

NATIONAL BULLETIN

Bulletin 1 | 2022

Our Energy Future – what will be the key changes?

By Jeff Allen, National President of the Electric Energy Society of Australia | January 2022

Welcome to 2022. It looks like 2022 will be another year of considerable challenge for all Australians given the impact that COVID 19 is having on all of us across the country and internationally.

EESA will continue to offer lots of information on all the changes and developments occurring in the electric energy area through our monthly Bulletin and we will continue to offer a range of professional development opportunities for our members via our local seminar and national webinar program as well as an interesting and informative EECON 2022 (as a face-to-face event in Brisbane and online for attendees from around Australia) in October 2022.

Another major issue for all of us associated with the electric energy industry is a better understanding of what will be the key changes occurring in our east coast and west coast electricity systems in Australia over the coming years.

Last August I authored an article for the Energy Source and Distribution Magazine that discussed the key changes that could occur in the east coast NEM over the next few years. This was based on AEMO's draft 2022 Integrated System Plan (ISP) and the associated 2021 Inputs, Assumptions and Scenarios Report (IASR) which set out the five future energy scenarios used to develop AEMO's 2022 draft ISP.

The five scenarios that were used in developing the draft ISP were:

- the "Steady Progress" scenario
- the "Net Zero 2050" scenario,
- the "Step Change" scenario
- the "Slow Change" scenario
- the "Hydrogen Superpower" scenario

Since September 2020, AEMO has consulted with all industry stakeholders in preparing the Draft ISP. After 18 months of consultation, stakeholders overwhelmingly nominated Step Change as the most likely future scenario.



Jeff Allen, National President of the Electric Energy Society of Australia

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The Step Change scenario forecasts a rapid transformation in Australia's National Electricity Market, consisting of a significant investment in renewable generation, storage, and firming generation (as coal plants exit) and improvements to the transmission networks.

Under the "Step Change" scenario,

- In 2040, consumers have led a transformation by installing more of their own power sources, buying electric vehicles, and voting for strong global policy action to rapidly reduce carbon emissions.
- Because electricity will be generated with near Zero carbon emissions, businesses and households are preferring electricity ahead of other more carbon intensive options.
- Rooftop solar capacity has more than quadrupled since 2020 with about triple the number of roofs covered. Energy efficiency and switching to electric heating and electric appliances has cut our use of gas in homes by 85%
- Industry is using almost 20% less gas, 30% less coal and 90% less oil than in 2020.
- Almost 60% of our cars are now electric and almost a third of heavy vehicles are fuelled by hydrogen.

The Step Change scenario anticipates a transformation of the NEM by 2050 including:

- A near doubling of electricity consumed from the grid to 330 terawatt hours (TWh) as transport, heating, cooking, and industrial processes are electrified.
- Construction of nine times the NEM's current utility-scale wind and solar generation capacity (from 15GW to 140GW).
- Installation of four times the current distributed PV capacity (from 15GW to 70GW), with most coupled with an energy storage system.
- Treble the firming capacity that can respond to a dispatch signal (including 30GW at utility scale.)

Based on AEMO's current plan, it is interesting to note the discussions that occurred at our EECON 2021 conference in Perth in November, regarding whether there is "evolution" or "revolution" occurring in the electric energy industry. In my view, revolution seemed to be the more popular view of the key participants involved and the consultation that AEMO has undertaken with all its stakeholders has resulted in the "Step Change" scenario being seen as the most likely change – and thus it could be that a revolution is commencing in the electric energy area and will continue for the next 20 years or so.

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AEMO's latest draft 2022 Integrated System Plan (ISP) was published on 10 December 2021, and it sets out a roadmap for the development of eastern Australia's electricity system. AEMO will finalise the 2022 ISP by 30 June 2022.

In a recent media release AEMO CEO, Daniel Westerman, said the significant changes already underway in the NEM have continued to accelerate in recent years, considerably exceeding forecasts as set out in the 2020 ISP Central scenario. "The Step Change scenario forecasts a rapid transformation in Australia's National Electricity Market, consisting of a significant investment in renewable generation, storage and firming generation as coal plants exit, and improvements to transmission."

"This transformation will efficiently deliver secure, reliable and affordable electricity while substantially contributing to national emissions objectives," he said. "It is essential that communities, governments, and industry collaborate to meet the aspirations of consumers and the communities that will host new infrastructure. Without meaningful community consultation, projects will be delayed and become more expensive. Efficient delivery is also critical," he said.

Stakeholder consultation on the Draft 2022 ISP, including public forums and written submissions, is open until 11 February 2022. EESA has a small team (Terry Lampard, Dr Robert Barr, and Bruce Howard – all members of the NSW/ACT Chapter committee) collaborating with Engineers Australia in reviewing and providing comment on the draft plan.

Interesting times ahead due to the revolution occurring in the electric energy industry!

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LOCAL NEWS

AUSGRID TO BUILD VIRTUAL “DIGITAL TWIN” MODEL OF ITS ENTIRE NETWORK

By Ausgrid | 16 December 2021 | Source: [Ausgrid](#)

Ausgrid Partners with Neara to Optimise Network Management and Performance

Ausgrid has partnered with Neara, a leading cloud-based utilities analytics platform, to improve grid reliability and resiliency, and optimise the operational efficiency of its network.

Neara will work with Ausgrid to build a 3D ‘digital twin’ of the entire Ausgrid network. The digital twin will combine 3D spatial visualisation with full engineering-grade analytics functionality, which will enable Ausgrid staff to design and monitor poles and wires remotely, rather than on site, resulting in improved efficiency for customers.

Ausgrid General Manager of Asset Management Junayd Hollis said Ausgrid is committed to delivering affordable, reliable, and sustainable energy solutions for customers now and in the future, while minimising its impact on the environment and actively responding to climate change.

“We are investing in digital innovation to evolve our network’s ability to support the energy mix of the future, including accelerated adoption of renewable generation and distributed energy resources,” Mr Hollis said.

“In Neara we have found a partner which understands and shares our ambitions and has the expertise to build and scale a solution which will enable a more resilient and optimised network for our customers, particularly in the face of climate change and more extreme weather events.” - Junayd Hollis, Ausgrid General Manager of Asset Management

Neara Chief Commercial Officer Jack Curtis said Neara will also deploy a broad spectrum of physics-enabled use cases to optimise vegetation management, identify and remediate at-risk assets, prioritise maintenance tasks and optimise network design, operation and interaction.

“We look forward to partnering with Ausgrid to enhance their existing network activities and support their vision for a reliable grid in the face of increasing environmental challenges, and in the rapid transition to a cleaner energy mix,” Mr Curtis said.

About Neara

Neara is a cloud-based engineering analytics platform that delivers a true digital twin for utilities to tackle their most complex problems. Neara converts raw data into a 3D interactive model in a physics-enabled environment. This allows utilities to perform complex engineering analysis, run scenario simulations such as extreme weather events, and assess risks at-scale. Through large scale analysis and actionable insights, utilities can optimise the performance of their whole-of-network and network assets. Founded in 2016 in Sydney, Australia, Neara’s mission is to bring safety and resiliency to global energy infrastructure in an increasingly unstable climate. For more information visit: [neara.com](#).



LOCAL NEWS

HOW 5G WILL TRANSFORM THE ELECTRIC ENERGY INDUSTRY

By Optus | 18 November 2021 | Source: [Create Digital](#) and [Optus](#)

5G in Industry: An Ecosystem Ripe for Exploration



Great business
starts with
yes OPTUS

Overview

Welcome to *5G in Industry: An Ecosystem Ripe for Exploration*. Published by Optus Business, this report is designed to inform businesses about 5G and help them make decisions now that will set them up for the future.

This report showcases the current and future state of 5G in Australia and how it will affect different industries. Most importantly, it demonstrates that 5G is not just '4G but faster' or a piece of technology – rather, it's an entire ecosystem that can revolutionise how we work.

This new ecosystem will allow us to connect in diverse new ways. It will one day allow super-fast speeds in more places than ever. It will make cutting edge technology more practical. It will bring cloud computing into local networks – and that's just the beginning.

Optus Business endeavours to help owners to grow their businesses. We believe we have an opportunity to help businesses accelerate the use of new technology, connect to next generation network infrastructure, improve customer experiences, create new ways to differentiate in the market – and grow.

To maximise the potential benefits of 5G, businesses of all sizes should be strategising now, at the start of this exciting transformation. We hope this report helps you get started.



Libby Roy
Managing Director, Optus Business

November, 2021



yes OPTUS

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The revolution has begun – 5G and accelerating innovation

Australian business is experiencing a period of immense change, an era some call the fourth industrial revolution. Digital technology, automation, Artificial Intelligence (AI) and machine learning are transforming the way Australians live and work. 5G, the next generation of wireless data, is set to supercharge that transition.

At its simplest, 5G means speed. In laboratory conditions, Optus 5G has already achieved rates as high as 10Gbps¹, fast enough to download a full-sized Blu-ray movie in 2 to 5 seconds. In real-world Australia, on real-world devices, Optus 5G mobile tested with median download speeds of 323.94Mbps and uploads of 22Mbps.² This earned Optus the award of the Fastest 5G Mobile Network in Australia for the Q1–Q2 2021 award period by Ookla®, an independent benchmarking company.

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But there is more to 5G than speed. Greater capacity – the number of users who can use wireless simultaneously in one place – means more connections. Up to a million linked devices per sq km could be a feasible reality by 2023, compared to just 10,000 on 4G. Extremely low latency (lag) – we could see under 3ms end-to-end in the future – enables responses potentially 10 times faster than the fastest 4G, while 5G remains stable even on vehicles travelling at speeds of 500km/h.³

With over 2,500,000 5G devices already in use for consumers and businesses, of which Optus provides over 1,000,000, parts of the Australian work environment are already starting to see the benefits of mobile 5G.⁴ The pandemic accelerated an ongoing shift to hybrid work patterns. When staff are all in different locations – the office, their home, their garden, their local cafe, or on the road – video meetings and cloud collaboration become standard. The usefulness of 5G will only become more pronounced in the future. Its high speeds and low latency will empower Australia's newly mobile workforce, making for reduced staff downtime, increased productivity, better collaboration and a lower-stress employee experience, even mid-lockdown.

However, it is 5G's possibilities in the near-to-mid future that are motivating governments around the world to fund the emerging ecosystem. One estimate suggests 5G will enable over \$13 trillion in sales worldwide by 2035⁵, while the government has invested over \$22.1 million in the Australian 5G Innovation Initiative.⁶ According to its [press release](#), it believes 5G will add \$1,300 to \$2,000 in GDP per person after the first decade of the rollout.

5G in the lab²



5G in the real world



Download
Median:
323.94 Mbps



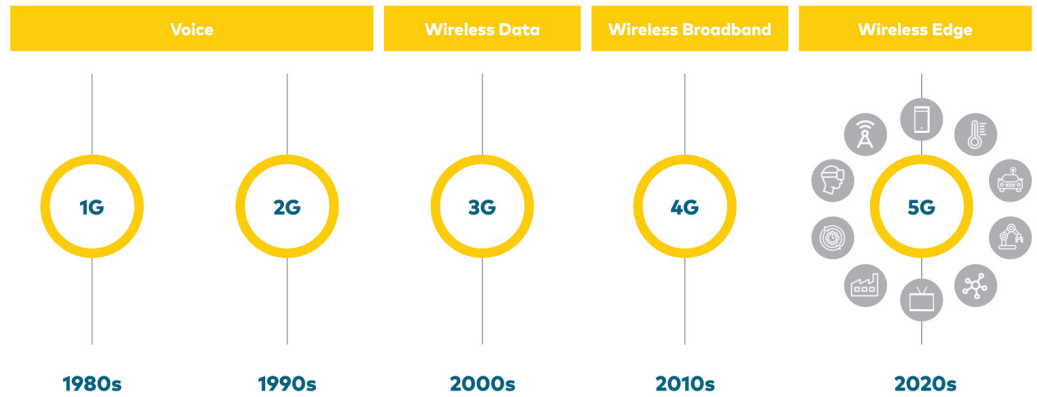
Upload
avg:
22.00 Mbps



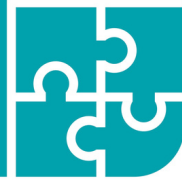
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A brief history of the Gs



Optus has partnered with Western Australia's Curtin University to launch the Curtin 5G Lab. The unique lab has already demonstrated possible applications including remote monitoring of brain activity for epileptic events and remote training of vision-impaired people in the use of guide dogs.⁷



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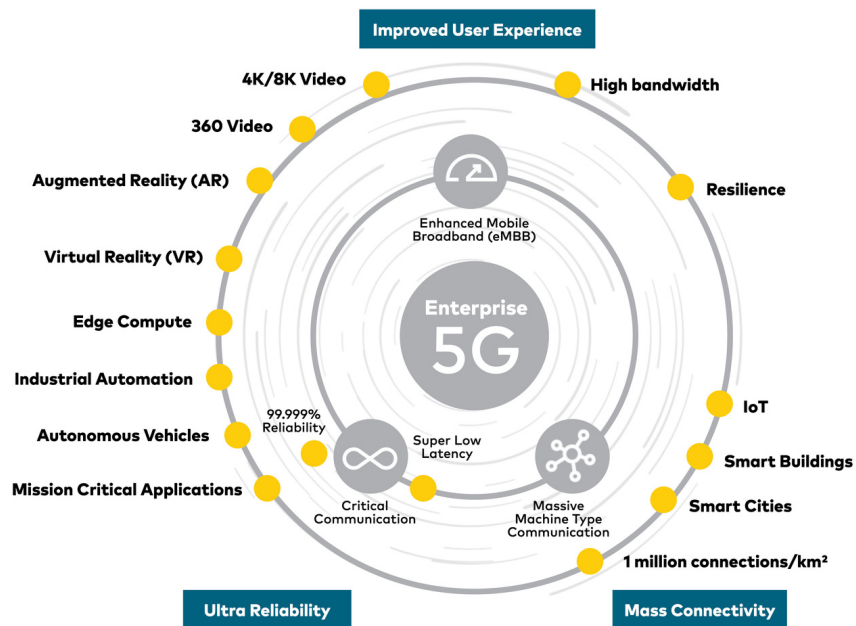


The 5G ecosystem – its present and future

The 5G ecosystem is a complex interplay of technology, infrastructure, pricing and demand, built on the intersection of smart devices, machines and systems. Technologies including 8K, holograms and smart glasses are maturing as 5G makes them more practical. Advanced systems, such as light detection and ranging (Lidar) 3D mapping, are more useful in handsets thanks to 5G.⁸ These developments, in turn, drive an expansion of 5G, which advances the creation of new applications.

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What's all the excitement about?



Sources: ATK Report, Cradlepoint Report, Nokia Report, Mason Report

As the ecosystem expands, demand should grow and prices start to fall. Australians can now buy entry-level 5G devices for under \$400 (excluding phone plan), but enterprise-grade 5G routers remain a significant investment at this point in time.

With faster speeds, lower latency and more connections, existing technologies will soon be able to take a leap into the 5G future. Within the next five years, low-latency robotics, which traditionally operates on fixed networks, could potentially be able to use Ultra-Reliable Low Latency Communications (URLLC), and super-stable networks, suitable for mission-critical applications, from autonomous vehicles through to remote surgery.

Edge computing

5G will also make edge computing – where computation and storage occur nearer to where data originates – simpler to accomplish. For example, cloud computation can happen nearby, within the local 5G network, rather than travelling long distances to data centres that host the broader internet. Coupled with 5G's low latency, fast speed and high capacity, this accelerates performance, making responses faster, smoother and more natural.

5G will transition audio and visual technologies that have been in development for decades to an entirely new level of performance, including:

- Virtual Reality (VR), which is the digital simulation of an entire experience
- Augmented Reality (AR), which overlays digital information on the real world
- Mixed Reality (MR), which fuses real world and virtual elements

Today's VR headsets host content on the device, making them heavy and clunky, while current speeds and capacity make seamless upload and download to or from multiple devices difficult. High speeds, low latency and edge computing will make next generation devices smaller, faster and more realistic, empowering applications from gaming to policing.



