Impact Summary: Ensuring effective regulation of health and safety risks associated with work on commercial and industrial refrigeration, heat pump, and air conditioning systems

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General information

Purpose
The Ministry of Business, Innovation and Employment (MBIE) is solely responsible for the analysis and advice set out in this Regulatory Impact Statement (RIS), except as otherwise explicitly indicated. This analysis and advice has been produced for the purpose of informing key policy decisions to be taken by Cabinet.

Key Limitations or Constraints on Analysis
This RIS provides an analysis of options to: • reduce the risk of harm to persons and property from incompetent installation, repair, or maintenance work on commercial and industrial refrigeration, heat pump, or air conditioning systems that use flammable, toxic, or very high operating pressure refrigerants by ensuring that only competent persons carry out this work (**Part 1 of this RIS**); and • reduce the risk of harm to persons and property from leaks or unintended discharges of anhydrous ammonia from commercial or industrial refrigeration systems by ensuring that best industry practice for the safe design, construction, installation, operation, maintenance, and repair is followed (**Part 2 of this RIS**). **Ensuring only competent persons install, repair, or maintain refrigeration, heat pump, or air conditioning systems** Under current regulatory settings, there is no specific control to prevent an individual from working on a refrigeration, heat pump, or air conditioning system beyond their level of skills, qualifications, and experience. This has not been a significant concern up until now given the widespread use of non-toxic, and non-flammable Hydrofluorocarbon (HFC) refrigerants. However, the global phase down of HFCs from 2019 is expected to incentivise many commercial and industrial system owners in New Zealand to either retrofit or replace their current systems with new systems that use alternative flammable refrigerants (e.g. hydrocarbons), toxic refrigerants (e.g. anhydrous ammonia), or very high operating pressure refrigerants (e.g. carbon dioxide). Incompetent installation, repair, and maintenance of such

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systems will increase the risk of an incident causing significant, and in some cases irreversible harm, to persons and property.

The scope of the proposals considered in Part 1 of this RIS are limited to work on commercial and industrial refrigeration, heat pump, or air conditioning systems that use flammable, toxic, or very high operating pressure refrigerants. The scope does not apply to the following types of work or workers: trainees or apprentices who are working towards trade certification in order to be licensed, and are under the supervision of a technician who holds a current authorisation;[1] plant operators responsible for the day-to-day operation of a commercial or industrial refrigeration system; work on domestic or light commercial refrigeration, heat pump, or air conditioning appliances; work on commercial or industrial refrigeration, heat pump, or air conditioning systems that use non-hazardous refrigerant gases[2]; work on automotive air conditioning systems; and work on refrigeration, heat pump, or air conditioning systems on ships or aircraft.

There are some uncertainties around the one-off costs for technicians to complete any additional training that may be required to gain the proposed authorisation. The industry association has estimated that this could be between $500 and $2,000 depending on the current qualifications and experience of each individual.

Ensuring owners of ammonia refrigeration systems meet best industry practice for design, construction, installation, operation, maintenance, and repair

Anhydrous ammonia is commonly used as a refrigerant in large commercial and industrial refrigeration systems. It is an acutely toxic substance that is also corrosive to the skin and eyes and flammable when mixed with air at certain concentrations.

Under current regulatory settings, owners of ammonia-based refrigeration systems are required to ensure that the pressure equipment associated with these systems is safe, is operated safely, is operated within the limits that it was designed to operate within, and is maintained in a safe condition. However, owners of ammonia-based refrigeration systems are exempt from a requirement to comply with the joint Australian/New Zealand (AS/NZ) Standard for commercial refrigeration systems. This Standard sets best practice requirements for the design, construction, installation, operation, maintenance, and repair of commercial refrigeration systems.

Owners of ammonia refrigeration systems are also exempt from a basic requirement to display signage at the entrance to the building and the entrance to the land on which the building is located, which displays the hazard pictogram and statement for the hazardous substances contained in the building. This information is essential for firefighters when responding to an incident.

Both of these exemptions are inconsistent with the approach taken for the regulation of commercial or industrial refrigeration systems using other flammable refrigerants. As more systems transition to ammonia in the future as the supply of HFCs is phased down, the current approach is expected to increase the likelihood of leaks or unintended discharges of ammonia causing significant, and in some cases irreversible harm, to persons and property.

There are uncertainties in predicting the cost impact of complying with the joint Standard for commercial refrigeration systems when extensions or modification to existing systems are carried out. For new systems the costs of complying with the Standard will be absorbed

[1] An *'authorisation'* means a licence, permit, registration, consent, certificate or other authority however described.

[2] In this context *'non-hazardous refrigerant gases'* means gases that are non-flammable, non-toxic, and do not have a very high operating pressure.

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during the design phase and should therefore be less costly.
Responsible Manager (signature and date):
Saskia Patton Manager Health and Safety Policy Labour and Immigration Policy Ministry of Business, Innovation and Employment Date:

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Part 1: Ensuring only competent persons install, repair, or maintain refrigeration, heat pump, or air conditioning systems

Problem definition and objectives

What is the policy problem or opportunity?

HFCs are widely used in refrigeration heat pump, and air conditioning systems
HFCs are widely used in refrigeration, heat pump, and air conditioning systems because of their favourable thermodynamic properties and low toxicity, reactivity, and flammability. However, HFCs are contributing to climate change worldwide and will become a significant influencer on climate without action to curb their use.

A global phasedown on HFCs has commenced under the Kigali Amendment
The world is moving away from using substances that have a high global warming potential. The Kigali Amendment to the Montreal Protocol on Substances that Deplete the Ozone Layer puts in place a worldwide phase down on the production and consumption of HFCs.

The Kigali Amendment came into force in January 2019 for those countries that have ratified it. Developed countries are required to phase down consumption of HFCs by 85 per cent by 2036. Developing countries have a slower phase down schedule, beginning in 2024 or 2028 and ending in 2047.

New Zealand will ratify the Kigali Amendment on 3 October 2019, so it will enter into force for New Zealand on 1 January 2020.

The Kigali Amendment will result in significant reductions in the global supply of HFCs which will have a significant impact on the costs of HFCs and will incentivise many commercial and industrial system owners to retrofit or replace their current systems to use alternative refrigerants.

Non HFC refrigerants typically have hazardous properties
Alternative (non HFC) refrigerants are less harmful to the environment but can present increased risks to health and safety because of their hazardous properties; flammability, toxicity; or very high operating pressures.

Risks associated with work on commercial or industrial systems that use refrigerants are expected to increase over time
Currently the majority of commercial refrigeration systems (e.g. walk-in chillers) and a smaller number of industrial systems (e.g. meat processing plants) use HFCs. HFCs are also widely used in domestic and light commercial appliances (e.g. retail food and beverage display cabinets) and in automotive air conditioning systems. HFCs have low toxicity, reactivity, and flammability. From 2019 onwards, these HFC-based refrigerating systems will increasingly be retrofitted or replaced with systems that use flammable refrigerants (e.g. hydrocarbons), toxic refrigerants (e.g. anhydrous ammonia), or very high operating pressure refrigerants (e.g. carbon dioxide).

