

Regulatory impact statement amending the *Gas Safety (Gas Installation) Regulations 2018* to mandate AS 4575 for Type A appliance servicing

February 2022



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How to respond to the proposed regulatory package

Businesses, members of the public and other interested parties are invited to make submissions responding to this RIS.

All relevant materials can be accessed via Engage Victoria's website: engage.vic.gov.au

Alternatively, comments may be provided via email to the following email address:
gas.safety@delwp.vic.gov.au

Hard copy submissions will also be accepted and should be addressed to:

Manager, Energy Safety Projects
Energy Safety and Security Branch
Department of Environment Land Water and Planning
PO Box 500 East Melbourne, VIC, 8002

For further assistance about the public comment process, or to obtain copies of the RIS, please call 136 186.

Executive summary

Executive Summary

There is currently no mandated standard for the servicing of Type A appliances (such as cookers, space heaters, central heaters) in Victoria. As a result of this, there is limited capacity for the regulators to subject servicing activity to the existing audit, compliance and enforcement provisions within relevant regulations and legislation. Evidence suggests that there are inconsistent and/or inadequate approaches to servicing of Type A appliances which have resulted in adverse safety outcomes for Victorians.

Context

The *Gas Safety Act 1997* is the primary legislation for the regulation of gas safety in Victoria. It is supported by the *Gas Safety (Gas Installation) Regulations 2018* (the Regulations) which mandate standards for gasfitting work and provide procedures on gas installations. The Regulations form the key regulatory framework for the safety and work of gas appliances and installations.

The Australian Standard 4575:2019 Gas appliances - Servicing of Type A appliances (AS 4575) specifies the minimum requirements for Type A appliance servicing, repair, and conversion from one gas type to another testing for safe and correct operation, and related aspects of gas installations; and the associated quality management systems. Type A appliances include domestic and light commercial type appliances such as cookers, space heaters, central heaters, water heaters, and catering equipment and can be found in buildings, as well as in caravans, mobile homes, boats and house boats. As it refers to gas installations, the standard does not cover servicing for portable Type A appliances such as portable camping appliances. Currently, AS 4575 is only mandated in Tasmania. AS 4575 is not currently a prescribed standard in Victoria and therefore only provides guidance to practitioners on servicing work.

The Minister for Energy, Environment and Climate Change is responsible for administering the *Gas Safety Act 1997* and regulations made under this Act, including the *Gas Safety (Gas Installation) Regulations 2018*. The Minister for Planning is responsible for administering the *Building Act 1993* and regulations made under this Act, including the *Plumbing Regulations 2018*. The Victorian Building Authority (VBA) administers the licensing and registration of plumbing practitioners (gasfitters) and enforces plumbing and gasfitting standards.

The VBA administers and enforces the plumbing laws (including laws relating to gasfitting) as provided under the *Building Act 1993* and *Plumbing Regulations 2018*. It regulates Standard Gas Installations and has jurisdiction over Type A appliances where they are part of a Standard Gas Installation. The VBA also oversees the licensing and registration of gasfitters, as well as overseeing the compliance certificate regime for plumbing work (including gasfitting work on Standard Gas Installations) in Victoria. Gasfitting work currently subject to audit by VBA includes work which generates a compliance certificate.¹ Most gas servicing work does not trigger the need for a compliance certificate due to it usually costing less than the \$750 threshold and therefore is not subject to VBA audits.

Energy Safe Victoria (ESV) administers and enforces the *Gas Safety Act 1997*, the *Gas Safety (Gas Installations) Regulations 2018* and the *Gas Safety (Safety Case) Regulations 2018*. As such, ESV is responsible for regulating Complex Gas Installations. Complex Gas Installations can include both Type A and Type B appliances.

Problem

Several problems have been identified with the current gas servicing environment in Victoria. Firstly, there is some inconsistency in the servicing of Type A appliances as there is no mandatory technical standard for gas

¹ Victorian Building Authority, 'Issuing compliance certificates,' accessed via <https://www.vba.vic.gov.au/plumbing/renewals-other-requirements/compliance-certificates>

servicing work in Victoria. Inadequately serviced gas appliances can result in their malfunction which can pose health risks to household occupants, such as exposure to dangerous levels of carbon monoxide (CO) or fires and explosions. According to data supplied by ESV, since 2009-10 there have been seven deaths resulting from malfunctioning Type A appliances, three of which were associated with CO toxicity and the remaining four were associated with fire/explosion.

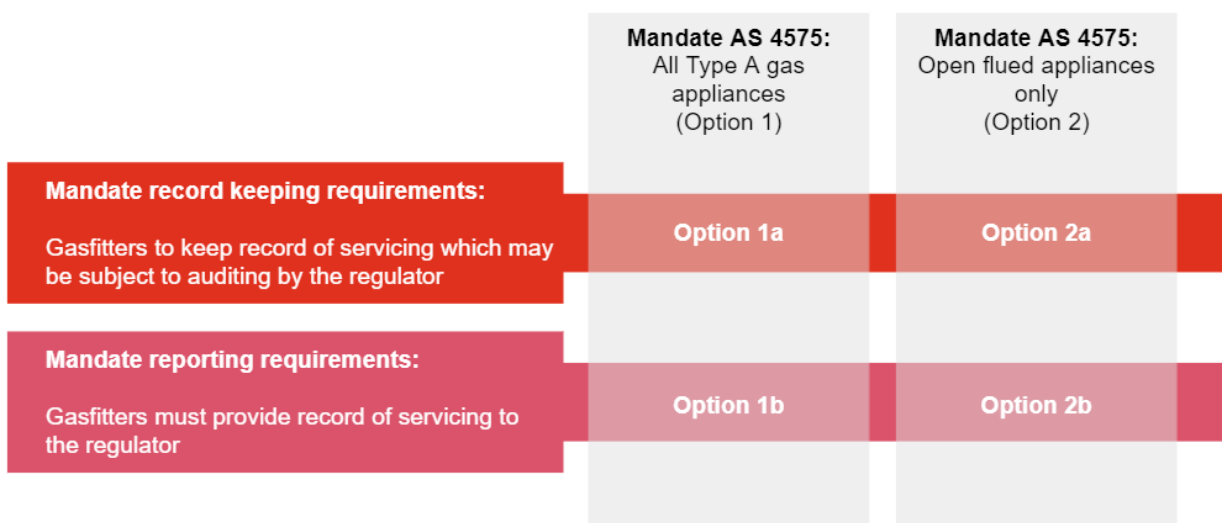
In addition, as there is not currently a mandated standard for the servicing of Type A appliances, the VBA and ESV have limited data on gas appliance servicing practices (i.e. quality, volume, frequency) in Victoria. The lack of a mandated standard limits the regulators' ability to provide appropriate and relevant education for gasfitters and/or households to address any emerging trends and/or risks. It also limits the ability of the regulators to design and implement targeted compliance and enforcement activities.

Consultation to date has indicated there is agreement between government and industry stakeholders that more prescriptive regulation of gas appliance servicing standards, if supported by a suitable compliance and enforcement strategy, would improve community safety outcomes.

Regulatory options

The key objective of the proposed reform is to improve safety of the public in relation to the use of gas appliances.

The Victorian Government is considering four options (including sub-options) to amend the *Gas Safety (Gas Installation) Regulations 2018* to mandate AS 4575 for gas servicing work and introduce supporting amendments to collect data on gas servicing work carried out in Victoria. Two overarching options (Options 1 and 2) have been developed that mandate AS 4575 for different scopes of gas appliances, along with two sub-options (a and b) relating to data collection and reporting requirements. The options are outlined below:



Under Option 1, AS 4575 would be mandated for all Type A appliances, which means that gasfitters would be required to apply AS 4575 for every Type A appliance they service. Option 2 provides a more targeted approach by mandating AS 4575 for the servicing of open-flued gas appliances only. Open-flued gas appliances pose the greatest risk in terms of CO spillage compared with non-open flued Type A appliances.

The subset of options for data collection reflects different requirements for record-keeping and reporting. Under sub-options 1a and 2a (record-keeping), gasfitters would be required to create a record of the service and retain it for 7 years. The VBA would be able to request this information as part of its compliance activities. Under sub-options 1b and 2b (reporting), gasfitters would be required to report key information to the VBA soon after each service.

Stakeholder consultations

To inform the development of this RIS, stakeholder consultations were conducted in October 2021 with the following stakeholders:

- Australian Gas Association
- Department of Justice and Community Safety
- Energy Safe Victoria
- Gas Appliance Manufacturers Association of Australia
- Master Plumbers
- Plumbing Advisory Council
- Plumbing Industry Climate Action Centre
- Plumbing and Pipe Trades Employees Union
- Victorian Building Authority.

DELWP also undertook preliminary consultation with government, industry and community groups on options to mandate AS 4575 in March 2021.

Analysis of options

The options have been assessed using (1) a breakeven analysis that considered the costs of each option and the required level of benefits (avoided deaths and injuries) in order for the benefits to fully offset the costs, and (2) a multi-criteria analysis (MCA) that assessed the options against a broader set of quantitative and qualitative benefit and cost criteria to provide an overall balanced assessment. The MCA provides a relative assessment of the benefits of each option, given that an absolute assessment of the quantum of benefits is not possible due to uncertainties around the number of future deaths and injuries that would occur under the base case and the precise extent to which each option would avoid any particular death or injury.

Breakeven analysis

The direct health benefits assessed in the breakeven analysis relate to:

- avoided fatalities
- avoided serious injuries
- avoided minor injuries.

The direct costs associated with the options affect industry and government. For industry, the key costs relate to the additional time required to conduct an AS 4575 compliant service and to undertake record keeping and/or reporting of gas service work done. The costs to government relate to developing and implementing the I.T. platform for gasfitter reporting and the ongoing costs associated with monitoring and compliance activities under the new requirements.

Table 1 outlines the estimated cost categories and potential time impacts associated with the reform and the relevant cost assumptions. A sensitivity analysis was conducted to consider the impacts of varying key cost assumptions on the total cost of each option.

Table 1: Overview of costs and relevant assumptions

Assumption	Estimated time	Comment
Costs associated with servicing (to AS 4575)	10 minutes (additional)	Based on stakeholder input on the average additional servicing time that could be required for gasfitters providing servicing where it does not currently meet AS 4575
Cost associated with record-keeping	10 minutes	Based on stakeholder input and assumes that record-keeping requirements will only affect those servicing jobs where AS 4575 or equivalent is not currently applied.
Cost associated with reporting	5 minutes	Assumes an online or app-based reporting system

Table 2 provides a summary of the cost results for each option.

Table 2: Summary of estimated costs of each option (PV over 10 years) - \$ million

Cost type	Cost recipient	Option 1a	Option 1b	Option 2a	Option 2b
Cost of purchasing AS 4575	Industry	\$0.540	\$0.540	\$0.540	\$0.540
Cost of record-keeping	Industry	\$6.651	\$6.651	\$0.867	\$0.867
Cost of reporting	Industry	N/A	\$28.385	N/A	\$2.369
Cost of increased servicing time	Industry	\$6.651	\$6.651	\$0.867	\$0.867
Cost of implementation ²	Government	\$0.107	\$0.452	\$0.107	\$0.452
Cost of monitoring and compliance ³	Government	\$0	\$4.856	\$0	\$4.856
Total costs		\$13.948	\$47.534	\$2.381	\$9.951

The estimated costs of the options range from \$2.38m for Option 2a, through to \$47.53m for Option 1b. The key cost driver for Option 1b is the costs associated with gasfitters being required to report to the VBA on the servicing of all Type A appliances.

Since 2009-10, there have been a total of seven reported deaths in Victoria as a result of Type A appliances, with three associated with dangerous levels of CO resulting from malfunctioning or poorly serviced Type A appliances. Table 3 provides the proportion of the deaths and injuries that would need to be avoided by each option over the next 10 years in order to fully offset its costs (presented as a percentage of the deaths that have occurred in the previous 10-year period and the number of deaths). This was developed using the value of a single statistical life year and the value of a single avoided serious injury from CO and fire/explosions⁴:

² This is based on costs estimates provided by the VBA

³ This is based on cost estimates provided by the VBA. It is likely Option 2b will have smaller ongoing costs due to monitoring only a subset of Type A appliances. As such, the ongoing costs for Option 2b reflects this.

⁴ See chapter on Impact analysis of options for more information

Table 3: Proportion of avoided deaths and injuries over 10 years to breakeven (by Option)

	Option 1a	Option 1b	Option 2a	Option 2b
Proportion of total avoided deaths and injuries	19% (or 1.3 deaths)	65% (or 4.6 deaths)	3% (or 0.2 deaths)	14% (or 1.0 death)

The analysis shows that Option 1 would need to avoid between 19 per cent and 65 per cent of the deaths and injuries that have occurred in Victoria in the last 10 years involving Type A appliances. Option 2 would need to avoid between 3 per cent and 14 per cent of deaths and injuries. This may suggest that Option 2 is more likely to reduce deaths and injuries and achieve its breakeven point compared to Option 1 due to the higher risk of CO spillage among open-flued appliances and the lower breakeven level required. However, the reported cases of deaths from fire/explosion caused by faulty Type A appliances like cooktops (four deaths reported in the last decade) illustrates the significant uncertainty regarding harm caused by faulty Type A appliances. With the breakeven levels for both Option 1a and 1b lower than the seven reported deaths in the past decade due to faulty Type A appliances, the options have the potential to achieve their breakeven levels and there is value in adopting a precautionary approach to reduce the risks associated with these appliances. In this regard, Option 1b would provide the greatest reduction in health and safety-related risks.

Multi-criteria analysis

A multi-criteria analysis (MCA) was used to supplement the breakeven analysis. It captures additional non-monetised benefits that were not able to be considered in the breakeven analysis. These additional benefits relate to the improved consumer confidence that comes with having more consistent servicing quality of gas appliances and the improved information and transparency from the provision of servicing information from gasfitters to the regulator. The benefits criteria assessed in the MCA are:

- improved health outcomes (includes reduced risk of CO exposure and reduced risk of fire/explosions)
- improved regulator information and industry transparency
- increased consumer confidence and peace of mind
- improved performance and efficiency of appliances.

The cost criterion relates to the estimated costs to industry and government associated with each option.

Weightings have been allocated to each criterion based on its relative importance to the reform, with benefits and costs each having a total 50 per cent weighting. As the key focus of this reform is to improve safety for Victorian households in relation to the use of gas appliances, the 'improved health outcomes' criterion has been weighted at 30 per cent. Table 4 provides the MCA weighting and scoring of each criterion for each option:

Table 4: Multi-criteria analysis results (weighted scores shown underneath raw scores in brackets for each criterion)

Criteria	Weighting	Option 1a	Option 1b	Option 2a	Option 2b
Benefits (weighted score)	Total of 50% weighting for benefits	2.2	4.6	0.4	0.9
Improved health outcomes	30%	5 (1.5)	9 (2.7)	1 (0.3)	2 (0.6)
Improved regulator information and industry transparency	10%	1 (0.1)	10 (1.0)	0 ⁵ (0.0)	0.5 (0.05)
Increased consumer confidence/peace of mind	5%	5 (0.30)	9 (0.45)	1 (0.05)	2 (0.10)
Improved performance and efficiency	5%	5 (0.30)	9 (0.45)	1 (0.05)	2 (0.10)
Costs	Total of 50% weighting for costs	-2 (-1)	-6 (-3)	-0.3 (-0.15)	-1.0 (-0.5)
Total (weighted score)		1.2	1.6	0.25	0.4

The MCA shows that all four options are expected to have a net positive impact on society relative to the base case as all options score above zero. Options 1a and 1b are scored the highest as both options apply to a broader scope of gas appliances than Options 2a and 2b.

The following summarises the scoring of the options against the benefit criteria:

Improved health outcomes: Option 1b is expected to provide the greatest health benefits as it mandates AS 4575 for the servicing of all Type A appliances (compared with Options 2a and 2b that apply to only open-flued gas appliances). The reporting requirement under Option 1b is expected to encourage higher rates of servicing compliance by gasfitters due to the greater transparency the VBA will have of their activities (compared with Options 1a and 2a). Option 1b would also provide the VBA with detailed gas servicing information to better target its compliance activities to reduce non-compliances and consequently reduce health and safety-related risks associated with CO exposure and fire/explosions.

Improved regulator information and industry transparency for Type A appliances: Option 1b is expected to provide the most information on Type A appliances and associated servicing practices to regulators as AS 4575 will be mandatory for the servicing of all Type A appliances (compared with Options 2a and 2b where it is only applied to open-flued appliances). The inclusion of a reporting requirement allows for more timely and comprehensive information on all Type A appliance servicing activity conducted using AS 4575 to be provided to regulators (compared with Options 1a and 2a which only have a record-keeping requirement). This would support more informed engagement and compliance activity and policy development, both in community awareness and regulatory interventions such as tracking product recalls.

⁵ While this is scored higher than the baseline, this scoring has been rounded down to 0.

Increased consumer confidence: Option 1b is expected to provide the greatest level of consumer confidence as not only will AS 4575 be mandatory for servicing work on all Type A appliances (unlike Options 2a and 2b where it is only applied to open-flued gas appliances), but the reporting requirement would also provide the additional accountability for gasfitters to meet AS 4575 (compared with Options 1a and 2a).

Improved performance and efficiency: Option 1b is expected to provide the greatest improvement in the performance and efficiency of Type A appliances as it will require the servicing of all Type A appliances in accordance with the requirements of AS 4575. In addition, the oversight provided by the regulator of this work due to the reporting requirements under Options 1b and 2b would lead to greater accountability by gasfitters carrying out servicing work and therefore encourage higher compliance rates and safer appliances.

Preferred option

Option 1b scored the highest overall in the MCA, meaning it is expected to provide the greatest net benefit factoring in its costs.

Option 1b provides significantly greater benefits to deliver on the government's objectives in relation to improving the safety of Type A appliances. These benefits primarily relate to reducing deaths and injuries from CO exposure, fire and explosion and other risks, as well as providing greater information and transparency to the regulator to support compliance activities and enable more targeted interventions where required. The option would also help to improve the performance and efficiency of gas appliances leading to energy cost savings for consumers and reduced environmental emissions compared with the base case.

The breakeven analysis found that Option 1b would need to avoid around 65 per cent of the deaths and injuries involving Type A appliances that have occurred in the last 10 years in Victoria in order to be justified on direct health benefits alone. Given the additional broader non-monetised benefits considered in the MCA, this Option would be expected to provide net benefits even at a lower level of avoided deaths and injuries.

This conclusion aligns with stakeholder feedback provided during the RIS development process, with stakeholders generally supporting a mandate of AS 4575 for servicing across all Type A appliances with associated reporting obligations.

Implementation and evaluation

To implement Option 1b, the *Gas Safety (Gas Installation) Regulations 2018* would need to be amended to mandate AS 4575 and introduce record keeping and reporting requirements (see Appendix A for the draft regulatory amendment). The new requirement is expected to commence by mid-2022. In the lead up to its commencement, there would be targeted engagement with industry and other stakeholders on the proposed reforms, along with development of industry guidance information and seminars. An evaluation strategy will be developed to assess the effectiveness of the reform, with the evaluation scheduled to commence three years after the implementation of the reform.

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Glossary

Acronym	Full name
ABS	Australian Bureau of Statistics
AGA	Australian Gas Association
AS	Australian Standard
BCA	Building Code of Australia
CO	Carbon monoxide
COHb	Carboxyhaemoglobin
DELWP	Department of Environment, Land, Water and Planning
ESV	Energy Safe Victoria
MCA	Multi-criteria analysis
OFGSH	Open flued gas space heaters
RIS	Regulatory Impact Statement
VBA	Victorian Building Authority
the Regulations	<i>Gas Safety (Gas Installation) Regulations 2018</i>

1 Introduction

Gasfitters in Victoria operate within a complex legislative and regulatory framework. The *Gas Safety Act 1997* is the primary legislation for the regulation of gas safety in Victoria. The Act is supported by the *Gas Safety (Gas Installation) Regulations 2018*, which prescribes standards for gasfitting work and provides procedures for Complex Gas Installations. Together they form the key regulatory framework for the safety and work of gas appliances and installations, with Energy Safe Victoria (ESV) responsible for ensuring new and existing gas installations meet the requirements in accordance with the Act and Regulations.

