Smart Energy

AN OFFICIAL **SMART ENERGY COUNCIL** PUBLICATION

WOMEN IN SOLAR AND SMART ENERGY

Intergenerational responsibility and Duty of Care
COP26: rising to the challenge
Smart energy on Show
Energy efficiency and PV popularity
Hydrogen Australia's first Zero Carbon Certificate
Smart Energy Council's new look and website

VOLUME 41. ISSUE 162. WINTER 2021

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Smart Energy is published quarterly.

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WINTER 2021 Volume 41 Issue 162

Front cover:
Opportunities abound for women in solar and smart energy

Welcome

John Grimes, Chief Executive Smart Energy Council

SINCE 2013 the federal government has told us Australia can either have a strong economy **OR** a safe climate. They say meaningful action on climate will destroy our economy.

This false choice has always been wrong, but now more than ever it is wilful and economically destructive.

Solar PV costs have dropped 21 per cent every year for the past 10 years. Today solar PV is the cheapest form of electricity in the history of the world. And the price declines are not stopping.

A solar panel in Australia will produce up to 2.6 times more energy every year than the same solar panel in Germany. This is Australia's national competitive advantage now, and in the decades ahead.

Zero carbon fuels and gases, zero carbon ammonia, zero carbon steel and other metals will be produced in the lowest cost jurisdictions.

With national leadership, this shift could deliver the reindustrialisation of the Australian economy, attract energy intensive industries, and underpin the export of zero carbon energy to power the world.

By creating a false choice, the federal government is squandering our economic potential and our economic future, right at a time when the world undergoes a massive energy disruption driven by environmental imperatives, economics and global policy.

By failing to shift, Australia is in danger of becoming the Kodak of the future. A company that went from peak profitability in 2000 to bankruptcy in 2012. Australia clings to fossil fuels, denies and retards the development of renewables, and is blind to the massive economic potential that is ours to claim.

The only possible solution for Australia is to have a strong economy **AND** a safe climate. All else is folly.

In my view

AUSTRALIA INSTALLED more renewable generation in the last three years than in the thirty years prior.

From Australia's first grid-connected solar PV installation in 1994 on a suburban home at Mt Coolum in Queensland, it took 24 years to install 10GW of solar. It took just 27 months to install the next 10GW.

Over the past 12 months renewables have provided 28 per cent of energy in the National Electricity Market and 30 per cent in WA's electricity grid the SWIS.

However you look at it, Australia's renewables sector has been nailing it.

The Australian Energy Market Operator's 2020 Integrated System Plan plots several possible futures. Under the "Step Change" scenario we'll build two and a half times as much renewables again over the next 15 years, transitioning from one of the world's dirtiest grids to one of the cleanest.

In the year since the ISP was published, wind, solar and battery installations have outpaced Step Change, putting us well ahead of the AEMO's most ambitious scenario.

It's no secret that our federal government treats our sector with utter disdain. Its 2015 tweak of the Renewable Energy Target cut back annual demand by 8,000GWh.

Simon Holmes á Court is senior advisor at the Energy Transition Hub, Melbourne University

There was a time when the sector hung off the energy minister's every word. With apologies to Prussian diplomat Metternich, when the minister sneezed, the renewables sector caught a cold.

Recently I've heard reports of business leaders turning down invitations to meet with the minister – why bother? The federal government has, for now, become largely irrelevant.

Against that backdrop, how has industry exceeded all expectations? The dramatic price reductions of smart energy technologies have been instrumental.

The RET, popular with the public and well designed, helped establish an efficient, skilled and resilient sector. Households love their solar panels and demand continues to grow.

States have massively stepped into the leadership void with reverse auctions and ambitious plans for building out renewable energy zones. Businesses have supported the sector with mutually beneficial corporate PPAs.

Many challenges lie ahead, the greatest of which is arguably grid connection. Without strong cooperation between industry and governments at all levels, progress will inevitably slow.

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INDUSTRY DEVELOPMENTS

HUGE POTENTIAL At the ALP's Clean Technology Jobs Summit Labor leader Anthony Albanese declared Australia must avoid "further drifting and time-wasting and embrace a revolution in jobs growth right across the Australian economy based on one inescapable fact – renewable energy is not only clean, but cheap, and getting cheaper."

If elected the Labor government would create a $15 billion *National Reconstruction Fund* and *Rewiring the Nation* for expansion in the sector, unlocking hundreds of thousands of secure, well-paid jobs.

John Grimes of the Smart Energy Council which facilitated the summit later commented: "We managed to outline the compelling story that action on climate equals job creation and economic opportunity and that Australia is at a sliding doors moment in history… we can either stay wedded to the past and end up as a great big stranded asset globally or we can embrace low cost solar and wind and transform our energy sector. That would set us up at a comparative advantage in producing and exporting zero carbon and low carbon products and fuels to the world."

NEW ENERGY APPRENTICES If elected, Labor will establish 10,000 New Energy Apprenticeships with apprentices receiving $10,000 to work in rooftop solar, battery storage, large-scale renewables, energy efficiency, renewables manufacturing and renewable hydrogen.

Labor will also invest $10 million in a New Energy Skills Program to tailor skills training to the specific needs of new energy industries. John Grimes said "This is exactly what is needed to help create the skills that will make Australia a renewable energy superpower. We can, and must, have a strong economy and a safe climate."

The Smart Energy Council joined ALP's Anthony Albanese and Chris Bowen at AC Solar Warehouse to promote the New Energy Apprenticeships Program

MEANTIME action by Federal Minister Keith Pitt has effectively blocked NAIF funding for a wind farm in north Queensland that would have generated 250 regional jobs and savings in the region of $461 million in power costs.

WORSE The federal minister for energy and emissions reductions has signed off on $600 million of taxpayer funds on a new 660MW gas-fired generator in the Hunter Valley. More fossil fuel generation = more greenhouse gas emissions; **even the International Energy Agency states investment in new fossil fuel projects must cease now to meet climate targets**.

WESTERN AUSTRALIA GETS IT with an ambition to scale up big time: up to 100GW of new wind and solar capacity by 2030 to facilitate generation of green hydrogen. No, GW is not a misprint, neither is the fact WA aspires to twice the quantity – 200GW – by 2040. Contrast this with WA's current solar and wind capacity sitting at sub 1GW and Australia not quite pipping 10GW large scale renewables in the energy market of 70GW.

THE RATE OF WIND AND SOLAR ADDITIONS on the NEM's eastern seaboard is powering along, with AEMO noting renewables supersede the most optimistic forecasts of 90 per cent by 2040. Currently up to 5.5GW is in the pipeline across 300 generation and storage projects, more than twice the existing capacity.

ENERGY SECURITY BOARD Chair Dr Kerry Schott says it is impossible to overstate the scale and pace of change in Australia's electricity sector and "the rapid spread of large-scale wind and solar, along with rooftop PV means our energy system is experiencing the fastest and most substantial change in the world. We are preparing the advice Ministers need to enable the critical decisions needed for an affordable, reliable and secure electricity system that can ultimately operate at net zero emissions."

COLLABORATIVE LOBBYING Australia's renewables potential surpasses every other nation in the world. Recognising this, more than 100 businesses and organisations joined forces with WWF in early May to call for Australia to become a Renewable Energy Superpower as part of the Renewables Nation campaign to shine a light on Australia's renewable superpower opportunity.

SMART ENERGY COUNCIL

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No. of Modules*	2	3	4	5	6	7
System Capacity	7.1kWh	10.65kWh	14.21kWh	17.76kWh	21.31kWh	24.86kWh
Voltage Range	44.5-54VDC					
Dimensions (W*D*H mm)	600*380*530	600*380*700	600*380*870	600*380*1040	600*380*1210	600*380*1380
Weight	86.5kg	123kg	159.5kg	196kg	232.5kg	269kg
Charge/Discharge (Recommended)	30A	45A	60A	75A	90A	100A
Charge/Discharge (Max)	75A	100A				
Charge/Discharge (Peak @ 15S)	110A					
Communications	RS485 / CAN					
Protection Class	IP55					
Temperature	Operating: 0°C to +50°C; Storage: -20°C to +60°C					
Altitude	<2000 metres					
Design Life	15+ Years (25°C)					
Authentication Level	VDE2510-50 / IEC62619 / IEC62477 / IEC62040 / CE / UN38.3					

*minimum 2 modules required. Force L1 = 7 modules max., dimensions are wider & lower. Force L2 = 4 modules max., dimensions are narrower & higher.

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INDUSTRY DEVELOPMENTS

VALE GOVIND KANT

The Smart Energy Council mourns the passing of popular industry identity Govind Kant who tragically succumbed to COVID while visiting India for his mother's funeral. An outpouring of grief followed his untimely death in mid-May, just three months after his promotion to Assistant Director for Trina Australia following six years as country manager. Govind was well liked and respected for his generosity in sharing his extensive knowledge and positive views on the direction of Australia's solar energy industry. He will be remembered for his technical expertise and wisdom.

Tributes laying testimony to Govind's achievements exemplified his qualities: humble, jovial, warm, professional, industry leader, legendary.

Hearts go out to Govind's wife and daughters in Sydney and his extended family, colleagues and community.

Proceeds of a Go Fund Me page established by Andrew Burgess of Solar Juice will help provide for Govind's young family.

SUNLIGHT TO SOLVE THE WORLD'S CLEAN WATER CRISIS

Researchers at UniSA have developed a cost-effective technique using sustainable materials and sunlight that could deliver safe drinking water to millions of vulnerable people. The heatsink technique derives freshwater from seawater, brackish water, or contaminated water through highly efficient solar evaporation system that focuses energy precisely on the surface to rapidly evaporate the uppermost portion of the liquid. In future the technology could include treatment of wastewater in industrial operations.

Smart Energy is printed by Camten on 100 per cent recycled paper which is certified Carbon Neutral by the Department of Environment under the National Carbon Offset Standard (NCOS). Made in Australia by an ISO 14001 certified mill. No chlorine bleaching occurs in the recycling process. Camten uses sustainable printing practices – Sustainable Green Print – Lean and Green, and is fully FSC certified SGS COC 004746.

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

AIRPORTS' SOLAR POTENTIAL

An RMIT study finds Australia's government-owned airports could produce enough electricity to power hundreds of thousands of homes via large-scale rooftop solar systems.

Researcher Dr Chayn Sun said "Airports get good sun exposure because they're not shaded by tall buildings or trees, making them a perfect spot to harness the sun's energy and could [collectively] avoid 63 kilotons of coal being burned in Australia each year."

ARENA HAS PLEDGED $11.3 MILLION

to energy-intensive Alcoa in the bid to demonstrate technology that can electrify the production of steam in its alumina refining process using renewable energy. In 2019, alumina refining accounted for more than 14 million tonnes of carbon dioxide in Australia, almost a quarter of Australia's Scope 1 manufacturing emissions. Alcoa's main objective for the project, costing all up $28.2 million, is to demonstrate feasibility of Mechanical Vapour Recompression powered by renewable energy to produce process heat.

THE 2021 LOWY CLIMATE POLL

revealed greater overall concern about climate change, with 60 per cent of respondents saying 'global warming is a serious and pressing problem and Australia should begin taking steps now, even if this involves significant costs'. A majority (55 per cent) say the government's main priority for energy policy should be 'reducing carbon emissions' and 74 per cent say 'the benefits of taking further action on climate change will outweigh the costs'. Almost all Australians (91 per cent) say they would support the federal government 'providing subsidies for the development of renewable energy technology'. The big unknown is when or if such sentiments will be reflected in votes at forthcoming federal elections.

SHELL-VING EMISSIONS

In mid-May a Dutch court ordered Shell to reduce its planet warming carbon emissions by 45 per cent by 2030 from 2019 levels – a drastic cut on the existing. Shell was told a failure to do so would effectively breach the human rights of Netherlands citizens. Friends of the Earth justifiably declared the case "a huge win for us and for anyone affected by climate change." Shell is, however, prepared to put up a multi-million dollar fight to appeal the verdict.

In late April the **GLASGOW FINANCIAL ALLIANCE** for net zero emissions was formed that will see 160 firms which preside over assets north of $70 trillion accelerate the transition under the Net Zero Finance Alliance 1.5°C.

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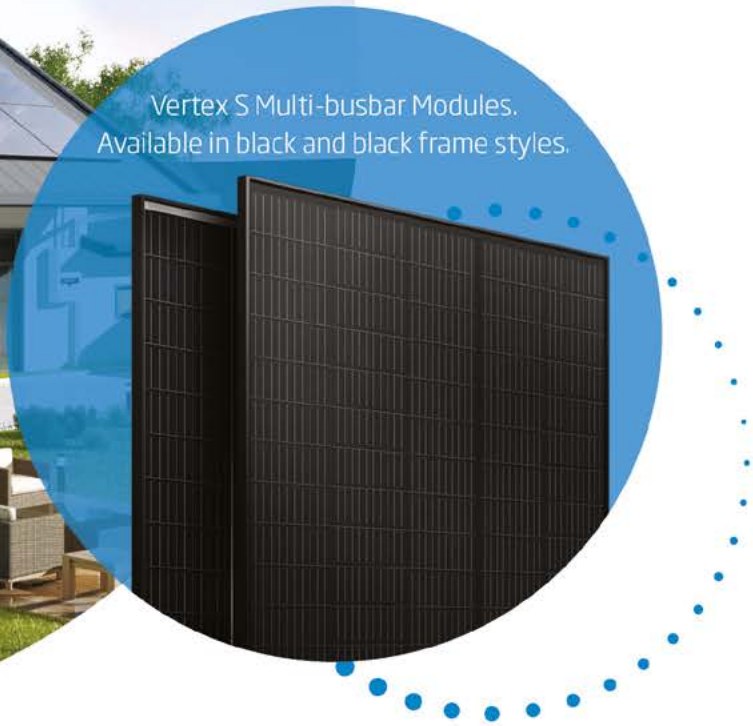

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Vertex S is available in black frame and full black, is easily deployed and compatible with a variety of mounting solutions and mainstream inverters. There is a standard 15 year product warranty (extendable to 20 or 25 years), and a reduction in overall BOS costs for residential and commercial customers. If you're looking for small size and big power, get in touch with the team at Trina Solar today.

www.trinasolar.com

DUTY OF CARE FOR PRESENT AND FUTURE GENERATIONS

Do we have a right to dismiss our moral obligation toward future generations and to squander their future? What will it take for us to accept reality, take responsibility and minimise climate risk? Pressure is building from industry, business and civil society for a smarter way forward.

HOLDING BACK POTENTIAL has never been trendy or popular and is rarely a smart move especially when actions that preserve the status quo are harmful.

As we write this, just weeks following the US Leaders' Summit on Climate, the federal government is inking plans for a new 660 megawatt taxpayer-funded $600m, fossil gas-fired power plant in the Hunter Valley in New South Wales, a development that has been slammed as out of touch and reckless by climate action groups and the Smart Energy Council.

"Astounding. In this day and age and hot on the heels of the Biden Climate Summit the federal government has the tenacity to announce a new fossil fuel plant that not only locks in harmful emissions that impact health and environment but also in a few short years becomes a stranded asset," John Grimes said.

Australia's emissions are already the highest globally on a per capita basis. John Grimes said, the government needs to be held accountable for this preposterous decision. Every move, every power plant and all emissions count.

Energy Security Board chair Kerry Schott stated "A taxpayer-funded gas-fired power station in the Hunter Valley makes little commercial sense, given there are cheaper alternatives like wind, solar, big batteries and pumped hydro already available."

NSW Minister for Energy and Environment Matt Kean sent a powerful message about intergenerational justice when addressing the Smart Energy Conference

And speaking at the 2021 Smart Energy Conference Malcolm Turnbull told delegates "People who want to hang on to oil and gas are basically arguing for higher prices and emissions."

Why then? Perhaps an answer lies in the fact that Australia's prominent gas players have allegedly donated in excess of $6 million to the two major political parties over the past decade; in the last two years alone peak gas lobby group APPEA bestowed almost $250,000.

Reality check

In mid-2020, 25 scientists penned an open letter to then Chief Scientist, Alan Finkel expressing concern over his support for the use of gas as a transition fuel over "many decades" which is inconsistent with a safe climate and the Paris Agreement. The scientists noted too that the combustion of natural gas is now the fastest growing source of carbon dioxide to the atmosphere, the most important greenhouse gas driving climate change.

Evidently the warning fell on deaf ears. And if we don't listen to scientists what hope do we have of containing global warming to 1.5 degrees?

To avoid the worst outcomes, we need to achieve net-zero emissions of greenhouse gases by 2050.

The single most important step to tackle the climate crisis is phasing out coal from the electricity sector. Coal used in electricity generation needs to decrease by 80 per cent on 2010 levels by 2030.

To maintain pace Australia needs to hasten the retirement of its coal plants. But according to Global Energy Monitor's report, Australia is the worst offender after China in building new coal projects, with the equivalent of 31 million tonnes per annum under construction and 435 million mtpa in the pipeline – enough to double existing emissions.

NSW Energy Minister Matt Kean says "People defending old technologies are the equivalent of defending Blockbuster in a Netflix world". Others compare it to Kodak's myopic and catastrophic failure to transition to the digital world.

Even the conservative International Energy Agency is now calling for a total cessation of exploration for new fossil fuels and no new fossil fuel infrastructure, along with the retirement of all coal-fired power stations in advanced economies by 2030, and across the world by 2040.

Australia remains stuck in a time warp through the failure of its elected officials to facilitate the transition to a low-cost clean alternative. No renewables targets, no firm date for net zero emissions. The absence of climate action

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SEC thanks Cathy Wilcox for allowing reproduction of this smart satirical political message

responsibility, acumen, wisdom, call it what you will – threatens our ecosystems and our future.

Appeal for rational action

Matt Kean's appeal for intergenerational responsibility met with murmurs of approval at the Smart Energy conference.

"Intergenerational justice demands responsible economic and environmental actions, and include but are not limited to decarbonising the energy system and investing in renewable energy and slashing carbon emissions," he said to a round of applause.

"We need to plan cleaner and measurable roadmaps to get there."

The world is closing in on the energy sector.

The Australian Federal Court recently decreed the federal Environment Minister had a legal duty to prevent "catastrophic" and startling harm to young people caused by intensifying climate change when approving coal mining projects such as Whitehaven's extension to its Vickery coal mine in NSW.

The Justice stated climate change would result in more than one million children requiring acute care from heat stress caused by global warming at some point in their lives and that inaction will cost young people up to $245,000 each over their lifetimes. At stake are house values, wages growth and business continuity affected by extreme weather events including hotter and more regular heatwaves and more frequent and intense bushfires.

Richie Merzian of The Australia Institute commented: "The world we take for granted right now won't be here for the next generation and it's the fault of the current generation."

The Federal Court ruling filed in late 2020 by a group of eight young people representing their generation is believed to be a world first and could create a domino effect by setting a fundamental legal precedent for principles of Duty of Care.

This sage remark from President of the Australian Lawyers Alliance Greg Barns SC: **"The judgment is not radical, it's an extension of fundamental principles of negligence. When there is foreseeability of harm, you have a duty as a person in a position to prevent it, to do just that."**

Younger generations are becoming ever more vocal, adding pressure on regulators to step up to be accountable and prevent practices that threaten future generations. They are calling on Australia to move away from fossil fuel projects and join the world in taking decisive climate action.

Rolling Extinction Rebellion protests are sending the same messages.

School Strike 4 Climate on May 21 saw thousands of students from cities and towns across Australia take their concerns to the streets, in Perth hundreds landed at the Supreme Court Gardens with a clear message to the federal government to alter its course from a gas-fired COVID-19 economic recovery to renewable energy.

More cases in point

Returning briefly to significant developments on the world stage, among them a Dutch court order to Shell to slash its greenhouse gas emissions by 45 per cent by 2030 from 2019 levels.

The lawsuit filed by groups including Greenpeace and Friends of the Earth accused the oil and gas giant of threatening human rights.

The case follows that of Germany's highest court which declared the country's climate targets grossly insufficient and in "responding to a legal rebuke that its current goals violate the rights of young people and children" the government subsequently announced a new goal of 65 per cent emissions cut by 2030, 85-90 per cent by 2040 and new net zero by 2045 rather than 2050.

(A thought: Would Australia follow suit if the courts ordered such?)

Chevron is likewise under fire with 61 per cent of investors calling on the oil giant to substantially reduce its scope 3 emissions by selling a lower quantity of fossil fuels; similar pressure is being felt in the wider business sector.

Terra Carta

Prince Charles has weighed into the debate, urging more targeted investment to drive down carbon emissions and stating "My great and abiding hope is that by COP26 in November, we will see global financial institutions, such as superannuation funds, announce to their members and shareholders their own roadmaps that define the steps they will take to bring their portfolios more rapidly to net zero."

He has established the Terra Carta charter to accelerate sustainable investments in the private sector over the course of the decade.

"It is time to extend universal rights not just to humanity but also to nature… an opportunity to advance leadership to improve the health of our planet for the benefit of future generations, after all, human health, economic health and planetary health are fundamentally interconnected [and] now is the time for meaningful and urgent global action."

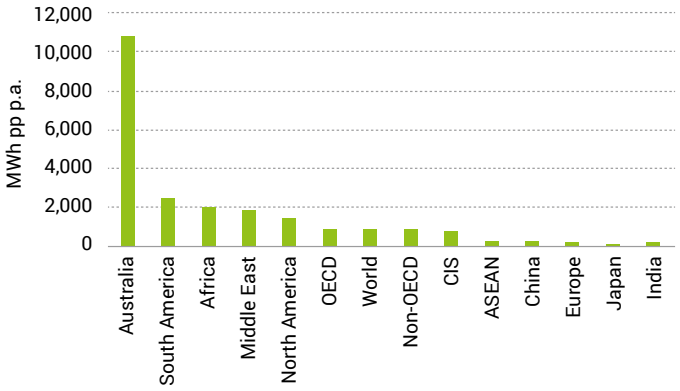
Similarly at the US Climate Summit Biden declared "This is a moral imperative, an economic imperative, a moment of peril, but also a moment of extraordinary possibilities. Time is short but I believe we can do this and I believe we will do this."

