

Guideline for minimising greenhouse gas emissions

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# **Introduction**

The [*Environment Protection Act 2017*](https://www.legislation.vic.gov.au/in-force/acts/environment-protection-act-2017/004) (the EP Act) requires all persons who engage in an 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 is the general environmental duty (GED).

Greenhouse gas (GHG) emissions contribute to an increase in climate change risks, and so create a risk of harm to human health and the environment.

This guideline is designed specifically to help persons who conduct a business to understand their obligations under the GED in relation to GHG emissions.

As a business owner, whether a company or sole trader, it is your responsibility to understand and minimise (so far as reasonably practicable) the risks of harm from GHG emissions from any activity you engage in. This applies whether you emit small or large amounts of GHG emissions.

You do this by demonstrating that you have considered and implemented the most suitable actions and controls that are available to eliminate or reduce the harm.

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 minimise it.

The approach and steps you take will depend on the scale and complexity of your activities.

For example, as a small business with small energy use, you might minimise risks of harm from your GHG emissions by:

* adjusting air conditioning temperatures according to the season
* installing LED lighting to save electricity
* maintaining your equipment.

You may also choose to track your energy, gas and fuel usage to see how effective your controls are over time.

In contrast, a larger business may require more complex systems, procedures and documentation to minimise risks of harm from their GHG emissions.

For specific requirements for EPA licence holders, see [Implementing the general environmental duty – a guide for licence holders](https://www.epa.vic.gov.au/for-business/find-a-topic/environment-protection-laws-and-regulations/implementing-the-general-environmental-duty---a-guide-for-licence-holders).

## 1.1 Climate change

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

Changes to the climate system are 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
* changes in weather patterns, and the frequency and intensity of weather events.

Victoria has warmed by 1.2°C since official records began in 1910. As a result, Victoria’s average rainfall has already decreased (especially in cooler months), the frequency of extreme heat events has

increased, and there has been an increase in dangerous fire weather and the length of the bushfire season.

If global emissions continue to increase, in the 2050s Victoria may experience an average annual temperature increase of up to 2.4°C, longer fire seasons and more very hot days, more intense downpours, rising sea levels, and declines in cool season rainfall and alpine snowfall.[[1]](#footnote-2)

Climate change impacts on health and wellbeing are many and varied. These impacts, along with impacts on the social determinants of health (such as education, gender, socio-economic status), will be felt earlier and will be most pronounced for vulnerable communities.[[2]](#footnote-3)

The report from Working Group 1 of the Intergovernmental Panel for Climate Change (IPCC, 2021)[[3]](#footnote-4) covers the physical science of climate change. It is the first contribution to the IPCC’s [Sixth Assessment Report](https://www.ipcc.ch/assessment-report/ar6/). 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 (CO2) 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 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](https://unfccc.int/sites/default/files/english_paris_agreement.pdf)) 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*](https://www.climatechange.vic.gov.au/legislation/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, the Victorian Government released [Victoria’s Climate Change Strategy](https://www.climatechange.vic.gov.au/victorias-climate-change-strategy) in May 2021, 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 and future targets are informed by the latest climate science, including the IPCC reports.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 GHG emissions in Victoria are from the energy sector (including electricity generation and direct combustion), transport (including 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, air conditioning and electrical equipment), waste (including from landfills and wastewater treatment) and clearance of forested land.[[4]](#footnote-5)

Businesses, governments and households generate GHG emissions, including 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
* fugitive emissions – equipment leaks and losses during the use of refrigeration and air conditioning equipment.

## 1.2 Purpose

This guideline will assist you to understand and meet your obligations under the general environmental duty (GED) under Section 25 of the EP Act. It provides clarity on the application of the GED to GHG emissions and adds to the ‘state of knowledge’.[[5]](#footnote-6)

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

The guideline will help you better understand how to identify and assess your GHG emissions and implement and check controls to minimise the risks of harm from these emissions so far as reasonably practicable.

The guideline does not tell you what specific controls to put in place. It provides examples of controls to help you decide what best suits you. 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](https://www.epa.vic.gov.au/about-epa/publications/1741-1) (EPA publication 1741) for information about other resources that can contribute to your knowledge.

This guideline is for all types of businesses whose activities give rise to risks of harm from GHG emissions (directly or indirectly), including:

* hospitality and retail, such as cafes, restaurants and shops
* commercial, 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.

The 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 and the environment from activities which result in GHG emissions, please go to the ‘For community’ pages at epa.vic.gov.au.

## 1.3 Regulatory context

### 1.3.1 General environmental duty

A cornerstone of the *Environment Protection Act 2017* (the EP Act) is the GED, which is a preventative duty.

Section 25(1) of the Act requires:

‘A person who is engaging in an activity that may give rise to risks of harm to human health or the environment from pollution or waste must minimise those risks, [so far as reasonably practicable](https://www.epa.vic.gov.au/about-epa/publications/1856).’

GHG emissions are considered waste and pollution under the Act. As per Section 3 of the Act, the definition of:

* environment includes ‘the physical factors of the surroundings of human beings including the land, waters, atmosphere, climate, sound, odours and tastes…’
* GHG substance is:
1. carbon dioxide, methane, nitrous oxide or sulphur hexafluoride; or
2. a hydrofluorocarbon or a perfluorocarbon that is specified in the regulations made under the National Greenhouse and Energy Reporting Act 2007 of the Commonwealth. (See also Appendix A of this Guideline)
* waste expressly includes ‘a greenhouse gas substance emitted or discharged into the environment…’
* pollution captures GHG emissions as an ’emission, discharge, deposit, disturbance or escape of … a solid, liquid or gas…’.