The *Building Act 1993* and *Plumbing Regulations 2018* are other key legislative and regulatory documents in the regulation of gasfitting. The *Building Act 1993* adopts the provisions of the *Gas Safety Act 1997* that relate to the carrying out of gasfitting work into the plumbing laws, sets out the requirements for the registration and licensing of gasfitters and establishes a compliance certificate regime for all plumbing work (including gasfitting work). The *Plumbing Regulations 2018* prescribe the scopes of work for the classes of plumbing work in Victoria. The *Building Act 1993* also establishes the Victorian Building Authority (VBA) as the regulator for building and plumbing work in Victoria, which includes work associated with Standard Gas Installations.

The Australian Standard 4575:2019 Gas appliances - Servicing of Type A appliances (AS 4575) provides the required minimum standards for Type A appliance servicing. These include domestic and light commercial type appliances such as cookers, space heaters, central heaters, water heaters, and commercial catering equipment and can be found in buildings, as well as in caravans, mobile homes, boats and house boats. Compliance with AS 4575 is currently voluntary in Victoria as it is not mandated in any of the above regulatory regimes.

AS 4575 was first published in 2005 by Standards Australia to provide a minimum set of technical requirements for the servicing, repair, conversion, testing and management of Type A appliances (e.g. gas heaters, stoves and hot water services). AS 4575 was revised in 2019 due to the age of the standard. The standard now contains revised spillage tests for open flued appliances, which reflects their risk profile, and includes an example of a checklist for gasfitters to complete. The revision also incorporated a recommendation made by the Victorian Coroner following the death of Ms Sonia Sofianopoulos from CO poisoning from an OFGSH.

By contrast, Type B appliances are defined in the *Gas Safety Act 1997* as appliances with a gas consumption exceeding 10 megajoules per hour, including any components and fittings of that appliance downstream of and including the appliance manual shut-off valve. Examples of Type B appliances include industrial boilers and incinerators. Type B appliances are beyond the scope of the proposed reform and are therefore not considered in this Regulatory Impact Statement (RIS).

The Department of Environment, Land, Water and Planning (DELWP) is considering two options for mandating of AS 4575 within the *Gas Safety (Gas Installation) Regulations 2018*, with two sub-options on ways in which record-keeping and reporting of gas servicing work should be conducted. The purpose of this RIS is to describe the options and consider their costs and benefits, impacts on affected stakeholders, and the implementation pathway for the preferred option.

Scope of this RIS

AS 4575 refers to Type A appliances specifically in gas installations, the RIS does not consider Type A appliances that are portable such as portable camping appliances. In addition, in accordance with the *Gas Safety (Installation) Regulations 2018*, the RIS will focus on Type A appliances that are within the definition of Standard Gas Installations. These are gas installations that meet specific criteria detailed in the *Gas Safety Act* and Regulations and can be found in the following residential premises:

- buildings defined as Class 1a buildings under BCA Volume Two;

- buildings defined as Class 2 buildings under BCA Volume One that have 5 storeys or fewer above the ground;
- residential premises in buildings defined as Class 2 buildings under BCA Volume One that have more than 5 storeys above the ground if the premises are occupied or have been previously occupied
- caravans and mobile homes

Actions outside of tests for CO spillage to address negative pressure environments, such as the provision of education materials to educate homeowners on ways to mitigate this, are considered a matter beyond the scope of this RIS.

Mandating the frequency of servicing is also outside the scope of this RIS. While servicing frequency is currently mandated within specific housing situations, such as residential tenancies and public housing, there are insufficient policy levers to require owner-occupiers to adhere to a regular servicing schedule.

RIS Structure

The RIS is structured as follows:

- Section 2: provides the strategic context behind mandating AS 4575 and the inclusion of additional records management requirements for gas servicing work
- Section 3: explores the key problems associated with the current regulatory framework for gas servicing and the risks associated with carbon monoxide exposure from Type A appliances
- Section 4: outlines the reform's objectives
- Section 5: details the options for mandating AS 4575 and the ways for which records management could be applied for gas servicing work
- Section 6: provides the impact analysis of the cost and benefits of the options and the methodology used
- Section 7: outlines the preferred option
- Section 8: sets out the implementation plan and evaluation strategy for the preferred option.

2 Background

2.1 Gas usage in Victorian homes

Victorian homes are the most gas-connected across all the Australian jurisdictions, with 2,089,000 homes connected to gas or 76 per cent of all Victorian households.⁶ Type A appliances are a ubiquitous feature among Victorian households, with an estimate of 5,233,000 residential gas network-connected appliances, far exceeding that of all other households in other Australian jurisdictions.⁷ Table 5 provides detailed information on gas usage by jurisdiction.

Table 5: Gas usage among Australian households by jurisdiction

	Aus.	ACT	NSW	QLD	SA	TAS	VIC	WA
Homes connected to gas ('000)	5,163	153	1,491	211	450	13	2,089	757
Percentage of homes connected to gas	48%	73%	43%	10%	56%	5%	76%	68%
Average household gas consumption (GJ pa)	32	33	20	9	17	30	54	13
Percentage of total jurisdictional household energy from gas	45%	54%	30%	4%	36%	5%	71%	35%
Percentage of energy from gas for average electricity and gas connected household	63%	62%	50%	31%	51%	49%	76%	44%
Length of distribution gas mains (km)	97,646	4,933	27,566	7,123	8,420	839	34,203	14,362
Estimated residential gas network-connected appliances ('000)	12,169	286	3,302	643	1,003	33	5,233	1,669

Source: Energy Networks Australia, 'Reliable and clean gas for Australian homes,' July 2021

Gas heaters are a key gas appliance in Victorian homes. Households that have gas use an estimated 65 per cent of their gas usage for heating.⁸

⁶ Energy Safety Networks Australia, 'Reliable and clean gas for Australian Homes,' July 2021.

⁷ Ibid.

⁸ ACIL Allen, Energy Consumption Benchmarks, Electricity and Gas for Residential Customers (2017) as cited in Energy Networks Australia, 'Reliable and clean gas for Australian homes,' July 2021, p. 4.

2.2 Safety risks

2.2.1 Risk of fire and explosion

Natural gas is flammable and presents a risk of fire and explosion. Faulty Type A appliances could be a cause of this. Potential consequences include injuries such as burns and smoke inhalation as well as property damage. Appropriate servicing of Type A appliances would reduce such risks.

2.2.2 Risks of carbon monoxide on human health

Carbon monoxide (CO) is an invisible and odorless gas. Exposure to high concentrations of CO can result in adverse health outcomes and in extreme circumstances, death. While having a gas installation installed by a qualified gasfitter is the first point in mitigating unsafe levels of CO in a residence, unsafe levels of CO within a residence can still occur if the Type A gas appliance is faulty, there is poor or inadequate ventilation, and/or the gas installation is faulty/non-compliant. This risk is further exacerbated by a lack of servicing or inadequate servicing. This risk increases as houses are built or renovated to be draught proof in order to improve the energy efficiency of the building. Draught proofing results in less adventitious ventilation which can cause a negative pressure build-up in a building when extraction systems such as bathroom exhaust fans and kitchen rangehoods are operated. This negative pressure can result in combustion products, including carbon monoxide, being drawn back into a building

Symptoms that indicate exposure to CO typically range from flu-like symptoms to serious illness and sometimes death at higher levels of exposure.⁹ The process in which exposure to CO results in CO poisoning first occurs through the absorption of CO into the bloodstream after entering through the lungs. Once this occurs, CO is combined with haemoglobin (Hb) to form carboxyhaemoglobin (COHb).¹⁰ The risk of this occurring is high as the bond to haemoglobin for carbon monoxide is 245 times as strong compared to oxygen,, results in little oxygen being transported through the body cells due to oxygen being quickly displaced.¹¹ The higher the percentage of COHb in the bloodstream, the greater the severity of the CO poisoning.

Table 6 provides a depiction of the variable levels of harm towards human health as a result of CO poisoning:

⁹ Safe Work Australia, 'The risk of carbon monoxide poisoning from domestic gas appliances,' February 2012, p. 2.

¹⁰ Safe Work Australia, 'Hazardous Chemical Information System (HCIS) Exposure Standard Documentation: Carbon Monoxide,' accessed via <http://hcis.safeworkaustralia.gov.au/ExposureStandards/Document?exposureStandardID=111>

¹¹ Coroners Court of Victoria, 'Inquest into the death of: Sonia Sofianopoulos (File no. COR 2017/3566), p. 20.

Table 6: Health effects of COHb blood levels on health adults

% COHb	Effects
0.3 - 0.7	No signs and symptoms. Normal endogenous level.
2.5 - 5	No symptoms. Compensatory increase in blood flow to certain vital organs. Patients with severe cardiovascular disease may lack compensatory reserve. Chest pain of angina pectoris patients is provoked by less exertion.
5 - 10	Visual light threshold slightly increased.
10 - 20	Tightness across the forehead. Slight headache. Visual evoked response abnormal. Possibly slight breathlessness on exertion. May be lethal to foetus. May be lethal for patients with severe heart disease.
20 - 30	Slight or moderate headache and throbbing in the temples. Flushing. Nausea. Fine Manual dexterity abnormal.
30 - 40	Severe headache, vertigo, nausea and vomiting. Weakness. Irritability and impaired judgement. Syncope on exertion.
40 - 50	Same as above, but more severe with greater possibility of collapse and syncope.
50 - 60	Possibly coma with intermittent convulsions and Cheyne-Stokes respiration.
60 - 70	Coma with intermittent convulsions. Depressed respiration and heart action. Possibly death.
70 - 80	Weak pulse and slow respiration. Depression of the respiratory centre leading to death.

Source: Safe Work Australia

2.2.3 Phase out of open flued gas space heaters

The Victorian Government has recently initiated a range of policy initiatives to improve gas safety in residential dwellings. Open-flued gas space heaters (OFGSHs) are being phased out via fast-tracked amendments to the relevant Australian Standards requiring conformance with new safety requirements. The new amendments will require OFGSHs to shut down safely in a negative pressure environment to address risks associated with CO spillage among OFGSHs.¹² The Victorian Government's decision to phase out the existing technology associated with OFGSHs was in response to the Coroner Inquest into the death of Ms Sonia Sofianopoulos from CO poisoning emitted from an OFGSH installed in her home. The amendment does not focus on the wholesale removal of existing OFGSHs, but rather, future sales of them.¹³

While exposure to background levels of CO may commonly occur in an urban environment, exposure to high concentrations of CO is harmful and potentially lethal. In the case of Ms Sofianopoulos, toxicological analysis of her blood detected elevated COHb at 64 per cent saturation.¹⁴ By comparison, normal concentrations of CO in an urban environment among non-smokers is 2 per cent and among heavy smokers, may reach 6 per cent.¹⁵

The focus on OFGSHs is due to their higher risk for CO spillage compared to other flued and flueless Type A appliances. This is a result of their open-flued design which, in combination with internal or external factors like powerful exhaust fans or a blocked flue, can lead to CO spillage. Figure 1 illustrates the difference between open-flued space heaters and room sealed space heaters and how open-flued space heaters are more susceptible to a negative pressure environment and the spillage of CO into the room.

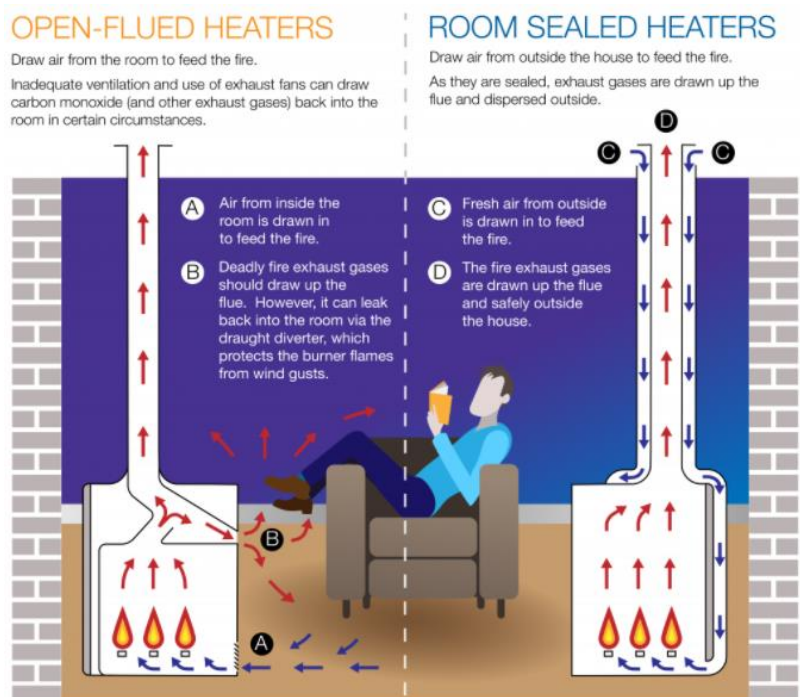
¹² Deloitte Access Economics, 'Regulatory Impact Statement: Phase out of Open Flued Gas Space Heaters,' p. 12.

¹³ Ibid, p. 6

¹⁴ Coroners Court of Victoria, 'Inquest into the death of: Sonia Sofianopoulos (File no. COR 2017/3566), p. 8.

¹⁵ Ibid.

Figure 1: Open-flued heaters vs room sealed heaters¹⁶



While the phase out of open flued gas space heaters is to occur via the obligation to adopt new safety requirements by 1 January 2022¹⁷ which allow for the mitigation of CO spillage among newly manufactured OFGSHs, this will not apply to existing OFGSHs currently installed in homes. Among these households, it is estimated there are approximately 287,000 OFGSHs installed as of the end of 2020.¹⁸ As such, risks continue to exist in currently installed OFGSHs in many homes.

2.2.4 Coroner's Inquests recommendations to improve gas safety

The Coroner's Inquest into the death of Sonia Sofianopoulos produced eight recommendations, which included that the Australian Gas Association and Energy Safe Victoria collaborate to implement a strategy and a plan to phase out OFGSHs, with DELWP leading this policy proposal.¹⁹ In addition to the death of Ms Sofianopoulos, there have been other confirmed deaths from CO poisoning in Victoria including that of Chase and Tyler Robinson in 2010.²⁰ An additional five serious yet non-fatal cases of likely CO poisoning were also confirmed during this period and possibly linked to OFGSHs.²¹ The number of incidents associated or likely associated with exposure to high levels of CO poisoning from OFGSHs has highlighted to the Victorian Government the need to improve gas safety in Victorian homes and to mitigate the risk of CO poisoning in households.

In addition to the phase out of OFGSHs, the Victorian Government has implemented (or is in the process of implementing) the following measures based on the recommendations from the Coroner's Inquest:

- The VBA has assessed issues associated with the provision of compliance certificates for the servicing, testing and maintenance of OFGSHs and identified that the cost of the majority of gas servicing work

¹⁶ Energy Safe Victoria, 'FAQs - Open-flued gas heaters and ventilation,' accessed via <https://esv.vic.gov.au/safety-education/gas-safety-at-home/heating-your-home-with-gas/open-flued-heaters-faqs/>

¹⁷ It includes the requirement for all new open flued gas space heaters to shut down within 15 minutes under negative pressure conditions to prevent long term CO spillage.

¹⁸ Deloitte Access Economics, 'Regulatory Impact Statement: Phase out of Open Flued Gas Space Heaters,' p. 38.

¹⁹ Victorian Government Response to Coroners Court inquest into the death of Sonia Sofianopoulos - Implementation Update, 25 October 2019.

²⁰ Coroners Court of Victoria, 'Inquest into the death of: Tyler Robinson (File no. COR 2010/2038), Coroners Court of Australia, 'Inquest into the death of Chase Robinson (File No. COR 2010/2037).

²¹ Deloitte Access Economics, 'Regulatory Impact Statement: Phase out of Open Flued Gas Space Heaters,' p. 16.

falls below the threshold for a compliance certificate and therefore will not trigger its lodgement. A range of policy options were identified, noting that any changes to the compliance certificate triggers will require an amendment to the *Building Act 1993*. This has been highlighted to DELWP for possible future amendment.

- The VBA and ESV administered a joint CO training program requiring all gasfitters to complete and pass a training module and examination on combustion spillage testing as a condition of renewal of their registration and licence. An online instructional video on negative pressure and carbon monoxide spillage was also developed for gasfitters.
- ESV has commenced a research project on how it communicates to stakeholders in the delivery of guidelines, changes to legislation, and industry updates
- The launch of the 'Be Sure' campaign by ESV to increase carbon monoxide awareness in Winter 2019.
- Annual carbon monoxide spillage and negative pressure testing education/information for gasfitters by the VBA and ESV in collaboration with Master Plumbers.

In addition, the Coroner's Inquest was also a factor in the decision to develop a continuous professional development (CPD) scheme for registered builders and licensed and registered plumbers. This is expected to be introduced by mid-2022.²²

²² Engage Victoria, 'Continuous Professional Development for Builders and Plumbers', accessed via <https://engage.vic.gov.au/continuing-professional-development-builders-and-plumbers>

2.3 Type A appliance servicing

The *Gas Safety Act 1997* (the Act) defines a Type A appliance as:

- an appliance (including a second-hand appliance) for which an acceptance scheme has been authorised by ESV in accordance with section 68²³, or
- an appliance that has been accepted under section 69

The *Plumbing Regulations 2018* uses the same definition as the Act for Type A appliances with Type A appliance servicing work defined in the *Plumbing Regulations 2018* as “the internal cleaning, maintenance, and adjusting of a Type A appliance and includes adjustment, repair or replacement of a component of the Type A appliance.”²⁴

For the purposes of this reform, including both this RIS and the draft regulations, the *Plumbing Regulations 2018* definition of Type A appliance servicing has been used.

Type A gas appliances include domestic and light commercial type appliances such as cookers, space heaters, central heaters, water heaters, and catering equipment.²⁵ As AS 4575 refers to gas installations, the standard does not cover servicing for portable Type A appliances such as portable camping appliances. For the purposes of categorisation and for ease of analysis, Type A appliances can be broadly classified into the following functions²⁶:

- space heating
- water heating
- cooking.

The classification above does not include laundry drying, refrigeration, decorative effect, and small gas engines. This is because of the expected relatively small number of these Type A appliances in Victoria and a lack of available data. However, these Type A appliances are included in the total number of Type A appliances used in the RIS.

Open-flued appliances are considered a subset of Type A appliances. An open-flued appliance is defined as “an indoor appliance that is connected to a flue system with combustion air being drawn from the room or space in which it is installed.”²⁷ Examples include open-flued gas space heaters and open-flued water heaters.

Only a licensed or registered gasfitter with the requisite competencies and experience can carry out Type A appliance servicing work. This means that the gasfitter must hold a licence or registration in the specialised class of Type A appliance servicing work in order to carry out this work. Licensed gasfitters have responsibility over the supervision of registered gasfitters undertaking Type A appliance servicing work. They can certify and issue a compliance certificate for this work and must hold relevant and current insurance.²⁸

²³ This refers to ESV's acceptance schemes for gas appliances in which they must 'accept' the safe design of a gas appliance before it can be legally supplied, sold or installed in Victoria. Within the residential sector, this is usually done through a certification system run by organisations like the Australian Gas Association (AGA), SAI Global, IAPMO R&T Oceana, Global-Mark or BSI.

²⁴ Regulation 37, *Plumbing Regulations 2018*

²⁵ Energy Safe Victoria, 'Is your gas heater safe?,' accessed via <https://esv.vic.gov.au/campaigns/carbon-monoxide/>.

²⁶ ACIL Allen Consulting, 'Energy consumption benchmarks: Electricity and gas for residential customers,' p. 85.

