar businesses struggle to keep up with advising their customers about ever-changing energy plans. Plan Optimiser saves solar businesses time by offering the latest information and clearly highlights the savings for their customers," Nigel said.

Plan Optimiser is part of Solar Analytics' suite of powerful solar management tools, and will be included with all residential subscriptions.

sales@solaranalytics.com.au.

SOLARWATT PANEL VISION German-made Solarwatt panels are being supplied with a 30-year product and performance guarantee on the glass-glass modules. Products are developed in Dresden and Hürth and manufactured in Dresden, and extensively tested before shipping.

A company statement advised the power of the solar modules decreases to a maximum of 97 per cent in the first year and in the period from the 2nd to the 29th year, the power of the modules decreases by no more than 0.345 per cent per year. By year 30, the guaranteed power is at least equal to 87 per cent.

SOLARWATT BATTERY: A 10-year product and performance guarantee is provided on its new battery. The guarantee implies a minimum of 80 per cent of the usable capacity for 10 years.

www.solarwatt.com.au

AUSTRALIAN CLEAN TECHNOLOGY BUSINESS 5B, developer of MAVERICK – the prefabricated, rapidly-deployable solar solution – has successful completed its $12 million Pre-Series B funding round launched in late 2020 to accelerate its technology development roadmap and expansion into new global markets, along with bringing new strategic impact investors into the business.

The round was predominantly supported by existing investors, led by The AES Corporation and including Eytan Lenko (Beyond Zero Emissions Chairperson). New investors include Former PM Malcolm Turnbull and Smart Energy Council Director Simon Holmes à Court.

5B co-founder and chief executive Chris McGrath said "We are at the cusp of what will arguably be the next industrial revolution for the world, driven by ultra low-cost, massively abundant clean energy from solar PV. The only remaining question is not if, but how quickly, we will achieve this."

https://5b.co/

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SMART ENERGY COUNCIL

A 100MW AGRICULTURAL PHOTOVOLTAIC SOLAR PROJECT fitted with Trina Solar's 210 Vertex modules, situated in Luotian County, Hubei province, China, has been connected to the grid.

The project, covering 160 hectares, is expected to generate 110 million kWh of electricity a year, offsetting 42,000 tons of emissions.

https://www.trinasolar.com/au

JINKOSOLAR'S DESIGN RESOURCES FOR AUSTRALIAN INSTALLERS Prominent panel maker JinkoSolar has partnered with OpenSolar, a whole-of-business platform for solar installers that offers tools related to design, sales and management. Installers can use OpenSolar to design systems with panels from JinkoSolar, as well as estimate the benefit of using certain energy storage products.

"JinkoSolar is pleased to get suggestions from our installer partners, and we remain open to other suggestions from our local clients, being experts on the ground here," Head of Australia, Bright Wang said.

http://jinkosolar.com.au/

RECORD RETURN Industry superannuation fund Cbus, a Platinum member of Smart Energy Council, has hit a record high with its Cbus MySuper Growth option returning 19.34 per cent for members in 2021.

Chief investment officer Kristian Fok (pictured) said the result was the best yearly return in the 22 years he had been associated with the fund, and was driven by soaring global sharemarkets supported by record-low interest rates. Over 19 years the fund has averaged a 9.55 per cent return.

https://www.cbussuper.com.au/

MEET THE SMART ENERGY TEAM

The heads up on who's who and what they do in the organisation where everyone shares a commitment to sustainability and the growth of smart energy systems for a better future.

SMART ENERGY COUNCIL

JOHN GRIMES Chief Executive

Having been at the helm since 2008, John Grimes has built up the profile and influence of the Smart Energy Council. He is a bold advocate for the smart energy industry and sits on several expert reference committees and boards providing advice to state governments and the energy sector. John is regularly called upon by the media to provide relevant and independent comment on all aspects of smart energy.

After a career as an officer in the Air Force John went on to found and grow a number of companies, including a start-up he took to a successful listing on the ASX with a market capitalisation in excess of $30m. His most recent company was in the environmental sector with operations in Australia, the US and the Middle East.

WAYNE SMITH External Affairs Manager

Wayne is a political strategist who helps develop campaigns for the Smart Energy Council.

