

# National Bulletin

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## Hydrogen in the Changing Energy Mix?

**Author: Jeff Allen, National President of the Electric Energy Society of Australia**

**Date: July 2019**

As National President, I represent EESA on Engineers Australia's "Energy Advisory Panel." The Panel was recently asked by Engineers Australia's Public Affairs group if there was interest in making a short submission in the next phase of the COAG Energy Council's plans for development of a National Hydrogen Strategy.

Engineers Australia's Energy Advisory Panel has previously contributed with a submission in April, and a few people from the Panel attended the follow-on workshops convened by the Chief Scientist - Dr Alan Finkel - in May this year.

As some further background to this area, in December 2018 the COAG Energy Council agreed on the need to develop a national hydrogen strategy. The Hydrogen Working Group has been developing a strategy that will be delivered to COAG by the end of 2019. COAG believes that a national strategy on Hydrogen will enable Australia to define its role in what is seen to be a major new industry and a promising export market.

The Hydrogen Working Group has been taking a coordinated approach, working with industry, experts, end users as well as environment and community groups. According to the COAG Energy Council, the strategy aims to be "bold and ambitious, balancing the need for safety, cost-effectiveness and commercial viability". The vision is to build a clean, innovative and competitive hydrogen industry and position Australia as a major global player by 2030.

As some further background – an introduction to this consultation phase is here:

<https://www.industry.gov.au/news-media/australias-hydrogen-potential-a-message-from-the-chief-scientist>

In this latest consultation phase the Engineers Australia's "Energy Advisory Panel" was invited to comment on a series of nine issues papers.

- Hydrogen at scale
- Attracting hydrogen investment
- Developing a hydrogen export industry
- Guarantees of origin
- Understanding community concerns for safety and the environment
- Hydrogen in the gas network
- Hydrogen to support electricity systems
- Hydrogen for transport
- Hydrogen for industrial users

More information on the nine issues papers is available here:

<https://consult.industry.gov.au/national-hydrogen-strategy-taskforce/national-hydrogen-strategy-issues-papers/>



**Jeff Allen**  
EESA National President

## Affiliations



The EA "Energy Advisory Panel" decided that we should focus on "Hydrogen to support electricity systems" and work is underway in developing this submission

I am of the view that there are great opportunities for Hydrogen in assisting Grid Stability and Energy Storage as well as Hydrogen as a renewable and clean mobility fuel source and as a renewable export industry.

As we all know, the electricity industry is going through significant transition, with increasing penetration of renewable energy and grids struggling to maintain security.

Storage technologies are seen to be a key opportunity, not only to the transition to a new energy mix but also for reduction in greenhouse gas emissions. Major energy storage solutions currently range from conventional pumped-storage plants to advanced battery-based systems.

A number of major pumped hydro projects have progressed in the last year or two. Snowy 2.0 got the official go-ahead from the Snowy Hydro board in December 2018, and the Federal Government gave its final approval for the project in February 2019. Upon completion in 2024-25, the 2000 MW project will increase the capacity of the Snowy Hydro Scheme by 50 per cent, pumping 350,000 MWh of on-demand generation into the National Electricity Market. Tasmania's Battery of the Nation project also inched closer to reality, with Hydro Tasmania spending \$30 million to take the first phase of the project to the investment stage and the Federal Government providing \$56 million towards the building of a second interconnector between Tasmania and the mainland

There is a view that Pumped-Storage power plants have somewhat limited potential in Australia due our water constraints, which means we have to find alternative storage technologies that will accommodate large volumes of electricity.

Battery storage solutions have made huge advances in recent years with a number of utility-scale batteries connecting to the grid. These include the 30 MWh Ballarat Energy Storage System in Victoria, the 30 MW/8 MWh Dalrymple Energy Storage for Commercial Renewable Integration in South Australia, the 25 MW/50 MWh Gannawarra Energy Storage System in Victoria and the 5 MW Alice Springs Battery Energy Storage System in the Northern Territory. These new batteries joined the 100 MW/129 MWh Hornsdale Power Reserve in South Australia, which remains the world's largest battery. The benefits of the Hornsdale Power Reserve were made clear in 2018, with the battery believed to have reduced frequency control ancillary services costs by up to \$50 million.

The drawback with all of the above is that they offer storage periods measured only in minutes or hours. Researchers are therefore focusing on solutions that will convert electricity into forms of energy that lend themselves to long-term storage, such as hydrogen, as well as chemicals such as ammonia and methanol.

Hydrogen storage therefore is seen to be a key enabling technology for the advancement of hydrogen and fuel cell technologies in applications including stationary power, portable power, and transportation. In addition, there are major export opportunities.

The concept supporting all this is that Hydrogen is an improved storage medium compared to batteries and is one that allows excess Wind and Solar power to create Hydrogen. This hydrogen then can then be stored and converted back into electrical power in gas turbines as required. Thanks to this so-called reconversion process, energy is available whenever it is needed for a number of uses in the generation area, the transport area (using fuel cells) and manufacturing/industrial and agricultural areas.

It will be interesting to watch developments in the Hydrogen area over the next few years.

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## AUSTRALIAN ARTICLES

### Chief Scientist Alan Finkel's Plan to Jump Start Australian Innovation

Author: Rachel Brown

Date: 5 April 2019

Source: [World Engineers Convention](#)



As both an engineer and entrepreneur, Australia's Chief Scientist Dr Alan Finkel knows how to make things happen. He brings to his new role energised leadership, a vision to support great science and research, and the courage to confront real issues.

Soon after he was announced as [Australia's next Chief Scientist](#), Dr Alan Finkel addressed the media at the National Press Club.

His speech began with a story about a fearsome and powerful warship, the Vasa, that was built in Sweden in 1625. Various tasks, he said, were outsourced to specialists in other countries during the ship's three-year construction process.

Halfway through the build, the King decided he wanted an extra deck with more cannons, and of course his wish was granted. Twenty minutes after the ship's launch in front of an enormous gathering on the shores of Stockholm's harbour, it sank. A total of 53 lives were lost.

There had been no testing prior to launch, Finkel said. Specifications had changed at political whim. The workforce was split into silos, some separated by national borders. There was no prior research, no prototype built and no appetite for frank and fearless advice. In other words, there was no science.

Four hundred years later and science – evidence-based testing, modelling, candid and open discussion – is even more important in order to meet current and future challenges. Now that he holds the office of Chief Scientist, Finkel intends to create a new roadmap for Australia's scientific future and, thereby, contribute to raising the nation's scientific output.

#### Direct research funding

"Research infrastructure, of course, is not the roads and buildings," he said.

"It's the big ticket scientific equipment that has a national utility that will underpin our future ability to understand the cosmos, where technology is taking us, artificial intelligence, self driving cars, medical breakthroughs, and also capture and archive and use the information that gives us knowledge about our history and culture and our stories.

"I use the word 'research' rather than 'science' because the brief is not just to look at the physical sciences. It is not just to look at the



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natural sciences, but also to underpin and support the research [from] the experts from humanity, the arts and social sciences, too."

Finkel's aim, essentially, is to define where government might direct large amounts of research funding over the next 15 years in order to develop infrastructure on a national scale, accessible to researchers around the country. Such infrastructure, or 'big-ticket scientific equipment' as he called it, will mean great science becomes possible. With great science comes innovation – not that we don't have a good innovation track record already.

"Australia is actually quite innovative and entrepreneurial, but not always in the space where people are looking for it," Finkel said.

"People tend to look for entrepreneurship in 'high tech', 'bio tech' anything that ends in 'tech' ... and they just don't necessarily see it elsewhere."

Look at the banking and mining sectors, he says, and you'll see plenty of innovation. "Banks have developed and implemented back-end software and front-end software for their customers that transformed the way banking is done in this country," he said.

"It's much easier to do a transaction of any sort here than in America."

In our mining sector, Finkel continued, you only need to look as far as the processes, systems and technologies put in place by businesses such as Rio Tinto and BHP to automate mines and make them more efficient, cost effective, environmentally friendly and safer for mine workers, to see innovation on a massive scale.

But still, the innovation in technology sectors as a measure of contribution to GDP is very small, likely below 1 per cent. Also low are the current translation levels of academic research to industry relevance.

And so, science and innovation, which when done well go hand in hand, are twin obsessions for Finkel. The question is, how will he go about encouraging both?

#### **Wear an engineer's hat**

As well as developing a plan for the next generation of all-important research infrastructure, Finkel said he is one of a panel of three reviewing the \$2.9 billion a year R&D tax incentive to ensure it really is effective at encouraging research and development that would not otherwise have taken place.

As Executive Officer of the Commonwealth Science Council, he will measure the nation's progress against nine national science and research priorities. He is also planning to develop a dynamic database of extracurricular STEM initiatives to teachers, students and parents, to help develop children's interest in the topics from an earlier age.

All of this is just the beginning, the first steps to solve an enormous problem. But thanks to his education and experience as an engineer, Finkel said, he has the ability to break a problem down into manageable pieces.

"I think that, as an engineer, I bring that ability to analyse problems and test and deliver solutions in a very methodical fashion," he said.

"With my engineer's hat on I think of my role as an upside-down T. The base of that upside-down T is a lateral, or latitudinal component. That's the breadth of research activity across publicly-funded research institutions.

"The vertical arm, which is the longitudinal component, is the translation of that research activity into the community for economic or societal benefits. So, perhaps what I bring as an engineer, beyond what I would bring if I was a scientist alone, is the specific interest in the translation all the way through to economic and societal benefits."

That engineer's outlook has also taught him that failure represents learning and opportunity, and that even a sunken ship can be turned into a positive.

At the end of his address to the National Press Club, Finkel explained that the Swedish warship Vasa sat on the bottom of the harbour for 333 years and was finally raised, almost perfectly preserved in the icy waters, in 1961.

"Raising it was a phenomenal feat of ingenuity and engineering," he said.

"It was installed in a purpose-built museum, where more than a million people every year line up to see it. To Sweden, the Vasa is now a great source of national pride.

"Sweden didn't give up on building ships. They built two-deck gunships. They built three-deck gunships. Gunships that became the pride of the Swedish military for the next 30 years. They helped to usher in the age the Swedes call 'stormaktstiden' – the Great Power Period. Failure – repurposed as a symbol of success. But we don't have to get there from the bottom of the harbour. Let's take the direct path to our own stormaktstiden, our Great Power Period."

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### Let's talk nuclear energy

Some have said that Dr Alan Finkel is pro nuclear energy. Where does he really stand on the divisive energy source? In a recent interview with the news website The Conversation, Finkel was asked about his views on nuclear energy. His answers made his point of view perfectly clear.

"I am not an actual advocate of building nuclear electricity," he said.

"I am somebody who feels we should have an open debate about its potential to contribute."

What is important, Finkel said, is that we choose an ambition, rather than a technology. That ambition, he believes, should be zero emission technology. In order to then achieve that goal, we must look at technologies that could make it a reality.

In this case, the big four energy sources would be solar and wind, coupled with some sort of energy storage method, as well as hydro and nuclear.

"Other ones that get talked about often in discussions, such as waves and tidal, just have not proved to be practical," he said.

"If growth [in energy demand] is strong and if we are determined to approach a zero emissions supply as part of our commitment to meeting the Paris accord, then we have to use zero emissions technologies.

"But whether or not we should build nuclear depends not only on whether the technology can deliver zero emissions electricity, but also on the economics and the societal acceptance. And ultimately that is very much a decision for politicians."

Dr Alan Finkel will a keynote speaker at the World Engineers Convention 2019, 20-22 November in Melbourne.

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## Pilbara Green Hydrogen Project to Reach 15GW Wind and Solar

**Author:** Giles Parkinson

**Date:** 12 July 2019

**Source:** [Renew Economy](#)

The huge wind and solar project planned for the Pilbara region of West Australian has grown in scope again – and will now aim to build 15GW of wind and solar capacity as it focuses on encouraging local industry and the "green" hydrogen domestic and export market.

The project, known as the Asia Renewable Energy Hub, is backed by CWP Renewables, Macquarie Group, and the world's biggest wind turbine manufacturer Vestas. It had originally aimed for 9GW, [but with more studies it grew to 11GW](#) late last year and now to 15GW.