Malcolm Turnbull highlighted the contrast between the US and Australia telling *Smart Energy* "Biden's ambition for America is 100 times per capita greater than that of Australia.

The Julia Creek Dunnart faces existential threat from mining in their habitat which some say could mirror the fate of humans

Solar and wind technical potential per capita MWh pp p.a.

Source: Solargis, NREL, Jacobson, BP, Carbon Tracker assumptions



Great potential, let's not squander it

"The Americans and British are very disappointed in Australia, particularly given we have so much potential," Turnbull said. He notes too that 70 per cent of Australia's trade is with international partners who have greater emissions ambitions.

John Grimes calls it "An international embarrassment that Australia is not reading the room… a global economic race is underway and if Australia doesn't respond and secure its piece of the potentially highly lucrative renewables market then others will steal that from us.

"The whole world sees Australia as an outlier… the US has gone from laggard to leader.

"It's no longer funny that vested interests just want to hang on to fossil fuels. The cost of pursuing that agenda is not just that we are dirty but that we are uncompetitive and it actually condemns our future, so the cost is mounting because a key thing we know is that solar is the cheapest way to generate electricity.

"We are completely exposed by protecting the interests of the very few, the big fossil fuel companies that currently operate in Australia. We will actually condemn ourselves to a poorer standard of living and more difficult economic circumstances.

"We have a moral duty to provide a safe climate, economic stability, jobs and environmentally sustainable practices."

The solutions are simple and necessary, he said: Prevent all new fossil fuel developments including gas and speed up the phase-out of existing fossil fuels, and focus more on renewable energy. Electrify transport and industry.

"We owe it to ourselves to take advantage of our extensive resources and leave this world a better place for generations to come. Not a hot-house earth that is increasingly uninhabitable.

"Climate champion Nigel Topping has implored Australia to 'join us in the race to a better world – a race to zero' and we want to do just that."

*In the lead up to COP 26 SEC will bring new voices to an Australian audience through its **Global Race to Zero** online summit on 1 September. Keep an eye out for it.*

01-12 NOV 2021
GLASGOW

COP26

IN PARTNERSHIP WITH ITALY

THE COUNTDOWN TO COP26: FORECASTING THE CRITICAL ISSUES AND AUSTRALIA'S ROLE IN NEGOTIATIONS

The effects of climate change are being felt unequivocally across the globe. Without dramatic societal reform, scientists agree that these effects will continue to intensify as people endure 'untold suffering'. International cooperation is essential in overcoming the challenges that we face. Here, Peta Bulling highlights the five most critical issues of COP26.

Responsibility

Different nations have varying responsibilities for climate action depending upon current and historic emissions, ability to implement change, and developmental rights. Responsibility will be critical at COP26 due to the 2020-21 Nationally Determined Contribution (NDC) updates. NDCs embody efforts by each country to reduce national emissions and adapt to the impacts of climate change. Australia will no doubt come under fire due to its ongoing and inequitable status as a wealthy country and major polluter and for its failure to update its NDC in 2020.

Ambition

In the lead up to COP26 there have been many opportunities for countries to promote their climate ambition. First, through the submission of updated NDCs during 2020. Second, at the Climate Ambition Summit in December 2020. Third, at the 2021 Climate Leaders' Summit. Ambition will certainly take centre stage at COP26 as experts claim that current NDCs are woefully unambitious, such that, "Nations must redouble efforts … if they're to achieve the Paris Agreement goal". Australia is likely to come under increasing pressure from the UK, EU, US, and its Pacific Island neighbours to strengthen its carbon reduction measures.

Finance

The payment of funds from developed to developing countries in recognition of the imbalanced effects of climate change is facilitated under the Green Climate Fund. Climate finance is anticipated to be a critical issue at COP26 as the US seriously reinvested in the fund, in early 2021. Furthermore, the economic impacts of COVID-19 render the objective of the fund increasingly pertinent. Australia pulled out of the fund in 2019; as such, it is forecast that all eyes will be on us: The nation with the most but that does the very least.

Loss and damage

Loss and damage payments are made from developed to developing countries in situations where adaptation to climate change is no longer a possibility. The issue will be critical at COP26 as developing communities, particularly those in the southern hemisphere, are already facing the effects of climate change. Furthermore, developing nations are disproportionately vulnerable and do not have the economic capacity to rebuild from climate change related events. This has grown in significance with the emergence of COVID-19.

Carbon markets

Carbon market regulations were a hot topic at COP24 and COP25. Negotiations have customarily broken down, and as such, COP26 is set to be the backdrop of attempts to finally resolve this issue. The scheme supports emitters to 'offset' their emissions through buying other countries unused carbon budget or by investing in emissions reduction and/or renewable energy development. Carbon markets have been recognised in Australia under the Emissions Reduction Fund and Renewable Energy Target. It is essential that regulations are agreed upon at COP26 to ensure accurate tracking of carbon emissions and trade.

The principal theme that has emerged from Australia's anticipated negotiations at COP26 is this: Australia is not doing enough to tackle climate change on equitable or practical grounds and as such its international relations are worsening.

Of particular significance should be Australia's deteriorating relationship with its Pacific Island neighbours. Intensified climate action would not only have positive benefits for the planet, but also for international relations and the economy.

Renewable energy is the key to a 100 per cent sustainable future; not only protecting our planet but also our family, friends, animal life and future generations.

Peta Bulling is an environmental scientist and law student.

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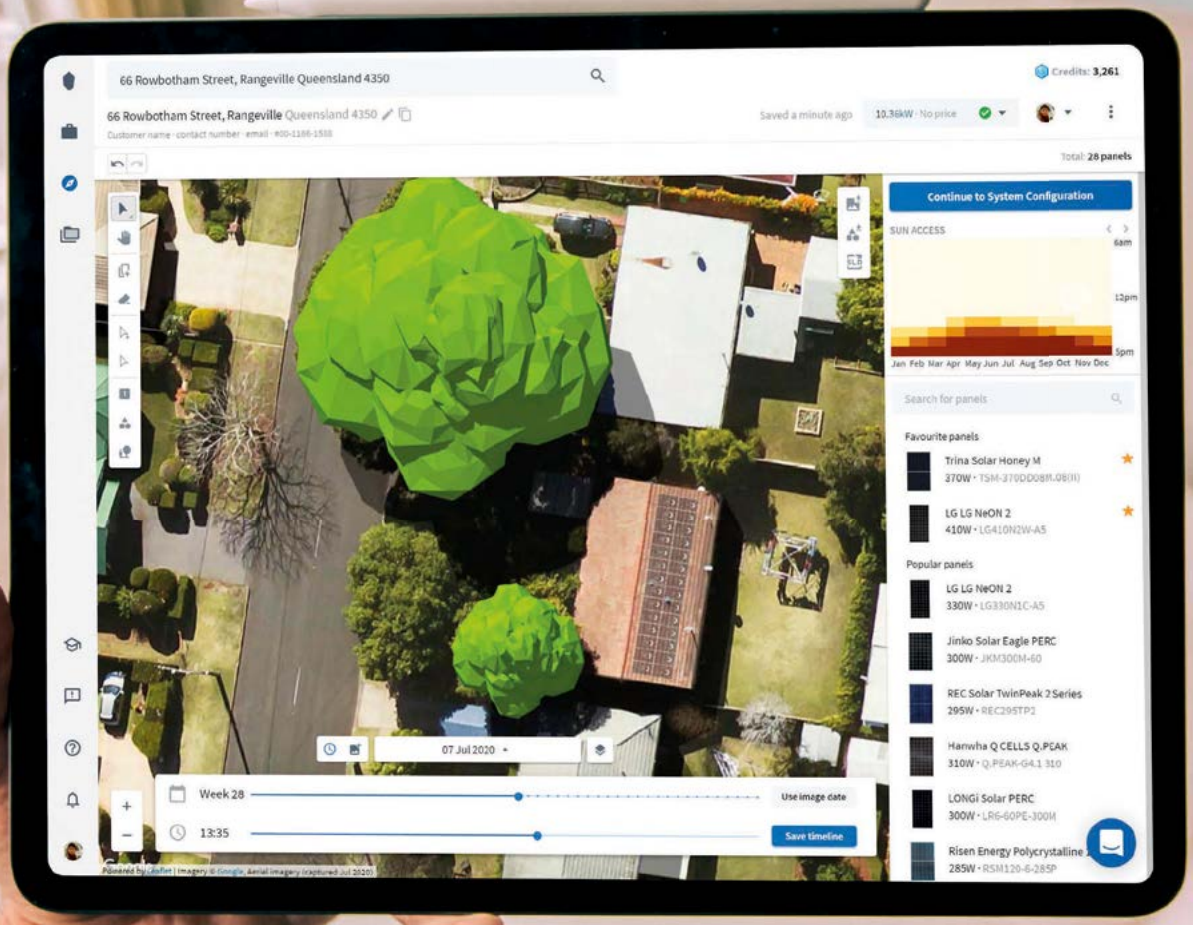

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PLOTTING THE PATH TO A JUST TRANSITION

This year's Smart Energy Conference and Exhibition highlighted the rapid rate of renewables entering the energy mix – a pace few could have predicted. But Australia is yet to realise its potential and must respond to the shifting goalposts to avoid missing its greatest ever opportunity. A robust roadmap, tangible targets and portfolio of plans must be developed.

THERE'S NOTHING LIKE an upbeat assessment of the renewables industry to buoy the spirits and during the Smart Energy Conference & Exhibition a bright and positive scenario – albeit with some qualifiers – was presented by **Kobad Bhavnagri**.

The highly respected BloombergNEF analyst shared what he described as a good news story that highlighted swathes of progress and forward momentum despite the ravages of the COVID pandemic which presented the most difficult of economic circumstances during 2020.

This year actually marked a point where the energy transition really gathered pace, he said, spurred along by more than half of global greenhouse gas emitters declaring some form of net zero target, well up on the 34 per cent at the beginning of 2020. The list includes Australia's major buyers of coal and gas exports: Japan, South Korea and China.

Kobad reeled off a series of encouraging numbers. "During 2020, investment in the energy transition passed half a trillion dollars per annum which was quite a milestone… investment in renewable energy had flatlined since 2015 but because of the continual decline in the cost of wind and solar, although investment has stayed flat, the amount of capacity that gets installed for each dollar has continued to grow," he explained.

Investment in electric vehicles and also in heat electrification, a pathway to decarbonisation, have continued to expand the market passing the $500 billion mark for the first time.

"It's very much a good news story and companies and corporations around the world are also making very credible and science-based commitments to limiting emissions," he said.

"The economics of renewables are now such that two-thirds of the global population lives in a country where wind or solar is the cheapest form of new electricity supply, and that covers about 70 per cent of global GDP."

From hereon new wind and solar will also become even cheaper than operating an existing fully depreciated coal or gas plant, with a tipping point just three or four short years away in many major markets like China, like the United States.

The economics of renewables

"Australia's probably already across that point so the economics of renewables of course continued to get better and better, more and more compelling and really irrefutable."

"Battery storage economics too of course continue to improve thanks to the decline in capital costs of lithium ion battery packs. These days four hours of battery storage is the cheapest form of dispatchable power generation capacity in many major markets around the world, outcompeting open cycle gas turbines or peaker gas in the very cheapest of markets… the economics of both batteries and renewables mean that we are heading towards a global power system which is of course dominated by renewables."

BloombergNEF data indicates without any further policy about 69 per cent of total electricity generating capacity by the year

2050 could come from solar power. Add nuclear to that mix and the world could reach about 80 per cent of zero carbon generation.

Signals are positive, "Global coal demand is in inexorable decline… demand has already peaked and it will not rebound," Kobad said.

Strong sales of electric vehicles complement the round-up, increasing by 28 per cent in the pandemic year and gaining speed, the economics are not far from tipping points where electric vehicles become cheaper on a total cost of ownership basis and about a year after that on an upfront sticker price.

This, he says, will drive mass market uptake. "It's a really good news story: the transition that's taking place in the transport sector means that global emissions from energy have likely already peaked and although they will rebound from 2020 levels thanks to the COVID dip they are unlikely to ever eclipse the level of 2019".

More action required

A note of caution, however: "Progress has been made but it still very far from where we need to be, we need rapid decarbonisation and to meet the 1.5 degree pathway we actually need to reduce emissions at the same rate we did from shutting down the economy in 2020."

Despite strong pledges from progressive nations such as Germany, France, South Korea and the UK "nobody really has policy that is strong enough and aligned enough to meet the goals of the Paris Agreement… and Australia sits in the middle of the poor performing path. Everybody needs to lift their game."

That includes pathways for electricity and green hydrogen, electrifying more transport and industrial processes, heat for buildings and offices and using green hydrogen.

BloombergNEF's New Energy Outlook cites the need for $11.6 trillion worth of additional wind and solar capacity build in order to produce hydrogen from green sources and $2.7 trillion to store that hydrogen mostly in underground cabins and then a whopping $28 trillion and much more for transmission and distribution infrastructure. It's a mighty shopping list.

"But clearly none of this will happen without policy and hydrogen in particular needs policy in order to scale up and to be competitive for use against the cheapest fossil fuels… and still needs carbon prices in order to be economically viable against the cheapest fossil fuels currently in use in all of these sectors from steelmaking to space and water heating.

"It's not a magic pudding it doesn't happen without policy support." Kobad stressed the difficulties and cost of exporting hydrogen, explaining why the economics are fundamentally challenging and why we need to get much smarter in building a hydrogen economy and become competitive by making better use of green hydrogen onshore as a fuel for power generation for pig iron or steel, and ammonia for fertilisers.

In short, "Australia needs to become smarter and sharper about the way we approach the opportunities of the energy transition… we're

"Those of you who are worried about coal retiring please don't be, it's happening and it's happening for commercial reasons"

KERRY SCHOTT

of course not at the end of the road, we're far from it and there's a steep climb ahead so lots of work to be done and so it's up to us all to help accelerate that."

Kerry Schott of the Energy Security Board: Coal generators are going broke

Take a look at the graph of exits and entries of energy generation and take heart: from 2009 through to 2024 black coal is exiting while wind and solar are increasing along with a bit of battery storage.

But, says **Kerry Schott**, a large storage entry is anticipated in the middle of the 2020s on the back of the Snowy Hydro expansion.

SMART ENERGY
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"Grid congestion and disruption is forcing changes within an ill-equipped network"

BENN BARR

"The generation system is changing and it's changing rapidly and it is driven largely by two things: the states have an enormous role in energy and you should be grateful for that because they all have targets that are net zero by 2050 or more aggressive," she told delegates at the Smart Energy conference.

"A federal government target would help but the reality in this industry is that all states do have targets."

Conference goers with strong stakes in renewables also welcomed the news that "The coal generators are going broke so those of you who are worried about coal retiring please don't, it's happening and it's happening for commercial reasons."

Generators dispatch on the basis of what's the cheapest and leading by a long shot is wind and solar.

"So what we're seeing is a complete thumping of all the coal generators; they're retiring, they are ageing as well and if you are a commercial operator of a coal generator you'll start spending less on maintenance because it's not worth it which means that you're liable to become more unreliable and you are likely to not operate as well as you used to," Schott said.

"The whole economics of coal generation is really dreadful [and] the same can be said of gas that runs all the time but there is a role for gas to run when renewables are not there… yes gas is a fossil fuel but in Australia at the moment there is really very little alternatives for firmness apart from hydro and an increasing role for batteries which are getting better all the time."

Of Australia's 8,000,000 homes two and a half million have got rooftop solar but most of it is still passive, lacking battery storage and more sophisticated energy management systems of any kind. This, she says, is what's causing operational problems particularly for the distribution companies, and especially in Adelaide where in the middle of the day there is no demand for grid power, threatening electricity stability.

It's one of a series of issues the ESB is grappling with in the transition that will see ever more batteries deployed in households.

AEMO estimates that by 2025 we could be running at around about 75 per cent renewables across the market which the NEM can cope with but beyond that "the technology starts getting really tricky … which is why we're relying on storage of hydro and batteries and increasingly a bit of gas for frequency and inertia to stabilise systems during times of insufficient renewables or storage."

Improved integration of rooftop solar and demand response and pumping billions of dollars into transmission are integral to the energy security, in turn managing congestion.

"It is slowly dawning on renewable builders that while at the moment grids are not congested excepting in a few places it's going to be congested so we do need some way of managing that congestion," Schott said.

"We've also suggested physical retail obligation – RRO – which a lot of people don't like with retailers having financial contracts/ physical certificates for allocation of wind, gas and coal and so on, so there's a lot of detail and work needed there."

More to come on that score, and the Smart Energy Council is contributing to the discussions around the energy mix.

Benn Barr: Breaking the gridlock

AEMC chief executive, **Benn Barr** agreed on the pressing need for congestion solutions to facilitate the new energy mix, citing the need between now and 2040 for between 26 to 50GW of new variable renewable energy to replace retiring coal plants.

Market operator AEMO's statement of opportunities reveal 300 generation and storage projects with 55,000MW of projects on the way for the NEM, double the current installed capacity.

"There will be a big uptick in solar and wind accompanied by smaller amounts of gas hydro and battery storage," Benn Barr stated.

"Solar PV take up continues to outpace expectations: solar PV is more than an uptick it's a phenomenon, he said, with over 20 per cent of homes in 2020 or 2.66 million rooftop systems and around 14 gigawatts of installed capacity.

"By 2030 it is expected to rise and be almost 50 per cent of homes… solar is the largest generator in the system and Australia is a standout by international comparisons."

Eight in ten households don't yet have solar but will want it, he said, and network congestion is already an issue in many places.

This is driving three key changes: networks to deliver quality export services; two-way pricing to reward exports when the grid needs it; and networks to offer flexible pricing solutions and future planning for when 50 to 80 per cent of households have their own energy resources and the technology to manage grid congestion.

John Grimes: Energy market disruption presents a sliding doors moment

The acceleration of solar, wind and batteries accompanied by significant cost reductions is occurring at breakneck pace and there is no doubt the new energy system that replaces what we have today is going to be much larger than the one that we have today, **John Grimes** told the conference.

"We have an enormous national competitive advantage thanks to our extensive solar resources, one solar panel here will generate more than double the energy from the same solar panel installed in Germany."

This comparison highlights the massive economic advantage that Australia stands to capitalise on.

"We are very well placed to pick up this economic opportunity, we're on the cusp of the threshold of abundant carbon free energy at near zero marginal cost," John Grimes said.

"It makes us super competitive, globally this is the cheapest place in which to invest and make energy and this could underpin Australian manufacturing through value adding by using green hydrogen to produce green steel and aluminium, ammonia and cement … it could fortify the re-industrialisation of our nation and the opportunities are enormous.

"We get to electrify everything including the entire transportation fleet.

"However, the federal government has been peddling the line for many years that a strong economy cannot run parallel to a safe climate.

"That is absurd especially at this critical juncture in history where we face catastrophic

"Australia can be super competitive, globally it's the cheapest place to make and invest in renewable energy"

JOHN GRIMES

consequences of failing to address global warming caused by continued digging up and burning of fossil fuels.

"What we need to do is ramp up renewable energy and If we fail to do so we forfeit our economic potential and our future, that's because there is a massive energy disruption underway," he said.

"Australia needs to ruthlessly pursue its national interests to secure its rightful place in the global economy and at the same time deliver prosperity to this nation.

"The opportunities in renewables jobs for this nation are enormous, so big that they're going to keep our children and our grandchildren economically competitive for generations to come.

"We need to get this right," he said, "We've got to change our thinking from one of extraction to one of creation… we live in a country that is failing to react to the economic realities of life.

The green transformation will rival the industrial revolution and it's going to happen ten times faster than the industrial revolution: within the next decade.

John Grimes lauded conservative Britain's bipartisan ambition for 68 per cent emissions reduction target by 2030 followed by a legislated 78 per cent by 2035. Or, as colourfully put by former PM Malcolm Turnbull: "UK Conservative party leader Boris in UK has not succumbed to loopy anti science populism."

Where's Australia's stated ambition?

Let's take a closer look at conservative Britain where action on climate change has long been a bipartisan agenda item.

British HC Vicki Treadell: in tune with the environment

Britain is on the countdown to hosting COP26 later this year and is forging pathways based on sustainable practices.

Referencing the Indigenous people who are custodians of the land, and their sustainable practices over the millennia, British High Commissioner to Australia **Vicki Treadell** said there is much we can learn and that part of the climate challenge must involve nature-based solutions.

Indeed, Aunty Ann Weldon in her Welcome To Country speech urged leaders to be more mindful, smarter and kinder and: "Create the legacy that must be done".

"Climate action is Britain's number one top foreign policy," Treadell declared; time is short, there needs to be an injection of urgency into international action. Viruses and climate change have not gone away – they are all around us.

"We need to address these global challenges and a global requirement, our call to action is to join the race to net zero emissions, this is a security and economic agenda too.

"Threat of climate is a security issue, greater threats to low lying countries and more economic migration in recent times than ever before will be nothing compared to climate migration and people looking for a new land."