A professional lobbyist and policy advisor, Wayne also plays a wider role in guiding the Smart Energy Council policy and presenting industry submissions. As manager of external affairs, Wayne is responsible for policy, advocacy, strategy and campaigning across the organisation. He has held senior roles in the renewables industry for over a decade, working and consulting for some of Australia's leading renewable energy companies and industry bodies. Wayne has been a senior adviser for several Federal Shadow Ministers and has previously worked for the Federal and ACT Governments, as well as several peak non-government organisations.

SHARON OLIVER Financial Controller

Sharon brings a strong background in accounting, extensive budgeting, auditing and financial management knowledge to her role. With a diploma in Accounting, Sharon has managed the finances of various small businesses and has held a series of managerial jobs over many years. In that time she has gained a reputation for her strong organisational skills. Clocking up seven years with the Council, she has multi-tasked, organising several annual Exhibitions and Conferences, and she continues to contribute to numerous areas of Council operations.

ALETHIA BARCEINAS ACT Renewables Hub Project Leader and Business Development

Alethia, who has been deeply involved in business innovation for many years, today supports the events and sales teams and is also focused on strengthening the Renewables network in the ACT. With a Masters in Public Policy and Public Administration, and a second one in Accounting, her experience is predominantly on developing relations between the private and public sectors for the creation of social welfare. For two years she worked on environmental and sustainability issues in the ACT as Policy and Planning Manager of the Renewables Innovation Hub. During 2020, Alethia played a crucial role in the transition to a virtual intensive platform and was events manager staging online events for several months. *alethia@smartenergy.org.au*

AGNES BURRELL Digital Communication and Marketing

Agnes' creative expertise spans more than ten years of experience for companies worldwide. Having lived for almost a decade in the world's front-runner smart city, Copenhagen, she is passionate about how digital innovation and smart technologies can be used to handle challenges of economy, urbanisation and climate change. Agnes holds a diploma in Multimedia Design & Communication and a Bachelor in Digital Concept Development and MSc in Digital Innovation & Management. Thriving on problem-solving, Agnes finds freedom in structure and navigating complexity, which comes in handy when juggling work, family, travel, and slipping in some high altitude climbing whenever she can. *agnes@smartenergy.org.au*

NICOLA CARD Smart Energy magazine editor

Having assembled the Council's magazine over several years, Nicola has witnessed the speed of development in what is an essential transition towards a low carbon economy. After living in many developing nations and gaining an hons degree in the UK, Nicola migrated to Australia and has worked in personnel, lobbying, media and communications for various organisations and publishers. She has contributed to or edited numerous business and industry newsletters and magazines. Nothing more important or fascinating, however, than *Smart Energy* and reporting on the key drivers of the emerging energy landscape.

nicola@smartenergy.org.au

SMART ENERGY COUNCIL

MARIANNE FANG China Sales Manager

Marianne brings several years of marketing experience in the solar and energy storage industry to her role at SEC where she is successfully enabling Chinese companies to enter the Australian smart energy market and grow market share. She is well placed to advise Chinese companies and share key reports and local industry intelligence. Marianne is a dynamic and results-driven professional with a highly successful background in marketing, management and new business development. Her core mission is to exceed customer service expectations by ensuring optimum brand impact.
marianne@smartenergy.org.au

MAX HEWITT Division Manager for Hydrogen Australia

Equipped with an honours degree in History, Max studied in liberal arts with an emphasis in historical inquiry and political science. His well-honed written communication skills and ability to research quickly and critically are a good fit for Max within the rapidly changing hydrogen space. He has organised several online seminars with leading industry representatives, and carried out multiple market studies of renewable hydrogen projects in Australia. Max's earlier experience includes an internship with CWP Renewables as a Business Analyst and a Research Project for the Queensland Museum..
max@smartenergy.org.au

JOE JACOB Project Manager

After gaining a Master of Engineering specialised in Electrical and Renewable Energy Systems, Joe completed two years of engineering and project delivery experience working in the Solar PV industry. He has been involved in commercial and residential solar projects across all states and has in-depth knowledge on renewable energy systems. Joe also holds a Bachelor of Engineering degree specialising in Electronics and Communication.
joe@smartenergy.org.au

MONIQUE MORRIS Events Producer

With over a decade of experience in event management and 15 years in advertising and marketing, Monique has worked for companies like Mojo, Clemenger, George Patterson Bates, HHCL, IPAA Vic, Bigger Than Ten Bears, ARBS Exhibitions and Graffiti.