That represents some \$30 billion in investment and the potential to generate some 50 terrawatt hours of electricity a year, roughly equivalent to one fifth of the country's annual electricity consumption, and about twice the current capacity of installed large-scale wind and solar.

The Pilbara project is positioning itself to be in prime position as the green hydrogen export market takes off over the next decade and two, targeting a renaissance of Australian industry based on cheap and clean power, and also power-hungry north Asia economies such as Japan and South Korea who have limited domestic renewable energy sources and want to wean themselves off fossil fuel imports.

CWP Renewables development manager Andrew Dickson says the upgrade in scale follows further studies into the resource, and how the site can be optimised.

"We can produce more green hydrogen with more electricity, for local and export markets," Dickson told RenewEconomy. "We believe the market for green hydrogen will grow very large over time, and we're ideally placed to deliver to that market"

Dickson says the AREH consortium anticipates reaching financial close in 2023, and expects to deliver the project in phases over 10 years, dependent on securing off-takes for either green electricity and/or green hydrogen.

Interest in green hydrogen is growing rapidly, even if there are conflicting views about the ability of Australia to compete.

A recent [McKinsey study suggested that while the cost of electrolyzers](#) – the key technology to transform wind and solar power into hydrogen – was likely to fall dramatically over the next decade, Australia could be hampered by the cost of transport and handling, which would be the same again.

That has led some to suggest that while green hydrogen exports may be a good idea, it could be equally smart to use Australia's cheap wind and solar power to encourage domestic industries, using clean and cheap power for refiners, smelting and manufacturing.

The chief scientist Alan Finkel [is leading a team that is putting together a national hydrogen strategy](#) that he plans to deliver to state and federal energy ministers later this year – presuming federal energy minister Angus Taylor ever gets round to calling a COAG meeting.

That national strategy will focus on all aspects of the hydrogen economy, including storage and transport, but is also likely to focus on the potential of green hydrogen exports and domestic manufacturing, powered by arrays of wind and solar that could be, like Pilbara, at scales of more than 10GW.

The International Energy Agency presented a hydrogen road map report to the G20 meeting last week, in which it cited the Pilbara project, noting that it planned – before the mooted expansion – to install 7.5GW of wind energy and 3.5GW of solar, with much of it going to hydrogen from domestic consumption and export.

"Several other projects to produce hydrogen from dedicated renewable resources in various parts of the world are in preparation or have been announced," the IEA noted.

"In areas where both resources are excellent, combining solar PV and onshore wind in a hybrid plant has the potential to lower costs further."

Unfortunately, fossil fuel developers are also interested in hydrogen, and the federal and Victoria state governments last year promised a combined \$100 million to help fund a Japanese-led project to use brown coal, or lignite, to produce hydrogen in the Latrobe Valley.

That [\\$500 million project will produce just 3 tonnes of hydrogen for export](#), but it is generally thought that making hydrogen from fossil fuels through a technology based around steam reforming, will remain cheaper than renewables and electrolyzers, at least in the short term, but will lead to a huge increase in emissions.

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## 'Vital Development': Market to Pay Big Users to Cut Power

**Author:** Peter Hannam

**Date:** 18 July 2019

**Source:** [Sydney Morning Herald](#)

Australia's biggest electricity users will be able to get paid for reducing power demand during peak times, easing the load on the grid and potentially cutting "costs for everyone".

The Australian Energy Market Commission will unveil on Thursday its draft decision to introduce a so-called demand response mechanism to operate in the east coast's wholesale electricity market.

The mechanism, first touted in the Parer review almost two decades ago, is scheduled to start in July 2022.

It's been a long time coming but a demand-side response market could be operating in the National Electricity Market by mid-2022.

"Taking demand pressure off the power system is a substitute for generation and helps tackle rising wholesale prices at peak times, reducing electricity costs for everyone," John Pierce, the chairman of the Australian Energy Market Commission (AEMC), said.

While households and small energy users are excluded for now, the AEMC said it would review the need for consumer protections over the next 12 months to determine how they could participate in the future.

"It makes sense to manage demand for electricity if we are going to deliver reliable energy at the least possible cost.

### 'Extreme peaks'

The AEMC's determination, which will be subject to further rounds of public feedback, was greeted with approval from consumer advocates - particularly the Australian Competition and Consumer Commission (ACCC) - but more warily by generators and some analysts. State and federal governments also welcomed the move.

Major users said they would need to see more detail. However, the head of one of the nation's largest electricity users who declined to be named as the company was in "sensitive" contract talks, said the start of a market that rewarded firms for curbing demand during "extreme peaks" could avoid some of the worst of the price hikes.

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The delay of the introduction for another three years, though, "does seem a bit long", the company chief said.

**'More efficient'**

Rod Sims, the ACCC chair, provided some of the strongest endorsements, saying the new mechanism would be "a vital development in the reform of the national electricity market".

"A demand-response measure allows the electricity system to be more efficient, limiting the need for additional generation and, importantly, constraining the power of generation businesses, both leading to lower prices for consumers."

Dan Cass, an analyst with the Australia Institute, described the plan as "a big win", and in line with overseas moves: "The three biggest electricity markets in the world - China, America and the European Union - are pursuing similar reforms and Australia must keep up."

**Biggest challenge**

However, Bruce Mountain, director of the Victoria Energy Policy Centre, warned that the complexity of such mechanisms meant there would be "no panacea" to the sector's wider woes of soaring prices and increasingly uncontrolled supply as coal-fired plants falter and renewables expand.

The biggest challenge would be determining what a participant's baseline demand is and therefore how much it is giving up during peak period.

"The incentives for gaming the system are huge and the oversight needs are large," Dr Mountain said. "These things don't spontaneously exist - it's very complex."

The Australian Energy Council, which represents big generators such as AGL and Origin, echoed some of those concerns.

"It is difficult to set accurate baselines, which are critical, and to minimise the added costs to settlement arrangements with new third-party demand response providers becoming involved in the market settlements," Sarah McNamara, AEC's chief executive, said.

**'Overdue' change**

Energy ministers were generally welcoming of the changes, though Victoria's Lily D'Ambrosio noted "this proposal is something the AEMC has been resisting for too long".

"It's well overdue, and shows how far they have to go in keeping pace with changing customer preferences and new technologies."

Matt Kean, NSW's Energy Minister, said he "strongly" supported the proposal "being introduced as soon as possible".

"Increasing competition in the market will help reduce the demand in peak times, drive down prices and ultimately help keep the lights on," he said.

Angus Taylor, the federal energy minister, said he was "pleased to see the AEMC deliver rule changes that complement our work in giving power back to consumers".

"Consumers that work together will have improved negotiating power and will get a better deal - that's an important change," he said.

Queensland has already been paying households for allowing their air-conditioners to be remotely powered down when demand surges, a service that now counts some 100,000 participants across the state.

**Retailers 'didn't like it'**

Ross Fraser, a project manager who helped set up the NEM in the late 1990s, said a demand-response component was "something we thought about" at the time.

The problem, he said, was "retailers didn't really like it", but Western Australia and New Zealand showed such a mechanism could work well. "You don't have to do it very often," he added.

Dylan McConnell, an energy researcher at Melbourne University's Australian-German Climate and Energy College, said the draft determination indicates increased competition could be a side benefit.

"It's accidentally addressing market concentration concerns," Mr McConnell said. "That's not a bad objective but it's a funny way to go about it."

Enel X, a company that provides demand-response services, said it was "encouraged" by the AEMC's plan.

"A properly designed mechanism has the potential to reveal the least-cost combination of supply and demand options, to the benefit of



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all electricity consumers who will receive increased choice, transparency, and grid system resiliency," Claire Richards, an Enel X manager, said.

"At the very least, the AEMC's draft decision provides a framework for a long overdue reform that can be further improved as the market matures."

Ms Richards pointed to the results of the decision to open up the frequency control market to non-retailers two years ago. Enel X's customers alone now provide 15 per cent of such services in the NEM, contributing to lower costs for maintaining grid frequency, she said.

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## Curtin University Working on Thermal Battery for Solar Systems

**Author:** [Joshua S Hill](#)

**Date:** 12 July 2019

**Source:** [Renew Economy](#)

Researchers at Western Australia's Curtin University are currently working on an innovative thermal battery which will be a key component in allowing solar power systems to produce electricity overnight – a breakthrough which could allow solar systems to be used as a viable alternative to fossil fuels in commercial and heavy industries around the world.

The new thermal battery project – led by Professor Craig Buckley from Curtin's School of Electrical Engineering, Computing and Mathematical Sciences and run in collaboration with international renewable energy companies United Sun Systems and ITP Thermal – stems from a thermal battery which was part of the Concentrated Solar Power (CSP) system being developed by United Sun Systems.

It benefits from a \$1 million Federal Government grant through the Global Innovation Linkages Program.

"Storage has long been a stumbling point for renewable energy, but our prototype thermal battery is able to store and, as required, release solar energy without reliance on sunlight at all times," [Professor Buckley said](#).

"The battery uses a high-temperature metal hydride or metal carbonate as the heat storage medium and a low temperature gas storage vessel for storing the hydrogen or carbon dioxide.

"At night, and in times of cloud cover, hydrogen or carbon dioxide is released from the gas storage vessel and absorbed by the higher temperature metal to form a metal hydride/metal carbonate, which produces heat used to generate electricity."

The project is working towards developing a solar power system that is able to produce electricity 24-hours a day, seven days a week, and is commercially viable for industry.

"As with the lithium battery systems that Curtin is also developing, the deployment of a cost-effective energy storage system using thermal batteries will revolutionise the landscape of renewable energy production world-wide by allowing renewables to truly compete with fossil fuels," explained Curtin University Deputy Vice-Chancellor Research Professor Chris Moran.

"While a lithium battery stores electrical energy that can be used to provide electricity when the sun is not shining, this thermal battery stores heat from concentrated solar thermal, which can be used when the sun is not shining to run a turbine to produce electricity."

Curtin University is hoping to combine their new thermal battery with dish-Stirling systems which can provide up to 46 kW of power and are ideal for powering remote energy intensive industries such as mine sites.

These industry sites often require power on demand and as required and are thus currently reliant on fossil fuel generation to meet these requirements – be that through traditional large-scale infrastructure or small-scale fossil fuel-powered generators.

However, if a thermal battery can be combined with a dish-Stirling Concentrated Solar Power (DS-CSP) system, then the opportunity for companies to transition away from fossil fuels will be all that easier.



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## Countering the “Urban Myths” Surrounding Chernobyl

**Author:** Gerry Thomas, Professor of Molecular Pathology at Imperial College London.

**Date:** 5 July, 2019

**Source:** [Sydney Morning Herald](#)

It concerned me to read the anti-nuclear campaigner Helen Caldicott, writing in the Herald last week, citing a book that claimed 985,000 deaths could be linked to the 1986 Chernobyl nuclear station explosion. Caldicott acknowledged this work lacked peer review.

I was born in the 1960s and grew up believing that the word “radiation” had an infinitely dangerous meaning. So, I was sceptical about nuclear power. It wasn't until 1992, when I started to study the health effects of the Chernobyl accident, that I began to question that view.

Starting my journey from science fiction to scientific fact, I established the Chernobyl Tissue Bank in 1998 with one of the world's pre-eminent thyroid pathologists to give scientists access to properly curated and documented human samples. This would enable better understanding of the effects of a nuclear accident, with the aim of creating scientific evidence to guide our opinions of the risks and benefits of nuclear power.

Yet more than 30 years after the accident, some misguided individuals and organisations are still peddling conspiracy theories. Let's start with some facts.

Human beings inhabit a naturally radioactive world. If we had not evolved protective mechanisms to deal with the effects of natural radiation, we wouldn't be here.

We will all be exposed to between 2 and 3 milliSievert (mSv) of radiation every year from our natural environment. We all ingest about 2 micrograms of uranium every day, and uranium is present in shampoos and sea water.

While we accept the individual risk associated with the use of radiation for medical diagnosis and treatment, there seems to be less general acceptance of exposure to much lower levels of radiation when it is associated with nuclear power plant accidents.

While some of those who were children at the time of the Chernobyl accident did receive large doses of radiation to the thyroid gland, the average dose to residents in Belarus and Ukraine who lived in the areas closest to the reactor between 1986 and 1995 was 10mSv, or the equivalent of one whole body CT scan, over nine years.

