ENERGY EDUCATION

Mauri mahi, mauri ora

ENERGY NEWS FROM THE REGION, COUNTRY AND WORLD | DECEMBER 2022

2022 - that's a wrap!

Kia ora koutou, 2022 has been another year of continuous change and some glimpse of a new normal.

As an organisation that delivers tertiary education within Taranaki and throughout the motu we have moulded our business to accommodate the needs of our learners.

On the 1 November 2022, WITT officially became part of Te Pūkenga and is now part of the organisation that will strengthen tertiary education throughout Aotearoa. Te Pūkenga is represented by what was formally the 16 Institute of Technology and Polytechnics and nine Industry Training Organisations which consists of approximately 13,000 staff and 240,000 learners.

New renewable energy courses delivered in 2022

In 2022 we have continued to gain momentum in renewable energy education with the delivery of solar microcredentials. These courses have seen 40 qualified electricians and engineers complete 95 hours of online learning and then attend a three day practical block course in Taranaki. The courses have been well received by attendees and we look forward to continuing more training in 2023. (Please see the last three pages of this edition for further information.)

With the strength of Te Pūkenga in 2023 and the collaboration of tertiary education throughout Aotearoa, the future opportunities to communities and key stakeholders will become more evident.

We look forward to bringing you more stories and updates next year and wish all readers and their whānau a very safe and enjoyable holiday season.

Ngā mihi nui, Kyle Hall

This issue : Offshore renewable energy comes a step closer

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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.

Te Pūkenga

Government says offshore renewable energy can be a game-changer and enhance energy-independence

The Government is seeking public feedback on the development of offshore renewable energy infrastructure like wind farms, Energy and Resources Minister Dr Megan Woods said in New Plymouth on a recent visit.

"Offshore renewables have the potential to produce the electricity needed to replace fossil fuels and support New Zealand's transition to net zero by 2050," Megan Woods said.

"Technology like wind farms set off the coast of New Zealand can deliver a clean, stable source of renewable energy to help us become more energy-independent and avoid the fluctuations in cost of fossil fuels like oil and coal."

> **"The proposals released today set out potential approaches to manage feasibility activity, with consideration of environmental and cultural factors alongside commercial viability.**

"This delivers on our commitment to regulate this promising area of renewable energy production, so investors have certainty and can get assessments underway as soon as possible," Megan Woods said.

The potential environmental and cultural impacts will be closely examined before decisions are made about what projects could be constructed and this will require developers to work closely with iwi to understand these impacts.

"We firmly see Taranaki's future as still being an energy future. New Zealand has high levels of renewable resources – so we are well positioned globally to create a sustainable energy system for generations to come," Megan Woods said.

"Ensuring we have the right settings in place to encourage development of offshore renewable infrastructure will enable us to deliver net zero emissions by 2050," Megan Woods said.

Offshore renewable energy

Offshore renewable energy is energy generated in or on the sea from reusable, infinite natural sources such as wind, ocean currents, light or heat from the sun, rain and geothermal heat. Under the Emissions Reduction Plan, the Government has committed to put in place a regulatory regime for offshore renewables by 2024.

There are many ways of harnessing offshore renewable energy including floating solar and floating wind turbines, and infrastructure on the seabed itself such as those used for wave energy, tidal energy, and offshore wind. These technologies are emerging and are in various stages of development internationally. Fixed foundation offshore wind technology is the most mature of the offshore renewable energy sources today.

Before decisions can be made on whether to construct and operate offshore renewables, significant feasibility studies are needed to examine commercial and technical viability, and cultural and environmental impacts on the marine environment and existing uses of it.

The proposals set out options for how developers might assess feasibility. This could involve working in conjunction with one another or competing for permits that provide exclusive rights to do feasibility studies in an area.

Later in 2023, MBIE is expecting to consult on further regulatory settings to enable infrastructure to be constructed, operated and decommissioned.

Source: Beehive website

Dr Megan Woods. Minister of Energy and Resources

Developers are currently exploring Aotearoa New Zealand's world-leading offshore wind resources

Aotearoa New Zealand's average wind speeds are higher than in most other places, meaning that our wind farms can produce more energy per unit than the global average. The least-windy sites in Aotearoa New Zealand have better wind energy potential than the windiest sites in Australia.

There is already significant interest from experienced developers in establishing offshore wind energy in New Zealand's territorial sea (up to 12 nautical miles) and exclusive economic zone (between 12 and 200 nautical miles), with initial feasibility assessments underway in Taranaki, Waikato, and Southland.

Offshore renewable energy regulatory settings

The objectives of regulatory settings are to:

- Enable selection of both the developer and the development to meet Aotearoa New Zealand's national interests, including appropriate safeguards and benefits for the environment
- Enable Māori participation in offshore renewable energy development
- Provide certainty for developers to invest in the short term, and
- Ensure New Zealand remains competitive and can secure access to offshore renewable energy technology in a timely way.

