ENERGY EDUCATION

Mauri mahi, mauri ora

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

WITT
TE KURA MATATINI O TARANAKI

New Zealand nziht
School of Engineering, Energy and Infrastructure

VICTORIA UNIVERSITY OF WELLINGTON TE HERENGA WAKA

UC UNIVERSITY OF CANTERBURY
Te Whare Wānanga o Waitaha
CHRISTCHURCH NEW ZEALAND

The Future is about Infrastructure, Energy and Engineering

For New Zealand to achieve net-zero emissions by 2050, the majority of the heavy lifting in emissions reductions will be in the energy sector through the country transitioning to renewable energy.

Currently, only 30% of the energy we consume is from low emission sources. What this means is that the renewable energy sector is about to enter a development boom and associated construction jobs will be at a premium.

The Infrastructure Commission estimate that by 2024, New Zealand will need approximately 120,000 new construction jobs to meet the infrastructure requirements of our country. Many of these jobs will be in the energy sector.

It has been estimated that offshore Taranaki has enough wind to double New Zealand's electricity generation. Building and maintaining that offshore wind infrastructure offers massive opportunities to energy and engineering businesses in Taranaki. Then beyond that, skilled technicians will be required to run the new energy system.

"If floating wind turbines are to be considered then 14,000 km² of suitable area developed could deliver an additional 90 GW into the New Zealand grid. This is double New Zealand's current electricity demand and considerably greater than the energy supply that New Zealand is likely to need in 2050. The opportunity to grow offshore wind could provide large quantities of clean energy while using many of the complementary skills and resources that service the existing energy sector in Taranaki."

https://www.venture.org.nz/assets/Offshore-Wind-Discussion-Paper.pdf

WITT is offering courses in renewable energy. email info@witt.ac.nz or call 0800 948 869

ENERGY EDUCATION
Mauri mahi , mauri ora
energy@witt.ac.nz
Ph. 06 759 7065

WITT offers Solar Energy Courses in 2022

- Grid-connected Battery Storage Systems, Design & Install (Microcredential Course 1).
- Grid-connected PV Systems, Design & Install (Microcredential Course 2).
- Stand-alone Power Systems, Design & Install (Microcredential Course 3).

The above training is designed for qualified electricians throughout New Zealand and will be delivered in block course format (3-4 days face to face) in New Plymouth with the remaining of the learning being pre and post block. This training will help equip New Zealand for the transition into clean energy and support one of the solutions i.e. solar energy. This solar training is NZQA approved and successful attendees will be awarded a 10 credit micro-credential. Our trainer has 14+ years in solar installation, design and training throughout Australia. We are fortunate enough to have him now based in our beautiful country and calling New Zealand home.

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.

New Zealand nziht
School of Engineering, Energy and Infrastructure

WITT
WESTERN INSTITUTE OF TECHNOLOGY AT TARANAKI
TE KURA MATATINI O TARANAKI

New appointments to the WITT Engineering Team

Anna McMullen

New Engineering Tutor Anna McMullen is not only swapping work as a consultant structural engineer for her new role as Senior Academic Staff Member University of Canterbury/WITT, she's also swapping coastlines.

"I enjoy surfing and tramping and I am looking forward to exploring Taranaki," says McMullen.

After graduating from the University of Canterbury in 2014 with a Bachelor of Civil Engineering, Anna has spent the last seven years working in Tauranga and Queenstown as a structural engineer for top New Zealand consultancies on various residential and commercial projects.

"I've always had a passion for helping other people learn and encouraging people into STEM subjects."

As an engineering and maths kaiako Anna is looking forward to using recent industry examples to bring her teaching alive for students.

"I really enjoy calculations and problem solving, putting and applying technological knowledge to practical situations and I hope to use these skills and my industry knowledge to inspire the next generation of engineers."

Engineering is an industry that's always needed – as a society we need buildings and infrastructure and engineering is a great way to put your maths and physics skills and knowledge into practice through real life problem solving.

Anna McMullen

Aung Htut

With 20 years of experience as a mechanical engineer and project manager, Lead Engineering Tutor Aung Htut knows only too well about the importance of practical experience when it comes to learning.