In terms of health consequences directly caused by radiation exposure, 146 early responders received doses high enough to result in acute radiation syndrome, and 28 of these died as a result of their exposure.

A further 19 have died since, but many of these deaths were associated with lifestyle choices, such as smoking, drinking and driving cars.

It is estimated that some 16,000 cases of thyroid cancer in those who were exposed as children may eventually result. But thyroid cancer is curable, ironically using high doses of the same radioactive isotope that caused the cancer in the first place. We can predict about 160 deaths from these 16,000 cases.

The World Health Organisation estimated that there may be 4000 further cases of cancer in the workers involved in the clean-up of the Chernobyl reactor site. These workers received larger doses than the population living near the reactor.

However, 33 years after the accident, there has been no observed increase in solid cancers in these workers. There is a report of a slight increase in one form of leukaemia in one group of workers, but the numbers are small, and the increase is not significant and restricted to one of the four groups under study only. There is considerable discussion whether these cases are attributable to radiation exposure or some other cause.

The major difference between the scientific facts and the urban myths around Chernobyl is that the science is concerned with attribution, rather than association. Death is inevitable for all us, but what kills you can be attributed to many different things.

So why should we reallocate public funds towards properly conducted scientific studies, only to ignore them in favour of conspiracy theories?

If you want our planet's future to be decided by scientific fact instead of urban myth, including using zero-emissions nuclear energy, it's important to look at nuclear risks in a clear-eyed and objective way.

In the interests of reducing risk for current and future generations, it's time to ditch the fear campaigns and get behind nuclear power.

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## Smart Energy Council Urges No Vote on Home Battery Standard

**Date: 9 July 2019**

**Source: Smart Energy Council**

The Chief Executive of the Smart Energy Council, John Grimes, issued the following announcement on 9 July:

"Today the second draft of the Standards Australia Battery Standard goes to a vote for acceptance/rejection by the voting members of the committee that drafted it.

After consulting with our leading battery manufacturer members, the Smart Energy Council will be urging a 'no' vote on the draft.

Our concern is with fire control measures for pre-assembled battery storage systems.

The requirements are out of step with the risk posed and will add significant expense without significant benefit. Australia will again be an international outlier.

Despite frantic attempts to settle on an evidence-based risk management approach, the current draft has been submitted for a vote.

In order to resolve the issue, the committee needs the opportunity to fully consider this.

We urge the parties to do this quickly, so we can fast track an appropriate standard that all stakeholders can endorse."

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## Distributed Temperature Sensing Fibre Optics for Better Asset Management of Underground Cables

**Author: Terry Miller**

**Date: July 2019**

The article on Jeff Allen's Asset Management presentations in last month's Bulletin prompted EESA member David Eccles to write to Jeff pointing out the benefits of Distributed Temperature Sensing Fiberoptic (DTS FO) for underground cables.

David will be well known to EESA members for his many years of experience in subtransmission underground mains planning, development and installation, at the former Prospect County Council, his involvement in the Directlink HVDC interconnector between NSW and QLD, and later at Ausgrid.

David points out that the lessons of the catastrophic 110kV UG cable failures in Auckland in 1998 were resolved by the late Professor AD Stokes at the University of Sydney.

My understanding is that the Auckland cable failures were caused by overheating due to abnormally high soil thermal resistivity which had gone undetected. Like most (if not all) underground cables at the time, their operating temperature and rating was estimated based on either assumed or inaccurately measured soil thermal resistivity values.

Dr Stokes developed a DTS FO system which could monitor actual cable temperatures 24/7 along the full length of the route. He offered it for use as a trial in the Directlink project. Despite the minimal cost of \$50 000 in the \$150m project and the opportunity to increase peak rating of the interconnector by 15%, the trial unfortunately did not proceed.

The benefits of this system for effective asset management cannot be overstated. Conservative cable ratings based on estimates and calculations can be replaced by totally accurate actual real time data, particularly useful for implementing higher short-term peak ratings and eliminating assumptions based on weather and ground conditions.

David was pleased to see Federal Funding allowing the implementation of an effective DTS FO system in 2011-13 as part of the Smart City Trials with Ausgrid, where it was installed on a 5km run of 33kV underground cable. This proved accurate to 0.1 degrees C. David reports it is possible to watch a tree shadow move over the ground covering the cable. Enough said!

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## Two Engineering Brothers Heat Up the Waste To Energy Market

**Author:** Susan Muldowney

**Date:** 27 June 2019

**Source:** [Engineers Australia Create Magazine](#)

Two Australian brothers saw an opportunity to transform waste into something useful, and their ambitions are global in scale.

When brothers Mike and Matthew Martella set out to rewrite Australia's energy rule book in 2007, they had very few pages to work with.

How could two brothers — both of them qualified chemical engineers — shake up a market that was barely off the ground?

The answer would be found in Anergy, the global waste transformation company that the Martella brothers established in Bunbury, Western Australia, more than a decade ago.

After purchasing a 70 per cent stake in Ansac, their father's thermal processing equipment business, Mike and Matthew developed a new model to help companies manage their industrial waste while securing and controlling their future energy supplies via distributed power generation.

Since 2013, Anergy has built, or is in the process of building, approximately 10 waste transformation plants around the world. It now employs more than 70 people in its global offices.

But, as both brothers attest, it hasn't been easy.

"What we saw as a two or three-year journey has probably been more like 10 years, and it's a bit tough," said Mike, Anergy's CEO.

"It's difficult to launch new technology in a new space, and to prove a process to a level where it can be financed and accepted as a mainstream. We've got several projects that we've built, and several are in the works, and all of them are based around the same core energy processing technology. The real vision is now starting to come into focus."

### Turning up the heat

Anergy designs, develops, constructs and operates thermal renewable power plants using high-temperature pyrolysis (HTP) technology that the brothers said is unique in the market place.

Pyrolysis can broadly be defined as the thermochemical decomposition of organic materials at elevated temperatures and without oxygen.

While traditional pyrolysis can reach temperatures of up to 550°C, Anergy's HTP can pyrolyse at temperatures greater than 800°C.

Anergy's technology is based on kiln technology that the Martellas' father, Charlie, developed over more than two decades.

The higher temperature allows for a more thorough chemical breakdown of the materials, reducing tars and improving both yield and emissions. Except for nuclear, all types of wastes can be processed.

"We were looking for new opportunities for what we could do with the kilns that our father had been [producing] for the mining industry," explained Matthew, Anergy's COO.

"The truth is that neither of us really knew what we had our hands on at that stage. What we did know was that there was a gap in the marketplace and that companies are paying a lot of money to divert their waste from going into landfill."

Nike Florin, Research Director at the University of Technology Sydney's Institute for Sustainable Futures, said waste transformation is more mature in markets outside Australia.

"There's huge potential in Australia to be looking at material value through waste conversion," he said.

"So much is going into landfill."





An Anzac kiln. (Image: David Forster)

Florin sees hybrid opportunities of recovering energy and maximising resource recovery, citing Anergy's first Canadian HTP plant, completed in December last year, as an example.

Developed in collaboration with Toronto-based CHAR Technologies, the project was supported by the Canadian Government.

"Anergy's project in Canada is an interesting example," Florin said.

"It's converting waste streams like anaerobic digestion sludge, and I think one of the priorities for Australia is getting organic waste streams out of landfill. Anaerobic digestion can produce a fuel gas and recover nutrients from food waste.

"Further energy recovery is possible by using the Anergy technology downstream."

Anergy's plants range in size from large fixed facilities down to packaged containerised plants. A recent project in Spain, for example, was built entirely within shipping containers.

"The idea is that it's constructed completely in our factory and we ship it to site almost fully commissioned and then just plug it in to place," Mike said.

"We also see great potential in creating a network of small power plants, which replace diesel generators and provide much lower cost electricity to some of the poorer people on Earth. That approach is something that nobody's been able to do so far."

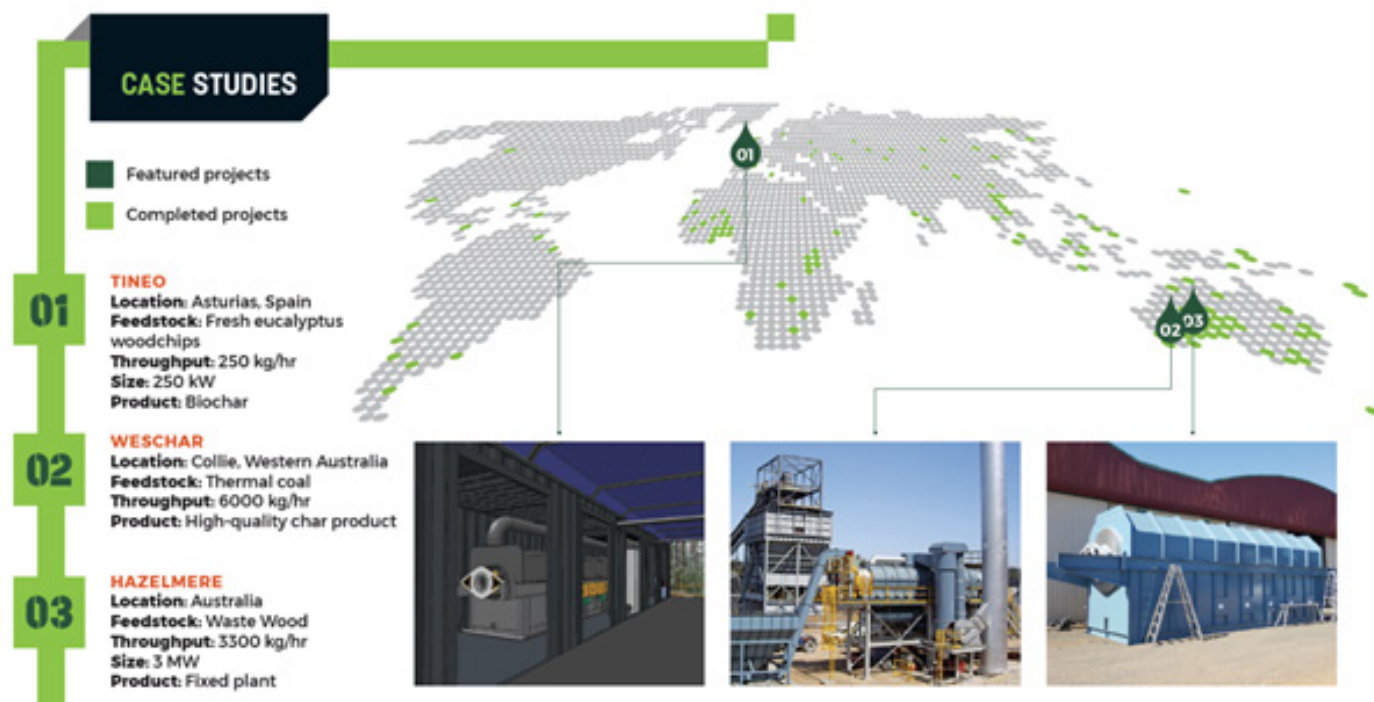
#### **New horizons**

The brothers' global vision prompted them to move the Anergy head office to Singapore in April 2018.

"We want to tap into markets where there's a lot of growth, and that's Southeast Asia," Mike said.

"When we were starting out, there was hardly any discussion about renewable energy [in Australia] and there was no discussion about waste-to-energy. Europe was the only place where you could work in this space, so I moved back to the UK in 2009 to set up [an Anergy office]."

Over this time, the Martellas have seen Australia's appetite for renewables increase rapidly. While Singapore is viewed as Anergy's strategic springboard to markets such as China and India, Anergy's flagship project to date is located in Hazelmere, 14 km east of Perth's central business district.



An aerial view of an Anergy HTP plant. (Image: Paul Miller)

A joint project between Anergy, the Eastern Metropolitan Regional Council (EMRC) and AusIndustry, the plant is installed on a site with an existing waste timber recycling facility.

It will produce three megawatts of electricity to provide renewable, base-load power to Perth Airport and is expected to be operational in 2019.

"It was an excellent project for us and it's in our home state, which is great," Mike said.

"On the negative side, as it is partially funded by the Federal Government, it ran into a lot of regulatory issues by the EPA [Environmental Protection Authority], which was related to the State Government, and the actual site is under local government.