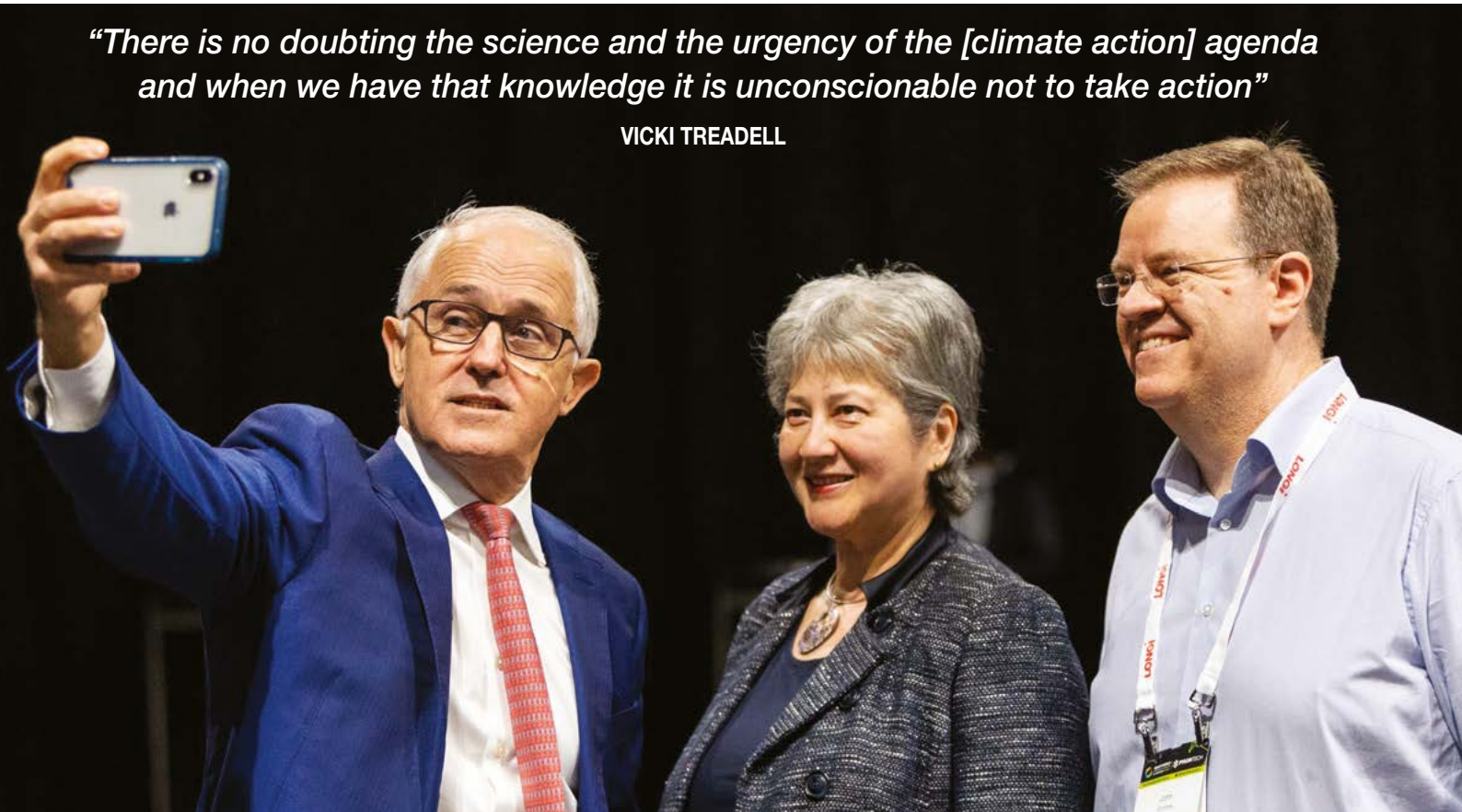
Applauding the enormity and consequences of advances made by **Martin Green** she said "There is no doubting the science and the urgency of the agenda and when we have that knowledge it is unconscionable not to take action."

Britain drove the first industrial revolution now it is vital for it to be at the forefront of the new green industrial revolution and the energy requirements of the transition.

Taking the helm as COP26 champion, Britain is encouraging all nations to raise their levels of ambition for net zero targets but sooner than 2050.

"There is no doubting the science and the urgency of the [climate action] agenda and when we have that knowledge it is unconscionable not to take action"

VICKI TREADELL



"A global giant whose work is going to save us all and this planet"

MALCOLM TURNBULL INTRODUCING PROFESSOR MARTIN GREEN

"Prime Minister Boris Johnson recently set our ambition that by 2035 Britain will cut emissions by 78 per cent on 1990 levels," she said which drew applause from delegates.

COP26 goals

The four goals for COP26 are net zero targets including interim targets; plans for adaptations: plans for wealthier countries to support and finance poorer nations: and for civil society to be an active voice on the global agenda as "voices matter: they translate into votes for the parties and governments that have the best policies; we need to back the party we think that will progress our economic transition and ensure the future well-being of our people."

A strong theme throughout the conference was the need to plan, to establish clear pathways.

Once again Britain is taking the lead with a 10 point plan.

"A plan with £12 billion British government money to back it that we hope to see tripled by attracting private sector investment so we should be looking – if our plans succeed – at £36 billion worth of investment into the UK economy and that's because the government is being part of this and putting its own skin in the game. We hope this will result in 250,000 new green jobs in the UK, 60,000 of which alone will be in offshore wind and the whole supply chain industry that will feed that new and burgeoning sector of our economy."

There you have it the trifecta of jobs, investment in renewables and a strong economy. A vision that is shared by the ALP which recently staged a Renewable Energy Jobs Summit.

Britain's ten-point plan:

- Backing offshore wind
- Low carbon hydrogen
- New and advanced safer nuclear energy
- Zero emissions vehicles with a bold target that all new cars made or sold in Britain by 2030 cannot be petrol or diesel (audience applause)
- Green public transport including new cycleways and walkways transitioning trains or buses to all electric or technology like hydrogen
- Incentives and work with industry to attract investment for 'jet zero' the future of aviation "green ships or green marine, those are future frontiers of transitioning our aeronautic aviation and marine industries and Britain wants to be at the forefront of that"
- Greener buildings… more energy efficient carbon neutral buildings
- Carbon capture storage and usage to prove the science
- Natural environment rewilding the world and restoring our forests, and finally
- Green finance and innovation to spur technology.

"Britain is asking our friends and our partners to share our ambition because this is an existential threat to the world, this is a real and present danger but most of all this is an economic opportunity, a well-being opportunity for the people of this world. What better journey could we be on than one we enter freely with vision and ambition towards COP26, and one in which we secure decisive commitment of finance, along with the plans and the roadmaps to take us beyond that?

"It is what we do in the next decade and beyond that will determine whether this generation succeeds in leaving a legacy for the future with your children, your grandchildren and those to come for a better world.

"We have a choice, let's make it now."

THE REAL DEAL **A big thank you** to all who presented addresses and all who exhibited at the show, in particular AlphaESS, One Stop Warehouse, Growatt, Pylontech and SolaX and all our other show partners. A word of appreciation also to all who attended the show.

The NSW COVID scare the week prior to the event was cause for trepidation but – relief – the stars were clearly aligned in favour of the renewables industry. All the more reason to enjoy all on offer including the face-to-face gatherings after a year-long hiatus.

RENEWABLES WRAP

Fascinating facts and insights presented at the 2021 Smart Energy Conference & Exhibition.

PERC UP! Approximately 95% of c-Si cell production in 2021 will be p-mono PERC. By late 2021 there will be more PERC installed than all other PV in history.

GLOBAL AVERAGE SOLAR PV electricity generation contribution is forecast to reach 69% by 2050.

AMAZING PPAs In January 2014 a PPA bid (electricity price) of around US$90MWh was the lowest (Chile) soon followed by Brazil (around $US80MWh).

The period 2016-2017 saw a steep decline with the lowest PPA bids at around US$20MWh and in late 2017 solar matched that of wind.

In 2021 the PPA low of just 1c/kWh was reached in Saudi Arabia.

The global average solar PPA contract is around 15 years.

Source: Prof M Green of UNSW referencing his own work, PVTech, IEA, LUT Uni, BNEF, IEA and others

MORE THAN HALF (54%) OF ALL GLOBAL EMISSIONS are now covered by a form* of net zero emissions target.

**legislated, in process of being legislated, government position or under discussion.*

WE'RE NOW TALKING HALF A BILLION DOLLARS Energy transition investment reached $501** billion in 2020, well up on the $33 billion of 2004 (which almost doubled to $61 billion the following year).

***Of that $300 billion was in renewable energy, the balance predominantly in electrified transport followed by electrified heat. Energy storage sits just at the tip of the iceberg.*

CREDIBLE COMMITMENTS TO LOWERING EMISSIONS As of July 2020, 1092 companies with a market capital of $15.4 trillion representing 20% of the Global Fortune 100 had formed science-based targets.

WIND AND SOLAR POWER are the lowest cost new source of power for two-thirds of the global population.

GLOBAL COAL DEMAND has already peaked (in 2018) and will not rebound.

PASSENGER ELECTRIC VEHICLE sales increased 28% during 2020, with Europe and China dominating the charge followed by North America.

From 2023 the upfront cost of EV ownership will undercut ICEs.

SEE-SAW Global emissions from energy have peaked but will rebound from 2020 lows.

Source: BloombergNEF (All dollars are US)

THE RISE AND RISE OF RE100 In April 2021 RE100 hit a milestone with a 300th company joining the energy initiative for business in which 100 refers to their commitment to buying 100 per cent renewable electricity. Signed up companies either use over 100GW hours of electricity each year, are a major multinational company Fortune 1000 or equivalent or a globally or nationally recognised and trusted brand.

Interestingly, a survey of RE100 members late last year revealed almost 70% of respondents cited cost savings as a driver for switching to 100% renewable electricity.

SMART ENERGY COUNCIL AND RE100 MEMBER CBUS INDUSTRY SUPERANNUATION is expanding its renewables investment from large scale wind and solar to a broader range of energy transition technologies targeting sectors such as transportation and buildings.

LEADING INVESTMENT MANAGEMENT CORPORATION BLACKROCK has found globally, investors are hungry and looking to double holdings in sustainable investments to 2025.

ROOFTOP SOLAR PV presents the highest rate of investment return in the electricity sector: 18% (subsidised system) or 11% (unsubsidised).

Source: Solarchoice, ITK

HOW GOOD IS THIS Australia boasts a world beating installation industry of $50 and one hour for network approval versus $1000 and six weeks in the US.

ROOFTOP PENETRATION OF DETACHED HOUSES 11GW installed to date in Australia but, provided economics remain positive, plenty of scope for 2GW additional capacity each year for the next decade.

Source: APVI, ABS

SOLAR PV PENETRATION BY 2025

SA: 85%

Queensland: 57%

NSW: 48%

Victoria: 48%

Tasmania: 21%

WA and NT: TBA

By 2040 the majority of Distributed PV is likely to be dispatchable.

PWC A conversation with 50 energy experts revealed the top four concerns in the broader energy sector were: underinvestment in transmission and distribution; the slow grid connection process; government and regulatory intervention; and dealing with carbon.

Of least concern and sitting at the bottom of the list were 'AEMO overstepping its role' and the ESB 'not being independent'.

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RENEWABLE HYDROGEN, THE RACE IS ON

Renewable hydrogen has taken on a life of its own and pundits who forecast a rapid trajectory agree Australia has much to gain provided we move fast.

JUST A FEW SHORT YEARS AGO renewable hydrogen barely rated a mention at Smart Energy conferences. But advances in new energy move at a pace and this year, hydrogen developments occupied a full one-day stream with 22 expert speakers. Addressing conference delegates live from London was COP26 High Level Champion for Climate Action Nigel Topping whose key messages orbited around the need to seize opportunities and ratchet up velocity.

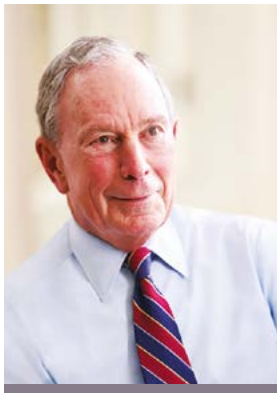
"The world urgently needs to massively ramp up deployment of breakthrough solutions like green hydrogen… the bold vision and leadership of businesses can propel green hydrogen along an exponential growth trajectory to support economic recovery and deep decarbonisation sooner than anticipated," he said.

Topping implored Australia to join the race to net zero, emphasising the need to significantly increase renewable energy investment to achieve green hydrogen aims, saying "Australia needs to be among the first movers to meet the emerging Asian markets and attract necessary investment as destination of choice.

"Over the next five years international markets and domestic demand for green hydrogen will be emerging… yes, there is big upfront capital expenditure for large scale projects for export that involve an element of risk but technology that is proven and at scale leads to lower costs."

And what lies ahead is jobs, manufacturing and export, Topping said, forecasting an escalation of production.

It is now estimated that green hydrogen could supply up to 25 per cent of the world's energy needs by 2050 and become a US$10 trillion market by 2050. These projections are underpinned by the recent emergence of strong hydrogen-focused national strategies in Australia as well as Chile, Germany, the EU, Japan, New Zealand, Portugal, Spain and South Korea.



COP26 Climate Champions have named Michael Bloomberg as a Global Ambassador. The Climate Champions are Founding Partners in the Zero Carbon Certification Scheme

"The world urgently needs to massively ramp up deployment of breakthrough solutions like green hydrogen…"

COP26 HIGH LEVEL CHAMPION FOR CLIMATE ACTION NIGEL TOPPING

Mindful of the need to stir momentum and position Australia as an energy superpower, the Smart Energy Council is, through its Division Hydrogen Australia, accelerating the shift to a zero-carbon economy.

Smart Energy Council's world-leading Zero Carbon Certification Scheme gathers pace

Hydrogen Australia has welcomed a series of prominent Founding Partners in the Zero Carbon Certification Scheme, as explained by Wayne Smith.

"The ACT government's participation is very significant, as is global ammonia consortium Ammonia Energy Association which is headquartered in the US and represents some of the biggest ammonia companies," he said.

"We have also welcomed the high level COP 26 Climate Champions, including Michael Bloomberg, as a founding partner, along with global non-profit organisation Energy Web, the open source blockchain company that tracks and traces energy products including potentially hydrogen and ammonia."

Other founding partners include Star Scientific, Australian National University, CWP Global, Evoenergy and the ACT Renewable Hydrogen Cluster.

The German Energy Agency (dena) and Australian National University are Advisors to the Zero Carbon Certification Scheme and joining the scheme as a partner is the Green Hydrogen Catapult, a consortium of the world's seven largest renewable hydrogen companies including Yara and CWP Renewables.

The Catapult Group has committed to the deployment of 25GW through to 2026 of renewables-based hydrogen production, with a view to halving the current cost of hydrogen to below US$2 per kilogram.

"Hydrogen Australia will be working closely with Green Hydrogen Catapult on global certification which will reinforce our standing and the uptake of green hydrogen," Wayne Smith said.

More recently the Victorian Government and Australian blockchain energy company Power Ledger came on board as founding partners of the Zero Carbon Certification Scheme:

Power Ledger chief executive Jemma Green said "Our technology is already being used around the world to support the proliferation of renewable energy and we want to continue to be at the forefront of this innovation in our own backyard."

For her part Victorian Energy Minister Lily D'Ambrosio declared the Scheme as "Exactly what is needed to accelerate renewable hydrogen in Australia."

Things are moving at a pace.

The first project to be certified under the world-leading Zero Carbon Certification Scheme will be ActewAGL's hydrogen refuelling site in the ACT

HYDROGEN AUSTRALIA ON SHOW The Smart Energy conference welcomed insights from the German and Norwegian Ambassadors, Australia's Chief Scientist, and senior representatives from Thyssenkrupp, HYZON Motors, DNV, H2U, CWPR, LAVO Technology.

The broad range of topics covered included hydrogen applications for marine transport; scaling up commercialisation of renewable hydrogen and ammonia; the importance of certification for international trade; and an update on the Asian Renewable Energy Hub.

Other addresses drilled down on developing community trust in hydrogen, hydrogen for off-grid networks, unlocking the global hydrogen economy, and large-scale hydrogen storage solutions.

Several speakers agreed to share their material, which can be found on the SEC website at www.smartenergy.org.au

Dr Thomas Fitschen, Ambassador of Germany, addressing the conference

pictured at right. Hydrogen Australia division manager Max Hewitt describes the hydrogen refuelling station which is Australia's first such public station as "a landmark project and one that the Smart Energy Council will certify powered by 100 per cent renewable energy and producing zero emissions hydrogen."

He explained Hydrogen Australia has gone to limited tender for the certification work and will manage the certification process which he anticipates will be completed by late July. "We are achieving Zero Carbon Certification at breakneck speed and our ambition is to have four projects certified zero carbon by year's end. A robust certification scheme is critical to the development of the industry, and we don't have time to waste."

Max added Hydrogen Australia is also keen to work with more international partners and would welcome the opportunity to certify the Hydrogen Hubs as zero emissions renewable energy projects under the Zero Carbon Certification Scheme.

www.smartenergy.org.au/hydrogen-australia

ENGV was selected to deliver Australia's first public hydrogen refuelling station in Canberra, for ActewAGL. The refuelling station is designed to refuel up to 20 hydrogen fuel cell electric vehicles initially and scale up as the hydrogen transport market develops

Hydrogen Hubs

News of the federal government's recent pledge of $275.5 million for four hydrogen hubs was well-received by the Smart Energy Council which stressed the need for the hubs to focus on zero emissions renewable hydrogen and renewable ammonia.

"This is the only way to create a strong economy and a safe climate," John Grimes said. "The stamp of authentication provides international customers with the necessary assurance over the resulting renewable hydrogen and will be a significant asset to the federally funded hydrogen hubs."

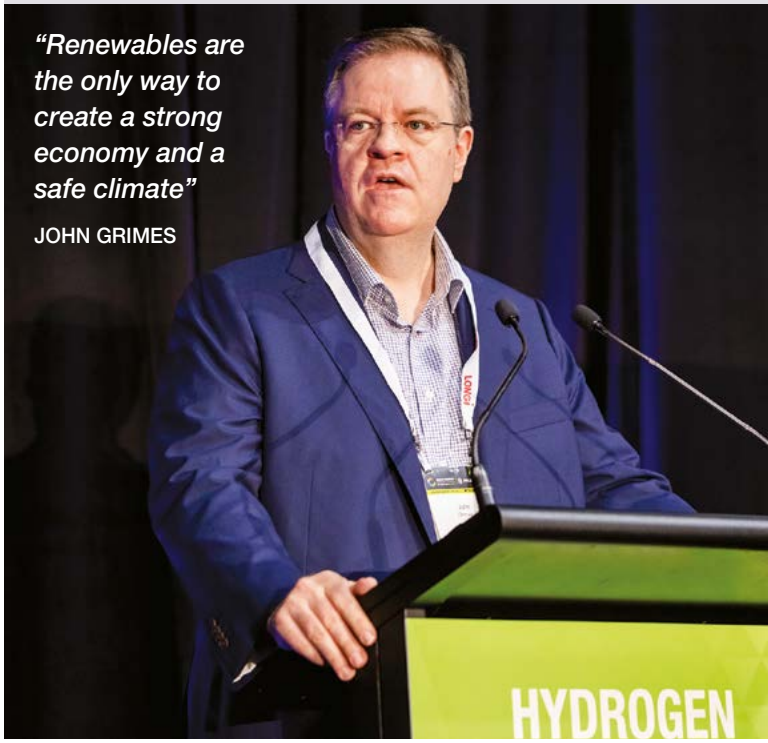
In all the federal government has committed to more than $1 billion in funding for hydrogen and carbon sequestration projects, as well as funding for international research partnerships on low-carbon technologies such as green steel, small modular nuclear reactors and batteries.

Industry sees a red flag however in the inclusion of an investment of $30 million in blue carbon projects that involve carbon capture.

Supporting the Smart Energy Council's position while speaking at its May conference former Prime Minister Malcolm Turnbull pulled no punches when stressing the need to avoid "fudging" of technologies and calling blue hydrogen "for what is it: BS".

"Green hydrogen is the only colour we should support," he announced to a round of applause.

Turnbull recently accepted the role of chair of Fortescue Future Industries which has a vision to be the world's largest green hydrogen



producer. A series of mind-boggling mega-scale projects are under consideration that would essentially rewrite the future of global energy supplies.

A powerful vision

"Fortescue's Twiggy has vision, ambition, drive and lots of money," Turnbull said. "With the work of a huge team of practically minded engineers they can build things and, in the race to produce green hydrogen FFI has all the elements to be a global player."

A qualifier: "But to be competitive the [capital] costs of electrolysers need to reduce by a power of eightX – that is, to take the same journey as PV modules."

Current global hydrogen demand of around 60 million tons per year would require more than 1,500GW of solar PV and demand could reach 800 million tons a year by 2050 if it is the dominant clean molecule and used predominantly for industry, power, transport and also buildings

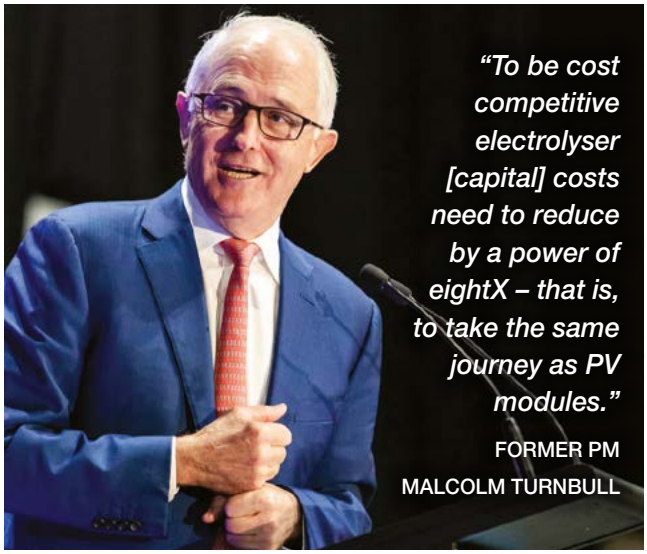
BloombergNEF's Kobad Bhavnagri who at the conference spoke of the need for electrification of transport and industrial processes and heat for buildings and offices said "for the parts of the economy where electricity doesn't reach we can use green hydrogen and in this sort of scenario we need to of course rapidly increase the pace of renewable deployment.