As per Section 4 of the 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.’

As per Section 6 of the Act, minimising the risk of harm to human health and the environment requires the person:

* to **eliminate** risks of harm to human health and the environment so far as reasonably practicable; and
* if it is not reasonably practicable to eliminate risks of harm to human health and the environment, to **reduce** those risks so far as reasonably practicable.

As per Section 6 of the Act, to determine what is **reasonably practicable** for the minimisation of risks of harm, you must have regard to the following matters:

* the likelihood of those risks eventuating
* the degree of harm that would result if those risks eventuated
* what the person knows, or ought reasonably to know, about the harm or risks of harm and any ways of eliminating or reducing those risks (the state of knowledge)
* the availability and suitability of ways to eliminate or reduce those risks
* the cost of eliminating or reducing those risks.

Section 5.2 of this guideline helps to determine what is reasonably practicable for GHG emissions. See [Reasonably practicable](https://www.epa.vic.gov.au/about-epa/publications/1856) (publication 1856) for more information.

It is your responsibility to understand and minimise the risks of harm to human health and the environment from GHG emissions arising from any activity you engage in.

EPA’s compliance and enforcement approach uses a mix of encouragement and deterrence to motivate action to deliver improved outcomes. For more information see [EPA’s Regulatory Approach](https://www.epa.vic.gov.au/about-epa/what-we-do/epa-regulatory-approach) and [Compliance and enforcement policy](https://www.epa.vic.gov.au/about-epa/publications/1798-2) (publication 1798). EPA may refer to this Guideline, or any other relevant information, when providing advice or assessing compliance and the Guideline may be considered to form part of the state of knowledge.

It is important to note that a breach of the GED could lead to civil or criminal penalties if you are a business or conducting an undertaking, even if harm has not occurred.

Summary of the general environmental duty in the *Environment Protection Act 2017* for businesses

|  |  |
| --- | --- |
| This legal requirement | Means you have to… |
| General environmental duty (Section 25–27 of the EP Act) | *Understand* how your business activities may give rise to risks of harm to human health or the environment from pollution or waste.*Put in place* reasonably practicable measures to eliminate or reduce identified risks of harm from pollution and waste (including GHG emissions).*Use and maintain* so far as reasonably practicable:* plant, equipment, processes and systems in a way that minimises risks of harm (for example, maintain machinery and equipment in accordance with manufacturer’s specifications)
* systems for identifying, assessing and controlling risks of harm
* systems for evaluating the effectiveness of controls
* adequate systems to ensure that if a risk of harm eventuates, its harmful effects are minimised.

*Ensure,* so far as reasonably practicable, that all substances are handled, stored, used or transported in a way that minimises risks of harm from pollution and waste (including GHG emissions).*Provide,* so far as reasonably practicable, information, instruction, supervision and training to any person engaged in activities that may give rise to risks of harm to enable them to comply with the GED (for example, undertake toolbox sessions).**Note:** The duty to minimise risks is a preventive duty. It is triggered whenever a person's activity may give rise to risks of harm to human health or the environment. It doesn’t matter whether an adverse effect on human health or the environment has actually occurred. Failing to minimise the risks of harm, so far as reasonably practicable, will breach the GED, even if harm has not yet occurred.**If you engage in an activity that also involves the design, manufacture, installation or supply of a substance, plant, equipment or structure you must, so far as reasonably practicable:*** *Minimise* risks of harm to human health or the environment from pollution and waste (including GHG emissions) arising from the design, manufacture, installation or supply of the substance, plant, equipment or structure when used for the purpose for which it was designed, manufactured, installed or supplied.
* *Provide* information about the purpose of the substance, plant, equipment or structure and any conditions necessary to ensure it can be used in a way that minimises the risks of harm from pollution or waste (including GHG emissions).
 |

# **GHG emission risk management framework**

A risk management framework, such as EPA’s Assessing and controlling risk: A guide for business (publication 1695-1), will help you understand and minimise risks of harm from the GHG emissions produced by your activities. You can use a different risk management approach if it is more suited to your needs.

## 2.1 Steps in identifying, assessing and controlling GHG emission risks

The method for identifying, assessing and controlling risk has four steps (see Figure 1). It 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 risks of harm from GHG emissions | Identify your direct and indirect GHG emission sources and group them according to scopes (see Chapter 3). |
| 2 | Assess risks of harm from GHG emissions | Understand and assess how your GHG emissions contribute to the risk of harm. The greater the emissions, the greater the contribution. |
| 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 to ensure you are implementing the most current and effective options, where reasonably practicable. |

Note: Keeping a risk register or action plan can help you demonstrate what steps you have taken to manage your risks. See Appendix B for an example of an action plan template.

# **Icon  Description automatically generated****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* (Cth) (see Appendix A).

GHG emissions can be released directly or arise indirectly from your activities. Your GHG emissions can be grouped into different ‘scopes’.

Identifying and grouping your GHG emissions will help you identify what risks to human health and the environment may result from those emissions, and to inform what steps will be ‘reasonably practicable’ to minimise those risks.

## 3.1 Scope 1 GHG emissions

Scope 1 (or direct) GHG emissions are released directly into the atmosphere as a result of your activities.

Examples of Scope 1 emissions include:

* emissions from manufacturing or processing of chemicals and materials, such as the manufacture of aluminium
* emissions from combustion of fuel in your owned/controlled mobile sources, such as trucks and cars
* 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 production, coal mines or decomposition of organic waste in landfills and wastewater treatment plants
* hydrofluorocarbon emissions from leakage of gases during use of refrigeration and air conditioning equipment
* methane emissions from the digestive system of ruminants (for example, sheep and cattle) and effluent ponds
* nitrous oxide emissions from nitrogen-based fertilisers, livestock waste and effluent ponds
* emissions from burning of fossil fuels (for example, coal or natural gas) to generate electricity – these are Scope 1 emissions 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 indirect emissions from the consumption of purchased energy products (for example, electricity, heat, or steam).