"We found ourselves caught between these three layers. That's not a very good place to be and it meant that there's been more delays on the project than we had hoped."

Bureaucracy is not the only challenge the Martellas have faced. In the case of their recent project in Canada, they were battling the elements.

Andrew White, CEO of CHAR Technologies and a chemical engineer, said he chose to partner with Anergy due to the company's ability to achieve higher pyrolysis temperatures.

"We didn't know of anyone who could match the technology," White said.

The facility creates two of CHAR Technology's products: an activated charcoal called SulfaCHAR, and a solid biofuel CleanFyre.

"The challenge that we faced was that the plant is based in London, Ontario, where the temperatures reach minus 30 degrees Celsius," White said.

"It just gets too cold for the equipment to be outdoors, so it needs to be housed inside a building, but that presents potential fire safety hazards. Anergy helped us to find a solution to the problem and Matthew flew over here to work on it with us."

#### **Options open**

From the get-go, the Martella brothers have positioned their company as a waste transformation business rather than waste-to-energy.

"The reason is that we can do a lot more with the waste than just produce electricity," Mike said.

"Unlike an incinerator or a gas rotation pipe, we can produce gaseous fuel, we can produce liquid fuels, we can produce carbon products."

Much of Anergy's strategic decisions were developed over the Friday breakfast meetings the brothers would have each week in the early days of the company.

"There was no fixed time limit; if the meeting went through to lunchtime, so be it," Matthew said.

"We were constantly flying new ideas up the flagpole."

Funding was a focus of many of these early meetings. If they were to seek investors, what price would they put on their company?

"We made a decision a few years ago that we had enough in the traditional business [Ansac], so we've maintained our private shareholding," Mike said.

"This may change down the track."

What else do the Martella brothers have planned for Anergy? More projects in Australia may be on the cards. The company's exposure in the local market recently received a boost when Mike and Matthew were shortlisted as 2018 Western Region EY Entrepreneur of the Year finalists.

"It's a very long and expensive ride to get technology like ours to a commercial stage in the market and it takes a lot of effort," Mike said.

"I don't see any one else globally who is as technically capable and as far developed as we are."

"I think there's a window of opportunity for us to do something quite spectacular in the next few years."

"I accept that other technologies and groups will catch up with us, but we've got a three-to-five-year head start to really build a brand. There's a long way to go, but we've finished the uphill part on the rollercoaster and we're just about to start the really fun bit."

#### **Words of advice**

The Martella brothers believe engineers have a head start in the world of entrepreneurship.

"In engineering, you are taught to break down problems and solve them and that's a skill you need as an entrepreneur," Matthew said.

Mike added that an engineering degree helped him "connect the dots" in the business world.

"An engineering degree allows you to take stock of what resources you have, what opportunities you have, and then think structurally how you can connect them together," he said.

"I don't believe other types of degrees train you to think about the world in those ways."

Their advice for budding entrepreneurs? For Mike, it's about building a solid network of people while Matthew stresses the value of self-belief.

"Back yourself," he said.

"And don't do things the same way as everyone else, because that's not entrepreneurial. Don't follow the crowd."



## How Tasmania is Transforming into a Renewable Energy

**Author:** Susan Muldowney

**Date:** 26 June 2019

**Source:** [Engineers Australia Create Magazine](#)

Two ambitious projects are helping Tasmania make moves to become the 'battery of the nation'.

With a location south of the 40th latitude line, Tasmania sits directly in the path of the notorious system of westerly winds known as the Roaring Forties.

Long considered the bane of sailors, these fearsome gales may soon prove a boon for the National Energy Market (NEM) as the state gears up to propel Australia's renewable energy future.

Tasmania's \$2.5 million Battery of the Nation study was released in June 2018 by the country's largest generator of renewable energy, Hydro Tasmania.

It features a proposal to double Tasmania's renewable energy capacity over a 10-to-15-year period from 2500 MW to around 5000 MW via a combination of pumped hydro storage development, private wind power development and an upgrade of existing generation assets.

Integral to the proposal is the separate and highly ambitious Project Marinus, which aims to convert the state's abundant natural resources into valuable exports to the mainland via a second Bass Strait interconnector known as Marinus Link.

The two projects share a purpose: to aid the transition of the energy system.



A business case for Marinus Link is being examined as part of the \$20 million Project Marinus initiative, which is being undertaken by TasNetworks, the state-owned company responsible for electricity transmission and distribution throughout Tasmania, with support from ARENA, the Australian Renewable Energy Agency.

In addition to economic feasibility, TasNetworks is looking at the extent to which the Apple Isle's clean power can help balance the mainland's energy system, particularly in Victoria and South Australia.

It is also seeking to overcome a complex set of engineering challenges.

### **Powering the nation**

The Battery of the Nation study, managed by Hydro Tasmania, focuses on pumped hydro storage.

It has revealed the [potential locations of 14 pumped hydro sites](#) that together could generate up to 4800 MW, doubling the scale of the Snowy 2.0 scheme.

The overall project is expected to create up to \$5 billion of infrastructure investment and as many as 3000 jobs in regional Tasmania, including hundreds of engineering roles.

"Low-cost reliable clean power is part of the Tasmanian brand and it will attract new investment, development, growth and jobs," said Guy Barnett, Tasmania's Minister for Energy.

Barnett describes the Battery of the Nation and Marinus projects as "a compelling national story".

"Additional interconnection will enable Tasmania to leverage off this renewable energy advantage and Infrastructure Australia regards this project as a national infrastructure priority," he said.

"In short, we have what the country needs — low cost, plentiful renewable energy that can be dispatched on demand."



Chris Gwynne, Program Director for Battery of the Nation at Hydro Tasmania, said the initiative highlights the state's potential in transforming the NEM.

"We have amazing power down here," he said.

"Hydro and wind are the dominant ones in this analysis."

An important characteristic of Tasmania's abundant and predictable wind resource is that, unlike that of South Australia, it has little correlation with Victoria's wind patterns.

"In the evenings when South Australia or Victorian winds start to die off, you see Tasmanian wind picking up, and that brings diversity to the market," Gwynne said.

### Building new connections

The existing 370 km long Basslink cable, which was constructed in the early 2000s, has a 500 MW capacity. TasNetworks is examining the feasibility of either a 600 MW connection, with an estimated cost of \$1.3 to \$1.7 billion, or a 1200 MW link costing between \$1.9 and \$3.1 billion.

Gwynne, an electrical engineer, said the amount of energy supplied by each form of power depends on the size of the cable.

"If you had a 600 MW link go in, you could expect somewhere between 1000 to 2000 MW of wind development on the island — and that's conservative," he said.



Some of the underground cables.

"You could also potentially see pumped hydro development anywhere between 500 to 1000 MW to take advantage of a 1200 MW cable."

Stephen Clark, an electrical engineer and the Technical and Economic Leader for Project Marinus at TasNetworks, said the cable decision comes down to economics.

"We have a number of engineers working on the economics," he said.

"What we have to do is model the electricity market. Underpinning the market is the physical power system, so we need to understand that as well."

Clark said Marinus Link will take advantage of new high-voltage direct current (HVDC) technology.

"When Basslink was put in, it was cutting edge technology," he said.

HVDC uses transistor technology that enables it to create a voltage waveform.

"It's a bit like a generator and it gives us more control over the power and the voltage output," Clark said.

"It will also integrate better with new renewable energy sources, which connect to the power system via inverters. What we're doing is future-proofing the link as coal-fired generation retires and we get more renewable generation."

Engineers Australia's National Manager of Public Affairs Jonathan Russell said the link will have national benefits.

"The Marinus project is an example of how Australia can achieve an electricity market that achieves reliability, while also meeting emission reduction targets, delivered at least cost to the consumer," he said.

### Engineering challenges

The Battery of the Nation project presents a number of engineering challenges, particularly in relation to the Marinus Link component of the project.

"The average Tassie load is 1100 MW, so we'd potentially have a link that's the same size, and that's going to put a lot of stress on the power system," Clark said.

"We have to look at the control systems of the link to ensure it doesn't detract from Tasmania's power system. Victoria's system is about

five to six times the size of Tasmania's, so it would experience much less stress."

While HVDC technology is not new, Clark said that each system requires a bespoke engineering design and that requires much testing and quality assurance.

"We have a simulator arriving from Canada and this will iron out a lot of the unknowns," he said.

Even before the Marinus project receives the green light, Clark and his team are addressing what he describes as the "big-ticket-item challenges".

"How do we deliver a large-scale infrastructure project? Who are our suppliers? How many cables are required and what are the logistics of that? How can we ramp up our HVDC expertise? There's really not a lot of it in Australia."



A Lenah Valley station.

Russell said the project could have long-term benefits for Australia's engineers.

"To take advantage of the demand for new energy and the global low-carbon transition, opportunities like this must be used to develop a strong domestic baseload of energy skills," he said.

Gwynne said there will be high demand for civil, electrical, mechanical and environmental engineers when the Battery of the Nation project kicks off.

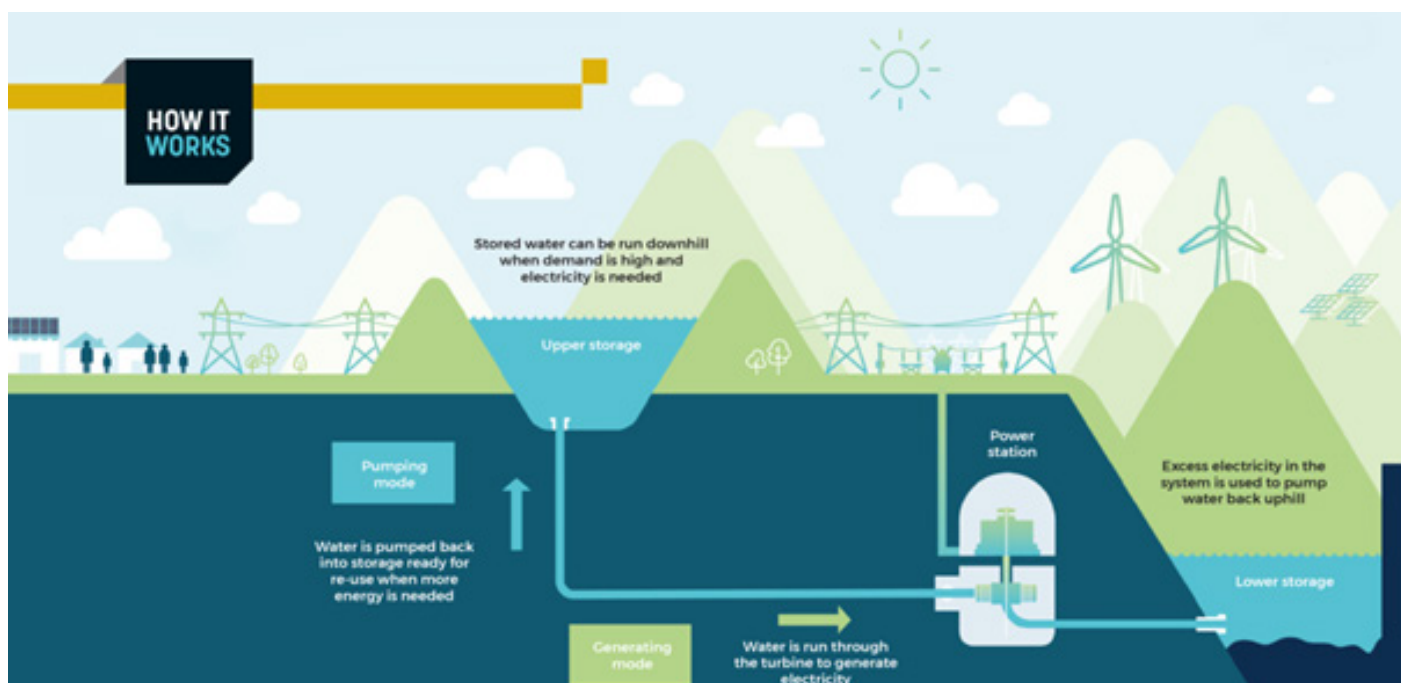
"We'll also need construction engineers," Gwynne said.

"You can design these things till the cows come home, but, in the end, you need people with the expertise to actually build them."

