Energy news from the region, country and world
Spring 2023

nziht | WITT | Te Pūkenga

Energy Education

Mauri mahi, mauri ora

Solar and Wind ramping up for major growth phase in Aotearoa New Zealand

Contents

A Centre of Excellence in Energy & Engineering will:

- Support the growth of excellent vocational education with a focus on teaching, learning and research.
- Support the development and sharing of high-quality curriculum and programme design.
- Be a consortium with expert representation from industry, the wider sector, and a range of other areas, for example iwi and vocational education representatives.
- Have a national focus.
- Be hosted by a regional campus of Te Pūkenga.
- Address issues and opportunities with a significant strategic impact, ideally with wide-reaching benefits across the sector.
- Solve real problems and grasp viable opportunities.

Stay up to date

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WITT Te Pūkenga

Our mission and values

As the local hub of learning in Taranaki, WITT is here to serve our community.

Our role is to cater to the needs of our learners, to play our part in addressing national skills shortages, to keep talented people in the region, and to provide our key industries and local businesses the skilled workforce that they need.

We are guided by WITT's Strategy, Te Korowai Mātauranga o Taranaki, and our 'why':

We connect people to their future

From degrees and diplomas to certificates and short courses, WITT delivers industry-relevant training to people at all stages of the learning journey. Through provision of education, we respond to the needs of industry and align with the regional development priorities outlined in the Taranaki 2050 Roadmap and Tapuae Roa.

WITT programmes include foundation levels 1 to 3 through to Bachelor's Degrees, Graduate Diplomas and Post Graduate qualifications at Level 9. We deliver through four academic schools and align with the needs of the region and skills shortages across the country:

- School of Māori Enterprise, Business and Information Technology
- School of Nursing, Health and Wellness
- School of Trade Training, Primary and Creative Industries
- School of NZIHT, New Zealand School, Engineering, Energy and Infrastructure.

A focus on collaboration with industry, schools, and local iwi keeps us relevant and connected to the needs of our community.

WITT's Solar courses proving popular with renewable energy workforce

In 2022 WITT Te Pūkenga launched two renewable energy courses to support the workforce demands needed for more sophisticated renewable systems. These enable homes and businesses to generate and store their own electricity, through photovoltaic solar systems.

Since the inception of these short courses run at WITT Te Pukenga, the courses have been filled with eager learners.

The prerequisite to enroll in these courses is to be a qualified electrical worker. The courses are suitable for electricians, electrical engineers and electrical inspectors.

The course **'Stand Alone Power Systems: Design and Installation'** is ideal for busy tradespeople who want to learn abour designing and installing reliable off-grid power sustems. The course covers topics such as site assessment, energy yield calculation, battery technologies, system design and installation, commissioning, and fault-finding.

The second course is called **'Grid-Connected Battery Storage Systems: Design and Installation.'**

This course is designed for electrical workers who want to learn how to design and install safe and effective grid-connected battery storage systems, with a focus on those integrated with gird-connected photovoltaic systems. Topics covered include battery chemistries and charateristics, battery charging, system design and yield calculations, and hazards associated with batteries and grid-connected battery storage systems.

Communities and industries can make substantial savings on their electricity costs from day one, once the installation costs of their system is recovered. A good place to start to investigate where solar is a good investment choice for you is at this website.

www.pricemysolar.co.nz

It's certainly a good investment choice for the planet!

Jill

Jill Warner – Acting Director NZIHT School of Engineering, Energy & Infrastructure

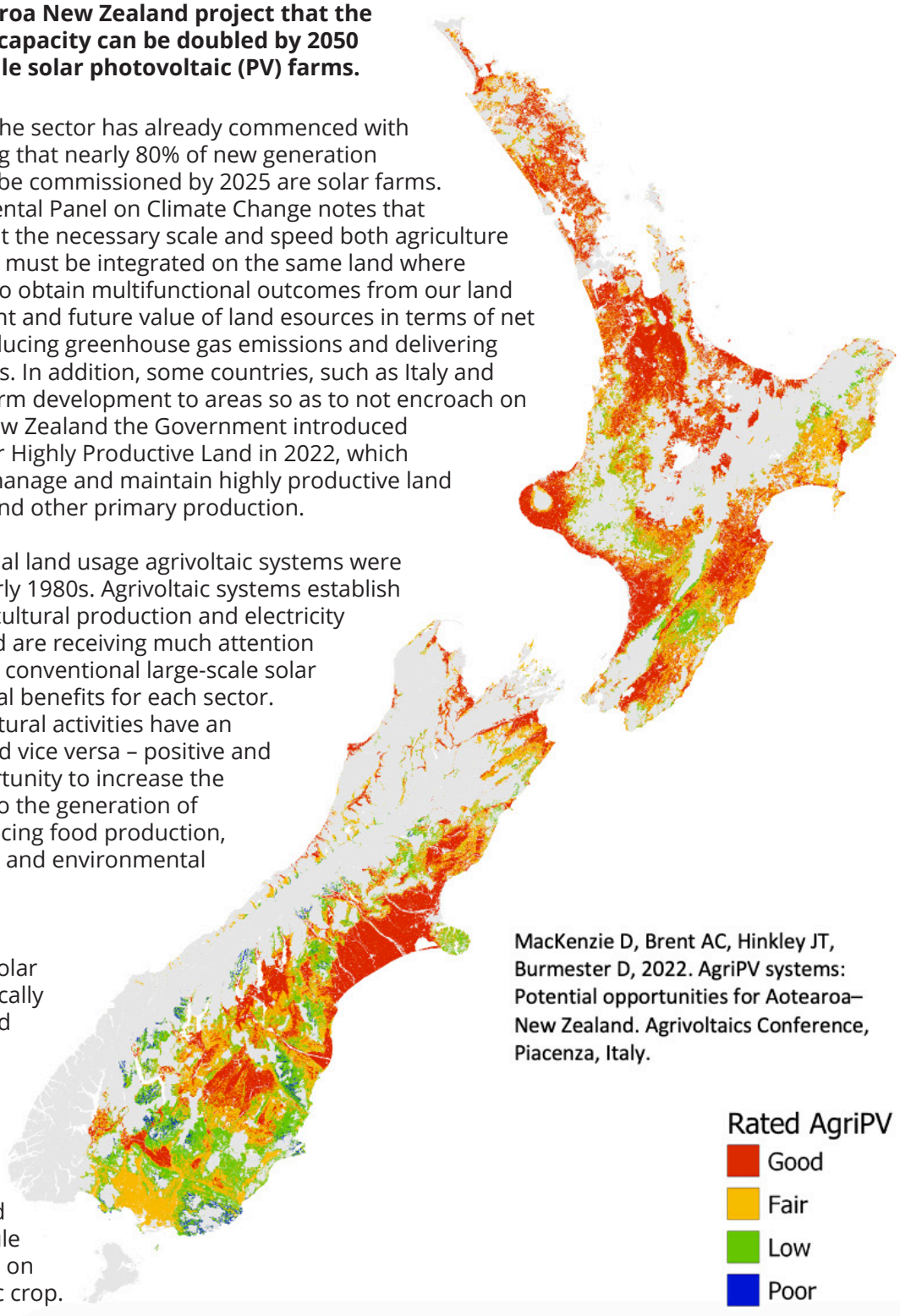
Agrivoltaics for livestock farming in the Canterbury region