IoT and AI

Internet of Things (IoT) technology will also see a revolution, as 5G enables myriads of sensors and devices to connect at high speeds and with low lag. Toyota in Japan and Mercedes-Benz Cars in Germany are already using private 5G networks to advance their manufacturing; the Mercedes-Benz factory uses techniques including VR and AR as well as more than 400 automated guided vehicles.⁹

AI and machine learning are starting to impact Australians' working lives, whether that's an instant meeting transcript or an automated production line. Coupled with 5G and edge computing, AI will become cheaper, faster and more powerful, as an entity's "brain" shifts from autonomous devices such as vehicles or robots into an ecosystem leveraging the 5G network.



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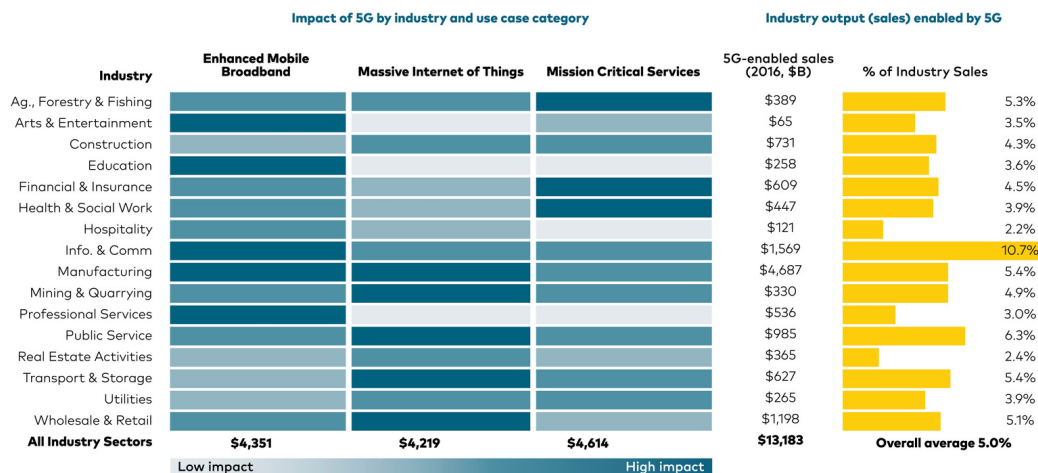
How 5G will transform industries

5G is set to transform Australian industry. According to an article by the UK edition of techradar, Australia boasts 5G speeds ahead of the UK and the US. Indeed, among the nation's major trading partners, only South Korea and China perform better.¹⁰ As 5G rolls out more widely and speeds and capacity accelerate, Australians should see dramatic transformations at home and work alike.

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5G is expected to significantly enhance revenues in all key industry verticals

5G will enable \$13.2 trillion in global sales activity in 2035



Source: IHS Markit © 2019 IHS Markit¹¹

Construction

Even in industries viewed as not requiring as much digital technology, such as construction, 5G can still increase productivity. It makes a fast, stable connection available from the second work on a site begins – without cable installation. Video conferencing becomes simple, while both 2D and 3D renders download fast. IoT solutions currently on the market will run more smoothly too, from smart anchoring devices that set themselves up to use the correct adhesive to camera-equipped hard hats and hazard-detecting sensors that can help to improve site safety.¹²

Looking to the mid-term, smart construction would allow autonomous drones to conduct aerial site surveys and create virtual 3D models of real-time progress. Consultants could conduct site visits from home using a headset as a more junior tradesperson navigates the site wearing MR glasses, saving on both time and travel expenses. Further in the future, site models could appear as holograms, while AI smart glasses could support technicians to ensure piping is placed and installed to plan.

"5G will be critical because it will enable unprecedented levels of connectivity, upgrading 4G networks with five key functional drivers: superfast broadband, ultra-reliable low latency communication, massive machine-type communications, high reliability/availability and efficient energy usage."

DEREK O'HALLORAN, WORLD ECONOMIC FORUM

Healthcare

In healthcare, 5G could maximise the potential of a range of technologies that are already part of the ecosystem by linking them to a broader network. Smartwatches can already monitor oxygen, track blood pressure and deliver a basic electrocardiogram (ECG) test. Smart sensors can already help protect the elderly by detecting and reporting falls, or observing that the stove is still on but the kitchen is empty. But an ecosystem connected via the 5G network, equipped with AI and coupled with telemedicine, could help preempt health problems, enable early intervention and therefore support the elderly in their own homes.¹³

Many Australian hospitals are relying on legacy technology, sometimes from decades ago, to connect with their workforces. 5G means faster connectivity and real-time health management, including lightning-fast access to patient records. In the future, inter-hospital drone corridors might enable the speedy transfer of organs for transplant or medical devices, while self-driving hospital beds might arrive on demand, rather than relying on porters to travel across the complex.¹⁴ MR headsets may enable specialists to guide an attending doctor remotely, rather than forcing urgent cases to wait until a specialist is physically on the ward.



Resources

Across the world, the mining and resources sector is testing private 5G networks.¹⁵ This will help accelerate the existing use of robotics and autonomous vehicles.¹⁶ In the future, a specialist machine operator, rather than flying into a remote site, might use MR to work from home. Remote mechanics might use MR with haptic (touch-based) technology to instruct less-skilled mechanics to perform repairs on-site. Vehicle to Everything (V2X) communication could allow multiple connected trucks to "platoon", with driverless vehicles following a lead human driver.



Manufacturing

5G is set to modernise factories.¹⁷ AR glasses can already deliver precise, hands-free, on-the-job assistance as employees work;¹⁸ 5G IoT will enable real-time, seamless tracking of parts and products, predicting workflows and helping manage supply chains; URLLC robotics will vastly increase automation on the shop floor; 5G-enabled advanced analytics will reduce energy use and waste to landfill.



"5G is fit-for-purpose and can be used across a range of industries. This positions it as the foundation upon which the next generation of business solutions will thrive."

FAHEEM TABASSUM, DIRECTOR 5G AND IOT PRODUCT AT OPTUS

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Retail

Immersive, 5G retail is already a reality at some malls in China and South Korea, whether that's personalised special offers delivered to a user's smartphone or MR mall navigation, complete with branded advertising. In the future, AR could allow in-store shoppers to test a prospective furniture purchase in a 3D mockup of their actual room, while Lidar handsets could let shoppers try an outfit on their virtual body and even see how the fabric moves.

Smart cities

Smart cities around the world already take advantage of IoT technology. Smart meters feed data back to the grid; smart gates speed progress through airports; and smart traffic lights ease congestion and reduce pollution. But most cities still run on a mix-and-match of siloed systems, operating on different networks and even different infrastructure. 5G can streamline those systems, linking cameras on multiple networks or combining the 20 different applications that operate within a typical building.

Looking to the future, 5G could power autonomous ground vehicles between the airport and the plane, with fast and fully-automated baggage handling. Ports might see autonomous cranes handling containers equipped with IoT sensors. Drones already slash the time humans spend monitoring solar farms, but with 5G autonomous drones will be able to plan their own flights, monitor panels for defects, and guide panels to correct positioning.¹⁹



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Next steps

4G transformed the business landscape by introducing video and 5G is set to shape the future even more dramatically. Whatever your industry sector, it's important to be prepared. Here's how:

- Establish where 5G can make an impact in your business
- Improve your technology architecture
- Research future applications that may be relevant to your business
- Connect to local infrastructure players

Excited? Curious? Want to learn more? [Visit Optus](#), reach out to your account manager or contact your local [Optus Business Centre](#) to explore further.

Endnotes

¹ [ZDNet, April 2021](#)

² [Optus Wins the Title of Australia's Fastest 5G Network: Tech Guide, July 2021](#)

³ [5G High Mobility Wireless Communications: Challenges and Solutions, 2016](#)

⁴ [RCRWireless, June 2021](#)

⁵ [Qualcomm, November 2019](#)

⁶ [Australian Government, business.gov.au, September 2021](#)

⁷ [Curtin University, May 2021](#)

⁸ [Verdict, January 2021](#)

⁹ [Enterprise IoT Insights, September 2020](#)

¹⁰ [Techradar UK, May 2021](#)

¹¹ [Telecomlead, November 2019](#)

¹² [TechCrunch, April 2021](#)

¹³ [Mobile Web and Intelligent Information Systems pp. 202-213, July 2019](#)

¹⁴ [Science Focus, October 2020](#)
[Forbes, August 2021](#)
[Verdict, June 2020](#)

¹⁵ [Techwire Asia, October 2020](#)

¹⁶ [NBC News, December 2017](#)

¹⁷ [The Manufacturing Institute, March 2021](#)

¹⁸ [IEEE Access, March 2017](#)

¹⁹ [Solar Power World, January 2020](#)
[Forbes, August 2021](#)



LOCAL NEWS

AER SEEKING BETTER OUTCOMES FOR VULNERABLE CONSUMERS

By Australian Energy Regulator | 20 December 2021 | [AER News](#)

The Australian Energy Regulator (AER) is consulting on a bold new strategy, launched today for consultation, to improve outcomes for consumers experiencing vulnerability and help them stay engaged with the rapidly transforming energy market.

Latest energy debt figures show a 56% increase over four years in average 90-day debt, from \$640 in 2016-17 to \$1000 in 2020-21. Alongside this, 44% of Australians have literacy levels below what is considered enough to get by in everyday life, one in five have a disability and almost half the population will live with mental illness issues at some point in their life.

“In the past, the energy sector has been focused mainly on addressing payment difficulties, but our research has helped us to understand that this is just the tip of the iceberg when it comes to improving outcomes for consumers experiencing vulnerability,” AER Chair Clare Savage said.

“Energy isn’t just something we choose to consume - it is a vital part of the way we live. As COVID-19 has shown us, anyone can suddenly find themselves in vulnerable circumstances, which can affect access to this essential service,” she said.

These concerns have formed the basis of the AER’s first ever draft Consumer Vulnerability Strategy, released for consultation. It follows extensive, ongoing engagement, working closely together with consumer groups, energy businesses, government and market institutions.

The term ‘consumer experiencing vulnerability’ refers to someone who is significantly more likely to suffer detriment or find themselves unable to pay for energy usage, whether from market complexity or personal circumstances such as low income, disability or poor mental health.

Many such consumers, however, struggle to self-identify as being ‘vulnerable’, whether due to shame, embarrassment or simply believing the term ‘vulnerable’ is too permanent for their individual situation.

Ms Savage said more needs to be done across the energy sector to break down these barriers so that consumers can access products and services that best meet their needs, that payment difficulties are met with more tailored support, and that the future energy market meets the needs of consumers.

“The energy market is rapidly transforming and it is important that new products and service design have consumers experiencing vulnerability in mind so that no one gets left behind,” Ms Savage said. “Now is the time for the energy sector to ask what else we could do to support consumers who find themselves in vulnerable situations, especially when they least expect it.”

The AER’s draft strategy introduces five overarching objectives designed to deliver lasting change, which are listed here with just some of the actions and ideas the AER will explore further with consumer groups, industry and government.



LOCAL NEWS

1. **Improve identification of vulnerable consumers:**

- Frequently, consumers don't identify as being vulnerable due to embarrassment, shame, or not having experienced being in this situation before. We are proposing a toolkit, including indicators that energy businesses should consider and use to activate early conversations with consumers.

2. **Reduce complexity and enhance accessibility for energy consumers:**

- The AER's new draft billing guideline (the Better Bills Guideline), also released for community consultation today, aims to ensure all consumers can easily understand their energy bills. It comes after AER research confirmed up to 45% of consumers were unable to select the cheapest offer when presented with three bill options.
- We are also improving the AER's Energy Made Easy website so that consumers can directly engage in the market and seek out better energy deals.
- We propose to explore how Retailer Report Cards could be more consumer-friendly, allowing them to directly compare the service quality of energy providers.

3. **Strengthen protections for consumers facing payment difficulties:**

- We would like to improve engagement between energy businesses and consumers experiencing vulnerability to ensure that disconnection is truly a last resort. In addition, the AER would like to review the minimum disconnection threshold which currently allows retailers to disconnect customers with debts greater than \$300, a limit that has remained unchanged since 2012.

4. **Use the consumer voice and lived experiences to inform regulatory design and change.**

- We need to ensure the consumer perspective is considered as technology changes in the energy market, particularly on how these changes impact consumers experiencing vulnerability. This includes reviewing the potential gaps in the current consumer protection framework that may emerge with new energy products and services.

5. **Balance affordability and consumer protections by minimising energy businesses' costs to serve their customers where possible:**

- We want to work with the sector to review regulations and consumer protections to ensure they remain fit for purpose, and encourage more consistency across jurisdictions. This will include considering reducing the cost on energy businesses in meeting their obligations – as these costs are passed on to consumers.

"The many groups we have spoken to during our consultation on this draft have indicated a willingness to collaborate in 2022 and to be ambitious in discussing next steps," Ms Savage said.

"Our vision is that the actions arising from our Consumer Vulnerability Strategy will ultimately help to improve energy accessibility and affordability, ensure consumers stay connected, and are better off, now and in the future."

Stakeholder feedback will be collated for inclusion in the AER's three-year Consumer Vulnerability Strategy, expected to be published mid-2022.

LOCAL NEWS

BHP LOOKS TO USING GIANT BLOCK STACKS TO STORE PILBARA ENERGY

By Peter Milne | 20 December 2021 | [Sydney Morning Herald](#)

BHP may stack massive blocks to store wind and solar energy in the Pilbara as part of its efforts to slash emissions from its global operations.

The miner has agreed with US-Swiss startup Energy Vault to study the use of its technology that lifts blocks to use surplus energy and later generates power when the blocks are lowered.



Energy Vault's working model of its technology in Switzerland generates electricity when the blocks fall to the ground. CREDIT:ENERGY VAULT

In 2020 Energy Vault constructed a commercial-sized demonstration unit in Switzerland that had six cranes on a single tower to stack and unstack blocks around the base of the tower. The electric motors that consume electrical energy when lifting the bricks then act as generators when the bricks are lowered, sending power back to the grid.

The technology is designed for longer duration storage, from four hours to more than 12 hours, where lithium-ion batteries can be too expensive.

A BHP spokeswoman said energy storage allowed a greater share of renewable energy to be incorporated in its power supply.



LOCAL NEWS

An initial desktop study will look at sites near the electrical transmission grid that serves BHP's iron ore operations in north west WA.

"The study will take a few months, and we will determine next steps from there," the spokeswoman said.

The gravity energy storage system is similar to another long duration energy storage technology - pumped hydro - as both use the energy of a falling mass to turn an electrical generator.

Energy Vault claims their technology, unlike pumped hydro, does not need large changes in landscape height so is viable in more locations and has less loss between energy stored and energy extracted.

BHP and Energy Vault will also study whether mine tailings could be used to make the blocks used in the system.

BHP aims to reduce the greenhouse gas emissions from its global operations by 30 per cent this decade. Electricity generation produces about 40 per cent of those emissions and burning diesel emits another 40 per cent.

Australian resource companies are under pressure to reduce emissions from customers that want less carbon-intensive inputs.

BHP's principal iron ore rival Rio Tinto has a \$2 billion plan to transition its Pilbara power generation from gas to a mix of solar, wind, batteries and just 20 per cent gas by 2030.

Both BHP and Rio Tinto have partnerships with the two leading haul truck manufacturers - Komatsu and Caterpillar - to develop zero emissions vehicles.

Fortescue has the most aggressive emission reductions targets of the Pilbara iron ore miners after setting a zero emissions by 2030 goal in March 2021. Its clean energy subsidiary Fortescue Future Industries is developing its own technology for haul trucks to be powered by hydrogen.