Currently, existing regulatory regimes such as the Resource Management Act 1991 and Exclusive Economic Zone and Continental Shelf (Environmental Effects) Act 2012 are insufficient to enable early feasibility activity by offshore renewables developers to proceed in a way that meets the above objectives.

This discussion document consults on:

- Implementing a permitting or collaborative approach to the production of feasibility assessments for offshore renewables developments in a way that meets the above objectives, and
- Gathering more information about existing rights and uses in areas where offshore renewables may develop.

Next steps

- Consultation on the proposals in this document will run from mid-December 2022 to April 2023. During this time, officials will meet with interested parties to discuss the proposals.
- A second discussion document in 2023 is expected to canvas further elements of required regulatory settings such as how best to manage the construction, operation, and decommissioning phases of offshore renewable infrastructure.
- Any regulatory changes would require either regulations made under an existing Act of Parliament, or a new Act. The Government remains committed to establishing fit for purpose regulatory settings by 2024. Where it is feasible and desirable to do so, the Government will implement these settings sooner.

Click here to access the Government website

Wind power – Team New Zealand break land speed record

Team New Zealand and land speed pilot Glenn Ashby have sailed their wind-powered land speed world record craft Horonuku faster than any previous record.

Horonuku named by Ngāti Whātua Ōrākei meaning 'gliding swiftly across the land' did exactly that and was clocked at 222.4km/h in 22 knots of wind speed on Lake Gairdner in South Australia.

WITT is part of Te Pūkenga - New Zealand Institute of Skills and Technology, together with all the other polytechnics in New Zealand. From 2023, all WITT learners will be enrolled with Te Pūkenga.

Offshore wind is moving forward

BlueFloat Energy, Energy Estate and Elemental Group hosted an event in November for industry keen to get involved in developing the offshore wind industry in Aotearoa New Zealand.

The event, co-osted by Engineering Taranaki Consortium, Venture Taranaki and WITT Te Pūkenga, aimed to increase awareness of the scale of the opportunity and potential for offshore wind in the country. The consortium has recently announced a 900 MW development for South Taranaki and a phased development off the Waikato coast starting with an initial 250 MW fixed bottom development followed by a larger floating wind farm.

This is the second consortium to announce their plans to establish an offshore wind farm off the South Taranaki Coast, with Energy Education featuring a story on the partnership of Copenhagen Infrastructure Partners and NZ Super's announcement in June 2022.

Speaking at the recent November event, Energy Estate Co-Founder and Principal Simon Currie said that Taranaki and wider New Zealand had a strong base of skills and experience to build a successful offshore wind industry:

"We can create renewable energy zones that are clustered with onshore renewables and integrated with existing infrastructure, ports and transmission systems, and the businesses that need the energy like dairy and industrial producers."

Brett Rogers (above), Director at Elemental Group said New Zealand's wind is world-class and that creates a wonderful opportunity to create a wind industry:

"There are a lot of synergies with the oil and gas sector and transferable skill sets so many of the firms and employees who have supported that industry will have the right type of expertise for offshore wind."

Kyle Hall from the NZ School of Engineering, Energy & Infrastructure at WITT Te Pūkenga spoke about up-skilling and training the workforce for the new energy sector:

> **"WITT Te Pūkenga can offer training and professional development in the areas of trades, engineering, energy, infrastructure, business, Māori enterprise, IT and many other supporting industries. We are prepared to upskill the current workforce, train new people moving into a new energy sector and develop new courses as required from industry."**

Offshore Wind 4 Kids

Samantha McKenzie from Atlas Professionals, HR and recruitment specialists for the energy sector, said they are looking to recruit the next generation of offshore engineers.

Supported by the BlueFloat consortium, Atlas hosted "Offshore Wind 4 Kids" at Ngāmotu Beach on 27 November and 11 December where kids learnt about offshore wind and had a chance to construct their own wind turbine.

Offshore research – an important next step

NZ Super and Copenhagen Infrastructure Partners have submitted a pre-activity notice to New Zealand's Environment Protection Authority (EPA) for a floating wind measurement device – a Floating Light Detection and Ranging device, or FLiDAR – to be deployed 37km off the South Taranaki Coast.

"This is an important step in understanding the wind resource that is available in our location of interest. Our initial research suggests the South Taranaki area has world-class fundamentals, however deploying the FLiDAR will help us build a fuller environmental picture and develop an investible proposition," says NZ Super Fund Head of Direct Investments Will Goodwin.