"But we will need to invest much, much more in renewable technology: $US35 trillion in power generation and batteries plus $US28.7 trillion in upgrading the power grid at which stage hydrogen would make about 20 per cent of the globe's final energy supply.

"In this sort of scenario you would need about $11.6 trillion worth of additional onshore wind and utility scale solar capacity build in order to produce that hydrogen from green sources. You need as well $US2.7 trillion to store that hydrogen mostly in underground caverns and up to the whopping $US28 trillion for transport, transmission and distribution infrastructure.

"None of this will happen without policy support clearly and hydrogen in particular needs policy in order to scale up and even then it needs policy in order to be competitive. For hydrogen, even when it gets to $1.00 per kilogram which is what we think could happen in the long term, still needs carbon prices in order to be economically viable against the cheapest fossil fuels currently in use in all of these sectors from steelmaking to space and water heating.

"It's not a magic pudding it doesn't happen without policy support."



Export reality check

Kobad Bhavnagri went on to outline the costly logistics of transportation involved in Australia fulfilling its dream of being a renewable energy superpower

"Even if we can produce hydrogen at around the world's best rate of $0.76 per kilogram in the year 2050 it'll cost about three times that much to put it on a boat and transport it to Japan, Korea or Asia, and so the delivered cost once it gets for instance to Japan is nearly $3 a kilogram.

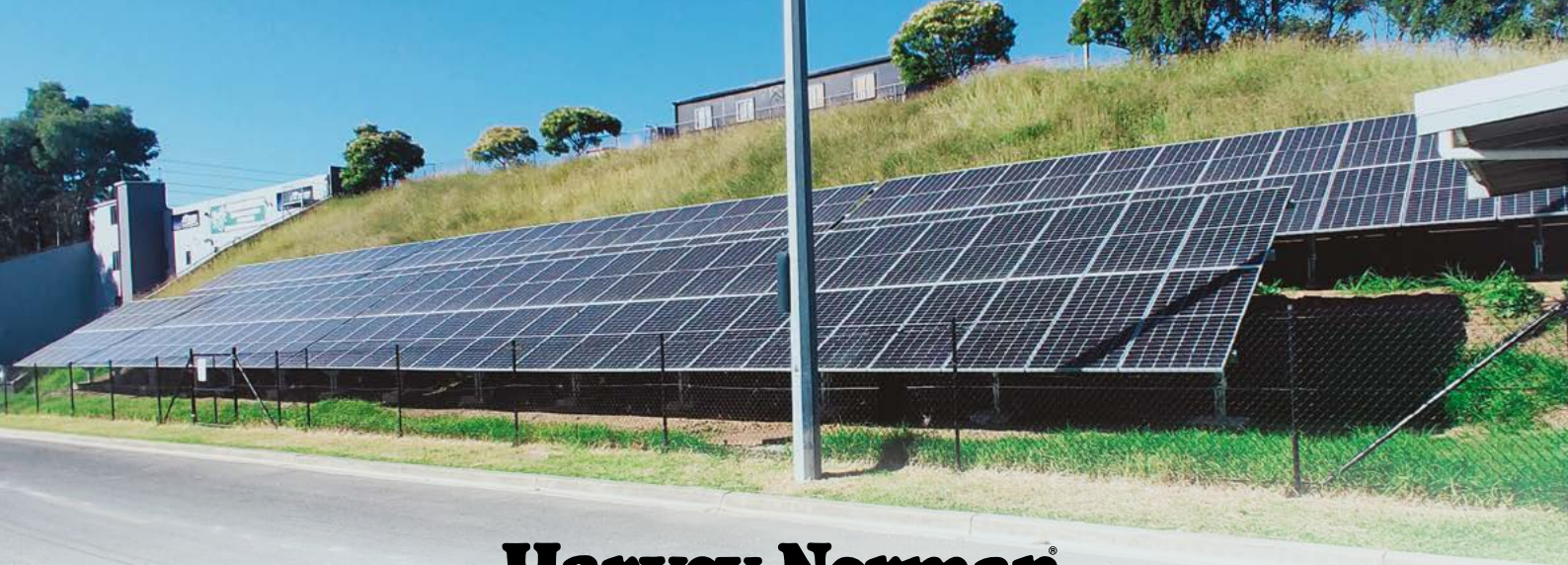
"Compare that to the cost of producing hydrogen onshore in Japan using their more expensive renewable power it's still about half the price that we could deliver it via boat so the economics are fundamentally challenging.

"We need to get much smarter therefore about how we build a hydrogen economy and become competitive," Kobad said.

"It's not really just about putting hydrogen on a boat and sending it offshore, we have to move up the value chain and make things from the hydrogen that we can then export, such as ammonia used in fertilisers and explosives, pig iron or steel, synthetic fuels or methanol for plastics and chemicals.

"Australia needs to become smarter and sharper about the way we approach the opportunities of the energy transition," he concluded.

Star Scientific hosted a visit from the PM during the Hydrogen Hubs announcement, Andrew Horvath on left



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HYDROGEN DEVELOPMENTS

The hydrogen industry continues to garner support from investors and innovators and is generating significant interest the world over. Here we look at some of the local advances.

WORLD FIRST GREEN HYDROGEN PLANT

Western Australia based Yara which supplies a not insignificant five per cent of the world's ammonia is destined to become the world's first industrial-scale renewable ammonia production plant. The world-leading fertiliser company is joining forces with Engie, a global low-carbon energy and services group, to build the renewable ammonia plant that has received an ARENA grant of $42.5 million and is scheduled for completion and to commence production in 2023.

The plant on the site of the existing Yara Pilbara ammonia plant will include a 10MW electrolyser, on-site PV panels and a battery storage system enabling off-grid operation.

It is slated to produce up to 625 tons of renewable hydrogen and turn this into 3,700 tons of renewable ammonia per year enabling customers to decarbonise emissions from power generation, shipping, fertiliser or mining explosives. This initial phase would be key to enable the facility to become the 'Pilbara Hydrogen Hub', building on the existing export infrastructure.

Yara Pilbara General Manager Laurent Trost said, "Renewable hydrogen can decarbonise ammonia production, and renewable ammonia can serve as renewable feedstock for a variety of industrial uses, and even more importantly, renewable ammonia is one of the world's most promising fuels for green power generation and shipping."

According to SEC's Wayne Smith Yara is keen to work with Hydrogen Australia on its Zero Carbon certification scheme and "Absolutely think we are on the right path with certification. The Pilbara project could well be one of Hydrogen Australia's first pilot projects."

Yara's green hydrogen project in the Pilbara will be the second project to be certified under the Zero Carbon Certification Scheme

TECTONIC SHIFT

According to BloombergNEF green hydrogen made from solar or wind electricity is ramping up to be more cost competitive than 'blue' hydrogen production facilities that use fossil fuels with carbon capture and storage.

The global analyst suggests the situation should reverse by 2030, including in countries such as the US with its with cheap gas and Japan and South Korea whose renewable power is more costly.

The dominant 'gray' hydrogen which is generated from fossil fuels without carbon capture and storage could also cost more than green hydrogen by 2030 in the majority of the countries modelled by BNEF.

This, they say will "unleash a tectonic shift in the hydrogen market" and render Shell's blue hydrogen plants due for completion closer to 2030 uncompetitive against green hydrogen.

The plummeting cost of solar power will hasten the trajectory so much so that **"By 2030, it will make little economic sense to build blue hydrogen production facilities in most countries, unless space constraints are an issue for renewables."**

By 2050, the cost of producing hydrogen from renewable electricity should fall by up to 85 per cent from today's price, BNEF predicts, with costs below the much-stated holy grail of USD$1/kg in most international markets.

Further, green hydrogen is on track to be cheaper than natural gas by 2050 in 15 of the 28 markets modelled, thus "completely rewrite the energy map". Data suggests at least 33 per cent of the world economy could be powered by clean energy for "not a cent more than it pays for fossil fuels".

IHS Markit believes green hydrogen could be cost competitive by 2030 and that until then government subsidies would be required to support business models.

Costs: According to the International Energy Agency, green hydrogen from onshore wind and solar costs $US2.50-6/kg; grey hydrogen is currently available at $US1-3/kg; and using CCS to generate blue hydrogen would add at least $US0.50/kg.

ELECTRONICS GIANT PANASONIC aspires to produce 100 per cent renewable electricity through the use of an in-house power generation system combining PV generators and pure hydrogen fuel cell generators along with storage batteries.

Panasonic will build a large facility at its plant in Japan which is equipped with an in-house power generation system that combines pure hydrogen fuel cell generators (500kW) and photovoltaic generators (approximately 570kW), as well as lithium-ion storage batteries (approximately 1.1MWh) for storing surplus power.

The power generated with this system will supply the entire power used in manufacturing departments of the fuel cell factory located within the site.

The demonstration plant is due to open in 2022.

Image of the RE100 solution demonstration plant to be constructed at Panasonic's Kusatsu site in Shiga Prefecture

HEAVY VEHICLE SPECIALIST CUMMINS and Spanish multinational electric utility Iberdrola have released plans for one of the world's largest electrolyser plants to generate green hydrogen.

Located in Spain, the €50m ($78m) PEM electrolyser plant's initial annual capacity will be 500MW and scalable to more than 1GW. The facility slated for launch in 2023 will create 350 new jobs.

Cummins is also teaming with Iberdrola on large-scale hydrogen production projects in Spain and Portugal and they are also joining forces on a hydrogen refuelling station in Barcelona.

MID-MARCH MILESTONE EVENT Queensland's hydrogen credentials stepped up a notch with the signing of a memorandum of understanding with major Japanese multinational Sumitomo Corporation.

The partnership has been formalised with Gladstone Ports Corporation, Gladstone Regional Council, CQUniversity Australia and Australian Gas Industry Group to develop Australia's first hydrogen ecosystem in Central Queensland.

Queensland Minister for Energy, Renewables and Hydrogen Mick de Brenni said the signing indicated a "Major endorsement of international investor confidence… we know countries around the world, like Japan, have mandated decarbonisation and set clear targets – and they're looking to Queensland for help to meet them.

"Gladstone's Hydrogen Ecosystem project will prove supply chains and grow a domestic hydrogen market," de Brenni said.

Wayne Smith commented that Gladstone formed an important focus in the work of Hydrogen Australia, with several members and partners developing projects in the region. SEC Board member Vanessa Sullivan has a seat on the Queensland Government's Hydrogen Task Force and Oliver Yates facilitated developments in collaboration with Attilio Pigneri of The Hydrogen Utility (H2U) and the Queensland government for the hydrogen producing export plant situated between transmission lines and in vicinity of an already-established ammonia export/import pipeline and terminal.

Oliver Yates believes Gladstone will be the home of the first major export project.

H2U's Dr Attilio Pigneri

H2U HAS TEAMED WITH RWE to develop global hydrogen trading between Australia and Germany from H2U's future green hydrogen site in South Australia. H2U plans building a 75MW electrolysis plant to supply hydrogen for about 40,000 tons of ammonia annually. Later expansion would see it scale up to 1.5GW of electrolysis.

H2U's Dr Attilio Pigneri said "H2U is pleased to partner with RWE to explore the possibilities for providing affordable green hydrogen and hydrogen derivatives such as ammonia and synthetic methane to power Germany and Europe's future. We see the trading of green hydrogen to Europe being fully decarbonised using green ammonia as the shipping fuel of the future."

AUSTRALIAN GAS NETWORKS has opened its $14.5 million hydrogen production facility at the Hydrogen Park South Australia (HyP SA) and commenced blending 5 per cent renewable hydrogen into part of its natural gas distribution network in Adelaide.

HyP SA is capable of producing up to 175 tons of hydrogen annually which equates to the total gas use of around 1,500 South Australian homes.

TOTAL EREN has inked a mighty 8GW green hydrogen project with Perth-based gold and copper miner Province Resources.

The duo is collaborating on a feasibility study into the hydrogen production facility in Western Australia's Gascoyne region

The French giant which currently operates two solar farms in Victoria cites the development in WA as "a concrete opportunity" to kick off its global hydrogen strategy.

Fabienne Demol, Global head of business development stated: "After solar, wind, and storage, we believe hydrogen is the next step of growth of renewable energies. We are determined to leverage our development and technical skills to make our first of several Hydrogen Projects in Australia a success."

Province Resources aims to be Australia's first truly Zero Carbon Hydrogen producer.

PRL's HyEnergy Renewable Hydrogen Project proposes to generate 1GW of renewable energy in Western Australia using wind and solar, and produce approximately 60,000 tonnes of green hydrogen or 300,000 tonnes of green ammonia.

EYE WATERING NUMBERS

Australia's potential for zero carbon hydrogen exports are tipped to reach $2.2 billion by 2030 and $5.7 billion by 2040, and, says mining magnate Twiggy Forrest by 2050 green (renewable) hydrogen could be the most important green energy source in the world and "power the world for all of mankind's existence".

"The green hydrogen market could generate revenues, at the very least, of $US12 trillion by 2050 – bigger than any industry we have now.

"Green hydrogen (is) the purest source of energy in the world – and one that could displace up to three quarters of our emissions, if we improve the technology and had the scale.

He's championing the move to Australian-made green, carbon-free, steel that will generate thousands of jobs.

IN OTHER NEWS

ENERGY BEHEMOTH AGL is considering a floating solar farm at the Loy Yang plant for contribution to the Hydrogen Energy Supply Chain project (HESC) in a bid to reduce emissions.

SIEMENS IS PLANNING 5GW of wind and solar capacity near Kalbarri in WA to power the generation of green hydrogen. BP too has plans for the area and Pilot Energy aspires to develop offshore wind and on-shore solar for a renewable hydrogen project of GW proportions.

OVER IN EUROPE HYTRUCKS aspires to deploy 300 hydrogen-powered trucks in Belgium by 2025. The HyTrucks consortium will initially install a network of 25 high-capacity hydrogen stations connecting major cities and all up by 2025 wants to enable 1,000 hydrogen-powered zero-emission trucks on the roads, with infrastructure connecting Belgium, the Netherlands and western Germany.

ISRAEL-BASED H2PRO has gained $22m in investments that will accelerate production of its water splitting electrolysis device in a bid to produce green hydrogen at $1/kg.

Last year the **EUROPEAN UNION LAUNCHED A NEW GREEN HYDROGEN STRATEGY** acknowledging up to 120GW of new renewables capacity would be needed to power the ~40GW of electrolysers that would be needed by 2030 for the industry to achieve sufficient scale so as to make green hydrogen production cost-competitive with other forms of hydrogen production.

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AUSTRALIA IS AT A CROSSROADS IN THE GLOBAL HYDROGEN RACE – AND ONE PATH LOOKS RISKY

Renewables or fossil fuels? The way hydrogen is produced makes a big difference to its emissions intensity say* Thomas Longden, Fiona J Beck *and* Frank Jotzo *of Australian National University.

THERE'S GREAT EXCITEMENT about Australia potentially producing hydrogen as a clean fuel at large scale, for export to countries such as Germany, Japan and South Korea.

Hydrogen (H_2) is a useful energy carrier, and doesn't release greenhouse gas when that energy is recovered. But carbon dioxide (CO_2) can be emitted when hydrogen is produced, depending on whether the process uses renewable energy or fossil fuels.

Dr Alan Finkel – the federal government's special adviser on low-emissions technology and a former chief scientist – recently said: "The world's going to need a lot of hydrogen, and so the more ways we can get that hydrogen the better".

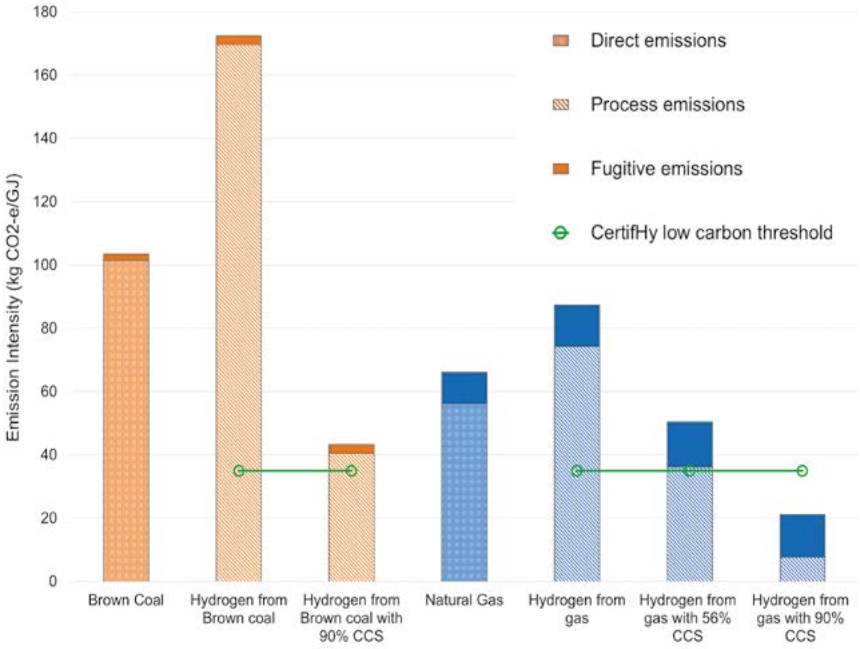
But our recent analysis shows producing hydrogen from fossil fuels carries significant risks. The process can emit substantial greenhouse gas emissions – and capturing these emissions at a high rate may make the process more expensive than hydrogen produced from renewable energy. These findings have big implications as Australia looks to become a hydrogen superpower.

'Clean' hydrogen from coal or gas?

Zero-emissions 'green hydrogen' is produced via the electrolysis of water, when the process is powered by renewable energy.

Hydrogen can also be produced from fossil fuels – including coal and gas. This can lead to a lot of CO_2 emissions, even when some of the carbon is captured and stored.

Emissions intensity of different fuels



Several strategy documents leave the door open for Australia to produce 'low-emissions' hydrogen from fossil fuels. These include the National Hydrogen Strategy Finkel spearheaded as chief scientist, and the federal government's Technology Investment Roadmap.

In a recent Quarterly Essay, Finkel said CO_2 from hydrogen production will need to be captured and stored – in fact, he argued, importing countries would insist on it. This, Finkel says, means hydrogen from fossil fuels would be 'clean hydrogen'.

But rates of carbon capture and storage (CCS) vary. And the greater the rate of emissions captured and securely stored underground, the more expensive the process.

A focus on emissions intensity

Globally, only a few large-scale hydrogen plants currently operate, and the rates of carbon capture achieved in practice are rarely reported.

When assessing whether a fuel source is low-carbon, we calculate its 'emissions intensity'. This refers to how many kilograms of CO_2 is associated with the energy produced.

Our analysis found the emissions intensity of fossil-fuel based hydrogen production systems are substantial, even with carbon capture.

For example, the production of hydrogen from coal, if 90 per cent of emissions are captured, has an emissions intensity not much below that of using gas for the same energy content. The same goes for hydrogen from gas, with a 56 per cent capture rate.

Our analysis also takes into account so-called 'fugitive emissions' released during the extraction and processing of fossil fuels. They are typically ignored, but are significant.

Under global accounting rules, emissions from hydrogen production will count against the producing country's inventory. But many hydrogen importers concerned about climate change will want to know what emissions were released in production.

This can be done through hydrogen certification schemes. For example, the European Union has developed the CertifHy Guarantee of Origin scheme which accounts for the origins of hydrogen used. It includes information on whether the hydrogen was produced using renewable or non-renewable energy sources (such as nuclear, or fossil fuels with CCS).

Under this scheme, only hydrogen produced from natural gas with a high carbon-capture rate (towards 90 per cent) could be called 'low-carbon' hydrogen.

These high capture rates are assumed in major reports and national strategies – including Australia's – but have not been achieved at a large-scale commercial

plant. Japan's Tomakomai CCS demonstration project has achieved a 90 per cent capture rate – but at a very high cost.

Now, a look at costs

At the moment, producing hydrogen with fossil fuels generally costs less than producing it with renewables-powered electrolysis. But the cost of electrolysis with renewable energy is falling, and could become cheaper than fossil fuel with carbon-capture options, as the graph opposite shows.

Our analysis found hydrogen from gas or coal costs between US$1.66 and $1.84 per kilogram without the carbon being captured and stored. This rises to between US$2.09 and $2.23 per kilogram with high carbon-capture rates.

A carbon penalty, such as is applied in Europe, would make hydrogen from fossil fuels more expensive. A penalty of US$50 per tonne of CO_2 pushes the central production cost estimate up to between US$2.24 and $3.15 per kilogram.

By comparison, Australia's Technology Investment Roadmap set a target for 'clean hydrogen' to be produced for under A$2 per kilogram, or US$1.43.

The true cost of carbon avoidance using CCS varies widely and is often not well defined. Current cost projections rely on optimistic estimates of CO_2 transport and storage costs, and generally do not include monitoring and verification costs for long-term storage.

So how does all this compare to 'green' hydrogen?