The 60 megawatt solar farm at Fortescue's Chichester Hub is the biggest in Australia not connected to a major power grid. CREDIT:FORTESCUE

In December Alinta Energy's solar gas hybrid power project at Fortescue's Chichester Hub was completed. Fortescue's Christmas Creek and Cloudbreak mines can be up to 100 per cent powered by solar energy during the day with gas and batteries supplying the remaining power needs.

The 60 megawatt solar farm covered 120 hectares with 160,000 solar panels.

LOCAL NEWS

SUN METAL ALSO TO USE GIANT GRAVITY BLOCKS FOR ENERGY STORAGE

By Sophie Vorrath | 10 January 2022 | [Renew Economy](#)



Korea Zinc's bid to make its Australian operations some of the greenest and most sustainable in the world continue to gather pace in 2022, off the back of a deal with Swiss energy storage company, Energy Vault.

The deal, announced in the first week of the new year, will see Korea Zinc's Australia-based subsidiary, Sun Metals, deploy Energy Vault's innovative long-duration energy storage technology at its north Queensland zinc refinery.

The companies said Energy Vault's "gigawatt scale" technology – a kinetic energy based solution inspired by pumped hydro, but using blocks of solid material instead of water – would be used to support renewable power supply and optimisation at Sun Metal's refining operations.

A joint statement said project deployment was expected to begin as early as mid-2022.

The scope of the partnership also includes the potential re-use of tailings and other refining waste materials within Energy Vault's eco-friendly composite blocks, which are lifted to store electricity and lowered when it is needed again, using gravity to generate the power as they descend.



LOCAL NEWS

The deal is similar to an MoU made between Energy Vault and Australian resources giant BHP in December of 2021, which also agrees to assess local supply chain collaboration and eco-brick manufacturing.

An earlier deal with Italian renewables giant Enel Green Power has also opened up the possibility of Energy Vault's eco-blocks – which weigh around 35 tonnes each – made up of recycled wind turbine blades.

For Korea Zinc, the deal with Energy Vault is just the latest in a spree of deals and corporate manoeuvres targeting the decarbonisation of the global giant's refining operations, starting with Sun Metals in Australia.

Sun Metals aims to become one of the first zinc refineries to produce "green" zinc in support of Korea Zinc's broader strategy to shift to 100% renewable power by 2040 with an interim target of 80% renewable by 2030.

To this end, Sun Metals has been a trail-blazer in Australia for sustainable industrial growth, including becoming the first major energy user to build its own large scale solar farm in Australia in 2017.

Through another of its subsidiaries, Ark Energy, Korea Zinc last month bought Australian-based renewable energy developer Epuron, giving it access to a pipeline of around 4,200MW of early "stage" wind and solar projects, mostly in Queensland, NSW and Tasmania, and potentially up to 4,800MW more.

At the time, Ark Energy CEO Daniel Kim described the acquisition as "the start" of a switch to green hydrogen in zinc processing, and to other domestic supplies, and then on to green hydrogen exports near the end of the decade.

In comments on the deal with Energy Vault, last week, Korea Zinc chair Yun B Choi said the grid-scale storage solutions would also provide an important piece of the "green zinc" puzzle.

"Energy Vault's innovative storage technology and energy management software platform can play a key role in enabling and accelerating our decarbonisation strategy as we enhance our ability to power our operations with renewable energy," he said.

In a LinkedIn post last week, Ark Energy's Kim described long duration energy storage that was not geographically dependent like pumped hydro, remained as "the holy grail of the energy transition."

"[Energy Vault's] innovative solution has the potential to accelerate our plans to decarbonise the Korea Zinc group and help Sun Metals' become the most competitive producer of green zinc in the world," Kim said.

LOCAL NEWS

AUSTRALIAN RESEARCHES DEVELOPING LOW COST SOLAR HYDROGEN PRODUCTION WITH NO ELECTROLYSERS

By Michael Mazengarb | 19 November 2021 | [Renew Economy](#)



Australian National University researcher Dr Siva Karuturi. (Supplied).

Researchers at the Australian National University say new technologies that allow hydrogen to be produced directly from solar energy – skipping the need for expensive electrolyzers – could be the pathway to low-cost renewable hydrogen supplies.

In new research published in the [journal Advanced Energy Materials](#), the ANU research team has developed new “photoelectrode” designs, which could be a critical step towards high efficiency and low-cost renewable hydrogen production.

Conventional solar cells use semiconductor materials to convert sunlight into electric current. Over the last few decades, advances in solar cell designs have seen solar technologies established as one of the cheapest sources of electricity generation while having virtually no emissions footprint.

Researchers have sought to adapt solar cell technologies so that rather than producing an electric current, the captured solar energy could be used to drive chemical reactions, including chemical reactions that can extract hydrogen from water.

The ANU's Dr Siva Karuturi, a co-author of the research, explained that the photoelectrodes being developed at the university create the potential for conventional solar cell technologies to be adapted for use in hydrogen production. “Solar cells turn solar energy into electricity. Photoelectrodes can go a step further to directly convert sun energy into storable chemical fuels such as hydrogen,” Dr Karuturi said.



LOCAL NEWS

Previous attempts at producing the solar-to-hydrogen photoelectrodes found that they were vulnerable to degradation, making them unsuitable for large-scale commercial deployment.

But the ANU research team has sought to solve this problem by “de-coupling” the electrodes from the chemical reactions that led to their degradation, recognising the potential for the direct production of hydrogen from solar energy to provide low-cost supplies of hydrogen that could be stored and used as a dispatchable supply of energy.

“While this is an enticing prospect to address the intermittency problem, it remained a challenge to construct a photoelectrode that is both efficient and stable for practical operation,” Dr Karuturi added.

“This works opens up a pathway to transform rooftop PV cells into solar water splitting cells that produce green hydrogen. This could be a crucial step in addressing the intermittency of renewables and accelerate our transition to net-zero emissions.”

The ANU research team developed an innovative process of combining photoelectrodes with “cocatalyst foils”, which had the effect of shielding the photoelectrodes from chemical degradation, allowing them to be used for hydrogen production with a significantly lower risk of them being rendered unusable by corrosion.

“In this work, we demonstrate the use of cocatalyst foils for stabilising photoelectrodes while attaining high water splitting efficiencies, achieved first by depositing catalysts on metal foils prior to device fabrication and second by protecting photoabsorbers from corrosive solution during operation,” Dr Karuturi said.

“The catalytic interface is therefore fully-decoupled from the photoabsorber during both fabrication and operation. We also show that the approach can be used with other proven PV materials to realistically attain high solar-to-hydrogen efficiencies approaching theoretical limits.”

The conventional approach to producing renewable hydrogen sees renewable electricity supplies, such as from wind and solar farms, used to power an electrolyser that produces hydrogen by passing electricity through water molecules, separating the hydrogen and oxygen atoms.

But the new technologies being developed at the ANU could allow solar energy to power lower-cost chemical reactions that produce hydrogen, allowing the electrolysis process to be skipped altogether.

“Green hydrogen can be produced from renewable energy-driven electrolysis but is not currently competitive with fossil fuel sources of hydrogen. Instead, we are looking at new ways of producing hydrogen directly from sunlight and water,” Dr Karuturi added.

“In direct solar hydrogen production, sunlight provides the energy to drive the water-splitting redox reaction – via the photovoltaic effect and catalysis – resulting in hydrogen production in a single integrated system.”

The ANU research team previously set new energy efficiency records for direct solar-to-hydrogen production, with efficiencies exceeding 20 per cent.

LOCAL NEWS

HORIZON POWER DISMANTLES 120KM OF POLES AND WIRES - REPLACED BY SOLAR AND BATTERY STORAGE

By Joshua Hill | 13 January 2022 | [Renew Economy](#)



Image: Horizon Power

Western Australian regional power company Horizon Power is continuing its rollout of standalone renewable power systems, installing off-grid solar and battery powered systems for another 19 customers east of the south coast town of Esperance.

Esperance is where, six years ago, Horizon Power first began offering certain remote regional customers the option to be powered by a custom built stand-alone solar and battery power system, or SPS, after bushfires destroyed more than 320 power poles and hundreds of kilometres of power lines in the region in November of 2015.

At the time, four landowners in the bushfire affected town took up the offer. Since then, Horizon Power has committed to deliver more than 1,000 standalone power systems across the regions and in remote Aboriginal communities as part of a broader \$75 million Renew the Regions initiative – itself a part of the Western Australian state government's Recovery Plan.

Horizon Power has so far received \$45.8 million to deliver 150 systems across regional WA. Each SPS consists of solar panels paired with battery storage and combined with a back-up diesel generator.

Each system is remotely monitored and controlled by Horizon Power, allowing the company to diagnose faults and remotely fix problems where possible, or send out regular on-site maintenance otherwise.



LOCAL NEWS

A total of 45 standalone power systems are set to be deployed in the Esperance region by March, allowing a number of large commercial farms at the fringes of Horizon Power's overhead network the opportunity to transition to off-grid power.

The latest 45 standalone power systems will lead to the removal of 120km worth of poles and wires from private paddocks, an added benefit that has proven attractive to farmers operating increasingly large farming equipment requiring them to navigate around electrical infrastructure.

"Horizon Power is committed to creating safe and reliable renewable energy alternatives for our regional and remote customers," said Stephanie Unwin, Horizon Power chief executive officer.

"Horizon Power pioneered standalone power solutions in Western Australia in response to the impacts of the 2015 Esperance bushfires. They provide improved reliability and reduce the risk of fire and safety incidents on farms caused by machinery connecting with the overhead network."

The installation of the Esperance standalone power systems follows on the heels of a number of other completed installations over the past few months under the Renew the Regions program.

Back in August 2021, a \$5.2 million solar and battery storage rollout was completed in the remote Kimberley region town of Derby, which saw a total of 283kW already installed across 13 community buildings and a 40kW solar shade installed at the local pool.

The north-western Western Australia town of Marble Bar installed in November a 582kW/583kWh battery energy storage system to be paired with the Marble Bar solar farm which generates more than 1,000MWh of electricity annually. The new battery is also expected to release 100kW of extra rooftop solar hosting capacity for residents sometime this year.

And in December, Horizon Power confirmed that two batteries in the WA coastal resort town of Broome were on track to be operational early in the near year, and would free up more than 1,400kW of new rooftop PV hosting capacity to residents and businesses of the Kimberley town in February of 2022.

LOCAL NEWS

AUSTRALIAN REGIONS WELL PLACED TO BUILD OUR GREEN HYDROGEN EXPORT INDUSTRY

By Steven Percy, Swinburne University of Technology | 17 January 2022 | [The Conversation](#)

You might remember hearing a lot about green hydrogen last year, as global pressure mounted on Australia to take stronger action on climate change ahead of the COP26 Glasgow summit last November.

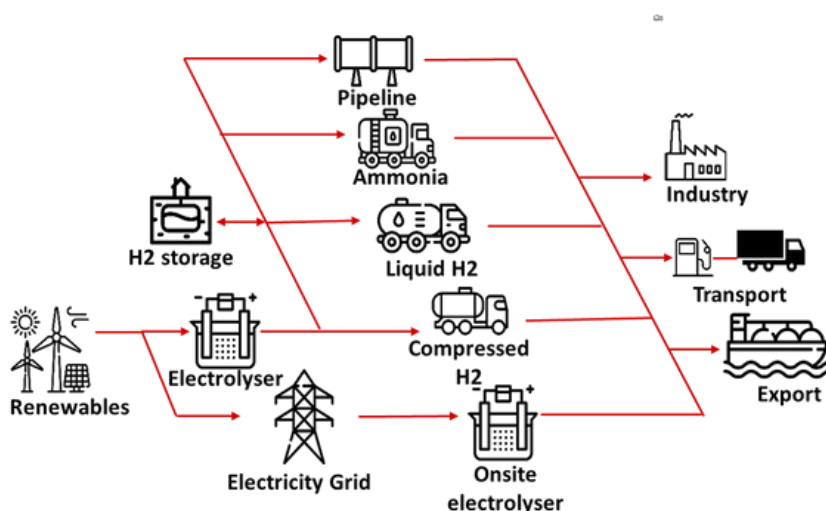
The government predicts green hydrogen exports and domestic use could be worth up to A\$50 billion within 30 years, helping the world achieve deep decarbonisation.

But how close are we really to a green hydrogen industry? And which states are best placed to host it? My research shows that as of next year, and based on where the cheapest renewables are, the best places to produce green hydrogen are far north Queensland and Tasmania.

As ever more renewable energy pours into our grid, this picture will change. By the end of the decade, the north Queensland coast could become the hydrogen powerhouse. By 2040, dirt-cheap solar should make inland areas across New South Wales, Queensland, Victoria and South Australia the lowest cost producers.

Renewable energy you can store and transport

Why is there so much buzz around green hydrogen? In short, because it offers us a zero emissions way to transport energy. Take cheap renewable energy and use it to split water into hydrogen and oxygen using an electrolyser. Store the hydrogen on trucks, ship it overseas, or send it by pipeline. Then use the hydrogen for transport, manufacturing or electricity production.



All the technology exists – it's the cost holding the industry back at present. That's where Australia and its wealth of cheap renewable energy comes in.

Making hydrogen is nothing new – it has a long history of use in fertiliser production and oil refining. But until now, the main source for hydrogen was gas, a fossil fuel.

Pathways for the production and use of green hydrogen. Author provided



LOCAL NEWS

In the last few years, however, there has been a sudden surge of interest and investment in green hydrogen, and new technology pathways have emerged to produce cheap green hydrogen. As global decarbonisation gathers steam, Japan, South Korea and parts of Europe are looking for clean alternatives to replace the role fossil fuels have played in their economies.

Australia is exceptionally well placed to deliver these alternatives, with world-beating renewable resources and ports set up for our existing fossil fuel exports, such as coal and LNG.

In 2019, we sold almost \$64 billion of black coal, with most going to Japan, South Korea, India and China. As these countries decarbonise, the coal industry will shrink. Green hydrogen could be an excellent replacement.

How competitive is Australian hydrogen?

At present, Australia is a long way from producing green hydrogen cheap enough to compete with fossil fuels, given we seem to have no appetite for taxing carbon pollution.

Does that mean it's a non-starter? Hardly. It was only a decade ago sceptics ridiculed solar and wind as too expensive. They've gone awfully quiet as renewable prices fell, and fell, and fell – as tracked by the [International Renewable Energy Agency](#). Now renewables are cheaper than coal. Battery storage, too, has fallen drastically in price. The same forces are at work on the key technology we need – cheaper electrolyzers.

By 2040, the CSIRO predicts an 83% fall in electrolyser costs, according to its [Gencost 2021-22 report](#). By contrast, gas-derived hydrogen with carbon capture is predicted to reduce in cost only slightly. That means green hydrogen is likely to capture much of the market for hydrogen from 2030 onwards.

Which states could benefit?

My research with the [Victorian Hydrogen Hub](#) shows as of next year, the lowest cost location for green hydrogen would be Far North Queensland (\$4.1/kg) and Tasmania (\$4.4/kg) due to high renewable resources.

But this picture will change. By 2030, northern Queensland's coastal regions could be the Australian hydrogen powerhouse due to a combination of cheap solar and access to ports. Western Australia and the Northern Territory could also have similar advantages, though the modelling for these areas has not yet been done.