## What is project Marinus?

Latin for 'marine', Marinus also means 'of or connected to the sea'. It's a fitting name for this \$20 million initiative, which investigates how an additional Bass Strait interconnection could deliver more low-cost clean energy to Australia's electricity and telecommunications grid.

A more advanced version of Basslink, the existing interconnector linking Tasmania and Victoria, Marinus Link would have a greater transmission capacity of between 600 and 1200 MW and could keep clean energy moving on-demand between Tasmania and Victoria.



The project is being undertaken by TasNetworks, with support from the Australian Renewable Energy Agency.

If economic modelling is approved, manufacturing of key components is anticipated to begin by mid 2021 and the project is expected to generate hundreds of engineering jobs.

"Depending on the size of the interconnector, Hydro Tasmania will most likely respond with hydro power development of its own," Gwynne said.

"It's a really exciting time for the Tasmanian energy industry. It's almost like turning on a big light switch."

## INTERNATIONAL ARTICLES

### Bitcoin Consuming More Energy than Switzerland

**Date:** 5 July 2019

**Source:** [Energy Source & Distribution](#)

Online currency Bitcoin consumes more energy than the nation of Switzerland, according to new estimates from University of Cambridge researchers.

A new online tool from the University of Cambridge – the Cambridge Bitcoin Electricity Consumption Index – provides a real-time estimate of the total electricity load and consumption of the Bitcoin network.

Bitcoin consumes electricity through the need to run bitcoin mining machines, the hardware of which consumes a lot of energy. The more machines a Bitcoin miner uses, the more likely they are to find Bitcoin.

Recent estimates (updated every 30 seconds) shows Bitcoin uses 59.19 terawatt-hours (TWh) per year, with Switzerland using 58.46TWh per year.

This means Bitcoin accounts for 0.27 per cent of the world's total electricity consumption.

By comparison, Australia uses 229.4TWh per year.

It's also estimated to use more energy than all of the world's traditional banks combined, as well as having significantly less transactions.

[View the tool here.](#)

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## Amazon seeks US approval to launch over 3,000 internet satellites

E&T editorial staff

Date: 8 July 2019

Source: [Engineering and Technology](#)

The firm's plans to provide broadband internet from space were revealed in April when GeekWire reported that [it had submitted three sets of filings with the International Telecommunications Union \(ITU\)](#).

Kuiper Systems, a subsidiary of Amazon, has [filed its application with the FCC](#). According to the filing, the 3236 satellites will be placed in a satellite constellation of 98 different orbital planes with altitudes ranging from 589 to 629km above the surface of the Earth. The satellites will use Ka band frequencies, which allows for high bandwidth satellite communication. This band will be used in the James Webb Space Telescope and the Iridium Next telecommunications satellite series.

Satellite internet remains expensive, but allows for wide access, high data speeds, and provides reasonably low latency for satellites in LEO.

Amazon states that its satellite constellation could bridge the "digital divide" by providing connectivity to rural and other underserved parts of the world, helping "tens of millions of people who lack basic access to broadband Internet." However, Amazon has requested a waiver on a requirement to serve the entirety of the US, as its proposed satellite constellation would not cover some parts of Alaska.

It has also marketed Kuiper as a means for providing mobile LTE connectivity to underserved areas.

"Amazon seeks to maximise the potential of spectrum and orbital resources available to advanced NGSO broadband constellations, providing high quality broadband service to customers while simultaneously enhancing spectrum efficiency and spectrum sharing with other authorised systems," the Amazon filing says.

The satellite constellation will be able to use existing infrastructure – such as data centres and fibre – which is used to support Amazon Web Services (AWS).

No timeline for launch was included in the FCC filing, although Kuiper Systems has said that satellite broadband could be offered soon after the first launch phase, which will involve a batch of over 500 satellites. The satellites are likely to be launched by rockets developed Blue Origin, which is funded by Amazon CEO Jeff Bezos.

While satellite constellations have [attracted concern due to their potential to contribute to space debris](#), Amazon has stated that the satellites would be set to deorbit themselves in less than 10 years.

An attempt by Microsoft to create a constellation of LEO satellites in the Ka band was abandoned in 2003, after mounting costs of more than \$9bn. Microsoft's failure dampened enthusiasm for similar ventures for the next decade, but a small handful of companies have recently entered the race to provide broadband internet via satellite constellation. Elon Musk's SpaceX has been given [permission by the FCC to deploy up to 7000 satellites](#) and [has already launched 60](#), while OneWeb and Facebook have laid out plans to build satellite constellations for the same purpose.

### Best Algorithms to Make Solar Power Storage Profitable

Which algorithms are best at integrating solar arrays with electrical grid storage?

By analyzing the kinds of algorithms that control the flow of electricity between solar cells and lithium-ion batteries, scientists have identified the best types of algorithms to govern electrical grid storage of solar power.

A dizzying number of algorithms exist to help manage the flow of electricity between photovoltaic cells and lithium-ion batteries in the most profitable manner. These come in a variety of complexities and have diverse computational power requirements.

"Lithium-ion batteries are expensive components, and photovoltaic plant owners have to pay large amounts of money in order to install lithium-ion batteries on plant," says study lead author [Alberto Berrueta](#), an engineering researcher at the [Public University of Navarre's Institute of Smart Cities](#) in Pamplona, Spain. "Management algorithms are of capital importance in order to preserve a long lifetime for the batteries to make the most out of the batteries."

To see which types of these algorithms work best at getting the most out of lithium-ion batteries, researchers developed models based off the amount of power generated over the course of a year from a medium-sized roughly 100-kilowatt solar cell array located in Navarre. They focused on concerns such as the computational requirements needed, the price of electricity, battery life, battery costs, and battery charging and discharging rates.



The researchers looked at three families of algorithms currently used in managing electricity from commercial solar cell arrays: [dynamic](#), [quadratic](#) and [linear](#). Dynamic algorithms tackle complex, sequential optimization problems by breaking them down into several simpler sub-problems. Quadratic algorithms each involve at least one squared variable and often find use in calculating areas, computing the profit of a product, and pinpointing the speed and position of an object. Linear algorithms each involve variables that are not squared and have the simplest computational requirements.

The scientists found the dynamic algorithms required far more computational power than the other two families of algorithms; as the number of variables grew, they experienced an exponential increase in problem complexity. A commercial PC that would take about 10 seconds to compute the energy flow between the solar cells and lithium-ion batteries using the linear and quadratic algorithms would take 42 minutes with the dynamic algorithms.

Linear algorithms had the lowest computational requirements but suffered in terms of accuracy. For instance, their simplified models did not account for how electrical current can reduce battery lifetime. All in all, the linear algorithms provided an average of 20 percent lower profits than the maximum achievable.

The researchers concluded that quadratic algorithms provided the best trade-off between accuracy and computational simplicity for solar power applications. Quadratic algorithms had about the same low computational requirements as linear algorithms while achieving revenues similar to dynamic algorithms for all battery sizes.

In the future, scientists can investigate which management algorithms might work best with hybrid energy storage systems, Berrueta says. Future research can also investigate which computer models work best at calculating all the factors affecting the lifetime of lithium-ion batteries, including batteries discarded from electric vehicles that might find a second life working in renewable energy plants, he adds.

The researchers detailed their findings at the [IEEE International Conference on Environmental and Electrical Engineering](#) in Genoa, Italy, on June 11

### **Grid operators set roadmap for Britain's smart energy transition**

The UK's electricity grid operators have unveiled a roadmap for a [smart grid](#) that they say will help deliver the flexibility needed to decarbonize the country's energy system.

Published by Energy Networks Association (ENA) and called *Our Six Steps for Delivering Flexibility Services*, it sets out exactly how grid operators will run new flexibility markets across the UK.

These markets will use the latest smart energy technologies in homes, businesses and communities to boost network capacity in Britain's electricity grid for connecting [renewable energy projects](#), electric vehicle charging points and heat pumps.

ENA chief executive David Smith said: "Expanding local energy markets will bring big economic and environmental benefits and continue to deliver the world class energy system we rely on every day. These steps further highlight the networks' commitment to finding innovative, customer-led market solutions to decarbonise the grid and drive down costs."

"Boosting grid capacity will see more energy from cleaner sources. These steps will lay the foundations of an [Internet of Energy](#) that maximises the potential of new smart technologies, for the benefit of all."

The ENA hopes that the smart grid roadmap will deliver a number of significant benefits, including households [charging their electric vehicles](#) at off-peak times or when it is sunniest, whilst other households' domestic solar panels are generating electricity; Businesses striking demand-side response agreements to adjust their electricity use at the times of day when they least need it, helping reduce the need and cost of building new infrastructure; and using [battery storage](#) to help network operators proactively manage a rapidly changing electricity grid where electricity now flows in many different directions, rather than in just one as it has done in the past.

The *Six Steps for Delivering Flexibility Services* outlines how these markets will work in practice while maintaining transparency for all to participate in and creating a level playing field for energy suppliers, aggregators and customers to procure and deliver clean energy.

The ENA comes as National Grid today said that this year Britain will – for the first time since the Industrial Revolution – get more of its energy generation from clean energy sources rather than fossil fuels.

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## Algorithms Help Turbines Share the Wind

**Author:** Peter Fairley

**Date:** 1 July 2019

**Source:** IEEE Spectrum

Field tests affirm the energy boost long promised by optimized 'wake steering' of wind turbines.

"Logic clearly dictates that the needs of the many outweigh the needs of the few." So declares Spock, Star Trek's Vulcan hero, as he sacrifices himself to save the Starship Enterprise and its crew in the 1982 film [Star Trek: The Wrath of Khan](#). Today Stanford University researchers presented the clearest proof to date that self-sacrifice can also benefit wind farms. In their demonstration at an Alberta wind farm, one turbine sacrifices a fifth of its generating potential to enable better performance by neighboring turbines, boosting the group's collective output.

And while Spock's heroics necessitated a major plot twist to revive his character for the next Star Trek sequel, teaching turbines to behave altruistically requires just a small (but intelligent) tweak to their control systems. What they learn is how to share the wind.

Like parasols casting shadows, spinning rotors in a wind farm cast an energy-depleted "wake" that can slow downstream turbines. The resulting lost energy can be 10 percent or more of a wind farm's annual power generation. At Denmark's [Horns Rev offshore wind farm](#), wake losses cut annual energy production by a hefty 20 percent

This week's [report](#) in the *Proceedings of the National Academy of Sciences* proves out a coordinated control scheme to cut the losses. It is called "wake steering" because rotors are turned about their towers to point slightly away from the oncoming wind and thus deflect their wakes away from downstream turbines.

Modeling and wind tunnel experiments have shown for more than a decade that wake steering should boost overall output, but it's been hard to test at wind farms according to [John Dabiri](#), the Stanford fluid mechanics expert behind the Alberta test. Wind producers are understandably reluctant to risk losing revenue during a test or, worse still, damaging multi-million-dollar turbines by placing them slightly off-kilter. "When you have technology that's seen as mature, people just want to operate it as is," says Dabiri.

Through a friend of a friend Dabiri found one company willing to give wake steering a try: Calgary-based wind operator [TransAlta Renewables](#). Last October TransAlta made a row of six turbines at its Summerview 1 wind farm at Pincher Creek, Alberta available to Dabiri and his team for ten days. The plant's turbines are laid out to face Pincher Creek's strong southeast winds. But during the summer and fall winds can also blow from the northwest, flowing straight down its tightly-packed rows of turbines [see photo below]. The northwest wind is no bother for the rows' lead turbines, but thanks to wind wakes each following turbine captures 30-40 percent less energy than its upstream neighbor.

Turbines arranged for wake steering at Alberta's Summerview 1 wind farm.

To determine the best yaw angle for their experiment, the Stanford team fed five years of wind speed, wind direction and power generation data from the six test turbines to their proprietary optimization algorithm. Combining that data with a simple wind model, the algorithm projected that yawing each of the five upstream turbines about 20 degrees to the north would maximize the group's generation from the northwest winds.

Next, they had to find a way to command the turbines. All commercial turbines are programed to always turn or 'yaw' their rotors to face the wind. Teaching them a new angle would require just a few days of coding work on most contemporary turbines, says Dabiri, but that was not an option for the relatively inflexible control systems running at Pincher Creek. Dabiri's team got it done with a manual workaround: repositioning the direction-tracking wind vanes atop the turbines' nacelles during the 10-day test and thereby tricking the control system to turn 20 degrees off the wind.