"One of the strengths of WITT's engineering qualifications is the industry knowledge the tutors offer to their students to complement the theoretical component of their courses," says Htut.

Originally from Myanmar, Htut completed his Bachelor of Technology in Mechanical Engineering at the National University of Singapore and later completed a Master of Engineering in Project Management at the University of Auckland. Most recently he worked in project management but started his career in the installation of air-conditioning systems in Singapore before moving to New Zealand to study and now work.

Passionate about engineering, Htut believes you can't go wrong with an engineering qualification.

"Engineering is everywhere - wherever you go you use something that's been engineered, whatever the industry you need an engineer at some point."

Htut joined the WITT whānau in July last year and currently teaches mechanical and civil engineering students. This involves travelling to Christchurch, Palmerston North, Hamilton and Auckland to teach block foundation courses.

"WITT is more than just an employer, they treat me like family," he says.

And family is something Htut is missing as he is separated from his wife and two daughters who remain in Singapore due to COVID's travel restrictions.

Aung Htut

Unlock an Exciting Future!

Start a career in exciting fields like Cyber Security Engineering and Artificial Intelligence at WITT thanks to the new WITT-Victoria University of Wellington partnership.

The agreement between Te Herenga Waka—Victoria University of Wellington and Te Kura Matatini o Taranaki—Western Institute of Technology at Taranaki (WITT) supports joint programmes including a Bachelor of Engineering (BEng) and a Bachelor of Science (BSc) with students studying their first year at WITT and seamlessly moving to Victoria University to specialise and complete their degree.

In addition to the personal appeal of staying in Taranaki, students study in the renewable energy capital of New Zealand and have access to supportive tutors and a modern lab for simulated practicals.

"We're excited to offer an Engineering pathway at WITT that leads to exciting careers in Software Engineering, Cyber Security Engineering or Electrical and Electronic Engineering," says John Snook, CE of WITT.

Ākonga can also study towards a career in in Computer Science, Computer Graphics and Games or Artificial Intelligence at WITT by completing the first year of their three year BSc at WITT and the following two years at Victoria University of Wellington.

Email info@witt.ac.nz for futher information.

"The flexibility of being able to stay in Taranaki to complete your first year then pathway to Victoria will be very attractive to our community,"

John Snook, WITT Chief Executive

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

Fuel prices – the ups and downs

Balancing supply and demand plays a very important role in keeping prices stable.

This is true for any commodity, but especially true for liquid fuels.

In 2020 with the surge of Covid around the world, there was a massive drop off of demand for fuel, simply because economic activity essentially came to a halt, air travel was grounded and general freight travel wasn't occuring at the same level. This collapse of demand created surpluses of fuel stocks around the world, which filled all available storage and therefore those who had oil on future orders actually paid people to take it off their hads.

Back in April 2020, MarketWatch said:

"Negative prices means someone with a long position in oil would have to pay someone to take that oil off of their hands. Why would they do that? The main reason is a fear that if forced to take delivery of crude on the expiration of the May oil contract, there would be nowhere to put it as a glut of crude filled up available storage.

Negative oil prices would also seem to be a foreboding sign about the outlook for an economy kicked in the teeth by the COVID-19 pandemic. At first glance, it would also point to ever-cheaper gasoline prices at the pump — a potential positive for hard-hit consumers."

https://www.marketwatch.com/story/why-the-oil-market-just-crashed-below-0-a-barrel-4-things-investors-need-to-know-2020-04-20?mod=article_inline

In New Zealand we saw the price of petrol drop by 10%. (See graph opposite).

Around the world, in response to the collapse in demand, oil producers wound back their production. Its wasn't just a matter of turning off a valve and then turning it on again when demand increased. Oil wells aren't like your kitchen tap.