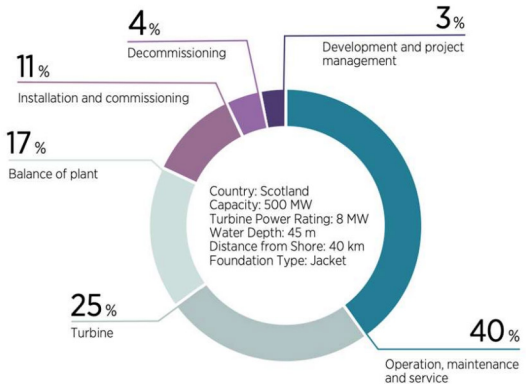
"The ability to bring in this kind of globally in-demand equipment highlights the benefit of working with an international partner such as CIP."

The FLiDAR, which is similar in size to a large ocean buoy, will be deployed for a minimum of 12 months and will measure area-specific wind speeds to help determine the feasibility of an initial up to 1GW clean energy project as well as the potential for an additional 1GW project.

Workforce capability research project underway

The CIP / NZ Super consortium has recently commissioned a research document on Taranaki industry capability to support the offshore wind opportunity. The Concept Consulting report will be presented at the Ara Ake / Venture Taranaki conference "Offshore Renewable Energy" in March 2023 and be shared across the industry.

Cost breakdown of an offshore wind farm reaching final investment decision in 2020



Source: Scottish Enterprise 2017 . Chart shows the cost breakdown of a 500 MW offshore wind farm in Scotland reaching final investment decision in 2020 using 8 MW turbines, on jacket foundations, in 45m water depth, 40 km from shore (total cost estimated at EUR 5.4 billion)

Global wind report 2022

Global Wind Energy Council

The global wind industry had its second-best year in 2021, with almost 94 GW of capacity added globally, trailing behind the 2020's record growth by only 1.8%

- 21.1 GW of offshore wind capacity was commissioned last year, three times more than in 2020, making 2021 the best year in offshore wind history, bringing its market share in global new installations to 22.5% in 2021.
- China made up 80% of offshore wind capacity added worldwide in 2021, bringing its cumulative offshore wind installations to 27.7 GW. This is an astounding level of growth, as it took three decades for Europe to bring its total offshore wind capacity to a similar level.
- Total global wind power capacity is now up to 837 GW, helping the world avoid over 1.2 billion tonnes of CO2 annually – equivalent to the annual carbon emissions of South America.
- Wind auction activities bounced back in 2021 with more than 88 GW of wind capacity awarded globally, 153% higher than in 2020.
- After a year in which net zero commitments gathered global momentum, coupled with renewed urgency for achieving energy security, the market outlook for the global wind industry looks even more positive. 557 GW of new capacity is expected to be added in the next five years under current policies. That is more than 110 GW of new installations each year until 2026.
- However, this growth needs to quadruple by the end of the decade if the world is to stay on-course for a 1.5C pathway and net zero by 2050.
- Europe, Latin America and Africa and the Middle East had record years for new onshore installations, but total onshore wind installations in 2021 was still 18% lower than the previous year. The decline was driven primarily by the slow-down of onshore wind growth in the world's two largest wind power markets, China and the US.

Total global wind power capacity is now up to 837 GW, helping the world avoid over 1.2 billion tonnes of CO_2 annually – equivalent to the annual carbon emissions of South America.

Without continuing action, lagging growth will leave a wind energy shortfall by 2030.

Wind energy is not growing nearly fast or widely enough to realise a secure and resilient global energy transition.

At current rates of installation, GWEC Market Intelligence forecasts that by 2030 we will have less than two-thirds of the wind energy capacity required for the 1.5°C and net zero pathway set out by IRENA in their 2050 roadmap, effectively condemning us to miss our climate goals.

A joint programme between WITT Te Pūkenga & Victoria University unlocks an exciting future

WITT Te Pūkenga is very excited 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 fulltime 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.

GNS SCIENCE TE PŪ AO

Ara Ake
Future Energy Development

On-shore petroleum exploration permits on hold

On Thursday 15 December, Minister of Energy and Resources, Dr. Megan Woods announced the Government is deferring decisions on future petroleum block offers.

In 2018, the previous Coalition Government announced an end to new offshore oil drilling and committed to another three rounds of block offers (2018, 2019 and 2020), which is the permit tender process for new drilling in onshore Taranaki.

