

ENERGY EDUCATION

Mauri mahi, mauri ora

ENERGY NEWS FROM THE REGION, COUNTRY AND WORLD | MAY/JUNE 2022



What is the energy trilemma?

WITT is becoming a 'test-bed' to develop a more renewable, lower emissions energy system that can be developed in its campus and similar ones like it. Therefore understanding what a 'healthy' energy system is, is important. Not just for WITT, but for companies and consumers all over Aotearoa New Zealand.

Healthy energy systems are secure, equitable and environmentally sustainable, showing a carefully managed balanced trilemma between the three dimensions.

Maintaining this balance in context of rapid transition to decentralised, decarbonised

and digital systems is challenging with the risk of passive trade-offs between equally critical priorities.

Energy leaders need to manage the competing demands of the energy trilemma. The World Energy Trilemma Index is an annual measurement of national energy system performances across each of the three trilemma dimensions:

Energy security

Energy Security measures a nation's capacity to meet current and future energy demand reliably, withstand and bounce back swiftly from system shocks with minimal disruption to supplies. The dimension covers the

effectiveness of management of domestic and external energy sources, as well as the reliability and resilience of energy infrastructure.

Energy equity

Energy Equity assesses a country's ability to provide universal access to reliable, affordable, and abundant energy for domestic and commercial use. The dimension captures basic access to electricity and clean cooking fuels and technologies, access to prosperity-enabling levels of energy consumption, and affordability of electricity, and fuel.

Continued over page



ENERGY EDUCATION

Mauri mahi, mauri ora
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WITT's Solar Energy Course (19-21 July)

- Grid-connected PV Systems, Design & Install (Microcredential Course 19-21 July / NPL).
- Grid-connected Battery Storage Systems, Design & Install (Microcredential course - date to be confirmed).
- Stand-alone Power Systems, Design & Install (Microcredential course - date to be confirmed).

New solar energy training courses to help equip New Zealand for the transition into clean energy are now being offered at WITT. Targeted at qualified electricians throughout New Zealand, these 10-credit NZQA approved micro-credentials solar energy courses will be delivered in blocks (three to four days face-to-face) in New Plymouth with the remaining learning taking place either side of the block learning. Participants will learn from an industry expert with more than 30 years of experience as an electrician including 15 years in the installation, design and training of solar systems throughout Australia.

Send all registered enquiries to info@witt.ac.nz or phone 0800 948 869. We will register your details and be in touch with confirmed start dates and further details for the remaining courses.

Enquire here now



Continued from page 1

Environmental sustainability

Environmental Sustainability of energy systems represents the transition of a country's energy system towards mitigating and avoiding potential environmental harm and climate change impacts. The dimension focuses on productivity and efficiency of generation, transmission and distribution, decarbonisation, and air quality.

The World Energy Trilemma Index

The index ranks energy performance of 127 countries on the three dimensions based on global and national data.

The goal of the index is to provide insights into a country's relative energy performance with regards to Energy Security, Energy Equity and Environmental Sustainability. In doing so, the index highlights a country's challenges in balancing the Energy Trilemma and opportunities for improvements in meeting energy goals now and in the future.

Index rankings provide comparisons across countries on each of the three dimensions, whilst historical indexed scores provide insights into the performance trends of each country over time.

New Zealand's grade

New Zealand has maintained its AAA grade rating and continues to rank amongst the world's top ten countries in the Energy Trilemma Index. New Zealand enjoys high levels of renewable electricity generation, most notably from hydro sources. Over the last decade, New Zealand's Energy Sustainability score has improved as thermal generators slowly retire and are replaced by geothermal and wind. However, this trend has led to a lower energy diversity which, paired with an increasing reliance on fuel imports, resulted in a decline in New Zealand's energy security score.

