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Dear consultation team,

AIRAH appreciates the opportunity to provide input on Victoria's Draft Guideline for Managing Greenhouse Gas Emissions.

As the peak body for Australia's heating, ventilation, air conditioning and refrigeration (HVAC&R) sector, AIRAH has a key part to play in achieving our climate goals. According to the most recent *Cold Hard Facts* report, HVAC&R uses more than 24 per cent of the electricity generated in Australia annually, and accounts for 11.5 per cent of the nation's carbon dioxide emissions.

Through our wide range of activities, AIRAH seeks to create an Australian HVAC&R industry that is highly skilled and professional, safe, sustainable and environmentally effective. This includes technical manuals, training, events and publications, building and sharing the latest knowledge on low-emissions HVAC&R equipment and practices.

AIRAH therefore commends the Victorian EPA on the release of the draft guideline for managing greenhouse gas emissions. We believe the practical and straightforward nature of the advice will help Victorian's reduce their environmental impact. We also support the approach of making businesses more aware of and accountable for their responsibilities towards the environment – we see this as a powerful lever for affecting change.

AIRAH especially welcomes the information in the guideline aimed at HVAC&R equipment. As noted above, our sector presents great opportunities for reducing emissions.

On another note, as an organisation headquartered in Victoria, AIRAH is looking at our internal operations and seeking to reduce our environmental impact. The guideline will serve as a valuable reference for us in this pursuit.

We have added some comments and suggestions to the draft guideline. If AIRAH can provide any more information to support the guideline, please don't hesitate to get in touch.

Regards,

Tony Gleeson, M.AIRAH
Chief Executive
AIRAH

EPA VICTORIA

Guideline for managing greenhouse gas emissions

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Draft for consultation

VICTORIA State Government

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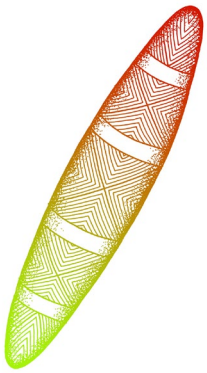

EPA acknowledges Aboriginal people as the first peoples and Traditional custodians of the land and water on which we live, work and depend.
We pay respect to Aboriginal Elders, past and present.
As Victoria's environmental regulator, we pay respect to how Country has been protected and cared for by Aboriginal people over many tens of thousands of years.
We acknowledge the unique spiritual and cultural significance of land, water and all that is in the environment to Traditional Owners, and recognise their continuing connection to, and aspirations for Country.

Disclaimer

EPA guidance does not impose compliance obligations. Guidance is designed to provide information to help duty holders understand their obligations under the Environment Protection Act 2017 and subordinate instruments, including by providing examples of approaches to compliance. In doing so, guidance may refer to, restate or clarify EPA's approach to statutory obligations in general terms. It does not constitute legal or other professional advice and should not be relied on as a statement of the law. Because it has broad application, it may contain generalisations that are not applicable to you or your particular circumstances. You should obtain professional advice or contact EPA if you have any specific concern. EPA Victoria has made every reasonable effort to provide current and accurate information, but does not make any guarantees regarding the accuracy, currency or completeness of the information.

Contents

1. Introduction

1.1 Climate change

Human-induced climate change is already affecting many weather and climate extremes in every region across the globe (IPCC, 2021).

Changing of the climate system is now evident from observations of increases in global average air and ocean temperatures, widespread melting of snow and ice, and rising global average sea level with changes in weather patterns and the frequency and intensity of weather events.

In Victoria this means a warmer and drier future, with an increasing likelihood of more extreme events such as heatwaves, bushfires and storms.

The report from Working Group 1 of the International Panel for Climate Change (IPCC, 2021), covering the physical science of climate change is the first contribution to the IPCC's Sixth Assessment Report. This report has found that:

- 'it is unequivocal that human influence has warmed the atmosphere, ocean and land.' (A.1)
- 'global surface temperature will continue to increase until at least the mid-century under all emissions scenarios considered. Global warming of 1.5°C and 2°C will be exceeded during the 21st century unless deep reductions in carbon dioxide (CO_2) and other greenhouse gas emissions occur in the coming decades' (B.1)
- 'with every additional increment of global warming, change in extremes continue to become larger. For example, every additional 0.5°C of global warming causes clearly discernible increases in the intensity and frequency of hot extremes, including heatwaves and heavy precipitation, as well as agricultural and ecological droughts in some regions' (B.2.2)

Global greenhouse gas (GHG) emissions will need to decline to net zero levels by the second half of the century to reach the international community's agreement (Paris Agreement) to hold the global average temperature increase to well below 2°C above pre-industrial levels and to pursue efforts to limit the temperature increase to 1·5°C above pre-industrial levels.

Victoria's net zero emissions future

Through the Climate Change Act 2017 (CC Act) Victoria has legislated a long-term target of net zero emissions by 2050 consistent with the Paris Agreement goal. This provides a clear signal to sectors of the Victorian economy for sustained and significant actions to reduce emissions and adapt to a changing climate.

As a key requirement under the CC Act, in May 2021 the Victorian Government released Victoria's Climate Change Strategy, setting out the Government's action on climate change and next steps towards achieving net zero emissions and a climate resilient Victoria by 2050.

The Strategy includes interim targets to reduce the state's GHG from 2005 levels by 28–33 per cent by 2025 and 45–50 per cent by 2030. These targets are informed by climate science, including the latest IPCC report.

Achieving these targets — and ultimately net zero emissions — requires action across all sectors of the economy by governments, businesses and the community. To help drive this the Government released emissions reduction pledges for sectors of the economy for 2021–2025 the first in a series of five-yearly pledges required under the CC Act.

The main sources of GHGs in Victoria are from the energy sector (including electricity generation, direct combustion, transport and fugitive emissions from fuel) and agriculture (including from livestock and fertiliser use). Other sources include industrial processes (such as metal and chemical production) and use

of synthetic gases (such as in refrigeration and air conditioning and electrical equipment), waste (including from landfills and wastewater treatment) and clearance of forested land[1].

Businesses, governments and households generate GHG emissions through:

- direct combustion emissions — from activities such as generating heat, steam or pressure in industry and burning gas for household heating, hot water and cooking
- transport emissions — from the combustion of fuel such as petrol and diesel in passenger and commercial motor vehicles.

There are practical steps that can be taken across all sectors of the economy to reduce GHG emissions.

1.2 Purpose

GHG emissions create a risk of harm to human health and the environment as they contribute to an increase in climate change risks. This guideline forms part of the 'state of knowledge' about the risks of harm arising from GHG emissions, and ways of eliminating or reducing those risks, which people subject to the general environmental duty (GED) should reasonably be aware of.

The guideline outlines a risk management approach that can be applied to GHG emissions. It is designed to support Victorians conducting a business with direct or indirect GHG emissions.

The guideline will assist you to assess your GHG emissions and take reasonably practicable steps to eliminate or reduce your emissions as part of your contribution to reducing climate change risks, as it is the many contributions from human activities that leads to the increased GHG concentrations in the atmosphere. The guideline will help you better understand how to identify and assess (for example, estimate, calculate) and manage (through implementing controls to minimise the risk so far as reasonably practicable) your direct and indirect GHG emissions.