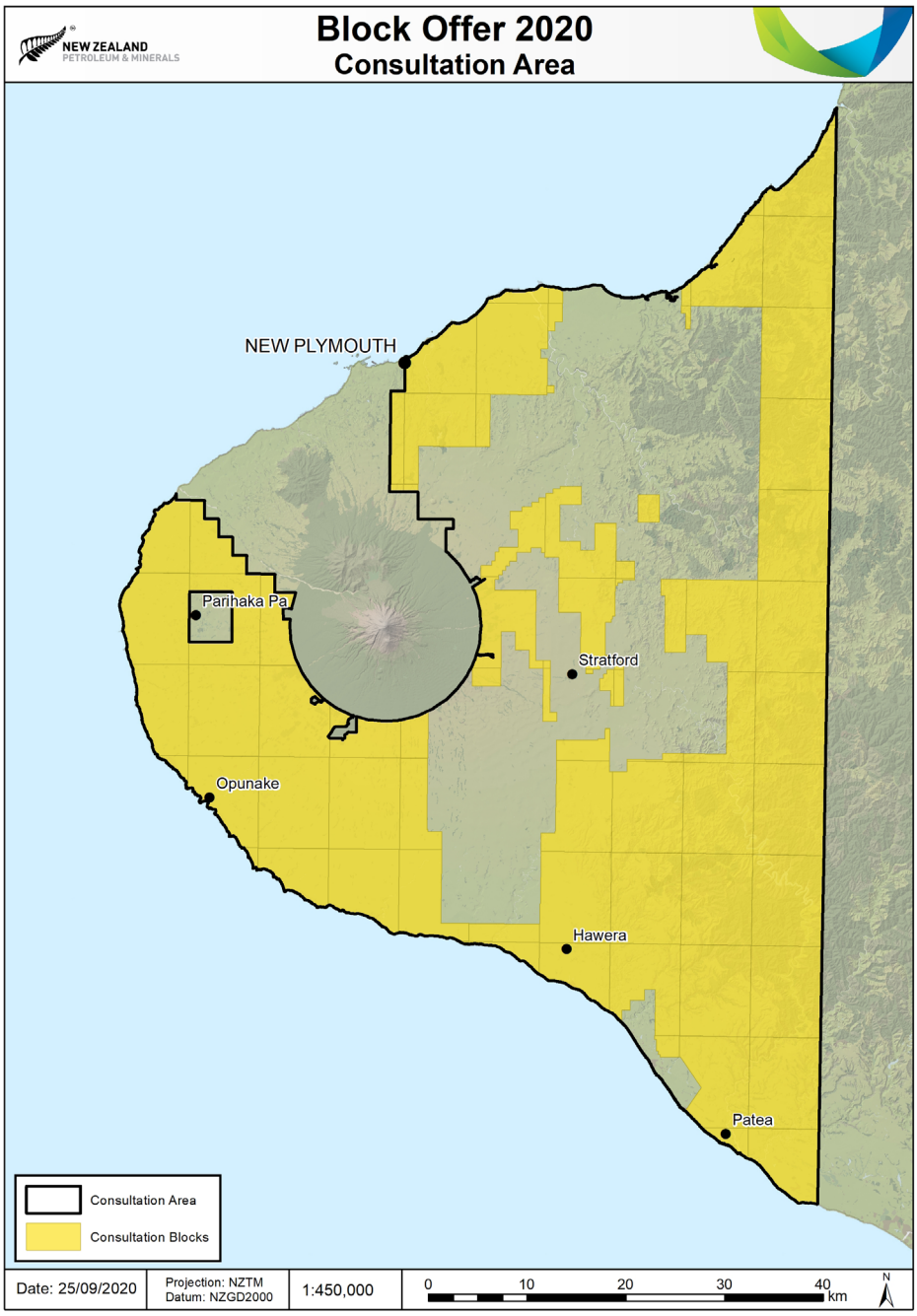
It also said decisions about future block offers beyond those committed would be made at a later date. Two of the tenders have been completed and the last (2020) remains in progress.

The 15 December announcement means there will be no further petroleum exploration permits granted, beyond what is already underway, until early in the next parliamentary term.

Minister Woods said, "I am not committing to any further block offers now. Decisions will be made early in the next parliamentary term when there will be a better evidence base of future demand."

"This Government is committed to scaling up the renewable energy sector to phase out harmful fossil fuels. While fossil fuels remain essential today, the needs of tomorrow need to be properly understood to support future generations of New Zealanders," Megan Woods said.

The Government has deferred decisions on whether there would be future offers until early in the next parliamentary term. This will allow time to build a better evidential base of future levels of demand for fossil fuels and other resources, including the most efficient ways to extract petroleum to meet this demand, and time to better understand the position of local iwi.



The Ministry of Business, Innovation and Employment is expected to make a decision on whether to open the tender for Block Offer 2020, in the first quarter of 2023.

By then it is likely that the Crown Minerals Act would have amended the purpose of the Act which currently says in clause 1A (1) " The purpose of this Act is to *promote* prospecting for, exploration for, and mining of Crown owned minerals for the benefit of New Zealand."

The word "promote" will be taken out of the Act, as this legally obligates the Government to promote mineral exploration in New Zealand. The Minister has said this clause is outdated in light of climate change.