These types of systems are installed, repaired, and maintained by technicians working in the heating, ventilation, air conditioning, and refrigeration (HVAC&R) industry. Incompetent installation, repair, and maintenance of such systems will increase the risk of an incident causing significant, and in some cases irreversible harm, to persons and property.

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The consequences of an incident involving a larger commercial or industrial system that uses a refrigerant with hazardous properties could be significant, despite the probability of an incident being low. For example, the 2008 Tamahere Cool Store Fire killed one and seriously injured seven firefighters, destroyed $25 million worth of stored products, and $2.2 million worth of fire service equipment. It is worth noting that the Tamahere incident involved a contractor working well outside of his competence on a large commercial refrigeration system with a hydrocarbon refrigerant.

Reliance on the training system alone is unlikely to provide adequate assurance that risks are effectively managed

The HVAC&R industry is underpinned by a well-established apprenticeship system. It usually takes apprentices four years to complete their National Certificate.

The National Certificate includes training modules on refrigerants with hazardous properties, electrical wiring risks, and the installation, repair, and maintenance of commercial or industrial systems that use those types of refrigerants. However, while many technicians have completed the National Certificate it is not a compulsory requirement for working on refrigeration, heat pump, or air conditioning systems.

Due to the widespread use of HFC refrigerants currently, many technicians lack sufficient practical experience and theoretical knowledge about: the safe handling of toxic, flammable, or very high operating pressure alternative refrigerants; and the installation, repair, and maintenance of refrigeration, heat pump, or air conditioning systems that use those hazardous refrigerants.

The exception to this is the relatively small number of technicians that work on industrial refrigeration plant that uses ammonia.

Despite courses being offered by training providers to address these gaps, there are limited levers to compel HVAC&R businesses to invest in such training. Approximately 80 per cent of HVAC&R businesses employ less than three technicians and have limited resources to invest in ongoing training and development activities.

Investment in training is also limited by the fact that technicians are not required to demonstrate their competence through an authorisation.

Continued reliance on the training system alone is unlikely to provide adequate assurance that risks associated with the increased use of refrigerants with hazardous properties will be adequately managed.

To date the HVAC&R industry has been unable to regulate itself effectively on a voluntary basis

Previous attempts by the HVAC&R industry to regulate itself, following the 2008 Tamahere Cool Store Fire, have not had sufficient uptake across the industry to be as effective as they could have been because of their voluntary nature and potentially because of the continued widespread use of relatively safe (but environmentally harmful) HFC refrigerants.

The proxy occupational licensing regime that has been put in place by the Institute of Refrigeration Heating & Air Conditioning Engineers (IRHACE), the Climate Control Companies Association New Zealand (CCCANZ), and the Refrigerant License Trust Board (RLTB) relies on the approved filler certification requirements under the *Health and Safety at Work (Hazardous Substances) Regulations 2017* (the Hazardous Substances Regulations) in combination with a voluntary agreement amongst key refrigerant wholesalers to restrict sales to refrigeration technicians who have evidence of competence to safely handle refrigerant, i.e. approved filler certification.

There are a number of weaknesses with this proxy regime, including:

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- approved filler training is a generic one day training course that is not specific to the needs of HVAC&R technicians;

- only half of the estimated 7,000 technicians working in the industry have completed approved filler training; and

- a number of suppliers, have not adopted the voluntary sales restriction agreement and sell refrigerants without restriction to persons with limited training or competency to safely handle those hazardous substances.

Current regulatory settings
The risks associated with hazardous refrigerants, and associated plant and equipment, are currently managed by a range of regulatory requirements made under the Health and Safety at Work Act (the HSW Act), the Electricity Act, and the Building Act. The current requirements place controls on: the use, handling, and storage of hazardous refrigerants; refrigeration plant and equipment; the management of electrical hazards; and emergency procedures. Generic, high-level training and supervision requirements that apply to all workers also exist but there are no specific controls to prevent a technician from working on a refrigeration, heat pump, or air conditioning system beyond their level of skills, qualifications, and experience.

There is no requirement to prevent technicians from working on refrigeration, heat pump, or air conditioning systems outside of their competence
Under current regulatory settings, there is no specific control to prevent an HVAC&R technician from working on a refrigeration, heat pump, or air conditioning system that uses flammable, toxic, or very high operating pressure refrigerants beyond their level of skills, qualifications, and experience.

This has not been a significant concern up until now given the widespread use of non-toxic, and non-flammable HFC refrigerants. However, the global phase down of HFCs from 2019 is expected overtime to incentivise many commercial and industrial system owners in New Zealand to either retrofit or replace their current systems with new systems that use flammable, toxic, or high pressure operating alternative refrigerants.

Incompetent installation, repair, and maintenance of such systems will increase the risk of an incident causing significant, and in some cases irreversible harm, to persons and property. If no further action is taken, then the likelihood of incidents involving toxic, flammable, or very high operating pressure refrigerants causing harm to persons and property is expected to increase over time because of:

- the increasing use of flammable, toxic, and high pressure alternative refrigerants as a result of the global phase down on HFCs;

- the insufficient level of HVAC&R technicians with adequate knowledge and experience of working with flammable, toxic, and very high operating pressure refrigerants and associated systems; and

- the absence of an incentive to compel, particularly the smaller, HVAC&R businesses to invest in ongoing training and development for their technicians.

There was general agreement from submitters that the issues have been accurately identified.

However, many submitters were of the view that the issues are not limited to flammable and toxic refrigerant use and that all refrigerants pose risks that require careful management. These submitters noted that all refrigerants can cause: severe burns and injuries if accidentally released and asphyxiation if accidentally released into a confined space. MBIE

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acknowledges that non-hazardous refrigerants do carry a level of risk. However, the level of risk presented by these refrigerants is well below the level of risk presented by toxic, flammable, or very high operating pressure refrigerants and a loss of containment from any system that uses a refrigerant with those hazardous properties.

A number of submitters were of the view that the issues that have been identified are not as relevant to the repair or servicing of refrigeration appliances or heat pump and air conditioning systems that are designed primarily for household or light commercial use given the small amounts of flammable refrigerants that are allowed to be used in such systems. Other submitters disagreed with this position. MBIE considers that the risks associated with work on such appliances are effectively managed under existing requirements. For example, in accordance with safety standards, manufacturers of domestic and light commercial refrigeration appliances that use flammable refrigerant (A3) must not exceed a charge of 150 grams. Similarly, manufacturers of domestic and light commercial air conditioners and heat pumps that use flammable refrigerant (A3) must not exceed a charge of 1kg. These maximum charge limits have been put in place by standard setting committees to minimise the risk of ignition from a domestic or light commercial appliance in the installed space.