In response to a reduction in fuel uses, Nature magazine reported in January 2021 that "after rising steadily for decades, global carbon dioxide

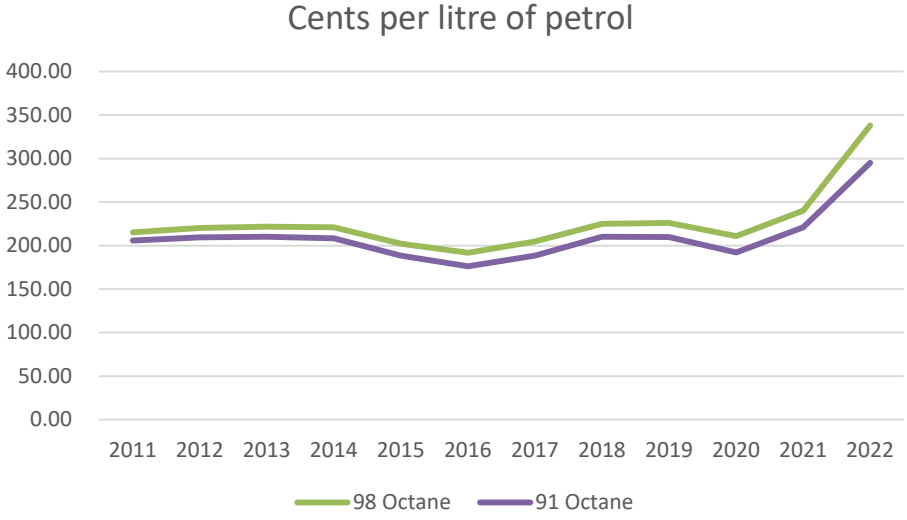
emissions fell by 6.4%, or 2.3 billion tonnes, in 2020, as the COVID-19 pandemic squelched economic and social activities worldwide, according to new data on daily fossil fuel emissions.

https://www.nature.com/articles/d41586-021-00090-3

Then came 2021, demand increased faster than oil could be supplied to refineries. Supply not meeting demand only means one thing for prices. Upward.

And now war. The Russian-Ukrainian war has increased volitility as international sanctions have come on Russia, who produce 8.4% of the world's crude oil. Not only did the USA say not one drop of Russian oil will go through their pipelines, but in retaliation Russia announced a freeze on all oil exports, so the global supply of oil has dropped by 8.4% when there was already a shortage.

Liquid fuels will be more scarce and consequently higher priced. Economic pain (increases in the cost of living and economic retractions) will be felt globablly. It is a wake up call for everyone to understand how dependent the world is on energy.



2011-2021 data from MBIE "Nominal annual average fuel prices."
2022 data quoted from 1news.co.nz

https://www.mbie.govt.nz/building-and-energy/energy-and-natural-resources/energy-statistics-and-modelling/energy-statistics/energy-prices/

https://www.1news.co.nz/2022/03/11/absolute-potential-petrol-prices-could-rise-further-economist/

Fuel Security assured: New Zealand supports global action to ease pressure on global fuel prices

New Zealand is a member of the International Energy Agency which requires member countries to hold 90 days of reserves in case of global disruptions through such things as wars.

The Energy and Resources Minister Dr Megan Woods has joined her International Energy Agency (IEA) counterparts to condemn Russia's invasion of Ukraine and agreed to measures to ease uncertainty about what it means for global energy supply and prices.

Megan Woods took part in a special meeting of Energy Ministers from the 30 member countries of the Agency IEA on 2 March.

Dr Woods agreed to contribute to a voluntary release of 60 million barrels of oil from global emergency stocks held by IEA members to ease uncertainty in the market. A process is now underway to determine what voluntary contributions member countries can make.

Members of the IEA are required to hold stocks equivalent to at least 90 days of net oil imports. New Zealand buys emergency reserve stocks that are held offshore so it can contribute to stabilisation of world energy markets.

Dr Woods says world oil prices reached an eight year high of 105 US dollars per barrel in the last couple of days, adding inflationary pressures to a global economy which has already taken a hammering from COVID.

"Russia has used its position as the third largest crude oil producer in the world and the second largest oil exporter to weaponise energy, withholding oil and gas supplies to Europe in the months before the invasion contributing to pushing up oil and gas prices," Woods said.

"This crisis highlights the need to transition away from a reliance on fossil fuels, not only to meet our climate change requirements, but also to ensure future world energy security.

"In the immediate term, this collective action by IEA countries will ensure there is less volatility in oil prices, as a result of the market impact from Russia's invasion of Ukraine," Megan Woods said.