The guideline doesn't tell you what specific controls to put in place, instead, it provides examples of controls and you can decide what is reasonably practicable and best suits your circumstances. It also provides knowledge sources including a list of resources and where to go for more help.

See also Industry guidance: Supporting you to comply with the general environmental duty (EPA publication 1741) for information about other resources that can contribute to your knowledge.

GHGs are produced by all types of businesses, including:

- hospitality and retail businesses, such as cafes, restaurants and shops
- commercial services, such as offices
- manufacturing
- transport, postal and warehousing
- healthcare
- education and training
- mining and construction
- primary industries, such as agriculture and forestry
- waste including landfills and wastewater treatment.

This guideline may also be of interest to others, including the broader community. For information on how individuals and households can minimise their risk of harm to human health or the environment from GHG emissions, please go to "For community" pages at epa.vic.gov.au.

[1] Department of Environment, Land, Water and Planning, 2020

1.3 Regulatory context – the general environmental duty

1.3.1 Environment Protection Act 2017

The cornerstone of the Environment Protection Act 2017 (EP Act) is the GED.

The GED (s25 of the EP Act) requires people who are engaging in any activity that may give rise to risks of harm to human health or the environment from pollution or waste to minimise those risks, so far as reasonably practicable. This requires such risks to either be eliminated or reduced if it is not reasonably practicable to eliminate them.

Doing what is reasonably practicable means putting in proportionate controls to understand and minimise the risk of harm from GHG emissions. Being proportionate means the greater the risk of harm (for example, the type and quantity of your GHG emissions), the greater the expectation for you to manage it. You do this by demonstrating that you've considered and implemented the most suitable actions and controls that are available to eliminate or reduce the harm.

Under the GED when a person is conducting a business they must:

- use and maintain:
  - plant, equipment, processes and systems in a way that minimises risks (for example, maintain machinery and equipment in accordance with manufacturer's specifications)
  - systems for identifying, assessing and controlling risks
  - adequate systems to ensure that if risk eventuates harmful effects are minimised
- ensure all substances are handled, stored, used and/or transported in a way that minimises risks
- provide information, instruction, supervision and training to people engaged in activities to ensure they comply with the requirements above (for example, undertake toolbox sessions where practicable).

Under the GED if you are conducting a business and engaging in an activity that involves the design, manufacture, installation or supply of a substance, plant, equipment or structure you must, so far as is reasonably practicable:

- minimise risks of harm to people or the environment from pollution and waste arising from the design, manufacture, installation or supply of the substance, plant, equipment or structure when used for the purpose it was intended
- where a risk of harm cannot be eliminated, provide information to each person about the purpose of the substance, plant, equipment or structure and any conditions necessary to ensure it can be used in a way that reduces the risks of harm.

The definition of waste expressly includes GHG substances emitted or discharged into the environment and the definition of pollution captures GHG emissions as an "emission, discharge, deposit, disturbance or escape of a solid, liquid or gas" (s3 of the EP Act).

The definition of harm means an adverse effect on human health or the environment (of whatever degree or duration) and may arise as a result of the cumulative effect of harm arising from an activity combined with harm arising from other activities or factors (s4 of the EP Act).

To determine what is reasonably practicable see s6 of the EPA Act and EPA guidance Reasonably practicable (EPA publication 1856). Section 5.3 of this guidance provides help on determining what is reasonably practicable for GHG emissions.

This guideline provides clarity on the application of the GED to GHG emissions and adds to the state of knowledge.

EPA's Compliance and enforcement policy, (EPA publication 1798) sets out EPA's regulatory approach, which uses a mix of encouragement and deterrence to motivate action to deliver improved outcomes. EPA may refer to this guideline, or any other relevant information, when providing advice or assessing compliance.

2. GHG emission risk management framework

2.1 Steps in identifying, assessing and controlling GHG emission risks

A risk management framework will help you understand and manage risks from the generation of GHGs emissions from your activities. EPA's Assessing and controlling risk: A guide for business (EPA Publication 1695) provides a risk management framework that you can use. You can use a different risk management approach if it is more suited to your needs. The method for assessing and controlling risk has four steps (see Figure 1). This method is a continuous process which returns to step 1 after a control is put in place:

Figure 1: Steps in controlling hazards and risks

Table 1: Steps in controlling hazards and risks associated with GHG emissions.

Step	Action	Description
1	Identify hazards	Identify your GHG emission sources and group them according to scopes (includes direct and indirect GHG emissions).
2	Assess risks from GHG emissions	Understand your GHG emissions and consider relevant information (see section 4.6) to assess the risk of harm.
3	Implement controls	Put measures in place to eliminate risks of harm from GHG emissions, or if that is not reasonably practicable, to reduce those risks so far as reasonably practicable.
4	Check controls	Review controls regularly to ensure they are effective and periodically review your controls to ensure you are implementing the most current and effective options, where reasonably practicable.

3. Step 1 — Identifying your GHG emission sources

The first step in minimising risks of harm from GHG emissions is to identify all your emission sources.

GHG emissions include:

- carbon dioxide
- methane
- nitrous oxide
- sulfur hexafluoride
- hydrofluorocarbon or a perfluorocarbon specified in the *National Greenhouse and Energy Reporting Act 2007* (see Appendix A).

GHG emissions can be released directly or caused indirectly from your activities. Your GHG emissions can be grouped into different "scopes".

The purpose of identifying and grouping your GHG emissions is to help inform choices on how you undertake activities across your business and to look for opportunities to reduce both your direct and indirect emissions through those choices.

3.1 Scope 1 GHG emissions

Scope 1 GHG emissions are the emissions released to the atmosphere directly from your own activity, or series of activities.

Examples of scope 1 emissions include:

- emissions produced from manufacturing processes, such as from the manufacture of cement
- emissions from the burning of fuel in motor vehicles
- fugitive emissions from leakage of gases during the exploration, production, transmission, storage and distribution of natural gas
- fugitive emissions, such as methane emissions from oil and natural gas production, coal mines or decomposition of organic waste in landfills and wastewater treatment plants, or from the use of refrigeration and air conditioning equipment
- methane emissions from the digestive system of ruminants (for example, sheep and cattle) and livestock manure
- burning of fossil fuels (for example, coal or natural gas) to generate electricity — these are scope 1 for the electricity generator but for others they are scope 2 (for example when the electricity is transmitted to be used in a factory to power machinery and lighting)
- emissions from gas powered equipment, such as kilns, boilers and dryers
- emissions from gas heating and cooking.

3.2 Scope 2 GHG emissions

Scope 2 GHG emissions are the emissions released to the atmosphere indirectly due to your consumption of electricity, heat or steam that is produced by another business.

For example, GHG emissions from your purchased electricity, which was generated by burning coal, are considered scope 2 emissions. Note that the power station burning coal and generating electricity would count these as part of their scope 1 emissions.