For example, GHG emissions from your purchased electricity, which was generated by burning coal, are considered Scope 2 emissions for your business. However, the power station burning coal to generate that electricity would count these as part of their Scope 1 emissions.

## 3.3 Scope 3 GHG emissions

Scope 3 GHG emissions are all other indirect emissions that arise from or in connection with your activities and come from sources you do not own or control. They are usually termed either upstream or downstream emissions.

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

Table 2: Scope 3 emissions

|  |  |
| --- | --- |
| **Upstream Scope 3 emissions** | **Downstream Scope 3 emissions** |
| Purchased goods and services | Downstream transportation and distribution |
| Capital goods (assets used to produce products and services – for example, buildings, machinery, tools and equipment) | Processing of sold products |
| Fuel and energy-related activities (not included in Scope 1 or Scope 2) | Use of sold products  |
| Upstream transport and distribution | End-of-life treatment of sold products |
| Waste generated in operations | Downstream leased assets |
| Business travel | Franchises |
| Employee commuting | Investments |
| Upstream leased assets |  |

For more information, see [Methods for identifying hazards](https://www.epa.vic.gov.au/-/media/epa/files/publications/1695-1.pdf) (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 medical aerosols. However, they contribute to climate change6. Hydrofluorocarbons such as R-134a and R-410a are now the most common refrigerants, making up 81 per cent of refrigerants in use in Australia. Synthetic GHGs listed in the Kyoto Protocol are regulated in Australia under the *Ozone Protection and Synthetic Greenhouse Gas Management Act 1989* (Cth).

6 Their stability and long life mean that 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.

# **Icon  Description automatically generatedStep 2 – Assessing risks of harm from GHG emissions**

GHG emissions contribute to risks of harm to human health and the environment as they contribute to an increase in climate change risks. The greater the emissions, the greater the contribution.

Therefore, eliminating or reducing GHG emissions to the extent reasonably practicable will minimise the risks of harm from a person’s activities.

Quantifying GHG emissions from your activities will inform your assessment of the risks of harm associated with these activities.

For businesses in low-risk situations (for example, a small takeaway shop at a food court, or a sole trader operating as a commercial cleaner) EPA does not expect you to quantify your GHG emissions. It is not considered reasonably practicable given the lower degree of harm that may result and the level of knowledge that is reasonably expected of these businesses. These businesses can go directly to (Chapter 5, Step 3) Eliminating and reducing identified GHG emissions, without calculating their emissions.

In general, EPA does not require GHG emission data for non-permissioned activities to be submitted. However, EPA has different information requirements for applicants and holders of EPA permissions (for example a licence or permit). EPA may also request information as part of assessing applications or determining compliance.

EPA’s [Development Licence Application Guidance](https://www.epa.vic.gov.au/about-epa/publications/2011) (publication 2011) provides more detail about the information EPA may require or request from permission applicants.

## 4.1 Calculating GHG emissions

In some cases, you may be able to rely on reputable GHG accounting tools to calculate your emissions. For example, Agriculture Victoria provides an up-to-date list of tools for the agriculture sector (See Chapter 9).

If you are a larger 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.

GHG emissions are usually expressed as carbon dioxide equivalent (CO2-e). The GHG emissions from each source can be calculated using the formula below.

**Emissions (CO2-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** – is an estimated value for determining an amount of a GHG emitted for a given activity. It is used by multiplying with the activity data to calculate GHG emissions as a quantity of emissions that is consistent year-on-year and comparable with other organisations.

You should list and quantify each of your emission sources (this is sometimes referred to as a GHG emissions inventory). Your GHG emissions inventory should document the standard used to calculate your inventory.

Individual emissions can be added to provide total emissions – which is often presented in units of tonnes of carbon dioxide equivalent (tCO2e).

You may choose to prepare your emissions inventory yourself or obtain assistance from a suitably experienced person such as a consultant. [EPA’s Fact Sheet 1702: Engaging consultants](https://www.epa.vic.gov.au/about-epa/publications/1702) provides advice on choosing and engaging consultants.

## 4.1.1 Activity data

Using data from reliable sources, such as bills, will provide the most accurate picture of your GHG emissions.

Most electricity bills will already have calculated your GHG emissions for you. Using this information will help you track your GHG emissions from electricity use over time. Sustainability Victoria has information on how to [understand your electricity and gas bills](https://www.sustainability.vic.gov.au/energy-efficiency-and-reducing-emissions/in-a-business/understand-your-business-energy-bill). You should also be able to get some activity data for GHG emissions from your gas bills and information on fuel used in company-owned vehicles using fuel invoices/receipts and vehicle mileage in logbooks or odometers. In many cases, this activity data gives you enough information to calculate common Scope 1 and Scope 2 GHG emissions.

You should prioritise getting reliable data for your substantive GHG emissions sources. However, if it is difficult to get activity data, you can use reasonable estimates, and document them.

## 4.1.2 Emission factors

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

The Australian Government’s [National Greenhouse Accounts (NGA) Factors](https://www.industry.gov.au/data-and-publications/national-greenhouse-accounts-factors) is published annually and provides emission factors to help companies and individuals to estimate their GHG emissions. It ensures consistency between inventories at the company and facility level.