In addition to the commitment to release oil stocks, each member country is encouraged to do its utmost to prioritise Ukraine in oil products supply, and reinforce global dialogue with gas producing countries to ensure secure, affordable and reliable gas supplies, including LNG.

The IEA and Fuel Security

The global oil market remains vulnerable to a wide range of risk factors

Ensuring energy security has been at the centre of the IEA's mission since its creation in 1974, following the oil crisis in 1973. Today, the global oil market remains vulnerable to a wide range of risk factors, including natural disasters, major technical accidents, and geo-political tensions. As oil is expected to remain a major component of global energy demand for the coming decades, particularly for the transportation sector, maintaining the IEA emergency response capability will continue to remain essential.

In accordance with the Agreement on an International Energy Programme (I.E.P.), each IEA country has an obligation to hold oil stocks equivalent to at least 90 days of net oil imports and to be ready to collectively respond to severe supply disruptions affecting the global oil market. Member countries have substantial flexibility in how they meet the stockholding obligation. That can include stocks held exclusively for emergencies and stocks held for commercial purposes (both in the form of crude oil and as refined products), as well as holding stocks in other countries under bilateral agreements. Each Member country is thus able to determine how to meet their IEA stockholding commitment in the manner most appropriate to their domestic circumstances. In case of a severe oil supply disruption, IEA members may decide to release these stocks to the market as part of a collective action.

https://www.iea.org/areas-of-work/ensuring-energy-security/oil-security

New Zealand Energy Quarterly

The current edition of Energy Quarterly is for the December quarter (Q4) 2021. It was released on 10 March 2022.

The New Zealand Energy Quarterly provides quarterly data and analysis on energy supply, demand, prices and associated greenhouse gas emissions. The next Energy Quarterly will be released on 9 June 2022.

Main highlights for this quarter

- The renewable share of electricity generation was 90.7%, 6.4% higher than a year ago. This is the highest renewable share since the December quarter 1995.
- Hydro generation is 4.7% higher than in the December 2020 quarter. Hydro lake storage levels and inflows were above historical averages after above average rainfall in hydro catchment areas.
- Generation from wind was 18% higher in this quarter compared to December 2020. The increase in hydro and wind generation led to a decreased reliance on fossil fuels for electricity generation.
- Electricity generated from coal dropped by 72% in this quarter to contribute 1.3% to the share of electricity generation. The last time electricity generation from coal (in gigawatt hours) was this low was in March quarter 1997.
- 2021 had the lowest annual gas production since 2006. This was mainly driven by an ongoing decline in production from Pohokura gas field. There was also an increase in gas storage at Ahuroa storage facility.
- International fuel prices rose during the quarter, driving increases in the price of regular petrol of 31% and diesel of 50%.

The renewable share of electricity generation was 90.7%

Generation from wind was 18% higher in this quarter compared to December 2020. The increase in hydro and wind generation led to a decreased reliance on fossil fuels for electricity generation.

A massive expansion of domestic renewable energy stops wars, not just climate change.

Hans-Josef Fell at Energy Watch Group says bluntly that a massive expansion of domestic renewable energy generation over the last decade would not only have saved the planet from a future climate catastrophe, it would be stopping wars today. Firstly, 70% of Russia's state revenues come from oil, natural gas, coal and nuclear energy deals. State revenues fund its military. Secondly, an EU dependent on imports from any geopolitical adversary will always struggle to impose sanctions on it. Fell explains that if the EU cuts energy imports from Russia it cannot easily get supplies from elsewhere, leading to a further increase in prices, more inflation, economic hardship and therefore political consequences at home. Reversing dependence on imports will take time, and Europe is now paying for the lack of foresight, says Fell.

What is Molten Salt?

The U.S. Department of Energy is funding research to get the cost of Concentrated Solar Power (CSP) down to $0.05 per kWh. One key element of that research is the materials used to absorb and store the heat energy. Three categories of materials are being looked at: liquid (i.e. molten salt), particle (like sand), and gaseous. NREL is leading the molten salt research, and there are multiple challenges. The salts can corrode the storage tanks and pipes, so corrosive impurities must be removed. Different salts must be investigated. Commercial molten salt systems use nitrate salts, but these start to degrade above a certain temperature. So chloride salts could be a better alternative, though these salts must be stable at high temperatures (they only liquefy at over 400°C). The research into optimising molten salts for heat storage can be used in other applications, including solar fuel synthesis, high-temperature fuel cells, and the nuclear industry.