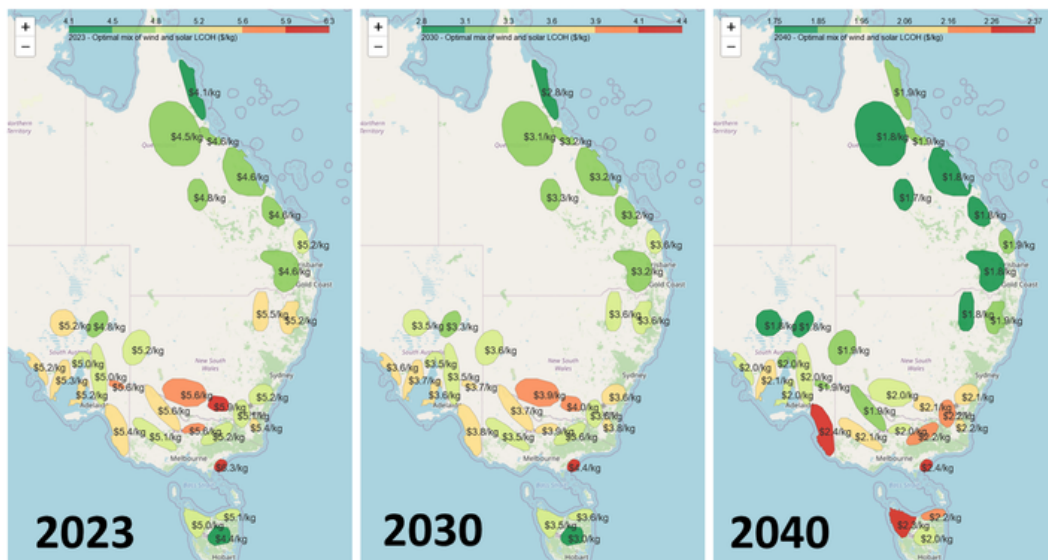
As solar energy and electrolyser costs continue to fall, new states could enter the green hydrogen economy. In CSIRO's cost predictions, electricity from solar is predicted to become much cheaper than wind by 2040. This means sunny areas like central and northern Queensland (\$1.7/kg) and inland NSW, Victoria and South Australia (\$1.8/kg) could be the best locations for green hydrogen production.

In making these estimates, I do not consider supply chain and storage infrastructure required to deliver the hydrogen. Transport could account for between \$0.05/kg to \$0.75/kg depending on distance.

Comparing my modelling to price thresholds set out in the [National Hydrogen Strategy](#) indicates we can produce green hydrogen for trucking at a similar cost to diesel within four years. Fertiliser would take longer, becoming competitive by 2040.



LOCAL NEWS



The levelised cost of hydrogen at renewable energy zones in Australia for 2023, 2030 and 2040.
(source: Steven Percy, Victorian Hydrogen Hub)

Does our dry country have the water resources for green hydrogen?

If we achieved the \$50 billion green hydrogen industry the government is aiming for, how much water would it consume? Surprisingly little. It would take only around 4% of the water we used for our crops and pastures in 2019-20 to generate an export industry that size – 225,000 megalitres.

Much more water than this will be freed up as coal-fired power stations exit the grid. In Queensland and NSW alone, these power stations consume around 158,000 megalitres a year according to a 2020 report prepared for the Australian Conservation Foundation. Coal mining in these two states takes an additional 224,000 megalitres.

As the cost of renewable energy falls and falls, we will also be able to desalinate seawater along our coasts to produce hydrogen. We estimate this would account for only about 1% of the cost of producing hydrogen, based on Australian Water Association desalination cost estimates.

How can we get there faster?

This decade, we must plan for our new hydrogen economy. Government and industry will need to develop and support new hydrogen infrastructure projects to produce, distribute, use and export hydrogen at scale.

We're already seeing promising signs of progress, as major mining companies move strongly into green hydrogen. Now we need governments across Australia to rapidly get optimal policy and regulations in place to allow the industry to develop and thrive.

ELECTRIC VEHICLE NEWS

CARBAR INTRODUCE EV SUBSCRIPTION SERVICE IN TASMANIA

By Sophie Vorrath | 3 December 2021 | [The Driven](#)



THE EVIE NETWORKS RAPID CHARGER AT CAMPBELL TOWN, TAS (SUPPLIED).

Tasmanian drivers will soon have easy access to a range of new and used electric vehicles with the launch of a new partnership between Australian car subscription service, Carbar, and local utility Aurora Energy.

The pay-as-you-go electric car package will offer a range of electric vehicles for a weekly subscription fee, including the Kia Niro, Hyundai Kona, MG ZS EV, Nissan Leaf and – coming in early 2022 – Tesla Model 3.

According to Carbar's usual model, customers pay an upfront fee to cover delivery and other initial costs and then a weekly amount that covers pretty much all of the costs of owning and running a car, including rego, insurance, maintenance, roadside assist, tyres and batteries.

For the Tassie offer, the weekly subscription prices currently range from \$279 per week (for the 2020 Nissan Leaf) to \$389 pw for the Kia e-Niro.

The offer, which requires no lock-in contracts, is open to all-comers – that is, you don't have to be a customer of Aurora Energy, but apparently there are some extra perks that will be offered exclusively to customers of the state-owned retailer.

The first of these exclusive deals is a launch offer to the first 20 Aurora Energy customers who sign up to Carbar, that will give cut the weekly cost of the MG ZS EV from \$296 per week to \$220 per week for the first 3 months – a total discount of \$988.



ELECTRIC VEHICLE NEWS

All subscriptions also qualify for Carbar's loyalty program, which reduces the weekly cost of subscribed vehicles every year through and offers a 50% discount a year if customers want to either swap vehicles or subscribe to an additional car.

The deal is well timed, both for Tasmania and Carbar, following the February launch of a fast charging network that installed 12 50kW charging stations across the state. The state also has two ultra-rapid charging stations offering charging rates of up to 350kW, and in May installed Australia's first V3 Tesla Supercharger at the port city of Devonport.

Carbar's arrival in the island state addresses the missing piece of the puzzle to drive EV uptake in the state – the actual cars. As Giles Parkinson wrote here in March, for a destination that is shaping up as perfect for an electric driving holiday, there remains shortage of EVs available for purchase or hire.

"There's an incredible demand for EVs across Australia, and we believe this is especially the case in Tasmania, which has been a pioneer in Australia's clean energy sector," said Carbar founder and CEO Des Hang.

"In addition to being an affordable means of getting behind the wheel of an EV, this launch is an ideal opportunity for many Tasmanians to try their first car subscription.

"With EV technology and innovation moving at a pace, subscriptions are ideal for those who always want to be behind the wheel of a car at the cutting edge of this trend," Hang added.

"There's no unexpected running costs and you can cancel your car at any time; we believe this level of flexibility and affordability really resonates with the Tasmanian community."

Aurora Energy CEO Rebecca Kardos said the energy retailer also hoped the partnership would act as a catalyst for the uptake and growth of sustainable transport in the majority hydro-powered state, which is currently pitching for a 200% renewable electricity supply.

"We're focussed on helping our customers become more sustainable, whether that's through being more energy efficient in the home or through greater access to low emissions transport," Kardos said.

"Our partnership with carbar will do exactly that and help capitalise on Tasmania's renewable energy advantage as we push towards becoming a carbon neutral economy."

ELECTRIC VEHICLE NEWS

ELECTRIC VEHICLE COSTS THREATENED BY RISING LITHIUM PRICES

By Sophie Vorrath | 17 January 2022 | [The Driven](#)



MODEL 3 PRODUCTION. SOURCE: TESLA

Electric vehicle affordability is poised to hit a speed hump on its journey down the cost curve, as global demand for battery-grade lithium starts to outstrip supply, driving up prices of the key ingredient in both the clean transport and clean energy transitions.

After a decade of price declines, costs of battery-grade lithium are “poised to skyrocket,” according to research from Rystad Energy, posing the threat of a “major cost headache” for electric vehicle makers, just as the market really starts to hit its straps.

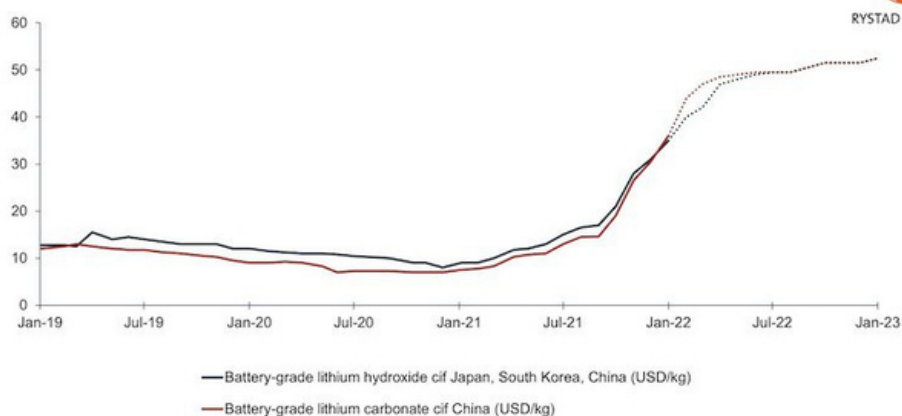
According to Rystad Energy's [analysis from late last week](#), prices for lithium are currently trading at a record high of \$US35 per kilogram in Asia, and are likely to keep climbing to \$US50 per kilogram in the second half of 2022 on the way to around \$US52.5 per kg, this time next year.

Signs of trouble were hitting the market towards the end of 2021, with a December report from S&P Global forecasting that booming EV demand growth in 2022 would result in a lithium deficit, as use of the material outstripped production and depleted stockpiles.



ELECTRIC VEHICLE NEWS

Rystad Energy's lithium price outlook to January 2023
USD per kilogram



Source: Rystad Energy BatteryMaterialsCube, research and analysis



According to Rystad Energy, the supply of lithium salts is expected to remain tight through the first half of 2022, at least, due to lagging production in China and South America.

Rystad says producers in these regions are hesitant to ramp up operations, taking a cautious stance because of the ongoing logistical challenges wrought by the global Covid-19 pandemic.

“Producers appear reluctant to sell significant volumes on the spot market, as supply constraints and the ongoing

logistical issues caused by the pandemic create bottlenecks in the trading market for lithium salts,” the report says.

This is likely to have a flow-on effect on the price of EV battery packs. According to Bloomberg NEF, lithium-ion battery pack prices – which have fallen from more than \$1,200 per kilowatt-hour in 2010 to \$132 by 2021 – could rise to \$US135 per kilowatt-hour in 2022.

As is the case with solar panels, the state of the market in China weighs heavily on the state of the global market when it comes to lithium, accounting for more than 65 per cent of global battery production and more than half of lithium chemical production.

According to Rystad, the supply tightness for lithium salts, combined with the demand outlook for LFP batteries that typically feed on lithium carbonate, is expected to keep lithium carbonate prices high and support a notable premium over the price for lithium hydroxide in early 2022.

Of course, this dynamic won't last forever. Rystad Energy estimates the price premium will gradually narrow after seasonal supply bottlenecks ease in China and a ramp-up plan in South America materialises. Australian lithium resources could play a part in meeting demand, too.

But don't expect lithium prices to crash back down, either. According to Wood Mackenzie's research director for battery raw materials, Gavin Montgomery, cited in FT.com last week, this outcome is unlikely.

“We're entering a sort of new era in terms of lithium pricing over the next few years because the growth will be so strong,” he said.

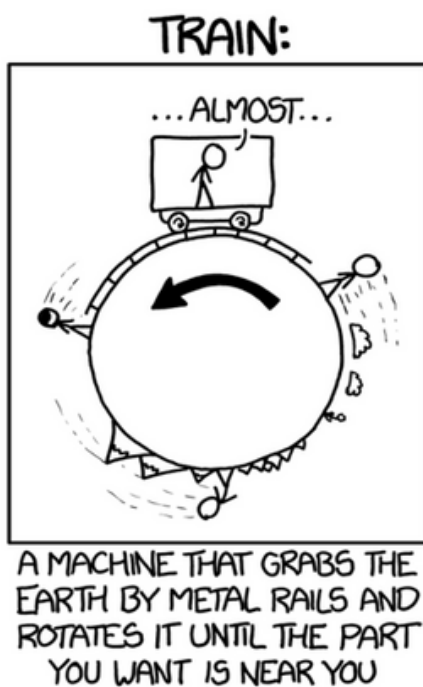
HUMOUR BREAK

A question was asked in seminar

Why employees don't discuss about their problems and frustrations to their management ?

The best answer came from a really frustrated employee,

"You cannot discuss your Malaria problems with the Mosquito!"





INTERNATIONAL NEWS

The Top 5 industry Trends in 2022

By Teresa Hansen | 5 January 2022 | [T&D World](#)

Below are the five trends I believe will be at the top of the list in 2022 for North American grid owners and operators.

Happy New Year, everyone! It's hard to believe it's already 2022. As crazy as 2020 and 2021 were, they seemed to fly by. I'm happy they're behind me, but sorry that we're entering another year where COVID 19 is still in the spotlight. As we start our journey into 2022, I predict that we will continue to be impacted to some degree by the pesky virus that won't go away. That's a pretty easy prediction, so I'll move on to some others that may or may not pan out. Below are the five trends I believe will be at the top of the list in 2022 for North American grid owners and operators.

Decarbonization

Reducing carbon emissions has been driving the energy transition for most of this century and will continue to do so, but the pace picks up in 2022. The retirement of central station coal-fired power plants coupled with the addition of more intermittent renewable energy is the main driver. The Energy Information Administration (EIA) expects about 65 GW of coal power to be retired between now and 2030, and it reports that nearly 90 GW has already been retired since 2011. The latest EIA data also predicts renewable energy in the U.S. will make up 50% of the energy generation mix by 2030. In 2020, it made up just under 20%. When you compare how long it took for the country to get to 20% vs. only a decade to reach 50%, it's easy to see that the rate of renewable penetration on the grid will require a lot of innovation and investment in electricity delivery systems. So far, grid owners and operators have managed to keep up, but as the pace increases, new technology will be required, and I expect to see more innovation in this area in 2022.

Electric Vehicles

While most automobiles on the road are still fueled by gasoline, enthusiasm for electric vehicles (EVs) is spreading fast. Most every auto manufacturer has already introduced or plans to introduce mass produced EVs in 2022. Data recently released by Rystad Energy, a global independent energy research and business intelligence company, predicts that global EV sales will reach 7 million cars in 2021, which is more than double 2020 sales of 3.2 million. It also reported that when purchases of plug-in hybrid EVs and battery electric EVs are combined, about one in every 10 cars purchased in 2021 falls into that group. That also doubles 2020 sales. The U.S. had 1.68 million charging points at the end of 2020, according to BloombergNEF. While that's a start, it is far from enough to support the number of EVs expected to hit the road in this decade. For most grid owners and operators, EV charging will require upgrades and/or new infrastructure to accommodate the additional power that will be needed, as well as move that power to the right places. In recent weeks, I've seen several news items in my inbox concerning the need to mine more lithium to meet the demands of EV battery suppliers. I've also seen news that highlights environmental groups' concerns about lithium mining practices. Will these be obstacles that could change the EV trajectory, probably not in 2022.

Hydrogen

There has been a lot of talk about hydrogen in the last few years. In fact, it is one T&D World readers' favorite topics. Will vehicles fueled by hydrogen gas made from renewable energy become an option that changes the EV trajectory? Eventually, maybe. Green hydrogen (hydrogen made using renewable energy) that can be used as fuel to make baseload power (electricity that can be added or removed from the grid when needed) could also become an option. Hydrogen-fueled power could not only add clean energy to the grid, it also could be used to stabilize the grid when solar and wind are not available, or even to replace intermittent renewables. I don't expect this to happen in 2022, but I do expect hydrogen to continue to be a big topic in 2022 and for technology development to continue.



INTERNATIONAL NEWS

Infrastructure Upgrades

Much of today's electricity delivery infrastructure is old and obsolete and must be upgraded. In many cases, T&D grids are operating in ways they were never designed to operate. I tip my hat to not just the T&D grid owners and operators, but also the many solution providers that have worked with utility engineers to create products and solutions that are keeping today's infrastructure operating reliably. In my last Global Viewpoint column, I wrote about the Infrastructure Investment and Jobs Act, so I won't say much about that, but I believe the infusion of this federal money in 2022 will speed up infrastructure upgrades and help fund additional technology development, which is a must if the T&D grid is going to keep up with the energy transition. In addition, I think we'll see more utilities undergrounding their distribution lines to improve not just reliability, but also resiliency.

