MINISTRY OF BUSINESS, INNOVATION & EMPLOYMENT
HĪKINA WHAKATUTUKI

COVERSHEET

Minister	Hon Poto Williams	Portfolio	Building and Construction
Title of Cabinet paper	**Establishing a new occupational regulatory regime for professional engineers**	**Date to be published**	31 March 2022

List of documents that have been proactively released		
Date	**Title**	**Author**
March 2022	*Establishing a new occupational regulatory regime for professional engineers*	*Office of the Minister for Building and Construction*
16 March 2022	*DEV-22-MIN-0036*	*Cabinet Office*
March 2022	*Establishing a new occupational regulator for professional engineers*	*Office of the Minister for Building and Construction*
16 March 2022	*DEV-22-MIN-0037*	*Cabinet Office*
11 February 2022	*Regulatory Impact Statement*	*MBIE*
11 November 2021	*Cost benefit analysis*	*Sapere*
March 2022	*Summary of submissions*	*MBIE*

Information redacted **NO**

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Regulatory Impact Statement: Occupational regulation of engineers

Coversheet

Purpose of Document	
Decision sought:	*Analysis produced for the purpose of informing final Cabinet decisions.*
Advising agencies:	*MBIE*
Proposing Ministers:	*Minister for Building and Construction*
Date finalised:	*11 February 2021*

Problem Definition
New Zealand has had multiple high-profile engineering incidents. In 2011, the Christchurch CTV building collapsed from the Canterbury earthquakes, killing 115 people. In response, the Canterbury Earthquakes Royal Commission of inquiry investigated the incident, citing the design engineer misrepresented his competence and was inadequately supervised by his senior engineer.[1] While many of New Zealand's engineers are professional and competent, the system for regulating the profession has significant gaps. There is no uniform regulatory regime covering engineering practitioners in New Zealand and the approach is ad hoc and largely voluntary. Engineers in most areas, including high-risk areas, are able to work outside of a regulatory regime and are not subject to disciplinary processes. The disciplinary processes under the Chartered Professional Engineers of New Zealand Act 2002 (CPEng) and Engineering New Zealand (ENZ) are not sufficient to enforce accountability. The current regulatory framework does not address market failures that exist in the market for engineering services. There is a risk that substandard engineering work will lead to catastrophic failures, harm to the public, significant economic costs, and damage to the public's confidence in the engineering sector. Asymmetric information on quality is present because it is difficult for a buyer of engineering services or consumer (ie the person using the product) of the engineering product to assess the quality of the engineering service offered before or after a purchase (eg foundations of a building or inside a piece of mechanical equipment) or to understand the risks of poor engineering. The service is not observable or able to be inspected before purchase, engineering services are by nature often complex and require considerable knowledge and skill to produce and assess, the quality of the service is difficult to assess even after it is complete, and many buyers/consumers of engineering services are not frequent buyers/consumers. The consequences of poor buying/consumer choices can be significant, as the service may be a large financial cost and a poor-quality service can cause significant harm.

There are also market failure externalities in the market for engineering services, as the consequences of poor-quality engineering services are borne significantly by third parties rather than the engineer. This includes the buyer/consumer and the broader New Zealand community.

There are some bespoke regulatory controls for specific groups of engineers. These have limited scope and are regulated under different legislative regimes. Detailed descriptions of these can be found in the Appendix One.

Executive Summary

Occupational regulation of a profession aims to protect the public from the risks of an occupation being carried out incompetently or recklessly by addressing the failures that are present in the market for the services of the occupation. MBIE consulted on reforms to occupational regulation of engineers in 2014 and 2019, but due to feedback, neither process resulted in the introduction of new occupational regulation for engineers.

In response to the feedback received during the 2019 consultation, MBIE developed a new proposal for an occupational regulatory regime for engineers, with a wider scope, encompassing all professional engineers. MBIE released a discussion document for consultation in May 2021.[2] MBIE has analysed feedback and further refined the proposal.

This RIS provides a high-level summary of the problem being addressed (summarised above), the option being proposed and its associated costs and benefits, the consultation undertaken, and the proposed arrangements for implementation and review.

The primary aim when designing an occupational regulatory regime for engineers is to:

> *Give people confidence in the engineering profession and to protect the public from harm caused by negligent, reckless, or dishonest behaviour.*

The objectives of this reform are to assess whether the status quo ensures:

- engineers provide engineering services with reasonable care and skill,
- engineers are operating within their areas and levels of expertise,
- regulation is proportionate to the risks to public safety and wellbeing, and
- engineers can be held to account for substandard work or poor behaviour.

What options are being considered?

The Ministry of Business, Innovation and Employment (MBIE) contracted Sapere Research Group (Sapere) to assess four options to regulate engineers in addition to the status quo option (these options were set out in MBIE's May 2021 discussion document). Option 5, mandatory registration and licensing for high-risk practice fields, is the preferred option.

Certification and registration provide tools to ensure the professionalism of individuals, by requiring certified or registered individuals to abide by a code of ethical conduct and imposing professional development obligations.

[2] Available at https://www.mbie.govt.nz/dmsdocument/14456-proposed-occupational-regulation-for-engineers-discussion-document

Licensing has a focus on competence. Entry is restricted to licensed individuals who must demonstrate they have the skills and knowledge to practise competently.

The five options considered were:

1. *The status quo* – retaining the current CPEng regime under the *Chartered Professional Engineers of New Zealand Act 2002* (CPEng Act) and continuing to rely on Engineering New Zealand (ENZ) enforcing standards with its members.
2. *Voluntary certification and licensing* – a new voluntary certification regime would act as a mark of quality for engineers. It would be complemented by a new licensing regime for engineers working in high-risk practice fields.
3. *License high-risk practice fields only* – engineers practising in specific high-risk practice fields would need to be licensed; other engineers would not.
4. *Licence all practice fields* – all engineers would require a licence to work in their practice field. This could mean an engineer needs to hold several licences to practise.
5. *Mandatory registration and licensing for high-risk practice field* – all professional engineers would need to be registered, and work in high-risk practice fields would be restricted to engineers with appropriate licences.

Analysis of options

First, Sapere conducted a high-level multi-criteria analysis to compare how efficient and effective each option would be in achieving the primary objectives described above.

After this analysis, the lowest scoring options were ruled out. These were: *Option 2 (voluntary certification and licensing in high-risk fields)*, and *Option 4 (licensing all practice fields)*.

Option 2 is expected to decrease the risk to public safety from engineering failure by increasing the standard of engineering in high-risk practice fields, but by only having voluntary certification for other engineers, it does not sufficiently address the problem of a large number of engineers who practise outside of a regulatory system. MBIE consulted on option in 2019 and received little support.

Option 4 addresses the underlying issues of market failure by licensing all engineers. However, it imposes high costs on all engineers, not just those in high-risk areas. All engineers would be required to demonstrate competency in their chosen field. The costs associated with this requirement was determined to be disproportionate to the benefits incurred, particularly for those engineers working in lower-risk disciplines who would be subject to the same high compliance costs as those in higher-risk areas. The cost of managing the system for the regulator will also be significant.

A detailed analysis of the two remaining options, Option 3 and Option 5, was conducted against the status quo, including a high-level scoring of benefits and costs. Benefits assessed were:

- reduced risk to the public (financial, life safety, environment)
- efficiency gain from increased continuing professional development (CPD)
- increased information on quality/risk.

Option 3 (License high-risk practice fields only) is expected to decrease the risk to public safety from engineering failure by increasing the standard of engineering in high-risk practice fields, but does not address the issues of many engineers practising outside of a regulatory regime. It therefore scores higher on benefits than the status quo option, but lower than Option 5.

Option 5 (Mandatory registration and licensing for high-risk fields) requires all professional engineers to be registered, and work in high-risk practice fields would be restricted to engineers licensed in that field. This means all engineers will practise inside a regulatory regime. The costs of this option are higher than the status quo but do not outweigh the benefits.

Option 5 is expected to best address the problem, meet the policy's objectives, and deliver the highest net benefits.

Option 3 and Option 5 were further assessed using a detailed cost-benefit analysis (CBA).

Detailed CBA

The table in Appendix Two summarises the outcomes of the CBA of the preferred option for the occupational regulation of engineers, comparing the estimated costs and benefits of Option 5 *(Mandatory registration and licensing for high-risk fields)* to those under the status quo. Detailed results and methodology underlying this analysis are provided in the CBA.

Total monetised net costs for Option 5 are $1,391 million and total monetised benefits are $1,683 million over a 25-year period. This results in a net benefit of $292 million over 25 years. In addition, significant benefits are likely to be achieved that have not been monetised, such as more lives saved and reduced environmental costs from avoided incidents. Mandatory registration and licensing of engineers practising in high-risk fields is expected to decrease the risk to public safety from engineering failure by increasing engineering standards. This risk can be large, though unpredictable and infrequent.

These potential benefits have been discussed extensively in the attached CBA report; however, a high level of uncertainty means these benefits to public safety were not included in the monetised net benefit. The actual benefits achieved are likely to be much higher than the monetised benefit set out in the CBA.

It is also important to note that the monetised net benefits estimate is sensitive to the value placed on engineers' time. If the CBA had valued all time spent by engineers at the full average engineer charge out rate, then Sapere's estimate of costs would have been significantly higher.

Limitations and Constraints on Analysis

Key assumptions of analysis:

- Full cost recovery of government's administrative costs – for the purpose of the CBA, these costs are assumed to be passed through to engineers in registration and licence fees. However, some regime establishment costs in initial years might be covered by government.
- Costs to engineers will ultimately be passed down to clients through higher prices for engineering services.
- The annual growth rate of registrants is equal to the compound annual growth rate of CPEng membership from 2017 to 2020.
- There are annual renewals of registration.

- There is a six-year phase-in period for licensing of structural, geotechnical, and fire practice areas, the areas likely to be first restricted by licensing.
- The present-value impacts are analysed over a 25-year period, with a 5 per cent discount rate.

The scope of this RIS is focused on improving the regulation of the profession in order to address the risks to the public. It has a focus on the individual practitioner and does not consider other options to reduce risks, such as product regulation.