A number of submitters were also of the view that the issues are not as relevant to the servicing of automotive air conditioning systems, again because of the small amounts of refrigerants used in such systems. Other submitters disagreed with this position. Again, MBIE considers that the risks associated with work on such systems are effectively managed under existing requirements.

A case was made to exempt on-farm milk vat refrigeration systems from the policy on the basis that there could be reduced access and potentially greater cost to access refrigeration technicians in remote, rural areas and such systems are factory built to standardised designs and located in well ventilated semi-detached or detached buildings therefore presenting a lower level of risk. There are an estimated 11,500 of these systems around the country.[3] Further targeted consultation about the suitability of an exemption for these types of systems will be carried out before a policy decision is made on this matter.

Taking into account the feedback received from submitters, MBIE considers that the policy should apply to work carried out on all commercial and industrial refrigeration, heat pump, or air conditioning systems that use flammable, toxic, or very high operating pressure refrigerants.

MBIE considers that the policy should not apply to the following types of work or workers: trainees or apprentices who are working towards trade certification in order to be licensed, and are under the supervision of a technician who holds a current authorisation; plant operators responsible for the day-to-day operation of a commercial or industrial refrigeration system; work on domestic or light commercial refrigeration, heat pump, or air conditioning appliances;[4] work on commercial or industrial refrigeration, heat pump, or air conditioning systems that use non-hazardous refrigerant gases; work on automotive air conditioning systems; work on refrigeration, heat pump, or air conditioning systems on ships (including refrigerated transportable containers while in transit);[5] and work on refrigeration, heat pump, or air conditioning systems on aircraft.[6]

[3] This estimate is based on the total number of dairy herds in New Zealand according to the *New Zealand Dairy Statistics 2017-18* published by Dairy NZ.

[4] Light commercial stand-alone refrigeration appliances typically have small refrigerant charges. The majority of these types of appliances are used in the food retail and hospitality sector in small grocery stores, butcher shops, liquor shops, corner stores, food takeaways and restaurants.

[5] Individuals that work on these systems on New Zealand ships are already subject to a licensing regime under Part 32 of the Maritime Rules and are not permitted to work on systems outside of their competence.

[6] Individuals that work on these systems on New Zealand aircraft are already subject to a licensing regime under Part 66 of the Civil Aviation Rules and are not permitted to work on systems outside of their competence.

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MBIE intends to carry out further targeted consultation to determine the application of the policy to transport refrigeration systems that use flammable, toxic, or very high operating pressure refrigerants (i.e. refrigeration units used in trucks, trailers, and transportable containers).

Who is affected and how?

This policy will affect HVAC&R technicians and businesses that work on commercial and industrial refrigeration, heat pump, or air conditioning systems that use flammable, toxic, or very high operating pressure refrigerants. There is widespread support for this policy from HVAC&R technicians and businesses.

This policy could also have a marginal increase on the cost of purchasing HVAC&R services for owners of refrigeration, heat pump, or air conditioning systems, because HVAC&R technicians and businesses may increase their charges to recover costs associated with training and authorisation fees. However, system owners expect these costs to be outweighed by the benefits as it could provide them with improved assurance that the technicians working on their systems are competent and it could also reduce system operating costs associated with running an inefficient system through better skilled installation, servicing, and maintenance. There is widespread support for this policy from owners of large commercial and industrial refrigeration systems.

Are there any constraints on the scope for decision making?

This policy will provide support to the Government plans for New Zealand to ratify the Kigali Amendment in October 2019 and for it to enter into force from January 2020 by providing for a safe transition away from HFC refrigerants.

Options identification

What options have been considered?

Objectives
The primary objective of the policy is to reduce the risk of harm to persons and property from incompetent installation, repair, or maintenance work on commercial and industrial refrigeration, heat pump, or air conditioning systems that use flammable, toxic, or very high operating pressure refrigerants.

In achieving this objective, it is also desirable to:

- avoid placing a disproportionate cost, relative to the risk of harm on individual HVAC&R technicians or businesses and minimise the administrative burden and cost to government; and
- be simple for HVAC&R technicians or businesses to comply with and for government to administer.

There was almost unanimous support for these objectives from submitters.

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Criteria
The following criteria was used to assess each option against the policy objectives:

- **Effectiveness** – the option reduces the risk of HVAC&R technicians carrying out installation, repair, or maintenance work on commercial and industrial refrigeration, heat pump, or air conditioning systems outside their competence
- **Cost impacts** – the option minimises compliance, transitional, and administrative costs
- **Simplicity and consistency** – the option is simple for government to administer and for HVAC&R technicians and/or businesses to understand and comply with
- **Proportionality** – the degree of regulation is commensurate with risk.

Criteria 1 (effectiveness) is the primary criteria, as meeting this criteria is required to achieve the policy objectives. The other criteria are secondary considerations and have accordingly been given lesser weighting.

Options analysis
The options analysis considered the impacts of retaining the status quo and not implementing any authorisation requirement but instead building on the current HVAC&R industry approach to self-regulation combined with increased WorkSafe education and enforcement effort (Option 1). It has also considered two options for introducing an authorisation requirement – an authorisation for individual HVAC&R technicians (Option 2) or an authorisation for HVAC&R businesses (Option 3). The options are mutually exclusive.

Retaining the status quo (option 1) would mean that HVAC&R technicians would still be able to carry out installation, repair, or maintenance work on refrigeration, heat pump, or air conditioning systems beyond their level of competence. There would be no mandatory requirement to demonstrate they have obtained a recognised qualification and/or have equivalent experience in the HVAC&R field. This option was unanimously rejected by submitters.

Placing an authorisation on HVAC&R businesses (option 3) would adequately reduce the risk created by technicians carrying out work on commercial and industrial refrigeration, heat pump, or air conditioning systems outside their competence. However, this option is likely to be more difficult for businesses to implement and for government to administer.

Consequently, MBIE recommends placing an authorisation on individual technicians (option 2). This option would adequately reduce the risk created by technicians carrying out work on commercial refrigeration, heat pump, or air conditioning systems outside their competence. It would provide technicians with a transferrable, marketable competence and provide asset owners with improved assurance and improved system safety and energy efficiency.

Which of these options is the proposed approach?

MBIE considers option 2 (an authorisation for individual HVAC&R technicians) to be the best option.

Under this option, a duty would be placed on a person to not carry out a class of work on a commercial or industrial refrigeration, heat pump, or air conditioning system — which uses a flammable, toxic, or very high operating pressure refrigerant — unless the person holds a licence for that class of work. This would ensure that technicians do not work on systems beyond their level of skills, qualifications, and experience.