Alan Brent and Ellie Wright – Te Herenga Waka Victoria University of Wellington • Anna Vaughan and Megan Fitzgerald – Tambo • Jasper Kueppers – Infratec

Disruptive scenarios for Aotearoa New Zealand project that the current electricity generation capacity can be doubled by 2050 with, among others, utility-scale solar photovoltaic (PV) farms.

The fast-paced development of the sector has already commenced with the Electricity Authority indicating that nearly 80% of new generation projects – or just under 2 GW to be commissioned by 2025 are solar farms. Nevertheless, the Intergovernmental Panel on Climate Change notes that for the transition to be feasible at the necessary scale and speed both agriculture and centralised solar production must be integrated on the same land where possible. This is an opportunity to obtain multifunctional outcomes from our land and thereby maximise the current and future value of land esources in terms of net agricultural return, as well as reducing greenhouse gas emissions and delivering benefits for farming communities. In addition, some countries, such as Italy and Germany, are restricting solar farm development to areas so as to not encroach on quality farmland. In Aotearoa New Zealand the Government introduced the National Policy Statement for Highly Productive Land in 2022, which requires local councils to map, manage and maintain highly productive land to prevent it falling out of food and other primary production.

To facilitate the integration of dual land usage agrivoltaic systems were proposed as a solution in the early 1980s. Agrivoltaic systems establish synergistic combinations of agricultural production and electricity generation on the same land and are receiving much attention globally as a viable alternative to conventional large-scale solar PV installations – to create mutual benefits for each sector. With agrivoltaics systems agricultural activities have an influence on solar generation and vice versa – positive and negative – but provide the opportunity to increase the productivity of land, contribute to the generation of renewable energy without displacing food production, and potentially optimise farming and environmental outcomes.



MacKenzie D, Brent AC, Hinkley JT, Burmester D, 2022. AgriPV systems: Potential opportunities for Aotearoa–New Zealand. Agrivoltaics Conference, Piacenza, Italy.

Agrivoltaic systems differ from conventional ground-mounted solar arrays in that the panels are typically given more ground clearance and are spaced further apart. This provides enough space for farming equipment to operate and allows light to reach the crops below.

A yield decrease can be expected due to the shadows under module arrays, but this amount depends on the climate as well as the specific crop. On the other hand, if agrivoltaic systems are designed well, land productivity could

rise by 60 to 70% compared to operating a dedicated solar PV farm. Additionally, agrivoltaic systems have been used in pastoral lands, with added shelter to protect livestock against heat stress and adverse winter weather.

The Sustainable Energy Systems research group of the Wellington Faculty of Engineering undertook a collaborative investigation with Infratec and Tambo, as the project lead, to understand the opportunities and constraints facing Aotearoa New Zealand livestock farmers to integrate agrivoltaics into their farm systems – with a specific focus on the Canterbury region. The project was enabled though the Rural Professional Fund of MBIE's Our Land and Water National Science Challenge.

A significant area of Canterbury is classified as suitable for agrivoltaics and innovations in solar array designs and configurations are developing rapidly. In saying that, certain factors remain challenging, such as the increase in wind shear effects and financial expense when panels are elevated to reduce shading and prevent damage from larger grazing livestock, such as cattle. The trade-offs to consider when selecting the most appropriate design for agrivoltaic systems add additional complications. Some of the factors to balance include electricity generation, cost-effectiveness, degree of shading produced, ability to withstand the site environment, and ability to withstand livestock grazing underneath.

Shade provision to mitigate heat stress risk, and sheltering from harsh weather, are perhaps the greatest potential benefits of agrivoltaics for livestock. However, given the condensed siting of the panels (for example, one paddock), and limitations with cattle, the benefits are limited for the overall farming system. This may change as capital cost of PV investments decrease. Also, the impacts of agrivoltaics on crops and pasture in an Aotearoa New Zealand context are largely unknown.

While much is known theoretically of the environmental impacts associated with the manufacture and end-of-life disposal and recycling of solar PV panels, there are relatively few mitigators and solutions at present in Aotearoa New Zealand. The end-of-life disposal and recycling is of particular consequence to this country, and will require rapid investment, development and likely legislation to create solutions and reduce future harm to the environment. In terms of environmental impacts on the farmland where agrivoltaic systems are located, there is, again, a lack of research to refer to, particularly in Aotearoa New Zealand.

Case study analyses were carried out on a dairy farm (central Canterbury) and a sheep and beef farm (north Canterbury). These considered both technical design and financial analysis. The sheep and beef case study analysis indicated a significant opportunity for sheep and beef farmers to increase their profitability by incorporating agrivoltaics into their farming enterprise. This comes at a time of increased interest in complementary revenue streams due to reduced farmgate product prices, increased working expenses and increased compliance costs and associated administrative workload.

The financial analysis of agrivoltaics in the dairy farm case study suggested it was significantly less lucrative and indicates that incorporation of solar generation on dairy farms might be best suited to non-productive areas and/or the installation of panels on shed roofs, rather than agrivoltaics.

A workshop was facilitated in Christchurch that included both dairy and sheep and beef farmers. Attendees were initially presented with pertinent information regarding agrivoltaics, before being invited to participate in a design thinking inspired workshop to identify potential barriers and benefits of agrivoltaics and possible solutions to overcome the barriers to adoption. The participants' feedback demonstrated that farmers were open to the idea of agrivoltaics, assuming it was financially viable and key concerns were addressed. The need for accessible and easily understood resources to inform decision making and provide confidence to engage in conversations and form partnerships with solar energy companies was identified as a key requirement going forward.