Some engineering firms may offer support for their engineers' compliance and continued professional development (CPD) costs. However, given the uncertainty of whether support will occur – and if so, the extent of it – the CBA assumes that these costs are borne by individual engineers.

Many of the assumptions used in the CBA are a result of limited detail about the proposed regulatory scheme due to it still being in the early stages of design. Much of the framework that will drive the costs, such as registration and licensing requirements, will be set by subordinate legislation with costs becoming clearer during the implementation stage.

These details, once known, will enable costs to be estimated more accurately. To address the lack of detail at this stage of the policy process, the CBA uses a sensitivity analysis to examine the impact of key-parameter uncertainty.

Uncertainty around the number of engineers

A large uncertainty is the number of engineers operating outside of existing regimes. Lack of sufficient data means there are significant challenges to estimating an accurate number of engineers who will be covered by the regime. Sapere adopted a conservative approach by using NZ Census data on the number of engineers. Comparisons with other sources of MBIE and PwC[3] estimates suggest the Census figures are an upper-bound estimate of the number of engineers that will be covered, meaning the cost figures reported are also on the higher side than what might actually occur.

Uncertainty around the number of engineers undertaking CPD outside of existing regimes

As there are currently limited mandatory requirements for undertaking CPD, we lack information on the amount of CPD that is currently being undertaken by engineers. The CBA assumes that the level of CPD being undertaken by engineers outside of existing regulatory settings is half that of the CPEng/ENZ level. Stakeholder consultation suggests this could be a conservative assumption as there are incentives for firms to encourage staff to undertake CPD, ie to increase their standard of output. As part of their targeted consultation when developing the CBA, Sapere heard many employers have CPD requirements or encourage their employees to set aside time for professional development. Sapere takes a cautious approach in the CBA and uses a midpoint assumption, testing the impact of this assumption in sensitivity analysis.

The appropriate value for the opportunity cost of engineers' time is unclear

To estimate engineer compliance cost, the CBA assumes there is an opportunity cost in the form of billable work that CPD displaces. This assumes that there a high level of unmet

[3] PwC (2020) *Economic contribution of engineering*. Wellington: Engineering New Zealand

demand for engineering services. Given a tight labour market for engineers and their services this seems reasonable, but it is possible the opportunity cost, or some part of it, is leisure time. Therefore, the CBA uses a cost of time that averages the cost of time across working time and leisure time.		
Responsible Manager(s) (completed by relevant manager)		
Amy Moorhead Manager, Building Policy Building System Performance Ministry of Business, Innovation and Employment 11 February 2021		
Quality Assurance (completed by QA panel)		
Reviewing Agency:	MBIE	
Panel Assessment & Comment:	*MBIE's Regulatory Impact Analysis Review Panel has reviewed the attached Impact Statement prepared by MBIE. The Panel considers that the information and analysis summarised in the Impact Statement is sufficient to meet the criteria necessary for Ministers to make informed decisions on the proposals in this paper*."	

Section 1: Diagnosing the policy problem

This section outlines the background to this RIS and the current policy problem in relation to engineering in New Zealand. It describes the context of current engineering policy regulation, which is the status quo.

Context and background of the policy problem

There is currently no restriction on the title 'engineer', with the term being used for many roles outside the traditional engineering disciplines, such as steel fabricators, software programmers, and even stay-at-home parents (referring to themselves as a 'domestic engineer'). As it stands, the number of engineers practising in New Zealand is unknown. PwC estimates of traditional disciplines range from 59,400 to 87,900, while the 2018 Census states there to be 82,149.[4]

Within the profession, there are a range of practice areas. 2018 Census data includes 45 different areas, with the three most popular areas including software engineers (14,298), mechanical engineers (12,177), and civil engineers (8,430). Of these 45 areas, 21 are classed as engineering associates.

Associates are already covered under the voluntary regime provided by the Engineering Associates Act 1961 and have the ability to sign off on a limited range of work. MBIE will be looking at engineering associates separately and have not included this group within the scope of Sapere's analysis.

There are many risks inherent in the nature of engineering. The consequences of these risks tend to be high. In New Zealand, there have been multiple high-profile engineering incidents,

[4] PwC (2020) *Economic contribution of engineering*. Wellington: Engineering New Zealand

including the 2011 Christchurch CTV building collapse which killed 115 people. In response, the Canterbury Earthquakes Royal Commission of inquiry investigated the incident, citing the design engineer misrepresented his competence and was inadequately supervised by his senior engineer.[5]

The Royal Commission offered 189 recommendations, several of which were related to how engineers are regulated. This included creating a new class of engineer with specific prescribed qualifications, competencies and expertise in structural design.

In response to the Royal Commission's report, MBIE reviewed the occupational regulation of engineers in 2013 and 2014. The review found:

- the regulatory system for engineers did not ensure that commercial and multi-unit and multi-storey residential buildings were designed by people with the right knowledge, skills and competency levels,
- engineers were not always held to account when their engineering designs were substandard, and
- the regulatory system was based on self-regulation without sufficient checks and balances.

Considering the findings of the review, MBIE undertook several rounds on consultation on on the occupational regulation of engineers.

Consultation in 2014

In response to the Royal Commission's review, MBIE consulted on a proposal for the occupational regulation of engineers that would introduce greater checks and balances on the self-regulation model and restrict certain work to CPEngs registered in an appropriate practice field. MBIE received 69 submissions, predominantly from the engineering profession. Many submissions supported the proposal's objectives, agreeing with the issues identified in the consultation document. However, many supportive responses had caveats around the detail of the proposal and the need to minimise additional compliance costs. The proposal did not progress further.

Consultation in 2019

In 2019, MBIE developed and consulted on another proposal to regulate engineers, including introducing a voluntary certification process to replace the Chartered Professional Engineer (CPEng) credential,[6] a new licensing regime for high-risk work,[7] and new governance arrangements.[8] Submissions did not support the voluntary certification process, and while there was widespread support for a licensing regime, many engineers argued that other engineering disciplines (other than those categorised as high-risk) have the potential to harm public safety and therefore should be included in the new regulatory scheme.

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[5] Canterbury Earthquakes Royal Commission. (2002). Vol 6, Section 2: Canterbury Television Building (CTV).

[6] Engineers applying for certification would be required to meet prescribed competency standards that demonstrate an ability to deal with complex engineering problems, and commit to continuing professional development.

[7] Restricting who can do fire, geotechnical, and structural engineering work that is medium-to-high complexity and that has implications for life safety.

[8] A new independent regulator would be established.

New proposal for an occupational regulatory regime for engineers

In response to the feedback received during the 2019 consultation, MBIE developed a new proposal for an occupational regulatory regime for engineers, with a wider scope, encompassing all professional engineers. MBIE released a discussion document for consultation in May 2021. MBIE has analysed feedback and further refined the proposal.

This RIS provides a high-level summary of the problem being addressed, the option being proposed and its associated costs and benefits, the consultation undertaken, and the proposed arrangements for implementation and review.

The current policy setting

There is no uniform regulatory regime covering engineering practitioners in New Zealand. The approaches are ad hoc and largely voluntarily.

New Zealand has two approaches for occupational regulation of engineers: the co-regulatory approach of the *Chartered Professional Engineers of New Zealand Act 2002* and self-regulation by Engineering New Zealand (ENZ)[9] of its members. These schemes are voluntary. In addition, specific categories of engineer must be registered, licensed or certified in order to undertake certain work under various enactments.

Chartered Professional Engineer co-regulatory approach

The Chartered Professional Engineer (CPEng) credential was established as a voluntary occupational regulatory regime in 2002. CPEng is a statutory title that recognises an engineer's general competence and professionalism. The CPEng credential is administered by ENZ, with oversight from the Chartered Professional Engineers Council.

To become a CPEng, an engineer needs to demonstrate that they can deal with complex engineering problems that require specialist, New Zealand-specific knowledge and experience, and be reassessed at least every six years. An engineer must also have a Washington Accord-accredited qualification (Bachelor of Engineering (Honours)) or be able to demonstrate equivalent knowledge, which shows that the engineer can meet an international standard and must commit to the CPEng Code of Ethical Conduct.

CPEng members also have ongoing obligations. Members are required to complete a minimum of 40 hours of CPD a year, abide by the ethical code of conduct, and be subject to disciplinary processes should the need arise.

CPEngs are automatically deemed to meet the design licensing requirements for restricted building work under the Licensed Building Practitioners scheme without any further assessment.

CPEng legislative requirements

Requirements for certain work to be undertaken or signed off by a 'recognised engineer' or 'chartered professional engineer' are outlined in two Acts:

- *Building Act 2004*
  - Requirement for sign-off by a CPEng for some building work where consent is not required (section 42A)

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[9] Engineering New Zealand Te Ao Rangahau is a peak industry body. It is a not-for-profit professional body that promotes the integrity and interests of members, the profession, and the industry.

   - Requirements for dam classification (section 134B) and safety/maintenance requirements (sections 135 to 145) to be undertaken by a recognised engineer

- *Fire and Emergency New Zealand Act 2017*
   - A qualified person (section 81) in relation to any property, means any of the following persons who has the qualifications and experience suitable for valuing a property – includes a CPEng, within the Chartered Professional Engineers of New Zealand Act 2002.

The references in these Acts pertain to the title CPEng, as defined by the *Chartered Professional Engineers of New Zealand Act 2002*.

CPEng embedded in operational practice

While not required by law, many areas of work use the CPEng title as an indicator of adequate skill and professionalism. The title is used as a method to ensure work is completed to a high standard and therefore causes it to be embedded in many areas of operational practice.

Engineering New Zealand self-regulatory approach

ENZ also administers a self-regulatory system for ENZ members, so, unlike the CPEng regime, ENZ's system is not backed by legislation. Being an ENZ member is meant to demonstrate an engineer's credibility and professionalism. To become a 'member', an engineer must have:

- completed a recognised engineering or engineering geology qualification, or demonstrates knowledge through an assessment
- completed an Emerging Professional Development Programme, or has at least five years' work experience in an engineering role
- committed to the ENZ Code of Ethical Conduct and continuing professional development (CPD).