Other sources of emission factors include:

* source or facility-specific emission factors
* governmental publications in Australia
* scientific sources in Australia
* credible commercial/non-commercial sources in Australia
* [GHG protocol tools](https://ghgprotocol.org/calculation-tools#sector_specific_tools_id)
* factors from governments and other organisations in other countries.

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 sourced from IPCC Assessment Reports. GWP values convert GHG emissions data for non-CO2 gases into units of CO2e.[[6]](#footnote-7)7

The GWP values are based on the different effects that different GHGs can have on the Earth’s warming. Two significant ways these gases differ from each other are in their ability to absorb energy (their ‘radiative efficiency’) and how long they stay in the atmosphere (their ‘lifetime’).

GWP values can change over time and are updated in IPCC Assessment Reports. For example, based on IPCC’s Sixth Assessment Report, 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 CO2). The larger the GWP, the more that a given gas warms the Earth compared to CO2 over that period.[[7]](#footnote-8)8 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 minimise 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 (NGER) scheme[[8]](#footnote-9)9
* understand your Scope 1, Scope 2 and Scope 3 emissions as part of voluntarily seeking carbon neutrality under [Climate Active](https://www.climateactive.org.au/) (a voluntary carbon-neutral certification program)
* quantify emissions for internal and other business reporting purposes.

Existing information can be used to help you assess the risks of harm from your GHG emissions.

## 4.3 Standards for quantifying your GHG emissions

The World Resources Institute/World Business Council for Sustainable Developments [Greenhouse gas protocol corporate accounting and reporting standard](https://ghgprotocol.org/corporate-standard) (GHG Protocol) is globally recognised, 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](https://www.iso.org/standard/66453.html) is available for purchase and is closely based on the GHG Protocol. It specifies principles and requirements at the organisation level for the quantification and reporting of GHG emissions and removal. 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](https://www.industry.gov.au/data-and-publications/climate-active-carbon-neutral-standard-for-organisations) is a voluntary standard to manage GHG emissions and achieve carbon neutrality. It provides best-practice guidance on how to measure GHG 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.

Both Climate Active (Carbon Neutral Standard for Organisations, page 5) and the GHG protocol (Corporate Standard, page 7) provide for the following principles: Relevance, Completeness, Consistency, Transparency, and Accuracy in the preparation of carbon accounts.

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

## 4.4 Understanding and minimising your Scope 3 emissions

When quantifying GHG emissions arising from or in connection with your activities, Scope 3 GHG emissions should be included as this will assist you to assess the risks of harm (refer to Table 3). This is consistent with the GED requiring that risks of harm from GHG emissions that may arise from your activities be minimised so far as reasonably practicable.

Identifying and understanding these emissions can also help you identify and assess the relative risks compared to your Scope 1 and Scope 2 GHG emissions and where to focus your efforts to minimise the risks of harm to human health and the environment.

For some businesses, Scope 3 GHG emissions may be where most GHG emissions occur (in 2021 the CDP found that GHG emissions in a company’s supply chain are, on average, 11.4 times higher than its operational emissions (CDP 2022)).

In some cases, you are legally required to minimise the risks of harm from your Scope 3 GHG emissions to satisfy your GED. For example, under Section 25(5) of the EP Act, if you are conducting a business and are engaged in an activity that involves the manufacture of a substance, you must (so far as reasonably practicable) minimise the risk of harm from the GHG emissions arising from the manufacture of the substance when the substance is used for the purpose for which it was manufactured.

The control, ownership or influence you have over the source of emissions may also affect what is considered to be reasonably practicable. Larger businesses and large energy users are likely to have greater control, ownership and influence over upstream and downstream emissions.

The World Resources Institute/World Business Council for Sustainable Development published the [GHG Protocol Corporate Value Chain (Scope 3) Accounting and Reporting Standard](https://ghgprotocol.org/sites/default/files/standards/Corporate-Value-Chain-Accounting-Reporing-Standard_041613_2.pdf) (Scope 3 standard) in 2011. The Scope 3 standard provides an internationally recognised method to enable GHG emission management of companies’ value chains. The companion [Technical Guidance for Calculating Scope 3 Emissions](https://ghgprotocol.org/sites/default/files/standards_supporting/Intro_GHGP_Tech.pdf) provides methods businesses may choose to use for calculating GHG emissions for each of 15 Scope 3 categories.

The sources of Scope 3 emissions can vary widely in different industries and not all 15 categories will be relevant to all businesses (refer to Table 2 in Section 3.3). 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.

As an example, if most of your GHG emissions are from purchased goods and services, ways to reduce risk of harm from those emissions may include supplier engagement and your procurement policies and choices.

For downstream GHG emissions, where you may have a lower degree of influence, there may still be ways to reduce risks of harm from GHG emissions during the use phase, via customer engagement and your investment choices.

## 4.5 Verification

It is not necessary to independently verify or publicly report your GHG emission data in order to comply with the GED (although this may be legally required by some other means, for example, if it is a condition of a permission). However, you may choose to engage an independent third party to verify your inventory to ensure reliability and confidence in the data.

Common reasons for undertaking independent verification are publicly reporting GHG emissions to demonstrate transparency and as part of best practice carbon accounting, and increased confidence in making investment decisions and setting targets.

For example, [Climate Active](https://www.climateactive.org.au/) incorporates independent third-party validation processes, and requires businesses who wish to retain certification to report their carbon neutral claim in a publicly accessible Public Disclosure Statement which is published each reporting year on the Climate Active website.