3.3 Scope 3 GHG emissions

Scope 3 GHG emissions are also indirect emissions. They are indirect emission that are not included in scope 2 emissions.

Scope 3 emissions come from your activities generated in the wider economy, from sources you do not own or control. They are usually termed either upstream or downstream emissions. Both upstream and downstream emissions contribute to scope 3 emissions.

Examples of upstream and downstream scope 3 emissions are shown in Table 2 below.

Table 2: Scope 3 emissions

Upstream scope 3 emissions	Downstream scope 3 emissions
Purchased goods and services	Processing of sold products
Waste generated in operations	Use of sold products
Transport and distribution	End of life treatment of sold products

For more information on ways to identify your GHG emissions see the methods to identify hazards, in EPA's Assessing and controlling risk: A guide for business (EPA publication 1695).

Did you know

Sulfur hexafluoride, hydrofluorocarbons and perfluorocarbons are synthetic GHGs that are manufactured for use in industry. They were introduced as replacements for ozone depleting substances as they do not damage the ozone layer and are commonly used in refrigeration and air conditioning, fire extinguishing, foam production, and in medical aerosols. However, they contribute to climate change[2]. The most common synthetic GHG in Australia (HFC-134a) is mostly used in refrigerators and air conditioners. Synthetic GHGs listed in the Kyoto Protocol are regulated in Australia under the *Ozone Protection and Synthetic Greenhouse Gas Management Act 1989*.

[2] Because of their stability and long life, synthetic GHGs can remain in the atmosphere for a long time, increasing their contribution to climate change. The first synthetic GHGs developed, such as sulfur hexafluoride, are gradually being replaced by new synthetic GHGs with lower global warming potential, or gases that do not impact on greenhouse gas levels.

4. Step 2 — Assessing risks from GHG emissions

Continued emission of GHGs will cause further warming and long-lasting changes in all components of the climate system, increasing the likelihood of severe, pervasive, and irreversible impacts for people and ecosystems[34] - Intergovernmental Panel on Climate Change.

Assessing risks from GHG emissions means understanding the amount of GHG emissions resulting from your activities. By quantifying GHG emissions from your activities you will better understand the risks associated with these activities, how your emissions change over time and how you compare with others in your sector.

For some businesses in low-risk situations (for example, small businesses with small energy use) after you have identified your sources of GHG emissions you can proceed directly to eliminating and reducing your GHG emissions (Section 5, Step 3), without calculating them.

Tracking activity data such as electricity, gas and fuel usage can be a way to see whether your controls are effective over time. Most electricity bills also have GHG emissions data that you can track over time — it is usually shown as a total amount in tonnes GHG or in a graph.

4.1 Calculating GHG emissions

If you are a medium to large size business and/or have large energy use you should quantify your GHG emissions.

Rather than direct measurement of GHG emissions, the most common approach to calculate scope 1, scope 2 and scope 3 GHG emissions is to use emission factors and relate them to activity data for each source.

Emissions are usually reported as carbon dioxide equivalent (CO_2-e). The emissions from each source can be calculated using the following formula.:

Emissions (CO_2-e) = Activity data x Emissions factor

Activity data — is a key input into the calculation of GHG emissions. It refers to quantitative data associated with the activity that generated the GHG emissions. For example, activity data for emissions from purchased electricity may refer to electricity consumption amounts over a period of time stated on supplier invoices (typically in kWh).

Emissions factor — GHG emissions are determined by multiplying the activity data with conversion (or emission) factors so that GHG emissions can be expressed as a quantity of emissions that is consistent year-on-year and comparable with other organisations, (for example, carbon dioxide equivalent – CO_2-e).

You should list and quantify each of your emission sources. This is sometimes referred to as a GHG emissions inventory. Individual emissions are added to provide total emissions — which is often presented in units of tonnes of carbon dioxide equivalent (tCO_2e).

[3] IPCC, 2014: *Climate Change 2014: Synthesis Report*. (See Chapter 9, Further reading).
[4] IPCC, 2021: Summary for Policymakers. In: Climate Change 2021: The Physical Science Basis. (See Chapter 9, Further reading)

4.1.1 Activity data

You should be able to obtain some activity data for emissions from gas use from your gas bills and information on fuel used in company-owned vehicles using fuel invoices/receipts and vehicle mileage in vehicle logbooks or odometers. This activity data should be enough to help you calculate your GHG emissions for many circumstances. Most electricity bills will already have calculated your GHG emissions for you. Using this information will help you track your emissions over time. Sustainability Victoria has information on how to understand your electricity and gas bills.

Using data from reliable sources, such as from bills, will provide the most accurate picture of your GHG emissions. Obtaining reliable data for your substantive GHG emissions sources should be prioritised. If it is difficult to get activity data you can use reasonable estimates and these should be documented.

4.1.2 Emission factors

You should use well known emission factors from reputable sources to ensure the credibility of your GHG quantification.

The Australian Government publishes National Greenhouse Accounts (NGA) Factors annually to be used by companies and individuals to estimate their GHG emissions, which allows for consistency between inventories at company and facility level.

If emission factors are not available and you need to develop your own quantification methods, you should document your assumptions. As new and more robust emission factors increase over time these should be used.

The NGA Factors include the global warming potential (GWP) of different GHGs and is sourced from the IPCC Assessment Reports. GWP values convert GHG emissions data for non-CO_2 gases into units of CO_2e[5].

The GWP values are based on the different effects that different GHGs can have on the Earth's warming. Two key ways in which these gases differ from each other are their ability to absorb energy (their “radiative efficiency”) and how long they stay in the atmosphere (also known as their “lifetime”). The GWP values can change over time and are updated in IPCC Assessment Reports. For example, based on the sixth assessment report of the IPCC, sulfur hexafluoride has a GWP of 25,200 over a 100-year horizon — that is — each tonne of sulfur hexafluoride released results in the equivalent of 25,200 tonnes of CO_2. The larger the GWP, the more that a given gas warms the Earth compared to CO_2 over that time period[6]. Synthetic GHGs generally have a high GWP.

4.2 Using existing data

You may already understand some or all of your scope 1, scope 2 and scope 3 GHG emissions. For example, you may already:

- calculate and manage your scope 2 emissions as part of your energy management system or energy audit
- understand and report your scope 1 and scope 2 emissions under the Australian Government’s National Greenhouse and Energy Reporting scheme (NGERs)[7]
- understand your scope 1, 2 and 3 emissions as part of seeking carbon neutrality under Climate Active https://www.climateactive.org.au/.

[5] World Resources Institute and World Business Council for Sustainable Development, see Chapter 9, Further reading
[6] United States Environment Protection Agency, see Chapter 9, Further reading
[7] NGERS is a national framework for reporting GHG emissions, and energy production and consumption. Methods used in NGER reporting are defined in the National Greenhouse and Energy Reporting (Measurement) Determination 2008. http://www.cleanenergyregulator.gov.au/NGER

4.3 Standards for quantifying your emissions

The World Resources Institute/World Business Council for Sustainable Development's Greenhouse gas protocol corporate accounting and reporting standard (GHG Protocol) is globally accepted, freely available and widely used for GHG emission accounting and reporting.