Her events experience spans everything from a party for 2,000 people to 31 events in one week, and with occasional restrictions on physical gatherings Monique has fast pivoted to staging virtual events and webinars. Monique has lived and worked in Sydney, London and Singapore.

monique@smartenergy.org.au

ALISTAIR McGRATH-KERR Sales Manager

Alistair is a new recruit who brings to the Council extensive experience across a variety of small to medium sized solar companies, energy efficient and passive house building consultants. Early signs of Alistair's passion in renewable energy surfaced over his fascination, at age 7, with a solar powered toy car. The switch was flicked – that excitement has driven him ever since. It led him to a Masters Degree in Engineering Management with a thesis in residential battery storage and a Design and Install Off Grid CEC Accreditation, as well as certificates in Passive House Building design. Alistair is ready to share his excitement for all things smart, efficient and digital with members. *alistair@smartenergy.org.au*

CRISTINA SANCHEZ ROBLES Admin Assistant for SEC and ACT Renewables Hub

Roles in clinical health and education have enabled Cristina to develop strong customer service, communication, organisational, and problem-solving skills. Cristina's interest in creating a more sustainable world led her to a career change and she says the renewable energy industry presents a great opportunity to continue learning and growing. She holds a Master of Human Nutrition and Food Quality, and a Diploma of Leadership and Management.
cristina@smartenergy.org.au

CONNOR WOULFE Research and Project Assistant, Hydrogen Australia Division and Smart Energy Exchange

With a keen interest in environmental sustainability and advancing the energy transition, Connor previously worked at Stride Renewables and also gained research experience in environmental policy and emission reduction strategies for the ACT government, ACF, Farmers for Climate Action and the Antarctic Southern Ocean Coalition. Connor is currently completing a Bachelor of Laws (Hons) and a Bachelor of Development Studies, with a minor in Environmental Studies. Connor aspires to find ways of leveraging emerging smart energy technologies, markets and opportunities.

connor@smartenergy.org.au

ACT RENEWABLES HUB

ACT Renewables HUB

Connecting industry, sharing knowledge, and building business opportunities through collaboration.

ZeroCO$_2$ Renewable Energy and Sustainability Collaboration Lab

The ACT Renewables Hub is supporting the CIT's ZeroCO$_2$ Renewable Energy and Sustainability Collaboration Lab at CIT Bruce on Wednesday 3 November.

The event brings together industry and education and training providers to explore the future skill and training needs for the local and national renewable energy sector.
For more information visit: www.cit.edu.au

The Canberra Institute of Technology (CIT) which supports the renewable energy and sustainability workforce recently took up Gold Membership with the ACT Renewables Hub and the Smart Energy Council.

CIT's membership of the Hub and the Smart Energy Council affirms its depth of investment in the sector, highlighted by its delivery of new training programs through the Renewable Energy Skills Centre of Excellence.

"The major aim of the Centre is to position the ACT and CIT as leaders in building a renewable energy workforce across the ACT Region, Australia and the Asia-Pacific," said Ilsa Stuart, CIT's Senior Manager, Renewables

"We curate and deliver a suite of renewable energy programs and work closely with industry and government to explore future possibilities."

Current courses include Solar Photo Voltaic & Small Battery Storage training for licenced electricians and apprentices; Grid Connect Photo Voltaic Systems for fully qualified electricians; Battery Storage Systems also for fully qualified electricians; and Global Wind Organisation training.

Courses are delivered at CIT's $9.3 million Sustainable Skills Training Hub at the Bruce campus that was opened more than a decade ago and is described as a 'pioneering purpose-built facility for hands-on green skills training' in emerging renewable energy and sustainable technologies for both residential and commercial sectors.

"The CIT has also constructed a multi-purpose sustainable house and training facility as an up-to-date residential home showcasing the latest building technologies including the very best of solar passive design and renewable energy systems," Ilsa explained.