# **Icon  Description automatically generatedStep 3 – Identify and implement controls to minimise risks arising from GHG emissions**

## 5.1 GHG emission control options

EPA’s risk management framework includes a hierarchy of risk controls. Options for controlling risk are prioritised from the highest level of effectiveness to the lowest, as shown in Figure 2. Controls are placed into three categories. Together, these elements create a ‘hierarchy’ of risk control standards. Further information on the hierarchy of controls is provided in EPA publication 1695-1.



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 when reviewing risks is whether you can improve current risk controls by adopting controls that are higher on the control hierarchy. Eliminating the hazard is the highest level of risk control and this should be given the highest consideration. Then you should consider substituting or controlling the hazard (often achieved by engineering controls such as energy efficient lighting) and then administrative controls.

The following Sections provide examples of risk controls for GHG emissions. However, the suitability of different options and risk control measures needed to meet your obligations under the GED (refer to Section 1.3) will depend on your specific circumstances. It is your responsibility to understand your risks and the right approach to minimise them, see [Reasonably practicable](https://www.epa.vic.gov.au/about-epa/publications/1856) (publication 1856).

Guidance from industry associations can help you find common, effective practices and controls specific to your industry. For example, businesses from different agricultural sectors can find controls for their sector in relevant codes and guidelines.

In some circumstances, minimising 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 GHG emissions elsewhere, particularly outside of Victoria.

The risk control measures you select should seek to eliminate or reduce risk of harm overall. That is, measures that reduce GHG emissions should not be adopted if they result in a net increase of overall risk of harm.

## 5.1.1 Eliminate the hazard

Eliminating the risk of harm is the highest level of risk control and is legally required so far as reasonably practicable. Start by considering how you can eliminate the risks so far as reasonably practicable. You should be able to demonstrate if/how elimination of the hazard was considered in your decision making.

Eliminating the risk means avoiding generating Scope 1 GHG emissions or causing the generation of Scope 2 and/or Scope 3 GHG emissions to the extent it is reasonably practicable to do so.

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](http://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 ways businesses might eliminate risks of harm from GHG emissions using circular economy principles[[9]](#footnote-10)10 include:

* designing out waste through material efficiency (to reduce raw material requirements) and optimising supply chains (to reduce waste generation)
* reducing energy consumption across the supply chain
* 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 reduce them so far as reasonably practicable.

## 5.1.2 Reduce the risks: substitute the hazard/engineering controls

When it is not reasonably practicable to eliminate the risk, the next preferred option is to substitute the hazard by replacing the cause of the emissions with something safer, or by using engineering controls.

Examples of substituting the hazard include:

* switching to refrigeration systems that use natural refrigerants
* electrifying processes (for example, switching from coal and gas to electrical heating such as industrial heat pumps) and using renewable energy
* substituting natural gas with biogas
* using renewable hydrogen to replace fossil fuels
* switching from internal combustion engines to electric vehicles.

Engineering controls are physical controls for a risk. 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 minimise fugitive emissions in oil and gas production
* introducing feed-based strategies to reduce GHG emissions on farms.

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
* modifying process controls, including installing automated control systems
* installing variable speed drives on pumps and other equipment
* installing control systems on heating, ventilation and cooling (HVAC) systems to optimise performance and 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 the efficiency of lighting, motion and daylight sensors, and removing unnecessary lighting
* installing energy-efficient cool rooms and refrigeration
* exploring heat recovery options in industrial processes
* improving process efficiency.

You should consider the best available techniques and technologies when assessing engineering controls to reduce risks of harm as part of the process of identifying all reasonably practicable measures to minimise risk.

[Energy ratings](https://www.energyrating.gov.au/) can be used to compare the energy efficiency of various appliances. Both the [Victorian Government](https://www.energy.vic.gov.au/) and [Australian Government](https://www.energy.gov.au/) have information and support available to manage and reduce energy use, including assistance in purchasing renewable energy (either onsite or offsite – sometimes known as power purchase agreements (PPAs) and energy-efficient equipment. The City of Melbourne has developed [a guide to buying off-site renewable electricity](https://www.melbourne.vic.gov.au/business/sustainable-business/mrep/Pages/renewable-energy-procurement-guide.aspx).

The Australian Government also has [information for building owners and tenants to improve energy efficiency](https://www.energy.gov.au/business/industry-sector-guides/building-owners-and-tenants) including whether you have an existing lease arrangement or you are a building tenant looking at new lease arrangements.

## 5.1.3 Reduce the risks: administrative controls

The last control option is 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 the risks arising from GHG emissions may include:

* advising on GHG emissions when supplying and installing equipment and plant
* running GHG emissions reduction training and induction for staff
* regular maintenance of refrigeration and air conditioning equipment including detection of leaking refrigerant gases and maintenance of air filters
* safe management and disposal of high GWP refrigerants in accordance with the Commonwealth [*Ozone Protection and Synthetic Greenhouse Gas Management Act 1989*](https://www.environment.gov.au/protection/ozone/legislation)
* ensuring technicians handling refrigerants or working on refrigeration and air conditioning equipment have a refrigeration handling licence with the [Australian Refrigeration Council](https://www.arctick.org/) in accordance with the [*Ozone Protection and Synthetic Greenhouse Gas Management Regulations 1995*](https://www.dcceew.gov.au/environment/protection/ozone/legislation)
* regular maintenance of machinery and equipment
* checks to ensure refrigerator doors are kept closed
* fixing air leaks on equipment, including boilers and compressors
* turning off lights 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 non-critical HVAC systems out of hours
* turning off engines in cars, trucks, forklifts and tractors rather than idling
* running eco-efficient driver training for vehicle fleet drivers
* regular maintenance of vehicle fleets.