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There was almost unanimous support for this option from submitters – both large asset owners and HVAC&R businesses and technicians. Comments were largely directed at the details of this proposed option. Only two submitters out of 288 submissions, a large installer of domestic heat pumps and an industry association representing automotive technicians, did not support this option.

Individual technicians would be required to obtain an authorisation from WorkSafe before being permitted to work on commercial or industrial refrigeration, heat pump, or air conditioning systems that use flammable, toxic, or very high operating pressure refrigerants. The authorisation would be valid for five years from the date of issue, consistent with other authorisation regimes administered by WorkSafe and consistent with the high-risk work licensing regime in Australia. Some submitters suggested that the proposed authorisation should have a two year renewal cycle. MBIE considers that there is not a strong enough case for imposing a two year renewal cycle and that it would impose unnecessary costs on authorisation holders.

WorkSafe would also be required to establish and maintain a register of the individuals who have been issued an authorisation.

In order to qualify for an authorisation, individual applicants would have to demonstrate to WorkSafe that they: have knowledge of the installation, commissioning, servicing, and maintenance of refrigeration, and/or heat pump, and/or air conditioning plant and equipment relevant to the class of work for which the applicant seeks an authorisation; have knowledge of the hazardous properties for the classes of refrigerants they are likely to use; and have had suitable training and experience. There was wide support from submitters for these general competency requirements.

The general competency requirements to be met by applicants would be set in regulations and the more specific competency requirements would be set in a Safe Work Instrument. The more specific requirements would include the details of any relevant trade qualifications and any additional unit standards that may be required for each authorisation class. Safe Work Instruments are disallowable instruments that are made by the Minister for Workplace Relations and Safety and notified in the Gazette.

Different authorisation classes would ensure that technicians do not work on systems that use flammable, toxic, or very high operating pressure refrigerant gases outside of their competence. The classes have been shaped by the feedback that we received from industry and recognise the different skillsets that are required for work on different applications. The proposed classes are as follows:

- the heating and air conditioning authorisation would enable the holder to work on any commercial or industrial heat pump or air conditioning system;
- the refrigeration, heating, and air conditioning authorisation (excluding ammonia) would enable the holder to work on any commercial or industrial refrigeration, heat pump, or air conditioning system, including transport refrigeration systems but excluding systems using ammonia refrigerant; and
- the refrigeration, heating, and air conditioning authorisation (including ammonia) would enable the holder to work on any commercial or industrial refrigeration, heat pump, or air conditioning system, including transport refrigeration systems and including systems using ammonia refrigerant.

MBIE will be carrying out further targeted consultation to determine whether a further authorisation class is required for individuals that would only be carrying out work on transport refrigeration systems. Individuals that carry out this type of work are not subject to

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any restrictions that prevent them from working on systems outside of their competence and are not subject to an associated licensing regime in the same way as individuals who work on marine or aviation refrigeration systems.

Given the scope of this proposal, we expect that this option will impact approximately 4,000 of the estimated 7,000 technicians and engineers that work in the HVAC&R industry.

It is also proposed that a consequential change would need to be made to the Hazardous Substances Regulations to remove duplication by ensuring that an individual who holds this authorisation would not need to hold an approved fillers certificate under those regulations.

This option would enable the primary criteria (effectiveness) to be adequately met. An authorisation on individual technicians would allow only suitably qualified and/or experienced technicians to carry out work on commercial and industrial refrigeration, heat pump, or air conditioning systems that use flammable, toxic, or very high operating pressure refrigerants, reducing the risk of harm to persons and property from incompetent installation, repair, or maintenance work.

The renewal process for an authorisation on individual technicians would compel them (and their employers) to invest in ongoing training and development activities in order to keep up to date with changing industry practices.

Impact Analysis (Proposed approach)

Summary table of costs and benefits

Affected parties *(identify)*	**Comment**: nature of cost or benefit (eg ongoing, one-off), evidence and assumption (eg compliance rates), risks	**Impact** *$m present value, for monetised impacts; high, medium or low for non-monetised impacts*
Additional costs of proposed approach, compared to taking no action		
Regulated parties	We anticipate that the one-off costs for technicians to complete any additional training that may be required to gain an authorisation could be between $500 and $2,000 depending on their current qualifications and experience. For those that already hold a level 4 trade certificate in refrigeration and air conditioning, or have equivalent qualifications or experience, the amount of additional training required and associated costs are expected to be small. Prior to carrying out the consultation process, WorkSafe advised that the administrative fees for an authorisation regime would likely need to be in the order of $250 in order for WorkSafe to recover their costs. However, subsequent work on administrative fees	Low – Medium

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	post consultation has increased the estimate of fees for this regime to be in the order of $680 (if the full costs of processing applications and ongoing competency assurance of technicians is recovered) or $430 (if the costs associated with the processing of applications only are recovered). Individuals would be able to spread these costs over the proposed five year duration of the licence, which would reduce the impact to $136 or $86 each year. MBIE notes that the estimated fees are similar to the fees for asbestos removal licences ($490). MBIE also notes that the estimated fees are similar to or lower than the licensing fees paid by electrical workers and lower than the fees paid by plumbers. An electrical worker pays $350 for registration (one off cost) and then $250 every two years for a practising licence; which equates to $625 over five years. A plumber pays $375 for registration (one off cost) and then $375 each year for a practising licence; which equates to $1,875 over five years. MBIE anticipates that licence holders, or employers of licence holders, are likely to recover these additional costs by increasing their service charges to clients. MBIE intends to release a further consultation document to impacted stakeholders in order to test the proposed administrative fees for the licensing regime in more detail. Cost increases are unlikely to have an adverse impact on the supply of HVAC&R services in the market. The cost of an authorisation would make up a small proportion of the overall costs of being an HVAC&R technician. These costs are expected to be outweighed by the benefits of introducing an authorisation requirement.	
Regulators	There would be one off establishment costs for WorkSafe to implement the proposed authorisation regime associated with developing the register, developing the business processes, developing guidance, awareness raising activities, and recruiting new licensing staff (potentially 2 FTE). Ongoing operating costs, including the resourcing of a programme of competency assurance checks by a suitably qualified/experienced	Low

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	individual/s, would be recovered through the proposed administrative fees.	
Wider government	Not applicable	Not applicable
Other parties	The proposed authorisation regime may place some small cost increases on system owners because HVAC&R technicians and businesses may increase their pricing to recover the costs associated with any additional training and authorisation fees.	Low
Total Monetised Cost		
Non-monetised costs		Low