ENZ also offers membership for students and emerging professionals, and recognises more experienced engineers with their 'chartered' and 'fellow' types of membership.

Regulation of specific areas of engineering

Other regulators have developed parallel regimes to ensure engineers are competent and regulated. These include:

- Electrical engineers
- Heavy Vehicle Certifying engineers
- Aeronautical engineers
- Maritime engineers
- Recreational safety engineers
- Design verifiers.

Across each of these areas, regulation aims to ensure the competency of the engineer performing work. The risks in each area are perceived to be high enough to warrant additional regulation. Without regulation, there is an increased likelihood of poor-quality work and therefore increased risk to public safety.

Detailed descriptions of each area's legislation and requirements can be found in the Appendix One.

What is the policy problem or opportunity?

Many engineers operate outside of existing voluntary CPEng co-regulatory and ENZ self-regulatory regimes and are not captured by the specific regulatory frameworks that apply to certain types of engineer or engineering work.

Should these engineers undertake poor-quality work or display inappropriate behaviour, lack of membership in a regulatory regime (eg ENZ or CPEng) means they are not subject to accountability measures. Even if an engineer is a CPEng or ENZ member and is subject to a disciplinary process, sanctions are weak. Apart from in practice areas that require a CPEng qualification, there is no ability to prevent an engineer who has had their CPEng registration or ENZ membership suspended or revoked from practising.

New Zealand's ACC system restricts individuals suing for personal injury, which is used in other countries as a measure of accountability.

Nature of the risk

The current regulatory framework does not address market failures that exist in the market for engineering services.

Engineering services are purchased by governments, large and small business, and individual consumers. Asymmetric information on the quality of the engineering service being offered is present because it is difficult for a buyer of engineering services or consumer (ie the person using the product) of the engineering product to assess the quality of the engineering service offered before or after a purchase (eg foundations of a building or inside a piece of mechanical equipment) or understand the risks of poor engineering. Engineering defects are usually hidden, or people lack the knowledge and expertise to identify issues. The service is not observable or able to be inspected before purchase, engineering services are by nature often complex and require considerable knowledge and skill to produce and assess, the quality of the service is difficult to assess even after it is complete, and many buyers/consumers of engineering services are not frequent buyers/consumers. People inherently trust that the building they are in will withstand an earthquake, or that the machine (eg a lift in a building) they are using is safe.

The consequences of poor buying/consumer choices can be significant as the service may be a large financial cost and a poor-quality service can cause significant harm. There is a risk that substandard engineering work will lead to catastrophic failures, harm to the public, significant economic costs, and damage to the public's confidence in the engineering sector.

There are also market failure externalities in the market for engineering services, as the consequences of poor-quality engineering services are borne significantly by third parties rather than the engineer. This includes the buyer/consumer and the broader New Zealand community.

Consequences of engineering failure can include:

- Health risks: through such things as flooding of natural environment or contaminated drinking water, badly designed or 'sick' buildings (eg from poor air-conditioning, rising damp, low natural-light levels).

- Life safety risks: fatalities and injuries from the collapse or other significant failure of buildings, bridges or other structures, or through the failure of hazardous services such as gas, electricity or mechanical systems.
- Economic risks: involving financial costs such as design and construction costs, litigation costs, lost production and rectification costs.
- Environmental risks: adverse environmental effects caused by engineering failures, such as a petroleum well blow-out or a dam failure.

Impacts

There have been several high-profile engineering incidents in New Zealand that have caused significant harm. Many engineering incidents are not fully attributable to engineers and may have other significant contributing factors, but an engineering failure will have contributed to their occurrence.

- In 2011, the Christchurch CTV building collapsed during the Canterbury earthquakes, claiming 115 lives. An investigation by the Royal Commission of Inquiry found the building's design to be deficient and the building's engineer to have been working beyond his competence.[10]
- In 2016, engineering failure contributed to the contamination of Havelock North's water supply, affecting approximately 5,500 individuals and costing $21 million.
- A school structure was designed in 2019, costing $1 million to build. Structural deficiencies were identified in its design, and the school had to spend $3 million on restrengthening.[11]
- In 2020, a concrete pour twisted a beam in the construction of a Tauranga car park. Subsequent investigation found issues associated with the seismic resilience of the building. Initially commissioned at $29 million to build, the council was advised to limit losses to about $27 million to pull it down, compared to a quote of $65 million quoted to rebuild.[12]
- In 2016, five people were injured after a tuk-tuk rolled in Mt Victoria, a hilly suburb of Wellington. A mechanical engineer had earlier certified the vehicle as satisfying rollover strength and stability requirements when it did not.[13]
- One engineering firm designed 148 buildings in the Palmerston North region. The Palmerston North City Council analysed a random sample of 12 of these, finding eight of these had multiple problems. These problems included serious deficiencies in concrete panels, or steel beams that were either too small or deficient.[14,15] Anecdotal evidence suggests each building can cost in excess of $1 million each to repair.

There are also many examples of engineering failure overseas. The following examples have been used to illustrate the types of failures that can occur across different areas of engineering and the consequences that can result.

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[10] https://nzhistory.govt.nz/media/photo/ctv-building-collapse

[11] Sapere stakeholder consultation

[12] https://www.rnz.co.nz/news/national/423991/a-27m-hole-tauranga-faces-huge-bill-for-defective-carpark-building

[13] https://www.engineeringnz.org/news-insights/complaint-upheld-about-tuk-tuk-design/

[14] https://www.rnz.co.nz/news/national/401068/two-thirds-of-buildings-investigated-by-palmerston-north-city-council-may-have-structural-problems

[15] https://www.rnz.co.nz/news/national/403417/council-unable-to-identify-possible-defective-buildings-in-capital

- In 2016, BP's Deepwater Horizon drilling rig exploded, causing 11 fatalities and releasing 200 million gallons of oil into the Gulf of Mexico. While multiple failures contributed to this disaster, a failure in engineering was partially responsible.[16]
- In 2006, the De la Concorde overpass in Canada collapsed, crushing two vehicles under it, killing five people and seriously injuring six others. The Inquiry found the collapse was due to shear failure in the southeast abutment. Three engineers were named as being responsible for unprofessional work on the overpass.[17]
- In 2014, in Melbourne, the Lacrosse building caught fire. Within minutes of igniting, over 400 occupants were evacuated as the fire raced up 13 storeys via the external façade of the building. The building was clad in combustible aluminium composite cladding containing polyethylene. The builder was ordered to pay more than AUD$5.7 million to apartment owners. The Victorian Civil and Administrative Tribunal found the architect, fire engineer, and building certifier who worked on the project had breached contractual obligations and would have to pay at least $5.7 million in damages. The fire engineer was responsible for paying 39 per cent of this compensation amount.[18]
- In 2010-11, in Queensland, dam engineers released large amounts of water following extensive rainfall, to prevent the Wivenhoe Dam from collapsing. Thirty-three people died, three went missing, and 29,000 homes and businesses suffered some form of inundation. The economic cost was estimated to be in excess of $5 billion. The Queensland Floods Commission of Inquiry Report found that the manual governing operations of the dam had been breached. However, the Inquiry did not find the dam's management caused the flood, but it did find the Crime and Misconduct Commission should investigate the conduct of three engineers relating to preparation of documents and testimony to the Inquiry.[19] In 2019, the Supreme Court determined a class action and found four engineers to have failed in their duties which resulted in 23,000 properties in Brisbane and Ipswich being inundated. It has been reported that the decision has been partially settled for $440 million by some defendants but Seqwater has appealed.[20]
- In two separate incidents in 2018 and 2019, two Boeing 737 MAX passenger jets crashed minutes after take-off, together claiming nearly 350 lives. After the second incident, all 737 MAX planes were grounded worldwide. Design of the jet was found by the US Congress Committee on Transportation and Infrastructure to be marred by technical design failures, lack of transparency with both regulators and customers, and efforts to downplay or disregard concerns about the operation of the aircraft.[21]

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[16] https://www.thechemicalengineer.com/features/deepwater-horizon-as-it-happened/

[17] Commission of Inquiry into the Collapse of a Portion of the de la Concorde Overpass Report, 2007

[18] Victorian Civil and Administrative Tribunal Civil Division Building and property List VCAT Reference No. BP 350/2016.

[19] Queensland Floods Commission of Inquiry Final Report, March 2012.

[20] www.insurancenews.com.au, 1 March 2021.

[21] Final Committee Report on the Design, Development and Certification of the BOEING 737 MAX, 2020.

The current approach to occupational regulation of engineers is not adequately protecting the public

This section discusses problems with the current approach and how it does not address the market failures that are present in the market for engineering services, as discussed above:

- Many engineers are practising outside of an occupational regulatory regime.
- The public lacks information about competency to practise.
- There are few restrictions on practising in specialised fields.
- There is a lack of accountability.
- The regulation of engineers is at odds with comparable professions within New Zealand and overseas.

Many engineers are practising outside of an occupational regulatory regime

Many engineers are not subject to occupational regulation, and both CPEng and membership of Engineering New Zealand are voluntary.

There are around 4,000 engineers that are CPEng and 22,585 members of ENZ. There is a considerable degree of uncertainty about how many engineers sit outside of an occupational regulatory regime. For the CBA (supplementing this RIS), Sapere reviewed the available data sources and estimated that the total number of engineers ranged between 36,587 and 61,248 The CBA analysis focused on the upper bound number (more detail is provided on this in the supporting CBA report). Subtracting engineers that are part of ENZ and CPEng, it is estimated that between 14,804 and 39,465 engineers sit outside of an occupational regime.

Engineers that sit outside the regulatory regimes have no checks on their professionalism, qualifications or competence, and there are few means to hold these engineers to account should their standards slip.

The public lacks information about competency to practise

There are no restrictions on the use of the title ‘engineer’. Anyone can call themselves an engineer and provide engineering services (except for the specific regulated engineering areas discussed in section 1), regardless of qualification or experience. ‘Engineer’ is a title used widely, including outside traditional engineering disciplines.