The study provides evidence that agrivoltaics is worthy of further consideration, particularly due to the way in which it offers solutions to some of the major challenges of standard utility-scale solar electricity generation. It is evident that the significant gaps in literature need to be addressed to further understand what the potential financial, environmental and social impacts are for the people of Aotearoa New Zealand.

More details on the outcomes can be found on Tambo website here.

INFRATEC

TAMBO NEW ZEALAND LTD

VICTORIA UNIVERSITY OF WELLINGTON TE HERENGA WAKA

WITT and VUW researchers collaborating on new solar receivers for high-temperature CSP systems

by Associate Professor Tim Anderson

Aotearoa, the land of the long white cloud.

This is not a name that immediately conjures up visions of mirrors reflecting sunlight onto a point to generate the high temperatures required for a solar power station. However, it is this very concept that researchers at WITT Te Pūkenga and Victoria University of Wellington (VUW) are pursuing.

VUW PhD candidate Mustafa Alqudah (pictured), is currently working with Associate Professor Tim Anderson (WITT/VUW) and Dr Jim Hinkley (VUW) on the design and development of a novel fluidised bed solar receiver for beam-down concentrating solar power (CSP) tower systems.

Current generation CSP systems utilise a vast field of mirrors (called heliostats) to direct solar radiation onto a central tower and receiver, whilst the state-of-the-art involves particles falling in the tower to absorb the radiation, requiring complex particle conveying systems. However, in beam-down CSP systems, the radiation is instead directed to a central mirror which then 'beams' this radiation onto a central ground-level fluidised bed receiver (as shown in the figure), simplifying access considerably.

As such, the team is taking advantage of this access and combine it with low cost particles (sand) as a novel heat transfer and storage media for CSP systems. Ultimately, they hope such a concept will lead to a reduction in the capital cost of CSP in the future.

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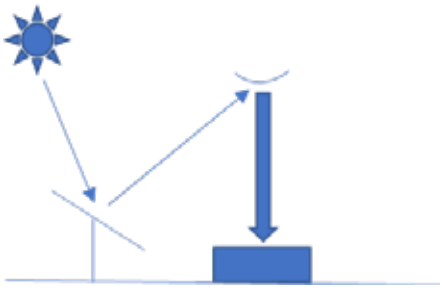
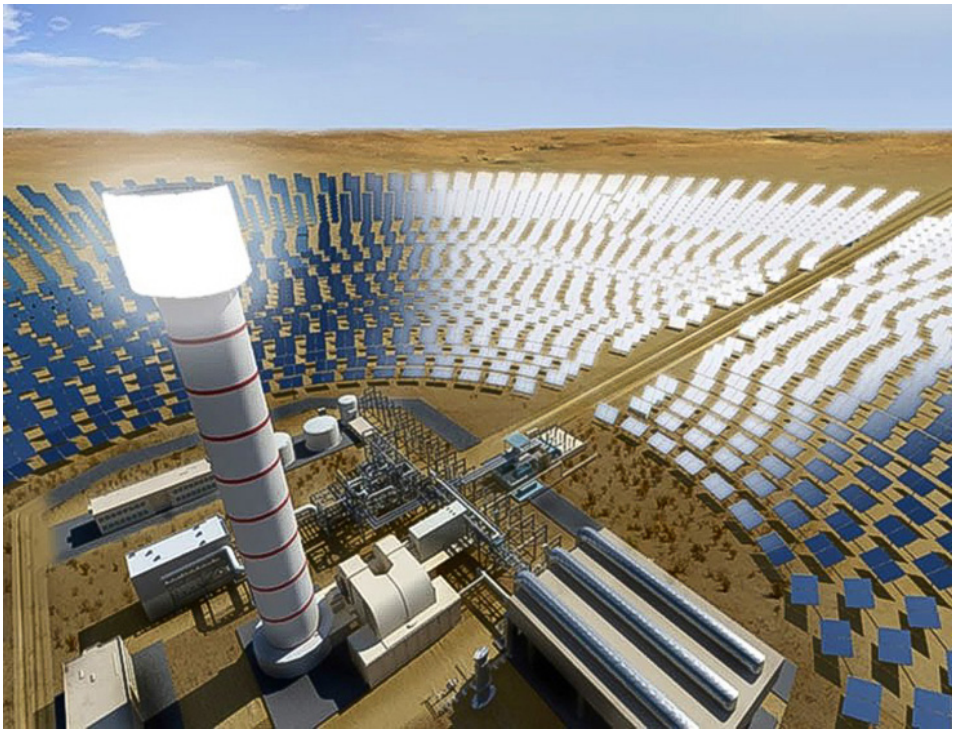
VUW PhD candidate Mustafa Alqudah



Concentrated solar power (CSP, also known as concentrating solar power, concentrated solar thermal) systems generate solar power by using mirrors or lenses to concentrate a large area of sunlight into a receiver.



An exciting future

A joint programme between WITT Te Pūkenga and Victoria University unlocks new pathways

WITT Te Pūkenga is pleased to be partnering with Te Herenga Waka, Victoria University Wellington (VUW) to create opportunities for rangatahi to stay in Taranaki and study then pathway to an exciting degree programme at Victoria University.

Study the first year of your engineering degree at WITT Te Pūkenga, then pathway to Victoria University.

- Joint BEng (Hons) Programme
- Joint BSc Programme

Scholarships

WITT Te Pūkenga has scholarships available to study full-time engineering in New Plymouth, either at diploma or degree level and welcomes enquiries regarding these.

If a student has a preference to focus on computer software, engineering and associated fields, then WITT Te Pūkenga can now help you on that journey and better prepare you for life at university.

These scholarships are proudly sponsored by Ara Ake and GNS.

Ara Ake
Future Energy Development

GNS SCIENCE
TE PŪ AO

Introducing the Taranaki Young Energy Professionals Network

The Young Energy Professionals Network (YEPN) is a nationwide community of passionate young* professionals who share a passion for the energy sector.

Their common goal is to continually upskill through the power of knowledge sharing, collaboration, and leadership development opportunities. With hubs based in Auckland, Wellington, Christchurch, and Taranaki, these are thriving networks of like-minded individuals eager to connect and promote various inspiring events to participate in.