Collaboration is clearly key to success: donations from industry of the latest technology and equipment such as storage batteries allow CIT to optimise training sessions.

Close ties with Vestas, a world leader in the design, manufacture, installation and servicing of wind turbines, and Neoen, a leading independent producer of renewable energy in Australia and abroad, are among the more significant partnerships. A key pillar of the relationship with Vestas has been the development and delivery of one of Australia's first Global Wind Organisation-accredited wind safety and technical training programs.

The broader community also benefits. In late 2018 Evoenergy (formerly ActewAGL) and the CIT joined forces to build a first-of-its-kind hydrogen test facility at CIT's Fyshwick campus. The facility has been trialling the interaction of hydrogen with network materials, work practices and equipment.

The Centre also liaises with ACT Government to ensure the work of the Centre of Excellence is able to rapidly respond to demands as a result of new ACT Government policy and initiatives.

"Collectively the CIT and its partners have a passion for the renewables industry and sustainability. Together we can provide a unique platform to share the exciting opportunities associated with the renewables industry and our local community, schools and colleges," Ilsa said.

"Likewise our involvement with the ACT Renewables Hub allows us to better connect with industry enabling us to be across different perspectives in the renewable energy sector and to foster greater collaboration with businesses."

ACT Renewables Hub

For information about the range of resources available through the ACT Renewables Hub contact Manager Alethia Barceinas on 0452 414 070 or email alethia@smartenergy.org.au www.actrenewableshub.org.au

SMART ENERGY COUNCIL

WELCOME TO THE SMART ENERGY COUNCIL'S NEW WEBSITE!

IN JULY the Smart Energy Council launched its new website with ease of use in mind. The clear layout on the home page allows simpler and faster access to key features, enabling browsers to locate the service or news item required. For those who may still be navigating the changes, following are some guides, based on the most frequently asked questions.

How to log in

You will need to have a current membership with the Smart Energy Council to access member benefits and resources.

STEP 1: Click the 'Members Login' button located on the top right corner of the home page.

STEP 2: Your Username is your email address, make sure your email address matches the one you registered with.

Then enter your password.

If you don't know your password, click on 'Reset Password' and a temporary password will be sent to your email address.

How to reset a password

STEP 1: Click the 'Members Login' button located on the top right corner of the home page.

STEP 2: Click on 'Reset Password'.

STEP 3: Enter your email and click 'Send Reset Email'.

An email will be sent with recovery instructions to reset your password. If you do not see the email, please be sure to check your spam or junk email folder.

Where can I find the Smart Energy Council logo?

A reminder that you must have current membership with the Smart Energy Council to access member benefits and resources.

STEP 1: Login to your Member Account.

STEP 2: Navigate to 'My Account', on the left hand side you will see a link 'Other Downloads'.

STEP 3: Select Smart Energy Council Logo and click Download.

Where can I find my member logo?