Our analysis found the median estimate for renewables-based electrolysis falls from US$3.64 per kilogram today to well below US$2 per kilogram.

The cost of producing hydrogen with renewables depends mainly on the cost of electricity, as well as the capital cost and how intensively the electrolyser is used. The cost of solar and wind power has fallen dramatically in the past decade, and this trend is likely to continue.

As electrolysers are deployed at scale, their costs may decrease rapidly, pushing down the cost of green hydrogen.

More may not be better

So what does all this mean? If Australia pushes ahead with producing hydrogen from fossil fuels, two possible risks emerge.

If carbon-capture rates are low, we may lock in a new high-emissions energy system. And if capture rates are high, those production facilities could still become uncompetitive. This raises the risk of stranded assets – investments with a short economic life, which do not make a viable return.

Investment decisions for large scale hydrogen production will ultimately be taken by businesses, on the basis of commercial viability. But governments have an important role early on as they set expectations and assist pilot projects. The fossil fuel route is becoming a riskier bet.

Thomas Longden is Fellow, Crawford School of Public Policy, ANU, Fiona J Beck, Senior research fellow, ANU and Frank Jotzo Director, Centre for Climate and Energy Policy, ANU

WOMEN IN SMART ENERGY

Many leading roles in the renewable energy sector are occupied by women, however statistics reveal less than two per cent of PV installers are women. Why does this matter and what can be done to shift the gender balance?

"There are many female leaders in the field of renewable energy policy and advocacy which is to be welcomed but female representation in the burgeoning PV trade is very low which is not acceptable in this day and age; we need to do far better."

THINK OF AUSTRALIAN ENERGY SECURITY and Kerry Schott comes to mind, energy market operations and the legacy of former AEMO chief executive Audrey Zibelman tops the list. Blockchain technology? Trailblazers Jemma Green and Maria Atkinson. Those at the forefront of farmers united in climate action? Anna Rose, Wendy Cohen and Anika Molesworth.

The broader renewables industry contains many female thought-leaders and influencers. At the political level, Minister Lily D'Ambrosio, Zali Steggall and Cristina Talako are driving the charge from fossil fuels to renewable energy, and spearheading climate action advocacy are the likes of Amanda MacKenzie, Anna Skarbek, Lesley Hughes, Monica Richter, Kelly O'Shanassy, Zoe Whitton and Emma Herd. On a more practical level are Renate Egan, Vanessa Sullivan, Fiona and Ria O'Hehir, Kathleen Ryan, Barbara Elliston and a host of others including Nicky Ison who is leading WWF-Australia's campaign to make Australia a renewable powerhouse.

She told *Smart Energy* that women in the renewables industry bring their unique skills to the position and tend to excel in their chosen ambitious and sometimes unusual pathways.

"They have set their sights on what matters to them and have brought vitality and determination to their roles," Nicky said.

Many women are playing vital roles behind the scenes, among them Gabrielle Kuiper who has enjoyed a dream run in an impressive career devoted to the energy transition. A first-class honours in Experimental Physics was the springboard to her role as energy, environment and climate change advisor to then Prime Minister Julia Gillard.

"You know that you're in an incredibly privileged position and you work hard, being tested all hours to try and get the best public policy through to contribute to substantial change," she told *Smart Energy*.

"We had a brief period where there was a substantial decline in emissions as a direct result of the policies being put in place."

A subsequent role at Energy Security Board enabled Gabrielle to make significant contributions preparing for the ascendency of distributed energy resources. "There's still an enormous amount of work we need to do to in technical, regulatory and market integration but the opportunity to develop a road map and work with the other energy market institutions to further some of those discussions was inspirational," she said.

Representation

Increasingly the glass ceiling is being smashed, particularly in policy and entrepreneurship and innovation says John Grimes of the Smart Energy Council whose Board of nine comprises four females.

"We have been looking for a long time to create gender diversity on our board as it means adding different skill sets to our board, women bring different perspectives and add dimension.

For an organisation to build strength and health it is important to have disparate groups, he says.

"You want to avoid 'group think' on any board or in any organisation and when you get people who are similar in age, sex and background it can compromise progress.

"The SEC always encourages female leaders who want to grow their profile and have something to contribute."

But while there are many female leaders in the field of renewable energy policy and advocacy, it's rather different in the hands-on PV installation trade.

"Representation in the sector is very low which is not acceptable in this day and age; we need to do far better. That is why we are very supportive of the women in solar industry group AWISE and are doing what we can to Increasing the visibility and growth of the network."

Smart Energy caught up with AWISE member and installer Lily Pejkic of Sydney Solar and Batteries who traces the gender disparity in the PV installation trade back to educators and industry itself and a notable lack of encouragement at a grass roots level.

The environmental scientist who is also qualified as an electrical engineer credits her former employer, a large power company, for inspiring her to get into the trade that she would not necessarily have considered.

"What will it take to get more women become installers? I believe there should be more advice about industry pathways at schools, students would benefit too from mentorships and a program that eases them into the industry through an electrical apprenticeship, ideally that would be someone they know and trust who can teach them the trade skills," she said.

SEC Board member and co-founder of AWISE Sam Craft is spreading the word about opportunities for women in the solar and smart energy industry

AWISE movers and shakers Sam Craft, Christine Kennedy, Lily Pejkic, Bobbi McKibbin and Sophie Wright with John Grimes. (Keshia Noronho not pictured.)

What about recruitment? Do male managers prefer to take on male rather than female apprentices?

It's a sensitive issue.

"There is the issue of physical differences, compare a woman weighing say 60kg to a male applicant at 90kg who would be more adept at carrying 20kg panels up a ladder," Lily said.

"However women can complement men's abilities on the job which covers a range of demands and skills including data entry and records."

As it stands, however, less than two per cent of installers are female, a trend that has been noted by engineer Alkyra Hutchison-Menzer of RFI. The Product Manager who specialises in PV Engineering and is a well-respected speaker and industry trainer cannot help but note the imbalance.

Does the sub-2 per cent representation matter?

"When there is that much of a gender imbalance is becomes an inherent disincentive for women to get involved unless they are really keen on their career path and training choices," Alkyra said.

"You have to be really interested in the PV industry and prepared to fight to get a spot in such an imbalanced space - there is a degree of isolation when you are in the minority - you have to go into it knowing there will be entrenched barriers.

"You know you are not conforming and that there will be barriers, even if others are not always conscious of it."

You have to have the tenacity to stick at it; strength, integrity and determination need to kick in, and they will if you have a sense of pride and confidence in yourself and your abilities in an industry which has been male dominated for so long, she said.

"Lots of businesses talk up equal opportunity but that may not be reflected with what's happening on the ground; these are called baseline attitudes within a business."

Slow but sure shift

Lily believes there's a growing and positive shift in the mindset toward females.

"For a start the opportunities for women in the industry are gradually improving, people are becoming more supportive and so are businesses, in general the industry trend is to be a bit more aware and encouraging."

Facilitating that trajectory is the work of AWISE that is highlighting opportunities and providing support in a range of forums including networking events where, she says, "like-minded people gather and connect and compare notes.

"For many it has meant coming out of their 'comfort zone' and to a networking session and finding themselves in the company of others who share views and attitudes, so they feel quite relaxed!"

Will this help attract and retain more female installers and solar workers? Lily thinks so.

"As an installer I often felt uncomfortable going to these sorts of events and felt I did not have much in much in common with others but AWISE brings a new dimension, it makes people feel supported, it will make a difference and will only grow in influence while nurturing more female talent.

"In the past it's been more of a cultural thing in which blokes prefer to hang together, now the make-up is changing and it's more comfortable knowing there are others like you at industry events."

AWISE agenda

AWISE is on a mission to create a strong and sustainable industry through diversity and inclusiveness and at the heart of this lies effective communication, says Sam Craft.

"This was highlighted at our networking event at the Smart Energy Show in May which attracted a broad section of the industry who recognise the skills and opportunities that women bring to the sector.

"Beyond that the AWISE board is making concerted efforts to reach more solar energy companies, industry groups, training organisations and government bodies to help develop programs for women.

"We also aspire for greater awareness among schools so they can set the wheels in motion for PV related opportunities via apprenticeships and tertiary studies.

"The AWISE board is progressing a series of plans, projects and programs, which in turn spreads the word about the great opportunities for women in the solar and smart energy industry.

"Over the past 20 years solar has become the new normal and in order for this to continue its upward growth trajectory, women need to have equal representation across the industry – we won't wait 20 years though!"

To learn more about AWISE visit www.awise.com.au
Join the Facebook group: https://www.facebook.com/groups/awisegroup

THE UNSTOPPABLE RISE OF RENEWABLES

(even so there is an urgent need to significantly ramp up in order to reduce global emissions)

RISE OF RENEWABLES The latest International Renewable Energy Agency report revealed global renewable energy generation capacity increased 10.3 per cent in 2020 despite a year marred by a pandemic and global economic slowdown.

That translated to new solar PV and wind capacity encompassing three-quarters of global net new generation capacity during 2020, and according to the International Energy Agency "For projects with low-cost financing that tap high quality resources, solar PV is now the cheapest source of electricity in history".

Combined, new PV and wind capacity was 10 times greater than new hydro and new coal capacity and 100 times larger than new nuclear, carbon capture and storage, and other types of energy generation capacity.

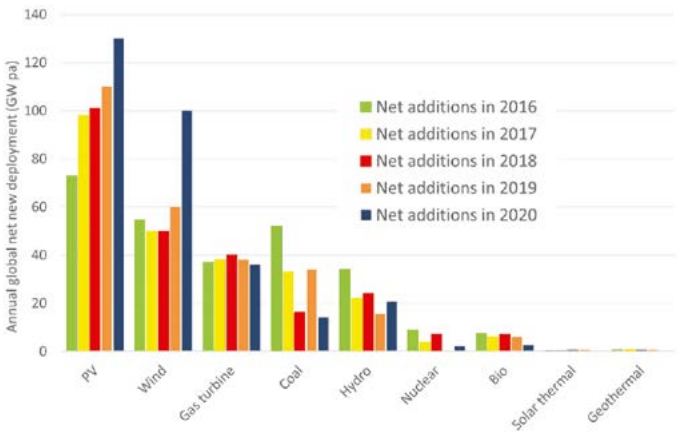


Figure 1. Net new global generation capacity (Gigawatts). Graph: Professor Andrew Blakers, RE100 Group, ANU

Stellar solar DNV's 2020 Energy Transition Outlook reports solar PV generation is on a path to grow almost 30-fold globally to 2050, at which stage PV will supply close to one-third of global electricity. That is 18.7 PWh/yr, contributing double the electricity from gas- and coal-fired generation combined.

Australia is tracking in the right direction, sitting at the top of the league table of installed solar PV capacity per capita, beating Germany, the Netherlands, Japan and Belgium.

However last year the Netherlands pipped Australia in global per capita leadership in new renewable generation capacity, but these two nations outpaced the rate of new renewables per capita globally by 10 times and three times that of China and the US.

In global rankings for wind, Australia is in fourth place for deployment speed (Watts per person per year) and 13th for total deployment (Watts per person). European nations and Uruguay outrank Australia for total deployment.

The 7GW of new solar and wind energy capacity added in 2020 pushed the share of renewable electricity to 30 per cent in the National Electricity Market and is forecast to reach 45 per cent by 2024.

Australia's renewable energy industry is now worth $11 billion per year (rooftop, and utility solar and wind systems) and employing 27,000 people.

But there's a but: Electricity production in Australia needs to double to decarbonise electricity systems and electrification of land transport and heating, eliminating 69 per cent of emissions without significant impact on electricity prices.

To achieve this by 2040, PV and wind deployment rates need to double from 7GW in 2020 to 14GW each year. Daunting as it sounds, experts say it is eminently doable and will be aided by Snowy 2.0 and Kidston, the two pumped hydro systems under construction with combined storage power and energy of 2.3GW and 350GWh respectively, and the 2GW (2GWh) of utility batteries under development.

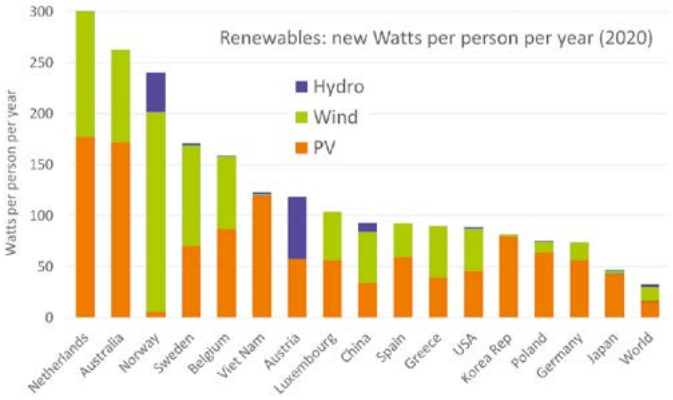


Figure 2. New renewables in 2020. Graph: Professor Andrew Blakers, RE100 Group, ANU

Global Trends towards Renewables with staggering speed: During his upbeat address at the Smart Energy annual conference Tim Buckley of the Institute for Energy Economics and Financial Analysis conveyed the staggering speed of disruption as illustrated by global trends in renewables uptake, costs, finance, targets, pledges and more.

Tracking the levelised cost of energy benchmarks he singled out three recent remarkable developments: the April 2021 600MW solar tender awarded in Saudi Arabia at US$10.40/MWh (down 23 per cent since April 2020); the November 2020 1,070MW solar tender awarded in India at just Rs2.00/kWh (an LCOE <US$20/MWh) down 18 per cent year on year.

Prior to that was the notable 700MW solar tender awarded in Portugal at US$13.15/MWh of August 2020, down 24 per cent year on year.

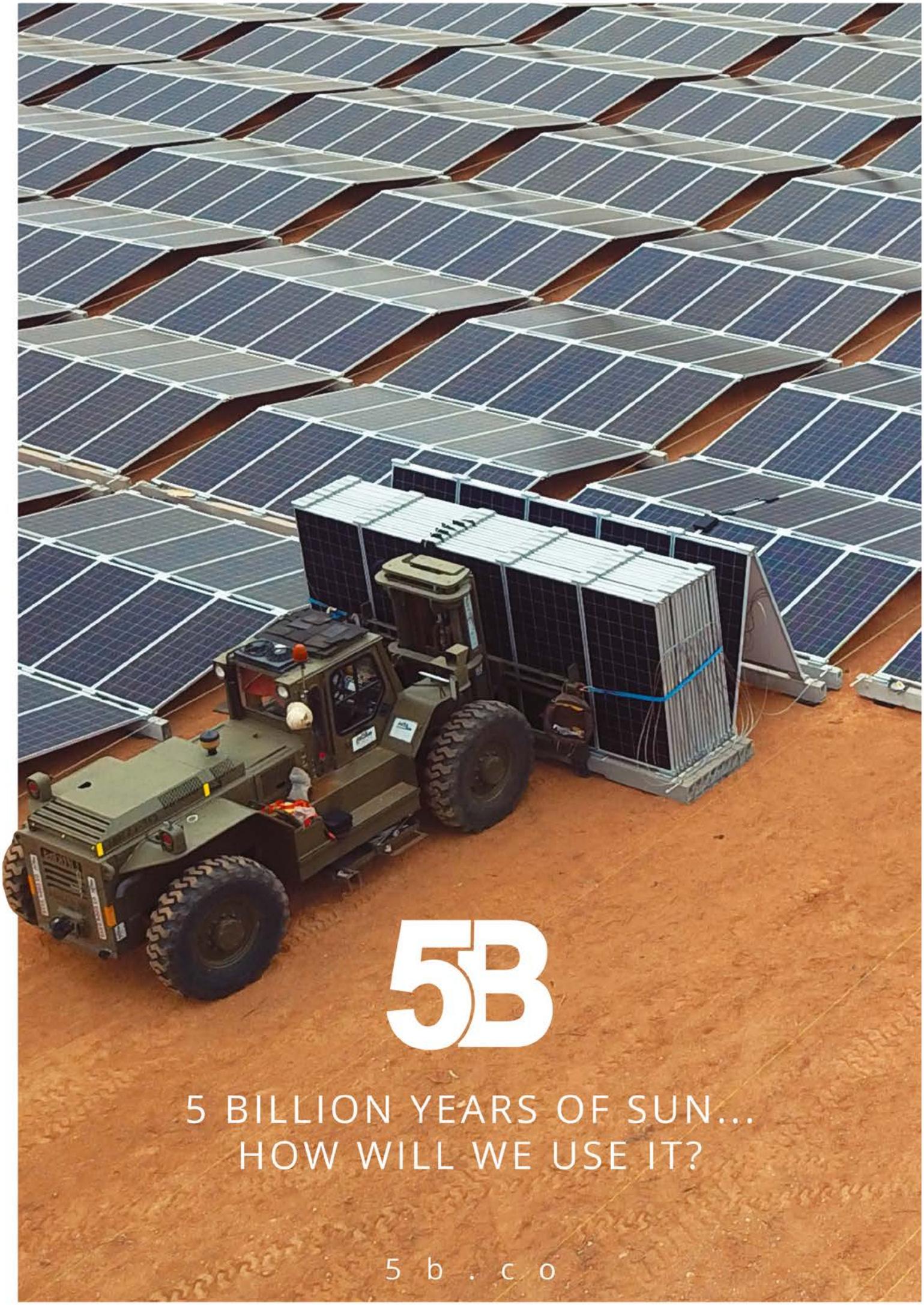
Global impetus was also illustrated at the April 2021 US Climate Summit where the US raised its pledge of emissions reductions of 26-28 per cent by 2030 to 50-52 per cent by 2030. Part of this will be achieved by an ambitious Jobs Plan that pledges US$174 billion "to win the Electric Vehicle market".

Japan lifted its pledge to curb emissions to 46 per cent by 2030 (up from 26 per cent) and in its bid to reach net zero by 2050 Japan's last 1.3GW coal plant proposal has been cancelled and the behemoth Sumitomo Corp announced its exit from all its coal mines by 2030 and coal power plants by 2040.

Germany plans to cut emissions 65 per cent by 2030 and its 2045 net zero goal that is one of the most ambitious among developed nations.

Canada will slash emissions 40-45 per cent by 2030, up from 30 per cent.

China has committed to peak thermal coal in power generation by 2025.


5B
5 BILLION YEARS OF SUN...
HOW WILL WE USE IT?
5 b . c o

Brazil aspires to achieve net-zero by 2050 and end illegal deforestation by 2030.

Russia pledged to 'significantly' reduce its emissions until mid-century, and

South Korea which has pledged net zero by 2050 will end public financing of coal-fired power plants overseas, and plans to invest $US32 billion on a 6GW, world's largest floating offshore wind farm that will slash greenhouse gas emissions by 9.3 million tons and produce 84,000 tons of renewable hydrogen annually.

New analysis from Climate Action Tracker shows that the raft of new climate commitments announced at the US Leaders Climate Summit will reduce global carbon emissions by between 2.6 and 3.7 gigatonnes, a commendable 12 to 14 per cent decrease on predicted levels.

Reality check: Substantial though that is, there is a gap of between 20 and 24 gigatonnes of carbon emissions that would nudge the world closer to achieving a 1.5°C climate target.

Reflecting the host of pledges and targets, global finance is on the march: characterised by Larry Fink of BlackRock as an "acceleration of a tectonic shift" who expressed his own surprise at the speed of change in reallocation of capital. But even so it is just the beginning of a long but accelerating global transition, he says.

In the 11 months to November 2020 investors in mutual funds and Exchange Traded Funds poured $288 billion into sustainable assets, representing a 96 per cent increase on all of 2019.

"We know that climate risk is investment risk, but we also believe the climate transition presents a historic investment opportunity," Fink says.

Climate change advisory and investment firm Pollination presents the data thus:

NET ZERO IN NUMBERS

$2.8 Trillion

Climate finance invested globally in the past 5 years

The low down on Australian fossil fuel subsidies

According to The Australia Institute, Australian fossil fuel subsidies hit an astronomical $10.3 billion in 2020-21 which means for every minute of every day $19,686 was given to coal, oil and gas companies and major users of fossil fuels.

One Commonwealth tax break alone of $7.84 billion exceeds the $7.82 billion spent on the Australian Army, the TAI noted.

TAI's Rod Campbell commented "Coal, oil and gas companies in Australia give the impression that they are major contributors to the Australian economy, but our research shows that they are major recipients of government funds… from a climate perspective this is inexcusable and from an economic perspective it is irresponsible."

Australia is increasing fossil fuel subsidies, while the Biden administration is committing to phase them out. Yet again, Australian governments are going against the tide of global trends and good climate policy," Mr Campbell said.

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"Decarbonising our economy can only happen if we first decarbonise our electric system. I believe technologies like machine learning and artificial intelligence, as well as advanced visualisation and computing have the potential to unlock the tools we need to provide clean, affordable and reliable electricity to everyone — and I'm committed to making these tools available to people worldwide. I believe strongly in the importance of integrating cutting edge technology into grid design and management."

AUDREY ZIBELMAN, Former AEMO chair, now with X, Alphabet's moonshot factory to lead their moonshot for the electric grid with its industry-leading work to combat climate change and build a greener economy

"The national consensus for climate action in Australia has shifted markedly in recent years. Every state and territory government is now committed to net zero emissions, so too are our peak industry, business and agriculture groups, as well as our national airline, and even our largest mining company.

The main thing holding back Australia's climate ambition is politics: a toxic coalition of the Murdoch press, the right wing of the Liberal and National parties, and vested interests in the fossil fuel sector."