Joining YEPN is free and includes benefits such as:

- **Engaging events:** Free attendance to our quarterly in-person gatherings and regular webinars, designed to enhance your understanding of the ever-evolving energy landscape.
- **Networking:** Forge valuable connections within the energy sector at industry events.
- **Mentorship:** Take part in our "coffee catch-up" mentoring programme connecting young and senior energy professionals.
- **Your Voice, Your Forum:** YEPN provides a platform to discuss pertinent issues and contribute innovative ideas tailored to our members' interests.
- **Informed insights:** Stay in the loop with the latest developments through our bi-monthly newsletter and regular LinkedIn posts.
- **Global opportunities:** Opportunity to participate in the World Energy Council's global Future Energy Leader (FEL-100) program.
- **Job hub:** Hear about job openings within the industry.

Taranaki's YEPN

Led by Emily Hilton, Taranaki YEPN brings a local touch to the broader energy landscape. Their events offer an opportunity to mingle with the local energy community while gaining insights from industry experts. Past topics have included "Harnessing Innovation to Shape the Energy Transition," "Aotearoa New Zealand's Changing Electricity Market," and "The Potential of Offshore Wind in NZ."

Your input matters, and Taranaki YEPN eagerly welcome suggestions for future event topics. Don't miss their upcoming TYEPN event, "Accidental Energy Professionals." Join them as they hear from a lineup of inspirational speakers sharing their unique journeys and how they found themselves immersed in the world of energy professionals.

Who's welcome? Everyone!

*YEPN is not just for "young" people; whether you're a student venturing into the energy industry, in the early stages of your career, or simply young at heart and seeking like-minded collaborators, YEPN has a place for you. Join their thriving network today, free of charge, at www.bec.org.nz/yepn.

For more information about Taranaki-based events, please reach out to Emily Hilton by emailing ehilton@hiringa.co.nz.

Taranaki's YEPN look forward to connecting with you!

Emily Hilton leads the Taranaki Young Energy Professionals Network

Ngāmotu New Plymouth delegation visits Vilnius, Lithuania to share learnings on energy transition

A delegation from New Plymouth led by David Bublitz, the Deputy Mayor and including Jonathan Young (Ara Ake), Cathy Clennett (Hiringa Energy), Kelvin Wright (Venture Taranaki), the regional development agency and Jacqueline Baker (NPDC), visited Vilnius in July this year.

This was a reciprocal visit after a delegation from Vilnius visited New Plymouth a year prior. Funding for the visits was from the European Union's IURC programme, which New Plymouth and Vilnius are sister cities.

Vilnius is the capital of Lithuania, one of the three EU Baltic member states. It has a population of approximately 600,000 and is the economic heart of Lithuania. The city has set ambitious targets for the energy transition.

Lithuania shares land borders with Latvia to the north, Belarus to the east and south, Poland to the south, and Russia (Kaliningrad) to the southwest. Lithuania has a population of 2.86 million.

Vilnius is among 100 European cities to be implementing the innovation programme to become a climate-neutral by 2030 under the EU's "100 Climate- Neutral and Smart Cities". This mission is about cleaner air, more efficient public transport systems, innovation, energy saving and independence from fossil fuel imports.

Waste Management

Vilnius's move to renewables and greater energy independence has seen biomass play an increasingly important part in their energy mix. New Zealand on the other hand, with a high percentage of electricity already renewable, has not incorporated biomass into its energy mix as early or extensively. However, the opportunity still exists to utilise biomass, especially from waste streams for energy.

New Zealand has over three million tonnes of waste generated CO2-e emissions, being 4% of our gross total. Not only would waste-to-energy have multiple economic value chains, but there would also be a significant environmental gain in reducing emissions and the amount of waste going to landfill.

Solar energy

Solitek is a Lithuanian company specialising in manufacturing Photovoltaic solar panels. They demonstrate a pinnacle of creative

thinking and business development in their ever expanding solar lineup. Their world best environmental standards and the circularity of their product line lends itself to being able to supply a long duration sustainable product.

The levelised cost of electricity (LCOE) is a calculation based on the value of electricity generated through an asset's value over the lifetime of the asset. This is where quality build can reduce the LCOE as the asset has a longer life. Currently Solitek guarantee 90% efficiency of their panels after 30 years and expect their panels to last for 50 years. Added to this, Solitek have demonstrated how to deploy their product to every extent possible.

See their brochure here.

Solitek are close to 100% self-sufficient in their energy needs. They say "Most of our power demand is satisfied by our own patented PV-Geothermal heating and cooling system, which consists of 1 MW of Geothermal power and 150 kW of PV power."

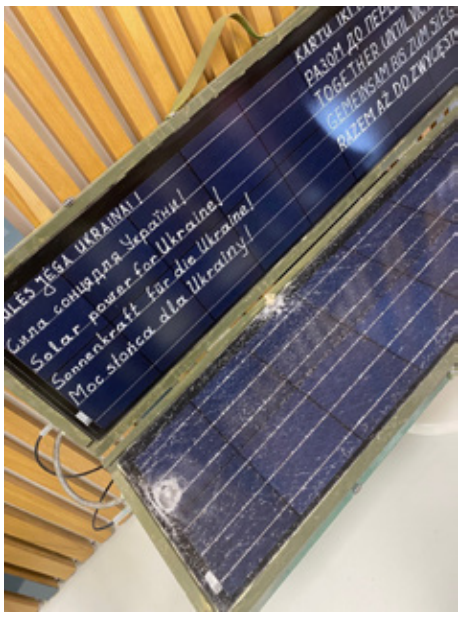
Energy Cells battery parks

Energy Cells has installed four 50 MW energy storage facilities at transformer substations in Vilnius, Šiauliai, Alytus, and Utena. It is currently the largest project in the Baltics and one of the largest of its kind in Europe.

After the synchronisation with the continental European networks (CEN), the energy storage facilities system operated by Energy Cells will be able to store and, if necessary, supply electricity generated by solar or wind power plants to the grid.

By 2030 Lithuania aims to produce 70% of the country's energy consumption and almost half of it from renewable energy sources.

The energy storage system, which will ensure the operation of the instantaneous isolated electricity reserve for Lithuania before the synchronisation with the continental European networks (CEN), will be used for the integration of energy produced from intermittent renewable energy sources after the synchronisation.



Portable solar panels used to charge communication devices in the Ukraine, back for repair after being damaged by shrapnel incurred in the conflict.

SoliTek design and manufacturing

Big numbers in the renewable electricity generation game!

A record number of enquiries for grid connections have been received by Transpower.