Other well-known options for quantifying and reporting GHG emissions include:

- ISO Standard, ISO 14064-1:2018, which is available for purchase and is closely based on the GHG Protocol. This specifies principles and requirements at the organisation level for the quantification and reporting of GHG emissions and removals. It includes requirements for the design, development, management, reporting and verification of an organisation's GHG inventory.
- The Climate Active Carbon Neutral Standard for Organisations is a voluntary standard to manage GHG emissions and achieve carbon neutrality. The standard can be used to better understand and manage carbon emissions, to credibly claim carbon neutrality and to seek carbon neutral certification. It provides best-practice guidance on how to measure, reduce and report emissions data for the operations of organisations.

These standards assist in setting (operational and organisational) boundaries of your GHG emissions inventory, identifying and calculating GHG emissions and reductions, establishing a base year (to track emissions over time) and managing the quality of your inventory.

You can calculate your approximate GHG emissions to understand the key areas you should focus on before undertaking a more comprehensive inventory.

4.4 Benefits of understanding scope 3 emissions

There are several benefits associated with calculating your scope 3 emissions, including that you will have a complete understanding of the GHG emissions arising from your activities. For some businesses this may be where most GHG emissions occur.

The World Resources Institute/World Business Council for Sustainable Development published the GHG Protocol Corporate Value Chain (Scope 3) Accounting and Reporting Standard (referred to as the Scope 3 standard) in 2011 recognising that companies had initially focused their attention on emissions from their own operations but were increasingly understanding the need to also account for GHG emissions along their value chain to comprehensively manage their GHG-related risks. The Scope 3 standard provides an internationally accepted method to enable GHG management of companies' value chains. The companion Technical Guidance for Calculating Scope 3 Emissions provides methods for calculating GHG emissions for each of 15 scope 3 categories.

In line with the GHG Protocol, scope 3 GHG emissions should be included where measurable, material, and relevant to the organisation's overall GHG emissions. This is consistent with the GED requiring that GHG emissions be minimised so far as reasonably practicable.

The most important scope 3 emissions can vary widely in different industries. Some of the typical scope 3 emission sources for industries include:

- hospitality and retail businesses, such as cafes and restaurants — upstream suppliers and materials
- commercial services, such as offices — downstream emissions from leases
- manufacturing — upstream materials and downstream uses of products
- transport, postal and warehousing — contracted transportation
- mining and construction — processing/manufacturing of materials
- primary industries such as agriculture and forestry — transportation
- waste including landfills and wastewater treatment — upstream suppliers and materials.

By including all GHG emissions (including scope 3) from your activities in your assessment, you may be able to better demonstrate you are minimising the risks of harm to human health and the environment arising from your activities.

4.5 Verification

An independent third party can be engaged to verify your inventory to ensure reliability and confidence in the data. EPA's Fact Sheet 1702: Engaging consultants provides advice on choosing and engaging consultants.

Common reasons for undertaking independent verification are publicly reporting GHG emissions to demonstrate transparency, and increased confidence in making investment decisions and setting targets.

4.6 Information to help you assess the risk of harm

Given the global and cumulative nature of harm from GHG emissions the following information may assist you in assessing the risk of harm to human health and the environment from your GHG emissions:

- the direct and indirect GHG emissions likely to arise from your activities
- the quantity of your emissions in relation to each of your activities

This information can help inform your decisions on the use of controls to reduce your impact.

5. Step 3 — Identify and implement controls to reduce GHG emissions

5.1 GHG emission control options

Options for controlling risk are prioritised from the highest level of effectiveness to the lowest, as shown in Figure 2. In this ranking, controls are placed in three categories. Together, these elements create a 'hierarchy' of risk control standards. Further information on the hierarchy of controls can be found in Assessing and controlling risk guidance for business (EPA Publication 1695).

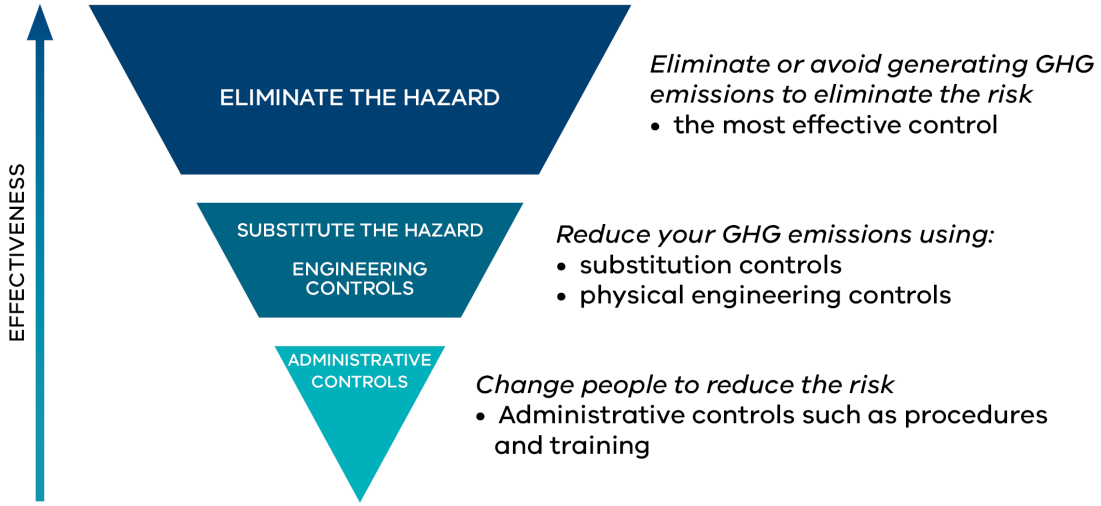

Figure 2: Hierarchy of controlling hazards and risks

Application of the control hierarchy and assessment of risk controls is a dynamic process. It should be done regularly to identify whether control measures continue to minimise risk so far as reasonably practicable.

A key consideration in the review of risks is whether current risk controls can be improved by adopting other controls that are higher on the risk hierarchy. This means consideration should be given to substituting or controlling the hazard (often achieved by engineering controls such as energy efficient lighting) over administrative controls.

Risk control examples for GHG emissions are provided in the sections below, however, the suitability of different options and risk control measures needed to meet your duties will depend on your specific circumstances. In considering and implementing the most suitable controls that are available to eliminate or reduce the harm so far as reasonably practicable, you are meeting your obligations under the GED (refer to section 1.3).

Taking advantage of Government initiatives (for example, rebates) to eliminate or reduce your GHG emissions will help you meet your obligations under the GED.

5.1.1 Eliminate the hazard

Eliminating the hazard is the highest level of risk control and you should be able to demonstrate how elimination of the hazard was considered in your decision making. Start by considering how you can eliminate the risks.

Eliminating the hazard means avoiding generating scope 1 GHG emissions or avoiding giving rise to the generation of scope 2 and/or scope 3 GHG emissions. Circular economy principles, (that reduce the need to manufacture or mine raw materials avoiding the associated GHG emissions) and net zero principles in designing new buildings are examples of how GHG emissions can be avoided.