The burden therefore falls on consumers of engineering services to uncover any adverse information about an engineer’s competence. An engineer’s reputation, qualifications, and experience signal their capability to provide a good quality service. However, the nature of professional engineering services can make it difficult for consumers of engineering services to determine whether an engineer is suitable. The lack of information, complexity of task, and infrequency of need causes what is essentially a problem of asymmetric information, resulting in a negative externality that falls on the consumer.

Few restrictions on practising in specialised fields

Some speciality fields pose a higher risk of significant harm to the public, eg, structural, geotechnical, or fire-safety engineering. There are no restrictions on practice or mandatory competency requirements for most types of engineer. As discussed in section 1, examples where there are restrictions include some aspects of electrical engineering, heavy vehicle engineering and amusement device certifiers.

CPEng and ENZ members have a professional obligation through the Code of Ethical Conduct to only work in their areas of competence; however, this is only enforced following a complaint. This does not provide sufficient assurance that all engineers practising in a high-risk field are competent.

Lack of accountability

Engineers that are not regulated under a specific engineers' scheme or voluntary members of CPEng or ENZ are not subject to a code of conduct, nor subject to any complaints and disciplinary processes.

Yet even if engineers are members of the voluntary schemes, the disciplinary processes are limited. CPEng engineers and ENZ must operate according to a code of conduct and are subject to disciplinary processes if standards slip. However, the regime does not have the full range of tools it needs to hold engineers to account for acting outside their competence or carrying out substandard work. A CPEng found to have performed engineering services in a negligent or incompetent manner or to have breached the code of ethics or other rules can:

- be censured,
- have their CPEng registration suspended or cancelled, and/or
- pay a maximum fine of $5,000.

There is nothing to prevent an engineer who has had their CPEng registration cancelled or suspended from continuing to provide engineering services. Instead, there is a reliance on people not engaging an engineer that has had their CPEng cancelled or suspended, or building consent authorities applying greater scrutiny to the engineer's work.

The regulation of engineers is at odds with occupational regulation of engineers in overseas jurisdictions

The absence of a broad and consistent occupational regulatory regime for engineers will mean New Zealand engineers are likely to incur additional costs of registration if they seek to work in Australia or other jurisdictions with occupational regulation of engineers (particularly if they do not hold a Washington Accord-accredited qualification). It could also diminish the reputation of the New Zealand engineering profession if it is seen as significantly out of step with overseas jurisdictions, which could impact opportunities for engineers to be employed overseas.

Many overseas jurisdictions have established or are moving towards establishing broad schemes for occupational regulation of engineers. In Australia, for example:

- Professional engineers engaged in a professional engineering service in Queensland must be registered under the *Professional Engineers Act 2002* (QLD), unless they work under the direct supervision of a Registered Professional Engineer Queensland.
- The *Design and Building Practitioners Act 2020* and *Design and Building Practitioners Regulation 2021* were established in NSW to raise the standards of building design and building work. The legislation establishes a registration scheme for Professional Engineers carrying out professional engineering work in NSW. People performing professional engineering work in following areas of engineering, who are not under direct supervision of a registered Professional Engineer, will need to be registered from 1 July 2021: civil engineering, electrical engineering, fire safety engineering, geotechnical engineering, mechanical engineering, structural engineering.

- The *Professional Engineers Registration Act 2019* was passed in the Victorian Parliament in August 2019. The Act introduces a co-regulatory scheme where, initially, five categories of engineer will be registered: civil, structural, mechanical, electrical and fire safety. Registration is expected to commence in 2021, and the scheme has been designed to be extended to other areas over time.[22]
- The Western Australian Government released a consultation paper in 2020 proposing changes to the *Building Services (Registration) Act 2011* to allow for the registration of building engineers and to introduce a code of conduct for engineers. It will also require all types of registered practitioners to work within their area of competence. The categories of engineer proposed to be registered include: civil, structural, hydraulic, mechanical, geotechnical, fire safety.[23]

What objectives are sought in relation to the policy problem?

The primary aim when designing an occupational regulatory regime for engineers is to:

> Give people confidence in the engineering profession and to protect the public from harm caused by negligent, reckless, or dishonest behaviour.

The objectives are that:

- engineers provide engineering services with reasonable care and skill,
- engineers are operating within their areas and levels of expertise,
- regulation is proportionate to the risks to public safety and wellbeing, and
- engineers can be held to account for substandard work or poor behaviour.

Section 2: Deciding upon an option to address the policy problem

What criteria will be used to compare options to the status quo?

A high-level multi-criteria analysis (MCA) was conducted by Sapere to compare options against the primary objectives described above. From this assessment, the lowest-scoring options were eliminated, being:

- Option 2 (voluntary certification and licensing in high-risk fields); and
- Option 4 (licensing all practice fields).

A more detailed analysis of the two remaining options was undertaken against the status quo, including a high-level scoring of benefits and costs. Benefits assessed are reduced risk to public (financial, life safety, environment), efficiency gain from increased CPD, and increased information on quality/risk.

Once a preferred option and an alternative option from this process was identified, a detailed cost-benefit analysis of these options was conducted, including quantitative analysis where possible.

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22 https://www.consumer.vic.gov.au/licensing-and-registration/professional-engineers

23 https://www.commerce.wa.gov.au/publications/consultation-paper-registration-building-engineers-western-australia

What options are being considered?

MBIE's discussion document considered four options to regulate engineers in addition to the status quo option:

1. **The status quo** – retaining the current CPEng regime under the *Chartered Professional Engineers of New Zealand Act 2002* (CPEng) and continuing to rely on ENZ enforcing standards with its members.
2. **Voluntary certification and licensing** – a new voluntary certification regime would act as a mark of quality for engineers. It would be complemented by a new mandatory licensing regime for engineers working in high-risk practice fields.
3. **License high-risk practice fields only** – engineers practising in specific high-risk practice fields would need to be licensed; other engineers would not.
4. **License all practice fields** – all engineers would require a licence to work in their practice field. This could mean an engineer needs to hold several licences to practise.
5. **Mandatory registration and licensing for high-risk practice field** – all professional engineers would need to be registered, and work in high-risk practice fields would be restricted to engineers with appropriate licences.

Multi-Criteria Analysis of options against objectives

Table 1 summarises each option against the objectives. Based on the results of this multi-criteria analysis, we rule out two options: *Option 2 (voluntary certification and licensing in high-risk fields)*, and *Option 4 (licensing all practice fields)*. The MCA scores are the same for Options 2, 3 and 4; however, Option 3 was assessed further because it has significantly lower costs.

Option 2 fails to sufficiently protect the public from risks to safety and wellbeing. Certified and licensed engineers will be subject to clear standards of professional behaviour, bound by a code of conduct and be committed to CPD. However, this option fails to address the problem of engineers practising outside of a regulatory system. It will only be mandatory for engineers working in high-risk areas to be licensed.

Option 4 protects the public from risks to safety and wellbeing; however, this option has a disproportionately large cost to low-risk areas of engineering and the regulator. Engineers working in lower-risk areas of engineering will be subject to the same high compliance costs as those in high-risk areas. The cost of managing the system for the regulator will also be significant.

Table 1: Multi criteria analysis: comparison of options

Scoring framework

++ much better than the status quo -- much worse than the status quo 0 about the same as the status quo

\+ better than the status quo - worse than the status quo

Objectives:	1. Status quo	2. Voluntary certification and licensing in high-risk practice fields	3. License high-risk practice fields only	4. License all practice fields	5. Mandatory registration and licensing for high-risk fields
Engineers provide engineering services with reasonable care and skill	0 Despite the voluntary regimes that are currently in place, many engineers choose to operate outside of a regulatory regime. Those that operate outside of a voluntary regime are not required to meet a prescribed standard, undertake continuing professional development (CPD) or adhere to a standard of professional behaviour (code of conduct).	+ This should result in more engineers providing services with reasonable care and skill in high-risk areas. However, there will still be a regulatory gap. Engineers practising in high-risk practice fields will need to meet a prescribed standard before being licensed, will be subject to clear expectations about standards of professional behaviour and sanctions for breaches, will be bound by a code of conduct and will be required to undertake CPD. There may be some change for engineers in lower-risk non-licensed fields, who choose to become certified. Engineers who opt in would be required to undergo a qualifications check, undertake CPD and adhere to a code of conduct. Engineers in lower-risk, non-licensed areas who choose to not be certified will not be required to undergo qualification	+ Similar to Option 2, this should result in more engineers providing services with reasonable care and skill in high-risk areas. However there will still be a regulatory gap. Engineers practising in high-risk fields will need to be licensed and subject to the requirements outlined in Option 2. Engineers in lower-risk non-licensed areas will not be required to meet a prescribed standard, undertake CPD or adhere to a code of conduct.	++ This should result in more engineers providing services with reasonable care and skill. There will be no regulatory gap. All engineers will be subject to clear expectations about standards of professional behaviour and sanctions for breaches, bound by a code of conduct and required to undertake CPD. There will be checks on qualifications and competency for all engineers.	++ This should result in more engineers providing services with reasonable care and skill. There will be no regulatory gap. All engineers, including those in lower-risk fields, will be subject to clear expectations about standards of professional behaviour and sanctions for breaches, bound by a code of conduct and required to undertake CPD. Only engineers in high-risk fields will be required to demonstrate competency, through a requirement to be licensed. Engineers in lower-risk fields will not be required demonstrate competency. In order to be registered, they would be required to undergo a qualifications check, undertake CPD and adhere to a code of conduct