²⁷ Standards Australia, AS 4575:2019 Australian Standard Gas appliances - Servicing of Type A appliances

²⁸ Victorian Building Authority, 'Engaging a plumber,' accessed via <https://www.vba.vic.gov.au/consumers/home-renovation-essentials/engaging-plumber>

Tables 7 illustrates what is required to be qualified in Type A appliance servicing work:

Table 7: Eligibility requirements for endorsement in Type A appliance servicing

Level	Requirements
Registration level	<ul style="list-style-type: none"> ● Registration in the parent gasfitting class ● Registered in the specialised class of Type A appliance servicing work ● Hold a Restricted Electrical Worker's Licence ● Completed the competency unit CPCGS4022A Service Type A appliances ● Successfully complete the VBA examinations of registration competencies for Type A Appliance Servicing work
Licensing level	<ul style="list-style-type: none"> ● Licensed in the parent gasfitting class ● Licensed in the specialised class of Type A appliance servicing work ● Hold a Restricted Electrical Worker's Licence ● Completed the following competency units: <ul style="list-style-type: none"> ○ BSBSMB401A Establish legal and risk management requirements of small business ○ CPCPCM4011A Carry out work based risk control processes ○ CPCPCM4012A Estimate and cost work ○ CPCPGS4022A Service Type A gas appliances ● Successfully complete the VBA examinations of licence competencies for Type A Appliance Servicing work

2.3.1 AS 4575

The Australian Standard 4575:2019 Gas appliances - Servicing of Type A appliances (AS 4575) provides the minimum standards for Type A appliance servicing. First introduced in 2005, AS 4575 was revised in 2019 to include a procedure for the testing of open-flued gas appliances for CO spillage in response to recommendations from the Coroner's Inquest into the death of Ms Sonia Sofianopoulos. In addition to testing for CO spillage, the standard also covers the following²⁹:

- competency
- preparation to work including site familiarisation and OH&S risk assessment
- electrical safety
- appliance inspection
- steps to take when encountering unsafe appliances or installations
- equipment requirements
- general servicing requirements
- replacement or repair of components
- gas type conversion

Within Victoria, compliance with AS 4575 is currently voluntary as it is not prescribed in Victorian Regulations.³⁰ One of the standards currently prescribed for gasfitting work under the *Gas Safety Act 1997* is AS/NZS 5601.1 (Standard Gas Installations). This sets out requirements for the installation of Type A appliances. Servicing of Type A appliances, post-installation, is not within the scope of AS/NZS 5601.1. Across Australian states and territories, only Tasmania has mandated AS 4575. This was achieved through the introduction of the *Occupational Licensing (Standards of Gas-fitting Work) Code of Practice 2019* which came into effect from 25 September 2019 in which servicing is prescribed, using AS 4575 as the relevant standard for the carrying out of gas-fitting work.

²⁹ Energy Safety Victoria, 'AS 4575: 2019 Gas appliances – Servicing of Type A appliances,' accessed via <https://esv.vic.gov.au/news/as4575-2019-servicing-of-type-a-appliances/>

³⁰ In contrast, AS/NZS 5601 is currently mandated in the Gas Safety (Gas Installation) Regulations 2018. It requires that any gas installations are made safe upon completion of the installation, however, it does not apply to servicing work alone. It also includes a requirement for commissioning of an appliance after its installation or after conversion or repairs and includes CO testing.

2.4 Regulatory environment

The compliance environment for the regulation of gasfitting work in Victoria is complex and involves much legislation, multiple regulations, and multiple regulatory agencies. Table 8 provides an overview of the regulatory framework:

Table 8: Summary of regulatory framework for gasfitting

Name	Role
<i>Gas Safety Act 1997</i>	Primary legislation for the regulation of gas safety in Victoria. Administered by Energy Safe Victoria
<i>Building Act 1993</i>	Primary legislation (in particular, Part 12A) for the regulation of building and plumbing activity in Victoria (including gasfitting work on Standard Gas Installations) in Victoria and for the registration and licensing of all plumbing practitioners, including gasfitters. Administered by the Victorian Building Authority.
<i>Plumbing Regulations 2018</i>	Provides detailed requirements for plumbing (including gasfitting) work in Victoria to ensure work is carried out safely and competently, including prescribing the scopes of work for a number of classes of plumbing work, including classes of gasfitting work.
<i>Gas Safety (Installation) Regulations 2018</i>	Provides detailed requirements for gas installation work in Victoria to ensure work is carried out safely and competently. This includes prescribing technical standards for carrying out gasfitting work in Victoria.
Victorian Building Authority	Independent regulatory authority for the building and plumbing industries (including accreditation of practitioners) in Victoria

2.4.1 Key regulatory bodies

The section outlines key elements of the regulatory environment as it relates to gas safety of Type A appliances in Victoria.

Victorian Building Authority

The Victorian Building Authority (VBA) is the regulatory authority responsible for the regulation of building and plumbing practitioners and building and plumbing work (including gasfitting work) and to provide information, advice and training to practitioners, industry and consumers through compliance, licensing, registration and advice functions.

Within the context of gasfitting work in buildings, the VBA administers and enforces the plumbing laws (including laws relating to gasfitting work) as provided under the *Building Act 1993* and *Plumbing Regulations 2018*. The VBA is also responsible for the registration and licensing of plumbing practitioners (including gasfitters) as well as managing the compliance certificate regime for plumbing work (including gasfitting). In addition, the VBA also regulates Standard Gas Installations and has jurisdiction over Type A appliances where they are part of a Standard Gas Installation.³¹

³¹ Standard Gas Installation is defined in the Gas Safety Act (Part 1, Section 3) as a gas installation that meetings all of the following three requirements:

1. Only contains Type A appliances, AND
2. Cannot exceed prescribed limits on the following:
 - total gas consumption flow rate
 - metering pressure or operating pressure
 - number of gas supply points
3. Is installed within one of the following specified types of building or dwelling:
 - a. BCA Class 1a buildings
 - b. BCA Class 2 buildings that have 5 storeys or fewer above the ground;

Energy Safe Victoria

Energy Safe Victoria (ESV) is Victoria's safety regulator for electricity, gas and pipelines and provides independent oversight in the safe generation, supply and use of electricity, gas and pipelines. Within the context of gas in buildings, Energy Safe Victoria (ESV) administers and enforces the *Gas Safety Act 1997*, the *Gas Safety (Gas Installations) Regulations 2018* and the *Gas Safety (Safety Case) Regulations 2018*. As such, ESV is responsible for regulating Complex Gas Installations, which may contain both Type A and Type B appliances.³² In addition, it also manages the acceptance scheme for the sale of Type A appliances and investigates incidents for all gas appliance types and gas installation categories. ESV also has the power to mandate a recall of unsafe or non-compliant appliances, gas installations, and components.

2.4.2 Compliance certificates

Type A appliance servicing work is only notified to regulatory authorities in certain circumstances. Under the *Building Act 1993*, a licensed practitioner who carries out Type A appliance servicing work is only required to lodge a compliance certificate for this work if the work has a total value of \$750 or more.³³ Licensed plumbers can purchase compliance certificates from the VBA for a current fee of \$36.50 per certificate. However, the cost of servicing of a Type A appliance typically tends to fall short of this threshold and therefore does not require the lodgement of a compliance certificate. This means that a significant proportion of Type A appliance servicing work is not subject to the VBA's auditing regime. It should be noted that there are other types of gasfitting work that require the lodgement of a compliance certificate, regardless of the value of the work. This includes the installation, relocation, replacement and conversion of gas-using appliances and the installation, modification or relocation of consumer gas piping that is not carried out or on behalf of a gas company.³⁴

VBA360

Part 12A of the *Building Act 1993*, as it relates to gasfitting, provides that a compliance certificate is required for certain gasfitting activities and for any gasfitting work with a total value over \$750. The Act specifies that where a compliance certificate is required, a signed copy of the certificate must be provided to the person for whom the work was carried out, within five days of completion of the work. The Act also requires that the licensed gasfitter who carried out or supervised the work must notify the VBA that the compliance certificate has been provided to the person for whom the work was carried out, in the manner specified by the VBA. Lodging the compliance certificate via the VBA360 portal is the current manner specified by the VBA for notifying the VBA in accordance with the Act. The VBA360 portal enables gasfitters to purchase, generate and lodge compliance certificates. The compliance certificate on the VBA360 portal includes certain fields of information that gasfitters must provide as part of the certificate.

2.4.3 Residential Tenancies Regulations 2021

A minimum standard for gas servicing has recently been mandated for rental agreements (including public housing). The *Residential Tenancies Regulations 2021*, which came into effect on 29 March 2021 and applies to rental agreements that commence after that date, requires rental providers to engage an appropriately licensed or registered gasfitter³⁵ every two years to conduct regular checks (known as a "Gas Safety Check")

-
- c. residential dwellings within BCA Class 2 buildings that have more than 5 storeys above the ground, if the premises are occupied or have been previously occupied
 - d. BCA Class 5 (office) or Class 6 (retail) buildings that have 5 storeys or fewer above the ground.

³² Defined under the Gas Safety Act (Part 1, Section 3) as "a gas installation which is not a Standard Gas Installation."

³³ Section 221ZH of the *Building Act 1993* denotes that a compliance certificate must be given for any plumbing work that has a total value of \$500 or more (or any higher amount fixed by the regulations). \$750 is the fixed amount outlined in regulation 47 of the *Plumbing Regulations 2018*. In addition, certain activities or work within the prescribed classes of plumbing work require a compliance certificate to be lodged, regardless of the value of the work.

³⁴ *Building Act 1993*, section 221ZH

³⁵ The *Plumbing Regulations 2018* already requires plumbers to be licensed or registered to conduct gas work.

on gas appliances and installations. The rationale for the Gas Safety Check is to ensure the safety of renters.³⁶ As part of the servicing requirements, the Gas Safety Check includes matters which gasfitters are required to address to meet the minimum requirements of gas servicing. Examples of provisions for servicing include³⁷:

- a clean of all dust and debris from appliances including burner, pilot, fan, filters and air intakes
- a check of the integrity of the heat exchanger
- a check of the gas supply and appliance operating pressures
- a check that the gas appliance burner ignition is reliable and complete
- a check for any gas appliance flame abnormality
- a check of the operation of the gas appliance, including safety devices
- a combustion spillage test in accordance with Appendix F of AS 4575 after service or repair of the heater.

The above provisions are also included in Appendix E of AS 4575 which acts as a gas appliance servicing checklist.

2.4.4 Internal servicing standards for public housing

In addition to the Gas Safety Check, there are also internal servicing standards for public housing maintenance contracts. Examples include mandatory works to ensure said property is habitable and in a safe condition before the arrival of a new tenant with such works including the requirement to check gas installations and service gas appliances.

³⁶ Victorian State Government, 'Heading for Home, Residential Tenancies Act Review Options Discussion Paper,' Fairer Safer Housing, p. 20.

³⁷ Consumer Affairs Victoria, 'Rental providers: gas and electrical safety,' accessed via <https://www.consumer.vic.gov.au/housing/renting/repairs-alterations-safety-and-pets/gas-electrical-and-water-safety-standards/gas-and-electrical-safety>

3 Problems to be addressed

The key problems identified are the risks associated with inconsistent Type A appliance servicing (as there is no standard set of minimum requirements across residential types for this work in Victoria), and that the regulator's ability to monitor the safety of Type A appliances is hampered by limited data on gas appliance servicing as this work does not ordinarily require the lodgement of a compliance certificate. These key problems are closely intertwined as effective data on gas appliance servicing is needed to ensure regulators have oversight over gas servicing work and can appropriately manage the inherent risks.

3.1 Problem 1: Risks associated with inconsistency in Type A appliance servicing

There is evidence of significant inconsistency in the regulation of servicing work of Type A appliances in Victoria, particularly in owner-occupied settings, and therefore concern over the ongoing risks to community safety. This can be largely attributed to the lack of guidance on the minimum requirements for servicing of Type A appliances and lack of mandated standard for which Gasfitters can be held to account. The consequences of inadequate and irregular servicing include poor burning calibration, flue obstruction/blockage, or the potential for the production of CO due to burner disruption.³⁸ This results in potential adverse effects on health and safety for consumers who use Type A appliances, such as the exposure to dangerous levels of CO.

3.1.1 Health risks among inadequately serviced Type A appliances

CO spillage

There are risks associated with faulty Type A appliances, in particular in terms of CO spillage, with this risk most notable among appliances with an open flue. CO spillage as a result of poor installation or servicing, in combination with poor air quality or ventilation in a room can lead to lethal consequences for occupants. A 2012 analysis of the baseline risk of CO poisoning for a number of gas appliance types considered the theoretical likelihood of events such as burner disruption or the unsafe discharge of combustion products at a national level. It shows that appliances like internal open flued water heaters and natural draught space heaters (including open flue heaters) are most at risk for such events to occur. These results are presented in Table 9:

³⁸ ACIL Allen Consulting, 'Energy consumption benchmarks: Electricity and gas for residential customers,' p. 16.

Table 9: Theoretical baseline risk posed by appliance type³⁹

Appliance	Estimated number of injuries from CO poisoning per year ⁴⁰	Injuries per million exposed
Natural draught heater (open flue heaters)	22.1	4.9
Balanced flue heater	0	0
Flueless heater	0.1	0.1
Cooktops	0	0
Internal domestic hot water services (open flue)	0.2	4.8

Source: The Allen Consulting Group, 'The risk of carbon monoxide poisoning from domestic gas appliances,' February 2012

Further data has been provided by ESV on reported incidents related to Type A appliances. While it does not specifically identify appliances associated with the incidents as being open-flued, out of a total of 33 deaths and injuries from February 2010 to July 2021, 17 were CO poisoning related and, of those, 5 were related to space or wall heaters (which are the most likely categories of open-flued appliances). Nonetheless, with almost 300,000 OFGSHs installed in Victorian homes, the risks of CO spillage remain significant.

The following case studies describe key incidents identified by ESV relating to CO poisoning from Type A appliances which highlights the risks associated with these types of appliances:

Case study 1:

On 17 December 2020, Homes Victoria and Department of Families, Fairness and Housing notified ESV that the occupant of one of its properties had reported elevated blood CO levels. A gas heater was the suspected cause.

ESV investigated in conjunction with representatives from the manufacturer and Homes Victoria detected CO spillage from a gas cooker hotplate when operating on low flame due to the appliance regulator not performing to specification. The hotplate was subsequently isolated and a Disconnection Notice issued. A report was forwarded to Homes Victoria on 15 January 2021. This matter is now considered to be resolved.

Case study 2:

On 18 August 2020, a licensed plumber notified ESV about CO spillage from gas heaters installed in a student accommodation complex. There were 26 gas heaters installed throughout the complex, five of which failed a CO test and were isolated pending further enquiries. On 19 August 2020, ESV met the plumber on site and completed further checking and testing of the appliances as well as requesting the plumber to demonstrate how the CO test was conducted (while conducting parallel testing using calibrated test equipment).

³⁹ Recent ESV data shows that there have been incidents for low risk appliances, for example relating to cooktops. As such, Table 9 only provides an indicator of risk and does not reflect actuals.

⁴⁰ Refers to Australia. Estimates were based on risk factors associated with each appliance, including probability of burner disruption and spillage occurring which may result in CO poisoning.

Case study 3:

On 7 January 2021, the Gas Technical Regulators Committee (GTRC) notified ESV about a consumer complaint to the Australian Competition and Consumer Commission (ACCC) involving a suspected CO poisoning. ESV contacted the consumer, who confirmed the affected premises were owned and managed by Homes Victoria.

While no CO spillage was detected from the suspect appliance (a gas heater), ESV identified minor installation faults and issued an Improvement Notice to Homes Victoria, which took immediate action. A report was forwarded to Homes Victoria on 22 January 2021. This matter is now considered to be resolved.

The above case studies are illustrative of the risks associated with Type A appliances towards human health, with examples of these appliances having been directly associated with fatalities and injuries from exposure to CO. Ms Sonia Sofianopoulos and Chase and Tyler Robinson are three confirmed fatalities from CO poisoning resulting from open-flued gas space heaters in Victoria since 2010.⁴¹ Open-flued appliances, when not properly installed and maintained, can lead to environments where occupants are exposed to high concentrations of CO. This is because the safety of an open-flued appliance is dependent on the environmental conditions in which it operates. Unlike non open-flued appliances such as a room-sealed gas heater in which it should operate safely regardless of its external environment, once ventilation of the environment becomes inadequate, such as in negative pressure environments, the ability for an open-flued appliance to operate safely is affected. This is discussed further in section 3.1.2.

Industry stakeholders have noted that adequate and regular servicing of gas appliances is the primary measure of mitigating occurrences of CO exposure resulting from gas appliances as it can both test and identify changes in ventilation and identify issues and risk. This is especially important within the context of a growing stock of ageing gas appliances which exacerbates such risks. Servicing should also be in conjunction with ensuring that ventilation requirements at the time of the installation of the gas appliance were also not reduced by homeowners or occupants for the purpose of achieving greater energy efficiency of the home. The deaths of Ms Sonia Sofianopoulos and Chase and Tyler Robinson and the serious injury of Vanessa Robinson are cases where subsequent investigation concluded that the relevant gas heaters had been inadequately serviced.⁴² Table 10 provides an overview of the points raised from the Coroner's Inquests into the above cases as it related to the deficient servicing conducted:

Table 10: Occurrence of poor servicing among reported incidents

Inquest	Findings
Inquest into the death of Sonia Sofianopoulos	<ul style="list-style-type: none">Carbon monoxide testing conducted in 2015 was sub-optimal and did not comply with GN38 08/11⁴³
Inquests into the death of Chase and Tyler Robinson	<ul style="list-style-type: none">Tests to determine negative pressure conducted in either 2004 or 2005 may not have been conducted or conducted incorrectly

Source: Coroners Court of Victoria, 'Inquest into the death of: Sonia Sofianopoulos, Inquest into the death of: Tyler Robinson, Inquest into the death of Chase Robinson'

While the inquest into the death of Sonia Sofianopoulos was not able to establish a sufficient causal link between the inadequate testing for carbon monoxide and her death, it nevertheless noted that the gas servicing

⁴¹ Victorian Government response to the Coroners Court inquest into the death of Sonia Sofianopoulos, p. 4.

⁴² Coroners Court of Victoria, 'Inquest into the death of: Sonia Sofianopoulos (File no. COR 2017/3566), p. 45, Coroners Court of Victoria, 'Inquest into the death of: Tyler Robinson (File no. COR 2010/2038), p. 11, Coroners Court of Australia, 'Inquest into the death of Chase Robinson (File No. COR 2010/2037), p. 11.

⁴³ ESV - Gas Information Sheet No 38, issued in August 2011. GN 38 is a guidance document for testing gas appliances for carbon monoxide spillage using appropriate detection equipment and is supplementary guidance information for Appendix R of AS/NZS 5601.1 and Appendix F of AS 4575.

work was “sub-optimal.”⁴⁴ The findings in the inquest into the death of Chase and Tyler Robinson stated that inadequate servicing did not sufficiently address the negative pressure that contributed to the boys’ deaths.⁴⁵ The inquest also noted that the unknown gasfitter was either unlicensed or “negligent” in their approach towards servicing the appliance.⁴⁶ While gas servicing conducted by a licensed or registered gasfitter reduces the risk of an unsafe outcome from a Type A appliance, this should be coupled with servicing work that is based on an understanding of what is minimally required. As such, a common understanding of what is expected in gas servicing is also needed to prevent fatalities and injuries.

Fires and explosions

While CO exposure is the primary health risk associated with Type A appliances, other risks include potential fires and explosions from faulty Type A appliances, causing burns and smoke-induced asphyxiation and/or property damage. Industry stakeholders have noted that gas servicing, if done appropriately, would also address other risks like electrical faults and fire risks. According to data supplied by ESV, since 2009-10, four of the seven deaths in Victoria caused by malfunctioning Type A appliances were associated with fire or explosion.

Data from ESV has shown that there have been a range of gas appliances associated with such incidents including gas-based cooktops, gas-based water heaters, and gas heaters.

3.1.2 Negative pressure environments

The risk of exposure to CO is higher for occupants because appliances such as open-flued appliances are installed in the living space. This is especially true if such rooms have been installed with powerful exhaust fans coupled with inadequate ventilation. This combination may lead to a negative pressure. In other words, the indoor atmospheric pressure is lower than the outside atmospheric pressure. This can cause toxic combustion by-products like CO, to be drawn into the occupied space, rather than expelled through the flue as intended.⁴⁷

Servicing in accordance with AS 4575 is important as it ensures appliances are tested under a plausible worst-case negative pressure. However, this alone is insufficient in mitigating such risks. Owners or occupants may do things that exacerbate the problem such as blocking ventilation openings or undertaking renovation that increase the air tightness of the building envelope. For this reason, it is also important that additional measures are pursued such as the provision of education materials to owners and occupants regarding these risks. Such measures are however beyond the scope of this RIS.

Higher standards of air tightness in newer buildings

Primarily due to a relatively recent focus on energy efficiency, newer buildings will tend to be more airtight than older buildings.⁴⁸ Therefore the risk of CO spillage from open-flued appliances will tend to be greater in newer buildings. As airtightness standards increase⁴⁹, the importance of proper servicing of gas appliances will increase.

Retrofitting of existing buildings to be energy efficient

Retrofitting of a building for the purpose of making it energy efficient can include draught sealing. Notwithstanding the benefits of retrofitting from an energy efficiency perspective, draft sealing will increase the

⁴⁴ Coroners Court of Victoria, ‘Inquest into the death of: Sonia Sofianopoulos (File no. COR 2017/3566), p. 45

⁴⁵ Coroners Court of Victoria, ‘Inquest into the death of: Tyler Robinson (File no. COR 2010/2038), p. 11, Coroners Court of Australia, ‘Inquest into the death of Chase Robinson (File No. COR 2010/2037), p. 11.