What is a circular economy?

A circular economy continually seeks to reduce the environmental impacts of production and consumption while enabling economic growth through more productive use of natural resources. It allows us to avoid waste with good design and effective recovery of materials that can be reused. It promotes more efficient business models that encourage intense and efficient product use, such as sharing products between multiple users, or supplying a product as a service that includes maintenance, repair and disposal.

The Victorian Government has a circular economy policy and action plan, *Recycling Victoria, a new economy*, available at www.vic.gov.au/recycling.

In the water sector GHG emissions can be reduced by capturing biogases from the sewage treatment process to generate renewable electricity.

Examples of opportunities to avoid GHG emissions using circular economy principles[8] include:

- designing out waste through material efficiency (to reduce raw material requirements) and optimising supply chains (to reduce waste generation)
- material substitution using renewable, low carbon, or secondary materials as alternative inputs to new production
- reusing products and components, minimising GHG emissions associated with new material production
- recirculating materials including recycling and recovery of waste instead of sending it to landfill (reducing the generation of methane emissions).

If it is not reasonably practicable to eliminate the risks, you must consider how you can reduce them.

5.1.2 Substitute the hazard / engineering controls

Substituting the hazard occurs when the cause of the emissions is replaced with something safer, for example:

- switching to refrigeration systems that use natural refrigerants or refrigerants with lower GWP over refrigerants with higher GWP
- electrifying processes (for example, switching from coal and gas to electrical heating such as industrial heat pumps) and using renewable energy
- using renewable hydrogen to replace fossil fuels in steelmaking
- switching to electric vehicles at replacement.

A hazard substitution is preferred over implementing other controls.

Engineering controls are physical controls for a hazard. Options for engineering controls to reduce scope 1 GHG emissions may include:

- capturing methane gas from landfill and waste processing facilities to produce heat and electricity
- improving operational practices around venting and flaring to manage fugitive emissions in oil and gas production.

Options for engineering controls to reduce scope 2 GHG emissions may include:

- designing and manufacturing energy efficient equipment
- installing meters to help monitor and reduce energy use
- process control modifications including automated control systems

[8] Ellen MacArthur Foundation 2019, see Chapter 9, Further reading

- installing variable speed drives on pumps and other equipment
- control systems on heating, ventilation and cooling (HVAC) systems to optimise performance; optimising thermostat settings based on the weather
- installing insulation to prevent heat loss
- ensuring hot water systems, boilers and compressed air systems are operating at optimum temperatures and pressure with insulation installed
- reviewing plant lighting including efficiency of lighting, motion and daylight sensors and removing unnecessary lighting
- exploring heat recovery options in industrial processes, such as collecting condensate for use as feedwater for boilers or using waste heat for space heating
- improving process efficiency.

Best available techniques and technologies should be considered when assessing engineering controls to reduce risks as part of the process of identifying the most reasonably practicable measures to minimise risk.

5.1.3 Administrative controls

Less effective controls are administrative controls, which rely on people's behaviour.

Administrative controls include training, procedures, policies, supervision or shift designs that lessen the threat of a hazard or at least help alert people to a hazard. Administrative controls to reduce GHG emissions may include:

- advising on GHG emissions when supplying and installing product equipment and plant
- running GHG emission training and induction for staff
- regular maintenance of refrigeration and air conditioning equipment including leak detection of refrigerant gases
- safe management and disposal of high GWP refrigerants in accordance with the Commonwealth Ozone Protection and Synthetic Greenhouse Gas Management Act 1989
- ensuring technicians handling refrigerants or working on refrigeration and air conditioning equipment have a refrigeration handling licence with the Australian Refrigeration Council
- checks to ensure refrigerator doors are kept closed
- fixing air leaks on equipment including boilers and compressors
- turning lights off when not in use
- prioritising use of natural ventilation through vents or doors, then fans to circulate air, rather than air conditioning where manually controlled
- turning off HVAC systems out of hours
- turning off engines on cars, trucks, forklifts, tractors rather than idling
- running eco-efficient driver training for vehicle fleet drivers
- regular maintenance of vehicle fleets.

You can also reduce GHG emissions by embedding consideration of GHGs in procurement policies including energy, new appliances and equipment, transport, and contracts. Energy ratings can be used to compare the energy efficiency of various appliances. Both the Victorian Government and Commonwealth Government have information and support available to manage and reduce energy use, including assistance on purchasing renewable energy (either onsite or offsite — sometimes known as power purchase agreements or PPA's) and energy efficient equipment. City of Melbourne has also developed a guide to buying off-site renewable electricity.

5.1.4 Other controls — Offsets

Carbon offsets or credits (purchasing emissions reductions elsewhere) are sometimes used to offset GHG emissions that cannot be avoided, usually as part of net zero emission or carbon neutrality initiatives. Offset products most typically involve projects that invest in renewable energy, energy efficiency and reforestation and may bring other benefits on top of GHG emission reduction, including improved air quality and waste reduction.

The GED requires that the risks of harm to human health and the environment from your GHG emissions are minimised so far as reasonably practicable.

EPA considers that the GED does not extend to the purchase of offsets. While you may consider that offsets may be an appropriate way for you to make a greater contribution to reducing GHG emissions overall, for those emissions that are unavoidable, you are not required to purchase offsets to meet your GED obligations.

5.2 A risk-based approach to minimising the risk of harm from GHG emissions

What constitutes "reasonably practicable" will vary by business, depending on your specific circumstances.

Minimising the risk of harm from GHG emissions "so far as reasonably practicable"

To comply with the GED, it's important all businesses understand what constitutes reasonably practicable when considering measures to eliminate or otherwise reduce risks.

The EP Act (s.6) provides a list of matters to determine what is reasonably practicable in relation to the minimisation of risks of harm to human health and the environment:

- the likelihood of the risk eventuating (in this guideline see section 4.6)
- the degree of harm that would result if the risk eventuated (in this guideline see section 4.6)
- what the person knows, or ought reasonably to know (that is, state of knowledge), about the harm or risks of harm and any ways of eliminating or reducing those risks
- the availability and suitability of ways to eliminate or reduce the risk
- the cost of eliminating or reducing the risk.

For more information on each of these matters, see Reasonably practicable (EPA publication 1856). However, given the global and cumulative nature of the risks of climate change, section 4.6 of this guideline provides guidance on how to understand the risks from your GHG emissions.

This approach is different to assessing the risk based on the likelihood and consequence of the risk as set out in step 2 of EPA's 4-step risk management framework in Assessing and controlling risk: A guide for business (EPA publication 1695).

The approach and steps you take to do this will also depend on the scale and complexity of your activities. In straightforward situations (such as a small business with small energy use), managing risk from GHG emissions from your activities will involve you thinking through your activities and taking simple steps to reduce the risk of harm from GHG emissions. For example, adjusting air conditioning temperatures according to the season, installing LED lighting to save electricity, maintaining your equipment, and using your energy bills to track how your emissions are changing over time.