Advance Digital Technology/Analytics

This final trend dovetails into the first four. Transitioning to a decarbonized grid will require data collection and advanced analytics that can manage large amounts of intermittent energy, give electricity to and take electricity from EVs, efficiently create hydrogen from renewable energy, and build a T&D infrastructure where digital sensors collect data and computers analyze it and make operational decisions. In 2022 and beyond, we will see more of the grid being controlled and operated by artificial intelligence and machine-to-machine learning. More data, faster networks, and more processing speed will augment human decisions and provide the capabilities needed to create the grid of the future.

An 'Organic' movement for materials

By Markus Buehler, McAfee Professor of Engineering at MIT | 6 January 2022 | [Research and Development World](#)

When we talk about advances in materials science, the focus is typically on the materials themselves: how strong we can make this fabric, how light we can make the construction materials, how cheap we can manufacture better products than we have now.

But the benefits of materials science go far beyond performance. In fact, the field could lead to an "organic movement" of sorts for materials, similar to the movement toward organic foods that we have seen in recent decades.

In the world of food, organics are often seen as preferable for their perceived environmental and health benefits. Also, many people who opt for organic foods make an additional effort to "eat local," consuming in-season products that are grown near where they live as a way to support their local communities and create more resilient supply chains.

Advances in materials science can help product designers to achieve similar benefits.

Environmental sustainability

Virtually every industry today relies, in some way, on relatively cheap fossil fuels. But as climate change becomes an increasingly pressing issue, and businesses potentially have to pay for the adverse environmental impacts of their operations, we're going to see more and more companies searching for sustainable alternatives to their current



INTERNATIONAL NEWS

approach. (Many people don't realize that around 8% of the world's carbon emissions are the result of concrete production, with around the same amount coming from the steel industry.)

In the wood industry, companies are starting to seek out greener methods of making particleboard. And makeup companies are looking to cosmetics practices from traditional cultures – using modern chemistry to try to replicate a more organic approach to production, rather than relying so heavily on petroleum and potentially toxic chemicals for their manufacturing processes.

There's also growing interest in crops that will yield strong fibers that can be mixed into polymer, cement, steel or even plastic. Imagine a genetically engineered plant that provides nanoscopic fibers that strengthen materials. This could not only lead to lighter, thinner, stronger product components, but also to those parts being more environmentally sustainable.

Streamlined supply chains

As we've seen during the COVID-19 pandemic, even the smallest disruptions to industrial supply chains can lead to enormous problems. The pandemic, which began with a widespread toilet paper shortage, eventually saw people hoarding dumbbells for resale and waiting months to buy a new car or bike.

These (relatively minor, all things considered) instances illustrate just how dependent we've become on complex, globe-encircling supply chains. One way to reduce this complexity and improve resilience is to depend more on locally sourced supplies that can be created using advances in materials science. The pandemic aside, there are a number of near-term reasons for companies to leverage materials science to insulate themselves against supply chain problems. For instance, a number of manufacturing processes are heavily dependent on rare earth-metals that are largely controlled by a handful of countries. A more streamlined supply chain also gives companies the flexibility to step away from existing partners in cases of global conflict, human rights abuses or other unpredictable events.

Often, materials science can help manufacturers to find workable substitutes for existing materials. If you're unable to use Product A, for instance, you might be able to replicate it using a combination of Product X and Product Y, but it sometimes takes analysis on the molecular level to make these discoveries.

Human health

In recent years, there has been growing attention paid to the impacts that the built and manufactured environments have on human health. One obvious example is Bisphenol A (BPA), the clear, tough plastic that many retailers have stopped using after questions were raised about the materials' potential toxicity.

It's important to note that, once upon a time, BPA was actually a win for materials science, given its properties as a material. This shift illustrates the importance of keeping human health impacts a top-of-mind concern during the materials development process. Advances in materials science are making it more and more practical for manufacturers to use plant-based materials in their products, in ways that are both functional and eco-friendly. Silk is a good example. Of course, silk is found in a number of different settings in nature, including among spiders and worms. Synthetic materials can sometimes have unpredictable health effects, whereas natural – or, “organic,” if you will – materials tend to be safer.



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In recent years, it has become commonplace for businesses to talk about a “triple bottom line,” valuing not only their profits, but also their social and environmental impacts. By improving the performance of products – while also promoting environmental stewardship, responsible and resilient supply chains, and human health – materials science can help companies move toward this ideal.

Report: Renewable Energy Integration Key to Asia's Decarbonization, Energy Transition

12 January 2022 | [T&D World](#)

The need to focus investments beyond generation into transmission and distribution is underlined throughout the report.

The integration of renewable energy into grid systems — more than simply deploying renewable energy to replace the region's large dependence on coal — is the biggest challenge facing Asia's electric industry, according to findings from this year's Black & Veatch Asia Electric Report.

“The report reveals that pressures to lower grid emissions are mounting from investors, large customers and governments as infrastructure needs continue to transform,” said Narsingh Chaudhary, executive vice-president & managing director, Asia Pacific. “The introduction of more renewable energy, is changing the very nature of electric grid management and this means Asian electricity providers must plan and invest seriously across the entire system of generation, transmission and distribution assets.”

The need to focus investments beyond generation into transmission and distribution is underlined throughout the report. For example, 25% of industry respondents are not confident in the performance and resilience of their transmission and distribution systems. In addition, two of the top three threats to providing reliable service to customers are cited as underinvestment in transmission and insufficient energy storage.

“The energy transition is underway across the region with more than 80% of respondents saying they are channeling capital to clean energy investments,” said Harry Harji, associate vice-president for Black & Veatch's management consulting business in Asia. “Solar, in particular, looks set to receive increased investments over the next five years while almost half of respondents think hydrogen will emerge as an alternative to gas generation by 2030.”

Other key findings highlighted in the report include:

- Only 15% of respondents see a future for coal generation asset investment beyond 2035; in addition, 85% believe there will be less investment in coal over the next five years.
- In contrast, nearly half of respondents see a long-term future for new gas generation asset investments beyond 2035 while an additional 25% think investments will be channeled to upgrading existing facilities.
- This aligns with optimism around hydrogen as a zero-emissions energy carrier. 73% believe that hydrogen will help meet carbon emission goals beyond more than any other technology while 46% will take off as clean and affordable alternative to gas generation.



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- Advance system control devices is the top investment priority area to improve transmission systems.
- Almost half of respondents are considering smart grid improvements in the next five years, more than any other grid hardening technique.
- 35% of industry respondents say their organization has no decarbonization response in place.
- The report also includes insights from large customers, surveyed for the first time.

Britain's gas grid preparing to accept 20 per cent hydrogen mix by 2023

By Jack Loughran | 13 January 2022 | [Engineering and Technology](#).

Britain's gas grid is being prepared to accept a blend of up to 20 per cent hydrogen from next year as part of efforts to decarbonise the UK's gas infrastructure.

The Energy Networks Association (ENA) has published a plan which sets out how all five of Britain's gas grid companies will meet the government's target.

It will also mean that domestic gas-fired power plants will be able to use blended hydrogen to generate cleaner electricity. The companies are also calling for the government to double its domestic 2030 hydrogen production target from 5GW to 10GW, to ensure that as much hydrogen as possible is produced from sources here in the UK. This could also help to avoid future spikes in gas prices the likes of which have caused a multitude of energy firms to collapse over the last few months.

The ENA said that blending 20 per cent hydrogen into the gas grid will reduce carbon emissions by the equivalent of 2.5 million cars a year without any changes needed to be made to people's cookers, boilers or heating systems.

The plan builds on the progress made by gas network companies through the HyDeploy project, which has demonstrated that blending hydrogen with natural gas is feasible and safe.

The project began blending hydrogen into the public gas network in Winlaton, Gateshead, in summer 2021.

David Smith, the ENA's chief executive said: "Whether it be heating our homes, powering our businesses or generating cleaner electricity, hydrogen will help drive up our energy security, while driving down our carbon emissions – and Britain's gas grid companies are ready to get on with the job of delivering that.

"This plan sets out the changes needed to deliver cleaner, more secure energy supplies for all. What's key is that the government does its bit too by lifting its target for homegrown hydrogen production this decade. Doing that today will help gas grid companies deliver for tomorrow."

Blending up to 20 per cent hydrogen into the gas grid is subject to a final decision by the government which it will make in 2023, as set out in its Hydrogen Strategy.

Hydrogen is currently much more expensive to produce than conventional fuels, so the government is considering proposals to bridge the gap between fossil fuel and hydrogen. It has proposed a twin-track approach to subsidies for developing both green and blue hydrogen. Green hydrogen is



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Hydrogen is currently much more expensive to produce than conventional fuels, so the government is considering providing subsidies to bridge the gap between fossil fuels and hydrogen.

It has proposed a twin-track approach to subsidies for developing both green and blue hydrogen. Green hydrogen is produced by splitting water by electrolysis while blue hydrogen is produced by splitting natural gas.

While green hydrogen can be a zero-emission fuel when electrolysis is powered by renewables, blue hydrogen can only be described as a net-zero carbon fuel when used in conjunction with carbon capture and storage. A recent study found that blue hydrogen is more carbon-intensive than natural gas, coal, or diesel, as a source of heat.

Some 85 per cent of UK homes are connected to the gas grid amounting to around 23 million properties. To reach net zero, Britain needs to reduce the average household's carbon emissions from nearly three tonnes today, to just 135kg by 2050 – a drop of 95 per cent.

UK Utility Transforms the Capture and Use of Inspection Data

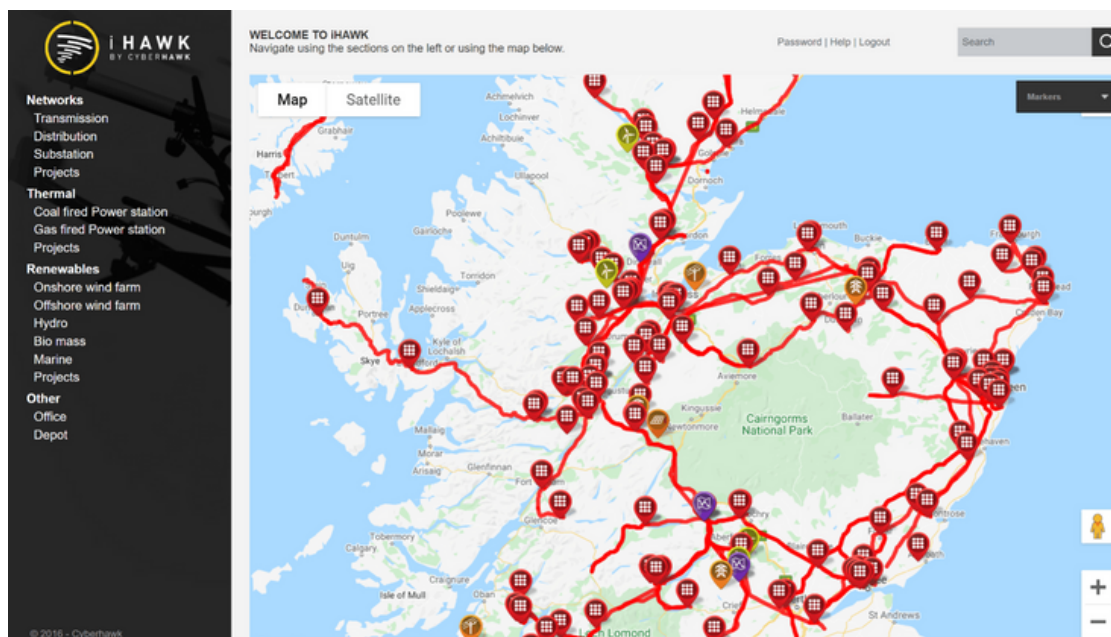
By Stuart Knight | 5 January 2022 | [Engineering and Technology](#).

SSEN Transmission improves system reliability with the early adoption of drones, internet of things and visualization software.

Part of the SSE Group, Scottish and Southern Electricity Networks Transmission owns and maintains the 400-kV, 275-kV and 132-kV transmission systems across the majority of Scotland. In 2019, the utility reviewed its digital strategy, outlining its commitment to safety, innovation and the best environmental practices — particularly those that apply to the routine operation and maintenance of its transmission system assets, such as overhead lines and substations in northern Scotland. The utility's asset base includes around 11,500 transmission line towers and 158 substations and switching stations.

Transmission line faults create disturbances that can have a significant impact on the system, reducing overall stability and security as well as resulting in the loss of renewable energy generation, as is often the case with modern networks. In extreme cases, it can even result in the loss of widespread customer supplies. For this reason, Scottish and Southern Electricity Networks (SSEN) Transmission works hard to ensure its inspection and maintenance programs are robust. Traditionally, this included field staff climbing transmission towers to carry out routine inspections, intervening to replace worn and damaged fittings as they found them. However, this required circuit outages and had the inherent risks associated with working at heights.

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Location of transmission system substations in northern Scotland

As part of its digital strategy, the SSE Group engaged Cyberhawk — a drone-based aerial inspection and data management solutions provider — to check the integrity of its overhead transmission system and adopt innovative digital solutions. In action since 2012, this program has transformed the way in which SSEN Transmission captures and uses inspection data today.

Multilevel Data

Recognizing the benefits of effective data management, SSEN Transmission now accesses terabytes of data captured from drone inspections on Cyberhawk's cloud-based internet of things (IoT) visualization platform, iHawk. This enables the utility to actively manage assets throughout their life cycle and accurately make informed future capital investments, driving whole-life value.

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The 400-kV, 275-kV and 132-kV transmission system in northern Scotland.

iHawk offers operational, project and asset teams unprecedented access to multilevel data, giving them a more comprehensive understanding of the network, exposing integrity risks and revealing opportunities for improvement. This innovative approach to data management is key to managing network assets and central to how SSEN Transmission's operational team manages inspections, maintenance, safety and compliance.

Drone Inspections

By carrying out drone inspections as business as usual and ensuring the data is efficiently processed and accessed on iHawk, SSEN Transmission's highly skilled operational teams can identify issues early and focus interventions on the highest priority items, before they fail.

The condition of towers and insulator fittings can deteriorate over time, leading to potentially catastrophic incidents. Therefore, the first priority is to provide a safe and secure transmission network. After all, the risk is too high to adopt piecemeal or percentage-based inspections. To overcome this, Cyberhawk continues to support SSEN Transmission by conducting regular drone-based inspections, which are agile, use time effectively and provide a safer alternative to the in-person method. Put simply: The operational staff and their time are too precious. Drone surveys provide the opportunity to get the most from this team while reducing risk and improving the performance of the network in the most efficient manner.

For example, in 2020, Cyberhawk's visual inspection data identified a missing split pin on a tower fitting. As a result, an outage was planned and a repair carried out the following weekend. In this case, the drone data on iHawk likely prevented a circuit failure and the loss of a key transmission circuit. By keeping its transmission lines in top condition, SSEN Transmission can retain a high level of network reliability at the lowest cost possible, ensuring delivery of the best value to the customer.

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Insulator fitting with missing split pin.

Furthermore, SSEN Transmission also has worked with Cyberhawk on the iSim application within iHawk, enabling the utility to apply the same rigor in managing its substation assets. As a result, inspection and maintenance data now are entered at the point of work, ensuring accuracy and the most up-to-date information is available for the maintenance teams.

Data Collection

Cyberhawk's data management solution also provided the system for compliance. As part of a compliance audit, iHawk ensures the SSEN Transmission data systems satisfy the statutory obligations of the electricity safety, quality and continuity (ESQC) regulations as the main holding of the data interrogated. ESQC regulations (2002) dictate that electricity distribution and transmission utilities must inspect and maintain accurate records of their assets. Without these records, SSEN Transmission would not be able to comply.

iHawk put the data at SSEN Transmission's fingertips, allowing teams to rapidly access historic information in one centralized place, providing ease of navigation and categorization. The utility can pinpoint key information, such as general-condition data, number of defects reported during any given time period in any given area or circuit, plus evidence to confirm remedial work orders have been completed.

iHawk functionality enables efficient reporting of defects identified during substation and overhead line inspections, enabling team members to tag defect notices to any given asset or location. The ability to include pictorial evidence and user commentary before autonomously passing an inspection over to maintenance managers for approval, scheduling and reporting enables quick reaction to any defects identified.