The resulting power gains were significant. Power generation rose 13 percent under northwest winds blowing into the wind farm at 7-8 meters per second (mps)—average speeds for Pincher Creek. Steering had a still greater impact amidst slower northwest winds by reducing the times when the wind hitting turbines fell below the 5 mps—the threshold at which they automatically shut down. For 5-6 mps winds wake steering boosted generation by up to 47 percent.

Dabiri says in its commercial incarnation wake steering should yield even better results by adjusting turbines dynamically, based on a table of optimal yaw angles for each turbine under a range of wind conditions. He says the group is readying a workaround to make such dynamic tuning possible for turbines with older control systems: a small logic circuit to tweak the data feed from the wind vane, spoofing the control system. "We intercept and change that number," says Dabiri.

Meanwhile they are planning with TransAlta for a larger wake steering run next year at an Ontario wind farm. Job one will be measuring

mechanical loads to ensure that wake steering is not straining the turbines. Dabiri says there is reason to expect the opposite, since wakes often hit rotors unevenly, torquing their components.

The U.S. [National Renewable Energy Lab \(NREL\)](#) is simultaneously pushing to improve its own wake steering algorithms, and testing them at commercial wind farms. NREL struck first in 2017 in a collaboration with Shanghai-based [Envision Energy](#). In that test steering [one turbine at an offshore farm in China](#) boosted output for several neighboring turbines. Two months ago NREL [reported successful steering of two turbines](#) at a Colorado wind farm operated by Juno Beach, FL-based [NextEra Energy Resources](#).

The NREL team says its results suggest that wake steering can boost annual wind farm output by at least 1-2 percent, lifting revenues at a typical 300-megawatt U.S. wind farm by \$1 million or more. Dabiri says his results suggest that wake steering could yield 7 percent more energy annually from those six Alberta turbines. Applied across the more than 600 gigawatts of wind power capacity installed worldwide, either estimate represents an impressive bolus of clean energy that can be seized with little extra investment.

Dabiri predicts that wake steering's greatest impact will be on future installations. While wind farms installed today are among the cheapest power sources available, he says decarbonizing economies in the decades ahead requires a multiplication of global wind capacity that will lead to more densely-packed wind farms tapping lower-quality winds. "There's a misconception that good winds are unlimited. That's just not the case," says Dabiri. "We're going to need to do a better job of extracting wind energy."

## HISTORY

### Glimpse into the Future

**Author:** Tony Patterson

**Date:** July 2019

**Paper:** Glimpse into the Future

**Author:** J H Hindman

**Date:** January 1944

The paper that I have chosen for this bulletin is "Glimpse into the Future", submitted to our conference in 1944.

If we were to glimpse into our future, what would we predict? We work in an industry that has always prided itself in its ability to accurately forecast, plan and implement, to provide our customers with a product with almost 100% availability and at an economical price. The equipment that we use has very long-life spans with generators, large substations, transformers, etc being operational for 50 years. Even LV Consac cable, that I was responsible for the installation of, has been in service for 45 years. Our planning needs to have a horizon of 50 years. However, our ability to do this is being influenced by many external factors.

Distribution organisations are facing the random installation of residential solar generation and in some areas, to the point of solar saturation. Transmission companies face a similar problem with "unplanned" installation of solar farms and wind turbine farms, sometimes at unsuitable locations. Generation faces significant problems with a privatised industry and fragmented coordination, with renewables receiving preference in dispatch and almost failure on windless nights. Planning in this segment is certainly not at the 50-year mark, but closer to 50 days. Renewables have a much shorter life span in the region of 10 to 25 years, depending on the technology, but I have never seen any plans for their replacement.

I offer no glimpse into the future, but I hope that someone does very soon.

In respect to the 1944 paper, the future is now.

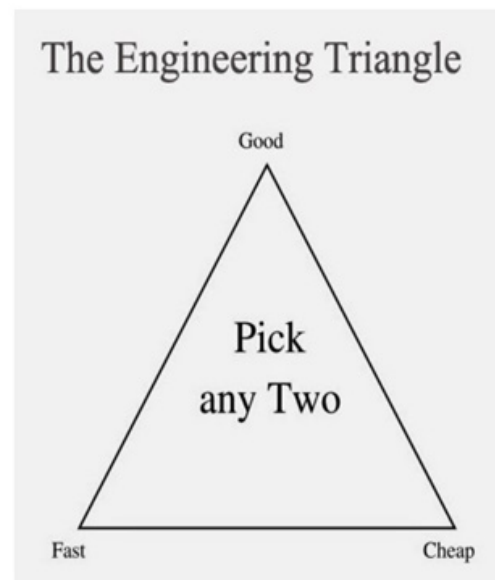
Read the paper to see if the predictions made in 1944 have been realised.

[Download Paper](#)

## HUMOUR CORNER



EARLY OHS RISK MANAGEMENT





## CIREP PAPER

### SF6 Alternative – What to Learn from the High Voltage Experience

Paper 0028 from the Madrid CIREP Workshop held on 3-6 June 2019.

#### Abstract

This paper presents the return of experience gained with g3 products over the past two years through two specific examples. The first example is a 145kV g3 GIS that has been installed in Switzerland. The second example is the 420kV g3 GIL that has been installed in England and in Scotland. Gas handling process, on-site tests and analysis are described through these two examples. On top of that, the full environmental life cycle assessment is presented to highlight the environmental benefit of the new equipment versus the SF6 version.

[Download Paper](#)

## UPDATES ON WORKING GROUPS

### STANDARDS AUSTRALIA

**EESA are looking for members to join the EL7-00-04 Short Circuit Currents Committee.**

EESA is looking for volunteers to join Standards Australia's committee EL7-00-04, Short circuit currents. EL7-00-04 goes back to 1984 when Australia rewrote the IEC documents into a computer calculable format and submitted it IEC to become the second edition of IEC 60909. Since then David Sweeting has concentrated all our activity on the IEC amendments, which include the addition of the contributions from inverters and DFIGs.

It is now time to update the Australian documents and introduce the calculation of arcing currents.

New members of EL7-00-04 with experience in electrical protection and symmetrical components are needed both for the Australian update but also for contribution to the next amendments of IEC 60909.

Please respond to [EESA](#).

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## CIGRE

#### Editorial from CIGRE Newsletter

By Rob Stephen, CIGRE President

Date: July 2019

CIGRE is embarking on a number of very interesting initiatives at present. These will become evident in the following months.

The first is the “**End to End**” campaign primarily to remove the perception that CIGRE is a Transmission or Grid only institution. CIGRE has for many years conducted work relevant to the lower voltages and this work and focus will increase in future as the issues facing different voltage levels become more blurred.

The second is the drive to embrace social media in a structured way mainly via LinkedIn. Specific detailed information will be shared on this platform that will benefit members in their particular areas of work. Links to relevant technical information including technical brochures will be provided.

The third is to share the insights and expertise of industry leaders such as CEOs of major companies. This will be covered both in Electra

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and a **"Leadership Circle"** online newsletter. These are based on interviews on specific relevant questions to the industry.

The fourth initiative is to provide members with important technical information that is being studied or worked on in CIGRE. This information may form part of a technical brochure in time but it was thought important that developments in the formation of technical brochures, as well as the development of the work to be shared immediately to bring members up to speed with the latest issues and solutions facing the industry. This online newsletter termed **"Future Connections"**, will cover important aspects such as the future of SF6.

In summary, as part of our branding efforts, you can see we have added communications channels with a new section in Electra **"Global Connections"** for invited articles, the **"Leadership Circle"** newsletter for executives and technology leaders, the **"Future Connections"** news for future grid news, and **"Global Briefs"** tied to newsletters. We are renaming this general newsletter **"PowerTalk"** refocusing on CIGRE news and events. Each newsletter will be focused and published 3-6 times per year.

Another related initiative is that the Steering Committee of CIGRE has agreed to increase the permitted number of synopses for all National Committees, in particular to those with a high number of members, for the Paris 2020 Session. In the past, NC's with over 400 members had only 30 synopses permitted irrespective of the number of members. This has now altered with far more opportunity in recognition to the remarkable growth of CIGRE. It is hoped that for the 2020 session CIGRE will boast over 1000 papers.

As you can see CIGRE is adapting and progressing in line with members requirements as well as to give proper answers to the energy transition challenges.

I hope to see you at a CIGRE event soon.

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## CIRED

Here are the [final figures of participation](#) for CIRED 2019 sorted by country.

Would you like to hear about what was discussed during the technical sessions? Please have a look at the 6 executive summaries [available here](#).

## EVENT RECAPS

### 2019 New Zealand Electricity Engineers Conference

EECON 2018 Conway Prize winner Terese Milford attended EEA Conference 2019.

Terese Milford (PhD, BE, GCEng (Elec), RPEQ) is Senior Future Technologies Development Engineer with Ergon Energy/Energex. Here is her report on how she found it:

"In June I was fortunate to be given the opportunity to attend the New Zealand Electricity Engineers' Association 2019 Conference and Trade Exhibition in Auckland. The focus of this year's event was "Engineering, Technology and Innovation", which meant a full line-up of interesting and diverse presentations across three days. It was clear that New Zealand has not yet had to face the kinds of solar PV uptake already occurring in Australia, and in particular Queensland. Impressively, New Zealand sources around 80% of their generation from renewable sources, with hydropower making up the majority. Safety, Electric Vehicles, Solar and Energy Storage all featured heavily in the program. Studies looking at the charging of electric vehicles showed that slow overnight charging of vehicles was manageable on the existing network, and questioned the need to fast-charge in the home if a slow overnight charge will reach the same goal. It was also pointed out that as we start to utilise the historically lightly loaded overnight period to charge, for example, an electric vehicle, transformers and plant which would otherwise have been able to cool down at night and 'have a rest' so to speak will now be subject to sustained usage which may impact lifespan. It was also emphasised that although as an industry we are having to adapt to changing demands from customers and adopt new technologies, systems and network management approaches that we should not lose sight of the main objective of delivering power reliably and safely to customers. The majority of networks are ageing and they must be well maintained.

A few points I found interesting from the keynote presentations; Dr David Prentice, Chair of the Interim Climate Change Committee, stressed that electricity networks must support decarbonisation; Dr Damir Novosel of Quanta Technology stressed that the electricity grid will remain essential, suggested we could jump start the electrification of the transport sector by targeting public transport and teaming up with transport companies, and he encouraged us as an industry to communicate to government and regulators what needs to be done; Vic Crone of Callaghan Innovation encouraged participation of young people under 30 in strategy discussions and Dr Ruomei

Li of the Chinese Society of Electrical Engineering reminded us that in our drive to address the challenge of climate change, we have to consider the human element – human nature will mean some things are easier/harder to achieve than others, depending on who is being advantaged/disadvantaged by the change.

I think the partnership between EESA and EEA is a fantastic way to expose both Australian and New Zealand industry members to developments across the Tasman Sea. Overall, I found the experience extremely beneficial as I was able to learn a little more about the New Zealand electricity industry, the challenges they are facing and the work they are doing to adapt for the future.

If you are interested in discussing the conference in more detail, please feel free to contact me on [terese.milford@energyq.com.au](mailto:terese.milford@energyq.com.au) or at <https://www.linkedin.com/in/terese-milford/>

## CIREN Event Guide

HELPING YOU UPDATE YOUR KNOWLEDGE ON THE  
LATEST DEVELOPMENTS

3-6 JUNE 2019  
MADRID, SPAIN  
CONFERENCE + EXHIBITION



3 DAYS of technical presentations and discussions covering the very latest challenges and issues facing electricity distribution.

### TUTORIALS

*Tutorials are an important way that we share new knowledge of concepts and developments, management and challenges. Tutorials are based on the outcomes of our study in Working Groups and their associated Technical Brochures. Tara-lee Macarthur helped arranged and presented in association with this year's CIREN event. The half day tutorial was a great way for CIGRE and other industry experts to present their work and share knowledge. The theme for Tutorial 5 was **CONDITION ASSESSMENT AND CONDITION MONITORING OF POWER TRANSFORMERS.***

### TECHNICAL VISIT

Technical site visits were arranged at CIREN for the attendees to provide an understanding of the training facilities in Madrid within the power and energy industry. Abrar Aziz attended the **IBERDROLA TRAINING CENTRE** where he was shown the training facilities for primary and secondary substations, smart metering, smart grids, outdoor installation demonstrators and also virtual training for substation. Right is a photo of Abrar trying the VR facility at the campus.