In larger businesses or those that carry out a lot of different activities, more complex systems, procedures, and documentation may be required.

This guideline includes some risk control examples to minimise GHG emissions, however, the suitability of different options and risk control measures needed to meet your duties will depend on your specific circumstances. It is always your obligation to understand your risks and the right approach to manage them, see Reasonably practicable (EPA publication 1856).

You should obtain knowledge about the risks your activities pose and how to address them from reputable sources like business and industry organisations, regulatory and government agencies and other independent and/or international organisations. Such information forms part of state of knowledge and needs to be considered when determining what is reasonably practicable in your specific circumstances.

In some circumstances reducing GHG emissions could lead to other impacts on the environment (for example an increase in other air emissions or reduction in water quality). Some options may simply result in a transfer of the emissions elsewhere, particularly outside of Victoria. The risk control measures you select should seek to optimise the environmental and health outcomes overall. This may be particularly problematic when making choices around activities that lead to scope 3 emissions, where outsourcing of GHG intensive activities to a third party may lead to an increase in GHG emissions.

6. Step 4 — Review controls to ensure they are effective

Controls must be designed and implemented to drive environmental performance objectives and be specific to the activity and operations. Controls that are put in place to eliminate or reduce risks must be monitored to ensure they work as planned.

6.1 Checking controls

You can consider these common methods to check the effectiveness of controls:

- regular site inspections and audits
- consulting with employees, contractors, occupants, and landlords
- inspecting, testing, and maintaining GHG emission control systems
- using available information, such as manufacturer/supplier instructions
- analysing records and data, such as energy bills.

If these checks are made regularly failures in controls can be identified as well as opportunities for improvement.

6.2 Maintaining effective controls

Several things need to be put in place to maintain controls and ensure they stay effective, these may include:

- reviewing GHG emission levels regularly as these can change over time
- regularly reviewing, testing and maintaining all engineering controls
- allocating responsibility and accountability for GHG emission controls
- clear and effective communication about the importance of minimising GHGs as part of the organisation's activities
- regular training, including refresher training for administrative controls.

6.3 Continual improvement and review

You should regularly check your risks and controls by reviewing:

- your understanding of the consequences of your activities and whether they are likely to cause risks
- the effectiveness of your approach to managing GHG emissions
- controls you have in place to reduce GHG emissions.

It is important that you maintain your understanding of the state of knowledge on GHG emissions reduction, including ensuring up-to-date understanding of:

- suitable new technology and practices that become available in your sector generally — the pace with which knowledge changes or improves is different for all industries and activities
- relevant strategies, programs, policies and guidance — for example Victoria's Climate Change Strategy and relevant Victorian Government Whole-of-Government and Sector Emissions Reductions pledges.

Documenting your risks and management actions to reduce your GHG emissions and reviewing these regularly will enable your business to determine the effectiveness of the controls and support continuous improvement. An example of a hazard and risk register is available in Assessing and controlling risk: a guide for business (EPA publication 1695).

6.4 GHG emission targets

Many businesses voluntarily set GHG emissions reduction targets or pledges to help drive reductions over time, track performance and ensure GHG emissions are factored into decision making. EPA licensed businesses are required to set environmental performance objectives as part of their risk management and monitoring program. The global GHG Protocol and the Science Based Target Initiative provide advice on how to set targets.

Targets should compare to a base year and be time dependent. A base year is a reference point in time that future emissions reductions are measured against, for example, a 25 per cent reduction from 1990 levels by 2020. The base year you choose should have representative, reliable and verifiable emissions data available.

Targets for GHG may include:

- an overarching long-term GHG emission target — such as reduce absolute scope 1 and scope 2 GHG emissions by 50 per cent by 2030 from a 2018 base year (see note about net zero targets below)
- interim targets aligned to the long-term target — for example for 2025, 2030. These targets are important given the urgency of GHG reduction required in the short-term and the need to drive continuous improvement

Relevant indicators or targets that can help contribute to emissions reductions targets include:

- percentage increase in renewable energy
- percentage improvement in scope 1, scope 2, and scope 3 emissions intensity[9]
- shift to low GWP refrigerants
- percentage improvement in energy efficiency
- percentage improvement in process efficiency
- percentage reduction in flaring, venting, and fugitive emissions
- percentage increase in purchase of low or no emission vehicles.

EPA acknowledges that the use of net zero targets by corporations has risen based on the Paris Climate Agreement need to reach net zero GHG emissions by mid-century. Given that net zero targets often encompass the use of offsets for emissions yet to be reduced or that remain unfeasible to be eliminated, if you are using net zero targets you still need to demonstrate how you are achieving GHG emission reductions so far as reasonably practicable for the purposes of meeting the GED.

[9] Emissions intensity is a ratio comparing the GHG emissions of an activity or economic sector to the economic value it generates.

7. Risk management examples

The following examples show how to use the four-step risk process to manage risks from GHG emissions.

7.1 Small Business (restaurant)

Mary owns a small restaurant. She looked at her supplier bills (including gas, energy, and waste) and inspected the restaurant with some of her staff to **identify** the following sources of GHG emissions from operating the restaurant:

- scope 1 GHG emissions — refrigerant gases from the air conditioner and refrigeration
- scope 2 GHG emissions — energy use for food preparation (for example, oven, dishwashers, rangehood and deep fryer), HVAC (including outdoor space heaters), lighting and refrigeration
- scope 3 — food supply, food waste and transportation.

Once Mary had identified her GHG emission sources she developed a simple GHG Action Plan that suited her needs. Mary looked for simple ways to **assess** the restaurant's GHG emission risk, including using her electricity bill which already calculates the business's GHG emissions for her. Mary will also document her gas usage from her gas bill and track this over time.

Mary looked at Sustainability Victoria's energy efficiency information in hospitality to help her identify **controls** and implemented some of these as part of the restaurant's Action Plan to reduce GHG including:

- installing solar by taking advantage of a government rebate for small business
- reducing food waste going to landfill by working with her suppliers to get smaller quantities of some fresh items with less wastage, and providing excess food to a local charity
- regular maintenance of all cooking and kitchen appliances and HVAC (to reduce energy use) and fridges, freezers and air conditioners to ensure refrigerants are not leaking
- replacing existing lighting with LED lighting
- turning equipment off when not in use
- only turning on outdoor space heaters at a customer's request.

Mary has assessed that it is reasonably practicable to reduce the energy use from her appliances in the short term by turning off equipment when not in use and undertaking regular maintenance. She will use Sustainability Victoria's energy upgrades tool to get recommendations for what to upgrade next and take advantage of the Victorian Energy Upgrades incentives where she can, and budget to replace her appliances with more efficient ones over several years.

Mary will keep **checking** the GHG emissions from her restaurant's electricity bill to ensure that the controls she has put in place are effective to reduce the risk of harm from GHG emissions. Mary will also look at calculating the GHG emissions from the restaurant's gas usage in the future to check how they stack up against the GHG emissions from electricity consumption. Mary has also identified future control options she can implement:

- exploring the use of a commercial organic waste collection service
- working with transporters who have made their own emission reduction commitments.