Environmental Impact

SSEN Transmission recognizes the digitalization of its systems and processes — underpinned by high-quality, accessible data — reinforces its commitment to deliver a network for net zero. Sulphur hexafluoride (SF₆) has been used extensively as an insulation medium in high-voltage equipment for more than 60 years, but it is now recognized as one of the most

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potent greenhouse gases. Although the industry is beginning to develop alternatives — environmentally friendlier insulation and interrupting gases — the amount of SF₆ is so vast it will be on the network for years to come. To mitigate the impact of this legacy and maximize network availability and performance, SSEN Transmission works tirelessly to reduce the leakage of SF₆ gas from its assets.



SSEN employee using iHawk table to access work orders.

SSEN Transmission is now benefitting from Cyberhawk's decades of oil and gas industry experience. The company recently introduced a new pressure-monitoring system that enables SSEN Transmission's plant maintenance teams to remotely monitor the SF₆ gas chambers and zones within the utility's assets.

An IoT sensor monitors for any leaks of the colourless, odourless synthetic gas. As soon as the system identifies a reading — regardless of the volume and how minor the leak — the operations team is alerted to take remedial action and repair the leak immediately, to limit gas from escaping into the environment. This not only enables the utility to manage SF₆ leaks proactively, but it also improves network performance, allowing plant outages for gas top-ups to be coordinated in a wider program and reducing the need for immediate, forced action.

Impact of Covid-19

When the impact of Covid-19 on the UK population became clear at the start of 2020, many businesses faced disruption of their day-to-day operations. Therefore, maintaining a secure and reliable supply of electrical energy was more essential, creating more pressure than ever before. The pressure was on utilities and their employees to continue to deliver this essential service despite the imposed restrictions.



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SSEN Transmission has an unwavering commitment to keeping people safe, reiterated by its safety message: "If it's not safe, we don't do it." In March 2020, SSEN Transmission faced the challenge of ensuring critical inspections and maintenance activities continued while allowing staff to comply with social distancing. Using iHawk tablets meant there was no reliance on paper-based systems, so it was possible to minimize face-to-face contact between the maintenance teams and engineering staff.

Stuart Knight (email address) has 15 years of industry experience with Scottish and Southern Electricity Networks (SSEN), starting as an apprentice and progressing, via protection and control engineering, to the position of head of operations. With wide experience in operations, maintenance and large capital projects, Knight has played a significant role in the growth of the northern Scotland transmission network over the past decade, with highlights such as commissioning SSEN's first 400-kV site, first IEC 61850 installation and first high-voltage direct-current link, all while supporting the day-to-day operations of the T&D business.

Renewable electricity growth is increasing faster than ever worldwide

December 2021 | [International Energy Agency Newsletter - The Energy Mix](#)

The world's capacity to generate electricity from renewable sources such as wind, solar and hydro is on track to set a new record in 2021, with installations expected to keep accelerating in the following years, according to our new annual market report. This impressive growth comes even as the cost of producing solar panels and wind turbines has been lifted by rising commodity and transport prices.

By 2026, global renewable electricity capacity is forecast to rise more than 60% from 2020 levels, reaching the equivalent of the current total global power capacity of fossil fuels and nuclear combined, our new report says. Renewables are set to account for almost 95% of the increase in global power capacity through 2026, with solar PV alone providing more than half of the growth.

China is expected to remain the global leader in the volume of renewable capacity additions over the next five years, with India set to enjoy the fastest rate of growth. Deployments are also expected to speed up in the United States and the European Union, with these four markets accounting for 80% of capacity expansions worldwide. However, even faster global growth – in renewable electricity, but also other areas such as biofuels and renewable heat – would be needed in a pathway to net zero emissions by mid-century.

To better track the development of renewable technologies, we've introduced our online Renewables Data Explorer, as well as the Residential Heat Economics Calculator, which explores and compares the economics of different residential heating systems.

To find out more, explore the full report, which is available on our website for free, read the press release and watch the launch event with our Executive Director Fatih Birol and Senior Energy Analyst Heymi Bahar.

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10 notable battery storage projects that went live in 2021

By David Cox, PE - President FirmoGraphs | 1 November 2021 | [Renewable Energy World](#)



Concept drawing of an energy storage system.

Battery storage is having its moment in the sun.

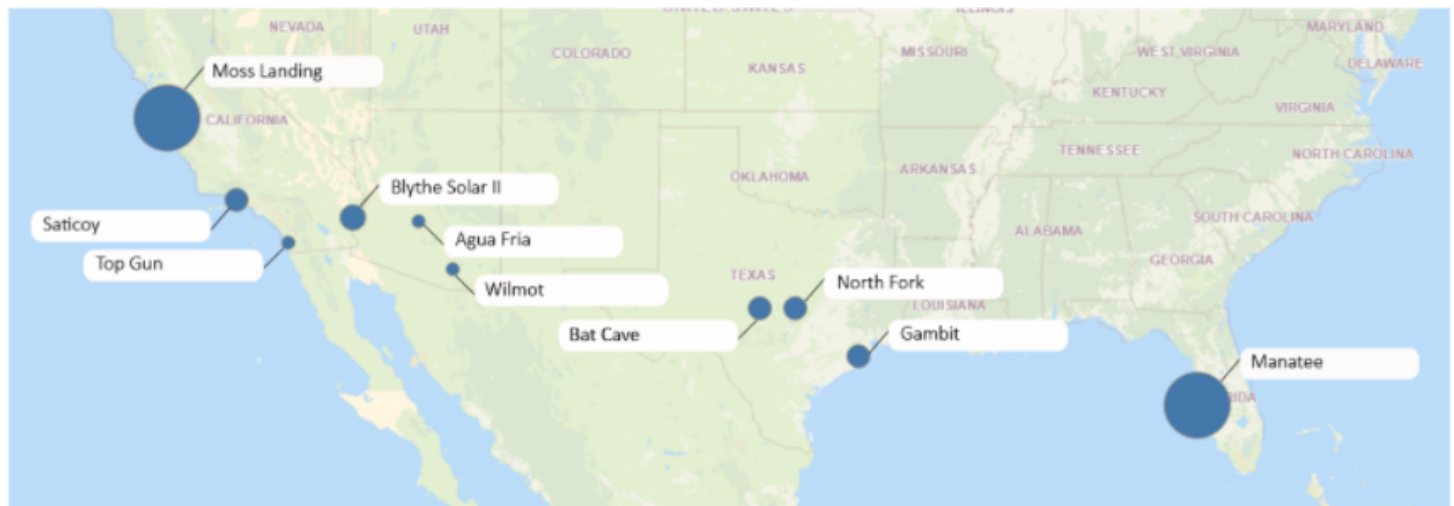
In its most recent Electricity Monthly Update, the U.S. Energy Information Administration said that when it totals up the numbers for 2021, it expects they will show that battery storage capacity grew by 4.5 GW, or 300%, in the year just ended. “Declining cost for battery storage applications, favorable economics when deployed with renewable energy (predominantly wind and solar PV), and value-added additions in regional transmission organization (RTO) markets have helped drive the expansion of battery storage,” the EIA said.

The EIA expects 10 GW of battery storage capacity to come online in the next two years, more than 60% of which will be paired with solar generation facilities.

FirmoGraphs monitors the projects involving that capacity from early stages of consideration to production. We track filings with utility regulators in all 50 states and Washington, D.C., as well as the Federal Energy Regulatory Commission, and keep an eye on electric power industry news. We enter information from the documents we collect into our database, which we use to provide business intelligence to interested parties such as U.S. infrastructure contractors.

The map below shows the location of 10 of the most notable battery storage projects in our database that came online last year with the size of the dots showing the total storage capacity at their sites. As you can see, four are in California, three are in Texas, two are in Arizona and one is in Florida.

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Source: FirmoGraphs Power Mart; reproduced from Qlik Sense Enterprise

Seven of them are stand-alone storage projects and are listed first in the table and descriptions below. At least seven have storage capacities of 100 MW or greater. The table shows the capacity added in 2021.

Name Project	Owner	Capacity	State
Moss Landing Energy Storage Facility, Phase II	Vistra Corp.	100 MW/400 MWh	California
North Fork	Broad Reach Power	100 MW/100 MWh	Texas
Bat Cave	Broad Reach Power	100 MW/100 MWh	Texas
Saticoy	Arevon Asset Management	100 MW/400 MWh	California
Gambit Energy Storage	Tesla	>100 MW/200 MWh	Texas
RES Top Gun Energy Storage	Renewable Energy Systems (RES) and San Diego Gas & Electric	30 MW/120 MWh	California
Bolster Substation Battery System	Salt River Project	25 MW	Arizona
FPL Manatee Energy Storage Center	Florida Power and Light Company	409 MW/900 MWh	Florida
Blythe II Solar Energy Center	NextEra, Blythe Solar II, LLC	115 MW	California
Wilmot Energy Center	Tucson Electric Power	30 MW	Arizona



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100 MW Moss Landing Energy Storage Facility, Phase II

Irving, Texas-based Vistra Corp. made the big even bigger last July when it completed construction on Phase II of its Moss Landing Energy Storage Facility, which is located at the site of its retired gas-fired power plant in Monterey County, California. The second phase added 100 MW/400MWh of storage capacity to the facility, bringing its total capacity to 400MW/1,600 MWh. Vistra says the facility, which uses technology from LG Energy Solution, is the largest lithium-ion battery storage system in the world. Burns & McDonnell provided engineering, procurement, and construction expertise for the expansion, which was completed in less than a year. The Phase II project is operating under a 10-year resource adequacy agreement with Pacific Gas and Electric Company. The 300-MW/1,200-MWh Phase I project has a similar 20-year resource adequacy agreement with PG&E.

North Fork and Bat Cave 100 MW battery storage resources

Broad Reach Power said on November 2 that its first two transmission-level battery storage resources, North Fork and Bat Cave, were online and had been placed into service with the Electric Reliability Council of Texas, which operates the Lone Star State's grid. Each is a 100 MW/100 MWh greenfield battery storage resource, and both are located in central Texas. Broad Reach said they cost more than \$100 million to build. Broad Reach now has 300 MW of dispatchable storage resources in ERCOT's territory.

Saticoy 100 MW battery storage system

Arevon Asset Management announced in late June that it had opened the Saticoy battery storage system in Oxnard, California. The affiliate of Capital Dynamics completed the system, which uses 142 Tesla Megapacks, in nine months. Strata Clean Energy originally conceived of and developed the 100-MW/400-MWh system after Oxnard residents prevented the construction of a natural gas-fired peaker plant. Power from the system is being sold to Southern California Edison under a 20-year purchase-and-sale agreement.

Tesla 200 MWh battery storage facility

On September 30, Tesla announced through a video on its website that it had installed more than 81 Megapacks with a combined storage capacity of 200 MWh in Angleton, Texas. Earlier in the year, Bloomberg had sussed out the project while it was being built and concluded that it was the work of a Tesla subsidiary named Gambit Energy Storage LLC and that the capacity was at least 100 MW. The system is registered with ERCOT and located next to a Texas-New Mexico Power substation. In November, the Texas Public Utility Commission approved a Tesla subsidiary named Tesla Energy Ventures to operate as a Retail Electric Provider in the Lone Star State, according to The Texan. Tesla said the battery storage facility built by its Gambit subsidiary is participating in the Texas energy market overseen by ERCOT.

30 MW RES Top Gun Energy Storage

On September 21, Renewable Energy Systems (RES) and San Diego Gas & Electric announced that the RES Top Gun Energy Storage Project in San Diego had begun commercial operation. The 30 MW/120 MWh project is named after the naval aviation training program that used to be located at Marine Corps Air Station Miramar, which is adjacent to it. Construction on the facility, which consists of more than 15,000 lithium-ion batteries in custom enclosures, began in early 2020. RES will provide operations and maintenance service for the facility.

Bolster Substation 25 MW battery storage facility

Salt River Project said on September 16 that it had placed a 25 MW battery storage facility at its Bolster Substation into service. The facility, which consists of a series of Tesla Megapacks connected to SRP's energy grid, is currently the biggest standalone battery storage system in Arizona. It's adjacent to SRP's 626 MW Agua Fria Generating Station in the City of

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Peoria. SRP has two other battery storage projects, both of which are pilots. One is the Pinal Central Solar Energy Center, a 20 MW, integrated solar energy and battery storage plant in Casa Grande. The other is the Dorman battery storage system, a 10 MW/40 MWh stand-alone battery storage system in Chandler. SRP recently contracted for the output from the Sonoran Energy Center, which will be the largest solar-charged battery project in Arizona.

409 MW FPL Manatee Energy Storage Center

On December 13, Florida Power and Light Company unveiled the 409 MW/900 MWh Manatee Energy Storage Center, which gets electricity from the adjacent 74.5 MW Manatee Solar Energy Center. The Manatee Energy Storage Center consists of 132 energy storage containers, each of which holds roughly 400 battery modules, on 40 acres in Parrish, Florida. FPL says the Manatee Energy Storage Center is the world's largest battery when measured by generating output and the world's largest solar-powered battery when measured by both total output and capacity per hour. FPL is a subsidiary of NextEra Energy, meaning it's a sister company of NextEra Energy Resources LLC, which is the world's largest generator of solar and wind power and a world leader in battery storage.



FPL Manatee Energy Storage Center

Blythe Solar II LLC 115 MW battery storage system

On January 6,, Blythe Solar II LLC synchronized the 115 MW battery storage system collocated with its 131.2 MW solar generating facility in Riverside County, California, with the grid, according to a Notice of Change in Status filing that its parent, NextEra Energy Resources LLC, made with the Federal Energy Regulatory Commission. The 115 MW battery storage system at NextEra's Blythe II Solar Energy Center is one of six battery storage systems with nearly 700 MW of capacity that the company plans to construct at existing solar facilities in California by the end of 2022.

Wilmot Energy Center with 30 MW battery storage

Tucson Electric Power said it started delivering power from its Wilmot Energy Center at the end of April. The center's main feature is a 100 MW solar array, but it also has 30 MW of linked battery storage. To interconnect them to its grid, TEP built a 138-kV substation, transmission lines and a switchyard. The company said the WEC cost about \$25 million to build. TEP also has two 10 MW battery systems it uses for frequency regulation and other functions that support service reliability, giving it 50 MW of storage capacity. It plans to increase its storage capacity to more than 1,400 MW over the next 15 years.



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GE Splitting Into Three Companies, Will Spin Off Energy Group

By Darrell Proctor | 9 November 2021 | [Power Mag](#)

General Electric (GE) has announced plans to split into three separate companies, breaking up into publicly traded groups for its energy, healthcare, and aviation divisions.

The company on Nov. 9 said the GE Power, GE Renewable Energy, and GE Digital groups will be combined into one business, with the company pursuing a tax-free spin-off of this group in early 2024. The company plans to spin off the healthcare business to its shareholders in early 2023. GE will then remain as a company focused on aviation, though it will retain a 19.9% stake in the healthcare group.

GE earlier this year sold its aircraft leasing business to Irish group AerCap in a \$30 billion deal, which the company said would reduce its debt by a similar amount. The company's competitors in the power generation equipment space also have had financial challenges, and undergone restructuring, in recent years, with rival Siemens spinning off its energy and healthcare businesses.

"Today is a defining moment for GE, and we are ready," said Chairman and CEO Larry Culp in a statement. "The momentum we have built puts us in a position of strength to take this exciting next step in GE's transformation and realize the full potential of each of our businesses."