In some cases, you are legally required to implement administrative controls to satisfy your GED. For example, under Section 25(5) of the EP Act, if you are conducting a business and are engaged in an activity that involves the design of equipment, you must (so far as reasonably practicable) provide information regarding the purpose of the equipment and any conditions necessary to ensure it can be used in a manner that complies with the GED.

You can also reduce GHG emissions by embedding consideration of GHG emissions in procurement policies including energy, new appliances and equipment, transport and contracts.

|  |
| --- |
| **Offsets**Carbon offsets or credits are financial products (purchasing GHG emissions reductions elsewhere) 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 third-party 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.It is often unclear whether offset products eliminate or reduce those risks of harm arising from the GHG emissions of a specific activity. For this reason, offset products will rarely be an appropriate mechanism to comply with the GED.  |

## 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.

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

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

Businesses must consider the five matters set out in Section 6 of the Act to determine what is reasonably practicable in their situation. Refer to [Reasonably practicable](https://www.epa.vic.gov.au/about-epa/publications/1856) (publication 1856) for more information.

It is well established that continued emission of GHGs will increase the risk of harm to climate systems occurring. The Intergovernmental Panel on Climate Change has said:

*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.*[[10]](#footnote-11)11

Given the nature of GHG emissions, it can be hard to determine the likelihood and consequence of risk from climate change arising from your emissions. However, any contribution to GHG emissions increases the likelihood and severity of the risk of harm.

Translated to the business, the likelihood that the risk of harm will eventuate by reason of your activities increases proportionately to the nature and extent of the GHG emissions arising from those activities.

To determine what is reasonably practicable it is important to consider the level or scale of risk of harm from your activities. The greater the risk of harm (for example, the type and quantity of your GHG emissions), the greater the expectation for you to minimise it.

Table 3 provides guidance on how to determine what is reasonably practicable in relation to minimising GHG emissions.

Table 3: Matters to consider in determining what is reasonably practicable in relation to minimising the risk of harm from GHG emissions

|  |
| --- |
| Matters to consider in the context of GHG emissions  |
| The likelihood of those risks eventuating | * What are the direct and indirect GHG emissions likely to arise from your activities? (Scope 3 emissions should be included particularly if the activity giving rise to Scope 3 emissions occurs within Victoria).
* How does the quantity of GHG emissions compare across each of your activities?
 |
| What the business knows, or ought reasonably to know, about the harm or risks of harm and any ways of reducing those risks | * Do you have systems in place to identify and assess the nature and scope of the risks of harm from GHG emissions arising from your activities?
* Is there sector-specific guidance that identifies significant Scope 3 emission sources for your sector?
* Do any of your Scope 3 emissions arise from activities that occur within Victoria?
* What works were carried out to evaluate the risks and develop adequate risk controls?
* What is the industry approach for eliminating or reducing those risks?
* What reliable source of information exist in the public domain on risks of harm and ways to reduce those risks?
 |
| Availability and suitability of ways to eliminate or reduce the risks | * What technologies, processes and equipment are available to eliminate or reduce the risk?
* How easy is it to eliminate or reduce the risk from a particular source?
* How effective is the approach in eliminating or reducing the risk of harm?
* How much control, ownership or influence do you have over the source of emissions? For example, to reduce Scope 3 GHG emissions you may need to rely on collaboration and cooperation from suppliers, customers, and other external stakeholders.
* Is the proposed approach to reduce emissions consistent with best available techniques and technologies?
* Does the proposed approach introduce new and higher risks when considering all the circumstances?
 |
| Cost of eliminating or reducing the risks | * What is the cost of the risk control measures available compared to how much the risks of harm would be reduced? (Some companies use an internal carbon price to reduce GHG emissions in their operations and supply chains, although these prices need to be reviewed regularly as prices are expected to rise over time.[[11]](#footnote-12)12)
* What would be the cost per unit reduction of risk for each control option?
 |

You should use reputable sources like business and industry organisations, regulatory and government agencies, and other independent and/or international organisations to learn more about the risks your activities pose and how to address them. This information forms part of the state of knowledge and needs to be considered when determining what is reasonably practicable in your specific circumstances. Chapters 8 and 9 of this Guideline also provide some useful information.

In many cases, a clear, accepted, and effective control or set of controls set out in reputable guidelines, standards, or industry practices may represent a good reflection of what is reasonably practicable for a situation.

Large emitters are expected to have a mature understanding of the GHG emissions risks posed by their operation and the approach to controlling those risks will reflect that understanding. This includes being aware of national and international approaches to eliminating or reducing the risks.

Please note that the general state of knowledge about the risks to human health and the environment improves over time. New knowledge on risks arises and new opportunities to better minimise risks arise through new and more affordable technology and techniques, for example, as solutions to eliminate or reduce GHG emissions move from research and development to commercial readiness and become more widely available.

See EPA’s [Reasonably Practicable](https://www.epa.vic.gov.au/about-epa/publications/1856) guidance (publication 1856) for more information on the state of knowledge.

# **Icon  Description automatically generatedStep 4 – Review controls to ensure they are effective**

Controls you have 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 electricity and gas bills and fuel usage.

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 emissions as part of the organisation’s activities
* regular training, including refresher training for administrative controls.

## 6.3 Continual improvement and review

The ultimate objective of continual improvement and review of risk control measures is to minimise the risks of harm to human health and the environment so far as reasonably practicable.

What is reasonably practicable to minimise risks of harm in any given context may vary over time, for example, as new knowledge emerges, and new techniques and technologies are developed.

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 tracking and calculating your GHG emissions (including improving the quality of your GHG emissions inventory)
* the effectiveness of your approach to minimising risk of harm from GHG emissions
* controls you have in place to reduce the risk of harm from GHG emissions.