7.2 Office building

Nitten operates a large business out of a refurbished office building. He has **identified** the following sources of GHG emissions:

- scope 1 GHG emissions — gas consumption and refrigerant gases from air conditioners and refrigeration

- scope 2 GHG emissions — purchased electricity for HVAC, lighting and refrigeration
- scope 3 — business travel, employee commuting, waste, catering and courier services.

Nitten looked at his electricity invoices which showed him the GHG emissions from the office's electricity usage. He used the NGER Emissions and Energy Threshold Calculator to understand the scope 1 and scope 2 emissions (noting that the calculator is provided for information only and is not to be used in place of professional advice). He also read on Sustainability Victoria's website about options to reduce energy use and impacts on the environment from his business.

Nitten decided to *engage an energy auditor* to undertake a detailed energy audit to better **assess** the business' energy use, patterns and demand and therefore the businesses GHG emissions risk of harm to the environment.

The information Nitten received from the energy assessment informed the development and implementation of a GHG management plan which sets out the **controls** the business has and will implement for energy efficiency and GHG emissions reductions over four years.

The GHG management plan includes changes related to the intelligent building management system to optimise heating and cooling. Nitten found that these little to no cost measures made a significant impact on the office's GHG emissions. Controls put in place included:

- Temperature controls were altered to cool if average temperatures were above 24˚C and heat if temperatures dropped below 20˚C. Computer and server room temperatures were also adjusted.
- Fixed speed drives on heating and ventilation systems were replaced with variable drives to respond to demand rather than running at full speed all the time.
- Sensors were installed to only run air conditioning and lighting when meeting rooms were occupied.
- Efficient boiler load optimisation control units were installed to the gas fired boilers (used for heating and hot water) to ensure maximum efficiency.

Other controls implemented as part of the GHG management plan included:

- installation of automatic switches and timers on lighting
- reduction in number of lights and installation of LED lights in non-office spaces in the building.

The business took advantage of funding opportunities to help finance some of these projects.

Nitten put **checks** in place to ensure that the initial energy efficiency (which saved money) and energy conservation controls were maintained. The GHG management plan also includes actions to implement future controls, such as to incorporate renewable energy options as part of the business' energy profile and to calculate and implement action to reduce the scope 3 emissions. Finally, Nitten looks to keep abreast of innovative technology solutions to reduce GHG emissions which he could implement in the future. The GHG management plan is reviewed annually.

Based on reporting data the business has achieved an 87 per cent reduction in gas consumption and a 39 per cent reduction in electricity consumption over three years at the building, despite a significant increase in the number of staff over this time.

7.3 Medium sized factory/industry

Stephen works for a global manufacturer of home care and beauty and personal products and is responsible for the business' voluntary climate strategy.

The climate strategy **identifies** the business' GHG emissions sources and **assesses** the risk of harm that the business' emissions have to human health and the environment. The assessment found that the business' major GHG emission risks come from:

- scope 3 — raw materials for ingredients and packaging

- scope 1, 2 and 3 —manufacturing, distribution and retail
- scope 3 — consumer use of the products (66 per cent of GHG emissions).

In response to the identified GHG emission sources and risks, the business has committed to the following targets and to implement the following **controls**:

- halving the GHG impact from its products across the lifecycle by 2030, and so far has:
  - redesigned laundry detergents enabling people to wash clothes in lower temperatures (reducing scope 3 GHG by up to 50 per cent per load)
  - reformulated products to reduce the amount of GHG intensive ingredients used
  - redesigned packaging with lighter and sturdier designs, using recycled and recyclable materials
- reducing scope 1 and scope 2 GHG by 100 per cent by 2030 from its own operations including:
  - installing onsite solar
  - electrifying as much equipment as possible (including for hot water and steam)
  - using energy efficiency to reduce GHG emissions from machinery
  - starting to switch the sales fleet to electric vehicles due to their lower running costs.

These targets have been approved by the Science Based Targets Initiative.

Stephen has identified that there are several options to reduce GHG emissions from distribution, such as filling their trucks to capacity, more efficient journeys, using alternative fuels and/or driver training on eco-efficient techniques. He will consider which of these are the most suitable for the business' circumstances and how effective the controls are compared to the cost to implement them.

Stephen looks to revisit the business' climate strategy annually and as part of that process he will seek to further develop the options to reduce GHG emissions from the business' distribution activities. Stephen also ensures that the controls currently implemented are regularly **checked** to retain and build on the reductions already achieved.

7.4 EPA licensed business

Binh manufactures widgets and holds an EPA licence which allows some discharges to air. EPA recently amended the licence to align it with the EP Act. One of the licence conditions requires the licence holder to develop a risk management and monitoring plan (RMMP) for its activities.

Binh uses Implementing the general environmental duty: A guide for licence holders (EPA Publication 1851) as a guide in developing the RMMP, and **identifies** and **assesses** GHG emissions as part of the process. She already has a good understanding of the scope 1 and 2 emissions as they are already calculated and reported annually to the National Greenhouse and Energy Reporting Scheme. GHG emissions include:

- scope 1 — fuel combustion and processes producing GHG as a by-product
- scope 2 — related to electricity use.

The RMMP sets GHG emissions environmental performance objectives including:

- a 20 per cent reduction in scope 1 emissions intensity by 2025 from a 2015 baseline
- a 40 per cent improvement in energy efficiency by 2030 from a 2015 baseline.

Binh used well known Scope 3 Accounting and Reporting guidance as part of the Greenhouse Gas Protocol to calculate the business' scope 3 emissions and now reports these as part of the annual corporate reporting.

The following **controls** have reduced scope 1 and scope 2 emissions:

- electrifying processes for stationary sources used for heating and industrial processes (and using renewable energy)

- using raw materials with lower emission intensity
- installing automated control systems and variable speed drives on pumps and other equipment
- installing control systems on HVAC systems to optimise performance.

Binh also has staff regularly **check** the controls to ensure the emissions reductions are maintained.

Binh is aware that this industry sector faces technical challenges in reducing some of its scope 1 and scope 3 GHG emissions, but that she is still required to monitor the businesses' GHG emissions and reduce the risk from them so far as reasonably practicable. In the short term the company will focus on energy and resource efficiency and move towards renewable energy.

In the medium to long term Binh will:

- look at adopting circular economy principles for the raw materials
- form new alliances with her supply chain
- consider adopting technologies that are currently in the demonstration phase.