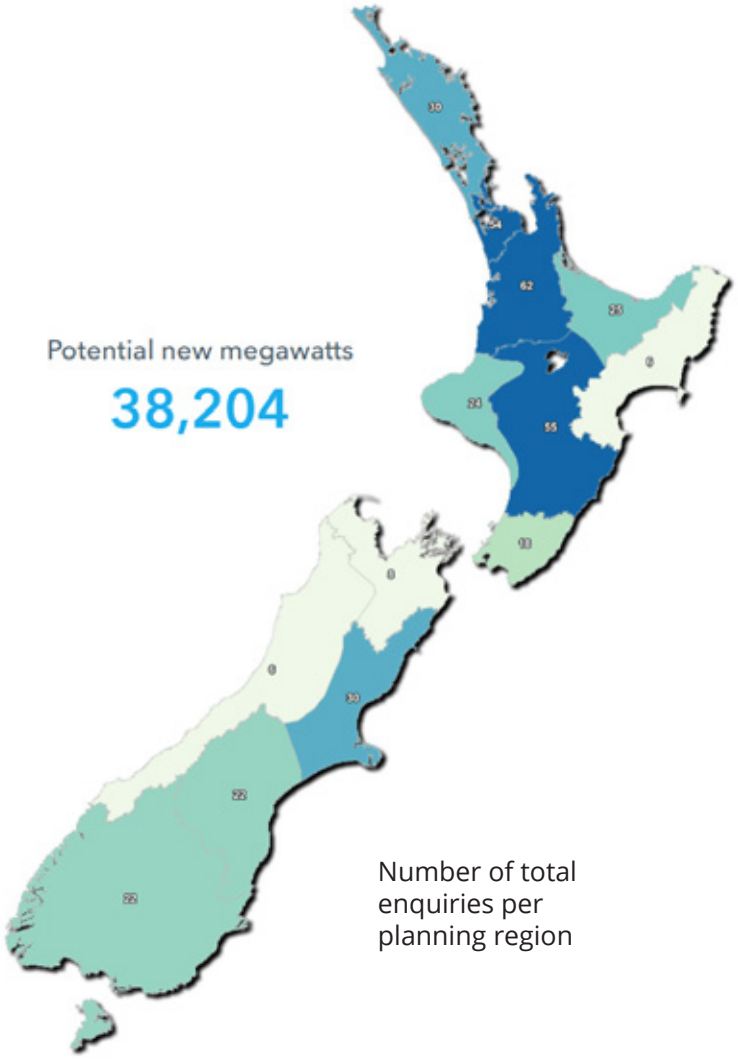
As of September 2023, there were a total of 362 enquiries to Transpower, the national grid owner and operator, for grid connections from developers.

These enquiries covered battery storage, data centres, geothermal devleopers, hydro, hydrogen, process heat, substations, transport hubs and the like.

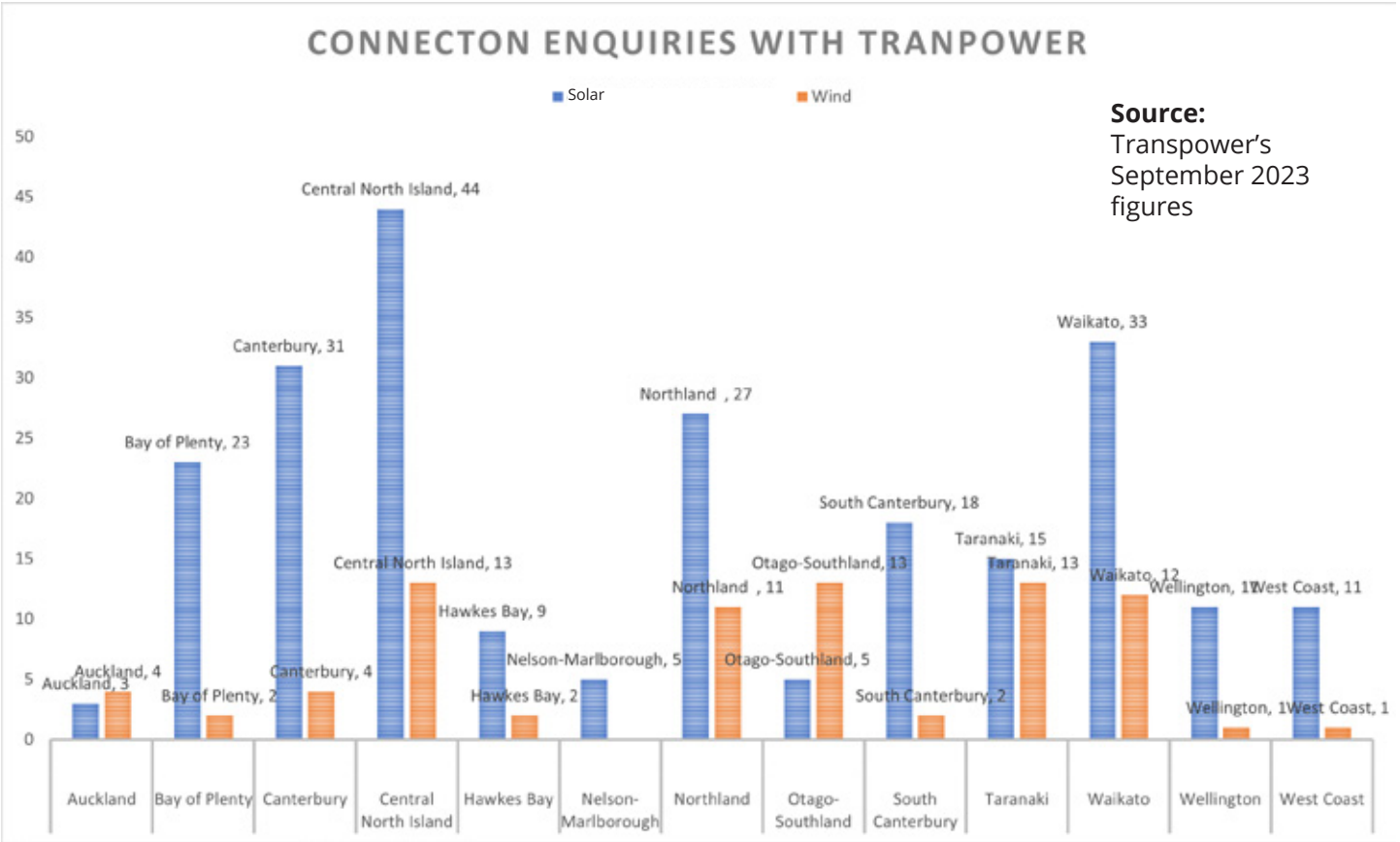
By far the biggest number of enquiries came from solar and wind developers, totalling 313 enquiries, or 86% of all enquiries.