Expected benefits of proposed approach, compared to taking no action		
Regulated parties	An authorisation on individual technicians would reduce the risk of harm to persons and property from incompetent installation, repair, or maintenance work. The renewal process for an authorisation would compel technicians (and their employers) to invest in ongoing training and development activities in order to keep up to date with changing industry practices. HVAC&R technicians would gain a transferrable, marketable competence. HVAC&R businesses would have a means of quickly assessing whether a potential employee has the required skills and ability to perform their job duties. Avoided costs associated with a major incident, which could include costs associated with investigations and legal costs.	Medium
Regulators	Avoided costs associated with a major incident, which could include costs associated with investigations and legal costs.	Medium
Wider government	Avoided costs associated with a major incident, which could include: treatment and compensation costs associated with fatalities and serious injuries; costs associated with emergency response; and costs associated with investigations and legal costs.	Medium
Other parties	System owners would have a means of quickly assessing whether the technicians they engage have the required skills and abilities to do the work	Medium

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	and continue to have up-to-date knowledge and skills (improved assurance). System owners would potentially reduce operating costs associated with running inefficient plant through better skilled installation, servicing, and maintenance of plant (improved energy efficiency) Avoided costs associated with a major incident, which could include: costs associated with investigations and legal costs; lost production costs; capital costs needed to recommence operations.	
Total Monetised Benefit		
Non-monetised benefits		Medium

What other impacts is this approach likely to have?

This option is more likely than option 3 (an authorisation on HVAC&R businesses) to be simple for technicians to comply with and for government to administer. Imposing an authorisation on the individual technician rather than the business would be more familiar to both individuals and businesses in the HVAC&R industry. An authorisation on individual technicians is more akin to the existing electrical service technician licence that many HVAC&R technicians are already required to hold in order to carry out limited electrical work associated with the installation of commercial and industrial refrigeration, heat pump, or air conditioning systems. The proposed approach under this option is also more consistent with the way in which other trades are regulated.

An individual authorisation regime would provide a more consistent approach to ensuring that only competent persons work on systems, because WorkSafe would be responsible for checking whether an applicant meets the required qualifications and experience before being issued an authorisation. Under option 3, the responsibility for assessing the competence of a technician falls to the PCBU that employs them. Consequently, there is likely to be a higher degree of variation.

MBIE considers that this option strikes an appropriate balance between workability of rules and the need to reduce the risk of harm to persons and property from incompetent installation, repair, or maintenance work on commercial and industrial refrigeration, heat pump, or air conditioning systems that use flammable, toxic, or very high operating pressure refrigerants.

A small number of submitters were of the view that this option could be further strengthened by also placing an authorisation on the HVAC&R business that employs the technician. This would ensure that accountability is more fairly apportioned between the employer and employee and could help to avoid situations where the technician may be pressured by their employer to carry out non-compliant work. MBIE considers that placing an authorisation on both the individual and business is unlikely to provide additional benefits (to an individual authorisation) relative to the additional costs that would be imposed on businesses.

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Stakeholder views

What do stakeholders think about the problem and the proposed solution?
A public consultation process, targeting HVAC&R technicians and businesses and owners of commercial and industrial refrigeration, heat pump, or air conditioning systems, was carried out from early September to mid December 2018. Feedback from the consultation process is discussed under each proposal. MBIE received 288 submissions from industry associations representing commercial and industrial refrigeration plant owners (Meat Industry Association of New Zealand, NZ Cold Storage Association, United Fresh New Zealand); industry associations representing individual HVAC&R technicians (IRHACE); industry associations representing HVAC&R businesses (CCCANZ); unions (NZCTU, e Tu, Meat Workers Union); training organisations for the HVAC&R sector (Competenz and the RLTB); large manufacturers/importers and suppliers; large companies that own multiple commercial and industrial refrigeration assets (Fonterra); Fire and Emergency New Zealand; and an academic/research body (NZ Committee of the International Institute of Refrigeration). A large number of submissions (236) were from individual technicians or HVAC&R businesses based on a summarised version of the submission prepared by their respective industry associations. The following government agencies were involved in the development of or consulted on the proposals: Ministry for the Environment; Ministry of Primary Industries; Ministry of Transport; New Zealand Transport Agency; Maritime New Zealand; Civil Aviation Authority; WorkSafe New Zealand; Fire and Emergency New Zealand; and The Treasury. MBIE intends to release a further consultation document to impacted stakeholders in order to: test the proposed administrative fees for the licensing regime in more detail; determine whether a further authorisation class is required for individuals that would only be carrying out work on transport refrigeration systems; and determine whether an exemption should be made for on-farm milk vat refrigeration systems.

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Implementation and operation

How will the new arrangements be given effect?
An authorisation on individual HVAC&R technicians would be put in place by making new regulations under the HSW Act. Implementing the authorisation regime would be led by WorkSafe, as the administering agency. Publicity of the new authorisation regime would be required, specifically targeting the HVAC&R industry and owners of commercial and industrial systems. Guidance on the application process and the detailed criteria that would need to be met by applicants would need to be developed by WorkSafe and made available before the authorisation regime is introduced. A three year transitional period is proposed, to provide technicians with sufficient time to complete any additional training that may be required for their authorisation class. This timeframe would also provide WorkSafe with sufficient time to design, build, and implement the systems and processes that will be required to administer the authorisation regime. On completion of the three year transitional period, technicians would be able to apply to

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WorkSafe for their authorisation but the requirement to have an authorisation would not commence until the fourth year.

Compliance monitoring and enforcement
Compliance monitoring of authorised technicians would be carried out through a programme of competency assurance checks carried out by persons competent to do so. This could be resourced by either staff recruited by WorkSafe or outsourced under contract to a suitably qualified person or persons.

Implementation risks
The risk of HVAC&R technicians carrying out work on commercial or industrial refrigeration, heat pump, or air conditioning systems outside their competence will still be present during the three year transitional period. MBIE considers that this risk would be reduced through WorkSafe and IRHACE awareness raising activities and through technicians undertaking additional training, where it is deemed necessary. Further, the expected level of retrofitting or replacement of HFC based systems during this transitional period is not expected to be significant.

There is a risk that some training providers may use the transitional period as an opportunity to make fast money through offering sub-standard training courses to those technicians that need to complete additional training. MBIE considers that this risk would be mitigated by ensuring that WorkSafe, IRHACE, and the RLTB work with Competenz (the ITO for the HVAC&R sector) and NZQA to ensure the relevance and quality of any new training courses that may be needed. These organisations will also need to ensure that any necessary adjustments are made to existing qualifications and training programmes for the sector.

Once the proposed authorisation regime commences, there is a risk that a small number of technicians and their employers may continue to carry out work on systems outside their competence despite the authorisation regime being in place. MBIE considers that this risk would be reduced through: WorkSafe and IRHACE awareness raising activities that target HVAC&R technicians/businesses and their clients (owners of commercial or industrial refrigeration, heat pump, or air conditioning systems); and publicising any WorkSafe enforcement action against persons carrying out unauthorised work.

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Monitoring, evaluation and review

How will the impact of the new arrangements be monitored?