8. EPA guidance relevant to GHG emissions and climate change

- Assessing and controlling risk: a guide for business (publication 1695) — how to manage risks, using a four-step process.
- Industry guidance: supporting you to comply with the general environmental duty (publication 1741).
- State of knowledge and industry guidance.
- Reasonably practicable (publication 1856).
- Fact sheet: Engaging consultants (publication 1702).
- Development licence application guidance (publication 2011).
- Guidance for operating licences (publication 1850) — outlines standard content of EPA operating licences in the new legislative framework.
- Implementing the general environmental duty: a guide for licence holders (publication 1851)
- Self-assessment tool for small business (publication 1812) — check what actions you can take to manage the risks of your business causing harm to people and the environment.
- Construction – guide to preventing harm to people and the environment (publication 1820) — how to manage risks in construction.
- Local government – guide to preventing harm to people and the environment (publication 1821) — how to manage risks in local government
- Manufacturing – guide to preventing harm to people and the environment (publication 1822) — how to manage risks in manufacturing.
- Mining and quarrying – guide to preventing harm to people and the environment (publication 1823) — how to manage risks in mining and quarrying.
- Retail – guide to preventing harm to people and the environment (publication 1824) — how to manage risks in retail.
- Waste and recycling – guide to preventing harm to people and the environment (publication 1825) how to manage risks from waste and recycling.

9. Further reading and references

This list of references includes many of the resources EPA drew from to develop this guide:

Australian Government Department of Agriculture, Water and the Environment, Access online: https://www.environment.gov.au/climate-change/climate-science-data/climate-science/understanding-climate-change.

Australian Government administers the

- National Greenhouse and Energy Reporting Scheme (NGERS). Access online: http://www.cleanenergyregulator.gov.au/NGER
- NGER Emissions and Energy Threshold Calculator. Access online: http://www.cleanenergyregulator.gov.au/NGER/Forms-and-resources/Calculators
- *Ozone Protection and Synthetic Greenhouse Gas Management Act 1989 and regulations* Access online: https://www.legislation.gov.au/Series/C2004A03755

Under *Ozone Protection and Synthetic Greenhouse Gas Management Regulations 1995*, people who acquire, possess, dispose or handle ozone depleting substances or synthetic greenhouse gases in the refrigeration and air conditioning industry in bulk or in equipment are required to hold a Refrigerant Handling Licence. The Australian Refrigeration Council (ARC) is appointed as the Industry Board to administer these licences and authorisations.

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City of Melbourne*, Renewable Energy Procurement, A guide to buying off-site renewable electricity. Access online:* https://www.melbourne.vic.gov.au/business/sustainable-business/mrep/Pages/renewable-energy-procurement-guide.aspx

Climate Active, Climate Active certification is awarded to businesses and organisations that have reached carbon neutrality. Access online: https://www.climateactive.org.au/

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ClimateWorks, Net Zero Momentum Tracker, tracks business and government emission reduction pledges across the Australian economy. Access online: https://www.climateworksaustralia.org/

Climate-KIC Australia 2020, *Climate Measurement Standards Initiative.* Access Online: https://www.cmsi.org.au/

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We mean business coalition, A global nonprofit coalition working with the world's most influential businesses to take action on climate change. Access online: https://www.wemeanbusinesscoalition.org/

World Resources Institute and World Business Council for Sustainable Development Greenhouse Gas Protocol, 2004, Corporate Accounting and Reporting Standard Revised Edition Access online: https://ghgprotocol.org/corporate-standard

World Resources Institute and World Business Council for Sustainable Development Greenhouse Gas Protocol, 2013, Required Greenhouse Gases in Inventories, Accounting and Reporting Standard Amendment. Access online: https://ghgprotocol.org/sites/default/files/standards_supporting/Required%20gases%20and%20GWP%20values_1.pdf

World Resources Institute and World Business Council for Sustainable Development GHG Protocol Corporate Value Chain (Scope 3) Accounting and Reporting Standard (referred to as the 'Scope 3 Standard'), 2011, offers an internationally accepted method to enable GHG management of companies' value chains and is a supplement to the GHG Protocol Corporate Accounting and Reporting Standard, Revised Edition (2004). Access online: https://ghgprotocol.org/sites/default/files/standards/Corporate-Value-Chain-Accounting-Reporing-Standard_041613_2.pdf

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10. Contact EPA

epa.vic.gov.au

Ph 1300 372 842 (1300 EPA VIC)

Head office:

200 Victoria Street
Carlton 3053

West Metro

Level 2, 12 Clarke Street
Sunshine 3020

South West

West 1, 33 Mackey Street
North Geelong 3215

Southern Metro

Level 3, 14 Mason Street
Dandenong 3175

North East

27–29 Faithfull Street
Wangaratta 3677

Gippsland

8-12 Seymour St
Traralgon 3844

North Metro

Building One,
13a Albert Street
Preston 3072

North West

Level 1, 47–51 Queen Street
Bendigo 3550

Other stakeholders and networks

Department of Environment, Land, Water and Planning

The Department of Environment, Land, Water and Planning (DELWP) works in partnership with a range of agencies and stakeholders to protect and preserve Victoria's native landscape. DELWP directs environmental policy development for Victoria and coordinates the environment portfolio with support from EPA and Sustainability Victoria.
environment.vic.gov.au

Sustainability Victoria

Sustainability Victoria (SV) is a Victorian State Government statutory authority established under the Sustainability Victoria Act 2005. SV facilitates and promotes environmental sustainability in the use of resources by delivering programs addressing integrated waste management and resource efficiency. SV is responsible for statewide waste management strategy and planning, including alternatives to waste disposal.
sustainability.vic.gov.au

Appendix A Greenhouse gases

Greenhouse gases are: carbon dioxide, methane, nitrous oxide, sulfur hexafluoride and a hydrofluorocarbon (Table A.1 below) or a perfluorocarbon (Table A.2 below) specified in the *National Greenhouse and Energy Reporting Act 2007*.

Table A.1: Hydrofluorocarbon greenhouse gases specified in the *National Greenhouse and Energy Reporting Act 2007*

Item	Hydrofluorocarbon	Chemical formula
1	HFC-23	CHF_3
2	HFC-32	CH_2F_2
3	HFC-41	CH_3F
4	HFC-43-10mee	$C_5H_2F_{10}$
5	HFC-125	C_2HF_5
6	HFC-134	$C_2H_2F_4$ (CHF_2CHF_2)
7	HFC-134a	$C_2H_2F_4$ (CH_2FCF_3)
8	HFC-143	$C_2H_3F_3$ (CHF_2CH_2F)
9	HFC-143a	$C_2H_3F_3$ (CF_3CH_3)
10	HFC-152a	$C_2H_4F_2$ (CH_3CHF_2)
11	HFC-227ea	C_3HF_7
12	HFC-236fa	$C_3H_2F_6$
13	HFC-245ca	$C_3H_3F_5$

Table A.2: Perfluorocarbon greenhouse gases specified in the *National Greenhouse and Energy Reporting Act 2007*

Item	Perfluorocarbon	Chemical formula
1	Perfluoromethane (tetrafluoromethane)	CF_4
2	Perfluoroethane (hexafluoroethane)	C_2F_6
3	Perfluoropropane	C_3F_8
4	Perfluorobutane	C_4F_{10}
5	Perfluorocyclobutane	c-C_4F_8
6	Perfluoropentane	C_5F_{12}
7	Perfluorohexane	C_6F_{14}

The National Greenhouse Accounts Factors provides methods that help businesses estimate their GHG emissions. The Commonwealth Government publishes revised factors every year.

https://www.industry.gov.au/data-and-publications/national-greenhouse-accounts-factors