Objectives:	1. Status quo	2. Voluntary certification and licensing in high-risk practice fields	3. License high-risk practice fields only	4. License all practice fields	5. Mandatory registration and licensing for high-risk fields
		check, undertake CPD or adhere to a code of conduct.			
Regulation is proportionate to the risks to public safety and wellbeing	0 The current approach does not address the problem of risks to public safety and wellbeing. People can carry out engineering services without first obtaining some form of endorsement that they meet minimum professional standards.	+ The risks to public safety and wellbeing will be reduced significantly as many of the current risks are associated with the high-risk fields. Risks in lower-risk non-licensed fields will be addressed where engineers choose to become certified. Risks in lower-risk non-licensed fields will not be addressed where engineers choose not to be certified.	+ Similar to Option 2, the risks to public safety and wellbeing will be reduced significantly as many of the current risks are associated with the high-risk fields. There is no regulation for engineers in lower-risk non-licensed fields. There are still risks in non-licensed areas that will not be addressed because they are able to work outside a regulatory regime.	-- The risks to public safety and wellbeing will be reduced significantly through licensing all engineering fields. Addressing risks to public safety and wellbeing in this way will come at a disproportionately high cost to engineers in lower-risk fields, who will be subject to the same competency checks as engineers in high-risk fields.	++ The risks to public safety and wellbeing will be reduced significantly through a combination of licensing and registration for all professional engineering services. Licensing of high-risk engineering fields means the regulation is targeted more where public safety and wellbeing is most at risk. Registration, which has fewer requirements than licensing and a lower cost for the engineers, is targeted at addressing the risks present in the lower-risk engineering fields.
Engineers are operating within their areas and levels of expertise	0 There are limited checks on a person's expertise and competence. There are limited restrictions on who can practise in both low-risk and high-risk fields, which means engineering services may be provided by people who are unqualified or who lack an adequate level of competence.	+ There will be some checks on a person's expertise and competence. There are restrictions on who can practise in high-risk fields. Engineers who want to practise in high-risk fields will be required to formally demonstrate their competence to become licensed, and demonstrate their continued competence in order to become re-licensed. Engineers in high-risk areas will also be bound by	+ Similar to Option 2, there will be some checks on a person's expertise and competence. There are restrictions on who can practise in high-risk fields. Engineers who want to practise in high-risk fields will be required to formally demonstrate their competence to become licensed, and demonstrate their continued competence in order to become re-licensed. Engineers in high-risk areas will also be bound by	++ There are checks on all persons' expertise and competence. Engineers who want to practise in any field will be required to formally demonstrate their competence to become licensed, and demonstrate their continued competence in order to become re-licensed. Engineers in all practice fields will not be allowed to work	++ There are appropriate and targeted checks on all persons' expertise and competence. There are restrictions on who can practise in high-risk fields. Engineers who want to practise in high-risk fields will be required to formally demonstrate their competence to become licensed, and demonstrate their continued competence in order to become re-licensed.

Objectives:	1. Status quo	2. Voluntary certification and licensing in high-risk practice fields	3. License high-risk practice fields only	4. License all practice fields	5. Mandatory registration and licensing for high-risk fields
		a code of conduct and subject to disciplinary incentives to sufficiently limit engineers working outside their area(s) of competence. There will be limited checks in lower-risk non-licensed fields, where engineers choose to become certified. These engineers would be bound by a code of conduct and subject to disciplinary incentives to limit engineers working outside their area(s) of competence. However, there are no checks on people's expertise or competence in lower-risk non-licensed fields, where engineers choose not to become certified. These engineers have no obligation to only practise within their area(s) of competence in lower-risk fields.	a code of conducts and subject to disciplinary incentives to sufficiently limit engineers working outside their area(s) of competence. There are no checks on people's expertise or competence in lower-risk non-licensed fields. These engineers are not prevented from providing engineering services outside their area(s) of competence.	outside their area(s) of competence.	All engineers are (though mandatory registration) bound by a code of conduct and subject to disciplinary incentives to sufficiently limit engineers working outside their area(s) of competence.
Engineers can be held to account for substandard work or poor behaviour	0 Engineers in most fields are able to work outside of a regulatory regime and are not subject to disciplinary processes. For those in a voluntary regime, the disciplinary processes under CPEng and ENZ are still not sufficient to enforce accountability. A person cannot be prevented from offering engineering services through	+ Engineers in some fields must be part of a regulatory regime and will be subject to disciplinary processes. Licensing for high-risk practice fields will hold those engineers to account for substandard work or poor behaviour. Engineers covered by licensing will be subject to a robust process to manage complaints and	+ Engineers in some fields must be part of a regulatory regime and will be subject to disciplinary processes. Licensing for high-risk practice fields will hold those engineers to account for substandard work or poor behaviour. Engineers covered by licensing will be subject to a robust process to manage complaints and	++ Engineers in all fields must be part of a regulatory regime and will be subject to disciplinary processes. All engineers are included in a regulatory regime, and will be subject to a robust process to manage complaints and discipline. Licensing will hold all engineers to account for substandard work	++ Engineers in all fields must be part of a regulatory regime and will be subject to disciplinary processes. All engineers are included in a regulatory regime, and will be subject to a robust process to manage complaints and discipline. Licensing for high-risk practice fields will hold those engineers

Objectives:	1. Status quo	2. Voluntary certification and licensing in high-risk practice fields	3. License high-risk practice fields only	4. License all practice fields	5. Mandatory registration and licensing for high-risk fields
	existing disciplinary processes despite substandard work and poor behaviour. Confidentiality around court outcomes mean information on substandard work or poor behaviour is often not public.	discipline. A licence can be suspended or cancelled through disciplinary proceedings, and the requirement to be licensed in high-risk fields means that those engineers will no longer be able to practise in those fields. It will be unlawful to carry out licensed work without holding a licence, which means those who hold themselves out to be licensed but aren't, will face consequences. Certification for lower-risk non-licensed fields will hold to account those engineers who choose to be certified. Engineers who choose to be certified will be subject to a complaints and disciplinary process for a range of matters relating to the code of conduct and CPD requirements. Engineers in lower-risk non-licensed fields who choose not to be certified will be able to work outside the regulatory regime and will not be subject to a complaints and discipline process. This also applies to engineers who have had their certification revoked or suspended as a result of disciplinary action.	discipline. A licence can be suspended or cancelled through disciplinary proceedings, and the requirement to be licensed in high-risk fields means that those engineers will no longer be able to practise in those fields. It will be unlawful to carry out licensed work without holding a licence, which means those who hold themselves out to be licensed but aren't, will face consequences. There is no requirement for engineers working in lower-risk non-licensed fields to be part of a regulatory regime. These engineers will be able to work outside the regulatory regime and will not be subject to a complaints and discipline process.	or poor behaviour. A licence can be suspended or cancelled through disciplinary proceedings, and the requirement to be licensed means that those engineers will no longer be able to practise. It will be unlawful to carry out licensed work without holding a licence, which means those who hold themselves out to be licensed but aren't face consequences.	to account for substandard work. Engineers covered by licensing will be subject to a robust process to manage complaints and discipline. A licence can be suspended or cancelled through disciplinary proceedings, and the requirement to be licensed in high-risk fields means that those engineers will no longer be able to practise in those fields. It will be unlawful to carry out licensed work without holding a licence, which means those who hold themselves out to be licensed but aren't, will face consequences. Registration for all practice fields will hold engineers to account for poor behaviour. Engineers will be subject to a complaints and disciplinary process for a range of matters relating to the code of conduct and CPD requirements. It will be unlawful to carry out professional engineering services and use the title *Registered Engineer* without being registered, which means those who hold themselves out to be registered but aren't face consequences.
Overall assessment	0	++++	++++	++++	++++++++

Descriptions and analysis

The following section examines the status quo and Options 3 and 5 in further detail against the primary objectives.

Option 1 – The status quo

Under the status quo, the CPEng regime will be maintained and ENZ will continue enforcing standards with its members. Existing industry processes will be relied upon to minimise safety risks. Engineers who are CPEng or ENZ members, or regulated under other frameworks, will continue to be subject to accountability measures through their membership organisations. However, the existing problem will not be addressed, and there will continue to be health, safety and economic risks in relation to engineering failure.

Stakeholders engaged in the consultation process broadly agree the status quo option is not adequately managing the level of risk posed by engineering work.

Analysis

Restrictions under the status quo are insufficient to ensure engineers provide a service with reasonable care and skill. The voluntary nature of the existing CPEng and ENZ membership regime, and the ad hoc nature of the different regulatory frameworks covering engineers, means many engineers are not covered by a regulatory framework. These engineers are not subject to any checks on competency or a code of conduct. In addition, disciplinary measures for engineers as part of existing regimes are limited.

Regulation under the status quo does not protect the public's safety and wellbeing. Engineers are able to produce sub-par work with limited consequences. Regulatory quality assurance is inadequate, and poor-quality work poses a risk to public safety and wellbeing. An information asymmetry exists, which means it is difficult for buyers of engineering services to understand and verify the quality of engineering services that they are buying.

The status quo does not restrict engineers from working outside their areas of expertise. In some practice areas, licensing – ie CPEng – is required; however, these areas do not cover most engineers. The limited restrictions mean work in some high-risk areas and all low-risk areas is able to be undertaken by engineers who lack the relevant expertise.

Only engineers that are part of existing regulatory regimes are able to be held to account for substandard work or poor behaviour, though these measures can be limited. In addition, many engineers work outside these regimes and therefore do not operate under a code of conduct and robust process to manage complaints and discipline.

Option 3 – License high-risk practice fields only

Under this option, all all professional engineers practising in high-risk practice fields will need to be licensed. These engineers will be subject to clear expectations about standards of professional behaviour and sanctions for breaches, bound by a code of conduct, required to undertake CPD, and subject to a robust process for managing complaints and discipline. This option addresses the problem of health, safety and economic risks from engineering failure in high-risk fields.

There is evidence of stakeholder support for a licensing regime. MBIE's 2019 consultation found widespread support for lciensing. Sapere's consultation with stakeholders confirmed this, finding a general acknowledgement of the need for licensing in high-risk engineering areas.

Analysis

Licensing will mean engineers will have to meet minimum competency standards and are subject to clear expectations about standards of professional behaviour, a code of conduct, sanctions if breached, and CPD requirements. Licensed engineers are therefore more likely to provide a service with reasonable care and skill.

The high-risk areas that require a licenced engineer will limit work in these areas to engineers with relevant expertise. These restrictions are not in place for lower risk areas of engineering. There will be no new restrictions in these areas to limit engineers working outside their areas of competence. However, stakeholder consultation suggests that even the perceived low-risk areas of engineering can pose risks.

Licensed engineers will be held to account by the regulator for substandard work or poor behaviour. Should the need arise, they will be subject to a robust process to manage complaints and discipline.