Reducing emissions as well as reducing poverty

One criticism of the energy transition is that efforts made by the rich world will be negated by the rise in wealth and consumption in the developing world. A new study puts figures on that expected increase in emissions. Eradicating all "extreme poverty" – by raising hundreds of millions above the US$1.90 per day threshold – would drive up global carbon emissions by less than 1%. Lifting 3.6 billion people over the poverty line of US$5.50 per day would increase global emissions by 18%. When you consider that the average carbon footprint in the top 1% of emitters is over 75-times higher than that in the bottom 50%, it's not hard to conclude that any emissions rise by the poorest can be more than reversed by the richest emitting less.

All three excerptes are from EnergyPost.EU

Emission Targets Likely to be Missed

A third of New Zealand businesses are set to miss their 2050 net zero carbon targets, putting in doubt the Government's ability to reach its own goal, according to a new report.

The Government passed the Zero Carbon Bill in 2019 which enshrined into law its target for zero net carbon emissions by 2050. The targets aim to keep global warming to within 1.5C by 2050.

But 32 per cent of businesses with more than 20 employees were on track to miss the 2050 target, according to research led by Dr Chris Brauer, director of innovation at Goldsmiths, University of London, and commissioned by Microsoft.

Given 97 per cent of New Zealand businesses are smaller than 20 employees and less well resourced, the numbers that would miss the target are likely to be much higher, it said

Stuff.co.nz

Global carbon dioxide (CO2) emissions rebounded

Global carbon dioxide (CO2) emissions from fossil fuels and cement have rebounded by 4.9% this year, new estimates suggest, following a Covid-related dip of 5.4% in 2020

The Global Carbon Project (GCP) projects that fossil emissions in 2021 will reach 36.4bn tonnes of CO2 (GtCO2), only 0.8% below their pre-pandemic high of 36.7GtCO2 in 2019.

The researchers say they "were expecting some sort of rebound in 2021" as the global economy bounced back from Covid-19, but that it was "bigger than expected".

While fossil emissions are expected to return to near-record levels, the study also reassesses historical emissions from land-use change, revealing that global CO2 output overall may have been effectively flat over the past decade.

Carbon Brief

Russia-Ukraine war could speed up 'renewable revolution'

Global renewable energy adoption such as green hydrogen could speed up as a result of Russia's war on Ukraine, according to a Sydney University energy and decarbonisation expert.

Professor Jun Huang from the school of chemical and bimolecular engineering says the crisis may quickly wean the European Union off fossil resources, fast-tracking the development of homegrown industries and renewable energy imports. According to the International Energy Agency (IEA), Russia is the world's third largest oil producer and the second largest crude oil exporter behind Saudi Arabia.

World oil prices reached an eight year high of US$105 per barrel in the last couple of days and are still climbing, adding to inflationary pressures.

The issue could be a strong motivation for the region to develop local renewable energy capacity, as well as move to reliable suppliers, like Australia's green hydrogen, he says.

EVs and Beyond

Observer Status Granted to Energy Resources Aotearoa

Energy Resources Aotearoa is proud to have been granted Observer Status with the United Nations Framework Convention on Climate Change (UNFCCC).

"This reflects the New Zealand energy sector's commitment to the net zero transition and our role in making it happen," says chief executive John Carnegie.

"It's also an important endorsement of our involvement in developing good policy. There is widespread agreement on the need to lower emissions, but the best ways to do that require careful thought to avoid unintended harm.

"Fuels like oil and gas will play a key role in keeping energy affordable and reliable as we develop new energy sources and new ways of using energy."

Observer status gives Energy Resources Aotearoa the right to attend important events such as Conference of the Parties (COP) events.

Energy Resources Aotearoa

Genesis and Westpac NZ sign a $100m Sustainability Linked Loan with market-leading emissions reduction targets

Genesis Energy will be required to meet ambitious carbon emission reduction targets if it's to avoid penalties under a Sustainability-Linked Loan agreed with Westpac New Zealand. The $100m loan financially incentivises Genesis to meet sustainability targets, which include reductions across all scopes of emissions, ramping up renewable energy generation, and a future of work programme. Genesis will pay a lower interest rate on the loan for achieving its goals but will have to pay higher interest if it falls short of its commitments.