Managing the transition

Energy Resources Aotearoa, the national association which most of the oil and gas exploration companies belong to, while applauding accelerating the regulatory development required for offshore renewable energy, has a different perspective with the Government's intention to phase out natural gas use. In a recent media statement, they quoted the International Energy Agency's World Energy Outlook 2022 report that says natural gas will

have a sustained role through 2050 in supporting global energy security and affordability.

The International Energy Agency report outlines that even as demand for natural gas decreases over time, it will continue to play a critical role in energy security by providing gas-fired power for peak electricity needs.

Energy Resources Aotearoa Chief Executive John Carnegie says:

"This is the latest in a long list of reports that show there is an important role for natural gas to play through and beyond New Zealand's and the world's transition to lower emissions energy.

"New Zealand is fortunate to have a domestic supply of natural gas, which insulates us from the global spikes in price we are seeing elsewhere.

The natural gas produced in New Zealand supports the energy needs of our households and businesses, and supports key export sectors like methanol, dairy, and steel."

They warn that premature retirement of this infrastructure could have negative consequences for energy security.

Other areas of opportunity in the energy sector which are highlighted by the IEA report include:

- carbon capture, utilisation, and storage technologies
- blue and green hydrogen
- biogases

Carnegie says that the report is a further proof point for why we need a sustainable natural gas sector in New Zealand to keep our options open.

"The energy transition is upon us, but it will take time. The IEA rightly points out that during energy transitions, both systems are required to function well to deliver reliable and affordable energy to customers."

Recycling carbon emissions could be key climate solution but won't be easy, report to Congress says

15 DEC 2022. A National Academies committee submitted a report to the US Congress stating that "turning carbon emissions into useful products like concrete could use as much as 5% of global CO_2 pollution".

The committee is chaired by Dr. Emily A. Carter, of Princeton University.

"Though it is still a nascent industry, carbon dioxide utilisation can participate meaningfully in the transition away from fossil carbon by providing pathways for sustainable synthesis of many carbon-based chemicals and materials that society needs," said Carter, Princeton's Gerhard R. Andlinger Professor in Energy and the Environment and senior strategic advisor for sustainability science at the Princeton Plasma Physics Laboratory.

The committee looked specifically at how to use carbon—captured from industry or directly from the environment—to make useful products. The goal is to move toward a "circular economy," which reuses materials that would otherwise become harmful waste.

The committee identified five broad classes of products that could be made from waste carbon: construction materials such as concrete; chemicals and fuels such as jet fuel; the ingredients for plastics; elemental carbon and engineered products such as carbon fibre; and other niche products.

Dr Emily Carter

Growing an Energy Centre of Vocational Excellence

Taranaki is experiencing the emergence of alternative energy industries and usages that have the potential to create a range of new career pathways that WITT Te Pūkenga is preparing to support.

WITT Te Pūkenga is positively connected to many industries which will lead the transition, enabling teaching to maintain a level of relevancy and responsiveness to those industry needs, which many other academic and vocational institutions will struggle to have.

Some of the areas that are anticipated to emerge include electric vehicles, hydrogen fuel technology, renewable generation technologies (hydro, wind, solar, geothermal, wave, tidal etc.).

WITT Te Pūkenga is supporting the energy industry by developing a Centre of Excellence in Energy and Engineering to provide work-ready graduates who are skilled in the latest technologies.

Strategic collaborations

Collaborations between Victoria University, Canterbury University and Ara Ake, the national new energy develop centre, creates strong relationships to ensure WITT Te Pūkenga is connected to other leading organisations in the energy field.

A Centre of Excellence must:

- 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.
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Air NZ selects Hiringa Energy on plans for green hydrogen aircraft

Air New Zealand has signed a strategic alliance agreement with Hiringa Energy to explore green hydrogen infrastructure for its zero emissions aircraft programme.

The national airline has also joined forces with some of the world's leading aircraft developers to make zero-emission flights a reality through its 'Mission Next Generation Aircraft' accelerator programme.

The aviation companies include Cranfield Aerospace, VoltAero, Beta, and Eviation. Air New Zealand says it will work with the aircraft innovators to have its first zero emissions flight — either cargo or passenger — in the sky from 2026 and begin replacing its Q300 domestic fleet.

Through a combination of electric, green hydrogen, and hybrid aircraft, these partners will work alongside Air New Zealand over the coming years to focus on developing the technology and associated infrastructure required to make flying these aircraft in New Zealand a reality.

Source : Transport Talk

NZ's first zero-emission dairy farm in South Taranaki

Fonterra and Nestlé today announced a new partnership designed to help reduce New Zealand's on-farm emissions, including a New Zealand first – a drive to develop a commercially viable net zero carbon emissions dairy farm.

Over the five-year project the farm, run with co-partner Dairy Trust Taranaki, will examine all aspects of farm operations to reduce carbon with the aim of cutting emissions by 30% by mid 2027, and a 10-year ambition of reaching net zero carbon emissions.