You must maintain your understanding of the state of knowledge on GHG emissions reduction opportunities, including ensuring an 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](https://www.climatechange.vic.gov.au/victorias-climate-change-strategy) and relevant [whole of Victorian Government and sector emissions reductions pledges](https://www.climatechange.vic.gov.au/victorian-government-action-on-climate-change).

Documenting your risks and management actions to minimise 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 an action plan template is provided in Appendix B.

For EPA licence holders, every licence issued by EPA requires the licence holder to have a risk management and monitoring program (RMMP) in place that enables the licence holder and EPA to determine compliance with the GED. EPA expects licence holders to have a robust system in place to ensure their environmental performance is adequately assessed and demonstrated to comply with their licence and the GED.

More information on RMMPs for licence holders can be found in [Implementing the general environmental duty: A guide for licence holders](https://www.epa.vic.gov.au/for-business/find-a-topic/environment-protection-laws-and-regulations/implementing-the-general-environmental-duty---a-guide-for-licence-holders). EPA’s [Development Licence Application Guidance](https://www.epa.vic.gov.au/about-epa/publications/2011) (publication 2011) has further detail about the information EPA may require or request from permission applicants.

## 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 RMMP. The global [GHG Protocol](https://ghgprotocol.org/corporate-standard) and the [Science Based Target Initiative](https://sciencebasedtargets.org/) 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 reducing 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 and 2030. These targets are important given the urgency of GHG emission reduction required in the short term and the need to drive continuous improvement.

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

* percentage increase in renewable energy
* percentage reduction in Scope 1, Scope 2, and Scope 3 GHG emissions
* percentage improvement in Scope 1, Scope 2, and Scope 3 GHG emissions intensity[[12]](#footnote-13)13
* shift to low GWP refrigerants
* percentage improvement in energy efficiency
* percentage improvement in process efficiency
* percentage reduction in flaring, venting, and fugitive GHG emissions
* percentage increase in the purchase of zero GHG emission vehicles.

EPA acknowledges that the use of net zero targets by businesses has risen based on the Paris Climate Agreement’s goal to reach net zero GHG emissions by mid-century. Achieving 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 offsets to achieve net zero targets you still need to demonstrate how you are minimising the risk of harm from your GHG emissions so far as reasonably practicable for the purposes of meeting your GED.

# **Risk management examples**

The following examples show how to use the four-step risk process to minimise risks of harm from GHG emissions across a range of situations.

## 7.1 Small business

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, which may give rise to risks of harm to human health and the environment:

* Scope 1 GHG emissions – refrigerant gases from the air conditioner and refrigeration, gas used for cooking and water heating
* Scope 2 GHG emissions – energy use for food preparation (for example, oven, dishwasher, 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. She will also document her gas use from her gas bill and track this over time.

Mary looked at Sustainability Victoria’s [energy efficiency information in hospitality](https://www.sustainability.vic.gov.au/energy-efficiency-and-reducing-emissions/in-a-business/by-sector/energy-efficiency-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
* ensuring paper, bottles and cans are being recycled instead of going to landfill
* 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 when customers are present.

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](https://www.sustainability.vic.gov.au/energy-efficiency-and-reducing-emissions/in-a-business/energy-upgrade-recommendations) to get recommendations for what to upgrade next and take advantage of the [Victorian Energy Upgrades incentives](https://www.energy.vic.gov.au/energy-efficiency/victorian-energy-upgrades) 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 minimise the risk of harm from GHG emissions. She will also look at calculating the GHG emissions from the restaurant’s gas usage in the future to check how they compare to 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 GHG 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 which may give rise to risks of harm to human health and the environment:

* Scope 1 – gas consumption and refrigerant gases from air conditioners and refrigeration
* Scope 2 – purchased electricity for HVAC, lighting, and refrigeration
* Scope 3 – business travel, employee commuting, waste, catering and courier services.

Nitten looked at his electricity bills which showed him the GHG emissions from the office’s electricity usage. He used the NGER [Emissions and Energy Threshold Calculator](http://www.cleanenergyregulator.gov.au/NGER/Forms-and-resources/Calculators#Emissions-and-Energy-Threshold-Calculator-202021-and-user-guide) 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 about options to reduce energy use and impacts on the environment from his business on Sustainability Victoria’s [website](https://www.sustainability.vic.gov.au/energy-efficiency-and-reducing-emissions/in-a-business).

Nitten decided to [engage an energy auditor](https://www.sustainability.vic.gov.au/energy-efficiency-and-reducing-emissions/in-a-business/find-an-energy-auditor) to do a detailed energy audit to better **assess** the business’s energy use, patterns, and demand and therefore the risk of harm to human health and the environment from the business’s GHG emissions.

The information he received from the energy audit informed the development and implementation of a GHG emission management plan which sets out the **controls** the business has and will implement for energy efficiency and GHG emissions reductions (including Scope 1 GHG emissions) over four years.

The GHG emission 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 include:

* altered temperature controls 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
* replaced fixed speed drives on heating and ventilation systems with variable drives to respond to demand rather than running at full speed all the time
* installed sensors to only run air conditioning and lighting when meeting rooms were occupied
* installed efficient boiler load optimisation control units to the gas-fired boilers (used for heating and hot water) to ensure maximum efficiency.

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

* installation of automatic switches and timers on lighting
* reduction in the 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 emission management plan also includes actions to implement future controls, such as incorporating renewable energy options as part of the business’s energy profile.