Genesis

Transpower inviting proposals to pilot renewable energy projects in Northland

Northland's sunshine and wind have helped propel the region to be considered for the country's first pilot Renewable Energy Zones consultation.

If successful, the Transpower-led pilot could see Tai Tokerau become self-sufficient in electricity over the coming years as it invests in renewable energy generation and feeding power into the national grid. That would mark a major shift from the current situation where Northlanders pay the most for power prices nationwide.

Northland's abundance of wind and solar resources was behind Transpower's decision to consider the region for the pioneering pilot, backed by lines operators Top Energy and Northpower.Most parts of Tai Tokerau receive about 2000 hours of sunshine each year and there are strong wind sites along the west coast.

Northern Advocate

WITT Builds its first solar powered Eco Education Centre

The heart of the vision

At the new extension of the TOPEC site an education centre will be constructed by WITT's Trade Academy students that will highlight our respect for and relationship with our natural environment.

This will come from drawing its electricity from renewable energy, to ecologically friendly ablution blocks, to the construction and utilisaton of a tunnel house for training and production in sustainable horticulture.

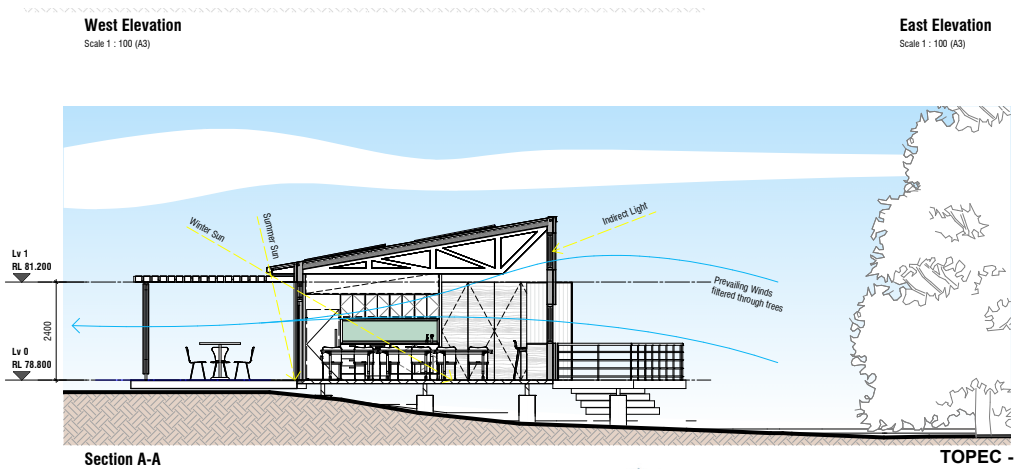
All these contribute to TOPEC/WITT goal of providing opportunities for people to enter into sustainable tourism, biodiversity and primary industry education and qualifications.

The eco education centre

The eco education centre is the launching pad for a different type of education and student. The investment in this will be felt for generations.

The projected costs for the eco classroom alone is $600,000. WITT is directly funding $200,000.

The wide project has a $1M price tag and WITT is seeking support for the balance from the philanthropic community in Taranaki. This will be an investment in the future careers of students across Taranaki, as well as an investment in the region we call home.



TOPEC - WITT Education Centre Masterplan

Concept Design
Hydro Road, Taranaki

Job No.	Scale [A3]	Drawing No.	Rev	Issue Date	Drawing Title	Print Date
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Study engineering and link your career to energy, structures, manufacturing, buildings, machinery, roads, products and more.

Study options include:

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

OVERVIEW

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 PER 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
j.warner@witt.ac.nz

FEES
$7,120 (Fulltime domestic)
$885 (per paper domestic)

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

OVERVIEW

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 PER 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
j.warner@witt.ac.nz

FEES
Free (TTAF Funded)

Introduction to Engineering Maths (Level 3)

OVERVIEW

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
j.warner@witt.ac.nz

FEES
Fees free