We will monitor the authorisation regime and its effectiveness through the collection of information from a range of sources, including:

- findings from WorkSafe licensing, compliance monitoring, or enforcement activities concerning HVAC&R technicians/businesses or commercial/industrial refrigeration, heat pump, or air conditioning systems;
- the number of notifiable events (serious injuries, fatalities, and loss of containment incidents) reported to WorkSafe involving HVAC&R technicians/businesses or commercial/industrial refrigeration, heat pump, or air conditioning systems;
- regular communication with industry associations to check-in on the implementation of the authorisation regime and consider any issues being raised by HVAC&R technicians/businesses or owners of commercial or industrial refrigeration, heat pump, or air conditioning systems.

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When and how will the new arrangements be reviewed?
A post-implementation review of this policy should be carried out no less than five years after the authorisation regime has commenced.

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Part 2: Ensuring owners of ammonia refrigeration systems meet best industry practice for design, construction, installation, operation, maintenance, and repair

Problem definition and objectives

What is the policy problem or opportunity?

Anhydrous ammonia is a refrigerant with toxic, corrosive, and flammable properties
Anhydrous ammonia is commonly used as a refrigerant in large commercial and industrial refrigeration plant. We estimate there to be some 200 commercial and industrial refrigeration systems across New Zealand that currently use anhydrous ammonia. A further 20 – 40 systems, which currently use HFCs, could be replaced with or retrofitted to use ammonia as the supply of HFCs is phased down.

Anhydrous ammonia is acutely toxic, corrosive, and flammable when mixed with air.

Unprotected exposure to ammonia at a high enough concentration can be fatal. Lower-level exposures can cause temporary blindness and eye damage, as well as irritation to the skin, mouth, throat, lungs, and mucous membranes.

An ammonia leak can also contaminate the food items that the refrigeration system was designed to protect.

Ammonia has a strong and unpleasant smell at low concentrations. The strong smell however can also provide an advantage over other refrigerants in that it can enable small leakages in a refrigeration system to be discovered quickly and corrected.

Ammonia is liquefied under pressure. Because of this pressure, it will rapidly release into the air. Typically, the ammonia will rise, however in the presence of moisture (such as high relative humidity), the liquefied ammonia gas forms vapours that are heavier than air. These vapours may spread along the ground or into low-lying areas with poor airflow where people may become exposed.

Mixtures of ammonia and air are flammable at certain concentrations (between 15% and 28%). While an ammonia deflagration does not have the destructive power of hydrocarbons, it is capable of causing burns and minor structural damage. In order to ignite ammonia the minimum energy needed is considerably higher than other flammable substances.

In other jurisdictions, explosions have been attributed to releases of ammonia contaminated with lubricating oil.

Incidents involving anhydrous ammonia
Between 1996 and 2016, 403 workplace incidents involving anhydrous ammonia were recorded. Of those incidents, eight involved serious injury to workers that required hospital admission or medical treatment.

In terms of more recent incidents, in 2017 a total of 17 workplace incidents involving anhydrous ammonia were recorded. In 2018 we had 11 incidents, one of which left three

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people needing hospital treatment after being exposed to the toxic gas and required the plant to be evacuated.

It should be noted that these are recorded incident and injury rates but that actual rates are likely to be higher.

Current regulatory settings
Under the HSW Act, a person conducting a business or undertaking's (PCBU's) primary duty is to ensure so far as reasonably practicable the health and safety of its workers while at work for the PCBU and any workers whose activities in carrying out work are influenced or directed by the PCBU while carrying out the work. The term "worker" includes employees, contractors, subcontractors, outworkers, apprentices and volunteers.

In carrying out the primary duty, the PCBU must ensure so far as practicable the provision and maintenance of a work environment which is without risks to health and safety and the provision and maintenance of safe plant (i.e. commercial or industrial ammonia refrigeration plant).

In addition to the primary duty of care, a further duty is place on a PCBU who manages or controls plant at a workplace to ensure, so far as is reasonably practicable, that the plant is without risks to the health and safety of any person.

Under the *Health and Safety in Employment (Pressure Equipment, Cranes, and Passenger Ropeway) Regulations 1999* (the PECPR Regulations), owners of ammonia refrigeration plant are required to ensure that the pressure equipment is safe, is operated safely, is operated within the limits that it was designed to operate within, and is maintained in a safe condition. The pressure equipment must have a current certificate of inspection before it can be operated.

Under the Hazardous Substances Regulations, a PCBU with management or control of a refrigeration system that uses a flammable refrigerant must ensure that the system complies with the joint AS/NZ Standard for commercial refrigeration systems (AS/NZS 5149:2016). AS/NZS 5149:2016 specifies requirements for the design, construction, and installation of refrigeration systems. It also specifies requirements for testing, commissioning, marking, and documentation. It applies to new refrigeration systems, extensions or modifications of existing systems, the conversion of a system to another refrigerant, and for used systems, being transferred to and operated on another site.

This requirement was introduced through the reassessment of the HSNO approval for LPG, butane, propane, and isobutane, in order to manage the risks associated with flammable hydrocarbon refrigerants following the 2008 Tamahere Cool Store Fire. The Fire Service Report into the Tamahere incident indicated that the loss of life may have been prevented if the cool store had been designed to meet the requirements of best industry practice; that is to comply with the joint AS/NZ Standard for commercial refrigeration systems.

This requirement was subsequently extended to all flammable refrigerants when it was transferred from the HSNO legislation into the Hazardous Substances Regulations under the HSW Act. However, ammonia was still outside the scope of this revised requirement, despite it having flammable properties, because the controls on flammable gases under the Hazardous Substances Regulations do not apply to ammonia. This exemption is a historical carry over from the former Dangerous Goods legislation, which acknowledged that the risks associated with ammonia refrigeration systems were at that time managed under the (now repealed) Factories and Commercial Premises legislation.

Owners of ammonia refrigeration systems are currently exempt from the requirement to comply with the joint AS/NZ Standard for commercial refrigeration systems
Under the Hazardous Substances Regulations, owners of ammonia refrigeration systems are

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exempt from the requirement to meet best industry practice for the safe design, construction, installation, operation, maintenance, and repair of those systems; that is there is no requirement to comply with the joint AS/NZ Standard for commercial refrigeration systems.

Owners of ammonia based refrigeration systems are also exempt from a basic requirement to display signage, which displays the hazard pictogram and statement for the hazardous substances contained in the building, at the entrance to the building and the entrance to the land on which the building is located. This information is essential for firefighters when responding to an incident.

Both of these exemptions are inconsistent with the approach that was taken for the regulation of commercial refrigeration systems using flammable refrigerants following the 2008 Tamahere incident.

As more systems transition to ammonia in the future as the supply of HFCs is phased down, the current approach is expected to increase the likelihood of leaks or unintended discharges of ammonia causing significant, and in some cases irreversible harm, to persons and property.