⁴⁶ Ibid.

⁴⁷ Deloitte Access Economics, ‘Regulatory Impact Statement: Phase out of Open Flued Gas Space Heaters,’ p. 5.

⁴⁸ Consumer, Building and Occupational Services, ‘The detrimental effects on flued appliances when installing mechanical ventilation (exhaust fans),’ Electrical Standards and Safety Hazard Alert 3.

⁴⁹ There have been recent efforts to address this, including the introduction of the Residencies Tenancies Regulations 2021 which notes that rental providers must not unreasonably refuse a request from the tenant to provide draught-proofing of homes.

risk of CO exposure where there are open flued appliances.⁵⁰ Draft sealing of the building envelope could invalidate the results of a previous Type A appliance servicing. Within the context of new Victorian Government measures to encourage energy efficiency retrofits for existing Victorian homes⁵¹, it is important that the current inconsistency of servicing across the gasfitting industry is addressed to mitigate these risks.

3.1.3 Divergent approaches to servicing among residential housing types

The current regulatory framework does not encourage a consistent approach in gas appliance servicing across segments of the residential housing population including: owner-occupied, rental properties, and government housing. This means that risks posed by Type A appliances are not being adequately addressed across certain segments of the residential housing population relative to other segments.

As stated previously, rental properties have minimum standards of gas appliance servicing applied through the Gas Safety Check under the *Residential Tenancies Regulations 2021* which includes a number of requirements of AS 4575. The Gas Safety Check incorporates regular two-year servicing checks that include testing for CO spillage and negative pressure conditions.⁵² This corresponds with the requirements in the AS 4575 which provides information on spillage tests for open flued appliances, as well as ducted heaters and appliances incorporating a heat exchanger.⁵³ Government housing also has similar two-year servicing requirements for gas appliances.

Approximately 68.3 per cent of Victorian households are considered to be owner-occupied, 29.4 per cent considered to be private rental properties, and 2.3 per cent considered to be public housing.⁵⁴ This means there are potentially 3.6 million Type A appliances that potentially exist in owner-occupied households that are not currently subject to a mandated minimum set of standards for servicing, unlike those in rental properties. The lack of a baseline standard of servicing across the residential housing population results in varying degrees of servicing quality across the industry.

3.1.4 Adverse effects on consumer confidence

Industry representatives consulted have raised the variability in the quality of gas servicing as a key problem that adversely affects consumers' confidence in the industry. Some noted examples provided are instances of gasfitters inadequately testing for negative pressure or CO spillage, or conducting servicing in a way that is superfluous and/or inefficient, the impacts of which have been discussed above.

3.1.5 Adverse effects on overall performance and efficiency of the gas appliance

Industry stakeholders have also noted the effects of poor servicing on the overall performance of an appliance. Other than the effect it has towards safety, this also has implications on factors such as the energy efficiency and running costs of the appliance, and impacts the value for money component of the service. This holds especially true for the existing stock of ageing gas appliances in which adequate servicing is required to ensure their continuing maintenance. Additionally, the variability of servicing means consumers cannot determine the quality of the service provided. Stakeholders considered that a mandated set of minimum standards for gas servicing of Type A appliances would ensure a minimum standard in the quality of servicing work, ensure value for money for consumers, and encourage behavioural change across the industry.

⁵⁰ Sustainability Victoria, 'Comprehensive Energy Efficiency Retrofits to Existing Victorian Houses,' April 2019, p. 22.

⁵¹ Please see Sustainability Victoria's Comprehensive Retrofit Trial

⁵² Victorian Government response to the Coroners Court inquest into the death of Sonia Sofianopoulos,' p. 11.

⁵³ See Appendix F of AS 4575.

⁵⁴ Australian Bureau of Statistics, 'Housing Occupancy and Costs, Australia, 2017-18, released on 17 July 2019.

3.1.6 Inability for regulators to take compliance/enforcement action

The lack of a prescribed servicing standard for gas service work means that there is no baseline reference for the regulator to determine whether the work carried out was appropriate or not. This makes it extremely difficult for compliance and enforcement action as the lack of a prescribed standard means that gas servicing work could be carried out to varying standards, with the risks from this exacerbated by the current ageing stock of appliances (see section 3.1.1 and 3.1.5). Therefore, the minimum scope of work expected to be covered under Type A appliance servicing could vary considerably between gasfitters.

3.2 Problem 2: Regulator safety monitoring is hampered by limited data on gas appliance servicing

Type A appliance servicing work is only notified to regulatory authorities in certain circumstances, i.e. where the total works cost \$750 or more and meets the threshold requirements for a Compliance Certificate. Given this, there is limited data available on Type A appliance servicing practices (quality, volume, frequency) and this inhibits the Government's ability to understand industry servicing practices sufficiently to conduct effective monitoring, enforcement and compliance. Effective recording of work done provides valuable information which addresses the above.

3.2.1 The current compliance certificate regime does not capture the majority of gas appliance servicing work which prevents government from providing targeted compliance and enforcement

Currently, the only form of regulatory oversight over gas servicing work is via the VBA's audit regime that focuses on completed work documented in compliance certificates. The requirements for compliance certificates are set out in section 221ZH of the *Building Act 1993* which provides that a licensed plumber must issue a compliance certificate for all plumbing work⁵⁵ where the total value of the work exceeds \$750⁵⁶ or for certain types of plumbing work regardless of the value of the work. This includes a number of gasfitting activities but does not include servicing.

Based on the most recent available data, in 2019-20, there were a total of 423,875 compliance certificates lodged by licensed plumbing practitioners, a slight increase from 420,841 in 2018-19.⁵⁷ However, details as to what proportion of this number constituted Type A appliance servicing work is limited as gas servicing work only requires a compliance certificate where the total value of the work is \$750 or more. The cost of most gas servicing on Type A appliances is likely to fall below the \$750 threshold and therefore not subject to a compliance certificate. Stakeholders have suggested that the average cost of servicing for a Type A appliance per job is approximately \$250 including GST. The rationale of the \$750 threshold is based on the notion that less regulatory oversight is required for lower cost and therefore likely lower risk plumbing work, and to minimise compliance burdens on such work, noting however that certain activities, irrespective of the value of the work, will require a compliance certificate due to the nature of the risk.⁵⁸ While most gasfitting work such as gas installation work requires a mandatory compliance certificate regardless of the value of the work, gas servicing does not trigger a compliance certificate unless the value of the value is \$750 or more. This means that despite the proven safety risks associated with non-serviced Type A appliances, a significant portion of gas servicing work is unlikely to be subject to the VBA's current Plumbing Audit Program. In this program, compliance auditors base their on-site audits on the compliance certificates lodged to ensure compliance with the plumbing standards. This limitation in auditing gas servicing work is also coupled with the lack of a mandated standard for gas servicing work which the regulator can audit any servicing work against.

⁵⁵ includes the installation, reclamation or replacement of any Type A gas-using appliance.

⁵⁶ \$750 is the fixed amount outlined in regulation 47 of the *Plumbing Regulations 2018*.

⁵⁷ Victorian Building Authority Annual Report 2019/20, p. 26.

⁵⁸ Department of Land, Water and Planning, 'Regulatory Impact Statement Plumbing Regulations 2018,' p. 32.

3.2.2 Lack of adequate regulatory information to inform future policy

Victoria is considering ways to transition away from natural gas and towards more sustainable options like hydrogen. This is to help reduce emissions from gas use and halve the state's carbon emissions by 2030 and reach net zero by 2050.⁵⁹ While the aforementioned is outside the scope of this RIS, it is nevertheless worth noting as the lack of adequate oversight over current gas servicing practices inhibits the Government's ability to understand the nature and location of installed gas appliances, which affects the feasibility of the transition and associated safety risks.

3.2.3 The regulators cannot identify, diagnose and address risks associated with Type A appliances in a timely manner

A lack of data on gas appliance servicing and reporting mechanisms means it is more difficult for regulators to identify and diagnose risks that arise across the industry in a timely manner, such as identifying appliances that pose the highest risk to the community. This limitation impedes the regulators' ability to address those risks. It is for this reason that most stakeholders consulted, ranging from industry bodies to regulators have noted that it would best support compliance activities if the regulator had access to information on the servicing of Type A appliances soon after the work was completed.

3.2.4 Inadequate or inconsistent record-keeping among gasfitters

The death of Ms Sofianopoulos demonstrates the consequences of not having a consistent requirement for record-keeping or reporting of servicing work by practitioners. In addition to the inadequate servicing conducted prior to the death of Ms Sonia Sofianopoulos, the inquest also noted that the posthumous servicing of the heater was not reasonable or appropriate due to inadequate record keeping of the service and resulted in a lack of clarity on what the work had entailed.⁶⁰ This resulted in a discrepancy over what work was done and when, which impacted on the understanding of how the heater contributed to the death of Ms Sofianopoulos.

⁵⁹ Premier of Victoria, 'Have Your Say On Victoria's Gas Substitution Roadmap,' accessed via <https://www.premier.vic.gov.au/have-your-say-victorias-gas-substitution-roadmap>

⁶⁰ Ibid, p. 15.

4 Objectives of reform

Ensuring Victorians can safely use gas appliances is a key priority of the Victorian Government. As part of this, the following objectives have been identified:

- Improving safety for households in relation to the use of Type A appliances.
- Supporting an effective compliance and enforcement regime informed by appropriate information.
- Improving consumer confidence in Type A appliance servicing

These objectives are in line with the Victorian Government's broader agenda to improve gas safety for Victorian households, along with other measures already implemented to support this.⁶¹ This should be contrasted with the Victorian Government's Gas Substitution Road Map which, by comparison, places more focus on long term objectives to reducing Victoria's consumption of gas.

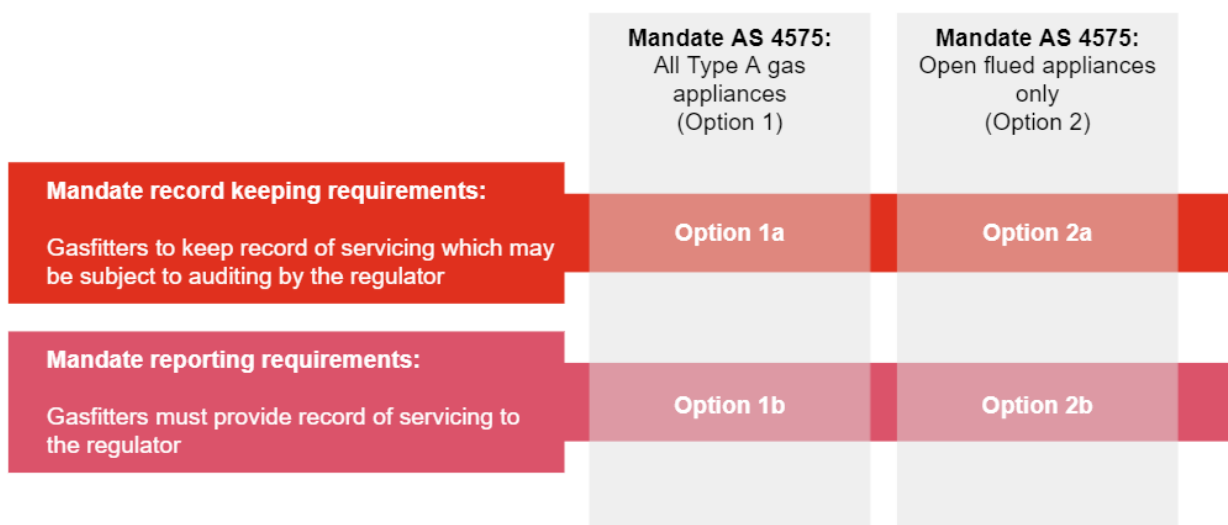
⁶¹ Examples include ongoing yearly training of gasfitters on the risks of CO and how to test for negative pressure and CO spillage, and revising AS 4575 to include guidance on negative pressure and CO spillage and a servicing checklist. In addition, there have been annual seminars and webinars held jointly between the VBA, ESV and Master Plumbers on carbon monoxide safety for gasfitters.

5 Options

The purpose of AS 4575 is to set minimum required standards for the servicing of Type A appliances and to provide guidance for gasfitters on how servicing should be performed. However, with the standard not currently being prescribed in Victoria, it means that much of the standard, including revisions made to address issues such as CO spillage and negative pressure, may not be being applied in a consistent manner.

DELWP has developed two options for how AS 4575 can be mandated to support the safety objectives, which includes two sub-options regarding what administrative, information management and record keeping requirements are needed to enable adequate monitoring, auditing and enforcement of servicing activity. Figure 2 provides an overview of these options.

Figure 2: Overview of the options



In the context of the proposed options for reform, the VBA would be responsible for establishing a compliance and enforcement regime for this gasfitting work if AS 4575 was mandated. This means the VBA would be able to use a range of compliance and enforcement powers available to ensure gas servicing work complies with the proposed regulatory requirements. This could include issuing warnings, rectification notices and/or taking disciplinary action against the responsible gasfitter.

As ESV is the State’s safety regulator for electricity, gas and pipelines and administers the provisions of the *Gas Safety Act 1997* and *Gas Safety Regulations 2018*, it would be responsible for issuing infringement notices for breaches of the Gas Safety Regulations. Both ESV and the VBA would also have a role in providing education on compliance with AS 4575.

The Draft Regulations are provided in Appendix A.

Table 11: Key regulators and their relevance to the proposed reform

Government agency	Relevance to this RIS and gas safety reform
Victorian Building Authority	The VBA has jurisdiction over Standard Gas Installations. In the context of this reform, the VBA would be responsible for establishing a compliance and enforcement regime for the gasfitting work if AS 4575 was mandated.
Energy Safe Victoria	Energy Safe Victoria (ESV) is the State's safety regulator for electricity, gas and pipelines. It is an independent government agency responsible for the safe generation, supply and use of electricity, gas and pipelines. ESV oversees both the installation and the ongoing operation of Complex Gas Installations which may include both Type A and Type B appliances. Where a Type A appliance is within a Complex Gas Installation, it is under ESV's jurisdiction.

5.1 Option 1: Mandate AS 4575 for all Type A gas appliances

Option 1 provides for the mandating of AS 4575 for all Type A appliances. This means gasfitters would be required to apply AS 4575 for every Type A appliance that they service, irrespective of its risk profile.

5.2 Option 2: Mandate AS 4575 for open flued appliances only

Option 2 provides a more targeted approach towards the mandating of AS 4575 in which gasfitters would be required to apply AS 4575 for the servicing of open-flued appliances only. The rationale for mandating AS 4575 for open-flued appliances only is that open-flued appliances pose the most risk in terms of CO spillage compared with other Type A appliances.

Definition of open-flued appliance⁶²

Open-flued appliance means an indoor appliance designed to be connected to a flue system, its combustion air being drawn from the room or space in which it is installed

The following two sub-options consider how gasfitters should conduct record-keeping or reporting of servicing as part of the mandating of AS 4575.

5.3 Option a: Gasfitters to keep a record of servicing which may be subject to auditing by the regulator

Under this sub-option, gasfitters would be required to retain a copy of the record for a minimum of 7 years from the date of servicing. The VBA could request access to a gasfitter's servicing records as part of its compliance activities. The regulations prescribe that the information captured in the gas service record should be based on AS 4575 Appendix E and include appropriate identification details of the registered and/or licensed gasfitter that conducted the work.

A record of the servicing conducted would also be provided to the consumer within the five days of the work being completed, which is similar to the current approach with compliance certificates.

⁶² Australian Standard, 'Gas appliances – Servicing of Type A appliances.'

5.4 Option b: Gasfitters must provide a record of servicing to the regulator

This option would require gasfitters to provide a record of servicing (separate from the compliance certificate regime) to the VBA within five days after the date of servicing. The duration of five days is consistent with the current plumbing regulatory regime for compliance certificates. The gas service record will contain prescribed information and is expected to be lodged on to a relevant I.T. platform to facilitate ease of use.

As gasfitters would be required to lodge gas service records with the VBA, this sub-option would allow the VBA to identify, audit and inspect such work as required. This means all gas service work would be captured by the VBA, providing additional oversight as a result and facilitating more data driven policy development.

5.5 Alternatives not assessed in this Regulatory Impact Statement

Mandating AS 4575 in part

There was consideration towards mandating only certain elements of AS 4575 that would address the highest risk elements in the servicing of Type A appliances, such as carbon monoxide spillage test for all gas heaters. The initial basis for mandating AS 4575 in part is that it could be a more cost effective option for consumers and address concerns with the quantity of informative and performance-based requirements contained within the standard. DELWP consulted on this option in early 2021. This option was not progressed further as the expert feedback indicated that AS 4575 needed to be applied holistically; it was not intended that individual components could be applied in isolation of the overall standard.

Expanding the scope of compliance certificates

Stakeholders have raised the possibility of expanding the scope of compliance certificates to gas appliance servicing work as a means of addressing the record keeping component of gas servicing work. Among its recommendations, the Coroner's Court Inquest into the death of Sonia Sofianopoulos suggested industry should be consulted on ways to strengthen compliance to assure quality of work, including examining the role of compliance certificates.⁶³ With the typical cost of gas appliance servicing work of around \$250, which is below the \$750 threshold required for the issuance of a compliance certificate, this would require amending the Building Act to include a new provision to require a mandatory certificate for gas servicing work, regardless of the value of work. Amendments to the *Building Act 1993* are outside the scope of this RIS process and would require a separate project.

⁶³ Victorian Government response to the Coroners Court inquest into the death of Sonia Sofianopoulos, p. 6.

6 Impact analysis of options

This section assesses the costs and benefits of the proposed options to determine the preferred option to achieve the Government's objectives. Stakeholders were consulted during October 2021 to inform the consideration of the costs and benefits of the proposed options. Appendix C provides a list of the stakeholders consulted.

6.1 Costs

The costs of the proposed options primarily relate to the additional time required for record-keeping/reporting and conducting servicing to AS 4575. There are also costs associated with implementation and operation of a reporting system. Table 12 provides an overview of the key costs associated with mandating AS 4575:

Table 12: Cost variables

Cost	Cost recipient	Description
Cost of purchasing AS 4575 documentation	Industry	It is assumed that a gasfitter currently not applying AS 4575 (or equivalent) will have to purchase a copy of AS 4575 from Standards Australia
Additional servicing time per job	Industry	It is assumed that gasfitters that currently do not apply AS 4575 will require additional time to conduct servicing
Additional record-keeping time per job	Industry	It is assumed that gasfitters that currently do not apply AS 4575 (or equivalent) will require additional time to conduct record-keeping
Additional reporting time per job	Industry	It is assumed that all gasfitters that conduct Type A appliance servicing work will require additional time to conduct reporting (for options which have a reporting component)
Implementation of reporting and compliance system	Government	It is assumed that the VBA will need a reporting and compliance system if AS 4575 is mandated. It also considers the provision of industry information and education.
Compliance and enforcement activities	Government	It is assumed that there will be ongoing costs associated with conducting audits, inspections and enforcement against AS 4575, as well as the provision of industry information and education

6.2 Key modelling assumptions

The costs associated with the options have been modelled based on a number of volume assumptions including:

- the proportion of gasfitters currently applying AS 4575 (or equivalent)
- proportion of Type A appliances by appliance type against total Type A appliances
- estimated number of impacted annual servicing jobs (based on a two-year recommended servicing frequency and consumer behaviours)

Where data was not publicly available, stakeholder input was used to inform various assumptions.

6.2.1 Proportion of gasfitters applying AS 4575 (or equivalent)

Among the three housing types in Victoria (owner occupied, private rental, public housing), the largest group are owner occupied. 68.3 per cent of dwellings are considered to be owner occupied, 29.4 per cent are considered to be private rental, and 2.3 per cent are considered to be public housing).⁶⁴ The private rental sector already has some form of mandated minimum standards for servicing, with the recently implemented Gas Safety Check containing servicing requirements broadly comparable to AS 4575. Public housing maintenance contracts also have internal servicing standards. Therefore, it is assumed that the majority of servicing jobs that are not currently meeting AS 4575 (or equivalent) are in the owner occupied sector.

It is estimated that approximately 35 per cent of gasfitters registered in Type A appliance servicing work are not applying AS 4575 (or equivalent) during servicing at owner occupied properties. This estimate was developed by using ABS data on the number and size of plumbing businesses in Victoria, applying weightings consistent with stakeholder feedback that gasfitters not applying AS 4575 (or equivalent) are more likely to be smaller businesses or sole proprietors in contrast to larger businesses.

6.2.2 Proportion of Type A appliances by type of appliance

All tables below relate to Victoria.

