engineering new zealand
te ao rangahau

BRIEFING TO INCOMING MINISTERS: **ENGINEERING SKILLS SHORTAGE**

Engineers are critical for New Zealand's economy. New Zealand has a long-term shortage of engineers. This shortage will become critical if the incoming Government does not intervene. We ask Government to prioritise investment in science, technology, engineering and maths education to train up the next generation of engineers.

Each year New Zealand needs at least 2,300 new engineers to sustain our economic development. Currently, we are only graduating approximately 2,000 engineers who will work within the profession. This number is decreasing and will continue to do so without intervention. Immigration is not keeping up with the shortfall. The situation is becoming urgent and we need to collaborate with the incoming Government to drive change.

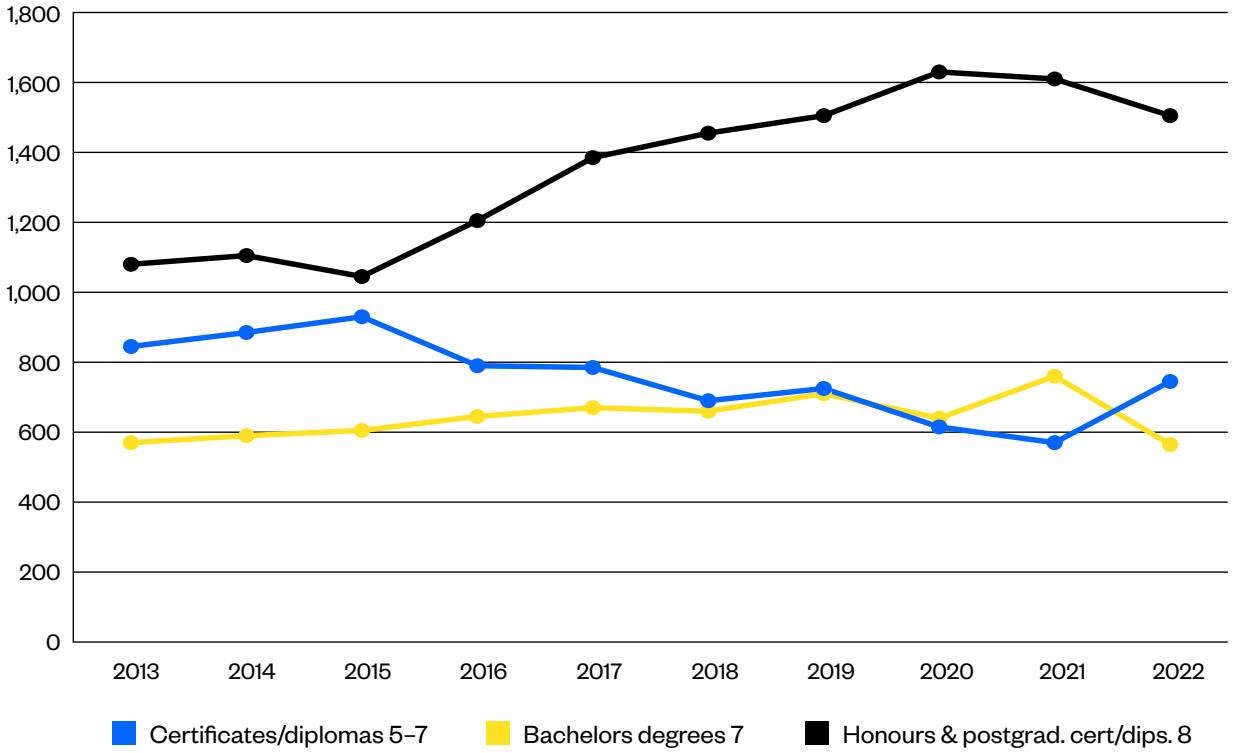
Supply of engineers is not matching demand

Engineers are critical to New Zealand's economic development. PwC research estimates we need approximately 2,300 new engineers every year to meet industry demands and support ongoing economic growth.[1] This figure does account for the impacts of attrition, retirement, family/caring responsibilities, leadership positions and others. Domestically, the number of engineering graduates has been declining since 2021, while international competition for engineering talent is increasing.

Domestic talent

New Zealand's tertiary education sector is not meeting the growing demand for engineers. The number of engineering graduates has trended up slightly over the last decade (see graph) but is not keeping pace with population increases or increased demand for engineering skills. Engineers Australia research indicates that only 73% of professional engineering graduates are available to practise onshore, with the rest taking up other occupations or leaving to work internationally. In 2022, New Zealand graduated 2,815 level 5–7 engineers.[2] If New Zealand's attrition rates are similar to Australia's (and we expect them to be higher), we are only graduating 2,055 engineers available to enter engineering practice. A skills gap is growing and will hinder our economic growth and development.

New Zealand lags behind OECD averages for the number of engineers it graduates, with professional (four-year degree) graduates making up approximately 9% of graduates.[3] The OCED average is approximately 14%.



Performance of New Zealand's education system

Engineering New Zealand has significant concerns that New Zealand's primary and secondary education system is failing to produce graduates qualified to undertake science, technology, engineering and math (STEM) careers. Our initial calculations indicate that over the last decade, the number of the National Certificate of Education (NCEA) graduates being assessed and achieving senior maths and physics papers has dropped by over 20 percent across these subjects.[4] Recent OECD Programme for International Student Assessment data shows that the performance of New Zealand 15-year-olds in maths has dropped to all-time lows.[5] Apart from the University of Canterbury, engineering schools had a drop in enrolments in 2022, with student places being vacant because either not enough students applying were suitably qualified or interested in engineering. This impacts on the ability of tertiary providers to retain their engineering programmes and has resulted in Massey University closing its engineering programmes, with the exception of food engineering.