Culp has made reducing the company's debt a hallmark of his tenure, continuing to sell off assets as his predecessors had done for more than a decade after the 2008 global financial crisis. GE on Tuesday said these latest moves come on the back of a stronger financial position for the company, including a reduction of more than \$75 billion in debt since 2018. GE said all three new companies would have investment-grade credit ratings.

"At GE we have always taken immense pride in our purpose of building a world that works. The world demands—and deserves—we bring our best to solve the biggest challenges in flight, healthcare, and energy," Culp said. "By creating three industry-leading, global public companies, each can benefit from greater focus, tailored capital allocation, and strategic flexibility to drive long-term growth and value for customers, investors, and employees. We are putting our technology expertise, leadership, and global reach to work to better serve our customers."

"GE's decision to spin off its energy-focused business marks a logical and necessary transition, one that will enable the new energy business to focus on expanding and transforming the energy market," said Andrew Dillon, an innovation fellow in the energy and utilities practice at West Monroe, a business/technology consultancy. Dillon told POWER, "With rapid escalation of importance of decarbonization, grid modernization, advanced energy markets and digital technologies, this decision increases GE's ability to increase its position relative to other major global energy players. This move is a clear indicator that a pure-play energy spin off is a forward-looking strategic move by GE."



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Financial Challenges

GE, a Boston, Massachusetts-based industrial giant founded by Thomas Edison in 1892, has faced numerous financial challenges in recent years. The company was removed from the Dow Jones Industrial Average in 2018 after years of declining valuation, in part due to the global move toward renewable energy at a time when GE's fortunes were still heavily tied to fossil-fueled power generation. The company last year said it was exiting the new-build coal-fired power market. GE's revenue for 2020 was \$79.62 billion, far below its 2008 revenue of more than \$180 billion.

GE in December 2020 agreed to pay \$200 million to settle charges by the U.S. Securities and Exchange Commission that it had misled shareholders about the decline of its power and insurance businesses in the years before the company's stock price plummeted. The company's stock in early 2001 was worth more than \$500 billion, and GE was one of the world's most-valuable companies, alongside Royal Dutch Shell, ExxonMobil, and Toyota.

That worth has fallen to about \$125 billion today. The company in July of this year completed a reverse 1-for-8 stock split to support its floundering shares.

A GE spokesperson told POWER that the moves announced Tuesday pave the way for the company's businesses "to unlock full potential," with "enhanced focus" and "opportunity for growth." The spokesperson emphasized that there is "no anticipated impact to employees at this time."

The company on Tuesday said it expects one-time costs associated with the split, including separation pay, of about \$2 billion, and tax costs of less than \$500 million depending on the specifics of the transaction.

'Greater Focus, Strategic Flexibility'

"By creating three industry-leading, global public companies, each can benefit from greater focus, tailored capital allocation, and strategic flexibility to drive long-term growth and value," said Culp, who will lead the aviation-focused GE after the split. Scott Strazik, currently CEO for GE Power, will head the combined Renewable Energy, Power and Digital business. Peter Arduini, current CEO of GE Healthcare, will continue in that role.

Said Strazik, "I am humbled, and energized to lead our combined GE Renewable Energy, GE Power, and GE Digital businesses moving forward. All one has to do is reflect on the days without power in Texas earlier this year to understand the importance of a resilient energy system ... or look at the forest fires in Oregon, or floods in Germany this summer to know we need to accelerate our path to a more sustainable future."

GE in December 2020 released a white paper outlining its position on how its power groups could combat climate change, including accelerating the phaseout of coal-fired generation.

The GE spokesperson told POWER that today's announcement comes as "Customer discussions on [the] path to decarbonize [are] increasingly happening at the CEO level," and that "asset-balancing decisions can best be solved with [an] integrated top-of-the-house approach." The spokesperson said that the energy groups represent "complementary technologies and operational opportunity in [a] large and growing market," and that "most importantly as [a] unified business, [will have] a more acute focus on a singular mission—accelerating the energy transition. The world needs us to



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lead here, in solving the energy trilemma." The trilemma comes from the World Energy Council's definition of energy sustainability, which is based on three core dimensions: energy security, energy equity, and environmental sustainability of energy systems.

Struggling Power Business

GE's power business has struggled financially since the acquisition of Alstom's Power and Grid business in November 2015. The €9.7 billion (\$10.6 billion) transaction—GE's largest deal ever—was expected to make the company even more of a global leader in the energy space.

But the power market was transitioning away from fossil fuels to cleaner energy sources, and GE—along with other power equipment manufacturers—suffered as a result. Weak earnings associated with the underperforming investment in Alstom prompted GE to restructure its power business in November 2017. Then-CEO John Flannery, who had replaced Jeffrey Immelt earlier that year, announced several changes for the company, including "right-sizing" for market structure, simplifying GE's portfolio, revamping its supply chain, and resetting its supply base. The company in December 2017 announced it was cutting 12,000 jobs as part of that restructuring.

Flannery famously in June 2018 said the company was "finished" with its overhaul, but that was not the case. The company continued to struggle, and Flannery was replaced as CEO by Culp on Oct. 1, 2018. Soon after, GE divested its Distributed Power business, which included the Jenbacher and Waukesha product lines; sold part of its stake in oil services company Baker Hughes; and announced its intention to reorganize GE Power into two businesses, forming GE Gas Power, comprised of Gas Power Systems and Power Services, and GE Power Portfolio, which includes the Steam, Grid Solutions, Nuclear, and Power Conversion businesses. GE in January 2019 said it would move its grid solutions, solar solutions, and storage businesses from GE Power to GE Renewable Energy.

The company in 2018 said it was cutting manufacturing jobs, including at a flagship facility in New York. GE in early 2019 said it would cut jobs at its units in France, including some associated with the Alstom acquisition. The company in May 2020 announced it would cut another 13,000 jobs from its aviation business due to the impact on air travel from the coronavirus pandemic.

Buffett Bought Large GE Stake in 2008

GE products have touched many corners of life, as the company has held interests in power generation, lighting, radio, cable television, aviation, healthcare, computing, and financial services, among others. The wide scope of its business holdings made it attractive to investors, but that changed in recent years.

The 2008 financial crisis provided warning signs for GE. Then-CEO Jeffrey Immelt issued a profit warning in September of that year, citing "unprecedented weakness and volatility in the financial services markets." That credit crunch had a major impact on GE Capital, the company's large financing division that loaned money to consumers and businesses.

Billionaire Warren Buffett poured \$3 billion into GE in October 2008, in exchange for preferred stock and "substantial equity participation." Buffett at the time said, "GE is the symbol of American business to the world. I am confident that GE will continue to be successful in the years to come."



INTERNATIONAL NEWS

Though some groups still looked at GE as a solid investment despite a downturn in orders for the company's gas turbines, and a global move toward renewable energy, some of the company's board members said they were frustrated with the company's slow pace of change as demand weakened for its power plant equipment.

Activist hedge fund Trian Partners in 2015 held a \$2.5 billion stake in GE, its largest holding at that time. The value of that stake was more than halved over the next three years, prompting Trian founder Nelson Peltz to say the fund's investment in GE was a "big mistake." Trian in a statement Tuesday said it "enthusiastically supports this important step in the transformation of GE."

Many institutional investors have called for a breakup of GE in order to boost the company's stock performance. Culp, speaking on CNBC on Tuesday, said, "We know looking at spins elsewhere that the focus and the accountability always increase. We think we have an opportunity here as well to have sharper capital allocation and greater strategic flexibility," repeating parts of his statement from earlier Tuesday.

EPRI reflects on the year gone by

By Clarion Content Directors | 30 December 2021 | [Power Engineering](#)



The past 12 months have been positively electric for the Electric Power Research Institute (EPRI). From working with the U.S. Department of Energy to develop a national EV charging infrastructure blueprint to speaking at COP26 about numerous EPRI-led decarbonization research initiatives, it has been a whirlwind of a year.

Let's hop in our electric-powered DeLorean and take a trip back to revisit 2021.



INTERNATIONAL NEWS

Among EPRI's highlights for the year:

- In April, the U.S. government announced plans to reduce U.S.-economy-wide carbon emissions by around 50 percent by 2030. Because other sectors, such as transportation, buildings, and industry, could largely reduce carbon emissions through electrification, the power sector will play a crucial role in achieving the administration's 2030 economy-wide goal. On Earth Day, the government announced that DOE, in partnership with EPRI, will develop a national EV charging infrastructure blueprint, including fast charging and grid interaction. The blueprint would assess needs in terms of connectivity, communication, and protocols from the utility down to the vehicle, to support electrification of the full vehicle fleet. EPRI also informed consumers through a new, interactive Electric Vehicle Consumer Guide, providing a searchable database for battery-electric and plug-in hybrid vehicles by make, model, electric range, and MSRP.
- Also, in April, EPRI announced its resource adequacy initiative to help ensure the ongoing ability to meet electricity demand by better anticipating and assessing risks to power supply resources due to extreme weather and other hazards. The project brings together grid operators, utilities, researchers, and other key stakeholders from across the electric power industry to accelerate the evolution of resource adequacy processes and tools.
- In June, EPRI published a preview of an important analysis, "Rethinking Deployment Scenarios to Enable Large-Scale, Demand-Driven Non-Electricity Markets for Advanced Reactors." The preview and forthcoming analysis examine four possible deployment scenarios that reimagine nuclear's role in meeting global energy needs into the future. These scenarios will include shipyard-based manufacturing and floating nuclear facilities, as well as hydrogen production at large scale. A full analysis is scheduled to be published shortly.
- In September, EPRI issued five Grand Challenges to accelerate the adoption of artificial intelligence technologies in high-value areas: advancing grid-interactive smart communities; lessening environmental impacts; strengthening energy system resiliency; enabling intelligent and autonomous power plants; and enhancing cybersecurity. The future power system will involve millions of variable, distributed resources working in concert to reliably meet customers' energy needs. AI holds the potential to greatly improve system operations, flexibly integrate distributed energy resources, and improve time-consuming tasks such as inspections.
- Continued progress on the Low-Carbon Resources Initiative (LCRI), launched in 2020 with EPRI and Gas Technology Institute. LCRI is focused on accelerating development and demonstration of low- and zero-carbon energy technologies. LCRI has nearly 50 industry sponsors and in October, kicked off its first demonstration project with the New York Power Authority, General Electric and Airgas to test blending renewable hydrogen with natural gas in a turbine at the Brentwood Power Station. The project could be used as a blueprint throughout New York — which aims to reduce emissions 85% below 1990 levels by 2050 — and the country, helping to further decarbonize the energy sector.
- Speaking at COP26 in Glasgow in November, EPRI announced it was partnering with the World Economic Forum and Accenture to accelerate the transition of industrial clusters towards net zero. Industrial clusters are geographic regions comprised of co-located energy supply and demand companies. Industrial clusters account for approximately 15% to 20% of global CO₂ emissions, making them an attractive target for impactful emissions reductions. The initiative aims to have more than 100 industrial clusters engaged by 2024, and four clusters from Australia, the UK and Spain have already joined, with a collective CO₂ emissions reduction profile equivalent to that of Denmark.

EPRI accomplished these and many projects in 2021, but we expect an even busier 2022. It's going to take all sectors of the economy working together to meet collective decarbonization targets. EPRI will help to lead the way to ensure the clean energy transition is equitable and sustainable, while keeping electricity accessible, affordable, and reliable for consumers in the U.S. and around the world.



INTERNATIONAL NEWS

Emerging Utility Business Models

By Perry Sioshansi | January 2022 | EEnergy Informer

Conditions are ripe for trying new business models and offering new services

Perry Sioshansi in the January edition of EEnergy informer writes that as numerous prior articles in this newsletter have pointed out, the traditional utility business model seems to be on its last leg in markets with competitive wholesale and/or retail. Moreover, as consumers discover and exercise options to migrate away from total reliance on upstream generators to produce electricity and on the delivery network for its transmission, the “utilities” – be they distributors or retailers – must go to Plan B. How would they find sufficient revenues to cover their fixed and variable costs as volumetric consumption declines when some consumers become prosumers – or go a step further and become prosumagers?

The debate about the future of net energy metering in California (preceding article) and similar debates in Australia and elsewhere with significant rooftop solar penetration is very much focused on this issue – namely how would the investor-owned utilities (IOUs) or the distribution companies survive as increasing numbers of customers self-generate and/or store some of the excess generation in batteries, electric vehicles, hot water tanks or other devices? What if they invest in more efficient buildings, appliances, lighting, HVACs, etc. – all compelling options – cutting down their net consumption and reliance on grid-supplied electricity? As this happens, the distribution utilities’ reliance on the volumetric bundled regulated tariffs will not suffice. And if they raise the retail rates to recover lost revenues more customers will flee, leading to the dreaded utility death spiral.

What if the 3 million solar customers in Australia double to 6 million by 2030 as projected? What if the 1.3 million solar customers in California double by 2030 – depending on what happens to the current net energy metering law? If regulators decide to pay little for the excess solar power exported to the grid – as proposed in California – that would simply increase the motivation to invest in storage and save the excess generation for later use, or for filling up the electric vehicle batteries, or filling the water tank with hot or cold water or sharing it with the neighbor across the street?

There are other more exotic options. Consumers, prosumers and prosumagers can form semi-self-sufficient micro-grids and/or join energy communities. Moreover, a new generation of smart aggregators are emerging who can orchestrate how such micro-grids or energy communities can optimize the consumption, generation and storage of energy to maximize value while reducing the costs of energy services.

The traditional utilities this editor is familiar with do not seem to be active in any of these endeavors – occasionally throwing roadblocks to the inevitable, trying to slow down the eventual outcome. But these efforts are unlikely to succeed in the long-run in places where the conditions are ripe for self-generation and storage – namely sunny places, with high proportion of dispatched households facing high retail tariffs. In this context, the trend to invest more in the electricity delivery network may make matters even worse, accelerating the utility death spiral.

Let’s be clear. The networks are critical and will become even more so in an electrified future – even for die hard prosumagers – but who and how to pay for them remains to be decided. One approach may be to switch from exclusive or primary reliance on volumetric tariffs – prevalent in the US – to fixed network connection charges.



INTERNATIONAL NEWS

Fixed connection charges are common in water utilities – or garbage collection. For the former, customers pay a monthly fee based on the capacity – the diameter size of the pipe connection – plus a commodity charge for each gallon of water consumed. The same can be applied based on the size of the copper wire connecting a household to the network plus a fee for the number of kWhs used.

As it happens, Tesla, in partnership with Octopus Energy Germany, is marketing retail utility services in 2 German states with a population of 24 million. The Tesla Energy Plan is available to households with a solar system and a Tesla powerwall with a 13.5 kWh battery. It is similar to a scheme offered by Octopus Energy in the United Kingdom.

Tesla's CEO Elon Musk has been talking about entering the utility business for some time. While the details are sketchy, Musk's scheme will most likely consist of interconnected localized renewable generation resources paired with short-duration Powerwall batteries as well as electric vehicle batteries, preferably the Tesla brand. Such a portfolio can be augmented with longer-term storage to accommodate utility- scale wind and solar generation. Would he be able to scale such a scheme to compete with traditional utilities remains to be seen.

Novel schemes such as Tesla's are emerging. According to Albert Cheung, head of global analysis at BloombergNEF, "It is now quite common to see these types of companies gain significant market share without necessarily owning any of their own generation or network assets at all."

"There are simply going to be more and different business models out there ... There is going to be value in distributed energy resources at the customer's home; Whether that is a battery, and a fixed monthly grid access charge of \$8/kW, called the Grid Participation Charge, is an example of this trend for solar customers.

It is an attempt to make sure they continue to pay for the maintenance of the grid when their volumetric consumption falls or totally vanishes. But there is no justification to limit such a charge to solar customers electric vehicle charger, a heat pump or other forms of flexible load, and managing these in a way that provides value to the grid will create revenue opportunities."