The demonstration farm at the centre of the project is a 290 hectare property surrounding Fonterra's Whareroa site.

Dairy Trust Taranaki will work with Fonterra and industry partners to reduce total emissions on the farm, including methane, with successful solutions also being good for the farmer, good for the cow and good for the milk.

Lessons learned and activities will be shared through open days with farmers, who can then adopt the techniques and technologies most appropriate for their own farms.

Source : NZTech

Why the Southern Hemisphere is stormier than the North

The southern hemisphere is a very stormy place. The winds at different degrees of latitude are described as the "roaring forties", "furious fifties" and "screaming sixties". Ocean wave heights can reach an astounding 78 feet (24 metres).

For a long time, most weather observations on Earth were taken on land. This gave scientists a clear picture of storms in the northern hemisphere. However, for the southern hemisphere, which is around 20% land, it was not until the advent of satellite-based observations in the late 1970s that we obtained a clear picture of storms there.

Thanks to decades of observations since the beginning of the satellite era, we know the southern hemisphere is about 24% stormier than the northern hemisphere.

Because the Earth is a sphere, it does not receive solar radiation from the sun evenly across its surface. Most energy is received and absorbed at the equator, where the sun's rays hit the surface more directly. In comparison, less energy is received at the poles, where the rays strike at a steep angle.

Decades of research show storms derive their strength from this energy difference. Our observational analysis suggests the different strength of storminess in the south versus the north is likely related to two different factors.

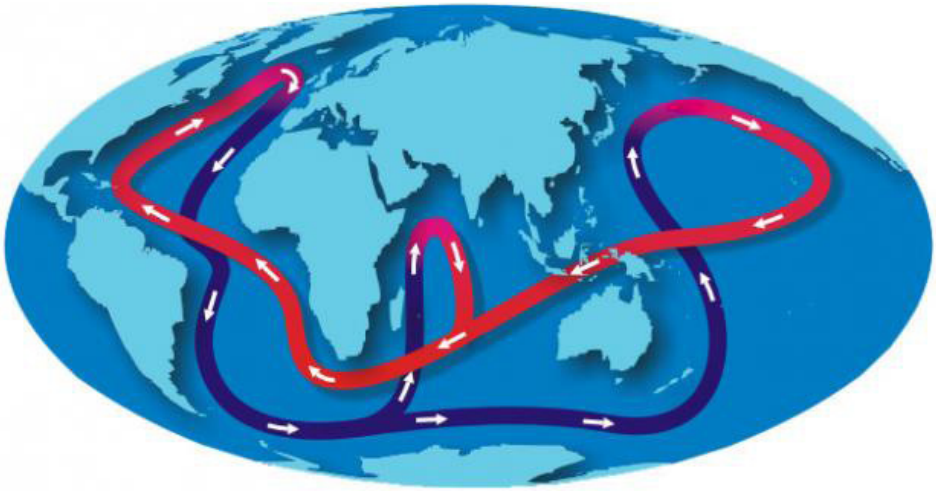
First, the transport of energy by the ocean, which is often described as a "conveyor belt". Water sinks near the Arctic, travels along the bottom of the ocean, rises up around Antarctica and flows back north along the equator – bringing energy with it. The net effect is that energy is moved away from Antarctica and toward the Arctic.

This leaves a larger energy contrast between the equator and the pole in the south than in the north, which contributes to a stormier southern hemisphere.

The second factor is the large mountains in the northern hemisphere, which suppress storms. Air flow over large mountain ranges create stationary highs and lows that leave less energy available for storms.

Source : Excerpts from guest post by Prof Tiffany Shaw (University of Chicago) on Carbon Brief

https://www.carbonbrief.org/guest-post-why-the-southern-hemisphere-is-stormier-than-the-northern/



WITT RENEWABLE ENERGY COURSES

Stand Alone Power Systems: Design and Installation

Stand Alone Power Systems (SAPS) can be a viable option for many applications, from a remote monitoring station to an off-grid household right up to village electrification.

For the reliable, long-term supply of power to off-grid users, electrical workers involved with these systems fully understand the operating theory and safety requirements in order to design and install safe and effective systems, as well as adequately manage customer expectations.

This course builds upon the basic knowledge provided in Grid-Connected Photovoltaic Systems and expands upon that in Grid-Connected Battery Systems.

Course Structure

The delivery of this course is designed for busy tradespeople who do not have the time to attend lengthy face-to-face courses. The online component is fully flexible to allow students to complete the theory in their own time.

- Pre-course learning: Online self-directed learning at your own pace, with tutor support (100 hours).
- Three day course at the WITT Te Pūkenga Infrastructure Park, New Plymouth (24 hours).
- Post-course assignment (16 hours).