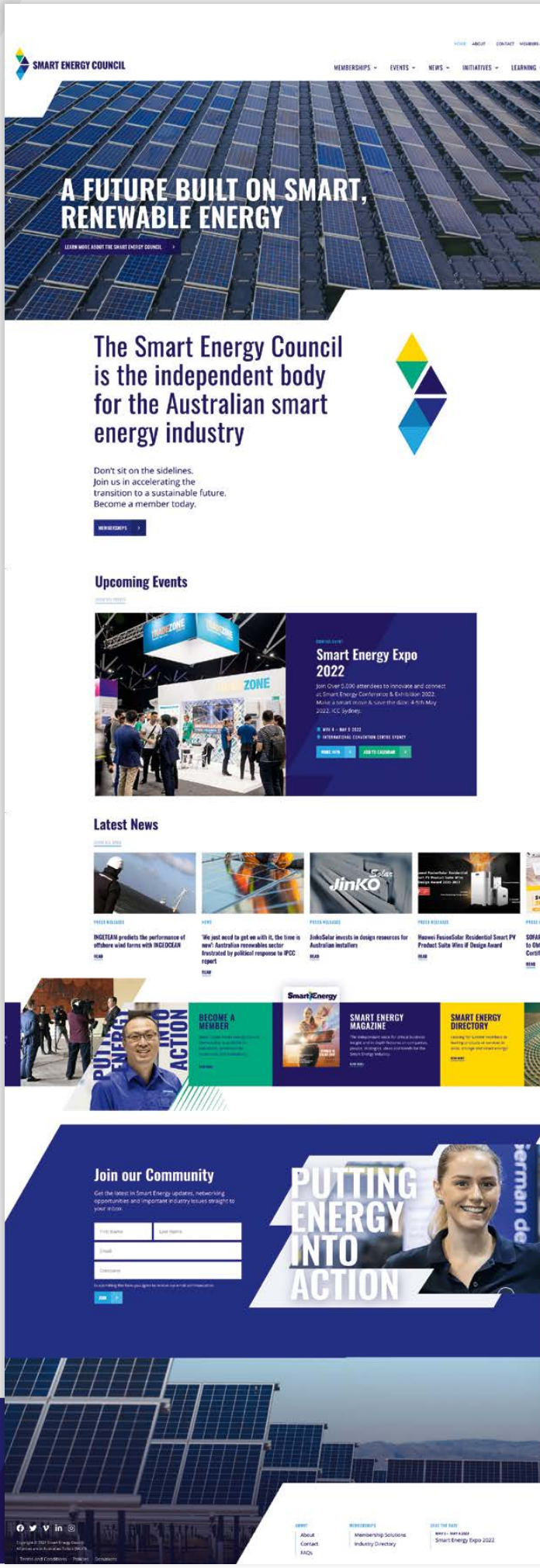
Again, please note you must have current membership with the Smart Energy Council to access member benefits and resources.

STEP 1: Login to your Member Account.

STEP 2: Navigate to 'My Account', on the left hand side you will see a link Download 'Member Badges'.

STEP 3: Select 'Member Logo' and click Download.

HAPPY NAVIGATING! We trust you will find all the resources you need or want on the website. Upcoming events are listed on the site, all important advocacy, green hydrogen, industry training along with member news, directory for smart energy products and services and more. And a tip for those who missed out on the **Queensland and New South Wales Smart Energy Summits** packed with high level political speakers and industry specialists: videos of key presentations can be found on the website, **www.smartenergy.org.au**



EMAIL CHANGES OR PROBLEMS ACCESSING YOUR USER ACCOUNT

Please call us on 1300 768 204 or email info@smartenergy.org.au and one of the team will be happy to assist.

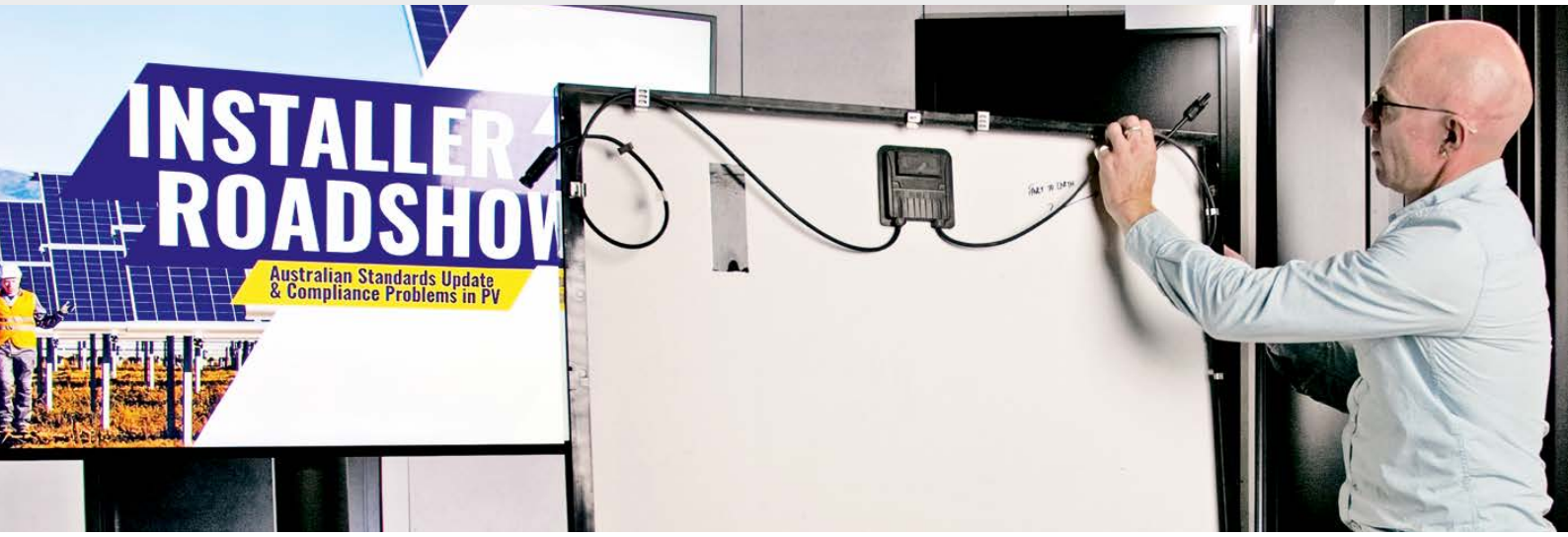
Note: you must have current membership with the Smart Energy Council to access member benefits and resources.