Option 5 – Mandatory registration and licensing for high-risk practice fields

Under this option, all professional engineers will be required to be registered, with licensing of engineering work in high-risk fields.

There is strong stakeholder support for this option. Consultations following MBIE's 2019 proposal supported the need for a licensing regime and mandatory registration, questioning the value in a voluntary certification process. Consultation with stakeholders suggests mandatory registration for all engineers and licensing for high-risk areas is seen as proportionate. MBIE's public consultation in 2021 supported this view, although we heard valid arguments for and against the mandatory registration of graduates (inclusion or exclusion of graduate engineers is further discussed in the CBA).

Analysis

Licensing and mandatory registration will mean engineers are subject to clear expectations about standards of professional behaviour, a code of conduct, sanctions if breached, and CPD requirements. All engineers, registered or licensed, will have incentives to provide engineering services with reasonable care and skill.

High-risk areas will be restricted to engineers that meet competency standards and hold a relevant licence.

Mandatory regulation and licensing mean all engineers will be subject to robust processes to manage complaints and discipline and can therefore be held to account for substandard work or poor behaviour.

The restrictive nature of licensing means it will incur a higher cost to establish and maintain. However, this is in the high-risk practice fields where the benefits will also be higher. Mandatory registration only for lower-risk areas is less restrictive and imposes fewer costs than licensing so is more proportionate to the level of risk.

Summary analysis of net benefits

A high-level analysis of costs and benefits of the status quo and options 3 and 5 is provided in Tables 2 and 3.

Option 3 (License high-risk practice fields only) reduces health, safety, economic and environmental risks of engineering failure in high-risk practice areas but does not address risks relating to engineers in lower-risk practice fields that are not subject to occupational regulation. This option scores higher on benefits than the status quo option, but lower than Option 5.

Option 5 (Mandatory registration and licensing for high-risk fields) reduces health, safety and economic risks of engineering failure in all areas of engineering. This means all engineers will practise inside a regulatory regime. The costs of this are considered proportionate because engineers in lower-risk areas are subject to less costly and restrictive regulation. The benefits of this option are expected to outweigh the costs.

Option 5 is expected to best address the problem, meet the policy's objectives, and deliver the highest net benefits

Option 5 *(Mandatory registration and licensing for high-risk fields)* is most likely to adequately protect the public and result in the highest net benefits. Mandatory registration and licensing will ensure all engineers are captured by an occupational regulatory regime. Licensing will restrict who can practise in specialised fields. All engineers will be subject to a robust process for complaints and discipline.

Options 3 and 5 are the two options assessed by Sapere as having higher benefits than the status quo. These two options were selected for the detailed MCA and then full cost-benefit analysis.

Benefits

Table 2: Multi-criteria benefits analysis of options 3 and 5 against the status quo

Benefits:	1. Status quo	3. License high-risk practice fields only	5. Mandatory registration and licensing for high-risk fields
Reduced risk to public (financial, life safety, environment)	0 Limited accountability mechanisms, engineers working outside their areas of expertise and poor-quality work mean there is a high level of risk to the public.	++ Increased accountability mechanisms and more stringent entry requirements will decrease the risk, and therefore the incidence of issues, of high-risk practice fields. However, there will be no change in frequency of issues for other engineers that are not licensed.	+++ Increased accountability mechanisms, more stringent entry requirements and mandatory CPD requirements will decrease the risk, and therefore the incidence of issues, of high-risk practice fields. Accountability mechanisms will appropriately lower the risk and incidence of issues in low-risk fields.
Efficiency gain from increased CPD	0 CPD requirements are limited to those in regulatory regimes. Everyone outside these regimes do not have a requirement to undertake CPD.	+ Engineers in high-risk fields will be subject to CPD requirements. The benefit is derived from improved skillsets, knowledge acquisition, retention, and application because of the additional licensed engineers now undertaking CPD. This benefit is limited to licensed engineers.	+++ All engineers will be subject to CPD requirements. Benefits are derived from improved skillsets, knowledge acquisition, retention, and application because of the additional registered or licensed engineers now undertaking CPD.
Increased information on quality/risk	0 Limited information on quality and risk. An outcome of this is councils deciding to maintain Producer Author Statement registers for engineers to help ensure quality.	+ Consumers of engineering services will be able to rely on the licensing system and information search costs should be reduced. Only licensed engineers able to practise in high-risk fields, which means there is a clear indicator of quality available. The need for Producer Author Statement registers for engineers may disappear if these standards ensure a sufficient professional standard able to sign off producer statements.	+ As per Option 3, although registration will also cover engineers not in high-risk fields. This is rated the same score as Option 3, as restrictions on who can practise in lower-risk practice fields are not expected to result in significantly higher benefits because of the lower risk level.
Overall assessment	0	++++	++++++

Costs

Table 3: Multi-criteria cost analysis of options 3 and 5 against the status quo

Costs:	**6. Status quo**	**3. License high-risk practice fields only**	**5. Mandatory registration and licensing for high-risk fields**
Registration	0 Engineers' costs will be limited to those in existing registration regimes.	0 No registration cost.	- Engineers' costs will increase. The increase above the status quo will depend on the number of engineers previously not part of a registry regime.
Licensing	0 Engineers' costs will be limited to those in existing licensing regimes.	-- Engineers' costs will increase. The increase above the status quo will depend on the additional engineers in the high-risk fields now involved in the licensing regime.	-- Engineers' costs will increase. The increase above the status quo will depend on the additional engineers in the high-risk fields now involved in the licensing regime.
Regulator	0 Costs associated with maintaining the current mix of regimes.	- Cost will be associated with the establishment and maintenance of the new licensing system. The extent of the change in these costs will depend on the regime's details.	-- Cost will be associated with the establishment and maintenance of the new regulatory system. The extent of these costs will depend on the regime's details.
Overall assessment	0	---	-----

Table 4: Multi-criteria analysis results

Benefits - Costs	0	+	++
Ranking	3	2	1

Net impacts and preferred option

The net result of each option (net benefits minus net cost) using multi-criteria analysis is provided in Table 4. Option 5 (*Mandatory registration and licensing for high-risk fields)* is ranked the highest.

What are the marginal costs and benefits of each option?

The detailed cost-benefit analysis of the options with Sapere's results are outlined below.

Comparing the two options through CBA results in a higher benefit-cost ratio for Option 3 (7.41) compared to Option 5 (1.21), a difference largely due to the small size of Option 3's denominator (net change in costs). However, Option 5 results in a larger net benefit to society, $292 million versus $202 million. In addition, the greater number of engineers covered means risk to the public is reduced significantly more with Option 5, although this is not quantifiable.

Detailed results and methodology underlying this analysis are provided in the supporting CBA document.

Option 5 (Mandatory registration and licensing for high-risk fields)

Table 5 compares the estimated costs and benefits of Option 5 to those under the status quo.

Table 5: **CBA results for Option 5 (preferred option) (25-year present value)**

Affected groups	Comment	Impact	Evidence Certainty
Additional costs of the preferred option compared to taking no action			
Engineers (CPD)	Cost to engineers from undertaking CPD, assume passed down to clients, ongoing	$1,240 million	low - medium
Regulator	Cost of administering regime, assume full cost recovery so falls on engineer who pass to clients, ongoing.	$90 million	Medium
Engineers (compliance)	Engineers' cost of compliance with regime, assume passed down to clients, ongoing.	$62 million	Low
Total monetised costs		$1,391 million	Low - medium
Additional benefits of the preferred option compared to taking no action			
Engineers	Returns to CPD, ongoing.	$1,482 million	Low - medium
Engineering clients	Reduced frequency of engineering incidents, ongoing.	$199 million	Low
BCAs / other regulators	Reduced need for independent verification of an engineer's competence. Reduces costs incurred by engineers, saving could be passed onto consumers.	$2 million	Low
Total monetised benefits		$1,683	Low

Non-monetised benefits	Reduced risk to the public from engineering incidents from engineering issues, ongoing.		Medium

Table 5 shows that Option 5 results in total (marginal) monetised costs of $1,391 million and total (marginal) monetised benefits of $1,683 million. There is an estimated net benefit to society of $292 million, or a benefit-cost ratio of 1.21.

Option 3 (Licensing high-risk fields only)

Table 6 below summarises the outcome of the cost-benefit analysis for Option 3.

Table 6: CBA results for Option 3 (25-year present value)

Affected groups	Comment	Impact	Evidence certainty
Additional costs of the preferred option compared to taking no action			
Engineers (CPD)	Cost to engineers from undertaking CPD, assume passed down to clients, ongoing.	$4 million	Low - medium
Regulator	Cost of administering regime, assume full cost recovery so falls on engineer who pass to clients, ongoing.	$27 million	Medium
Engineers (compliance)	Engineers' cost of compliance with regime, assume passed down to clients, ongoing.	$0.3 million	Low
Total monetised costs		$32 million	Low - medium
Additional benefits of the preferred option compared to taking no action			
Engineers	Returns to CPD, ongoing.	$34 million	Low - medium
Engineering clients	Reduced frequency of engineering incidents, ongoing.	$199 million	Low
BCAs / other regulators	Reduced need for independent verification of an engineer's competence. Reduces costs incurred by engineers, saving could be passed onto consumers.	$2 million	Low
Total monetised benefits		$235 million	Low
Non-monetised benefits	Reduced risk to the public from engineering incidents from engineering issues, ongoing.	Medium	

Table 6 shows that Option 3 results in in total (marginal) monetised costs of $32 million and total (marginal) monetised benefits of $235 million. There is an estimated net benefit to society of $203 million, or a benefit-cost ratio of 7.41.

Option 5 is the preferred option. Option 5 results in $89 million more of monetised benefits to society (relative to Option 3) and is expected to result in a higher level of non-monetised benefits (which relate to reduced risk to the public). The primary aim of the regime is to give people confidence in the engineering profession and to protect the public from harm caused by negligent, reckless, or dishonest behaviour, which Option 5 best achieves.