## DON'T BE AFRAID OF DATA

- Communications infrastructure is key
- Open systems foster innovation
- Demonstrate collaboration accelerates adoption
- Build in cyber security and data privacy management

### WHAT WE NEED TO DO MORE

Work with Startups, universities and organizations (EPRI, CIGRE, CIRED etc.) as they are tomorrow's innovators

### START-UP FERIA

Must see while at CIRED  
START-UP FERIA

Space dedicated to start-ups pitching innovative ideas to the attendees.

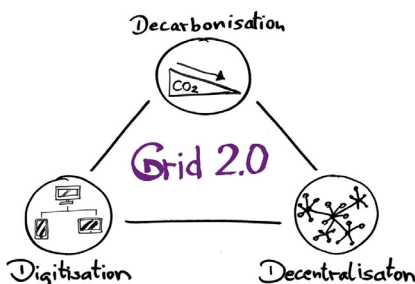
## #TRENDING

From our participation in the various sessions, we identified three main trends.

The electricity industry is witnessing considerable disruption.

### TREND #1 – Customer = new supplier

Transforming the way energy stakeholders think about, produce and use electricity. It's a transformational change towards Grid 2.0.



GRID 2.0 <https://www.energy-storage.news/blogs/determining-direction-the-three-ds-of-an-energy-sector-in-transition>

### TREND #2 – Peer to peer trading

"Peer-to-Peer (P2P)

can lead to the formation of energy communities, empower prosumers' engagement and support their investment on distributed energy resources..."  
DTU, DENMARK

### TREND #3 – Better use of data is key for making key business decisions

The advent of smart grids created a surge in the quantity of data available to the Distribution System Operator (DSO).

Data has become an asset as crucial for grid operation as the grid per se. However, if the first concern is to have data, the second one is to have good data.

Introducing questions about data security, about internal and external access control and on consistency of data.



### WHAT WE NEED TO DO MORE

BIG DATA [https://www.derivetechnology.com/services/solutions/big\\_data](https://www.derivetechnology.com/services/solutions/big_data)

### AUSSIE DINNER AT CIRED

Special thanks to Lisa Hampton from SAFEARTH for organising a great dinner.



We would like to take this opportunity to thank the Electric Energy Society of Australia (EESA) and the Electrical College of Engineers Australia for providing young engineers with the opportunity to attend such a prestigious event. It was an excellent event which captured the essence that this really is an exciting time to be working within the electrical power industry.





## DON'T JUST TAKE OUR WORD FOR IT

#CIRED2019



Well done to Jemena's Peter Wong who took to the stage at the #CIRED2019 conference in Madrid, Spain last week. Peter was invited to share Jemena's work on smart meter data analytics to a global audience at this major European event. Great work Peter!



**Anna Lilly Brodersson** • 3rd+  
Asset Management Analyst på Vattenfall Eldistribution AB  
1mo

Last week me and [Elin Andreasson](#) had the opportunity to presented our work on enabling data-driven decision making for large asset bases at #cired2019. Our paper (1897) describes how we enabled individual evaluation of health and risk for 2,5 million assets, using only already existing data sources.

Many thanks to everyone for great discussions and intriguing questions!

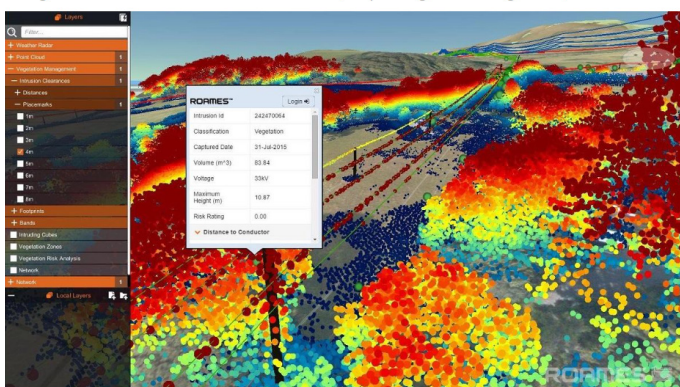


**Anuj Nayyar** CEng MSc BEng MIET MCMI • 2nd  
Business Manager - Power, Transmission & Distribution at Frazer-Nash Consult...  
2mo

Day 1 almost over in Madrid and we've had some really great discussions particularly around asset management and maturity, still seems like the UK are leading the way in the sector. Good reflection of the great work the UK DNOs are doing in asset management and data.

**Roames Power**  
1,055 followers  
2mo

Asset/risk management and regulation optimisation are key issues for DSOs. Learn how #Fugro applies its #Roames virtual world network modelling to quickly assess vegetation intrusions and clearance issues; improving risk management, ...see more



**Aleksei Mashlakov** • 3rd+  
Junior Researcher  
1mo • Edited

It has been an honour of representing #HEILA project and the paper "Uniform Web of Things Access to Distributed Energy Resources via Metadata Registry" in the Research and Innovation Forum at #CIRED2019 conference.

The personal highlights are such that the big data analytics, flexibility forecasting, market interfaces are the main digital enablers of resource flexibility integration in active network management. Moreover, distribution-level flexibility markets are not that far as it could seem, in particular cases, they are implemented already now!



**Power and Energy Research - The University of Ma...** + Follow  
629 followers  
2mo • Edited

Research work from our colleagues [Vidyadhar Peesapati](#) and [Richard Gardner](#), along side our industry partners [Samuel Jupe](#), [Jonathan Berry](#) and [James King](#), on understanding ways of power quality monitoring for future networks. Check the paper at #cired



**Rebecca Grill** • 3rd+  
Associate Business Advisor at WSP  
1mo • Edited

At #CIRED2019 presenting our article about the opportunities and risks of using heat pumps as a flexible resource for congestion management and frequency balancing in the electricity grid. Are you there? Contact me to discuss #f ...see more



## AWARDS

### Electrical College Awards

Spring Award Nominations are Now Open

Closing 16 October 2019

It's time to celebrate amazing industry achievement by recognising our best and brightest engineers and engineering students. You or a colleague could be eligible for any of the thirteen awards now open for nomination. If you know a brilliant engineer in the fields of civil, electrical, information, telecommunications and electronics engineering, or engineering education and research, nominate them!

**Nominations are now open for the following awards:**

National Professional Electrical Engineer of The Year  
M A Sargent Medal  
Young Electrical Power Engineer of The Year Award  
John Madsen Medal

[Nominate Now](#)

### Student Award Presentation at University of Adelaide

**Author: Martyn Pearce**

**Date: 8 July 2019**

The University of Adelaide's School of Electrical & Electronic Engineering 15th Annual Student Award Ceremony for the 2018 Academic Year Awards was held on Thursday 2nd May. There were 16 awards presented to 12 students. The Ceremony was hosted by Associate Professor Wen Soong, Head of School.

Since the inception of this Awards Ceremony EESA has sponsored the "EESA Prize" for the highest achiever in the "Electrical Power Systems" elective for the Electrical Engineering Degree. This year there was a three way draw with joint winners being Ms Emily Lauritsen, Mr Hongzhou Chen, and Mr Daniel Mignanelli.

Tom Bammann, S.A. Chapter Promotions and Web Page Coordinator, represented the Society. He presented the 'EESA Prizes' at the Award Ceremony at the Ingkarni Wardi Building, University of Adelaide.



Tom Bammann presenting to Emily Lauritsen



To Hongzhou Chen



And to Daniel Mignanelli



## ANNOUNCEMENTS

### Summary of EESA Constitutional Changes for Bulletin

**Author:** Martyn Pearce, Chair EESA Constitution Review Working Party

**Date:** 16 July 2019

A review of targeted aspects of the Constitution was completed in May. The EESA Council subsequently sought member feedback on the proposed reforms. There were comments on semantics and on detailed aspects of the proposed changes. Some adjustments have been made to the proposals and the amended Constitution will now be put to a vote of eligible members at a Special General Meeting (SGM) in Sydney on Wednesday 21st August. Eligible members who are not able to attend the SGM are encouraged to register a proxy vote.

The Electric Energy Society of Australia is an independent incorporated body that is also a technical society of Engineers Australia. For this purpose, it has its own Constitution and Treasury. The decision for a targeted review of the EESA Constitution was made after the first electronic election to elect members the National Council which was conducted last year. It was found the current Constitution:

- has no provision to ensure that individual State Chapter Committees are represented on Council (as a result, one State Chapter Committee was disenfranchised)
- has no provision for retired members to participate
- is limited in its inclusiveness of all members.

A Working Party was formed for the review. Two representatives from all Chapters were invited to participate. The Working Party members had discussions with and gained feedback from their respective State Chapter Committees. A raft of ideas and suggestions were forthcoming. These were then synthesised at Working Party meetings into a set of agreed reforms.

Matters examined were:

- Membership classifications and the opportunities for new classifications
- National Council membership, for better representation, and the process for electing Council members
- Election of Chapter Chairs and other Chapter positions
- Any other related matters relevant to the terms of reference

A number of reforms were recommended, in particular:

- Young Professional:
  - Nominations called during the national election period
  - Nominees to have at least two years' experience on State Chapter Committee and support of the State Chapter Committee
- Concession membership category created, with a common concession fee for all concession members, including a sub category for students.
- These persons can then participate in Council elections and on Committees
- Terms and tenures for senior roles

Other aspects recommended:

- Re-defining member classifications, fees, rights and obligations, voting and ability to stand for office

National Council:

- The number of Council members (with voting rights) will not vary, except as new Chapters form or existing ones disappear
- No one Chapter to have a voting majority
- Make up:
  - Chapter Chairs or their Representatives as agreed by the Chapter Committee
  - Three nationally elected members, with two elected during the planned three year term of an elected President, under most circumstances
  - Young Professional representative
  - Treasurer
  - Past President - one year only, non-voting
  - Secretary - non voting
  - Corresponding member(s) for identified specific roles - non voting

President:

- Elected by Incoming Council before selection of Treasurer and Young Professional
- Term three years, may then serve a further three-year term (having gained re-election to National Council) with a maximum term of six years

Honorary Treasurer:

- Nominations called during the national election period
- Selected by Council
- Appointed for three year term, may seek re-election

- Vice President selected by Council for a one year term

#### State Chapters

- Chapter Chair, Secretary and Treasurer elected by Committee at first meeting after State Chapter AGM
- Committee Representative on Council must be appointed prior to national election for Council members
- Chair must seek re-election every year
- Recommended tenure of Chair three to six consecutive years, not mandated

In addition the need was identified for developing procedures for inclusion in the Constitution for:

- Dispute Resolution Procedures, and
- Protection of privacy of member data held by EESA

These are important reforms to ensure that Council has sound governance, is better representative of the Society across all Chapters and provides new opportunities, particularly for young persons.

To understand more about the planned reforms, see the documents available on the web site:

- Terms of Reference of Working Party
- Working Group Issues Paper
- Copy of Constitution including proposed reforms

(Refer to Clauses 8 Membership, 14 National Council, 20 & 21 Chapter Committees and 9 Professional Conduct)

All eligible members are encouraged to take some time to consider the reforms and to participate in the vote. Please direct any questions to Penelope Lyons, EESA National Secretary at [plyons@eesa.org.au](mailto:plyons@eesa.org.au).

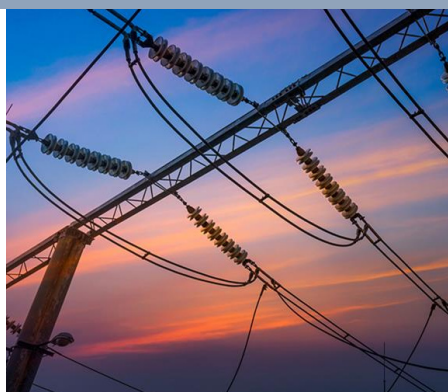
Use this link to access the working group terms of reference: <https://www.eesa.org.au/constitution-reform-working-group-tor>

## Successfully Managing Change in the Electric Energy Industry + EESA Special General Meeting

Wednesday, September 4th, 2019

NSW

[VIEW EVENT](#)



#### Overview:

Jeff Allen will discuss why engineers need to understand the all the details of their area of expertise as well as the "big picture" overview of the changes that are occurring and the impact of these changes on the transmission and distribution system so that they can successfully make the transition to this much more complicated world.