<https://www.worldenergy.org/transition-toolkit/world-energy-trilemma-index>

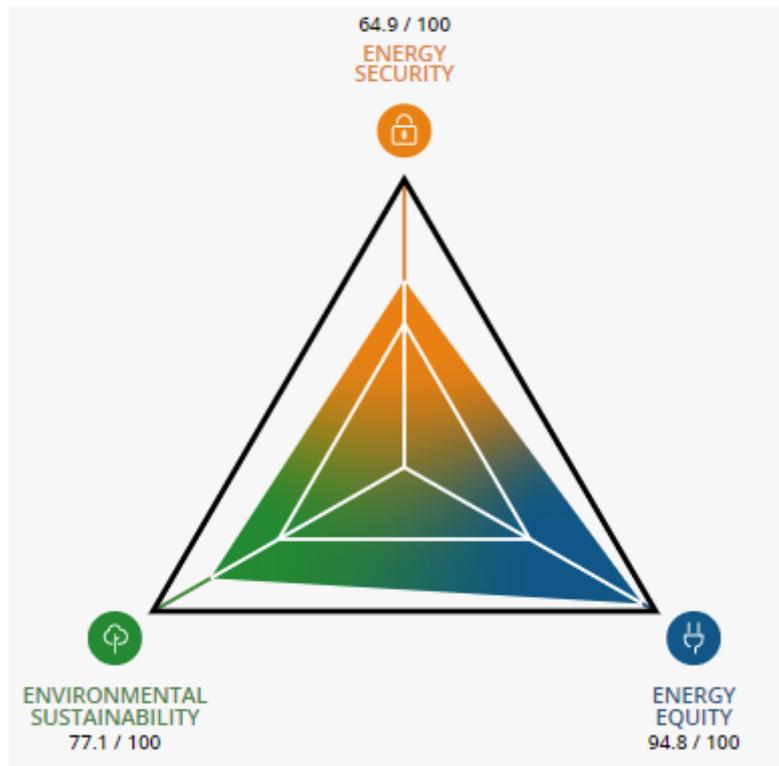
2021 Top Trilemma performers

TOP 10 RANK OVERALL PERFORMERS

1	Sweden	AAAa
2	Switzerland	AAAa
3	Denmark	AAAa
4	Finland	AAAa
4	United Kingdom	AAAa
5	France	AAAa
5	Austria	AAAa
6	Canada	AABa
7	Germany	AAAa
8	Norway	BAAa
9	New Zealand	AAAa
9	United States	AABa
10	Luxembourg	CAAa
10	Spain	ABaA



New Zealand's Performance



EVelocity returns to Taranaki

INSPIRING YOUTH

The EVelocity programme, a programme helping generate students' interest in the field of alternative and sustainable energy, returns to Taranaki in 2022.

EVelocity was brought to the region in 2021, as a result of the programme's regional partnership with WITT and, where over 60 high school students from schools around Taranaki were involved.

The EVelocity programme provides high school students with the opportunity to design and build an electric vehicle (EV) with the support of specialist mentors from WITT, to bring their creations alive and compete against their peers in the finals at the end of the year. It champions sustainability whilst inspiring young leaders to embrace careers in science, technology, engineering and mathematics, and teaching them how to use CAD design software, strength and rigidity considerations, steering, welding, drag and resistance, and

Arduino programming.

WITT and Ara Ake are back on board as EVelocity partners in 2022, alongside the Motor Trade Association, and New Zealand-based EV charging producer, Evnex.

As the education partner, WITT is providing access to the support and resources that the students require for building their EVs, including classrooms for the build days, technology for the design sessions, and hands on guidance from the staff.

This year's programme has been adjusted, and the teams will be working towards a final scrutineering in September where students will ensure their vehicles are safe and ready to race.

There are over 70 Taranaki students registered for 2022, and registrations are still open and encouraged.

The Taranaki regional finals are due to be held on Sunday 16

October, and the National Finals are scheduled for Sunday 4 December in Kartsport Hamilton.