Who is affected and how?

This policy will affect businesses that intend to build new ammonia refrigeration systems or extend or modify an existing ammonia refrigeration system. There was wide support for this option from submitters.

This policy is expected to have minimal cost impacts for new ammonia refrigeration systems, because compliance with AS/NZS 5149:2016 will be met during the design phase. It is expected to impose additional costs on extensions or modifications of existing systems but this impact is hard to quantify and will largely depend on the current condition of the system.

Are there any constraints on the scope for decision making?

This policy will also provide support to the Government plans for New Zealand to ratify the Kigali Amendment in October 2019 and for it to enter into force from January 2020 by providing for a safe transition away from HFC refrigerants.

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Options identification

What options have been considered?

Objectives
The primary objective of the policy is to reduce the risk of harm to persons and property from leaks or unintended discharges of ammonia by ensuring that best industry practice for the safe design, construction, installation, operation, maintenance, and repair of ammonia refrigeration systems is followed.

In achieving this objective, it is also desirable to:

- avoid placing a disproportionate cost, relative to the risk of harm on owners and operators of ammonia refrigeration systems; and

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- be simple for owners, operators, and others (designers, suppliers, and installers,) to comply with.

Criteria
The following criteria was used to assess each option against the policy objectives:

- Effectiveness – the option reduces the risk of harm to persons and property from leaks or unintended discharges of ammonia from commercial refrigeration systems;
- Cost impacts – the option minimises compliance and transitional costs;
- Simplicity and consistency – the option is simple for owners, operators, and others (designers, suppliers, and installers) to understand and comply with;
- Proportionality – the degree of regulation is commensurate with risk.

Criteria 1 (effectiveness) is the primary criteria, as meeting this criteria is required to achieve the policy objectives. The other criteria are secondary considerations and have accordingly been given lesser weighting.

Options analysis
The options analysis considered the impacts of retaining the status quo against an option that would require a PCBU with management or control of a new or modified ammonia refrigeration system to comply with the joint AS/NZ Standard for commercial refrigeration systems.

As more (potentially 20 – 40) large-scale commercial and industrial systems transition to ammonia in the future as the supply of HFCs is phased down, the status quo is expected to increase the likelihood of leaks or unintended discharges of ammonia causing significant, and in some cases irreversible harm, to persons and property.

Retaining the status quo (option 1) would mean that there is no requirement for owners of new or modified ammonia refrigeration systems to meet best industry practice for the design, construction, operation, and maintenance of their systems. This would be inconsistent with the approach taken to the regulation of commercial or industrial refrigeration systems using other flammable refrigerants. This option was widely rejected by submitters; the exception to this being owners of large cold storage operations represented by the New Zealand Cold Storage Association driven by concerns about the feasibility of upgrading older systems to meet the requirements in AS/NZS 5149:2016. MBIE considers that these concerns can be easily managed by clarifying in regulations that the scope of the Standard is limited to new refrigeration systems, extensions or modifications of existing systems, and the conversion of a system for another refrigerant.

Consequently, MBIE recommends (option 2) making amendments to the Hazardous Substances Regulations to ensure that a PCBU with management or control of a new or modified commercial or industrial refrigeration system that uses anhydrous ammonia complies with AS/NZS 5149:2016. Amendments would also be made to ensure the PCBU places signage displaying the correct hazard pictogram and statement for ammonia at the entrance to the building and the entrance to the land on which the building is located.

Option 2 would ensure consistent application of the Standard for commercial refrigeration systems across all commercial refrigeration systems that use refrigerants with flammable properties – including ammonia. This will help to establish a common understanding of requirements for the design, construction, installation, operation, maintenance, and repair of ammonia refrigeration systems between system owners, operators responsible for the day-to-day operation of the system, and refrigeration contractors used to carry out the maintenance and repair tasks.

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Option 2 would also ensure consistent application of current signage requirements across all commercial refrigeration systems that use refrigerants with flammable properties – including ammonia.

Which of these options is the proposed approach?

MBIE considers option 2 to be the best option.

Under this option amendments to the Hazardous Substances Regulations would be made to ensure that:

- a business with management or control of a commercial or industrial refrigeration system that uses anhydrous ammonia as a refrigerant complies with the joint AS/NZ Standard for commercial refrigeration systems (AS/NZS 5149:2016); and

- a business with management or control of ammonia commercial or industrial refrigeration system, in which more than 100kg of anhydrous ammonia is used as a refrigerant, places signage displaying the correct hazard pictogram and statement for ammonia at the entrance to the building and the entrance to the land on which the building is located.

This change would ensure consistent application of AS/NZS 5149:2016 across all commercial refrigeration systems that use refrigerants with flammable properties – including ammonia.

There was wide support for this option from submitters. However, two key stakeholders (one representing cold storage operators and one representing academics in the refrigeration field) were opposed to the proposal.

The first stakeholder was concerned about the feasibility of upgrading older ammonia systems to meet the requirements in AS/NZS 5149:2016. MBIE considers that this concern can be addressed by clarifying the application of the Standard in the regulations. The scope of AS/NZS 5149:2016 is limited to new refrigeration systems, extensions or modifications of existing systems, and the conversion of a system for another refrigerant. Making this explicit in the regulations will remove concerns that older systems must comply with the Standard.

Owners of older ammonia refrigeration systems would of course still need to ensure that they manage their systems in accordance with the more general duties of the HSW Act, and the more specific requirements to manage pressure equipment risks under the PECPR Regulations.

The second stakeholder was of the view that the main risks associated with ammonia systems are in theory already managed sufficiently under the PECPR Regulations. However, this submitter did concede that in practice pressure piping and associated safety equipment is often ignored by equipment inspectors carrying out periodic checks under the PECPR Regulations and that these persons often have limited familiarity with refrigeration and the particular risks of the process. MBIE considers that the PECPR Regulations alone are not sufficient to manage all risks associated with ammonia refrigeration systems.

This change would also ensure consistent application of current signage requirements across all commercial and industrial refrigeration systems that use refrigerants with flammable properties – including ammonia.

This option would enable the primary criteria (effectiveness) to be adequately met. It would help to establish a common understanding of requirements for the design, construction,

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installation, operation, maintenance, and repair of ammonia refrigeration systems between system owners, operators responsible for the day-to-day operation of the system, and refrigeration contractors used to carry out the maintenance and repair tasks.