The UK-based Harmony Energy, for example, is building a new 4-acre battery storage facility outside London, its third. It already has a 34 MW/68 MWh storage facility comprised of 28 Tesla Megapack batteries. Harmony expects to grow to large scale in the next 3-4 yrs. It is working with the UK's National Grid.

Both Octopus and Harmony depend on trading and energy network management software; the former has its own Kraken software while the latter uses Tesla's Autobidder. Tesla is fully licensed to trade in the UK and is an approved utility.

Peter Kavanagh, Harmony's CEO, says Tesla's Autobidder charges the batteries when power is cheap and discharges them when there's low wind and no sun, balancing the constant change of supply and demand while trading the residuals by bidding into the wholesale market. The bottom line is to aggregate a portfolio of distributed resources which can be monitored, managed and optimized as a virtual power plant. Kavanagh says, "Whether it's batteries or some other energy storage technology, it is key to hitting net zero carbon emissions. Without it, you are not going to get there."

INTERNATIONAL NEWS

Some established utilities including PG&E in California and RWE in Germany are investing in storage and at scale as are others across Europe. What is clear is that the consumers of the future will have multiples of options, no longer totally dependent on the “utility” to meet all their service needs at all times. Nor will they be passive, taking power from the grid, but potentially feeding into it at times and actively participating in how the distribution network is operated and how supply and demand are balanced.

This means that the traditional relationships between the customers and electricity service providers is changing, and the sooner the traditional “utilities” figure out what this means the better their chances of surviving.

Solar and Battery Companies Rattle Utility Powerhouses

By MICHAEL DUMIAK | 20 September 2021 | [IEEE Spectrum](#)



Harmony Energy's 34 MW battery storage site is now online between Brighton and London.
HARMONY ENERGY



INTERNATIONAL NEWS

All eyes these days may be on Elon Musk's space venture—which has just put people in orbit—but here on Earth you can now get your monthly electric bill courtesy of a different Musk enterprise.

Tesla and its partner Octopus Energy Germany recently rolled out retail utility services in two large German states. It's being marketed as the "Tesla Energy Plan," and is available to any individual household in this region of 24 million people that has a solar panel system, a grid connection—and a Tesla powerwall, the Palo Alto firm's gigafactory-made 13.5 kWh battery wall unit.

The German initiative comes on the heels of a similar rollout through Octopus Energy last November in the United Kingdom.

It's too soon to say if these are the nascent strands of a "giant distributed utility," an expression Musk has long talked up, the meaning of which is not yet clear. Analysts and power insiders sketch scenes including interconnected local renewable grids that draw on short-duration battery storage (including the small batteries in electric vehicles in a garage, models for which Tesla just happens to make) combined with multi-day storage for power generated by wind and solar. For bigger national grids it gets more complicated. Even so, Tesla also now has gear on the market that institutional battery storage developers can use to run load-balancing trade operations: the consumer won't see those, but it's part of ongoing changes as renewables become more important in the power game. Being able to get a Tesla-backed power bill in the mailbox, though—that's grabbing attention. And more broadly speaking, the notion of what is and isn't a utility is in flux. "Over the last five to 10 years we have seen an uptick in new entrants providing retail energy services," says Albert Cheung, head of global analysis at BloombergNEF. "It is now quite common to see these types of companies gain significant market share without necessarily owning any of their own generation or network assets at all."

A decade ago it became possible to get your electricity in the UK from a department store chain (though with the actual power supplied first by a Scottish utility and—as of 2018—arranged and managed by Octopus Energy). As Tesla and other makers of home energy storage systems ramp up production for modular large-scale lithium-ion batteries that can be stacked together in industrial storage facilities, new wrinkles are coming to the grid.

"There are simply going to be more and different business models out there," Cheung says. "There is going to be value in distributed energy resources at the customer's home; Whether that is a battery, an electric vehicle charger, a heat pump or other forms of flexible load, and managing these in a way that provides value to the grid will create revenue opportunities."

INTERNATIONAL NEWS



Tesla Gigafactory site taking shape in Grünheide, Germany in June 2021. It is due to open in late 2021 or early 2022.

MICHAEL DUMIAK

Tesla the battery-maker, with its giant new production plant nearing completion in Berlin, may be in position to supply a variety of venues with its wall-sized and cargo-container-sized units: As it does so, its controversial bet in first backing and then absorbing panel producer Solar City may start to look a little different.

Harmony Energy seems pretty pleased. The UK-based energy developer's just broken ground on a new four-acre battery storage site outside London, its third such site. Its second just came online with 68 MWh storage capacity and a 34 MW peak, with the site comprising 28 Tesla Megapack batteries. Harmony expects to be at over a gigawatt of live, operating output in the next three to four years.

The Harmony enterprise works with the UK national grid, however—that's different from Octopus's German and UK retail initiatives. Both Harmony and Octopus depend on trading and energy network management software platforms, and Tesla works with both. But while Octopus has its own in-house management platform—Kraken—Harmony engages Tesla's Autobidder.

Peter Kavanagh, Harmony's CEO, says his firm pays Tesla to operate Autobidder on its behalf—Tesla is fully licensed to trade in the UK and is an approved utility there. The batteries get charged when power is cheap; when there's low wind and no sun, energy prices may start to spike, and the batteries can discharge the power back into the grid, balancing the constant change of supply and demand, and trading on the difference to make a business.

A load-balancing trading operation is not quite the same as mainlining renewables to light a house. On any national grid, once the energy is in there, it's hard to trace the generating source—some of it will come from fossil fuels. But industrial-



INTERNATIONAL NEWS

scale energy storage is crucial to any renewable operation: the wind dies down, the sun doesn't always shine. "Whether it's batteries or some other energy storage technology, it is key to hitting net zero carbon emissions," Kavanagh says. "Without it, you are not going to get there."

Battery research and development is burgeoning far beyond Tesla, and the difficult hunt is on to move past lithium ion. And it's not just startups and young firms in the mix: Established utility giants—the Pacific Gas & Electrics of the world, able to generate as well as retail power—are also adding battery storage, and at scale. In Germany, the large industrial utility RWE started its own battery unit and is now operating small energy storage sites in Germany and in Arizona. Newer entrants, potential energy powerhouses, are on the rise in Italy, Spain and Denmark.

The Tesla Energy plan does have German attention though, of media and energy companies alike. It's also of note that Tesla is behind the very large battery at Australia's Hornsdale Power Reserve. One German pundit imagined Octopus's Kraken management platform as a "monstrous octopus with millions of tentacles," linking a myriad of in-house electric storage units to form a huge virtual power plant. That would be something to reckon with. This article appears in the November 2021 print issue as "The New (Distributed) Utilities."

Germany faces 'gigantic' task meeting energy, climate goals

By Clarion Energy Content Directors | 11 January 2022 | [Power Engineering](#)



FRANK JORDANS Associated Press

BERLIN (AP) — Germany's new climate minister said January 11 that the country faces a "gigantic" task if it wants to achieve its goals for reducing greenhouse gas emissions while ensuring sufficient energy for its energy-hungry industry.

Robert Habeck, a member of the environmentalist Greens, told reporters in Berlin that Germany is on track to halve its emissions by 2030 compared to 1990 levels — far off the government's target of 65%.

Pandemic-related effects that allowed Germany to achieve its interim goal of a 40% reduction by 2020 fell away last year, resulting in a renewed rise in

emissions for 2021.

One reason for Germany's rising emissions is the decision to switch off all nuclear power plants by the end of this year, increasing reliance on coal-fired power plants.



INTERNATIONAL NEWS

The government plans to phase out coal power “ideally” by 2030 as well, filling the gap with less polluting natural gas until enough renewable energy is available to meet the demands of Europe’s biggest economy.

Renewable sources such as solar and wind power currently provide about 43% of Germany’s electricity, but that share needs to almost double to 80% by 2030, Habeck said. He noted that electricity consumption over that period is projected to increase significantly as people switch from combustion engine vehicles to electric cars, and heating homes with oil to electricity-powered heat pumps.

“You can see the task is big, gigantic,” Habeck said.

The new center-left government that took power in Germany last month plans to put forward two packages of legislation this spring and summer that include revising subsidies for renewable energy, requiring solar panels on new buildings and adjusting the rules on where wind turbines can be erected.

Habeck said he expects a “huge political debate” over the measures, but insisted that Germany can’t afford to frame it as a tradeoff between preserving the natural landscape, protecting the economy or reducing emissions. Last year’s deadly flash floods in western Germany, which killed some 200 people and devastated entire villages, had shown one could happen without the others, he said.

A report by reinsurance company Munich Re found the floods in July were the costliest natural disaster ever recorded in Europe.

Economists cautiously welcomed Habeck’s plans, but said Germany should do more to expand Europe’s carbon trading system to cover the transport and heating sectors.

Some environmental groups have reacted angrily to draft European Union plans that would allow nuclear and gas power plants to be labeled “sustainable.” The proposal is seen as a compromise between France, which seeks to expand its use of nuclear power, and Germany, which wants to boost natural gas as a “bridge technology” on the way to a carbon-free future.

A group of activists on January 11 placed an atomic power plant made of cardboard in front of the German Chancellor Olaf Scholz’s office and held up banners reading: “No green stamp for nuclear and gas.”

Habeck said that while he doesn’t support the use of nuclear energy, it was up to each European country to decide how it wants to reduce its greenhouse gas emissions to zero.

Habeck also said it was “logical” to work on the premise that the amount of carbon dioxide Germany can emit in future is finite. The idea of fixed “carbon budgets” is something many countries oppose, but Habeck told The Associated Press that he believes the principle should apply globally.



CIRED INTERNATIONAL NEWS

CIRED Porto Workshop 2,3 JUNE 2022 E-mobility and power distribution systems

CIRED workshops on specific topics are organized in Europe every two years between CIRED main conferences. In 2022, the workshop will address “E-mobility and power distribution systems”. It will be held on 2-3 June 2022 in Porto, Portugal. Abstracts submission for CIRED Porto Workshop 2022 is now closed. All authors will be notified on 23 December 2021. Successful authors will be invited to submit a full paper by 11 February 2022.

Important Dates

23 December 2021

Abstracts notification of acceptance

1 February 2022

Registration available online

11 February 2022

Full papers submission deadline

CIRED PAPER

ENEL'S WAY TO SAIDI

Paper 2330 | Madrid | June 2019

In most Countries all over the world the quality of service delivered by Distribution Companies to final customers is measured through SAIDI (System Average Duration of Interruption Index). Enel Global Infrastructures and Networks currently operates 11 Distribution Companies (DisCos) in 8 Countries, in Europe and South America, serving around 72 million customers.

The diversity of structure, technology, organisation, history of each network raises the issue of setting a global and unique strategy for undertaking specific actions at a local level to improve the continuity of supply to final customers. The document, addressed to DisCos and Regulators, intends to show an effective and robust method of disaggregation of the SAIDI indicator in a spectrum of control dimensions covering all the aspects of network management, from Capital Allocation to Operations.

[DOWNLOAD PAPER](#)



CIGRE INTERNATIONAL NEWS

Power Talk – CIGRE

By Philippe ADAM, Secretary General of CIGRE | January 2022

Dear Readers,

On behalf of the CIGRE management team and of the Paris Central Office, I would like to wish you a happy New Year 2022, and a good health in spite of the continuing COVID-19.

For CIGRE, the year 2021 will have been mainly marked by the postponement of the Paris Session due to the pandemic, although it should already have been held in August 2020.

Nevertheless, the technical part of the Session, which took place in virtual mode, was an undeniable success in terms of achievement, even if the participation was much lower than expected.

In the end, CIGRE's financial situation is that of three consecutive years without a Session, from 2019 to 2021, forcing the Association to draw on its reserves in order to be able to continue providing services to its members (publications, collaborative platforms and websites).

This exceptional situation led the Administrative Council, meeting on October 5th, to decide on a number of measures to strengthen CIGRE's financial resources.

These measures include a moderate increase in registration fees for the 2022 Session, the launch of a sponsorship offer extended to all online publications (Electra, CIGRE Science & Engineering - CSE, e-cigre), and an increase in membership fees for some collective members.

As this last measure requires the convening of a General Assembly, the members of the Association have received on October 14th, a special newsletter of information. It announced that an Extraordinary General Assembly would take place on January 14th, 2022, to vote on the Council's recommendation.

The members were convened by e-mail on December 14th, but it seems that some of them did not receive the invitation, representing 18% of the 10 000 emails sent. The main reason of this situation is unsubscribing from previous e-consultations of the General Assembly.

Nevertheless, to enable these members to participate in the vote, a reminder will be sent in early January. The following link to the voting platform can also be used: <https://www.dupli-print.fr/>. Login details will be provided on request.

Despite these difficulties, 2021 will remain the year of three important achievements for CIGRE: the launch of CSE Digital in October; the implementation of a global gateway automating the first memberships via online payment; the realisation of a fully virtual Session with high performance technical means which led to an unprecedented level of satisfaction of the participants (95%).



CIGRE INTERNATIONAL NEWS

The 2022 Session looks very promising, with more than 950 reports selected by the Study Committees, and a programme including 16 Group Discussion Meetings, 16 tutorials, 16 poster sessions, 6 workshops and other forums. More exhibitors than ever will join the technical exhibition.

The Session will take place at the Palais des Congrès in Paris from 28 August to 2 September 2022.

The entire Central Office team is looking forward to seeing you there.



UPCOMING EVENTS

Fundamental Series: Protection

THURSDAY, 3 FEBRUARY 2022

QLD

[VIEW EVENT](#)



Overview:

EESA is pleased to present Craig Taylor, a long-time electricity industry professional, who will present a fundamentals series topic on Protection Systems. Are you familiar with the protection systems used to protect electrical network employees, the community as well as the equipment installed? [Read more.](#)

Time: 3.30 PM - 5 PM AEST

Location: 26 Reddacliff Street, Newstead Qld

Cost:

EESA members: \$0

EA members: \$20

Non-members: \$30

EESA Technical site visit to Hitachi ABB Power Grids

FRIDAY, 4 FEBRUARY 2022

VIC

[VIEW EVENT](#)



Overview:

Hitachi ABB Power Grids are the industry leader in high voltage solutions and products. For decades, the Victorian head office in Lilydale has specialized in power quality products and solutions for the domestic and global markets, manufacturing capacitor banks, capacitor switches, and energy storage solutions to enable its customers, to operate more efficiently and with less environmental impact. [Read more.](#)

Time: 9 AM - 12 PM AEST

Location: 88 Beresford Road Lilydale Victoria, 3140

Cost:

EESA members: \$0

EA members: \$20

Non-members: \$30

Natural ester dielectric fluid for the utility of the future

WEDNESDAY, 16 FEBRUARY 2022

NSW
ACT

[VIEW EVENT](#)



Overview:

As the unrelenting pursuit of decarbonization continues to intensify, utilities of the future must contend with the dual challenges of meeting the huge increase in electricity demand due to electrification of the transport system and the changeable, modular, and non-synchronous nature of distributed renewable energy resources. [Read more...](#)

Time: 11 AM - 12 PM AEDT

Online webinar

Cost:

EESA members: \$0

EA members: \$20

Non-members: \$30



UPCOMING EVENTS

Energy Speaker Series: Addressing challenges arising from renewable energy generation

24 FEBRUARY | 1 MARCH | 3 MARCH 2022

NSW
ACT

[VIEW EVENT](#)



Overview:

Australia is undergoing a period of immense energy transformation, going from the third-most carbon-intensive country to one with a high penetration of renewable energy. This three-part series showcases global examples of energy companies who have overcome various challenges in this transformation, including managing the impact of EVs, integrating renewable sources within existing networks... [Read more](#)

Time: 3.30 PM - 5 PM AEST

Online webinar

Cost:
FREE



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"Through our passion for innovation and always finding a better way, we are taking reliability, customer service and product value- for-money to a new level in the transformer industry."

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