Former Prime Ministers KEVIN RUDD (ALP) and MALCOLM TURNBULL (LNP)

"Australia needs to triple the level of its current ambition to cut emissions and aim for a 75 per cent reduction by 2030, and net zero by 2035. Net zero by 2050 is at least a decade too late. This means no new coal mines, no 'gas-led recovery', no more magical thinking about some new method of carbon capture and storage. We've got the sun, wind, land and water. We've got the brains, the science and the technology to do it now."

LESLEY HUGHES of the Climate Council and professor of biology and pro vice-chancellor at Macquarie University

"Many of the same folk who think that batteries and pumped hydro storage are unreliable are confident we can bury carbon dioxide underground for thousands of years with no chance it could ever bubble up"

[and]

"Is it just me or is there a bizarre overlap of right wingers who had no faith in scientists ability to predict climate change but have incredible faith in other scientists ability to invent solutions. CCS, magically turning coal into hydrogen, small scale nuclear."

RICHARD DENNISS TAI

Net zero is a 'deeply divisive proposal within the Coalition'...

Why is saving humanity deeply divisive? Why? What am I missing?"

DR ANIKA MOLESWORTH, Farmer, Scientist, Planet guardian

"Carbon Capture Storage has only two plants in the world — and they don't work. Angus Taylor says we should be focused on outcomes. So why is his government throwing another $250 million+ at CCS when we've already spent $1 billion with bupkis to show for it?"

Media commentator & entertainer DAN ILIC

TWITTERSPHERE FOLLOWING THE BIDEN CLIMATE SUMMIT

"The science says we need to halve global emissions by 2030 if we are to get to net zero by 2050. The US target is now almost twice as ambitious as Australia's and the UK's three times as much. No amount of spin changes that."

Former Prime Minister KEVIN RUDD

"A hollow boast to claim that we easily beat our Kyoto targets – our 1st 2012 commitment allowed us to increase emissions by 8% (the softest and only bettered by reduced land clearing), then by just 5% by 2020 off 1990 base. Government NOT 'world leader' in emissions reductions."

Former Liberal party leader JOHN HEWSON

"Australia sure is on its way to net zero, as the PM just said. On current projections they'll reach net zero in 2294."

KETAN JOSHI of RenewEconomy

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WHAT'S BEEN HAPPENING AT ONE STOP WAREHOUSE?

THE GOAL OF ONE STOP WAREHOUSE activities in the past year has been 'Bringing its customers more!'

One Stop Warehouse customers will have noticed some refreshing changes with the company as it is presenting itself with brighter, cleaner, greener livery with its new branding materials.

Timm McVaigh, the Digital Marketing Specialist for One Stop Warehouse explained "The brand's core has an energetic and colourful feeling that connects it more closely to the sun's energy, and the company's vision for sustainability to be 'Cleaner and Greener'.

"But it's not all just pretty colours and wavy lines. OSW has launched this new look with a range of downloadable technical resources. These include presenting customers with strategies for handling shading issues, and how they can step into a commercial project, or how to tackle the future of solar with battery storage.

"Each brochure is presented in a friendly, bright and easy to digest format and has proved very popular with OSW installers and retailers."

All-rounder

Andy Cheng, Head of Marketing, Product and Procurement at OSW said "One Stop Warehouse had become an industry leader thanks to our customer's loyalty to our products, pricing and service.

"However, we wanted to give our customers more. We have been focusing on providing technical and marketing leadership by closely aligning teams that work together, helping to bring our customers a host of value-added services, such as in-depth technical resources and weekly news.

"We also provide supplier insights through One Stop Live, hosted by the talented Diletta D'Arrigo and Timm McVaigh who, alongside our suppliers, provide product insight and industry updates.

"They also work with our knowledgeable technical team to produce Webinars, Panel Discussions and Tech Videos.

"We have appreciated the efforts of Ramsey Shamali's Tech Talk Videos focussing on new products and features. The team has also been working hard at refreshing the Zoom 'death by PowerPoint' format to create timely and lively panel discussions.

"All of this content has brought a closer connection between our manufacturers and our customers putting faces behind the brands. One Stop Warehouse has become a leading voice and a meeting place for our industry to keep informed, trained and up to date."

To further its goal of 'bringing its customers more', OSW is evolving its 'Solar Sessions' video delivery platform released in late 2020 to include training modules provided by GSES.

The partnership contract was signed in mid-April and is already presenting OSW customers training and CPD points opportunities with the GSES team led by Chris Martell.

Design Services Team

One Stop Warehouse customers can also commission the Design Services team that GSES has nurtured in its leadership of our industry.

Chris Martell, Director of Operations and Engineering at GSES, commented "GSES is excited to be adding its professional service and training offering to the One Stop Warehouse ecosystem.

"GSES' focus on quality, industry upskilling and capacity building aligns well with One Stop Warehouse's unrivalled industry reach and dedication. As an independent provider with deep ties to the renewable energy industry, GSES looks forward to working with One Stop Warehouse to address industry gaps and provide value to their customers."

With the anticipated changes to CPD point allocation by CEC, One Stop and GSES will help customers continue to build their professional development into the future and raise the professional standing of the industry.

When One Stop Warehouse brings its customers more, it has done so by aligning itself with leading brands, products and teams that have helped the company to ship approximately 600MW of panels and grow its revenues by 40 per cent.

"We believe this commitment to our customers and their success as installers and retailers has helped sustain our year on year growth."

Andy Cheng said "We believe the more value we give our customers and our Industry the more valuable our relationships become in growing a future built on sustainable solar energy."

www.onestopwarehouse.com.au

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

A LOOK AT GROWATT

Lisa Zhang, Marketing Director at Growatt brings readers up to speed on Growatt's developments.

SMART ENERGY: What can you tell us about the evolution of Growatt's product range?

LISA ZHANG: It's been six years since Growatt launched the first generation of residential storage solutions in 2015. Over the years, we have been able to develop a comprehensive range of product offerings for solar energy storage applications including DC coupling and AC coupling. For batteries, low voltage or high voltage, we adopt a modular design to facilitate capacity expansion and installation.

SE: In August Growatt is launching the new generation C&I inverter MID 17-40KTL-X: what special improvements or advantages does this deliver?

LZ: The MID 17-40KTL-X inverter series is developed according to our research and analysis of the Australian market demand. We've kept the OLED display feature for the inverter. Customers can access system data through our ShinePhone app on their mobile phone or touch the inverter screen to read the real-time data even where there's no internet. In another instance, our MID inverter of 17 to 25kW capacity is designed with three MPPTs, allowing for three solar panel orientations. For 30 to 40kW, it has four MPPTs, eight input strings, meeting the demand to adapt to more complicated installation scenarios and improve PV system efficiency. We design the MPPTs this way to meet the demands and needs of Australian installers.

SE: What special processes underlie the development and design of new Growatt products?

LZ: In Australia, all our products are developed and adjusted according to the actual needs and demands of customers. It is part of what we call our 'localisation strategy.' We make changes and upgrades to each inverter series to adapt to local demand. Customer orientation is one of the core values at Growatt. We adopt such localisation strategies as we expand our business globally. That way, we increase our service efficiency and improve product competitiveness, and win over customers.

SE: Has Australia played an important role in the growth of Growatt?

LZ: Australia was the destination of our first exported load of inverters back in 2011. For Growatt, we've been growing along with Australia's solar market over the past decade. We're deeply engaged with the solar community here and we are able to understand our customers' needs. Therefore, we continuously bring to Australia product innovations that are well received by the customers. And as our business grows, we add more local staff to our Australian service centre to deliver better technical support to customers. We're very pleased to work with our partners to promote solar energy and contribute to Australia's clean energy transition.

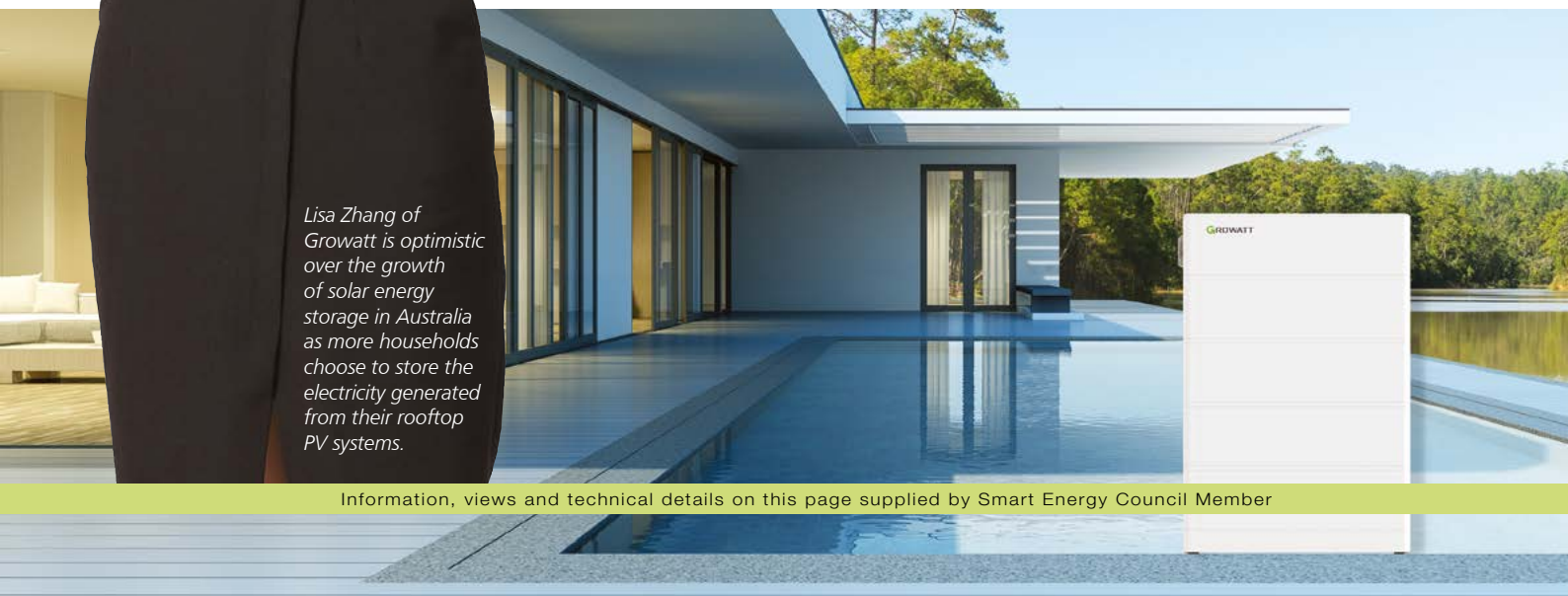
SE: And finally, what do you foresee for Australia's solar and smart energy market?

LZ: Solar energy storage is the future for solar energy in Australia, and we are optimistic about it. Australia's solar market is very mature and very well developed. Australians welcome solar energy and many have solar panels on their roofs. The entire solar industry has demonstrated very competitive professionalism.

The electricity tariffs in Australia are relatively high and the trend for the market (aided by incentives) is to increase solar PV self-consumption. That means enormous potential for solar energy storage. With this in mind we launched our new generation inverter with its battery ready feature to enable customers to extend to energy storage with their PV system at a later date. We believe as battery prices continue to drop, the energy storage solution will become increasingly competitive and economical and more households will have solar and battery for their houses, significantly reducing dependence on the grid.

www.ginverter.com

Lisa Zhang of Growatt is optimistic over the growth of solar energy storage in Australia as more households choose to store the electricity generated from their rooftop PV systems.



ON TIME DELIVERY – HOW HARD CAN IT BE?

Grant Behrendorff of AC Solar Warehouse explains the logistics behind every order which underscore the need for accuracy at every move.

AT ITS CORE, distribution is a pretty simple business. Solar wholesalers buy equipment from manufacturers around the world, store it in one or more locations across the country, and despatch it as and when required by their customers.

But behind this 'simple business' there are of course many processes that all need to be executed smoothly. These include foreign currency trading, importing and customs clearance, bulk storage, picking and packing of orders, freight management, insurance, short and long-term demand forecasting, trade credit management, sales, marketing, technical and engineering support, and assisting with warranty claims.

Survey findings

A recent survey of 200 Australian solar installers carried out by EUPD Research revealed that the single most important and valued function carried out by solar wholesalers is to reliably deliver equipment when it is required, to the nominated location. Delivery reliability rated above all functions including customer service, product range and even product warranties.

Solar installers understandably consider this basic function fundamental to doing business and expect that all wholesalers must be able to achieve accurate, on-time deliveries.

A more detailed look into this specific process reveals that there are many steps that need to be carried out successfully to achieve the desired outcome:

- Order submitted by installer (via website, email message, Purchase Order or phone call)
- Order entered into wholesaler's stock management system
- Order details sent back to installers for checking and re-confirmation
- Payment made or placed on trade credit account as applicable
- Packing list sent to warehouse
- Warehouse pick and pack equipment
- Most appropriate freight method confirmed and freight labels printed
- Warehouse attaches freight labels and arranges collection by freight company
- Freight company collects and delivers to installer, and
- Installer receives order and confirms order received as expected

If the order is collected from the warehouse by the installer the involvement of a freight company can be avoided, but in any event, there are more than seven individual steps required to be executed successfully so that an order is delivered on time to the correct location.

And every one of these steps represents a potential point where delays or errors can occur.

Quality assurance

Good wholesalers can be expected to have quality assurance processes in place to ensure that these steps are all executed quickly and accurately, but there are many things that solar installers can also do to minimise the risk of something going wrong along the way. These include:

- Providing comprehensive information at the time of ordering
  - Correct part numbers for every item ordered
  - Correct quantities taking into account minimum order quantities
  - Comprehensive delivery address details including identifying if it's a residential or business address
  - Hours when deliveries can be received, and
  - Confirmation of availability of forklift for unloading where required
- Accepting delivery
  - Ensuring there is an appropriate person at the nominated address to accept the delivery when it arrives
  - Taking photos and promptly reporting any damage that has occurred during shipping, and
  - Thoroughly checking the order to identify any discrepancies in items received and reporting these quickly so that they can be investigated and addressed

Errors and mistakes of course occur in all businesses, however if wholesalers have high quality processes in place, and assuming that comprehensive and accurate order information is provided at the start of the process, the risk of an error occurring between the order being received and it being despatched from the warehouse

PHOTO: MELISSA BELEVSKI

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

PHOTO: MELISSA BELEVSKI

"Delivery reliability rates above all functions including customer service, product range and even product warranties."

should be low – less than one error per 500 orders would be considered best practice.

Once an order is collected by a freight company data shows that delivery occurs on or before the estimated time of arrival (ETA) provided by the freight company on about 60 per cent of occasions, meaning 40 per cent of deliveries occur after the advised ETA. This is obviously outside of the wholesaler's control and represents by far the greatest risk in the ordering and delivery process. This is something that installers should be aware of and take into account. The best way of mitigating against delays by transport companies is to allow a few days extra for this step of the process. As simple as this seems, it is surprisingly uncommon. There is no insurance that can be taken out against delivery delays by freight companies, and there is frustratingly little that can be done in most cases to speed up deliveries that are stuck on long haul trucks or caught between carriers or freight depots. Understanding the potential for these delays and allowing for them in the job planning is the only proven method of managing this risk.

It is reasonable for solar installers to expect that wholesalers have high quality processes in place to ensure the equipment they need is reliably delivered to the right place at the right time. If installers also have high quality ordering processes in place the likelihood of accurate and on time delivery is maximised. Maintaining close, long-term working relationships between installers and wholesalers is the best way of reducing the risk of equipment delays and the flow-on problems this can cause for solar installers and retailers.

www.acsolarwarehouse.com

AC Solar Warehouse is 100 per cent Australian owned and operated. The company wholesales a comprehensive range of inverter, solar module and energy storage technologies and distributes via a network of warehouses across Australia and New Zealand.

GOODWE'S DIVERSIFICATION AND GROWTH

Since its public listing last year that was touted as "paving the Way for GoodWe's Future Growth Strategy" PV inverter manufacturer and energy storage solutions provider GoodWe has continued to diversify and expand. A series of developments are underway including a move into battery storage from later this year.

Country Manager Dean Williamson says solar power becomes more economical as each year passes

AUSTRALIA'S SOLAR MARKET may not be on a scale of other countries, but it represents a strong and safe solar market and that is why GoodWe is deploying significant resources in the region that currently represents the company's largest international residential market.

The China-based inverter manufacturer which boasts cumulative delivery of two million inverters and global installation of 23GW is primarily focused on the residential, commercial and storage sectors within the Australian and New Zealand market, where sales have increased a healthy 50 per cent year on year for the past four years.

"It's quite unique in that we have a strong presence across the markets and for this reason there is little risk in our dealings here in Australia compared to some other nations, not forgetting too the relatively skilled handling of COVID-19 within Australia," Country Manager Dean Williamson said.

"Throughout the worst of the 2020 pandemic we were able to enjoy continued growth due to the strong solar uptake within Australia."

This year is no different, with the company experiencing a sharp spike in demand for its residential product range. The smaller commercial sector too is humming along.

Dean attributes the release of GoodWe's larger single phase 3MPPT MS series as the key factor in their residential growth, saying a large portion of homeowners only have single phase power and the series paved access to this growing market.

It is always a matter of reading and responding to market forces, he says.

"The market has continued to mature and consolidate from a manufacturer's perspective and we're continually evolving to keep up with market trends and to stay at the forefront of innovation," said Dean who has clocked up many years in the industry and witnessed consistent growth in the residential market with record numbers month on month.

He's also witnessed the continual increases in the average system size, from 1.5kW to now somewhere north of 8kW and with that greater system sophistication.

"We're seeing inverters becoming smaller, lighter, more cost effective, more efficient, more flexible and they are also including more functionality IE [internet explorer] including more MPPTS, inbuilt DC isolators and larger input currents just to name a few."

A key focus moving forward will be the large commercial sector and GoodWe is primed with the release of its new HT series 100/110/120kw 12 MPPT that will become available in July.

Last year GoodWe had the honour of being named by Wood & Mackenzie as the largest supplier of storage inverters globally, with its single phase and 3 phase solutions, low voltage, high voltage and AC coupled solutions.

Storage momentum

Battery storage products represent a vital element of the GoodWe portfolio and from July consumers will also have the choice of GoodWe's first LV (low voltage) battery called Lynx which is being released into the Australian market.

As Dean stated, "We have seen growing demand from installers that they prefer to deal with only one manufacturer when it comes to inverters and batteries and as a result, we are excited to present our battery offering."

The company continues to shape itself according to market demand.

The future for solar in Australia is bright and there are no signs of it slowing down, Dean says. "The cost of power is ever increasing to the consumer and the cost of solar equipment has consistently declined which makes for a strong market.

"Solar power is only becoming more economical as each year passes."

Although the local market is regarded as strong and safe, Dean concedes market drivers and changes to incentives such as rebates, feed-in tariffs, STCs, LGCs can and will affect consumer sentiment and impact demand, but the solar sector has ridden and overcome many challenges in the past and remains as popular as ever.

The outlook remains bright, and to cater for burgeoning sales GoodWe has expanded its local team with local sales, service and marketing staff located in Brisbane, Sydney and Melbourne which recently relocated to a larger office and warehouse in the city's east

http://www.goodwe.com.au

GOODWE
YOUR SOLAR ENGINE

GoodWe specialises in the production of string solar inverters, with a power range between 1.5kW and 80kW. As well as single-phase and three-phase inverters, the company also manufactures inverter devices for use with energy storage. Its inverters have been used in residential and commercial rooftops, industrial and utility scale systems and range from 0.7kW to 250kW.

GoodWe has more than 2000 employees in 15 different countries and is ranked as the Global No.1 storage inverter supplier by Wood Mackenzie and one of the Top 10 inverter suppliers by IHS Markit and been awarded the TUV Rheinland 'All Quality Matters' Awards for five consecutive years.

Upmarket offering

Licensed Partner

Recognising the need for greater choice, GoodWe manufactured **GE** solar inverters were made available in the Australian market in early 2021, and in May the GE branded inverters manufactured by GoodWe under the name 'GE Solar Inverter' were showcased at the Smart Energy Conference & Exhibition.

"The latest and most advanced features have been reserved for the GE branded inverters," Dean explained. "The target audience for the GE branded inverters are those looking for a premium, top quality product whereas the target audience of GoodWe inverters are those looking for cost effective yet reliable inverters."

No other country in the world has access to these products yet, and there is a special and separate team working on the GE branded inverters both here in Australia and in China.