What number of actual connections will eventuate is unknown, and Transpower acknowledge that not all enquiries turn into actual projects, but certainly this figure indicates a strong surge in the investor interest and planning of solar and wind installations in the country.

If all of these enquiries eventuate into actual building of this infrastructure, then 38,204 extra new megawatts of electricity will be generated for New Zealand. This represents over four times the current generation capacity of New Zealand, which sits at around 9,500 Megawatts, although solar and wind are not able to generate 24/7 due to the variableness of both sunshine and wind.



Number of total enquiries per planning region



Source: Transpower's September 2023 figures

New Zealand wind energy setting for growth in new wind-farms

With over 82% of Aotearoa New Zealand's electricity derived from renewable sources, it is already ahead of many countries as each strive toward their respective renewable energy targets.

While we are in a privileged position, our commitments to obtain net zero carbon emissions by 2050 and our abilities to stretch toward 100% renewable electricity by 2035 represent a challenging road ahead. In recent times, four industry-led studies assessed our long-term energy forecast needs, and while each convey differing electricity growth projections, they all agree on one thing; our rate of renewable electricity growth needs to be significantly greater than it has been in the past.

To meet the forecast Accelerated Electrification demand forecast of 22 GW installed capacity by 2050, it is estimated that Aotearoa New Zealand must build at least 220 MW of additional wind capacity every year for the next 27 years. This would equate to almost 6 GW of wind capacity on the power system, up from just over 1 GW today. The task is ambitious, but achievable and exciting.

With 15 new onshore wind projects representing over 2 GW already consented or seeking consent, plus a growing pipeline of offshore wind representing an additional 4 GW, the future of wind energy is cemented in our future.

Enquiries to Transpower for new wind energy development connections out to 2050 have also surpassed expectations, with a reported 13 GW of wind energy projects in early investigation.

Aotearoa New Zealand has an incredible opportunity to be world leaders in renewable energy penetration, and wind energy, both onshore and offshore, is our pathway to achieving this outcome.

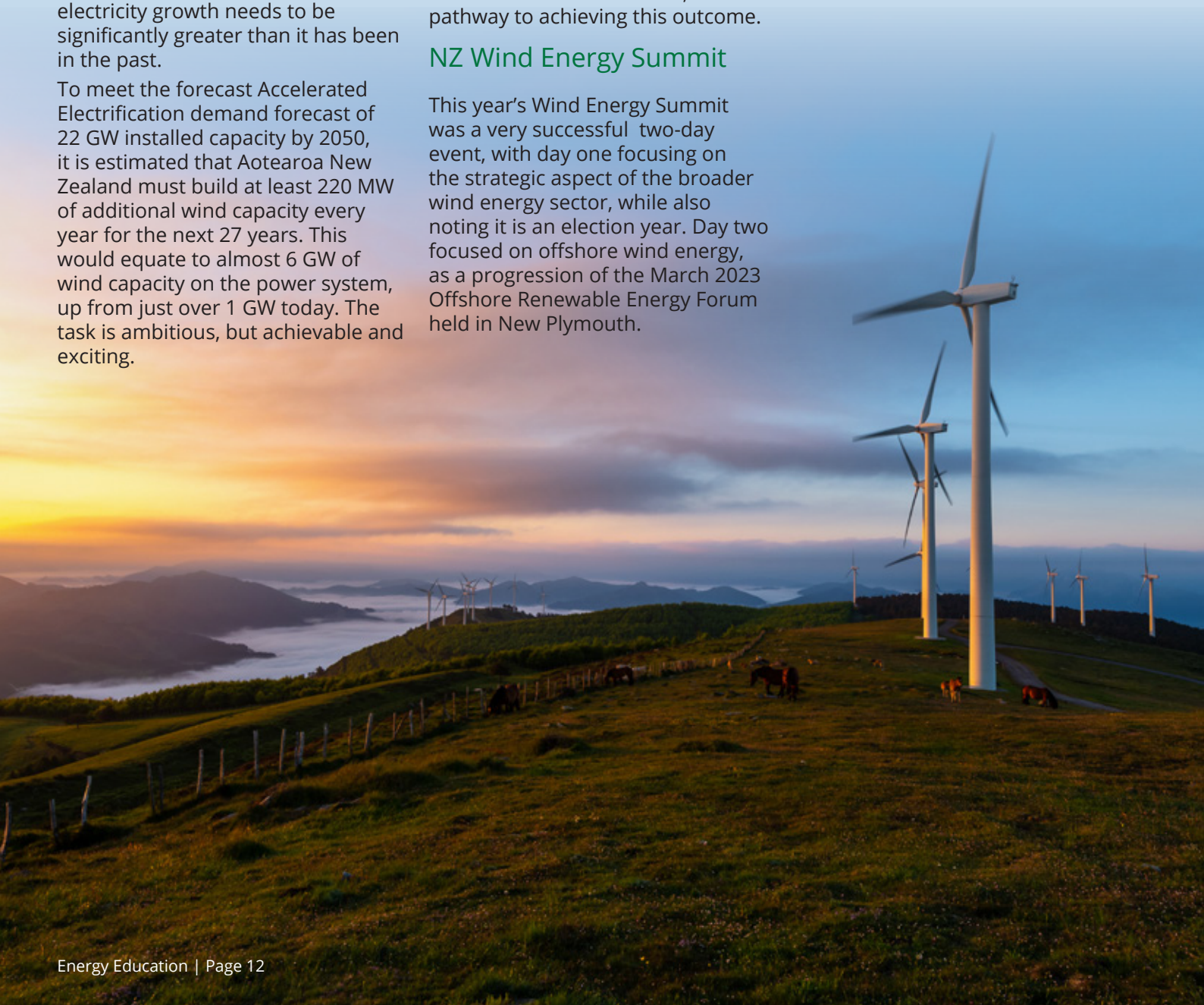
NZ Wind Energy Summit

This year's Wind Energy Summit was a very successful two-day event, with day one focusing on the strategic aspect of the broader wind energy sector, while also noting it is an election year. Day two focused on offshore wind energy, as a progression of the March 2023 Offshore Renewable Energy Forum held in New Plymouth.