The proportion of appliances has been estimated as follows:

Table 13: Current number and proportion of Type A appliances in Victoria (2021)⁶⁵

Type A appliance	Number of appliances	As a proportion of total Type A appliances
Gas heaters ⁶⁶	1,490,363	28.5%
<i>of which Open-flued gas space heaters</i>	<i>287,000</i>	<i>5.5%</i>
Gas cooktops	1,832,194	35%
Gas hot water systems	1,910,444	36.5%
<i>of which Open-flued hot water systems</i>	<i>6,890</i>	<i>0.1%</i>
Total appliances	5,233,000	

Table 13 indicates that around 5.6 per cent of Type A appliances are open-flued. This is based on the sum of open-flued gas space heaters (5.5 per cent) and open-flued hot water systems (0.1 per cent).

The Victorian Government's Home Heating and Cooling Upgrades Program will see 250,000 old electric, gas and wood-fire heaters be replaced over four years with electric reverse cycle units. The program will apply across all dwelling types (owner-occupied dwellings, private rental, and public housing).⁶⁷ For this RIS, it is assumed that 90 per cent of the 250,000 heaters to be replaced will be gas heaters (225,000 gas heaters in total). This reflects that 73 per cent of homes have gas heating, and of the remaining 27 per cent a significant

⁶⁴ Australian Bureau of Statistics, 'Housing Occupancy and Costs, Australia, 2017-18', released on 17 July 2019.

⁶⁵ Estimates developed based on the following:

- Australian Bureau of Statistics, 'Environmental Issues: Energy Use and Conservation, March 2014'
- Australian Bureau of Statistics, 'Census 2016.'
- Energy Networks Australia, 'Reliable and clean gas for Australian homes,' July 2021
- Regulatory Impact Statement on the phase out of open-flued gas space heaters
- The Allen Consulting Group, 'The risk of carbon monoxide poisoning from domestic gas appliances, Quantitative Risk Assessment,' February 2012

⁶⁶ Includes all gas-based heating appliances such as space heaters and ducted heaters.

⁶⁷ Victorian Government, 'Helping Vulnerable Victorians Stay Warm, And Cool, For Less,' accessed via <https://www.premier.vic.gov.au/helping-vulnerable-victorians-stay-warm-and-cool-less>

portion will already have electric reverse cycle units or no heating at all. This program will result in a reduction of 225,000 gas heaters in homes over the next four years of the program, with an assumed linear reduction of 56,250 gas heaters in each of those four years.

Alongside this short-term program, the number of Type A appliances in Victoria is estimated to decrease over time at approximately 3.14 per cent per annum over the next 10 years due to two main competing factors:

- Appliances reaching the end of their useful life (estimated average of 15 years)⁶⁸ are assumed to be replaced with electric appliances in 50 per cent of cases, with the other 50 per cent being like-for-like gas appliance replacements. This results in an estimated 3.33 per cent annual reduction in the number of Type A appliances in Victoria.
- Gas connections in new homes on greenfield sites⁶⁹ have been in steady decline, and it is assumed that only 20 per cent of new greenfield homes will have a gas connection.⁷⁰ Of those homes, they are estimated to install an average of 2.5 Type A appliances per home (consistent with the current rate of appliances per home). Accounting for the three-year average of greenfield construction in Melbourne,⁷¹ appliances from new greenfield construction have been estimated to lead to a 0.19 per cent increase in Type A appliances annually.

The Home Heating and Cooling Upgrades Program together with factors relating to ageing gas appliances and the rate of new greenfield construction means an average decline of 3.24 per cent per year for total appliances over the next 10 years.

Table 14 provides the estimated number of Type A appliances in Victoria over the next 10 years, resulting from both the Home Heating and Cooling Upgrades Program in the short-term and the factors discussed above.

Table 14: Indicative number of Type A appliances in Victoria ('000 appliances, FY22-32)

Number of appliances	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30	FY31	FY32
Gas heaters	1,490	1,434	1,378	1,322	1,278	1,235	1,194	1,154	1,116	1,078	1,042
Cooktops	1,832	1,775	1,719	1,665	1,613	1,562	1,513	1,465	1,419	1,375	1,331
Hot water systems	1,910	1,850	1,792	1,736	1,681	1,629	1,577	1,528	1,480	1,433	1,388
Total appliances	5,233	5,059	4,889	4,722	4,559	4,416	4,277	4,143	4,013	3,887	3,765

6.2.3 Number of affected gas servicing jobs

To estimate the number of gas servicing jobs affected by the reform, a segmentation of Type A appliances by housing type has been conducted. Type A appliances have been divided into those that are installed in owner-occupied, private rental and public dwellings. This recognises that the existing servicing requirements for rental properties (Gas Safety Checks) and public housing are expected to lead to higher rates of servicing compared with owner occupied housing where there are no legislated, contracted or equivalent requirements for the frequency of servicing. The segmentation has been calculated using ABS data on the proportion of each dwelling type as a proxy for the number of gasfitting servicing jobs. As such, it assumes an even distribution of Type A appliances across the different housing types. Table 15 provides the total number of Type A appliances in each dwelling type.

⁶⁸ Regulatory Impact Statement on the phase out of open-flued gas space heaters.

⁶⁹ Refers to undeveloped land in urban or rural areas.

⁷⁰ Note: only greenfields sites have been considered for this portion of the analysis due to the assumption that demolition of an existing dwelling to construct a new dwelling would not result in a net increase in appliances.

⁷¹ Urban Development Institute of Australia State of The Land 2021.

Table 15: Current number and proportion of Type A appliances in Victoria by dwelling type (2021)⁷²

Dwelling type	Proportion (of total households)	Type A appliances
Owner occupied	68.3%	3,574,139
Private rental	29.4%	1,538,502
Public housing	2.3%	120,359
Total		5,233,000

Given the existing servicing requirements outlined above in relation to private rental and public housing, it has been assumed that all Type A appliances in private rental and public housing are regularly serviced (i.e. every two years).

A survey conducted by Quantum Market Research on behalf of ESV in 2021 found that approximately 52 per cent of owner-occupied households had serviced their gas heater over a two year period. Of those, 40 per cent of owner-occupied households conducted regular servicing of their gas heater (i.e. every two years), with the remaining 12 per cent of owner occupied households servicing their gas heater due to an observed operational fault. During consultation undertaken as part of this RIS process, stakeholders noted that regular servicing for other appliances such as gas cooktops⁷³ and hot water services tends to be less common, with call outs from customers generally relating to issues such as operational faults or the replacement of an old appliance with a new appliance. As such, it has been assumed the population of households that regularly services their cooktops and hot water systems is approximately one fifth of those that regularly service their gas heaters (10 per cent over a two-year period).

The Gas Safety Checks required under the *Residential Tenancies Regulations 2021* apply to new tenancy agreements only, indicating a ramp up of Gas Safety Checks as new agreements are entered into. The RIS for the *Residential Tenancies Regulations 2021* contains a ramp up assumption for the number of new tenancy agreements, which has been reflected in this analysis.⁷⁴ For example, the proportion of rental properties that would be subject to the updated *Residential Tenancies Regulations 2021* in Year 1 was estimated to be 42 per cent.

Table 16 outlines the estimated number of services conducted each year by dwelling type and the number that are estimated not to meet AS 4575 under the base case. As noted previously, an increasing profile is assumed for private rentals consistent with the rate of new tenancy agreements, and that all private rental services will meet AS 4575 due to the servicing requirements of the Gas Safety Check, which is broadly similar to AS 4575. For public housing, it is assumed that all services meet AS 4575 because of internal servicing standards for public housing maintenance contracts.

⁷² Australian Bureau of Statistics, 'Housing Occupancy and Costs, Australia, 2017-18', released on 17 July 2019.

⁷³ Includes all gas cooktops, including freestanding ranges and gas wall ovens

⁷⁴ Derived from Regulatory Impact Statement, Residential Tenancies Regulations 2020, p. 40. The percentages used for each year are:

- 2021-22: 42 per cent
- 2022-23: 56 per cent
- 2023-24: 67 per cent
- 2024-25: 75 per cent
- 2025-26: 82 per cent
- 2026-27: 87 per cent
- 2027-28: 92 per cent
- 2028-29: 96 per cent:
- 2029-30 to 2030-31: 100 per cent

Table 16: Indicative number of Type A appliances in Victoria ('000 appliances, FY23-32)

Number of appliances	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30	FY31	FY32
Owner occupied										
Total appliances ⁷⁵	3,455	3,339	3,225	3,114	3,016	2,921	2,830	2,741	2,655	2,571
Total services per year ⁷⁶	381	369	358	346	337	329	320	312	304	297
Services not meeting AS 4575 ⁷⁷	132	128	124	120	117	114	111	108	105	103
Open-flued services per year ⁷⁸	50	48	47	45	44	43	42	41	40	39
Open-flued services not meeting AS 4575	17	17	16	16	15	15	15	14	14	14
Private rental										
Total appliances ⁷⁵	1,487	1,437	1,388	1,340	1,298	1,258	1,218	1,180	1,143	1,107
Total services per year ⁷⁹	300	382	439	478	508	529	546	560	571	553
Services not meeting AS 4575	-	-	-	-	-	-	-	-	-	-
Open-flued services per year	17	21	24	26	28	29	30	31	31	30
Open-flued services not meeting AS 4575	-	-	-	-	-	-	-	-	-	-
Public housing										
Total appliances ⁷⁵	116	112	109	105	102	98	95	92	89	87
Total services per year ⁸⁰	58	56	54	52	51	49	48	46	45	43
Services not meeting AS 4575	-	-	-	-	-	-	-	-	-	-
Open-flued services per year	3	3	3	3	3	3	3	3	2	2

⁷⁵ Total appliances decrease by an average 3.24% per year over the period, as shown in Table 14.

⁷⁶ Based on a two-year service frequency. To obtain the number of services that occur every two years, the total number of appliances was multiplied by the proportion of appliances that are serviced every two years and divided by 2 to obtain the annual frequency. For owner-occupied dwellings, servicing frequency is based on figures of 52% for heaters and 10% for cooktops and hot water systems, as discussed above. The share of gas heaters is 28.3% and the share of other gas appliances is 71.7%.

⁷⁷ Calculated by having the number of services per year multiplied by the estimated proportion of gasfitters registered in Type A appliance servicing work that are not applying AS 4575 (or equivalent) during servicing (35%).

⁷⁸ Based on a two-year service frequency. To obtain the number of open-flued services that occur every two years, the total sum of open-flued gas heaters and open-flued hot water systems (5.5% of gas heaters and 0.1% of hot water systems respectively) was multiplied by the proportion of appliances that are serviced every two years and divided by 2 to obtain the annual frequency. For owner-occupied dwellings, servicing frequency is based on figures of 52% for heaters and 10% for hot water systems.

⁷⁹ Based on a two-year service frequency. To obtain the number of services that occur every two years, the total number of appliances was multiplied by the proportion of appliances that are serviced every two years and divided by 2 to obtain the annual frequency. Services in rental properties in Year 1 are lower due to the expected ramp up profile of the Gas Safety Checks and are assumed to ramp up from 42% of rental properties in Year 1 to the full 100% by Year 9. The ramp up profile is consistent with the Residential Tenancies Regulation 2021 RIS.

⁸⁰ Based on a two-year service frequency. To obtain the number of services that occur every two years, the total number of appliances was multiplied by the proportion of appliances that are serviced every two years and divided by 2 to obtain the annual frequency.

Open-flued services not meeting AS 4575 - - - - -

6.3 Cost variables

The costs are principally associated with the additional time that gasfitters would need to spend in record-keeping and reporting, the additional time spent servicing to AS 4575, and the additional costs associated with implementation and operation of a reporting system, as well as compliance and enforcement for government.

The costs are presented as a Present Value (PV) over 10 years using a 4 per cent real discount rate, recommended by the Victorian Department of Treasury and Finance.⁸¹ The modelling assumes there would be full compliance on day one of the new requirements coming into effect, which has been assumed in the analysis to be from June 2022.

Table 17: Summary of estimated costs of each option (PV over 10 years) - \$ millions

Upfront cost	Cost recipient	Option 1a	Option 1b	Option 2a	Option 2b
Cost of purchasing AS 4575	Industry	\$0.540	\$0.540	\$0.540	\$0.540
Cost of record-keeping	Industry	\$6.651	\$6.651	\$0.867	\$0.867
Cost of reporting	Industry	N/A	\$28.385	N/A	\$2.369
Cost of increased servicing time	Industry	\$6.651	\$6.651	\$0.867	\$0.867
Cost of implementation ⁸²	Government	\$0.107	\$0.452	\$0.107	\$0.452
Cost of monitoring and compliance ⁸³	Government	\$0	\$4.856	\$0	\$4.856
Total costs		\$13.948	\$47.534	\$2.381	\$9.951

6.3.1 Cost of purchasing AS 4575

It is assumed that if AS 4575 is mandated, gasfitters that conduct Type A appliance servicing work would require a copy of AS 4575. The cost of purchasing AS 4575 is currently \$141.42.⁸⁴ It is assumed that those gasfitters already applying AS 4575 or equivalent would have an existing copy of the standard. As such, the costs associated with purchasing AS 4575 relate only to those gasfitters not currently applying AS 4575 (or equivalent) in their servicing work (i.e. 35 per cent of gasfitters that conduct Type A appliance servicing work, as discussed in Section 6.2.1).

It is assumed that all gasfitters conducting Type A appliance servicing work may also conduct open-flued appliance servicing work (i.e. this is not a specialty field), therefore even under Option 2 all gasfitters would be required to have a copy of AS 4575.

⁸¹ The Victorian Guide to Regulation recommends a real discount rate of four per cent for regulatory and legislative proposals.

⁸² This is based on costs estimates provided by the VBA.

⁸³ This is based on cost estimates provided by the VBA. While the cost estimates for both Option 1b and 2b is the same, in reality, it is likely Option 2b will have smaller ongoing costs due to monitoring only a subset of Type A appliances.

⁸⁴ SAI Global. This is the cost as of 2021.

New gasfitters servicing Type A appliances have been assumed to enter at a rate of 4 per cent into the market, with a total of 5,684 of gasfitters in Year 1.⁸⁵ It has been assumed that all new gasfitters who service Type A appliances would need to purchase a copy of AS 4575, although this value is likely lower given some may be employed by businesses who would provide a copy of AS 4575 or they may be members of peak bodies who may provide a copy of the standard.

There is uncertainty about the proportion of gasfitters that will need AS 4575 due to:

- the assumption that gasfitters applying an equivalent standard of servicing already have a copy of AS 4575.
- the assumption that gasfitters would have to purchase a copy of AS 4575 when realistically, if a business employs multiple gasfitters, it is likely that the business would purchase one copy only.
- there is the possibility that fewer gasfitters would be required to purchase AS 4575 as not all licensed gasfitters necessarily service appliances and may not need to purchase the standard (this is especially true of Option 2 which applies only to open-flued appliances).
- Some gasfitters may subscribe electronically to a number of technical standards, which may include AS 4575 via a package deal.

The estimated total upfront cost of purchasing AS 4575 is approximately \$279,000 and \$540,000 PV over the 10-year period.

Table 18: Cost associated with the purchase of AS 4575

Number of licensed gasfitters doing servicing work	Estimated proportion of gasfitters that do not apply AS 4575⁸⁶	Estimated cost of purchasing AS 4575	Estimated upfront cost in Year 1 ('22-23) - \$ million	PV over 10 years - \$ million
5,684	~ 35%	\$141.42	\$0.279	\$0.540

6.3.2 Cost of increased servicing time

Several stakeholders noted that servicing of a gas appliance using a lesser servicing standard than AS 4575 or an equivalent takes, on average, a shorter servicing time than a service that meets AS 4575 or similar, however this is not always reflected in the cost of the service. Therefore, additional servicing time is expected to be required for appliances not currently being serviced using AS 4575 (or equivalent). This is because core servicing elements such as CO spillage and negative pressure testing, where applicable, would need to be undertaken for a service to be compliant.

The assumption regarding the average additional time required for a service that does not meet AS 4575 (or equivalent) to meet AS 4575 under the proposed reform considered a range of stakeholder inputs, including a survey conducted by the Australian Gas Association (AGA) relating to current servicing habits. It is estimated that, on average, servicing jobs that do not currently adequately meet AS 4575 or an equivalent quality level will require approximately 10 additional minutes of servicing time to meet AS 4575.

A sensitivity analysis has been conducted on this estimate. Additional time required for servicing an appliance is a time cost for affected gasfitters. As it is not expected that additional resources or overhead costs would be

⁸⁵ Based on the VBA estimate of 5,684 licensed gasfitters registered in the Type A Appliance Servicing class.

⁸⁶ Original figure of 34.68% was rounded up to 35%. Estimate was developed by using ABS data on the number of plumbing businesses in Victoria and applying appropriate weightings for the application of AS 4575 per business size (discussed in Section 6.2.1).

required due to the incremental nature of the time cost increase for a gasfitter, the time has been valued using the average hourly earnings of a technician and tradesperson including the associated on-costs.⁸⁷

For Year 1 it is estimated that approximately 131,995 servicing jobs do not apply AS 4575 (refer to Table 16 for explanation on how this was calculated) based on the assumption that 35 per cent of gasfitters do not currently apply AS 4575 in owner occupied homes. These jobs would require additional servicing time under Option 1. It is estimated that the cost for all affected gasfitters to undertake additional servicing time is approximately \$0.924m per annum for Option 1.

Under Option 2, the total annual costs would be lower as the AS 4575 servicing requirement would only apply to a segment of Type A appliances (i.e. open-flued appliances). It is estimated that there are 17,223 open-flued appliance servicing jobs annually where AS 4575 (or equivalent) is not currently applied. The estimated cost for Year 1 associated with the increased servicing time would be \$0.121m for Option 2.

Table 19: Cost associated with servicing

Options	Estimated number of affected jobs in Year 1 ('22-23)	Estimated additional servicing time	Average hourly wage	Estimated cost in Year 1 ('22-23) - \$ million	PV over 10 years - \$ million
Option 1	131,995	10 mins	\$41.99	\$0.924	\$6.651
Option 2	17,223	10 mins	\$41.99	\$0.121	\$0.867

6.3.3 Cost of record-keeping

Several industry stakeholders have highlighted that recording what servicing work has taken place is considered business-as-usual for gasfitters that service to AS 4575 or an equivalent level. The record-keeping referred to in this discussion refers to requirements similar to the Appendix E checklist in AS 4575 and is in addition to a base level of 'record-keeping' (e.g. for the purpose of invoicing) which is assumed to occur across all servicing activity. Based on stakeholder input, an assumption is made that limited or no record-keeping (akin to the Appendix E checklist) is done in cases where AS 4575 or equivalent is not applied. Therefore record-keeping requirements associated with the options would only create an additional burden for those servicing jobs where AS 4575 or equivalent is not currently applied. It has been estimated from stakeholder consultation that it would take a gasfitter an average of 10 minutes per service to undertake record-keeping of the level required for this reform. Given that most gasfitters (i.e. the ones who meet AS 4575 or equivalent) are assumed to already be undertaking record-keeping and spending the 10 minutes, this incremental time requirement as a result of this reform would only apply to those gasfitters that do not currently meet AS 4575 or equivalent and undertake record-keeping.

It is estimated that the cost for the sub-set of affected gasfitters to undertake record-keeping under Option 1 is \$0.924m per annum. As Option 2 only applies to open flued appliances, the number of affected jobs is significantly smaller. As such, the estimated cost per annum associated with additional record-keeping time under Option 2 is \$0.121m.

⁸⁷ Australian Bureau of Statistics, 'Employee earnings,' Table 6, released on 11 December 2020. A multiplier of 1.16 on the average hourly wage rate was used to factor in oncosts which comprise superannuation, WorkCover premiums, and payroll tax.

Table 20: Cost associated with record-keeping

Options	Estimated number of affected jobs in Year 1 ('22-23)	Additional record-keeping time	Average hourly wage ⁸⁸	Estimated cost in Year 1 ('22-23) - \$ million	PV over 10 years - \$ million
Option 1	131,995	10 mins	\$41.99	\$0.924	\$6.651
Option 2	17,223	10 mins	\$41.99	\$0.121	\$0.867

6.3.4 Cost of reporting

Given that the reporting options (Options 1b and 2b) would introduce new requirements to report all Type A appliance servicing work to the VBA, additional reporting time is expected for all services, regardless of whether or not they currently apply AS 4575.