"At WITT, students will be given an insight into a range of pathway and career options. Our tutors have created pathways and will discuss possibilities within engineering diplomas and degrees, fabrication courses, electronics and software programming that could all lead from a programme like EVelocity. The practical 'real world' focus will lead students to actively pursue this as the future opportunities are growing both locally and internationally."

Ben Naughton, WITT Director of Teaching Partnerships.



Decarbonising energy

GOVERNMENT

The drive to decarbonise industry and further accelerate preparations for a sustainable, more resilient future will get a boost from the Climate Emergency Response Fund in Budget 2022 by supercharging efforts to encourage the switch to cleaner energy options and transform the energy system.

Emissions from the energy and industry sectors make up 27 percent of New Zealand's total emissions. In response, the government is committing to significantly expanding the Government Investment in Decarbonising Industry Fund or GIDI, which sees the Government partner with major process heat energy users, helping them cut costs as well as emissions.

The government is investing around \$650 million over four years to massively increase the size of the funding available to the GIDI programme,



"The expanded programme is estimated to deliver projects that will make up around one sixth or 17 percent of our total emissions reductions required between 2022 and 2025, and around one third or 35 percent of our emissions reductions required between 2025 and 2030, so it is doing some heavy lifting for our climate goals,"

Hon Megan Woods, Minister of Energy & Resources

There will also be targeted investment at a regional level for projects that optimise low emission fuel use, funding for electricity transmission and distribution infrastructure upgrades to support fuel-switching, and the early adoption of high decarbonisation energy technologies.

The original \$69 million GIDI fund has helped fund 53 major industrial decarbonisation projects – all contracted for completion by April 2024 and over their lifetime are estimated to save 7.46 million tonnes of CO₂, equivalent to taking 134,800 cars off the road.



"The transition to clean, green energy alternatives is a key part of the Emissions Reduction Plan, fundamental to New Zealand's journey to net zero."

Hon James Shaw, Minister of Climate Change

The funding builds on substantial investment over the last four years to help businesses move over to cleaner, more affordable, more efficient energy choices. Businesses all over Aotearoa are finding that in so doing, they are able to not only cut emissions, but also improve their profitability.

The government says there is a golden opportunity to do that in a way that makes people's lives better with lower bills and warmer homes.

Budget 2022 also includes support for an energy efficient equipment scheme that will help businesses to buy and install high efficiency electrical equipment used for industrial and commercial processes.

Another component will help commercial buildings replace fossil fuel use for space and water heating, and be more energy efficient.

There is a growing list of businesses that are keen to hurry up and decarbonise their products and services, but that cash-flow can be a barrier. This will encourage businesses, including small businesses, farms and factories, to purchase equipment with the highest efficiency rather than the less efficient, cheaper alternatives.

Almost \$18 million over three years will support the transition to a low carbon economy through the development of an energy strategy, a regulatory framework for offshore renewable energy, and a roadmap for development and use of hydrogen.



The numbers

GOVERNMENT

Just over \$650 million has been allocated to decarbonising industry over the four-year Budget 2022 period (2022/23 to 2025/26), plus a pre-commitment of \$25 million across 2022/23 and 2023/24 agreed prior to Budget 2022, with the remainder (approximately \$330 million) allocated over 2026/27 and beyond.

In addition, almost \$18 million to fund the development of:

- An energy strategy,
- A regulatory framework for offshore renewable energy, and
- A roadmap for development and use of hydrogen.

In addition, approximately \$5 million to:

- Develop and implement electricity market measures that support reliable and affordable electricity supply while accelerating the transition to a highly renewable electricity system.
- Explore and facilitate public sector procurement of renewable electricity via long term power purchase agreements.