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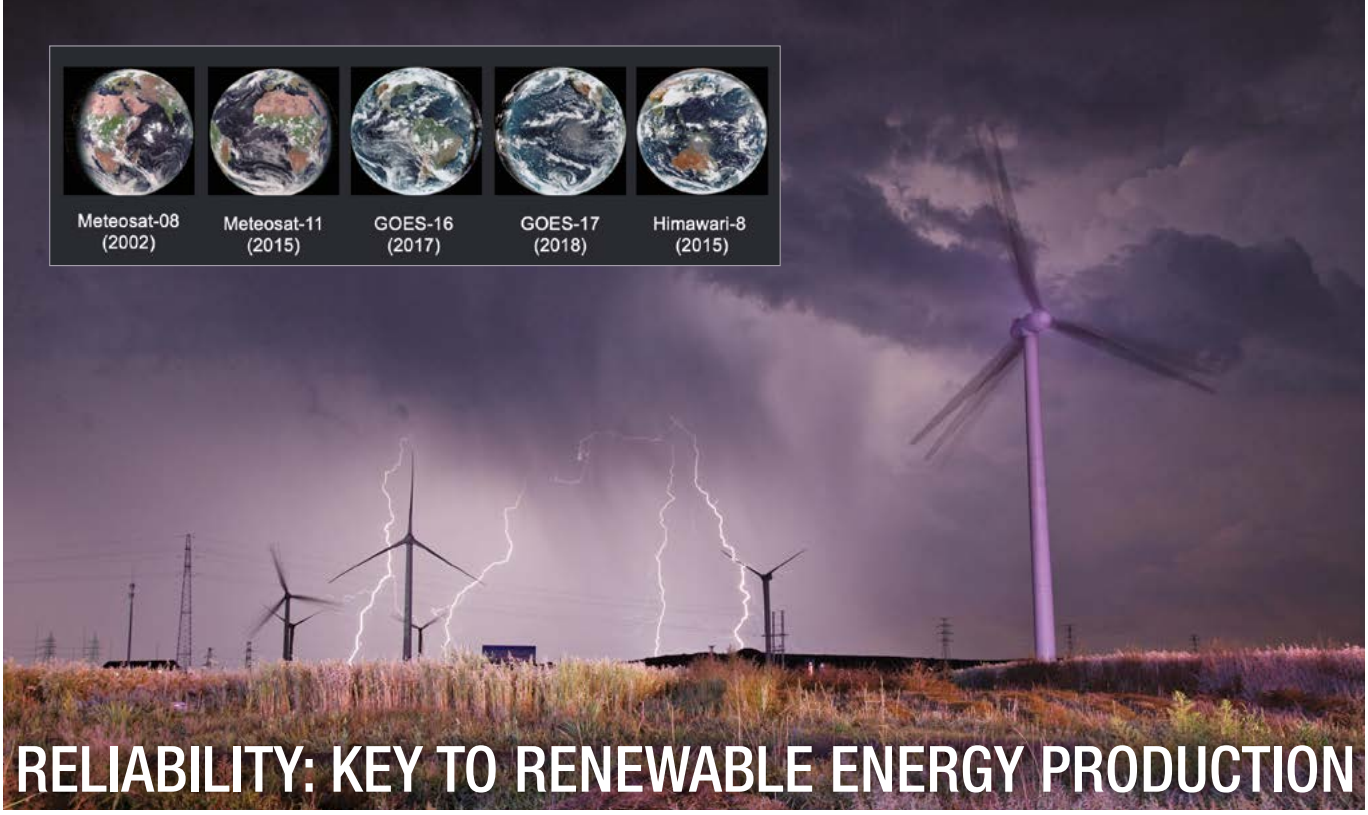


RELIABILITY: KEY TO RENEWABLE ENERGY PRODUCTION

weatherzone° business

WORLDWIDE SOLAR POWER DEMAND has been experiencing exponential growth over the past decade. Solar PV is predicted to become the most important source of energy for electricity production in a large part of the world by 2030.

Although improvements in technologies have increased storage capacity and made solar energy cheaper to generate, the variable nature of solar generation poses significant challenges for integration into the power grids.

However renewable energy production forecasting can help energy providers with network planning, load forecasting and operational visibility.

The key is to ensure that network operators make confident decisions based on accurate and reliable insights.

Weatherzone Business, a DTN company, and in partnership with Solcast, is a trusted partner for renewable energy production forecasting serving more than 60 per cent of operational solar farms in Australia's National Electricity Market (NEM).

The company uses an ensemble of weather and solar models and advanced technology to provide a sophisticated cloud identification and forecast for the solar industry.

This comprehensive forecast improves load and demand forecasts, manages solar-related network congestion and voltage changes, trade of wholesale power and manages virtual power plants and microgrids for small-scale photovoltaic systems as well as large-scale solar power plants.

Grasstops to rooftops challenge load prediction

Rooftop PV is the fastest growing in Australia's energy, with more than 3GW of new rooftop PV installations during 2020. The now largest renewables energy generator in the NEM has also brought new challenges for load forecasting. The variable nature of rooftop PV and the unknowns of generation versus consumption means that understanding the total output into the grid is essential.

Rooftop PV

Weatherzone's customised grid aggregation product provides accurate load and consumption insights needed to make these critical load forecasting decisions. The company uses live data as a realistic real-time proxy for measured rooftop PV output, and forecast data to guide daily network operation decisions. By using historic grid aggregation data for model training and forecast data as an input to model the rooftop PV aspect, network operations can understand annual averages for long term network and load modelling.

Large scale solar

Large scale solar which is better connected, also poses its own challenges for network operators. Fronts or cloud bands can bring large changes in solar and wind, which can result in large concurrent ramps in energy from Renewable Energy Zones. Having a better understanding of how weather systems are developing in real-time improves forecasting for real-time dispatch, allowing renewable energy generators to reduce penalties and manage storage.

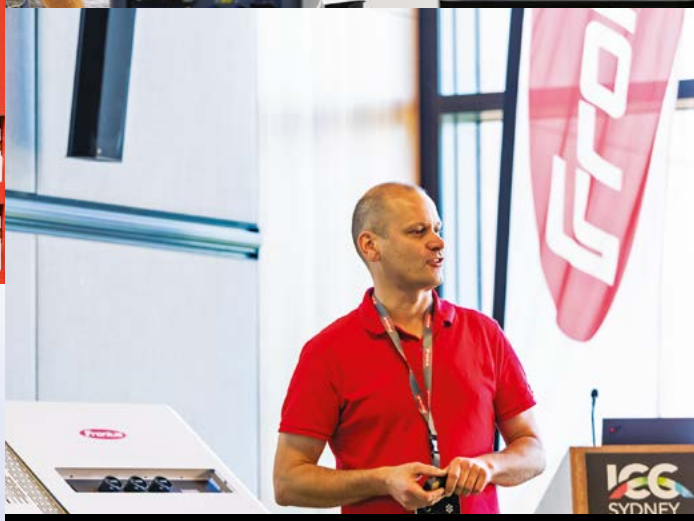
Better data, better prediction

Weatherzone uses high-resolution satellite imagery, irradiance modelling and installed capacities to create one forecast. Recent advancements in technology have improved data delivery to provide faster and more detailed insights. The Weatherzone Nowcasting system delivers at 1-2km resolution, updating every 10 minutes with fields such as temperature, wind, rain, cloud and lightning. There are customised options for companies that need even more precise details of individual cloud impacts up to 10 minutes ahead.

The convergence of an increasing focus on renewable energies, as well as the decreasing cost of production, has placed solar energy as a primary solution to reduce carbon emissions. This means regulators, businesses and the public will increasingly depend on and expect reliable generation.

The renewable energy production forecast created by Weatherzone and Solcast supports solar network providers with customised information to confidently plan short and long-term renewable energy generation.

For more information, please contact us at
business@weatherzone.com.au
www.weatherzone.com.au



We thank our Titanium, Platinum and Gold Partners at the Smart Energy Conference & Exhibition 2021

SMART ENERGY
CONFERENCE & EXHIBITION

PLENTI OF SMARTER HOMES

Plenti's lending for renewable energy has grown 100 per cent year on year providing over $130 million of finance for clean energy products.

IN 2017, PLENTI LAUNCHED an Australian-first: an opportunity for borrowers and retail investors to access the lending market for the purchase and installation of consumer renewable energy products.

The launch was based on the company's commitment to accelerating the uptake of solar energy and the new marketplace provided Plenti's lenders with access to invest in Australia's transition to a cleaner, more sustainable energy mix, ultimately contributing to a sustainable energy future.

Since then, Plenti's lending for renewable energy has grown 100 per cent year on year providing over $130 million of finance for clean energy products. It's been fuelled by the broader residential solar and battery market which saw 378,000 households install some form of solar energy in 2020, a hefty 30 per cent increase on the year before.

Plenti's Head of Renewable Energy Finance Louis Edwards said: "This is such an important part of our business: it's a segment of the market where we have the potential to make a real difference, and the demand for renewable energy will only continue to increase."

Plenti – formerly known as RateSetter – launched renewable energy lending with a simple, interest-bearing regulated loan. Fast forward three years and the business recently broadened its offer to include interest-free renewable energy finance to offer installers and vendors even more options for their customers. The launch reflects Plenti's focus on providing the best and broadest customer offer to its partner network.

James Strathdee of One Power Solar complimented Plenti for its point of difference, saying the technology, speed and innovation means they have the one-stop shop of finance offerings at their fingertips.

"We knew our installers and vendors wanted as many options as possible to offer their customers, so we ran a pilot program over three months to gauge the response to our interest-free product, and everything exceeded our expectations. Our pilot partners who came on board – all existing partners – showed an 80 per cent increase in solar finance applications compared with the six months prior.

"It was an obvious next step to roll out the new loan product, creating what is basically a one-stop-shop where installers or vendors can choose the finance that best suits their business and the demands of their customers," Edwards explained.

At launch Plenti's BNPL finance for renewable energy offered the longest loan terms in the market, at six years, highlighting the business's desire to provide its partner vendors with a meaningful point of difference for customers.

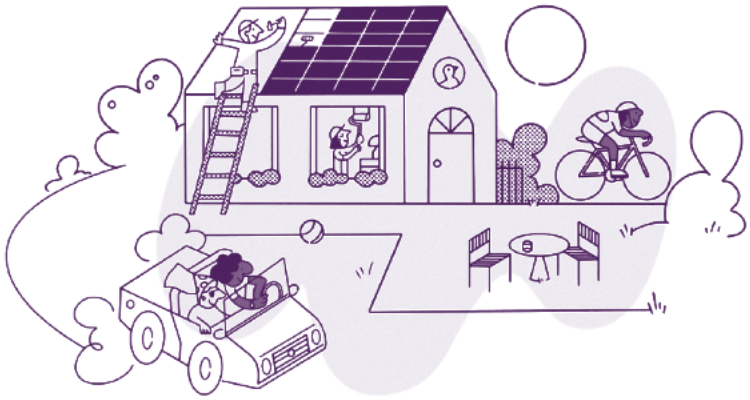
Plenti's ability to quickly develop and launch new products is underpinned by a sophisticated technology platform built, maintained and developed in-house. For consumers this translates to a greater experience on the back of market-leading speed, ease and convenience of application, funding and settlement processes.

"It's not only the technology that matters though," says Edwards. "The strong relationships

"Renewable energy finance is such an important part of our business: it's a segment of the market where we have the potential to make a real difference, and the demand for renewable energy will only continue to increase."

LOUIS EDWARDS, PLENTI

Plenti



BY THE PLENTI NUMBERS

12,800+ home renovation loans

14,000+ solar and home battery loans

28 awards in six years

3,645 5-star reviews

65,000+ big ideas brought to life

we have with our vendor partners, and the engagement right across our network ensures there's a level of contact and service that fully complements our digital offer. It's critical our partners know where to come to when they need more information about our products or assistance in facilitating a customer's loan application."

Government partnerships

An important part of Plenti's involvement in renewable energy lending are the pilot programs it has been running through its government partnerships with New South Wales and South Australia, and the federal government's Clean Energy Finance Corporation (CEFC).

In 2018, Plenti was appointed the exclusive administrator of the South Australian Government's Home Battery Scheme, a pioneering $100 million residential battery subsidy scheme, available for up to 40,000 South Australian households.

Plenti worked alongside the CEFC to structure the $100 million financing facility offered to South Australian residents at competitive rates to help break down costs and accelerate the adoption of residential batteries.

To date, the South Australian Home Battery Scheme has been a resounding success, delivering on both policy and consumer benefits with more than 13,500 batteries installed with total storage capacity of more than 160MWh and a further 14MWh awaiting to be installed.

Following on from the success delivered for the South Australian Government, Plenti was appointed exclusive delivery partner for the pilot of the New South Wales Empowering Homes program (EHP) in 2019.

The full program is expected to support the installation of up to 300,000 solar-battery systems across New South Wales over 10 years by providing interest-free loans to eligible New South Wales households.

This is a ground-breaking initiative, aiming to unlock up to $3.2 billion in clean energy investment and adding up to 3,000 megawatt hours of storage into the New South Wales energy system when complete.

Both these pilot programs reflect Plenti's ability to deliver customised products and innovations rapidly to market thanks to the proprietary technology that underpins its operations and strategic growth.

Louis Edwards said: "Working with government is a responsibility we take very seriously. Plenti is committed to Australia's environmental well-being, and these are partnerships where we're privileged to be able to play such an important role as we work towards a collective goal of driving Australia's clean energy future."

In addition to its government partnerships, Plenti has established a number of programs with globally recognised product manufacturers like Tesla, Energizer, LG and Origin Energy.

"Our commercial partnerships have provided more than $130 million in solar finance to Australian households since we started operating in this space. We want to find as many ways as possible to give our partner network the options we know their customers want – and we're working hard to bring our products to the distribution channels that are relevant to installers and vendors. If it doesn't move the dial for them, we'll change what we're doing until it does."

www.plenti.com.au

Plenti was known as RateSetter prior to August 2020

Kyle Jenkins, Chief Operating Officer, Clipsal Solar said *"Working with Plenti has provided a significant boost to our sales process and helped us offer our customers the best possible finance solutions."*

GREEN RENOVATIONS ARE A CLEAR TREND

Almost four in 10 Plenti home improvement loans are taken out for green renovations to help reduce energy bills such as energy efficient lighting, alternative power sources of batteries and solar panels, and energy efficient air conditioning and heating being the most popular.

According to industry data, homeowners overall borrow an average of $17,260 for home improvements or renovations. Energy efficient/green upgrades average around $9,500 (37 per cent), followed by general painting and decorating (35 per cent), upgrading outdoor areas (20 per cent) and replacing or upgrading kitchens (14 per cent) with pools, granny flats, living/kitchen extensions and additional bedrooms making up the balance.

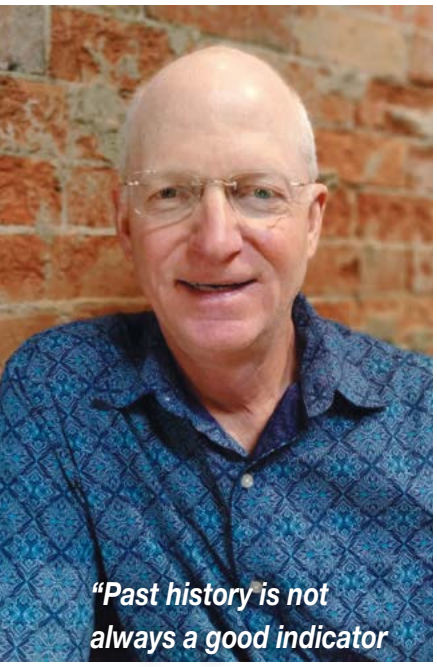
Plenti research revealed almost 50 per cent of the more than two million homeowners across Australia with rooftop solar PV were either actively researching or keen to invest even further by upgrading their existing system with more solar panels or adding a battery to improve efficiency.

The late 2020 consumer survey found 99 per cent of the 552 Australians nationwide who had purchased solar panels and/or battery storage for their home were happy with their green energy purchase claiming an average monthly saving of $175.

Plenti works with 650 partners across Australia to install solar panels, batteries and a range of green technology.

SMART ELECTRIC, ENERGY EFFICIENT HOMES

A comprehensive assessment of home energy use and opportunities for improvements can produce dividends but where do you start? Maybe by calling specialist advisor Tim Forcey who has helped more than 1000 homeowners improve their surrounds and highlights the enduring popularity of rooftop PV.



"Past history is not always a good indicator of the size of rooftop PV system needed and that is what installers do – examine bills and usage – when they need to consider future use of batteries and EVs."

TIM FORCEY

THOSE WHO LIVE IN A 'LEAKY TENT' find hot summers and cold winters exasperating, no matter the amount of heating or cooling, once the desired temperature is reached the warmed or cooled air gradually leaches out and it's back to square one. Too hot or too cold and too high a power bill.

According to home energy efficiency expert Tim Forcey those living in inefficient one-star houses might be spending up to $5000 a year to run equipment including ducted gas heating.

That is one of the 'hot' issues dealt with by the Melbourne-based specialist who suggests owners ditch their gas systems and convert to more efficient air conditioning split systems, preferably powered by solar PV and used when the sun's shining.

"For years air conditioners were demonised, older models were inefficient and costly to run but all that has changed with today's more sophisticated systems," he said. "I've tried to get the story out that air conditioners are good things. In winter they harvest free renewable energy from the heat outside the house and many homeowners could be saving hundreds of dollars a year by turning on the air con they already own by finding the heat button!"

In the five years since the not-retired-as-planned Tim started his rounds as an energy expert he estimates he's visited about 1,000 homes. During each three-hour visit he forensically examines housing structure for gaps and air leaks using a thermal imaging device and subsequently draws up a list of practical improvements.

Replacement of gas heating systems with electric space heaters is one of his top four recommendations along with insulation, draught proofing and a hot water replacement plan.

"Proper insulation is the low hung fruit, it's an easy and an important fix," says Tim who has seen all sorts of horrors in ceiling cavities including instances where large bulky bags of insulation have simply been dumped, or cases where insulation has been disrupted and not properly restored causing significant heat loss.

"As for draught proofing, sometimes you can stick your fingers through cavities above or below walls and doors, areas people just haven't spotted and that go unaddressed and that's why I often refer to homes as glorified tents," he said.

The use of a scientific blower door test detects the leaks by measuring air changes that on a blustery day can occur once or twice every minute or two making it impossible for residents to stay comfortable.

Smart hot water

Mindful of environmental imperatives Tim's no fan of the fossil fuel gas and frequently recommends replacement of gas-fired hot water systems with hot water heat pumps, telling clients "If a water heating system breaks down the chances are the plumber will replace it as it's the quickest alternative and it's hard to put up a fight, but an investment in a hot water heat pump makes sense in the long term and it's powered by renewable energy."

Eliminating all gas use in the home (for space heating, water heating and cooking) also means the end of the fixed supply charge of around $1 a day said Tim who was raised on a dairy farm in the US and has always felt a connection with the land and the natural world.

The qualified chemical engineer who joined Exxon has, since 1990, been "quietly watching the science of climate change". To better understand the unfolding scenario he undertook Al Gore training.

"What is the globe apart from a giant physical laboratory? We have runaway warming that is going to cook us, if this was a chemical plant you would not be able to operate it or get it under control!

"This is all about saving the planet for those who come after us," said Tim who is also spreading key messages to the tens of thousands who subscribe to the increasingly popular **My Efficient Electric Home (MEEH)** Facebook page he founded with architect Jenny Edwards and Richard Keech of Enhar.

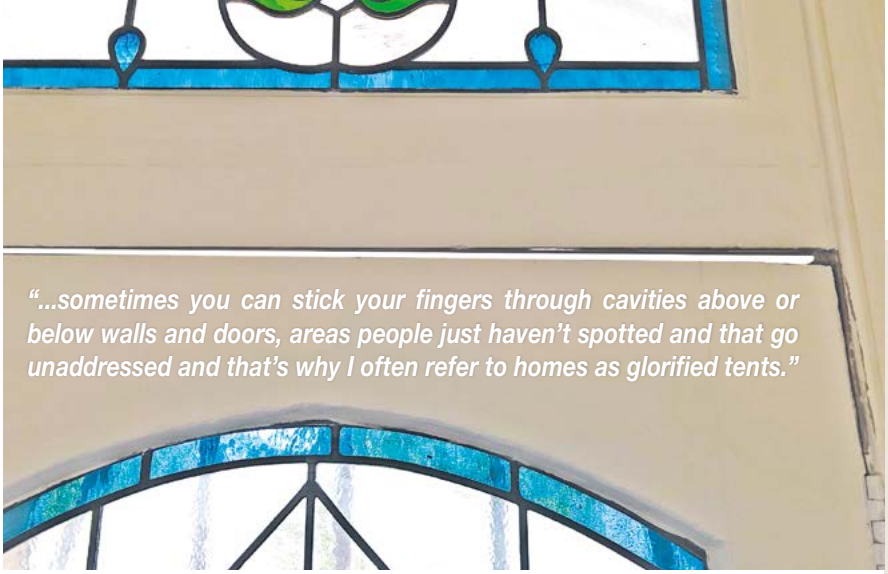
The greatest interest among subscribers, they have found, has always been in solar power and they are happy to peddle the range of financial and environmental benefits of rooftop PV.

Interest in solar energy continues to soar

"Solar power continues to be the big drawcard in terms of electric homes, most of MEEH's new members want to learn all about solar PV; those who have it wonder if they need more or to add a battery, storage is a huge driver of interest but we don't see batteries as an economic proposition as yet.

"Our best advice is to get a quote for the biggest solar system you can fit on the roof. Feed-in tariffs are declining and in some cases exports are being limited and this needs to be factored in but that will be all the more reason to consider batteries.

"Past history is not always a good indicator of the size of rooftop PV system needed and that



is what installers do – examine bills and usage – when they need to consider future use of batteries and EVs," said Tim who has upgraded his own rooftop PV system three times over 15 years.

"Of the close to 30,000 members of the My Efficient Electric Home forum most have or will have solar PV and we are yet to find one person who claims to have too large a system," he chuckled.

System designers will no doubt be pleased to pass on what appears to be a common conviction: the bigger the solar system, the smarter the move. Electrification of households is the way of the future, starting yesterday.

http://timforcey.com.au

If the name Tim Forcey is familiar, it's because he's featured in The Age *Domain, the* Herald Sun*, on Channel 9 television, and on ABC radio in Victoria and interstate. He's also published a series of articles in* The Conversation, Renew Magazine, the Fifth Estate *and regularly presents addresses to community groups. He's also advised energy companies, local councils and over the years has helped inform the Victorian government on VEET ratings and home energy opportunities.*

SYDNEY CITY USHERS IN A NEW ENERGY EFFICIENT ERA

The City of Sydney is introducing energy targets for Development Applications in a bid to make new office buildings, hotels and shopping centres more energy efficient and boost the use of renewable energy.