Stakeholders have advised that the additional time spent reporting would be dependent on several factors including the software used, how they are able to integrate the reporting into their existing systems and processes or whether they replace their own systems in favour of the reporting system. In addition, where a gasfitter services multiple Type A appliances in a single home, further time savings may be achievable.

Based on the factors listed above and additional considerations discussed with stakeholders, it is estimated that a gasfitter would require, on average, approximately 5 minutes to conduct reporting (in addition to the record-keeping time). This implies that record-keeping and reporting activities together would require, on average, an additional 15 minutes per job (for those services with no current record-keeping activities).

This estimate acknowledges that some gasfitters may take more time than this initially as they become familiar with the VBA reporting approach, with the reporting time reducing as they integrate it into their regular processes. Some gasfitters may require less than 5 minutes of additional time, particularly where the use of the VBA reporting application reduces their own record-keeping time through existing mechanisms, e.g. paper copies, spreadsheets, etc. For this latter group, the *total* record-keeping and reporting time may be lower than the assumed 15 minutes total for record-keeping and reporting.⁸⁹

It is estimated that the number of impacted annual servicing jobs for Year 1 is 738,807 (refer to Table 16) under the assumption that reporting requirements are expected to apply to all servicing jobs irrespective of whether AS 4575 is applied. The estimated cost for Year 1 associated with additional reporting time for Option 1b is \$2.585m⁹⁰ Like Option 1b, reporting requirements for Option 2b are expected to apply to all servicing jobs, however, this requirement would be restricted to open flued appliances, therefore 69,618 servicing jobs are affected for this option. The estimated total cost for Year 1 for additional reporting requirements under Option 2b is \$0.243m.

⁸⁸ As it is not expected that additional staff (or overhead costs) will be required due to the incremental nature of the requirements, record-keeping time has been valued using the average hourly earnings of a technician and tradesperson obtained from the ABS and includes the associated oncosts. This analysis assumes no real wage increases over the analysis period (i.e. wages increasing at CPI).

⁸⁹ Noting that even the full 15 minutes would only apply as an incremental addition to Type A appliance servicing for services where record-keeping is not currently undertaken.

⁹⁰ The PV over 10 years for reporting requirements is based on the assumption developed from the RIS on the Residential Tenancies Regulations 2020 that there is a proportion of existing rented premises that would not meet the Gas Safety Check. Those percentages were applied to the number of total servicing jobs in the rental sector that become subject to reporting requirements each year. The estimated cost per annum shown is the cost of the first year (year 1).

Table 21: Cost associated with reporting⁹¹

Options	Number of impacted jobs in Year 1 ('22-23)	Additional reporting time	Average hourly rate ⁹²	Estimated cost in Year 1 ('22-23) - \$ million	PV over 10 years - \$ million
Option 1b	738,807	5 mins	\$41.99	\$2.585	\$28.385
Option 2b	69,618	5 mins	\$41.99	\$0.243	\$2.369

6.3.5 Cost of implementation

Option 1a and 2a: Gasfitters to keep a record of servicing which may be subject to auditing by the regulator

The VBA would be responsible for compliance and enforcement of AS 4575 under the options being considered. While gasfitters are not required to lodge the gas servicing record with the VBA upon the completion of work under Option 1a and 2a, there are potential implementation costs for the VBA as they may subsequently select these records for audit. Additional staff would be required to update the current risk based matrix used to determine which records of service would be audited. Communications to industry would also need to be provided to supplement with the current joint seminars between the VBA and ESV during winter, such as webinars, practice notes/information sheets on AS 4575, and training material. VBA would also need to train its internal technical staff to understand the new reform in order to respond to technical queries. It is estimated that there is a one-off cost of \$0.107m for VBA staff.

As such, total upfront costs associated with implementation for Option 1a and 2a is estimated at \$0.107 million.

Table 22: Implementation costs - Option 1a and 2a⁹³

Upfront cost	Staff cost per annum	EFT	Estimated upfront cost - \$ million	PV over 10 years - \$ million
Staff	VPS5	0.31	\$0.062	
Staff	VPS6	0.17	\$0.045	
Total cost			\$0.107	\$0.107

Option 1b and 2b: Gasfitters must provide a record of servicing to the regulator

The VBA has provided a range of cost estimates for the implementation of a reporting system. The estimate that best aligns with the timeframes proposed for implementation of this reform involves a standalone I.T. platform to enable reporting by gasfitters, estimated by VBA to be around \$280,000. This estimate includes assessing business and system requirements, development, testing, system integration and rollout, however these cost estimates are indicative only. Additional staff would be needed to develop additional tools to support this new system, such as a process to identify jobs for audit. It is estimated that upfront staff costs would be approximately \$0.172m (Table 23).

Total upfront implementation costs associated with Options 1b and 2b are around \$0.452m.

⁹¹ Services in rental properties are assumed to ramp up to the full 769,251 in year 9 which will ramp up the cost of reporting in the same period.

⁹² As it is not expected additional resources are required due to the incremental nature of the increase, reporting time has been valued against the average hourly earnings of a technician and tradesperson and associated on-costs.

⁹³ A multiplier of 1.75 has been factored into staff costs to consider oncosts and overheads. The annual salary for VPS5 is \$114,828 as of 1 June 2022 which is the central estimate. Therefore the daily salary for VPS5 is \$442 based on an assumption of 260 working days in a year. The annual salary for VPS6 is \$149,023 as of 1 June 2022 which is the central estimate. Therefore the daily salary for VPS5 is \$573 based on an assumption of 260 days in a year.

Table 23: Implementation costs - Option 1b and 2b⁹⁴

Upfront cost	Staff cost	EFT	Estimated upfront cost - \$ million	PV over 10 years - \$ million
Upgrading / developing IT platform	-	-	\$0.280	
Staff	VPS5	0.48	\$0.096	
Staff	VPS6	0.29	\$0.076	
Total costs			\$0.452	\$0.452

6.3.6 Cost of monitoring and compliance

Option 1a and 2a: Gasfitters to keep a record of servicing which may be subject to auditing by the regulator

The VBA has indicated that it would have limited oversight under the options that require record-keeping but no reporting. This is because gasfitters would not be required to lodge service records with the VBA and most servicing attendances would not necessitate a compliance certificate (as the cost of the work was below \$750). The VBA has advised that no additional auditing resourcing would be required as it would incorporate oversight of the new requirements under its current auditing and compliance model. Therefore, no additional ongoing compliance costs have been assumed for the record-keeping options relative to the base case.

Option 1b and 2b: Gasfitters must provide a record of servicing to the regulator

The ongoing costs associated with the desktop and onsite audit function would vary depending on the volume of work to be audited. It is estimated that two VPS5-level⁹⁵ staff would cost around \$401,898 per annum inclusive of oncosts and overheads. A part-time VPS4-level⁹⁶ resource would also be required. The total cost of monitoring and compliance is estimated at \$598,684 per annum for Option 1b and 2b.

Table 24: Costs associated with monitoring and compliance⁹⁷

	Upfront cost	Staff cost	FTE	Estimated cost per annum - \$ million	PV over 10 years - \$ million
Option 1b and 2b	Scheduler for gas servicing audits	VPS4	0.5	\$0.084	
	Desktop and onsite audit function	VPS5	2	\$0.402	
	Other staff costs	VPS5	0.17	\$0.034	
	Other staff costs	VPS6	0.14	\$0.037	
	IT costs	-	-	\$0.042	
	Total costs			\$0.599	\$4.856

⁹⁴ A multiplier of 1.75 on staff costs has been used to incorporate oncosts and overheads.

⁹⁵ Annual full time equivalent salary including oncosts and overheads for VPS5 is \$200,949

⁹⁶ Annual full time equivalent salary including oncosts and overheads for VPS4 is \$166,228

⁹⁷ A multiplier of 1.75 on staff costs has been used to incorporate oncosts and overheads.

6.4 Benefits

The direct health benefits of mandating of AS 4575 that are assessed as part of the breakeven analysis include:

- avoided fatalities
- avoided serious injuries
- avoided minor injuries.

An analysis of past fatalities, serious injuries, and minor injuries, has been undertaken to understand the viability of the proposed options in achieving the desired safety outcomes.

The value of a statistical life and the value of a single statistical life year have been applied, which as of August 2021, are valued at \$5.1 million and \$220,000 respectively.⁹⁸ Using these values, estimates for the value of a single avoided serious injury and the value of a single avoided minor injury from non-fatal CO exposure and from fire and explosion-related incidents were developed. This was developed by applying disability weightings and average assumptions on the longevity of the symptoms. For consistency with previous analyses (e.g. the 2021 RIS on the phase out of open-flued gas space heaters), disability weightings and categories have been aligned to the Global Burden of Disease concept.

Table 25: Summary of methodology used to calculate the value of injuries

	Disability weighting (disability category)	Value of injury per life year	Assumed average duration of injury⁹⁹	Total value of injury
Serious injury from CO poisoning	0.35 (brain damage sequelae)	\$77,700	23.4 years	\$1,812,353
Serious injury from fire/explosion	0.25 (burns)	\$55,500	46.7 years	\$2,589,075
Minor injury from CO poisoning	0.06 (asthma)	\$13,320	6 months	\$6,600
Minor injury from fire/explosion	0.06 (asthma) ¹⁰⁰	\$13,320	6 months	\$6,600

Deaths, serious injury and minor injury associated with CO exposure

The methodology used to develop estimates for values of serious and minor injuries from CO exposure is based on the Global Burden of Disease concept, consistent with the methodology in the 2021 RIS on the phase out of open-flued gas space heaters. As a result, the value of a single avoided serious injury and the value of a single avoided minor injury associated with CO have been estimated at \$1,812,353 and \$6,600 respectively.

Deaths, serious injuries and minor injuries associated with fire/explosions

Estimates for fire and explosion related injuries were also based on the Global Burden of Disease concept. The value of a single avoided serious injury from fire and explosion-related incidents and the value of a single avoided minor injury from such incidents is \$2,589,075 and \$6,600 respectively. As it is assumed that fire and explosion-related serious injuries will last for the remainder of the person's expected life, the value of a single

⁹⁸ Department of the Prime Minister and Cabinet, Office of Best Practice Regulation, 'Best Practice Regulation Guidance Note Value of Statistical Life,' August 2021.

⁹⁹ Based on a median age of 37 and average life expectancy of 83.7 for Victorians, indicating 46.7 remaining life years. Note that this is an average and recognises that some specific injuries may have significantly longer durations.

¹⁰⁰ Minor injuries associated with fire/explosion tend to be related to smoke inhalation.

avoided serious injury from fire and explosion-related incidents is higher than the value of a single avoided serious injury associated with CO exposure due to the longevity of the fire-related injury.¹⁰¹

6.5 Decision tool

A breakeven analysis has been used to assess the level of benefits needed for each option to fully offset its estimated costs. The Victorian Guide to Regulation states that a breakeven analysis is best used when one unit of benefit can be valued (e.g. an avoided injury) but the number of units of benefit as a result of a regulatory proposal cannot be estimated (e.g. number of avoided injuries).¹⁰²

To determine the number of avoided deaths, serious injuries, and/or minor injuries required for an option to breakeven, the total cost of each option is divided by either the value of a statistical life, the value of a single avoided serious injury, or the value of a single avoided minor injury. In the absence of evidence illustrating minor injuries associated with Type A appliances in Victoria, UK data was used to inform estimates on the ratios for minor injuries to complement the Australian data on the ratio of deaths to serious injuries. In the past decade, the UK averaged 5.5 deaths and 239.8 injuries per year from CO poisoning.¹⁰³ This is equivalent to one death for every 43.6 injuries. During the same period, the UK averaged 2.4 deaths and 33.6 injuries per year from explosion or fires.¹⁰⁴ This is equivalent to one death for every 14.2 injuries. The above ratios were then used to extrapolate the number of gas-related minor injuries from the data provided by ESV on gas-related serious injuries during the same period. The breakeven point is based on the combined number of total avoided deaths, serious injuries, and minor injuries required.

6.6 Breakeven analysis

Tables 26 and 27 provide a summary of the total costs (PV over ten years) associated with the proposed options. Table 26 provides the number of avoided deaths, serious injuries, or minor injuries required for each option to break even for each type of avoided consequence. For example, 2.7 avoided deaths or 7.7 avoided serious injuries from CO would be required in order to justify the costs of Option 1a. Table 27 provides the combined number of avoided deaths, serious injuries and minor injuries required for an option to break even, using the ratios outlined in Section 6.5. Table 27 is more indicative of real world outcomes, where improved Type A appliance servicing is expected to drive outcomes across all types of adverse consequences (i.e. fatalities and injuries) rather than an impact on only one type of consequence.

¹⁰¹ The value of a single avoided serious injury from CO exposure was calculated by multiplying the value of a life year (\$220,000) with the disability weighting for brain damage sequelae (0.35). It is assumed that individuals will continue to experience symptoms for half of their remaining expected life (23.35 years based on a median age of 37 and average life expectancy of 83.7 for Victorians). The value of a single serious avoided injury from fire/explosion-related incidents was calculated by multiplying the value of a life year with the disability weighting for burns (0.25). It is assumed that burn-related symptoms will last the remainder of one's expected life (46.7 years) The value of a single avoided minor injury from CO exposure was calculated by multiplying the value of a life year with the disability weighting for asthma (0.06). It is assumed that symptoms will last for 6 months. This is also applied towards minor injuries for fire/explosion-related accidents as it is assumed that minor injuries would relate to smoke-related symptoms. Disability weights were obtained from the Global Burden of Disease concept (1996).

¹⁰² Commissioner for Better Regulation, 'Victorian Guide to Regulation, A handbook for policy-makers in Victoria,' p. 38.

¹⁰³ Health and Safety Executive (UK), Cross Government Group on Gas Safety and Carbon Monoxide (CO) Awareness Annual Reports.

¹⁰⁴ Ibid.

Table 26: Summary of breakeven analysis at an individual level - \$ million

	Option 1a	Option 1b	Option 2a	Option 2b
Cost of option (PV over ten years)	\$13.948	\$47.534	\$2.381	\$9.951
Avoided deaths required	2.7	9.3	0.5	2
Avoided serious injuries required from CO	7.7	26.2	1.3	5.5
Avoided minor injuries required from CO	2094	7137	357	1494
Avoided serious injuries required from fire/explosions	5.4	18.4	0.9	3.8
Avoided minor injuries required from fire/explosions	2094	7137	357	1494

Table 27: Summary of breakeven analysis at a combined level using the ratios in Section 6.5 - \$ million

	Option 1a	Option 1b	Option 2a	Option 2b
Costs of option (PV over ten years)	\$13.948	\$47.534	\$2.381	\$9.951
Number of avoided deaths required	1.3	4.6	0.2	1.0
Number of avoided serious injuries required from CO	2.7	9.2	0.5	1.9
Number of avoided minor injuries required from CO	26.6	90.7	4.5	19
Number of avoided serious injuries required from fire/explosion	2.3	7.8	0.4	1.6
Number of avoided minor injuries required from fire/explosion	7.3	24.7	1.2	5.2

Since 2009-10, there have been a total of seven reported deaths in Victoria as a result of faulty Type A appliances.¹⁰⁵ Of those, three deaths were associated with exposure to dangerous levels of CO in connection with Type A appliances, while the remaining fatalities were associated with fire/explosion.

Alongside these deaths, ratios of deaths to serious and minor injuries would indicate that in the last ten years in Victoria, 26 serious injuries and approximately 280 minor injuries have occurred as a result of CO poisoning

¹⁰⁵ Data provided by ESV.

from Type A appliances. This is supported by partial data provided by ESV, which identified a number of incidents associated with Type A appliances.

The data on the number of deaths and injuries in the last ten years has been used to illustrate the potential scale of benefits required to break even. This is presented in Table 27 as the proportion of deaths and injuries that would need to be avoided over the ten-year regulated period for each of the proposed options to break even. The numbers below are indicative only and may be over or under-estimated due to the following reasons:

- The numbers are based on the assumption that the incident trends over the previous 10-year period would continue for the next 10 years under the base case
 - The numbers considered, especially in relation to deaths and serious injuries, are small and irregular from year-to-year, making it difficult to robustly estimate the number of deaths and injuries that may occur over the next ten years
- The numbers are based on partial data on reported incidents provided by ESV
 - There may be more incidents that are not reported to ESV, particularly where the injuries are less serious or the injuries are not causally linked to the Type A appliance
 - The data is also incomplete in relation to prior servicing activity, both in terms of whether the appliance that caused the incident had been serviced and to what level or standard

Table 28: Proportion of avoided deaths and injuries required over 10 years to breakeven (by Option)

	Option 1a	Option 1b	Option 2a	Option 2b
Proportion of total avoided deaths and injuries	19% (or 1.3 death)	65% (or 4.5 deaths)	3% (or 0.2 deaths)	14% (or 1.0 death)

The breakeven analysis shows that Option 1 would need to avoid between 19 per cent and 65 per cent of the deaths and injuries that have occurred in Victoria in the last ten years involving Type A appliances. Option 2 would need to avoid between 3 and 14 per cent of deaths and injuries. All four options have a breakeven point that is lower than the total number of deaths and injuries that occurred over the previous 10-year period.

Option 1 requires between 5 and 7 times the number of avoided deaths to break even compared to Option 2, while covering almost 18 times the number of appliances (i.e. all Type A appliances compared to open-flued appliances only). However, as open-flued appliances carry a higher risk, specifically related to CO poisoning, it is unclear which of the Options would be most likely to breakeven.

6.7 Sensitivity analysis

A sensitivity analysis was conducted to understand the impacts of varying key cost assumptions on the overall costs of each option. The sensitivity analysis has considered the following assumptions.

- Additional servicing time
- Record-keeping time
- Reporting time

Each of the assumptions has been varied from its central assumption to provide a low cost and high cost scenario. Table 29 provides an overview of the different scenarios for each assumption:

Table 29: Low/central/high-cost scenarios for each assumption

Assumption	Low cost scenario	Central cost scenario	High cost scenario
Additional servicing time	5 minutes	10 minutes	15 minutes
Record-keeping time	5 minutes	10 minutes	15 minutes
Reporting time	2 minutes	5 minutes	8 minutes

The sensitivity analysis shows that the costs are most sensitive to variations in the additional reporting time (for the options that carry a reporting requirement). This is due to the fact that additional reporting time would apply to all services (as opposed to additional record-keeping and servicing time, which would only apply to services not currently meeting AS 4575). The reporting time sensitivity increased or decreased the overall cost of Option 1b by \$17 million or 36 per cent. Further details on the sensitivity analysis can be found in Appendix B.

6.8 Multi-criteria analysis

The reform options, particularly those involving reporting obligations, are expected to have benefits in addition to the quantified health and safety benefits considered above in the breakeven analysis. These additional benefits relate to improved data and industry transparency for the regulator and Victorian Government more generally, improved servicing outcomes / value for money for consumers, and improved appliance performance and efficiency. The additional data provided through the reporting options would be expected to lead to improved decision making and more targeted initiatives to improve safety and inform future policy for the sector.

A multi-criteria analysis (MCA) has been used to incorporate the impacts of these additional non-monetised benefits to assess each option. These non-monetised benefits were not included directly in the breakeven analysis. The MCA provides a relative assessment of the benefits of each option. This is because an absolute assessment of the quantum of benefits is not possible due to uncertainties around the number of future deaths and injuries that would occur under the base case and the precise extent to which each option would avoid any particular death or injury. Table 30 provides the criteria applied in the MCA and their weightings. The section below provides a description of each criterion.