INSTALLER ROADSHOWS AND CPD POINTS

Geoff Bragg of Sunman was the facilitator for the Virtual Installer Roadshow in August which also incorporated the Manufacturer sessions. The program has been split into two virtual, on demand sessions available online at smartenergy.org.au until 3 August 2022, as follows:

- Australian Standards Update & Compliance Problems in PV (30 CPD Points) https://smartenergy.org.au/events/installer-roadshow-2021/
- Manufacturers' Update August 2021 (10 CPD Points) https://smartenergy.org.au/events/ 10-cpd-points-manufacturers-update-august-2021-virtual-on-demand/

Stay tuned for details of the November Roadshow, also facilitated by Geoff Bragg.



PUTTING ENERGY INTO ACTION

SMART ENERGY COUNCIL

The **SMART ENERGY COUNCIL** is the peak body of the smart energy sector in Australia. We are a not-for-profit, membership-based organisation with around 1,000 members nationwide, consisting of companies and individuals operating in this rapidly expanding industry.

We are passionate and independent. Our deep understanding of and connections with our members and industry ensures that we deliver results for the smart energy industry and the community.

"The Smart Energy Council has the key people, experience, demonstrated effectiveness, and industry and government network and relationships, to rate as one of the top industry bodies in Australia and globally."

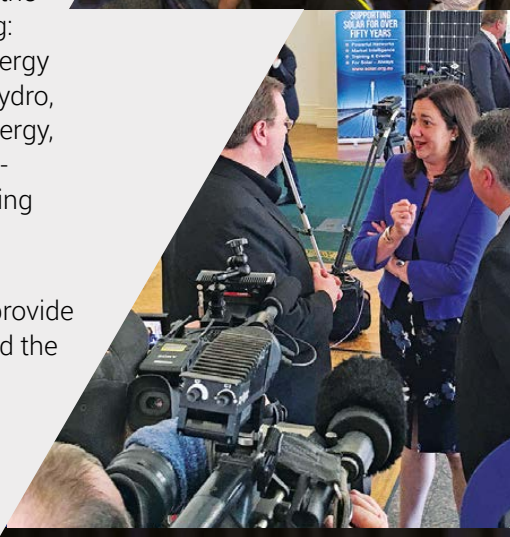
– John Hewson, Former Liberal Party leader, financial and economic expert

SUPPORT THE DRIVING FORCE OF SMART ENERGY

The **SMART ENERGY COUNCIL:**

- Fights hard for smart energy policy
- Provides actionable market intelligence
- Creates valuable networking and introductions
- Delivers high quality training and professional development
- Promotes 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, 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.