Leadership is needed by Government to address these issues. The Ministry of Education's science curriculum currently in development does not mention physics or chemistry.[6] This failure is alarming, and we are concerned about the exposure of New Zealand students to fundamental sciences, such as energy and matter. These subjects are critical for developing future engineers.

We understand this Government is focused on raising the performance of New Zealand students in literacy and numeracy. We strongly urge you to also focus on science, technology and engineering. Our education system's success in these areas will determine New Zealand's development in the future. This will be a key point of advocacy for Engineering New Zealand into this term of Government.

Engineering New Zealand, together with key partners, is pulling together further research on the depth of the engineering skill shortage issues in New Zealand. We will provide this research to Ministers and officials, along with recommendations in the new year.

In the interim, we welcome opportunities to collaborate with Ministers and officials on options. We will continue to share our findings with Ministers.

International talent

Historically New Zealand has relied heavily on overseas trained engineers. Within infrastructure, approximately 30% of the professional services workforce (predominantly engineers) are overseas trained. Engineers feature significantly on New Zealand's long term skill shortage lists.

Over the previous Government's last term, we supported widespread changes to the immigration system. These changes have eased administration processing and sped up international recruitment of engineers. We support ongoing work with Immigration New Zealand to continually reassess visa categories and opportunities to strengthen New Zealand's position as a destination of choice for engineers. Immigration New Zealand's agility is more critical now than ever, as international demand for engineering talent continues to increase with ongoing investment in public infrastructure, a re-emergence of the demand for minerals, a global transition to clean energy and increased work responding to natural disasters, notably those caused by climate change.

Our work to address demand

Wonder Project

Students' early exposure to engineering and other STEM careers is essential for addressing the skills gap we are facing. Students need to see that they can be an engineer or a scientist or a mathematician. We need to demystify these careers by connecting students with professionals and engaging their curiosity and problem-solving abilities.

Engineering New Zealand designed the Wonder Project to connect industry to students.[7] We have three programmes (the Rocket Challenge for Year 5–6, the Power Challenge for Year 7–8 and STEM Careers for Year 7–13), with a fourth challenge around water to be piloted in 2024. Programmes are fun, hands-on, engaging and accessible so that they resonate with all, especially girls, Māori and Pacific People. Industry 'ambassadors' join classrooms and support both students and teachers through programmes. The Wonder Project has reached over 100,000 students.

The Wonder Project was previously funded through Callaghan Innovation. However, in mid-2023 funding for the programme was cut due to internal reprioritisation of resources. In an escalating skills crisis, Engineering New Zealand and the industry have stepped in to support the project to continue. We are still looking for long term financial support and would welcome an opportunity to discuss this with Ministers.

Diversity Accord

For our engineering talent pool to thrive, we must foster diversity. We've taken the first step in this in our role as a founding organisation for The Diversity Agenda – a joint initiative by Engineering New Zealand, the New Zealand Institute of Architects and ACE New Zealand, established to make engineering and architecture better professions for all.[8] The Diversity Agenda's Accord Industry Impact Report 2023 shows that more needs to be done to increase the participation of Māori, pacific peoples, and women in leadership in the engineering and architectural industry, but that industry is committed to change.[9]

We welcome the opportunity to work with Government to foster a diverse talent pool for New Zealand and how this will support the long-term skills shortage.

Next steps

Having outlined the critical nature of the increasing engineering skills gap, as well as Engineering New Zealand's work to address these challenges, we welcome the opportunity to discuss the following with Government:

1. STEM education in New Zealand – further investment and accountability is needed. Engineering New Zealand is available to support Ministers, the Ministry of Education and the Tertiary Education Council to address failings within the current system and strengthen the curriculum and accountability mechanisms.
2. Immigration settings – continued agility to respond to market demand. Engineering New Zealand is a connector between government and industry, and we are available to support ongoing reviews of immigration settings with the Ministry of Business, Innovation and Employment.
3. Wonder Project support – we would welcome a discussion about reinstating funding for this highly effective and important STEM education programme.

1 PwC. (2021). Economic impact of engineering – update. d2rjvl4n5h2b61.cloudfront.net/media/documents/Economic_impact_of_engineering_update_August_2021_Final.pdf

2 Engineers Australia. (August 2022). Strengthening the engineering workforce in Australia. www.engineersaustralia.org.au/publications/strengthening-engineering-workforce-australia

3 Engineers Australia. (August 2022). Strengthening the engineering workforce in Australia. www.engineersaustralia.org.au/publications/strengthening-engineering-workforce-australia

4 New Zealand Qualifications Authority. (2022). Secondary Statistics Consolidated Data Files for 2022. www2.nzqa.govt.nz/ncea/understanding-secondary-quals/secondary-school-stats/data-2022/

5 Radio New Zealand. (6 December 2023). NZ records worst ever PISA international test results, amid global decline. www.rnz.co.nz/news/national/504020/nz-records-worst-ever-pisa-international-test-results-amid-global-decline

6 Radio New Zealand. 5 July 2023. Teachers shocked at leaked draft of science curriculum – 'Where's the physics and chemistry?' www.rnz.co.nz/news/national/493178/teachers-shocked-at-leaked-draft-of-science-curriculum-where-s-the-physics-and-chemistry

7 Engineering New Zealand Wonder Project. 2023. Accord Industry Impact Report 2023

8 Diversity Agenda. 2023. diversityagenda.org

9 Diversity Agenda. 2023. Accord Industry Impact Report 2023