NZWEA was proud to present the day two offshore agenda in partnership with Ara Ake, as we take a unified industry-wide approach to further develop the offshore wind energy industry in Aotearoa New Zealand.

The NZ Wind Energy Summit 2023, offered a great opportunity for people to engage with all industry, government, Iwi, and community stakeholders and partners regardless of their interest in the wind energy sector. Enhancing and building new relationships and collaborating for a sustainable future is how we will all be successful.

Source: NZ Wind Energy Association



Empower Energy helping reduce energy hardship

Michael Fitzgerald and Brian Stephens (Co-founders)

Empower Energy has launched its platform that enables the donation of power bill credits to be distributed to families experiencing energy hardship.

Empower Energy can now accept donations through its platform on its website. The charitable donations already received have gone directly to vulnerable families struggling with the cost of living, by paying a proportion of their power bill.

Empower Energy Chief Empowerment Officer, Michael Fitzgerald, is excited about the launch of the platform and the positive response it has received to date.

"We believe in the power of community and collective action. With the launch of our platform, we empower everyday kiwis to join us in the fight against energy hardship. Together, we can make a lasting difference in the lives of vulnerable families and create a brighter future for all," says Michael Fitzgerald.

Despite the energy hardship crisis, many energy retailers are yet to fully embrace the concept of facilitating donations through customer power bills. However, Empower Energy, supported by Orion and foundational sponsors Ara Ake and MainPower, is determined to address this pressing issue by enabling individuals to make a difference.

> **"We've been proud to support some of the initial development of Empower and I'd encourage others to jump onboard and consider being a platform partner."**

Orion Group chief executive Nigel Barbour.

Empower Energy has also experienced success in securing corporate donations of surplus solar credits.

"The donations we have received to date through corporates' surplus solar serve as a testament to the growing recognition of the importance of addressing the pressing issue of energy hardship. We're proud to demonstrate that the system works and that there are donors eager to support this cause," says Fitzgerald.

In line with its mission to expand and enhance its impact, Empower Energy is actively seeking platform partnerships. These collaborations will contribute to the continued development of the distribution platform, allowing it to become automated, self-sustaining and capable of assisting a larger number of vulnerable families and individuals.

Ara Ake chief executive, Dr Cristiano Marantes, is thrilled by the progress being made by Empower Energy and would encourage the sector to engage and participate and says:

> **"As part of our transition to a low-emissions energy future, we need to ensure that no one gets left behind. Empower Energy's donation platform puts vulnerable customers experiencing energy hardship at the forefront of this transition, and we're proud to be supporting this mahi."**

Cristiano Marantes

Empower Energy has partnered with FinCap, to receive support and guidance to identify recipients for the energy bill credits. Empower Energy has worked with several financial mentoring services to pilot the programme, with a view to expansion.

> **"Financial mentors have the trust of the recipient families, they understand their financial situations and can help them navigate their financial issues. They are experts are at the coal face of energy hardship, so they're the best-suited people to identify those families needing power bill credits, and how much would be meaningful for their unique situations"**

FinCap chief executive Ruth Smithers.

To learn more about Empower Energy and how to contribute to their efforts, please visit www.empowerenergy.org.nz

This article is courtesy of Ara Ake

Agrivoltaics advancing on both sides of the world

Lithuanian Agrivoltaics:

Agrivoltaics or Agro photovoltaics (AgroPV) is the simultaneous use of areas of land for both solar photovoltaic power generation and agriculture.

It is applying new technology to existing businesses - a 'two-in-one' approach.

Combining food and energy production dramatically increased the net revenue output from the same piece of land.

Crops are less affected by extreme heat, moisture is conserves in the ground, so less irrigation and saving water resources. More stable climate, so lower maximum temperatures and higher minimum temperatures. Durable and robust crop protection that withstands all weather conditions, so no more worries about storms, hail or heavy rain.

Choosing AgroPV system requires no more investment in expensive (conventional) cultivation aids, as no need for labor to assemble and disassemble the plastic/film as well.

Article republished from Solitek's website. The original source is here.

Agrivoltaics designed and built by SoliTek, Lithuania

Canadian Agrivoltaics:

GWs of solar power from farmland using strategically placed panels (and raising crop yields)

In Canada and the U.S. 'agrivoltaics' are taking off. It's when solar panels are laid out strategically on farmland. After concerns that it will obstruct farm machinery and lower crop yields, studies have shown that panels – on a large scale – can be placed so that they do not. In fact, certain crop yields can be raised when the panels are used to shield them from direct sunlight, explains Joshua Pearce at Western University, Canada. He looks at Alberta, Canada where farmers are set to install solar panel arrays, make more money, drop energy costs, and cut emissions. Changes to Alberta's farming regulations would need to be minimal. Impressively, dedicating less than 1% of Alberta's farm land to agrivoltaics can provide the entire state's electrical power, emissions free. Meanwhile in the U.S. the Department of Energy is now investing millions of dollars in search of dominance in agrivoltaics solutions.

Agrivoltaics is the simultaneous placement of food crops and solar photovoltaic systems that produce electricity directly from sunlight — while also producing a beneficial micro climate. Covering crops with solar panels may not seem intuitive, however, dozens of studies from all over the world have shown that many crop yields increase when they are partially shaded from solar panels.

1% utilisation

Using 1% of Alberta's farmland means zero power emissions statewide.

Agrivoltaics really has broad appeal. Farmers love it as it increases yields and provides steady incomes and so do solar developers and environmentalists. Even most Americans support solar development when agrivoltaics protects farm jobs. It is thus not surprising that agrivoltaics is exploding on the world market.

Eighty-nine per cent of Alberta's electricity came from fossil fuels, yet we published an article this year that showed that agrivoltaics on just one per cent of the current agricultural land would eliminate the carbon emissions entirely. Less than one per cent of Alberta's farm land dedicated to agrivoltaics, cuts all harmful emissions from Alberta's electricity sector while making more food.

This is a win-win for the farmers, and consumers alike. As Alberta's Conservatives are now able to lift the renewable energy ban knowing that the environment and the food system will be protected, they should ensure that large-scale solar in the province is encouraged to be agrivoltaic. Then all of us, regardless of party, can enjoy the conserved beauty of nature, lower-cost electricity and more food produced per acre. Whether or not this will result in lower costs at the grocery store checkout is a question yet to be answered — but we can hope.