Phasing and allocation of funding to decarbonise industry

Over seven years approximately \$1 billion, to be spent:

- **\$600m** towards an expanded process heat fund, which has the potential to include (subject to

further programme design):

- Nationally available contestable funding (similar to the current GIDI fund model)
- Streamlined process for smaller projects
- Partnerships with our biggest emitters
- Enabling infrastructure and supply of low emission fuels to support decarbonisation, such as network upgrades
- Regionally targeted decarbonisation based on plans through the Regional Energy Transition Accelerator (RETA)
- Technology diffusion

- **\$40m** for commercial space and water heating decarbonisation
- **Switching** fossil fuel space and water heating to renewable energy and to be more energy efficient in the commercial sector
- **\$330m** towards assisting businesses, including small and medium businesses, to upgrade to more energy efficient equipment

These are estimates which are based on current technologies and barriers. The Energy Efficiency & Conservation Authority's policy is to invest where the money will get the best return. This can change over time.

Source: The Beehive



Click [here](#) to access Ara Ake's Energy Innovation Fund Navigator

www.araake.co.nz



MARKETS - EVIDENCE AND INSIGHTS BRANCH

ENERGY IN NEW ZEALAND

21



2020 CALENDAR YEAR

Comprehensive information on and analysis of New Zealand's energy supply, demand and prices



Click to enter Te Pūkenga's Website

Te Pūkenga

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.

Below: Fonterra's Te Awamutu plant has replaced their coal boilers with wood pellets. (below)



A joint programme between WITT & Victoria University can unlock an exciting future.

Te Kura Matatini o Taranaki, Western Institute of Technology at Taranaki (WITT) is very excited to be partnering with the Te Herenga Waka, Victoria University Wellington (VUW) to create opportunities for our rangatahi to stay in Taranaki and study while pathwaying to an exciting degree programme at Victoria University.

With doing the first year of your Engineering Degree at WITT you will enable pathways to VUW in the following:

- **Joint BEng (Hons) Programme** (see right)
- **Joint BSc Programme** (see right)



Scholarships

WITT 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 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.



Joint BEng (Hons) Programme

First year WITT, years 2-4 Victoria

- Software Engineering
- Cyber Security Engineering
- Electrical and Electronic Engineering

Joint BSc Programme

First year WITT, years 2-3 Victoria

- Computer Science
- Computer Graphics
- Games or Artificial Intelligence

RECRUITING FOR A NEW ROLE

Associate Professor Transitional Energy

We are seeking applications from talented people to teach in the field of Transitional energy. The successful applicant must be organised, knowledgeable and give us the confidence you will get the job done. Possessing credibility with industry and other key stakeholders is paramount for this role.

Western Institute of Technology at Taranaki (WITT), Te Kura Matatini

o Taranaki and Te Herenga Waka, Victoria University Wellington (VUW), are working together to promote and grow Transitional Energy capabilities within Aotearoa.

The appointment of the Associate Professor in Transitional Energy will be based at WITT in New Plymouth and will create pathway opportunities for students, with a focus on sustainable energy and

on supporting mana whenua tairā | Māori students.