Sensitivity of results

The CBA required extensive sensitivity testing as there is uncertainty about some of the key assumptions used. As shown in the sensitivity results in Table 7, it is possible for the registration and licensing of engineers to produce a net benefit over 25 years of almost $2.7 billion or a net cost of almost $2.1 billion, depending on actual assumptions adopted. The costs associated with CPD and the current level of CPD activity is the main driver of this result. However, overall the core assumptions reflect a conservative CBA approach, being on the low side for benefits and the high side for costs.

Table 7: Sensitivity of estimates to the primary sources of uncertainty ($ millions 25-year PV)

	Worst case	Central	Best case
Status quo costs	3,490	**2,438**	605
Forecast costs	9,120	**3,829**	1,510
Net costs	5,630	**1,391**	905
Net benefit	3,561	**1,683**	3,560
Net impact	-2,069	**292**	2,655

Brief description of scenarios:

- The worst-case scenario uses the highest opportunity cost of time ($116 per hour), assumes no CPD outside of ENZ, the lowest cost of CPD activities, the upper range of registration costs, and the low discount rate of 4 per cent.
- The central scenario uses the central opportunity cost of time ($51 per hour), 20 hours of CPD outside of ENZ, the midpoint for the cost of CPD activities, and the central discount rate of 5 per cent.
- The best-case scenario uses the lowest opportunity cost of time ($10 per hour), no CPD outside of ENZ, the low cost of CPD activities, the upper range of registration costs, and the low discount rate of 4 per cent.

These scenarios result in a spread of $2.9 billion in status quo costs, $7.6 billion in forecast costs, and $4.7 billion in net costs. Although there is a spread of $1.9 billion in net benefits, the low and high estimates are within one million of each other. This small difference arises from using the assumptions of no CPD done outside of ENZ, low cost of CPD activities, and the four per cent discount rates across both the worst- and best-case scenarios – assumptions that generate the largest range in net impact. The $4.7 billion spread in net impacts is therefore primarily driven by changes in net costs, which largely reflects the uncertainty in our estimation.

Conclusion

Total monetised net costs for Option 5 (*Mandatory registration and licensing for high-risk fields)* are $1,391 million and total monetised benefits are $1,683 million over a 25-year period. This results in a net benefit of $292 million. In addition, there are significant benefits likely to be achieved that have not been monetised, such as lives saved and reduced environmental costs from avoided incidents.

Mandatory registration and licensing for high-risk fields is expected to decrease the risk to public safety from engineering failures by increasing the quality of engineering services. This risk to public life safety can be large, though engineering failure is unpredictable and infrequent. Although Sapere discussed potential benefits extensively in their report (attached to this RIS), a high level of uncertainty means they have not included it in the monetised net benefit. The benefits are therefore likely to be much higher than the monetised benefit.

It is also important to note that the monetised net-benefits estimate is sensitive to the value placed on engineers' time. If the CBA had valued all time spent by engineers at the full average engineer charge-out rate, the estimate of costs will be significantly higher.

High level case for recovering ongoing administration costs through fees and levies

This section of the RIS discusses the proposal to fully recover the ongoing costs of registering and licensing engineers under the proposed new regime. MBIE proposes that the new Act includes authority to set fees and levies in regulations to recover the costs to the regulator of exercising its statutory functions as they relate to registering and licensing engineers and engineering associates.

Policy rationale for cost recovery: why a user charge appropriate, and what type of charge is appropriate?

The primary goods or services that will be provided by the new regime are:

- Registration as a registered engineer or registered engineering associate (ie ability to legally use this title)
- Licensing as a licensed engineer in a particular licence class (ie the ability to legally practice restricted work).

MBIE considers that registration and licenses are primarily private goods as:

- they are issued only to a particular individual as recognition that the individual meets minimum standards
- the person registered or licensed benefits directly from being registered or licensed.

While a registration and licensing regime has benefits to related sectors and to the public, the registered or licensed person can pass some of the cost of registration and licensing onto their customers/employer through charging for their services or being paid a salary.

Full cost recovery by the regulator is consistent with other regulated occupations in the building and construction sector, where users of the scheme obtain a licence or registration and pay the fees and levies required to maintain the scheme.

It is proposed that the Act will authorise two types of charges: fees and levies.

MBIE envisions that fees will be sufficient to recover the costs of assessing and approving registration and licenses. We expect the fees will be predictable, and directly linked to the product that the person paying the fee receives.

MBIE envisions that a levy, or levies, will be appropriate to recover the costs where the cost drivers are not directly linked to those who receive the benefit of the activity. These activities could include the complaints and discipline functions (eg investigations) and costs of governing the regime (eg Board's operating costs).

All registered or licensed people will benefit from a well-governed regime and from public confidence in registration and licensing being upheld. However, the costs of ensuring these benefits occur are not easily attributed to individuals. They are also less predictable than for registration and licensing – in particular, the costs of investigating and hearing complaints will fluctuate depending on the volume and nature of disciplinary issues.

MBIE's proposed approach would be consistent with the approach taken to fees and levies under the *Building Act 2004* for recovering the costs of the Licensed Building Practitioners scheme.

High level cost components

At this early stage in the policy process MBIE has not analysed estimated charge levels. This will be undertaken as part of a separate policy process for setting fees and levies through regulations. We will complete a Stage 2 Cost Recovery Impact Analysis for any proposed fees and levies.

The table below outlines the main cost drivers for the activity, outputs and business processes used to produce those outputs.

Activity	Output	Cost drivers
Registering engineers: these costs are likely to be appropriate for recovery through fees (initial application fees and fees for renewals)	Determine initial applications	One-off qualification check and check any declaration of meeting minimum standards (fit and proper person test)
	Renewing registration	Review ongoing eligibility Verify, audit CPD Collect fees
	Maintain Register	Update information
Licensing engineers: these costs are likely to be appropriate for recovery through fees (initial application fees and fees for renewals)	Assess initial competence	Assessment process eg interviews, reviewing work, contact referees. Technical expertise eg independent assessors
	Assess competence and eligibility for renewal	
	Audit competence	
Complaints and discipline: these costs may be better recovered through a levy paid by all practitioners	Triage complaints	Complaints Officer assessment
	Investigation	Investigation resources
	Disciplinary hearings	Committee members' time External technical advice/evidence Secretariat/hearing costs
Scheme governance: these costs may be better recovered through a levy paid by all practitioners	Board meetings	Remuneration and expenses
	Monitoring the regulator and reporting to Minister on performance	Board and secretariat time
Overheads: further analysis required when setting charge levels to identify how these costs can be attributed.	Occupancy, IT system, website, communications with registered/licensed people and other scheme users, accounting and audit costs, legal etc.	

Section 3: Delivering an option

How will the new arrangements be implemented?

This section details how mandatory registration and licensing of high-risk fields can be given effect. Specifically, it outlines key challenges and risks that will need to be managed for this regulation to be feasible. As this RIS is for an in-principle decision, the details of the regulation are not yet clear and the following section is an indication of the implementation arrangements.

It will take time to establish the regime

MBIE estimates that a transition period to establish the regime in full could take up to six years from when enabling legislation is passed.

Currently, it is proposed that ENZ continues to administer the CPEng regime during this transition period, with oversight from the Chartered Professional Engineers Council (CPEC) to allow the new regulator to focus on establishing the registration and licensing regime.

Some of the actions to be completed during this transition period include:

- establishing governance arrangements,
- developing a code of conduct and setting expectations for CPD,
- recruiting any additional staff needed to administer the regime,
- developing and implementing processes and systems,
- developing regulations to set licensing classes, and the fees and levies for registration and licensing,
- developing and approving the competency standards and rules for licensing, and ensuring compliance with existing mutual recognition arrangements,
- developing assessment processes and systems, and recruiting assessors, and
- receiving and assessing applications for registration and licensing.

Automatic deeming some engineers as being registered or licensed

Provisions would be included in the Act to transition engineers onto the register if they have already demonstrated they meet eligibility. For example, if eligibility for registration is dependent only on a professional qualification, then current CPEng and members of ENZ have already demonstrated that they satisfy that requirement.

Likewise for licensing, the regulator may choose to recognise a practitioner’s experience in lieu of meeting other eligibility criteria.

These would be transitional arrangements and would not affect the requirement for an engineer to make an annual statement of compliance with the code of ethical conduct and continuing professional development obligations.

MBIE’s public consultation and Sapere’s targeted consultation with stakeholders yielded several suggestions and considerations for the automatic transfer of engineers to the new schemes:

- Appropriate grandfathering – care will need to be taken to balance the risk of carrying through issues from the current setting with the risk of unnecessary compliance costs for engineers in already competent schemes.
- Appropriate mutual recognition – mutual recognition with international schemes will need to be managed effectively so that international mobility is not decreased unnecessarily.

The future of the Chartered Professional Engineers regime

MBIE proposes the disestablishment of the CPEng regime in favour of the new registration and licensing regime. Licensing will be the new benchmark for competent and experienced engineers working in high-risk practice fields. A licensed engineer would need to demonstrate a higher degree of competency than what CPEng currently needs to demonstrate.

Several other regulatory regimes rely on CPEng. These include:

- *The Building Act 2004*,
- *Fire and Emergency New Zealand Act 2017*,
- *Amusement Devices Regulations 1978*, and
- Health and Safety in Employment (Pressure Equipment, Cranes, and Passenger Ropeways) Regulations 1999.

Some consequential amendments to these pieces of legislation would be needed to phase out references to CPEng.

However, many engineers value CPEng as a mark of quality and for its international recognition. For those engineers where licensing is not an option, and who wish to distinguish themselves from other engineers, ENZ's Chartered membership is available.

Sapere's consultation found the value placed on CPEng as a mark of quality to be an important consideration. There is a potential cost for engineers who are currently CPEngs but will not be covered under the new licensing scheme. To deal with this effectively, alternative indicators of an engineer's quality will need to at least match the benefit gained by CPEngs currently.

How will the new arrangements be monitored, evaluated, and reviewed?

Given the current stage of the process of the reviews across all building and construction related occupational regimes (ie prior to Cabinet decisions being taken and some time before the Bill would be introduced to the House), the details of the evaluation and monitoring approach are yet to be determined.[24]

Although detailed evaluation planning would be premature at this stage, officials have done some early, high-level thinking on what the evaluation and monitoring framework and process may look like, with particular regard to the indicators that could be monitored to evaluate the impact of the changes and track benefits.