Table 30: Criteria used in the multi-criteria analysis

Criteria	Weighting
Benefits, made up of:	Total weighting of 50%
<ul style="list-style-type: none"> Improved health outcomes 	30%
<ul style="list-style-type: none"> Improved regulator information and industry transparency 	10%
<ul style="list-style-type: none"> Increased consumer confidence/peace of mind 	5%
<ul style="list-style-type: none"> Improved appliance performance and efficiency 	5%
Costs	Total weighting of 50%

The criteria selected were weighted based on their relative importance against the objectives of this reform, along with consideration of the interests of the broader Victorian community. Equal weightings of 50 per cent have been applied to the total cost-related criteria and total benefit-related criteria. The criteria are:

- **Improved health outcomes (30%)** - the primary focus of the reform is to improve the health outcomes of Victorian households as they relate to the use of Type A appliances. The benefits relate to mitigating deaths and illness from inadequately serviced or maintained gas appliances as a result of the increased level of accountability of the gasfitter over the quality of servicing provided. These benefits were analysed in the breakeven analysis above.
- **Improved regulator information and industry transparency for Type A appliances (10%)** - The proposed options regarding record-keeping and reporting requirements also aim to address existing information gaps related to Type A appliances. Government agencies (such as ESV, VBA, DELWP) can use such data to assist them in monitoring the distribution of various types of Type A appliances throughout the state and issues associated with them. This could help in structuring policies and initiatives to enhance safety, energy efficiency, resilience and other factors. This is particularly relevant to changes taking place in this sector due to the following:
 - Phase out of open-flued gas space heaters
 - Increase in risks associated with the current trend to increase the airtightness of buildings
 - The general trend to switch to electricity from gas
 - Future initiatives to blend hydrogen and/ or biogas into the municipal gas supply – particularly where this may affect the performance of specific gas appliances
 - Introduction of new technologies such as fuel cells
 - Future shortages/ price rises of natural gas due to dwindling supplies of the domestic Victorian supply or from other influences.
 - The recently introduced Automatic Mutual Recognition program which will in the future, allow gasfitters, registered or licensed interstate, to have their qualifications automatically recognised in Victoria
- **Increased consumer confidence/peace of mind (5%)** – Several stakeholders highlighted that a key benefit of the proposed reform is the subsequent increase in confidence and peace of mind among consumers. This is due to consumers knowing that their gas appliance has been serviced according to a minimum set of standards, with the resultant peace of mind that the gas safety-related risks to that household have been reduced. This is also expected to be driven by a higher level of accountability placed on gasfitters to perform servicing work to an appropriate level.
- **Improved performance and efficiency of Type A appliances (5%)** – Ensuring consistency and quality in Type A appliance servicing is also expected to address issues of underperforming Type A appliances, allowing them to perform more effectively and efficiently. This can improve the thermal comfort of the home and the energy efficiency of the appliance, leading to benefits to households and society such as reduced energy costs for the consumer and reduced emissions for the environment.

To assess each criterion, each option was scored on a scale from -10 to +10 relative to the base case. For the benefits, positive numbers indicate the option is expected to provide greater benefits than the base case whereas negative numbers indicate the option is expected to provide fewer benefits than the base case. For the costs, a positive number indicates the option is expected to result in reduced costs compared to the base case, while a negative number indicates the option would lead to additional costs compared with the base case. Table 31 provides a description of the basis for allocating the scores for each benefit criterion relative to the base case:

Table 31: Description of the basis for allocating scores to each criterion

Criteria	Rating				
	-10	-5	0	5	10
Improved health outcomes	Significant reduction in health outcomes	Moderate reduction health outcomes	No overall change in health outcomes	Moderate improvement in health outcomes	Significant improvement in health outcomes
Improved regulator information and industry transparency for Type A appliances	Significant reduction in information and transparency	Moderate reduction in information and transparency	Information and transparency are unchanged	Moderate improvement in information and transparency	Significant improvement in information and transparency
Increased consumer confidence/peace of mind	Significant reduction in consumer confidence/peace of mind	Moderate reduction in consumer confidence/peace of mind	Consumer confidence/peace of mind are unchanged	Moderate increase in consumer confidence/peace of mind	Significant increase in consumer confidence/peace of mind
Improved performance and efficiency of Type A appliances	Significant reduction in performance and efficiency	Moderate reduction in performance and efficiency	Performance and efficiency are unchanged	Moderate increase in performance and efficiency	Significant increase in performance and efficiency

In relation to costs, a score of -10 (significant cost) equates to approximately \$75 million in costs and a score of -5 (moderate cost) equates to approximately \$38 million in costs over 10 years.

An overall score for the combined benefit-related criteria and cost-related criteria is calculated by summing the weighted score for each criterion (i.e. benefits and costs). Total scores that are above zero mean the option is expected to perform better than the base case and below zero mean that the option is expected to perform worse than the base case. The option with the highest positive score is generally considered to be the preferred option.

Table 32 provides a summary of the MCA results for the proposed options, with further detail on the scoring rationale for each criterion discussed in the sections below.

Table 32: Multi-criteria analysis results (weighted scores shown underneath raw scores in brackets for each criterion)

Criteria	Weighting	Option 1a	Option 1b	Option 2a	Option 2b
Benefits (weighted score)	Total of 50% weighting for benefits	2.2	4.6	0.4	0.9
Improved health outcomes	30%	5 (1.5)	9 (2.7)	1 (0.3)	2 (0.6)
Improved regulator information and industry transparency	10%	1 (0.1)	10 (1.0)	0 ¹⁰⁶ (0.0)	0.5 (0.05)
Increased consumer confidence/peace of mind	5%	5 (0.30)	9 (0.45)	1 (0.05)	2 (0.10)
Improved performance and efficiency	5%	5 (0.30)	9 (0.45)	1 (0.05)	2 (0.10)
Costs¹⁰⁷	Total of 50% weighting for costs	-2 (-1)	-6 (-3)	-0.3 (-0.15)	-1 (-0.5)
Total (weighted score)		1.2	1.6	0.25	0.4

6.8.1 Improved health outcomes

Table: 33 Benefit criterion 1 scoring

Criterion	Weighting	Raw score (weighted score)			
		Option 1a	Option 1b	Option 2a	Option 2b
Improved health outcomes	30%	5 (1.5)	9 (2.7)	1 (0.3)	2 (0.6)

All four options are expected to improve health outcomes for Victorian households compared to the base case. Options 1a and 1b are given higher scores than Options 2a and 2b due to the broader scope of application, meaning risk mitigation towards gas-related incidents like CO spillage and fire/explosions is provided for all Type A appliances. While open-flued appliances make up only 5.6 per cent of all Type A appliances, due to the relative risk factor of open-flued appliances compared to other appliances, the scores assigned to Options 2a and 2b are scaled at approximately 20 per cent of the scores of Options 1a and 1b. Discussion on the relative risk factors and their impact on the benefits of Option 2 compared to Option 1 can be found in Section 3.1.1 and Section 6.6. This scaling consideration has also been applied to the scoring under the consumer confidence/peace of mind and the performance and efficiency criteria.

¹⁰⁶ While this is scored higher than the baseline, this scoring has been rounded down to 0.

¹⁰⁷ Scores to one decimal place have been used for Options 2a and 2b to more accurately reflect the relativities in costs between the options.

Option 1b is given a higher score than Option 1a to reflect the inclusion of reporting requirements. The requirement to report is expected to encourage higher AS 4575 compliance rates and quality of servicing by gasfitters, with the higher level of accountability expected to drive further behavioural change. This would produce better health outcomes than Option 1a due to the expected higher compliance rates. It will also empower the VBA with more complete information on gas servicing, enabling the VBA to enhance its compliance activities, target interventions towards specific regions, gasfitters or appliances, and detect patterns to proactively avoid potential issues and incidents.

The same reporting related considerations apply for the scoring differences between Options 2a and 2b.

6.8.2 Improved regulator information and industry transparency for Type A appliances

Table: 34 Benefit criterion 2 scoring

Criterion	Weighting	Raw score (weighted score)			
		Option 1a	Option 1b	Option 2a	Option 2b
Improved regulator information and industry transparency	10%	1 (0.1)	10 (1.0)	0 (0.0)	0.5 (0.05)

Under the base case, there is limited data available on the quality, volume and frequency of Type A appliance servicing in the Victorian community, as well as information on the volume and age of Type A appliances currently. All the proposed options provide an improvement in this area compared to the base case as they all include some form of data recording mechanism for gas servicing work - even the record-keeping options would improve regulator information to some degree by implementing mandated minimum record-keeping requirements for gasfitters, which the regulator can request as required.

The stakeholders consulted identified the superiority of reporting compared to record-keeping in providing comprehensive information to the regulator on all Type A appliance servicing activity conducted using AS 4575. While mandating reporting will not necessarily lead to full compliance, it would be expected to lead to higher levels of compliance by practitioners. The information provided through the reporting would support more informed engagement and audit activity by the VBA and policy development by the Victorian Government. Accordingly, the options that propose reporting requirements (Options 1b and 2b), score higher compared with their counterpart options that propose record-keeping only (Options 1a and 2a). Option 1b scored the highest as it applies to all Type A appliances.

6.8.3 Increased consumer confidence

Table: 35 Benefit criterion 3 scoring

Criterion	Weighting	Raw score (weighted score)			
		Option 1a	Option 1b	Option 2a	Option 2b
Increased consumer confidence/peace of mind	5%	5 (0.30)	9 (0.45)	1 (0.05)	2 (0.10)

All four options would increase consumer confidence compared to the base case as they all introduce some mandated minimum set of standards for gas servicing, improving consumer confidence that work is done to an adequate (and government sanctioned) level.

The options that would see AS 4575 apply to all Type A appliances scored higher than the options where AS 4575 is only applied to open-flued appliances given both the greater scope of appliances and the additional opportunities for community awareness campaigns if the standard is applied more broadly.

Option 1b is scored higher than Option 1a due to the reporting element of Option 1b, which is expected to provide the additional accountability described in Section 6.8.1 and hence confidence and peace of mind to consumers, not only confidence in their individual gasfitter but in gas and the industry as a whole.

The same reporting related considerations apply for the scoring of Options 2a and 2b.

6.8.4 Improved performance and efficiency of Type A appliances

Table: 36 Benefit criterion 4 scoring

Criterion	Weighting	Raw score (weighted score)			
		Option 1a	Option 1b	Option 2a	Option 2b
Improved performance and efficiency	5%	5 (0.30)	9 (0.45)	1 (0.05)	2 (0.10)

All four options are expected to increase the performance and efficiency of gas appliances compared to the base case as they would improve the quality of servicing as a result of the introduction of a mandated minimum set of standards for gas servicing.

Improved performance and efficiency provide a number of benefits for both the individual and the state. For the individual, it is expected to result in reduced energy bills and improved thermal comfort in the home. For the state, overall reduced gas consumption results in reduced carbon emissions (relative to the base case) and contributes towards the Government's emissions targets.

The options that have the application of AS 4575 for all Type A appliances scored higher compared to the options where AS 4575 was only applied to open-flued appliances. The greater scope of appliances under Options 1a and 1b means that the improved performance and efficiency of gas appliances would relate to all Type A appliances rather than a subset.

Option 1b is scored higher than Option 1a due to the additional reporting requirements. The additional oversight provided by the regulator would encourage gasfitters to ensure that their gas servicing work is done to at least the minimum standard. This would be expected to lead to higher compliance rates.

The same reporting related considerations apply for the scoring of Options 2a and 2b.

6.8.5 Cost criterion

The costs used in the MCA refer to the total cost of each option. A score has been calculated for each option based on its relative total cost, detailed in section 6.3, and placed on a linear scale. Option 1b involves the greatest costs and is scored accordingly, with Option 2a providing the lowest costs and scoring the lowest in the MCA for this criterion.

6.9 Conclusion

The analysis assessed all options to be an improvement on the base case (i.e. all options have a net positive score in the MCA), Option 1b scored the highest, meaning it is estimated to provide the greatest benefits relative to its costs.

Option 1b provides significantly greater benefits to deliver on the government's objectives in relation to improving the safety of Type A appliances. These benefits primarily relate to reducing deaths and injuries from CO exposure, fire and explosion and other risks, as well as providing greater information and transparency to the VBA to support compliance activities and enable more targeted interventions where required. It would also be expected to improve the performance and efficiency of gas appliances, leading to energy cost savings for consumers and reduced environmental emissions compared with the base case.

The breakeven analysis found that Option 1b would need to avoid around 65 per cent of the deaths and injuries that have occurred in the last 10 years in Victoria involving Type A appliances in order to be justified on health benefits alone. Given the additional broader non-monetised benefits considered in the MCA, the Option would be expected to provide net benefits even at a lower level of avoided deaths and injuries.

This conclusion aligns with stakeholder feedback provided during the RIS development process, with stakeholders generally supporting a mandate of AS 4575 for servicing across all Type A appliances with associated reporting obligations.

It is also noted that Option 1b (as well as Option 1a) will be more relevant in the future (compared with Options 2a and 2b) given the expected phase out of OFGSHs.

7 Preferred option

Option 1b is the preferred option as it provides greater benefits than the other options in terms of delivering on the government's objective of improving the safety of Type A appliances.

Option 1b involves:

- The mandating of AS 4575 as the standard for servicing for all Type A appliances. This means gasfitters would be required to apply AS 4575 for every Type A appliance that they service
- Gasfitters being required to provide a record of servicing (separate from the compliance certificate regime) to the VBA soon after the date of servicing (i.e. within five days of completion of the service). The gas service record would be in a form approved by the VBA and would be lodged electronically.

Option 1b scored the highest overall in the MCA given its broader scope of gas appliances covered, and the additional benefits that reporting to the regulator are expected to deliver. Option 1b is expected to:

- reduce the risks of gas-related incidents like CO spillage and fire/explosions for Type A appliances
- improve regulator information and industry transparency through the requirement for reporting to the regulator, which would lead to higher levels of compliance with AS 4575 and would support more informed engagement and compliance activity by the regulator and policy development by the Victorian Government
- improve customer confidence and 'peace of mind' as customers would know their appliances have been serviced to a prescribed minimum standard that would be more likely to identify any health and safety-related risks that may exist
- increase the performance and efficiency of gas appliances through improving the quality of servicing which would lead to reduced energy bills and/or improved thermal comfort in homes.

While Options 2a and 2b focus on open-flued gas appliances which are considered to have the most risk in terms of CO spillage compared with other non-open flued Type A appliances, these options do not address the risks that non-open flued Type A appliances pose. Examples of these other risks include safety issues caused by cracks in heat exchangers and poor combustion from cooker burners.

The breakeven analysis found that Option 1b would need to avoid around 65 per cent of the deaths and injuries that have occurred in the last 10 years in Victoria involving Type A appliances in order to be justified on health benefits alone. Given the additional broader non-monetised benefits that Option 1b provides, it is the preferred Option.

This option was broadly supported by those stakeholders consulted as part of the development of this RIS.

The proposed regulatory reform is expected to be implemented in the winter of 2022.

7.1 Small business and competition impacts

It is expected that while small businesses may experience some disproportionate effects under the preferred option as small businesses are less likely than larger businesses to currently meet AS 4575, these effects are not expected to be significant. These effects would apply in cases where particular small businesses currently do not meet AS 4575 (or equivalent) for gas appliance servicing work, as has been reported by some stakeholders.

These impacts have been assessed in the impact analysis and would mean some smaller businesses would need to spend additional time to conduct servicing to AS 4575 and to undertake record-keeping. However, these changes would largely bring these businesses in line with the relevant practices that are already being applied by other gasfitters conducting servicing of Type A appliances.

In terms of understanding the requirements, it is not expected that significant time would be required for licensed gasfitters to understand and apply AS 4575. This is because AS 4575 is considered by industry to be the minimum set of standards for gas servicing. Stakeholders consulted noted that a licensed or registered gasfitter should be able to readily interpret the standard. To reduce any transitional impacts, the proposed reforms would be supported by industry information and education campaigns, delivered by the regulators during and after implementation.

Overall, any disproportionate impacts on small business are expected to be small and would be greatly outweighed by the net community benefit associated with improved health outcomes, and regulator information and industry transparency as a result of this reform.

It is not expected that the preferred option would materially affect competition as the introduction of a mandated minimum set of standards for gas servicing applies to all affected businesses regardless of size. Some stakeholders consulted indicated that the reform would improve competition by 'levelling the playing field' in Type A appliance servicing, with all gasfitters conducting servicing to the same minimum standard. Table 37 lists the questions used to assess whether a proposal is likely to affect competition as outlined in the Victorian Guide to Regulation. The responses indicate how this reform performs against each of the questions:

Table 37: Competition assessment questions

Question	Response
Is the proposed measure likely to affect the market structure of the affected sector(s)?	It is unlikely that the preferred option will have a material impact on market structure since AS 4575 is considered by many in the industry to be the minimum set of standards currently expected in gas servicing.
Will it be more difficult for new firms or individuals to enter the industry after the imposition of the proposed measure?	It is not expected that it will be more difficult for new firms or individuals to enter the industry as there are no changes to licensing/registration requirements for gasfitters as a result of this reform .
Will the costs/benefits associated with the proposed measure affect some firms or individuals substantially more than others?	It is expected that the costs associated with the reforms will impact gasfitters that do not currently apply AS 4575 or equivalent to a greater degree than those gasfitters that do. However, this is the intended effect of the reform, to increase the Type A appliance servicing standard. Even so, it is not expected that this additional impact would be significant.
Will the proposed measure restrict the ability of businesses to choose the price, quality, range or location of their services?	The preferred option does not restrict businesses to choose the price, quality, range or location of their services. It provides a minimum standard, with gasfitters able to provide a quality level at or above this standard
Will the proposed measure lead to higher ongoing costs for new entrants that existing firms do not have to meet?	The preferred option will apply to current and new entrants equally. It is expected to 'level the playing field' in terms of requirements.
Is the ability or incentive to innovate or develop new products or services likely to be affected by the proposed measure?	The preferred option is not expected to impact innovation or new service development in the industry.

In summary, the effect on small businesses and competition is expected to be small with any impact expected to be outweighed by the reform's net societal gain. This should also be considered within the context of the broad support from stakeholders consulted during the RIS process for the preferred option.

7.2 Cost to consumers

As indicated in the impact analysis of the options, mandating AS 4575 will increase the time spent undertaking the servicing where a gasfitter is not currently undertaking servicing work in accordance with AS 4575 (or equivalent) and engaging in the required recordkeeping activities. Gasfitters may increase the cost of a service to the consumer to cover the additional time spent. Given the time increase is not anticipated to be significant, any increase in the price of servicing for consumers is not expected to be significant.

8 Implementation and evaluation

8.1 Implementation plan

As set out in the Victorian Guide to Regulation¹⁰⁸, the implementation plan should set out a clear, practical strategy for implementing the preferred option by outlining:

- what needs to be done;
- who will be doing it;
- when it will be done; and
- who will monitor implementation (including identification and management of implementation risks).

8.1.1 Path for implementation

The analysis has shown that the preferred approach is Option 1b which involves mandating AS 4575 for servicing of all Type A appliances, with gasfitters required to provide a record of servicing to the regulator. To achieve this, the *Gas Safety (Gas Installation) Regulations 2018* would need to be amended to mandate AS 4575 and introduce reporting requirements with the new regulations expected to be introduced by June 2022. An appropriate IT platform to enable gasfitters to report gas servicing activity will also need to be developed / upgraded by the VBA to support the effective implementation of Option 1b.

8.1.2 Implementation tasks

Table 38 outlines the key activities to support the implementation of this reform:

Table 38: Key activities for implementation

Task	Responsibility	Key dates
Consider stakeholder submissions	DELWP	April 2022
Development of industry guidance information	DELWP/VBA/ESV	April - May 2022
Inform industry on changes during annual ESV/VBA/Master Plumbers gas safety seminars	ESV/VBA	April - June 2022
Upgrade / Development of IT platform to enable gasfitters to provide gas service reporting to the VBA	VBA	By June 2022
Amendment of Gas Safety (Gas Installations) Regulations	Minister for Energy, Environment and Climate Change	By June 2022
New requirements commence		Mid - 2022

It is expected that DELWP will be responsible for managing the overall implementation of the proposed reform.

8.1.3 Who will be responsible?

DELWP will have responsibility over communications to stakeholders on the reform and provide strategic policy development.

¹⁰⁸ Victorian Guide to Regulation, p. 43.

The VBA will have responsibility over the establishment of an effective compliance and enforcement strategy as it relates to AS 4575, including auditing gas service records and/or compliance certificates lodged for this work in accordance with the *Building Act 1993* to ensure gasfitting work complies with the requirements of AS 4575, investigating non-compliance with AS 4575 in response to consumer complaint and developing the gas service lodgement form. As described above, the VBA will also have responsibility for the implementation of an appropriate IT platform to support the reporting of gas servicing records.

8.1.4 Who will monitor implementation?

DELWP and VBA will have primary responsibility for monitoring the implementation of the proposed reform and managing associated implementation risks.

Role of the VBA in implementation of reform

The VBA will oversee implementation of the new requirement to carry out gasfitting servicing work using AS 4575.

The VBA will determine and implement an appropriate IT platform to enable lodgement of the gas servicing record with the VBA. VBA will develop an electronic gasfitting record form (which will contain all the required fields prescribed under regulation) which will be embedded into an appropriate IT platform. Gasfitters completing gas servicing work will then complete the record electronically and lodge it with the VBA via the relevant platform, similar to the process for lodgement of compliance certificates.