#### Time:

Registration: 4:30pm  
Presentation: 5pm - 6pm |  
SGM: 6pm

#### Venue:

Endeavour Energy, Warragamba Room  
51 Huntingwood Drive  
Huntingwood NSW

**Cost:** EESA members: \$0  
Non-members: \$30



## WHAT'S ON AT EESA

### EECON 2019 – Register Now for Your EARLY BIRD Rate

The banner for EECON 2019 features a collage of images including wind turbines, a city skyline at sunset, and a smart home interface. The text 'EECON 2019' is prominently displayed in large, bold letters, with 'EE' in blue and 'CON' in red. Below it, the subtitle 'A technical training initiative of the Electric Energy Society of Australia' is written in a smaller, italicized font. To the right, the dates '26-27 NOVEMBER 2019' and the location 'International Convention Centre Sydney' are listed. A teal bar at the bottom of the banner contains the text 'Earlybird pricing \$850pp available until the 17th of September, 2019'. Below the banner is a large red section with the text 'REGISTER NOW' and the website 'www.eecon2019.com.au' in white.

**EECON 2019**  
*A technical training initiative  
of the Electric Energy Society of Australia*

**26-27 NOVEMBER 2019**  
International Convention Centre Sydney

*Earlybird pricing \$850pp available until the 17th of September, 2019*

**REGISTER NOW**  
[www.eecon2019.com.au](http://www.eecon2019.com.au)



The NSW/ACT Chapter of the Electric Energy Society of Australia (EESA) will be hosting the 2-day National Electric Energy Conference – EECON at the International Convention Centre in Sydney on **26th and 27th of November 2019**. The theme of EECON 2019 is **“Engineering leadership providing sustainable, customer-centric electric energy solutions through the interactive grid”**.

The EECON 2019 Conference Organising committee is putting together a really interesting program that will give attendees a good understanding of the “threats and opportunities” they are likely to see in this rapidly changing industry over the coming years.

As someone who has been involved as an engineer working in many different roles in the electric energy area for over 50 years, I have seen many changes – and these changes are continuing at an even faster pace. Some of the changes I have seen in my engineering career:

- The demise of the typing pool
- No need for slide rules to calculate outcomes
- Introduction of mobile phones (early 1980's), personal computers (mid 1980's) and the internet (late 1980's),
- Indoor switchgear, pole top reclosers
- SCADA
- Electronic Protection Relays
- Mapping Systems, Asset Management and Work Management systems collecting data and turning this into information to improve the overall management of network assets.
- Move to an energy market (mid 1990's)
- The development of the "Smart Grid"!



What are the opportunities in the "Grid of the Future?":

- Digital transformation of energy management and automation is making major advances – We need to keep pace with this innovation for a competitive edge
- The growing Digital transformation will create a significant increase in energy consumption (By 2025 it is estimated that 21% of electric power will be consumed by IT)
- Digital is the new normal – 50 billion devices world-wide by 2020
- These days – the world is in our hands (via a smart phone)
- Change is not about improving what we are already doing – it's about new ideas/products/services that customers need. You need "People and Vision" – to achieve the changes necessary for future success.
- My view is that the key issues for successfully managing an electricity network business of tomorrow are:
  - Good Network Knowledge (the right people and good information systems)
  - Good Asset Management Processes (and the supporting Information Systems providing timely, accurate data)
  - Timely actions by well trained, focused and motivated people under the leadership of competent managers who are creating the right culture
- Regular reviews/audits/modelling

Thus, engineers need to understand the details as well as the "big picture" overview of the changes that are occurring and the impact of these changes on the transmission and distribution system so that they can successfully make the transition to this much more complicated world.

Potential Sponsors, Exhibitors and Attendees – **save the dates of 26th and 27th of November 2019 in your calendar.**  
You will hear more about EECON 2019 over the coming months

**Jeff Allen - NSW/ACT Chapter Chair – The Electric Energy Society of Australia**

## UPCOMING EVENTS

### Renewables and Our Engineering Future

Monday August 5th, 2019

QLD

[VIEW EVENT](#)



**Overview:**

This interactive presentation will explore a range of these opportunities and challenges from the perspective of different industry players. Using this foundation we'll look to explore what the industry of the future may look like for tomorrow's young engineers.

**Time:**

Registration from 5:30pm  
Presentation: 6pm - 9pm

**Venue:**

The University of Queensland  
Building 49, Staff House Road  
St Lucia QLD 4072

**Cost:**

EESA/EA members: \$0  
Non-members: \$30

### CONSORT Bruny Island Battery Trial

Thursday August 8th, 2019

TAS

[VIEW EVENT](#)



**Overview:**

This presentation will reflect the diversity of the project team by covering the network/technical aspects (Laura Jones) and the social science learnings (Pip Watson). It will present the results, learnings, and actions from the trial. This \$7.9m project received \$2.9m ARENA funding under their research and development round.

**Time:**

5:30pm - 7pm

**Venue:**

Level 5, 188 Collins Street  
Hobart TAS

**Cost:**

EESA members: \$0  
Non-members: \$30

### Keeping up with EESA events

To see an up-to-date list of EESA events, check under **EVENTS** on the EESA website or [CLICK HERE](#)

### Missed an event?

Recordings and papers are available under **RESOURCES** on the EESA website or [CLICK HERE](#)

## UPCOMING EVENTS

### Blockchain Technology in the Energy Sector

Tuesday August 13th, 2019

WA

[VIEW EVENT](#)



**Overview:**

In this seminar, an introduction of the fundamentals of blockchain and distributed ledger technology is initially provided with a focus on the features that make it well-suited for the energy industry. Then a review of notable use cases and possible challenges in the energy sector that could use blockchain as a solution is presented.

**Time:**

5pm for 5:30pm start – 7pm

**Venue:**

Engineers Australia Auditorium  
712 Murray St  
West Perth WA

**Cost:**

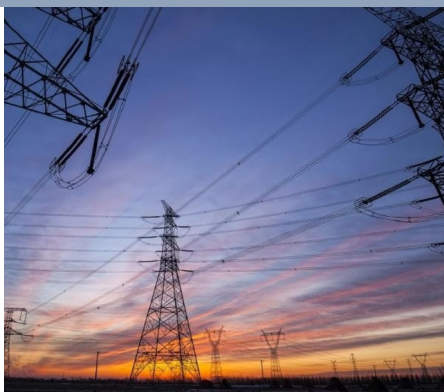
EESA members: \$0  
Non-members: \$30

### Operational Forecasting in the NEM

Wednesday August 14th, 2019

WEB/NSW

[VIEW EVENT](#)



**Overview:**

The forecasting of electricity demand and intermittent renewable generation (such as solar and wind power generation) is more important than ever for the operation of the power system. The speaker will explain how operational load forecasts and wind and solar generation forecasts are developed, how they are used by AEMO to operate the National Electricity Market and initiatives to improve operational forecasting.

**Time:**

6-8pm AEST

**Venue:**

Engineers Australia Newcastle - WEBINAR  
Suite 3, Tonella Commercial Centre, 125  
Bull Street (entry via Dickie Street)  
Newcastle West NSW

**Cost:**

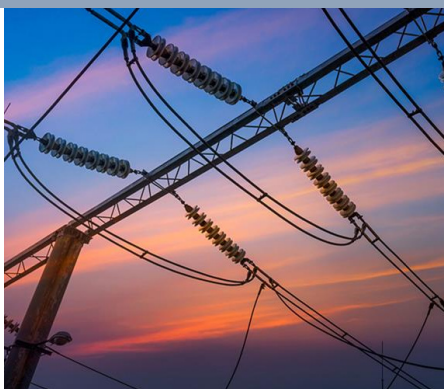
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Non-members: \$30

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Wednesday, September 4th, 2019

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Jeff Allen will discuss why engineers need to understand all the details of their area of expertise as well as the "big picture" overview of the changes that are occurring and the impact of these changes on the transmission and distribution system so that they can successfully make the transition to this much more complicated world.

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SGM: 6pm

**Venue:**

Endeavour Energy, Warragamba Room  
51 Huntingwood Drive  
Huntingwood NSW

**Cost:**

EESA members: \$0  
Non-members: \$30



## UPCOMING EVENTS

### EESA Industry Event | Energising Our Future

Friday September 13th, 2019

VIC

[VIEW EVENT](#)



**Overview:**

Over the course of a full day, experts from industry will outline how the innovations in energy sectors are revitalising our forthcoming future towards an increasingly efficient system. This event will highlight the key behind these innovations and the ongoing challenges required to the Australian network in order to successfully integrate new and emerging technologies.

**Time:**

8:30am - 5:30pm

**Venue:**

New Horizons Building, Level 4,  
20 Research Way  
Clayton VIC 3800

### The Next Generation Technology Project Showcase & Awards

Monday October 28th, 2019

WA

[VIEW EVENT](#)



**Overview:**

We are calling for entries of project posters related to the electric energy field by students of: Electrical Power Engineering, Electronic Engineering, or Renewable Energy Engineering; from: Murdoch University, Edith Cowan University, University of Western Australia or Curtin University.

**Time:**

1pm - 4:30pm AWST

**Venue:**

Western Power  
Ground Floor Auditorium, 363 Wellington St  
Perth WA

**Cost:**

Entry is free and refreshments are available.

### EECON 2019

November 26th - 27th, 2019

AUS

[VIEW EVENT](#)



**Overview:**

The Electric Energy Society of Australia (EESA) takes great pleasure in inviting you to EECON 2019 at the International Convention Centre in Sydney on 26th and 27th of November 2019.

The theme of EECON 2019 - our annual national conference - is "Engineering leadership providing sustainable, customer-centric electric energy solutions through the interactive grid".

**Time:**

8am, 26 Nov - 3:30pm, 27 Nov

**Venue:**

International Convention Centre Sydney  
Level 4, Convention Centre, 14 Darling Drive  
Sydney NSW

**Cost:**

Early-bird fee: \$850  
(until 5pm 17 September 2019)  
Standard fee: \$1050

## THANK YOU



The Electric Energy Society of Australia (EESA) is a non profit Technical Society of Engineers Australia, established to advance interest in the field of Electric Energy. The key objective of EESA is to provide a continuous professional development program to its members.

The successful functioning of EESA is owed to the support of EESA members and especially those who volunteer their time, effort, skills and expertise for the society. We thank our members and volunteers for their contribution.

We thank our corporate members for their support.

## Gold Members



### Essential Energy

At Essential Energy we look after the poles and wires that deliver electricity to 95 per cent of regional, rural and remote NSW and parts of southern Qld.



### Horizon Power

Horizon Power is a State Government-owned, commercially-focused corporation that provides safe and reliable power to about 100,000 residents and 10,000 businesses across Western Australia.



### AMSC Australia

AMSC generates the ideas, technologies and solutions that meet the world's demand for smarter, cleaner, better energy.



### Western Power

Western Power's vision is to deliver on the changing energy needs of Western Australians, powered by community trust and the passion of our people.

## Silver Members



### Evoenergy

Evoenergy is owned equally by Icon Water Limited and Jemena Ltd via subsidiary companies. Evoenergy owns and operates the ACT electricity network, and owns the gas networks in the ACT, Queanbeyan, Jerrabomberra, Bungendore and Nowra.



### nVent

We are a \$2.1 billion, high-performance electrical company with a dedicated team of 9,000 people and trusted brands. Known for innovation, quality and reliability, our products connect and protect, consistently delivering value to industrial, commercial, residential, energy and infrastructure customers.



### APD Engineering

APD Engineering have been providing Specialist Electrical Engineering Design and Consultancy Services to Power Utilities, Local Government Authorities, Land Developers, Mining, Construction and other industries for nearly 20 years.



### Wilson Transformer Company

Wilson Transformer Company is a leading specialist in the delivery of transformer solutions. In a changing world, organisations are increasingly turning to our specialist skills to meet their technical, safety and environmental challenges.

## Bronze Members

