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:

ALISTAIR McGRATH-KERR, Sales Manager
Email: alistair@smartenergy.org.au
T: 0499 345 013

SMART ENERGY COUNCIL CORPORATE MEMBERS

FOR FULL LISTING OF SMART ENERGY COUNCIL MEMBERS SEE **WWW.SMARTENERGY.ORG.AU**

PLATINUM MEMBERS

GOLD MEMBERS

SILVER MEMBERS

BRONZE MEMBERS

- Aus Solar Energy Group
- Aztech International
- B&R Enclosures
- Clean Technology Partners
- Crystal Solar Energy
- Emerging Energy Solutions
- Energy Ease
- Freshwater Group
- Future X Group
- Global-Roam
- ICON Water
- IQ Energy Australia
- Master Instruments
- Maxstar Holdings/ SuperGreen Solutions
- Mondiaux
- Off-Grid Energy Australia
- RETA (WA)
- Royal Automobile Association of SA
- Solar Wholesalers
- Solargain PV
- SolarHub /Smart Renewables
- Solastor
- STI Norland
- WINAICO Australia
- X-Elio Australia
- Zeromow
- ZNSHINE Solar Australia

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Email

support@solaxpower.com.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.

JinkoSolar was recently awarded the 'Top Brand PV Australia 2021' by specialised European research firm EuPD Research.*

POSITIVE QUALITY™
Continuous Quality Assurance

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

Solar JinKO
Building Your Trust in Solar

Contact Positive Quality™ Manager Alistair McGrath-Kerr on 0499 345 013, email alistair@smartenergy.org.au or visit www.smartenergy.org.au

SPRING ADVERTISING CONTENT

ADVERTISER	PAGE	WEB ADDRESS
Acciona Energy	25	www.acciona.com.au
AlphaESS	49	www.alpha-ess.com
Canadian Solar	47	www.csisolar.com/au
CATL	41	www.catl.com
CBus	33	www.cbussuper.com.au
Cobalt Solar	50	www.cobaltsolar.com.au
FIMER	53	www.fimer.com/flex
FoxESS	5	www.fox-ess.com
Goodwe	37	www.goodwe.com.au
Huawei	32	https://solar.huawei.com/au
Jinko	29	http://jinkosolar.com.au
Kuga Electrical	40	www.13kuga.com.au
LONGi	55	www.longi-solar.com.au
Master Instruments	Inside back cover	www.master-instruments.com.au
Metropolis Metering Services/South Street Energy	27	www.southstreetenergy.com
One Stop Warehouse/Discover Energy	31	www.discoverenergy.com.au/vpp
Powerledger	15	www.powerledger.io
Pylon	7	https://pylon.solar/smartenergy
Pylontech	23	http://en.pylontech.com.cn
Q Cells	64	https://q-cells-australia.com/total-package/
R&J Batteries	11	www.rjbatt.com.au/store-locator
Risen	45	https://risenenergy.com
SolaX Power	Inside front cover	www.solaxpower.com.au
SolaX Power	67	www.solaxpower.com.au
Solis	3	https://solisinverters.com.au
Solplanet	21	www.solplanet.net
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Sunman	56	www.sunman-energy.com
Weatherzone	54	https://business.weatherzone.com.au

SMART ENERGY COUNCIL

WESCOR

Innovative Solar Battery & Equipment Cabinets

Save time on-site with a dedicated, safe enclosure for solar system installations with these rugged aluminium solar battery & equipment cabinets. The cabinets are adaptable and sized to enable housing of all the battery and power conversion equipment required. A secure design that provides protection from the weather and pests, ultimately extending the system's service life.

Features

1. Double front doors, 3-point locking system and segregation between battery section and equipment section.
2. House up to 8 or 12 19" rack mount battery modules on slide-in shelves in an aluminium cabinet with IP protection rating.
3. Stainless steel lifting eyelets on each top corner to help lift and guide the cabinet into place. Rain and insect protected vents on either side and on top to facilitate passive ventilation.
4. Internal circuit breaker section for individual battery module isolation, with circuit breaker cut-outs in the escutcheon.
5. Optional 600mm tinned copper busbars with pre-drilled holes for battery cable connections.

Model	Battery Modules	External Dimensions (mm)			Weight (kg)
		H	W	D	
ALS8	8	1427	1500	550	67
ALM12	12	2027	1500	550	89
ALL12+	12	2027	1900	550	106

We can help!

Master Instruments is proud to be a master distributor of the Wescor Solar Battery & Equipment Cabinet range. Talk to our battery engineering team about how the Wescor range can support your system installation.

Our brands: *Through years of experience and research, we only stock and supply the brands we support and trust.*

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BATTERY ENGINEERING

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