To support implementation of this option, the VBA will work with ESV to develop substantive practitioner and industry information and education about the reform and the new obligations introduced for practitioners. This will include communications (by electronic newsletter, direct email and website information), the development of gasfitter practice notes/ information sheets about the new mandated servicing, record keeping and lodgement requirements. The VBA and ESV will also deliver webinars/ seminars to gasfitters on the reforms, potentially as part of the annual gas safety and carbon monoxide awareness seminars usually delivered in the first half of the year (usually during the Autumn months).

In addition, VBA staff will receive training on the new requirements to enable them to provide technical advice to practitioners, as well as to deliver its auditing, inspection, enforcement and customer service functions.

8.2 Evaluation strategy

The evaluation strategy is designed to assess the effectiveness of the reform following its implementation and operation for a period of time. The Victorian Guide to Regulation¹⁰⁹ notes that the evaluation strategy should include:

- what will be evaluated;
- how it will be done;
- who will do it;
- when it will be done.

8.2.1 What will be evaluated?

This RIS has determined that the preferred option is Option 1b: Mandate AS 4575 for all Type A appliances and gasfitters must provide a record of servicing to the regulator. As such, Option 1b will be evaluated to understand the extent it has met the objectives of this reform, including:

- Improving safety for households in relation to the use of gas appliances.
- Supporting an effective compliance and enforcement regime informed by appropriate information.

¹⁰⁹ Victorian Guide to Regulation, p. 47.

- Improving consumer confidence in Type A appliance servicing (potentially measured through consumer surveys)

As the primary objective of this reform is to improve safety for households in relation to the use of gas appliances, the effectiveness of Option 1b will be measured by the reduction in fatalities, injuries and reported incidents over time.

8.2.2 How will it be done?

A baseline will be developed to ensure an understanding of the current situation concerning fatalities, illness and injuries associated with non-compliant Type A appliances service work and to assess changes to it as a result of the introduction of the preferred option. Given the rate of fatalities is lower than one per year, the baseline will be required to run over multiple years. As such, the baseline is expected to be the period from 2017-18 to 2020-21 financial year based on the expectation that the new regulations will be introduced in winter 2022 with consideration towards data from previous years. The baseline is expected to be constructed with a mix of stakeholder consultations and surveys in conjunction with currently available data including:

- Injury and fatality data from Type A appliances as reported by ESV
- Type A appliance incident data reported and investigated by ESV

Additional qualitative and quantitative methods will be required to evaluate the effectiveness of Option 1b against the baseline. Given Option 1b will make available additional data to the regulator through its reporting mechanism, data on the volume and type of gas servicing work collected by the VBA will also be available to assess the effectiveness of the preferred option against the baseline.

8.2.3 Who will do it?

DELWP will be responsible for the whole of government evaluation of Option 1b. However, as the VBA will collect data relating to servicing work and ESV will collect data relating to infringement notices issued and any relevant gas safety incidents during this period, both agencies will provide support to DELWP in the first instance in assessing the effectiveness of the reform.

8.2.4 When it will be done

The evaluation is scheduled to commence three years after the implementation of the reform. This timeframe will provide sufficient time for the new arrangements to be fully operational and embedded as business as usual for gasfitters and will enable sufficient representative data to be collected to inform the evidence-based evaluation.

9 Appendix A

9.1 Draft regulations¹¹⁰

¹¹⁰ Provided by DELWP. Approved by the Office of the Chief Parliamentary Council.

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Gas Safety (Gas Installation) Amendment (Type A Appliances) Regulations 2022

S.R. No.

TABLE OF PROVISIONS

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Confidential Draft prepared by the Office of Chief Parliamentary Counsel Victoria

STATUTORY RULES 2022

Second Draft 4/2/2022

S.R. No.

Gas Safety Act 1997

Gas Safety (Gas Installation) Amendment (Type A Appliances) Regulations 2022

The Governor in Council makes the following Regulations:

Dated:

Responsible Minister:

LILY D'AMBROSIO

Minister for Energy, Environment and Climate Change

Clerk of the Executive Council

1 Objective

The objective of these Regulations is to amend the Gas Safety (Gas Installation) Regulations 2018—

- (a) to prescribe AS 4575 as the standard to which a certain kind of gasfitting work applies; and
- (b) to require the creation and giving of records in relation to that work.

2 Authorising provision

These Regulations are made under section 118 of the **Gas Safety Act 1997**.

3 Commencement

These Regulations, come into operation on 1 June 2022.

4 Principal Regulations

In these Regulations the Gas Safety (Gas Installation) Regulations 2018¹ are called the Principal Regulations.

5 Definitions

- (1) In regulation 5 of the Principal Regulations **insert** the following definitions—

"**AS 4575** means AS 4575, "Gas appliances— Servicing of Type A appliances" as published or amended from time to time;

licensed gasfitter means a person who is licensed, under section 221M of the **Building Act 1993**, to carry out gasfitting work within the meaning of the Plumbing Regulations 2018;

registered gasfitter means a person who is registered, under section 221O of the **Building Act 1993**, to carry out gasfitting work within the meaning of the Plumbing Regulations 2018;

supervising gasfitter, for gasfitting work (within the meaning of the Plumbing Regulations 2018) carried out by a registered gasfitter, means the licensed gasfitter under whose supervision the work is carried out as described in section 221OA(5) of the **Building Act 1993**;

Type A appliance servicing work is the internal cleaning, maintenance and adjusting of a Type A appliance and includes the adjustment, repair or replacement of a component of the Type A appliance;

VBA means the Victorian Building Authority established by section 193 of the **Building Act 1993**."

- (2) In regulation 5 of the Principal Regulations, in the definition of *the Act*, for "1997." substitute "1997;".

6 Prescribed standards for gasfitting work

After regulation 12(3) of the Principal Regulations insert—

- "(4) For the purposes of section 72(1) of the Act, the prescribed standard for Type A appliance servicing work on an appliance that is part of a standard gas installation is AS 4575."

7 New regulations 36, 37 and 38 inserted

After regulation 35 of the Principal Regulations insert—

"36 Licensed gasfitter who carries out certain work must create and provide a record

- (1) This regulation applies in relation to Type A appliance servicing work carried out on an appliance that is part of a standard gas installation (*applicable work*).
- (2) A licensed gasfitter who carries out applicable work must create a record of the work that—
- (a) includes the matters specified in Schedule 14; and
 - (b) includes the additional matters (if any) specified by the VBA; and
 - (c) is not false or misleading in any material detail; and
 - (d) is in the form specified by the VBA.

Penalty: 20 penalty units.

- (3) A licensed gasfitter who carries out applicable work must, within 5 days of carrying out the work, give a copy of the record to the person for whom the work was carried out.

Penalty: 20 penalty units.

- (4) A licensed gasfitter who carries out applicable work must, within 5 days of carrying out the work, give the VBA a record of the work that complies with subregulation (2)(a), (b) and (c) in the manner and form specified by the VBA.

Penalty: 20 penalty units.

37 Licensed gasfitter who supervises certain work must create and provide a record

- (1) This regulation applies in relation to Type A appliance servicing work carried out on an appliance that is part of a standard gas installation, and for which there is a supervising gasfitter (*applicable work*).
- (2) The supervising gasfitter for the applicable work must create a record of the work that—
- (a) includes the matters specified in Schedule 14; and
 - (b) includes the additional matters (if any) specified by the VBA; and
 - (c) is not false or misleading in any material detail; and
 - (d) is in the form specified by the VBA.

Penalty: 20 penalty units.

- (3) The supervising gasfitter for the applicable work must, within 5 days of carrying out the work, give a copy of the record to the person for whom the work was carried out.

Penalty: 20 penalty units.

- (4) The supervising gasfitter for the applicable work must, within 5 days of carrying out the work, give the VBA a record of the work that complies with subregulation (2)(a), (b) and (c) in the manner and form specified by the VBA.

Penalty: 20 penalty units.

38 Publication of matters specified by the VBA

The VBA must take reasonable steps to ensure that the following information is published on the VBA's website—

- (a) the matters, specified by the VBA under regulation 36(2)(b), that are to be included in a record referred to in regulation 36;
- (b) the form, specified by the VBA under regulation 36(2)(d), that is to be used for a record created under regulation 36(2);
- (c) the manner and form, specified by the VBA under regulation 36(4), in which a record under that provision is to be given to the VBA;
- (d) the matters, specified by the VBA under regulation 37(2)(b), that are to be included in a record referred to in regulation 37;

- (e) the form, specified by the VBA under regulation 37(2)(d), that is to be used for a record created under regulation 37(2);
- (f) the manner and form, specified by the VBA under regulation 37(4), in which a record under that provision is to be given to the VBA."

8 New Schedule 14 inserted

After Schedule 13 to the Principal Regulations
insert—

"Schedule 14—Matters included in record of Type A appliance servicing work

(Regulations 36(a)(i) and 37(a)(i))

- 1 The name of the licensed or registered gasfitter who carried out the work.
- 2 The licence or registration number of the licensed or registered gasfitter who carried out the work;
- 3 If the work was carried out by a registered gasfitter—
 - (a) the name of the supervising gasfitter for the work; and
 - (b) the licence number of the supervising gasfitter.
- 4 The business name of the vendor in the financial transaction for provision of the work.
- 5 The ABN of the vendor in the financial transaction for provision of the work.
- 6 The date the work was carried out.

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- 7 The address at which the work was carried out.
- 8 Details of the appliance on which the work was carried out, including—
 - (a) make;
 - (b) model;
 - (c) model number;
 - (d) gas type;
 - (e) serial number or date of manufacture;
 - (f) certification body;
 - (g) certification number.
- 9 A completed version of the checklist in Appendix E of AS 4575.
- 10 Details of the work carried out, including any adjustments, replacements, testing and repairs.
- 11 A statement to the effect that the information in the record is not false or misleading in any material detail.
- 12 The signature of the licensed gasfitter who either undertook the work or was the supervising gasfitter for the work.
- 13 The date on which the signature referred to in item 12 was given."

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Endnotes

¹ Reg. 4: S.R. No. 140/2018.

Table of Applied, Adopted or Incorporated Matter

The following table of applied, adopted or incorporated matter is included in accordance with the requirements of regulation 5 of the Subordinate Legislation Regulations 2014.

Statutory rule provision	Title of applied, adopted or incorporated document	Matter in applied, adopted or incorporated document
Regulation 5 which inserts the definition of AS 4575 into regulation 5 of the Principal Regulations Regulation 6 which inserts regulation 12(4) into the Principal Regulations	AS 4575, "Gas appliances— Servicing of Type A appliances" published on 9 August 2019 by Standards Australia	The whole
Schedule 14, item 9	AS 4575, "Gas appliances— Servicing of Type A appliances" published on 9 August 2019 by Standards Australia	Appendix E

10 Appendix B

10.1 Sensitivity analysis

A sensitivity analysis was conducted to understand the impacts of varying key cost assumptions on the overall costs of each option. The sensitivity analysis has considered the following assumptions as noted in Table 28:

- Additional servicing time
- Record-keeping time
- Reporting time

Each of the assumptions has been varied from its central assumption to provide a low cost and high cost scenario.

10.1.1 Servicing time sensitivity

Tables 39-41 show the effect of a variation in the servicing time assumption as noted in Table 19 on the total cost and breakeven point of each option. A 50 per cent sensitivity variance has been applied to the central estimate (10 minutes) to obtain the low cost scenario (5 minutes) and the high cost scenario (15 minutes). This results in the incremental cost change for the low and high cost scenario being half of the central estimate for the total servicing cost.

Table 39: Servicing time sensitivity - incremental cost change (percentage change as a proportion of total cost shown in brackets) - \$million

	Option 1a	Option 1b	Option 2a	Option 2b
Low cost scenario (5 mins)	-\$3.253 (-23.8%)	-\$3.253 (-7.1%)	-\$0.434 (-18.2%)	-\$0.434 (-4.4%)
High cost scenario (15 mins)	+\$3.253 (+23.8%)	+\$3.253 (+7.1%)	+\$0.434 (+18.2%)	+\$0.434 (+4.4%)

Table 39 shows that Option 1b is the least sensitive (on a relative basis) to changes from the central estimate while Option 1a is the most sensitive. This is because, while the two options are equally sensitive in absolute terms, Option 1b has a higher cost base.

Table 40 provides an overview of the effect on the total cost of each option under the low and high cost scenarios.

Table 40: Servicing time sensitivity - total cost of option - \$million

	Option 1a	Option 1b	Option 2a	Option 2b
Low cost scenario (5 mins)	\$10.622	\$44.208	\$1.947	\$9.517
Central estimate used in RIS (10 mins)	\$13.948	\$47.534	\$2.381	\$9.951
High cost scenario (15 mins)	\$17.273	\$50.859	\$2.815	\$10.384

Table 41 provides the revised proportion of deaths and injuries that would need to be avoided over the 10-year period for the proposed options to breakeven under the low and high cost scenarios.

Table 41: Servicing time sensitivity - proportion of avoided deaths and injuries over 10 years to break even - \$million

	Option 1a	Option 1b	Option 2a	Option 2b
Low cost scenario (5 mins)	15%	61%	3%	13%
Central estimate used in RIS (10 mins)	19%	65%	3%	14%
High cost scenario (15 mins)	24%	70%	4%	14%

10.1.2 Record-keeping time sensitivity

Tables 42-44 show the effect of a variation in the record-keeping time assumption as noted in Table 20 on the total cost and breakeven point of each option. A 50 per cent sensitivity has been applied to the central estimate (10 minutes) to obtain the low cost scenario (5 minutes) and the high cost scenario (15 minutes).

Table 42: Record-keeping time sensitivity - incremental cost change (percentage change as a proportion of total cost shown in brackets) - \$million

	Option 1a	Option 1b	Option 2a	Option 2b
Low cost scenario (5 mins)	-\$3.255 (-23.8%)	-\$3.255 (-7.1%)	-\$0.434 (-18.2%)	-\$0.434 (-4.4%)
High cost scenario (15 mins)	+\$3.255 (+23.8%)	+\$3.255 (+7.1%)	+\$0.434 (+18.2%)	+\$0.434 (+4.4%)

The sensitivities are broadly similar to the servicing time sensitivities (given they both add or subtract approximately 5 minutes to the gasfitter's time per servicing job relative to the central estimate). Similar to the servicing time sensitivity, while Options 1a and 1b have the highest absolute cost change, Option 1b has the smallest relative change while Option 1a has the highest relative change.

Table 43 provides an overview of the effect on the total cost of each option under the low and high cost scenarios.

Table 43: Record-keeping time sensitivity - total cost of option - \$million

	Option 1a	Option 1b	Option 2a	Option 2b
Low cost scenario (5 mins)	\$10.622	\$44.208	\$1.947	\$9.517
Central estimate used in RIS (10 mins)	\$13.948	\$47.534	\$2.381	\$9.951
High cost scenario (15 mins)	\$17.273	\$50.859	\$2.815	\$10.384

Table 44 provides the revised proportion of deaths and injuries that would need to be avoided over the 10-year period for the proposed options to breakeven under the low and high cost scenarios.

Table 44: Record-keeping time sensitivity - proportion of avoided deaths and injuries over 10 years to break even

	Option 1a	Option 1b	Option 2a	Option 2b
Low cost scenario (5 mins)	15%	61%	3%	13%
Central estimate used in RIS (10 mins)	19%	65%	3%	14%
High cost scenario (15 mins)	24%	70%	4%	14%

10.1.3 Reporting time sensitivity

Tables 45-47 show the effect of a variation in the reporting time assumption as noted in Table 21 on the total cost and breakeven point of each option. Note that this sensitivity is only relevant to Options 1b and 2b, given the other options do not have a reporting requirement. A 60 per cent sensitivity has been applied to the central estimate (5 minutes) to obtain the low cost scenario (2 minutes) and the high cost scenario (8 minutes).

Table 45: Reporting time sensitivity - incremental cost change (percentage change as a proportion of total cost shown in brackets) - \$million

	Option 1a	Option 1b	Option 2a	Option 2b
Low cost scenario (2 mins)		-\$17.031 (-35.8%)		-\$1.421 (-14.3%)
	N/A		N/A	
High cost scenario (8 mins)		+\$17.031 (+35.8%)		+\$1.421 (+14.3%)

Table 45 shows that Option 2b is relatively less sensitive to changes in the reporting time compared to Option 1b. However, the magnitude of the cost change for both options is significant, being greater than 36 per cent and 14 per cent respectively of the total cost of their respective option.

Table 46 provides the effect on the total cost of both options under the low and high cost scenarios.

Table 46: Reporting time sensitivity - total cost of option - \$million

	Option 1a	Option 1b	Option 2a	Option 2b
Low cost scenario (2 mins)		\$30.503		\$8.530
Central estimate used in RIS (5 mins)	N/A	\$47.534	N/A	\$9.951
High cost scenario (8 mins)		\$64.565		\$11.372

Table 47 provides the revised proportion of deaths and injuries that would need to be avoided over the 10-year period for the proposed options to breakeven under the low and high cost scenarios.

Table 47: Reporting time sensitivity - proportion of avoided deaths and injuries over 10 years to break even

	Option 1a	Option 1b	Option 2a	Option 2b
Low cost scenario (2 mins)		42%		12%
Central estimate used in RIS (5 mins)	N/A	65%	N/A	14%
High cost scenario (8 mins)		89%		16%

This sensitivity analysis shows that, for the reporting options, the costs and breakeven points are most sensitive to changes in the reporting time. This underscores the importance of implementing a simple and easy-to-use reporting system to minimise the amount of time that gasfitters will need to spend on reporting.

10.1.4 Combined sensitivity scenarios

In order to assess the cumulative effects of the three sensitivities considered above, two additional scenarios have been considered:

- **Low cost scenario:** assumes the low cost scenarios for additional servicing time (5 minutes), record-keeping time (5 minutes) and reporting time (2 minutes)
- **High cost scenario:** assumes the high cost scenarios for additional servicing time (15 minutes), record-keeping time (15 minutes) and reporting time (8 minutes)

Table 48 provides the key results of these combined low cost and high cost scenarios.

Table 48: Sensitivity analysis - Combined scenarios - \$million

	Option 1a	Option 1b	Option 2a	Option 2b
Incremental cost change (percentage cost change shown in brackets)				
Low cost scenario	-\$6.651 (-47.7%)	-\$23.682 (-49.8%)	-\$0.867 (-36.4%)	-\$2.288 (-23%)
High cost scenario	+\$6.651 (+47.7%)	+\$23.682 (+49.8%)	+\$0.867 (+36.4%)	+\$2.288 (+23%)
Total cost of option				
Low cost scenario	\$7.296	\$22.852	\$1.514	\$7.662
Central estimate used in RIS (5 mins)	\$13.948	\$47.534	\$2.381	\$9.951
High cost scenario	\$20.598	\$71.215	\$3.249	\$12.239
Proportion of avoided deaths and injuries required over 10 years to breakeven				
Low cost scenario	10%	33%	2%	11%
Central estimate used in RIS (5 mins)	19%	65%	3%	14%
High cost scenario	28%	98%	4%	17%

The combined sensitivity analysis shows that the break-even point for even the highest cost option (Option 1b) is still below the total number of deaths and injuries that are estimated to have occurred over the last 10 years. Overall, the sensitivity analysis shows that the cost and breakeven results are significantly sensitive to changes to the additional servicing, record-keeping and reporting time, with reporting time being the most sensitive.

11 Appendix C

11.1 Stakeholder consultation

To inform the development of this RIS, stakeholder consultations were conducted in October 2021 with a range of stakeholders.

11.1.1 Stakeholders consulted

The following stakeholders were consulted as part of this RIS process:

- Australian Gas Association
- Department of Justice and Community Safety
- Energy Safe Victoria
- Gas Appliance Manufacturers Association of Australia
- Master Plumbers
- Plumbing Advisory Council
- Plumbing Industry Climate Action Centre
- Plumbing and Pipe Trades Employees Union
- Victorian Building Authority

DELWP also conducted preliminary consultation during January 2020 which include the following stakeholders:

- Chase and Tyler Foundation
- Consumer Affairs Victoria
- Energy Safe Victoria
- Gas appliance manufacturers
- Plumbing and Pipes Employees Trade Union
- Master Plumbers
- Victorian Building Authority

11.1.2 How were they consulted?

The stakeholders were consulted through one hour one-to-one interviews. All the consultations were done through video conferencing and was seen as an effective medium of communication within the context of the COVID-19 pandemic and associated lockdowns.

11.1.3 What information was collected

Stakeholders were consulted on their understanding of the problem associated with inconsistency of Type A appliance servicing and limited data on Type A appliance servicing, key assumptions used in the cost analysis of the options, and perspectives on the proposed options.

11.1.4 How was the information collected used in the RIS?

The information was used to inform the analysis of the costs and benefits of the proposed options.