Joshua M. Pearce is the John M. Thompson Chair in Information Technology and Innovation and Professor, Western University, Canada.

Read the original article here

Solar and Wind save Europe €100bn uring energy price shock because of the Russian invasion of Ukraine.

According to the IEA, without the solar and wind capacity additions made in 2021-23 Europe's energy costs would have been €100bn higher in those three years, as prices spiked due to Russia's invasion of Ukraine and the unexpected drop in output from nuclear and hydro. That money saved is another reason why the ramp up of renewables is so important, explains Joe Myers writing for the World Economic Forum who summarises the IEA data.

Natural gas prices increased tenfold, hard coal prices fivefold, and European electricity prices were up to 15-20 times higher than their average in 2015-20. It's been a very difficult time, and it's not over. But it shows renewables are not just about the climate: they protect nations from macroeconomic and geopolitical price shocks beyond the region's control.

But new renewable power capacity has helped reduce the scale of these price increases, saving Europeans billions of euros.

The energy transition has made significant progress over the past decade as IEA data shows, but challenges remain.

https://energypost.eu/though-the-price-shocks-hurt-renewables-installed-between-2021-23-saved-europe-e100bn/

Space-Based Solar Power: getting closer as SpaceX and Blue Origin bring down the cost of heavy-lift launches?

"Space-based solar power" (SBSP) sounds great in theory: giant solar farms in space collect unobstructed sunlight 24/7 and beam it to Earth stations, all using technology that already exists. It isn't getting off the ground (pun intended!) primarily because of the cost of launching thousands of tonnes into space, plus assembly and maintenance. The attraction is that, if it can happen affordably, it could provide a hundred times the energy the world is predicted to need by 2050, says Matteo Ceriotti at the University of Glasgow. But with SpaceX and Blue Origin developing heavy-lift launch vehicles, could this bring the costs down by 90%? Ceriotti looks at the latest design concepts, and remaining challenges – not least the impact of the pollution and emissions from hundreds of heavy-lift launches. And solar cells will degrade and need to be maintained. The European Space Agency is evaluating the viability of SBSP with its SOLARIS initiative, with the prospect of a full development plan by 2025.

https://energypost.eu/space-based-solar-power-getting-closer-as-spacex-and-blue-origin-bring-down-the-cost-of-heavy-lift-launches/

"Book and Claim": how end consumers can pay distant producers for low carbon products

In long logistical chains (found in steel, concrete, aviation, shipping and others) end consumers that want to pay a premium to cut their emissions (for example to comply with corporate decarbonisation promises) often have no way to pay the first link in that chain to go low-carbon. "Book and Claim" creates a market to do that. Consumers buy certificates, and producers get the money to fulfil the commitment. And a working system will bring to life the market signals that more quickly incentivise innovative producers, attract further investment, and accelerate scale-up and cost reduction. Inevitably, standards, regulations, monitoring and transparency are key, to avoid fraud and double counting. Thomas Koch Blank, Laura Hutchinson, Oscar Hernandez, Esther Sicong Li and Alexandra Wall at RMI describe how it works. They give as an example Sustainable Aviation Fuel (SAF): it's expensive and desperately in need of rapid scale-up, and perfectly fits the model of the end user (a passenger or cargo) being distant from the fuel producer. The first ever joint SAF certificate purchase occurred this year, and the shipping sector is making moves to do the same. And regulators can also use Book and Claim as a flexible mechanism to enforce decarbonisation compliance in targeted sectors, especially where an emissions trading scheme doesn't already exist, explain the authors. A growing number of organisations, including RMI, are developing the tools and guidelines.

https://energypost.eu/book-and-claim-how-end-consumers-can-pay-distant-producers-for-low-carbon-products/

The final hurdle for 100% Sustainable Aviation Fuel? Turning Lignin biomass into the "aromatic" component

Making 100% sustainable aviation fuel seems a long way away. Aircraft need energy-dense power, as delivered by fossil fuels, and sustainable alternatives are being developed. But a big challenge is that 10% – 25% of the fuel must be "aromatic" which neither thickens nor freezes at cold altitudes. Also, aromatics get absorbed by the plastic seals, make them swell, and ensure those seals between various components in the aircraft's fuel system are tight.

No alternative to fossil aromatics has yet been found. Nancy Stauffer at MIT describes research and testing that has found a way to turn lignin – a cheap and abundant biomass component of plant cell walls – into a product that displays the same properties as the fossil fuel–derived hydrocarbons that now make up that last quarter of the jet fuel mixture. If this product passes some final rigorous tests, the result could be an aviation fuel that's completely 100% sustainable.

https://energypost.eu/the-final-hurdle-for-100-sustainable-aviation-fuel-turning-lignin-biomass-into-the-aromatic-component/

Discover our renewable energy courses

Get accredited at the WITT Te Pūkenga Infrastructure Training Park in New Plymouth

Stand Alone Power Systems: Design and Installation

Domestic: $1,200 International: $3,500

The course Stand Alone Power Systems: Design and Installation is ideal for busy tradespeople who want to learn about designing and installing reliable off-grid power systems.

The course covers topics such as site assessment, energy yield calculation, battery technologies, system design and installation, commissioning, and fault-finding.

Grid-connected Battery Storage Systems: Design and Installation

Domestic: $600 International: $1,750

This course is designed for electrical workers who want to learn how to design and install safe and effective grid-connected battery storage systems, with a focus on those integrated with grid-connected photovoltaic systems.

Topics covered include battery chemistries and characteristics, battery charging, system design and yield calculations, and hazards associated with batteries and grid-connected battery storage systems.

Assessment

- Pre-course online learning (100 hours),
- Three-day in-person course (24 hours)
- Post-course assignment (16 hours).

Who should attend?

- Electricians
- Electrical Engineers
- Electrical Inspectors

All applicants must be registered electrical workers and hold a current practicing licence.

Our presenter

Tim Francis is a trainer for PV training courses at WITT Te Pūkenga, NZIHT, and is supported by SEANZ.

He has 26 years of experience as an electrician, with a background in industrial control systems and renewable energy as a designer/installer.

Tim holds advanced diplomas in Electrical Engineering (Control) and Renewable Energy, and CEC Accreditation as a designer and installer for both grid-connected PV and stand-alone power systems with both micro-hydro and small wind endorsements.

witt.ac.nz/nziht/solar-energy-training/

N.B. Completion of Grid-Connected PV Systems: Design and Installation is a prerequisite for both courses. Courses run subject to numbers.

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