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24 In terms of sequencing, it is envisaged that this would take place after Cabinet decisions have been taken and would also be subject to the availability of the right resources (both in terms of capacity and capability) to carry out the work.

An evaluation framework for monitoring and evaluating the proposed occupational regulation of professional engineers working in high-risk fields of practice will be one part of a broader framework for monitoring and evaluating reforms to occupational regulation.[25]

There will be two levels of review, one at the level of engineers and one for the wider building system occupational regulation. The evaluation of the impact of changes will be assessed against the objectives of Phase Two of the Building System Legislative Reform Programme. The objectives set out for engineers in Page 16 of this RIS are shared across all the policy reviews being conducted under Phase Two, which focuses on professionals in the sector.

Depending on the availability of data, evaluation will include an analysis of incidents, enforcement and complaints data.

To establish an evaluation framework, MBIE will establish a baseline that can be used to monitor changes over time. The following indicator information may be useful to monitor the impacts of changes to the occupational regulation of engineers:

- The number of engineers, licensed engineers and registered engineering associates
- The average skill levels of registered persons
- Wage levels of registered and licensed engineers and the cost to consumers to purchase professional engineering services
- The number of building consent authorities that have duplicate registers of engineers
- The number and types of complaints, and the frequency of disciplinary action or the prosecution of offences
- The number of reviews requested of decisions made by the Registrar or Board, and the number that are successful.

For the purpose of monitoring and evaluation, measuring the benefits will be challenging and require almost immediate work on establishing a baseline. It is possible the use of surveys as part of the CPD record-keeping requirement could shed light on the process of knowledge acquisition, retention and application and perhaps infer value. The Annual Reports and data held by CPEC and ENZ, as the Registration Authority for CPEng, will form the main baseline.

Identifying the impacts of the changes will be done by a combination of stakeholder and expert judgments, review of monitoring documents and comparisons against the baseline and current society expectations.

Additional data requirements can be built into the administrative data collection requirements, noting that the data will be used to monitor the occupational regulatory system for engineers and the wider building system occupational regulation

MBIE will also monitor processing times of applications and renewals to identify potential efficiencies that can be gained in administering the new regime. A key focus will be assessing how the proposed temporary registration class for engineers that ordinarily reside outside of New Zealand facilitates the mobility of engineering specialists. During consultation, MBIE heard that companies may bring in specialist expertise into New Zealand.

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[25] The Minister for Building and Construction is responsible for the Chartered Professional Engineers of New Zealand Act 2002, Part 4 of the Building Act 2004 establishes the licensed building practitioner (LBP) scheme, Plumbers, Gasfitters, and Drainlayers Act 2006, Registered Architects Act 2005, Parts 10 and 11 of the Electricity Act 1992 and the Engineering Associates Act 1961.

Appendix One

Regulation of specific areas of engineering

The following section describes the regulatory requirements for different areas of engineering.

Electrical Engineers

Under section 74 of the *Electricity Act 1992*, registration as an Electrical Engineer is required for any persons with relevant engineering qualifications who wishes to undertake prescribed electrical work. Electrical engineers who do not undertake prescribed electrical work do not need to register. The criteria for entitlement to register as an Electrical Engineer are:

- Either
    - Option 1: Immediately prior to the promulgation of the Electricity (Safety) Regulations 2010 if a person was a Qualified Engineer under the Electricity Act 1992 or a Chartered Professional Engineer with the same or substantially similar practical experience as a Qualified Engineer, OR
    - Option 2:
        - Holds a Bachelor of Engineering (Electrical) qualification or a National Diploma in Engineering (Electrotechnology) (Level 6), or New Zealand Certificate in Engineering (Electrical); OR
        - An equivalent qualification as determined by either the Institution of Professional Engineers of New Zealand or the New Zealand Qualifications Authority
- Completed approved safety training within the prescribed time frame
- Passed both a Board-approved Electricians' Regulations coursework and written examination and a Board-approved Electricians' three-stage practical assessment, and
- Completed not less than one year of practical experience in carrying out prescribed electrical work that is satisfactory to the Board.

Heavy Vehicle Certifying Engineers

Heavy Vehicle Certifiers are mechanical engineers who obtain one or more technical certifications to practise as a certifier of heavy vehicles. The New Zealand Transport Agency (NZTA) oversees heavy vehicle certification. Clause 2.2(1) of the Land Transport Rule: Vehicle Standards Compliance 2002 outlines NZTA's requirements in the appointment of a vehicle inspector.

Aeronautical Engineers

The Civil Aviation Authority (CAA) regulates two groups of aeronautical engineers – Licensed Aircraft Maintenance Engineers (LAME) and design engineers.

The LAME certification process is recognised internationally and is harmonised with the International Civil Aviation Organisation. These maintenance engineers work on aircraft and certify that an aircraft may be released for service. The requirements for obtaining a licence include passing 10 theory exams and having at least five years' practical aviation engineering experience.

The CAA also regulates design organisations – the designers of aviation products and components. Specifically, there are approximately 11 aviation design organisations and 30 design delegation holders within these. Engineers working for design organisations must be authorised by the organisation for the types of work they conduct. Individuals may also hold a special authorisation that allows them to sign off designs on behalf of the Director of Civil Aviation. The CAA can grant and revoke design delegations, and can grant, suspend or revoke the certificate of design organisations. There are ongoing requirements to demonstrate competence and tools to support compliance. However, there is no code of conduct and no protected title.

Maritime Engineers

Maritime NZ certifies marine engineers to work on certain classes of vessels. The Marine Engineer Class 3 certification permits individuals to perform the functions and duties for the vessel propulsion type they specialise in, on ships powered by main propulsion machinery in any operational area:

- as the officer in charge of an engineering watch at an operational level in a manned engine room, and
- as a designated duty engineer in a periodically unmanned engine room.

The qualifications a marine engineer must hold to be certified depend on the class of marine engineering. Marine Engineer Class 1 engineers (the most senior) must hold a Level 7 diploma. Other classes must hold a Level 6 diploma or a certificate (Level 4). No class of marine engineer is required to hold a Level 8 (BE Hons) degree.

Naval architects generally hold a Level 8 (BE Hons) degree. Naval architecture deals with the safe design and specification of marine vessels and structures. Naval architecture is not regulated by Maritime NZ, but if a naval architect wishes to survey commercial vessels (a design approver), they must be recognised by Maritime NZ.

Recreational Safety Engineers

As per clause 8 of the Amusement Devices Regulations 1978, amusement devices must have a certificate of registration and be registered by WorkSafe NZ. To receive a certificate of registration, amusement devices must be examined and certified by a registered engineer. Safety Engineering, a technical group of ENZ, manages the register of qualified engineers. Recreational safety engineers who certify amusement park devices must be CPEng and mechanically qualified.

Design Verifiers (pressure equipment, cranes, passenger ropeways)

Under the Health and Safety in Employment (Pressure Equipment, Cranes, and Passenger Ropeways) Regulations 1999, a design verifier is a person employed or engaged by an accredited inspection body to carry out equipment design verification. The register of design verifiers is held by the Registration Authority for Chartered Professional Engineers. Design verifiers must hold a CPEng.

Producer statements

Producer statements have no legal status under the *Building Act 2004*. They were part of the *Building Act 1991* but were purposefully left out of the *Building Act 2004* because of building consent authorities' (BCAs) over-reliance on them, with BCAs often failing to verify the competence or qualifications of the individuals signing them off.

However, we have heard during stakeholder consultations that a number of BCAs use producer statements as a key part of their compliance process. Some councils have implemented a producer statement authors register, allowing the council to restrict who is able to sign off producer statements. This allows the council to assess the suitability of engineers to be authors of producer statements. Examples include Auckland City Council and Invercargill City Council.

Producer statements are professional opinions which are meant to be based on sound judgement and specialist expertise. Producer statements are used to provide BCAs with assurances that specialist (including engineering) design, design review, construction and construction review have been undertaken to an appropriate standard. BCAs use producer statements as evidence of reasonable grounds for the issue of a Building Consent or a Code Compliance Certificate, without having to duplicate design or construction checking undertaken by others.

Producer statements appear to be used by councils to fill a gap in the compliance process. CPEng is often used by BCAs as a mechanism to ensure the engineering author of the producer statement is suitably qualified. Design reports lack information on who is responsible for the design and the compliance pathway followed. Producer statements offer this information, and it is the core reason they are still used by many BCAs in New Zealand.

Appendix Two

This table summarises the outcomes of the CBA of the preferred option for the occupational regulation of engineers, comparing the estimated costs and benefits of Option 5 *(Mandatory registration and licensing for high-risk fields)* to those under the status quo.

Affected groups	Description	Impact over 25 years	Evidence certainty
Additional costs of the preferred option compared to taking no action			
Engineers' continuing professional development (CPD)	Cost engineers incur from undertaking CPD, assume passed down to clients, ongoing.	$1,240 million	Low-medium
Regulator	Cost of administering regime, assume full cost recovery so falls on engineer who pass to clients, ongoing.	$89 million	Medium
Engineers' compliance	Engineers' cost of compliance with regime, assume passed down to clients, ongoing.	$62 million	Low
Total monetised costs		**$1,391 million**[26]	Low-medium
Additional benefits of the preferred option compared to taking no action			
Engineers	Returns to CPD, ongoing.	$1,482 million	Low-medium
Engineering clients	Reduced frequency of engineering incidents, ongoing.	$199 million	Low
Building consent authorities (BCAs)	Avoided information search costs, measured as a reduced need for producer statement[27] registers for engineers. Reduces costs incurred by engineers to comply, saving could be passed onto consumers.	$2 million	Low
Total monetised benefits		**$1,683**[28]	Low
Non-monetised benefits	Reduced risk to the public from engineering incidents from engineering issues, ongoing.	Medium	

[26] These additional costs can be found in the supporting CBA document under section 5 on page 22.

[27] A detailed description of producer statements can be found in the Appendix One.

[28] These additional benefits can be found in the supporting CBA document under section 6 on page 37.