From January 2023 major redevelopments of existing buildings must comply with minimum energy standards on the path to achieving net-zero energy output by 2026.

Benefits come in many forms, slashing $1.3 billion in energy bills from 2023 to 2040 for investors, businesses and occupants, saving office owners $2,750 per 1,000 square metres of floor area and hotel owners $170 per room each year.

Lord Mayor Clover Moore said the updated DA's will help the City of Sydney meet its target of net-zero emissions by 2035 and that the performance standards can be used by all councils across Greater Sydney.

The changes will also support investment in renewable energy and create jobs in regional areas as already seen through CoS investment in several wind and solar farms, she explained.

SMART ENERGY COUNCIL
SOLAR, STORAGE, SMART ENERGY

ABOUT US

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 over 1,200 members nationwide, consisting of companies and individuals operating in this rapidly expanding industry.

HYDROGEN AUSTRALIA
A DIVISION OF THE SMART ENERGY COUNCIL

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.

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, hydro, bioenergy, ocean energy, geothermal, hydrogen, co- and tri-generation and hybrid and enabling technologies.

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

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

"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

BECOME A MEMBER TODAY

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

For further information please contact:

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

Learn more **smartenergy.org.au**

AUSTRALIA'S WASTE IS NOT BEING WASTED

Household waste powering 185,000 homes per day

Today, roughly **three quarters** of household waste in Australia is sent to a highly engineered landfill where it is converted into renewable energy. This is significant because it means our nation's landfilled waste is not being wasted a second time.

Landfill Bioenergy, pioneered in Australia by LMS Energy, produces enough green electricity from landfill to power 185,000 Australian households each day while also abating more than 6 million tonnes of greenhouse gases per annum.

LMS ENERGY

- AUSTRALIA'S LARGEST EMISSIONS REDUCER AND MOST EXPERIENCED BIOENERGY COMPANY
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PROMINENT SOUTH AUSTRALIAN SOLAR ENERGY EMPLOYER SUNENERGY was recently announced as one of the Top 20 Solar Companies in Australia and a Top 5 retailer in South Australia for 2020.

Despite the challenges brought by the pandemic SunEnergy saw its Australian business grow more than 46 per cent. Part of that success can be attributed to the 'pay as you save' product offered by SunEnergy says Managing Director Lee Lake, which was offered at the right time and place.

"Our 'pay as you save' product was a strong motivator for people to invest in solar even during COVID… people were able to budget out their solar and manage their cash-flow," Lee said.

"That's because during the year that threatened jobs and employment people were looking at their expenses, households were cutting down on unnecessary expense or trying to find savings, and financial decisions makers were finding more time on their hands to explore solar options."

In 2021, the trend continues with a rise in solar investment as people continue to work from home, Lee says, adding that recent plans by the South Australian Government to commit to 500 per cent renewable energy by 2050 also sends all the right signals.

Currently more than 8 of the 39 solar farms under construction in Australia are located in South Australia.

***SO FAR* SO GOOD** Inverter and battery manufacturer SOFAR Solar has partnered with Australian smart energy innovator carbonTRACK to join the list of approved products for the South Australian Home Battery Scheme.

The partnership means that every SOFAR Solar battery sold through the South Australian Home Battery Scheme will come with access to the carbonTRACK platform.

SOFAR Solar Australia Managing Director Yolanda Wang said carbonTRACK offered an end-to-end virtual power plant solution that incorporated hardware, firmware and software that creates a 'win-win' for both companies.

Melbourne-based carbonTRACK's smart energy management platform unlocks multiple revenue streams for Independent System Operators, energy aggregators, renewable energy financiers and energy traders. Low-cost scalable energy intelligence and resiliency is delivered using highly secure cellular communication to integrate hardware, network infrastructure and control systems with carbonTRACK's powerful machine learning engine.

With over 600 employees, SOFAR Solar specialises in R&D, production, sales and service of grid-tied inverters ranging from 1.1kW to 10.5kW (single phase), 3kW to 255kW (three phase), storage inverters ranging from 3kW to 20kW, batteries and other related renewable energy products.

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

SHINING THE LIGHT ON OUR FURRY FRIENDS

GoodWe, One Stop Warehouse and Risen Energy teamed their generosity of spirit and expertise to supply a solar system to Saving Animals from Euthanasia (SAFE), a not-for-profit animal rescue organisation in Karratha, Western Australia.

SAFE was chosen from a field of potential worthy recipients nominated by retailers and installers who acknowledged the impact COVID-19 on communities and businesses.

They were attracted to the organisation's mission, in particular their work in assisting individuals find companionship by connecting them with a pet, a partnership that proved more important during the pandemic that brought on isolation, and significant mental and emotional distress.

As part of this campaign, GoodWe donated their GW10KT-DT three-phase inverter, Risen Energy donated 36 x 370W Jaeger panels and One Stop Warehouse managed the logistics and coordination of the campaign. Cheeditha Energy carried out the installation of the 10kW solar system in April 2021.

SAFE Founder Sue Hedley OAM commented on the significant cost savings delivered by the solar system will enable them to carry on saving the lives of animals and humans alike.

"It's hard to find big enough words to get across the gratitude SAFE has to Risen, One Stop Warehouse, GoodWe and Cheeditha Energy for their generous support to a struggling animal rescue service. The amount of money that will be saved using solar powered energy in a place where the sun is constantly shining is exponential."

Dean Williamson of GoodWe Australia said his company felt a deep responsibility to "do a small part" in sustaining the good work of the animal shelter and Andy Cheng of One Stop Warehouse added he hopes more companies in the solar industry will bind and forge similar initiatives.

https://safe.org.au/help-us-out/

SAFE Founder Sue Hedley OAM fully appreciates the benefits and cost savings of solar PV

Thanks to GoodWe, One Stop Warehouse and Risen Energy a dog rescue centre in WA has a rooftop solar PV system

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

FARMING SUNSHINE

Redflow's largest shareholder Simon Hackett (pictured left) has successfully deployed a Redflow-based rural microgrid that delivers energy independence for buildings and equipment on his family farm in northwest Tasmania.

Set amid the working sheep farm set on a sprawling 73-hectares is a ground mounted 100 kilowatt-peak solar array and 28-battery Redflow-based energy storage system.

Energy is stored in 28 Redflow 10 kilowatt-hour (kWh) ZBM2 zinc-bromine flow batteries which have a total storage capacity of 280kWh.

Simon said the system would eliminate grid electricity costs for the property and "Also gives us energy resilience by automatically switching to off-grid mode during any grid power failures".

The battery array makes extensive use of the Redflow Standby Power System (SPS) mode, allowing batteries to be fully charged during good solar weather days, and to then be 'hibernated' with zero self-discharge. During extended overcast periods, the SPS batteries are automatically activated to support site loads instead of using the grid.

On the drawing board is an expansion to a 200kWp solar array to create an energy 'fuel station' that will serve electric tractors and other electric farm equipment that will eventually replace the existing fleet of diesel machinery.

JINKO CELEBRATES

During May JinkoSolar celebrated 3.2GW sales to the Australian market.

Head of Australia for JinkoSolar Bright Wang commented on the panel maker's proven experience in Australia over a decade presenting some tough conditions.

"JinkoSolar was one of the first major global manufacturers to ship the 370W power class to Australia, which has since become the standard go-to panel for the industry," Bright said. "JinkoSolar was also the first to ship transparent backsheet bifacial panels at scale, and the first Super League manufacturer to offer a full range of N type modules to Australia."

JinkoSolar's success in Australia has been underpinned by the Smart Energy Council's Positive Quality certification (see also page 64) and the PVEL tests in which Jinko has achieved seven consecutive years as a top performer.

SMASHING RECORDS

LONGi Solar set a new module shipment record of 24.53GW in 2020. The largest dedicated monocrystalline silicon PV module manufacturer globally broke all records with the shipment and with revenues of US$8.4 billion (A$10.7 billion) the company saw healthy growth of 65.92 per cent over the year.

According to insiders at industry website www.pv-tech.org this puts LONGi at the top of shipment rankings for 2020 and shows that the top five manufacturers represent a little more than 70 per cent of all solar module shipments in 2020. They state in 2020 the trend towards consolidation accelerated and the future is likely to see more and more of the market concentrated amongst the top five or six companies by shipment volumes.

Stephen Zhang, LONGi Solar Australia Managing Director

"In 2018, the top 10 module manufacturers represented 50 per cent of the market. Now three years later the top five module suppliers represent 70 per cent of the market," said Stephen Zhang, LONGi Solar Australia Managing Director.

Australia's domestic rooftop market has been quick to adopt the new Hi MO-4 module series launched by LONGi in 2020 and according to market analyst SunWiz LONGi modules now occupy the No. 1 position with 25 per cent market share.

In May this year LONGi released two new models for the Hi MO-4 range that were on display at the One Stop Warehouse, Austra Energy and Solar Juice booths at this year's Smart Energy Exhibition.

Earlier this year LONGi Solar Australia launched LONGi Solar Rewards to reward Australian solar installers selling and installing solar systems in Australia. LONGi recognises solar retailers and their staff every time they sell and install LONGi solar modules. Every kW of modules sold and installed by an authorised retailer will EARN reward points that can be redeemed in an online store. The Solar Rewards also provide members access to training, technology previews, business support and networking opportunities.

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

EV BUSES TAKE TO THE ROADS Enphase microinverters have been selected for Australia's first public transport depot to feature a fully solar-powered bus operated by multinational transit operator Transdev.

Transdev plans to electrify Australia's public transport network to demonstrate that it is financially and environmentally more economical to transition to solar-powered electrical vehicle (EV) buses.

Transdev partnered with REA Global, the residential and commercial solar installer with Platinum status in the Enphase Installer Network (EIN) in Australia. The first stage of the installation paired 250 x 380 W REA Power Series Modules with Enphase IQ 7+ microinverters to deliver this pioneering 95 kW commercial project.

Enphase microinverters were chosen as part of the REA Solar solution to help generate the most amount of energy for the available rooftop space and provide system safety and accountability with panel-level monitoring.

IQ 7+ microinverters leverage Enphase's software-defined architecture and semiconductor integration for reliability and economies of scale.

Both REA Global's residential and commercial installations are outfitted with Enphase Envoy™ communications gateways, which connect the solar systems to the Enphase Enlighten™ monitoring platform and help make per-panel energy monitoring and insights for operations and maintenance easy.

www.enphaseenergy.com

SMART ENERGY STORAGE SYSTEMS MANUFACTURER SONNEN in partnership with Australia's car subscription service Carbar has launched an electric vehicle (EV) subscription service, sonnenDrive.

This is the first time sonnenDrive has been offered to customers outside Europe. Customers will be able to choose from seven different vehicles, with prices starting at $320 per week for a new Nissan Leaf to $485 per week for a new Tesla Model 3.

sonnenDrive is available exclusively to sonnen customers only and together with a sonnen home energy storage solution. Clean energy generated by a rooftop solar system or stored in a sonnenBatterie will be used to power the leased EV.

There are no lock-in contracts and under the partnership Carbar will administer the subscription program, including delivering, maintaining and servicing all vehicles.

Nathan Dunn, CEO APAC and Managing Director of sonnen Australia said "Customers tell us they want to be able to live an even more sustainable lifestyle by extending their energy independence to e-mobility."

The Electric Vehicle Council of Australia reported sales of electric vehicles grew 200 per cent in 2019 while ICE vehicle sales fell 7.8 per cent, and 56 per cent of surveyed consumers would consider purchasing an electric vehicle as their next car.

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

MUST SEE – THE SMART ENERGY EXCHANGE FOR POSITIVE NEWS

HERE IS A BRAND-NEW SERVICE brought to you by the Smart Energy Council that is designed to bring you up to speed on a range of positive advances in renewable energy being driven by prominent organisations and individuals.

The Smart Energy Exchange, or **The SEE**, was developed in response to a gap in the renewable energy space identified by the Smart Energy Council. That gap was the lack of a unified platform to showcase the best and most interesting reports, videos, and events as we transition to a low carbon economy delivered through solar and wind power, energy storage and green hydrogen.

In collaboration with other organisations **The SEE** showcases the latest reports and videos in an easy to digest format. It also features commentary and insights from thought leaders who are driving policy and helping shape a more sustainable future.

It's all in the name: 'The SEE'.

- **SEE news as it happens**
- **SEE innovation**
- **SEE the future of renewable energy**

The SEE is unique in that it gives readers the best, newest, and most relevant information all within a 5-minute read or watch time. The editors of The SEE have researched, read and summarised the news so all that is left for readers to do is relax and peruse the content!

Those who may be too busy to remember to check the website are also encouraged to join a mailing list to have content delivered straight to their inbox.

All of **The SEE** content is curated to be snappy, positive, easy to read and dynamic. **The SEE** is a space to make Renewable Energy collaboration and innovation accessible for everyday Australians.

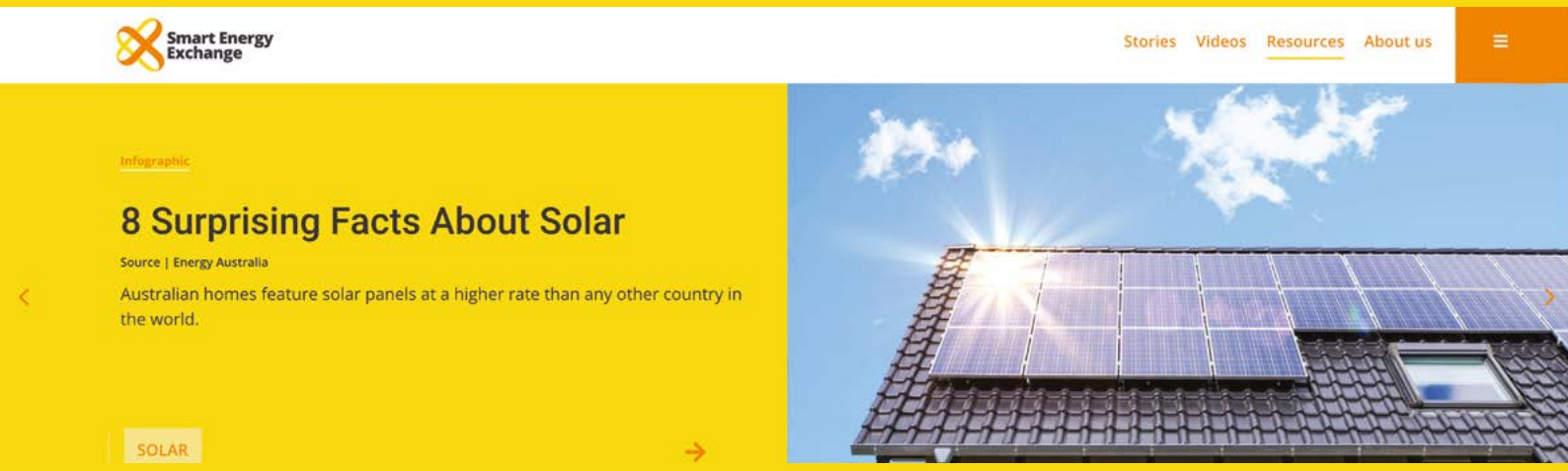
The new platform is the product of collaboration and innovation. We have put together the website through our committed industry contacts and partners, whose work over many years has complemented that of the Smart Energy Council.

These partners include renewable energy scientists and trailblazers, climate activists, environmental organisations, think tanks and other leaders in our dynamic sector. It is this unique family of organisations that make **The SEE** possible as we are united by the common passion for renewable energy and share optimism for a better, more sustainable future.

***The SEE** is first and foremost a collaborative space so we would like to hear from you! If you are keen to contribute, please send through your stories, insights and research findings to info@smartenergyexchange.org.au*

Smart Energy Exchange

All of The SEE content is curated to be snappy, positive, easy to read and dynamic



WWW.SMARTENERGYEXCHANGE.ORG.AU

SAY HELLO TO SMART ENERGY COUNCIL'S SMART NEW LOOK!

POWERING AHEAD The Smart Energy Council's smart new logo marks a more dynamic, bolder direction.

The carefully chosen colours and style convey a clarity of purpose which reflects the determination of everyone working in the renewable energy industry.

FORWARD THINKING The Smart Energy arrow signifies a move to the future, a new chapter in a bright new world powered and accelerated by renewable energy.

A future being shaped by the Smart Energy community.

The new logo is complemented by the smart new website.

Visitors to the new website that goes live on July 1 will find a clear, bright, purpose-designed, innovative layout that takes user friendly to new heights.

EASE OF NAVIGATION and relevance of content: With all options visible at a glance, website mega navigation directs visitors straight to the required resource via two or three quick clicks.

The latest informative content: market updates, news, reports, webinar recordings, directories and more.

STAY SMART AND IN TOUCH Stay up to date with the smart industry updates.

Smart energy at its best – a move in the right direction.

A smart move mirroring smart membership!

SMART ENERGY COUNCIL

ACT RENEWABLES HUB PACKS A PUNCH AT THE SEC EXPO!

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

The May Smart Energy Conference and Exhibition provided the ideal setting for the ACT Renewables Hub to showcase its services and spread the word about its mission to connect like-minded innovators.

ACT RENEWABLES HUB manager Alethia Barceinas was more than pleased by the level of interest generated among delegates that resulted in a boost in membership of the progressive Hub.

"Several significant things occurred, most notably while I was pitching the ACT Renewables Hub to an interested person at the SEC exhibition, a current member stopped by to visit and brought a peer along," she said.

"It turned out to be a case of serendipity as the guy that I was talking to was looking for the very service that the member and peer offer! They exchanged contact details and this opened the door to a B2B opportunity. And for me – the chance to snap the moment." (See image)

Alethia commented people who stopped by the Hub were pleased to hear about the value of having a 'two for one' membership with ACT Renewables Hub and Smart Energy Council.

"It was easy to illustrate the benefits of having a local ecosystem to work together, but also the benefits of a supporting organisation like the Smart Energy Council that is tireless in its support of its members and the industry at large."

Not everything went according to plan: "The ANU Energy Change Institute delivered an impromptu online lecture from our booth! Topical too – all about renewable hydrogen."

The message: be prepared for surprises that present dividends.

Smart Energy Council staffer Peta Bulling who welcomed visitors to the booth also noted the amount of interest stirring in the Hub, saying: "It's all about positive conversations and connecting with people from diverse backgrounds with a common purpose: people, who want to facilitate the development of renewable energy in all its forms."

Want to know more? 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

Pictured below: A spontaneous and informal lecture delivered by ANU academics (left) and a fortuitous meeting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WARM WELCOME

The Smart Energy Council would like to welcome the following new members:

SMART ENERGY COUNCIL
SOLAR, STORAGE, SMART ENERGY

PLATINUM MEMBERS

FIMER — fimer.com

Switch To Solar & Save with PowerSmart™ Solutions — powersmartsolutions.com.au

powow — gtlrenewable.com.au

WesternUnion WU Business Solutions — business.westernunion.com

GOLD MEMBERS

CIT Canberra Institute of Technology (RTO Code 0101 | CRICOS No. 00001K) — cit.edu.au

ecovantage — ecovantage.com.au

TITANIUM PARTNERS

Alpha·ESS — alpha-ess.com

1 STOP Warehouse — Be Clean, Be Green — onestopwarehouse.com.au

GROWATT — growatt.com

If you would like to speak to any of these companies or find out more about membership with the Smart Energy Council please contact:

LUKE SHAVAK
Sales Manager
luke@smartenergy.org.au
+ 61 499 345 013

MARIANNE FANG
China Sales Manager
marianne@smartenergy.org.au
或添加微信 18896983297

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
- Lendfin
- Master Instruments
- Maxstar Holdings/ SuperGreen Solutions
- Mondiaux
- Off-Grid Energy Australia
- RETA (WA)
- Revolusun power
- Royal Automobile Association of SA
- Solar Wholesalers
- Solargain PV P
- SolarHub
- Solastor
- STI Norland
- Victron Energy B V
- WINAICO Australia
- X-Elio Australia
- Zeromow
- ZNSHINE Solar Australia

BECOME A MEMBER TODAY **smartenergy.org.au**

SOLAR INDUSTRY Positive Quality™

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

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

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

The Smart Energy Council developed the program because the generic appearance of panels makes it difficult to determine good from bad,

unless an identification mark denotes otherwise. A logo that signifies superior quality.

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

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

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

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

Contact Positive Quality™ Manager Luke Shavak on 0499 345 013, email luke@smartenergy.org.au or visit www.smartenergy.org.au

POSITIVE QUALITY™
Continuous Quality Assurance

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

Solar JinKO
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WINTER ADVERTISING CONTENT

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5B	35	www.5b.co
Anavo/Polyglot	51	www.anavo.com
Cobalt Solar	28	www.cobaltsolar.com.au
Dyness	62	www.dyness.com.au
Ecovantage	21	www.ecovantage.com.au
Energizer	37	www.energizerhomepower.com
Fox	Inside back cover	www.fox-ess.com
GPG Naturgy Group	31	www.globalpower-generation.com
Harvey Norman	25	www.harveynormancommercialsolar.com.au
LMS Energy	53	www.lms.com.au
Master Instruments	5	www.master-instruments.com.au
Motherson	29	https://australia.motherson.com
Munich RE	61	www.munichre.com/gts
PowerSmart Solutions	39	www.powersmartsolutions.com.au
Pylon	13	https://pylon.solar/smartenergy
R&J Batteries / Zenaji	9	www.rjbatt.com.au/store-locator
SAJ Australia	36	www.saj-electric.com.au
Sofar Solar	59	www.sofarsolar.com.au
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