With successful completion of the course, the applicant achieves the following micro-credential: Stand Alone Power Systems: Design and Installation (20 credits).

At the end of the course participants will have the following knowledge

- Assess a site's suitability for a stand alone power system and calculate an estimated energy yield at each month of the year for the client.
- Assess a client's energy consumption, create a load versus renewable energy resource profile and estimate renewable energy percentage versus fuel generator energy [percentage.
- Determine best battery technology for a given scenario based on a variety of factors.
- Determine best mix of energy resources for a given site.
- Select appropriate components and assess their suitability.
- Design and install a stand-alone power system.
- Commission and fault-find stand-alone power systems.
- Optimise stand-alone power systems.
- Stand-alone power systems: design and installation

Topics include

- Commonly used off-grid battery chemistries and their characteristics.
- Battery charging, PWM regulators and MPPT charge controllers.
- Battery inverters, inverter/chargers, hardware differences between hybrid inverters and specifically designed off-grid capable inverters.
- AC and DC coupled battery inverter architectures.
- Cable sizing, fault level calculations and selection of protective devices.
- Balance of system components.
- Site suitability and load assessment.
- System design and yield calculations.
- Backup generators.
- Integration of multiple energy sources.
- Wind and micro-hydro generation (introductory info only).
- Applicable regulations, standards – in particular AS/NZS5033, AS/NZS4509.1 and AS/NZS4509.2, various battery standards including a look at the new AS/NZS5139 (not yet cited in Regs) and examples of lines company connection requirements in New Zealand.
- Installation, testing, commissioning and fault-finding of stand-alone power systems.
- Hazards associated with batteries and stand-alone power systems.
- Energy consumption assessment, detailed load profiling an optimisation strategies.
- Multiple scenarios where stand-alone power systems can be of use:
  - Remote monitoring and control.
  - Bach's and tiny houses.
  - Off-grid homes.
  - Off-grid workshops and industry.
  - Remote village electrification.

Who Should Attend?

- Electricians
- Electrical Engineers
- Electrical Inspectors
- N.B. Completion of Grid-Connected PV Systems: Design and Installation is a prerequisite for this course. Completion of grid-connected battery systems is highly recommended.
- All applicants must be registered electrical workers and hold a current practicing licence.

Led by Tim Francis

Tim is the trainer appointed to deliver the PV training courses at WITT Te Pūkenga, NZIHT - New Zealand School of Engineering, Energy & Infrastructure, supported by SEANZ.

Tim Francis is the Principal and Director of Southern Solar & Automation. He has a 26-year background as an electrician, initially specialising in industrial control systems and then spending the last 15 years in the Renewable Energy field as a designer/installer of both grid-connected and stand-alone PV and storage systems. Prior to moving to New Zealand in 2019, he was also engaged as a trainer in both subjects at both TAFE NSW and GSES Australia. He has advanced diplomas in Electrical Engineering (Control) and Renewable Energy and held 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 RENEWABLE ENERGY COURSES

Grid-Connected Battery Storage Systems: Design and Installation

Grid-Connected Battery Storage Systems, particularly those integrated with Grid-Connected Photovoltaic Systems, provide many valuable options to home and business owners. However it is essential that electrical workers involved with these systems fully understand the operating theory and safety requirements in order to design and install safe and effective systems, as well as adequately manage customer expectations.

This is a recommended prerequisite course for those wanting to install complete stand-alone (off-grid) systems and builds upon the basic knowledge provided in grid-connected photovoltaic systems.

Course structure

The delivery of this course is designed for busy tradespeople who do not have the time to attend lengthy face-to-face courses. The online component is fully flexible to allow students to complete the theory in their own time.

- Pre-course learning: Online self-directed learning at your own pace, with tutor support (100 hours).
- Three day course at the WITT Te Pūkenga Infrastructure Park, New Plymouth (24 hours).
- Post-course assignment (16 hours). With successful completion of the course, the applicant achieves the following NZQA framework registered micro-credential: Grid-Connected Battery Storage Systems: Design and Installation (10 credits).

At the end of the course participants will have the knowledge to:

- Assess a site's suitability for a grid-connected battery storage system and calculate an estimated energy yield for the client.
- Assess a client's energy consumption, create a load versus PV profile and recommend options to improve self-consumption of PV energy.
- Determine best battery technology for a given scenario based on a variety of factors.
- Select appropriate components and assess their suitability.
- Design and Install a grid-connected battery storage system.
- Commission and fault-find grid-connected battery storage systems.
- Optimise grid-connected battery storage systems for non-typical usages.