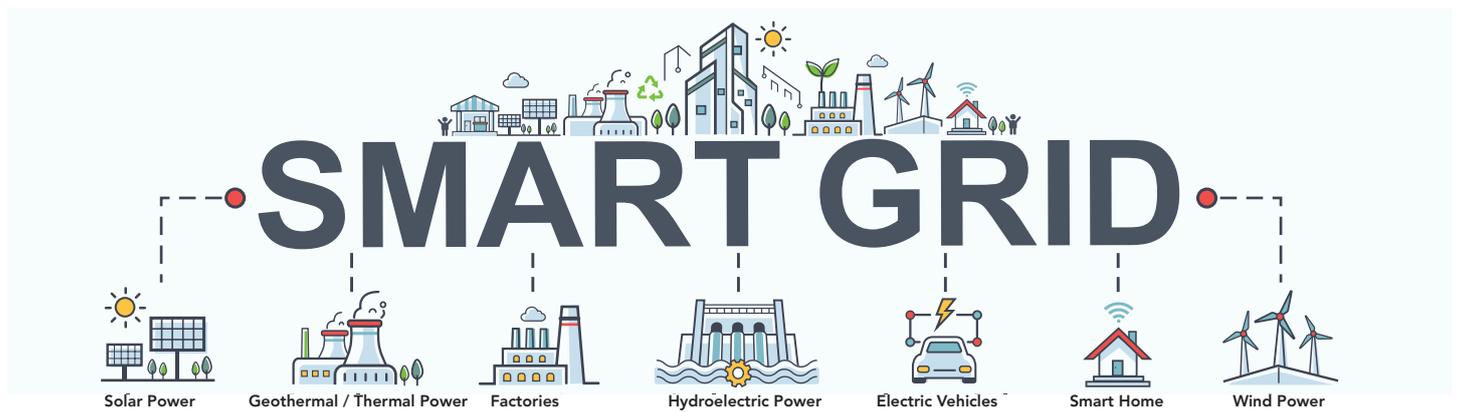
Want to know more?

If this opportunity sounds like you, please get in touch or apply via [Seek](#) before 7 June 2022.

You can get in touch with our HR team on hr@witt.ac.nz or phone

06 757 3100 ext. 8971.





Energy systems around the world are undergoing constant and radical transformation. Catchphrases like decentralization, digitalization and decarbonization have evolved from hyped buzzwords into the new reality.

The internet of things is becoming reality for energy companies, too. The combination of these two factors makes up an explosive and transformative mixture for the energy world: The traditional grid not only needs to integrate new, smart customers but also has to closely collaborate with them. This area is called the grid edge.

New Zealand Smart Grid Forum

Established in 2014, the Smart Grid Forum's new focus is to host lectures, workshops and panel discussions for the electricity industry. Since the forum was established in 2014, the context has changed. Many agencies and businesses are now actively considering smart grid issues, including a number of new advisory groups and working groups exploring the smart grid space.

A smart grid is an electricity network allowing devices to communicate between suppliers to consumers, allowing them to manage demand, protect the distribution network, save energy and reduce costs (European Commission).

One of the most valuable aspects of the forum was the platform for sharing knowledge and providing a base for coherent discussion. Therefore we will maintain this platform with lectures, workshops and panel discussions.

Smart grid developments could support emission savings

For some countries, smart grid developments provide an opportunity that has largely eluded them to date – to generate their electricity renewably, and hence reduce their emissions.

However, renewable generation is already the mainstay of New Zealand's electricity system, and we have more renewable resources that

we could develop. Because of this, the opportunities provided by smart grid developments are different here, such as:

New options for sourcing electricity:

- Supply - like solar PV – probably won't have much of an effect on our emissions, as they will largely replace one renewable technology with another.
- Flexibility – like batteries and demand response - could have a modest effect on emissions by supporting even higher penetration of renewable generation.

Developing a smart grid – by applying electronics, computing and communication technologies to electricity infrastructure - opens up new options around sourcing, using and transporting electricity.

There is a lot of excitement about what smart grids could potentially mean for society. For some countries, smart grid developments are a key way for them to reduce emissions. This is because the 'new options' include novel ways to generate renewable electricity, and a smarter grid can

integrate larger amounts of those technologies. Without a smart grid, many countries might continue to rely heavily on coal and/or gas fired electricity generation.

Smart grid developments can support increased penetration of renewable electricity generation in New Zealand.

However, the opportunity here is small compared to many other countries, because New Zealand's electricity is already highly renewable. Eighty percent of our electricity was generated from renewable resources in 2021.

Furthermore, given our portfolio of consented grid-scale renewable projects, and the considerable experience we have with these technologies, renewable electricity generation can, and is likely to increase without relying on smart grid developments.

EV charging at the best (cheapest) time.