Impact Analysis (Proposed approach)

Summary table of costs and benefits

Affected parties *(identify)*	**Comment**: nature of cost or benefit (eg ongoing, one-off), evidence and assumption (eg compliance rates), risks	**Impact** *$m present value, for monetised impacts; high, medium or low for non-monetised impacts*
Additional costs of proposed approach, compared to taking no action		
Regulated parties	Cost impacts are expected to be minimal for new ammonia refrigeration systems as compliance with AS/NZS 5149:2016 will be met during the design phase. Cost impacts may be higher for extensions or modifications of existing systems but this impact is hard to quantify and will largely depend on the current condition of the system and the scope of the extension or modification. Cost impacts associated with the proposed requirement to place signage displaying the correct hazard pictogram and statement for ammonia at the entrance to the building is expected to be minimal as most sites already comply with this basic requirement as it is good industry practice.	Low - Medium
Regulators	WorkSafe is currently carrying out operational work to improve ammonia refrigeration plant owner awareness, understanding, and compliance with current regulatory requirements. This work is being carried out from within existing baselines.	Low
Wider government	Not applicable	Not applicable
Other parties	Not applicable	Not applicable
Total Monetised Cost		Not applicable
Non-monetised costs		Low
Expected benefits of proposed approach, compared to taking no action		
Regulated parties	This change, by ensuring compliance	Medium

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	with the Standard, would reduce the risk of harm to persons and property from leaks or unintended discharges of ammonia from commercial refrigeration systems. It would help to establish a common understanding of requirements for the design, construction, installation, operation, maintenance, and repair of ammonia refrigeration systems between system owners, operators responsible for the day-to-day operation of the system, and refrigeration contractors used to carry out the maintenance and repair tasks. The second part of this change, by ensuring compliance with signage requirements, would ensure that emergency responders are aware of the refrigerant being used on site, which in turn helps to inform the tactics and equipment used when responding to an incident.	
Regulators	Avoided costs associated with a major loss of containment incident involving ammonia, which could include costs associated with investigations and legal costs.	Medium
Wider government	Avoided costs associated with a major incident, which could include: treatment and compensation costs associated with fatalities and/or serious injuries; costs associated with emergency response; and costs associated with investigations and legal costs.	Medium
Other parties	Not applicable	Not applicable
Total Monetised Benefit		
Non-monetised benefits		Medium

What other impacts is this approach likely to have?
Option 2 will improve simplicity and consistency for ammonia system designers, owners, operators, and service technicians by clarifying requirements through AS/NZS 5149:2016. However, consistent with the status quo there will be a lack of clarity and consistency of specifications and requirements in relation to older systems, as only performance-based requirements will apply. MBIE considers that this option strikes an appropriate balance between workability of rules and the need to reduce the risk of harm to persons and property from leaks or unintended discharges of ammonia by ensuring that best industry practice for the safe design, construction, installation, operation, maintenance, and repair of ammonia refrigeration

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systems is followed.

Some unions (E Tu and the Meat Workers Union) were of the view that this option could be further strengthened by requiring a higher standard of worker participation where an ammonia refrigeration systems is unable to comply with AS/NZS 5149:2016.

MBIE considers that existing requirements for worker participation are sufficient but that improved monitoring of the implementation of these requirements should be carried out as part of WorkSafe inspections of workplaces where these types of systems are used, such as meat processing plants.

WorkSafe considers a PCBU's worker engagement, participation, and representation practices when inspectors visit a workplace. WorkSafe inspectors ask questions to understand the arrangements in practice, provide relevant information, and require the PCBU to make improvements (where necessary). Enforcement action is undertaken where the PCBU has deliberately not implemented ways to engage with workers or support worker participation, and where worker participation is not working effectively.

Stakeholder views

What do stakeholders think about the problem and the proposed solution?
Refer to stakeholder views section in Part 1 of this Impact Summary.

Implementation and operation

How will the new arrangements be given effect?
Regulation changes – signage Regulation 2.5(3) of the Hazardous Substances Regulations would need to be deleted to ensure that a business with management or control of a commercial or industrial refrigeration system, in which more than 100kg of anhydrous ammonia is used as a refrigerant, places signage displaying the correct hazard pictogram and statement for ammonia at the entrance to the building and the entrance to the land on which the building is located. **Regulation changes – requiring compliance with the joint AS/NZ Standard for commercial refrigeration systems** Regulation 1.13(2) of the Hazardous Substances Regulations clarifies that these regulations (other than signage requirements at regulations 2.5 and 2.6) do not apply to a refrigeration system to which regulation 10.10 applies. Regulation 10.10 of the Hazardous Substances Regulations provides that a business with management or control of a commercial or industrial refrigeration system that contains a flammable gas refrigerant must ensure that the quantity and the means of containing the refrigerant comply with the joint AS/NZ Standard for commercial refrigeration systems. Regulation 10.2 of the Hazardous Substances Regulations clarifies that Part 10 of the regulations does not apply to anhydrous ammonia that is contained in plant in which anhydrous ammonia is used as a refrigerant.

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Consequently, deleting regulation 10.2 would ensure that regulation 10.10 also applied to anhydrous ammonia, given the flammable properties of the substance.

Regulation 10.10 would also be amended to clarify that this regulation only applies to new refrigeration systems, extensions or modifications of existing systems, and the conversion of a system for another refrigerant.

Implementation
Publicity of the changes would be required, specifically targeting the HVAC&R industry and owners of commercial and industrial ammonia refrigeration assets. This could be done as part of the work that is currently being carried out by WorkSafe to improve ammonia refrigeration plant owner awareness, understanding, and compliance with current regulatory requirements.

Compliance monitoring and enforcement
WorkSafe (as per normal processes) will target its enforcement activities to prevent most serious risk of harm, and this includes when monitoring compliance with notices. Notices would be issued when there is a significant risk, or when it is a compliance based matter. If compliance with then notice is in doubt, then the duty holder will be closely monitored. Failing to comply with an improvement or prohibition notice would normally lead to a prosecution.

Implementation risks
We anticipate that there will be some risks around duty holders lack of awareness of the requirements of the joint AS/NZ Standard for commercial refrigeration systems. This could be mitigated by awareness raising activities targeting the industry groups (e.g. the meat processing industry) that use commercial and industrial ammonia refrigeration systems.

Similar awareness raising activities will be needed to reach designers, fabricators, and installers of such systems.

Monitoring, evaluation and review

How will the impact of the new arrangements be monitored?

We will monitor the effect of the proposed changes through the collection of information from a range of sources, including:

- the number of notifiable events (serious injuries, fatalities, and loss of containment incidents) reported to WorkSafe involving ammonia refrigeration plant;
- any notifications of concern about unsafe conditions reported to WorkSafe involving ammonia refrigeration plant;
- communication between WorkSafe and: inspection bodies that periodically check the pressure equipment associated with ammonia refrigeration plant; HVAC&R contractors that specialise in ammonia based work; industry associations that represent owners of ammonia refrigeration plant (e.g. Meat Industry Association); and relevant unions (e.g. Meat Workers Union); and
- ongoing and completed investigations conducted by WorkSafe.

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When and how will the new arrangements be reviewed?
A post-implementation review of this policy should be carried out no less than five years after these changes have commenced.

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