Topics Include

- Commonly used battery chemistries and their characteristics.
- Battery charging.
- Multi-mode (hybrid) battery inverters.
- AC and DC coupled battery inverter architectures.
- Cable sizing, fault level calculations and selection of protective devices.
- Balance of system components.
- Site suitability and load assessment.
- System design and yield calculations
- Applicable regulations, standards – in particular AS/NZS5033, AS/NZS4777.1, various battery standards including a look at the new AS/NZS5139 (not yet cited in Regs) and examples of lines company connection requirements in New Zealand.
- Installation, testing, commissioning and fault-finding of grid-connected battery storage systems
- Hazards associated with batteries and grid-connected battery storage systems.
- Energy consumption assessment, detailed load profiling and optimisation strategies.
- Multiple scenarios where grid-connected battery storage systems can be of use for:
  - Maximising self-consumption of renewable energy.
  - Short-medium duration backup power.
  - Load shifting.
  - Tariff optimisation.
  - Grid support.
  - Avoidance of need to upgrade mains for some high-power loads.
  - Single to three-phase conversion.

Who should attend?

- Electricians.
- Electrical Engineers.
- Electrical Inspectors.
- N.B. Completion of Grid-Connected PV Systems: Design and Installation is a prerequisite for this course.
- All applicants must be registered electrical workers and hold a current practicing license.

DATES AND LOCATIONS FOR COURSES

All courses held at the NZIHT/ WITT Te Pūkenga Infrastructure Park - NP

STAND ALONE POWER SYSTEMS: DESIGN & INSTALLATION

8 - 10 February 2023
Domestic fees: $1,200*
International fees: $3,500
Courses run subject to numbers

GRID CONNECTED STORAGE SYSTEMS: DESIGN & INSTALLATION

13 - 15 February 2023
Domestic fees $600*
International fees $1,750
Courses run subject to numbers

* Applicants must supply a verified copy of either their NZ Passport or NZ Birth Certificate

For further information please contact the Programme Manager:

Jan Kivell
06 759 7065 ext 3708
jan@nziht.co.nz

Study options include:

Bachelor of Engineering Technology
(Mechanical/Civil, Level 7)

The Bachelor of Engineering Technology (BEngTech) is a three-year engineering degree, where students develop the capability to analyse and implement solutions to real-life, practical situations. It teaches students to understand and apply engineering science knowledge and provides a pathway into engineering, construction and related manufacturing industries. Students choose to major in civil or mechanical engineering. Graduates meet an industry demand for people who can actively apply engineering knowledge and integrate that knowledge into high level practical situations.

Job prospects for civil engineers
www.careers.govt.nz/jobs-database

Earn $60K-$70K a year
Engineering technicians/draughtspeople with one to four years' experience usually earn $50K-$70K per year. Senior civil engineers usually earn $120K-$180K per year.

Good job opportunities
Chances of getting a job as a civil engineer are good due to a shortage of workers.

Enrolment info@witt.ac.nz
Fees $7,312 (one year fulltime)
$914 (per paper)

NZ Certificate in Infrastructure Works
(Level 2 and 3)

The purpose of this qualification is to provide the infrastructure industry with people who have relevant knowledge and skills that can be applied to a range of infrastructure works processes. It is the cornerstone qualification for those graduates wanting to move into an infrastructure career pathway. Graduates of this qualification are able to carry out infrastructure works operations safely and to a quality standard in a variety of infrastructure work contexts. This programme can be studied part-time while you work and full time.

Enrolment info@witt.ac.nz
Fees Fees free

Graduate Diploma in Engineering
(Highways, Level 7)

This programme is designed to give those that have engineering qualifications a chance to gain technical knowledge in highway engineering and general knowledge of applied management. The goal is to provide the technical and management skills to function at middle management level.

Enrolment info@witt.ac.nz
Fees $6,970 (one year fulltime)
$871 (per paper)

NZ Diploma in Engineering
(Mechanical/Civil, Level 6)

This internationally recognised diploma gives students the knowledge and skills required of an engineering technician. You'll learn to apply theoretical and technical knowledge to practical situations and demonstrate the necessary strategies to work safely and effectively with contractors, communities, clients and authorities. Pathways include progressing to Bachelor of Engineering Technology.

Job prospects for engineering technicians
www.careers.govt.nz/jobs-database

Earn $50K-$70K a year
Engineering technicians/draughtspeople with one to four years' experience usually earn $50K-$70K per year.

Good job opportunities
Chances of getting a job as an engineering technician/ draughtsperson are good due to a shortage of workers.

Enrolment info@witt.ac.nz
Fees $7,256

Introduction to Engineering Maths
(Level 3)

Build your mathematic skills and knowledge in an engineering context. This training scheme provides a pathway for students to meet the entry criteria for the NZ Diploma in Engineering.

Enrolment info@witt.ac.nz
Fees Fees free

WITT's extensive range of qualifications includes more than 60 options with study pathways that include postgraduate study and bachelor's degrees through to diplomas, certificates and micro-credentials that can be completed part-time or full-time.

Click here for further information