Electric vehicles play on this opportunity perfectly. Each petrol or diesel vehicle that is replaced with an electric vehicle will achieve some reduction in emissions - even in the absence of smart grid developments. However, smart grid developments will help to accommodate widespread adoption of electric vehicles, and ensure that they take maximum advantage of renewable electricity by charging at the best times.

The benefits of a smart grid

The key technologies that form the basis of a smart grid are electronics, computing, and communication technologies. Applying these technologies to electricity infrastructure will facilitate:

- two-way communications that allow for real-time, actionable information to flow between decision-makers and all components of the electricity system
- two-way current flows, so that electricity can flow from lower-voltage networks to higher-voltage networks, and hence help to better integrate distributed generation
- sensing and monitoring of conditions on the grid, so that parties can react in realtime, and draw on digital and remote control capabilities to provide for an automated response
- installation of energy storage devices, which will help to manage periods of congestion on networks.
- the creation of large amounts of data, and the ability to quickly analyse it, which will allow parties to automatically identify and react to opportunities for greater efficiency and improved performance, and will support new approaches to business.

These capabilities open up new options around sourcing, using and transporting electricity.

Today's energy consumers will be tomorrow's energy prosumers.

Most of us have been consuming electricity from the grid the same way for more than a century now.

A new buzzword is out on the streets signaling a growing shift in how we power our homes and communities – “prosumers.”

Simply put, a prosumer is someone who both produces and consumes energy – a shift made possible, in part, due to the rise of new connected technologies and the steady increase of more renewable power like solar and wind onto our electric grid.

This is most often accomplished through rooftop solar panels and electric vehicles. Gone are the days when electricity consumption was a one-way street. Today's electric grid is blurring the lines between power generation and consumption.

The rise of prosumers highlights one of the most exciting trends in renewable energy. These emerging technologies can help preserve the natural environment, drive economic development, and provide people with more energy choices – spurring even greater competition and innovation in the energy sector.

Sources: Sciencedirect, MBIE (Smart Grid Forum)



A new FORCE enters the energy universe

One of the most-watched Super Bowl adverts was inspired by the Star Wars movies and brought together a young boy dressed as Darth Vader and a Volkswagen Passat.

The commercial features the boy attempting to use the Force to start a washing machine and a clothes dryer, and to wake the family's pet dog and a doll. After becoming

increasingly frustrated at his failed attempts, he is startled to then discover he can start the car ...

The funny advert, soundtracked by the Imperial March music from the hit films, first appeared on YouTube in the week before its TV debut during the 2011 Super Bowl. It quickly went viral and in its first year had nearly 50 million views.

To view, click [here](https://autofile.co.nz/marque-feels-the-force).



Credit: <https://autofile.co.nz/marque-feels-the-force>

Focus sharpening on transport emissions

Transport makes up 17 percent of total emissions and has increased 76 percent since 1990.

In the first emissions reduction budget, the transport sector will get a \$1.2 billion boost, including \$569m for the Clean Car Upgrade.

The emissions reduction plan also adopts the goal of to reduce total kilometres travelled by the light vehicle fleet by 2035 by 20 percent. Targets for Auckland, Hamilton, Tauranga, Wellington, Christchurch, Whangarei, Rotorua, New Plymouth, Napier, Hastings, Palmerston North, Nelson Tasman, Queenstown and Dunedin will be finalised by the end of 2022.



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Phone 0800 948 869

Thought about a career where you can design, build and manufacture the future?



Click here for further information





Study engineering and link your career to energy, structures, manufacturing, buildings, machinery, roads, products & more.

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	\$7,120 (Full time domestic) \$885 (per paper domestic)
Start date	25 July 2022

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
Start date	25 July 2022

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	\$6,784 (Fulltime domestic) \$843 (per paper domestic)
Start date	25 July 2022

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/draughtsman are good due to a shortage of workers.

Enrolment	info@witt.ac.nz
Fees	TTAF Funded until 31 Dec 2022
Start date	25 July 2022

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