A key action in the plan is to better calculate all GHG emissions including Scope 3 emissions arising from activities within Victoria. This will help develop future actions. He also understands there are some relatively easy actions he can commence in the short-term to reduce Scope 3 GHG emissions, such as working with their catering and courier suppliers to look for opportunities to reduce GHG emissions together.

Finally, Nitten looks to keep abreast of innovative technology solutions he could implement in the future to reduce GHG emissions. The plan will be reviewed annually.

Based on reporting data the business has achieved a 60 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 GHG-intensive factory/industry

Stephen works for a global manufacturer of home care and personal products and is responsible for the business’s climate strategy.

The climate strategy **identifies** the business’s GHG emissions sources which may give rise to risks of harm and **assesses** the risk of harm that the emissions have to human health and the environment. The assessment found that the business’s 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 **controls**:

* halving the GHG emissions impact from its products across the lifecycle by 2030, and it has:
	+ redesigned laundry detergents to enable people to wash clothes in lower temperatures (reducing Scope 3 GHG emissions 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 emissions by 80 per cent by 2030 from its own operations including:
	+ using energy efficiency to reduce GHG emissions from machinery
	+ converting energy sources to renewables
	+ electrifying as much equipment as possible (including for hot water and steam)
	+ starting to switch the sales fleet to electric vehicles.

These targets have been approved by the [Science Based Targets Initiative](https://sciencebasedtargets.org/).

Stephen has identified 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 most suitable for the business’s circumstances and how effective the controls are compared to the cost to implement them.

Stephen will revisit the business’s climate strategy annually and as part of that process he will seek to further develop the options to reduce GHG emissions from its distribution activities. Stephen also ensures that the controls currently implemented are **checked** regularly 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 Binh to develop and maintain a RMMP for her activities.

Binh uses [Implementing the general environmental duty: A guide for licence holders](https://www.epa.vic.gov.au/about-epa/publications/1851-1) on the EPA website as a guide in developing the RMMP, **identifying** and **assessing** risks of harm from GHG emissions as part of the process. She already has a good understanding of the Scope 1 and Scope 2 GHG emissions as they are already calculated and reported annually to the National Greenhouse and Energy Reporting (NGER) 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 GHG emissions intensity by 2025 from a 2015 baseline
* a 40 per cent improvement in energy efficiency by 2030 from a 2015 baseline.

She used well-known [Scope 3 Accounting and Reporting guidance](https://ghgprotocol.org/standards/scope-3-standard), which is part of the [Greenhouse Gas Protocol](https://ghgprotocol.org/corporate-standard), to calculate the business’s Scope 3 GHG emissions and now reports these as part of the annual corporate reporting.

The following **controls** have reduced Scope 1 and Scope 2 GHG 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 and that there is currently a lack of available controls to eliminate or reduce risks from some of these sources (one of the matters relevant to what is [reasonably practicable](https://www.epa.vic.gov.au/about-epa/publications/1856)). However, Binh understands that she is still required to monitor the business’s GHG emissions and minimise the risks from those sources so far as reasonably practicable. Therefore, 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
* keep an eye on relevant sources of information for her sector, such as the [Australian Industry Energy Transitions Initiative](https://www.climateworkscentre.org/project/australian-industry-energy-transitions-initiative/), to help her build her knowledge of emerging technology solutions
* adopt new technologies when it is reasonably practicable to do so.

# **EPA guidance relevant to GHG emissions and climate change**

* [Assessing and controlling risk: a guide for business](https://www.epa.vic.gov.au/about-epa/publications/1695-1) (publication 1695-1) – how to manage risks, using a four-step process.
* [Industry guidance: supporting you to comply with the general environmental duty](https://www.epa.vic.gov.au/about-epa/publications/1741-1) (publication 1741).
* [State of knowledge and industry guidance](https://www.epa.vic.gov.au/about-epa/laws/new-laws/state-of-knowledge-and-industry-guidance).
* [Reasonably practicable](https://www.epa.vic.gov.au/about-epa/publications/1856) (publication 1856).
* [Fact sheet: Engaging consultants](https://www.epa.vic.gov.au/about-epa/publications/1702) (publication 1702).
* [Development licence application guidance](https://www.epa.vic.gov.au/about-epa/publications/2011) (publication 2011).
* [Guidance for operating licences](https://www.epa.vic.gov.au/about-epa/publications/1850-1) (publication 1850)
* [Implementing the general environmental duty: a guide for licence holders](https://www.epa.vic.gov.au/about-epa/publications/1851-1) (publication 1851)
* [Self-assessment tool for small business](https://www.epa.vic.gov.au/about-epa/publications/1812) (publication 1812)
* [Auto recyclers guideline](https://www.epa.vic.gov.au/about-epa/publications/1810-1) (publication 1810)
* [Agriculture - guide to preventing harm to people and the environment](https://www.epa.vic.gov.au/about-epa/publications/1819-1) (publication 1819)

* [Construction – guide to preventing harm to people and the environment](https://www.epa.vic.gov.au/about-epa/publications/1820) (publication 1820)
* [Local government – guide to preventing harm to people and the environment](https://www.epa.vic.gov.au/about-epa/publications/1821) (publication 1821)
* [Manufacturing – guide to preventing harm to people and the environment](https://www.epa.vic.gov.au/about-epa/publications/1822) (publication 1822)
* [Mining and quarrying – guide to preventing harm to people and the environment](https://www.epa.vic.gov.au/about-epa/publications/1823) (publication 1823)
* [Retail – guide to preventing harm to people and the environment](https://www.epa.vic.gov.au/about-epa/publications/1824) (publication 1824)
* [Waste and recycling – guide to preventing harm to people and the environment](https://www.epa.vic.gov.au/about-epa/publications/1825) (publication 1825)

# **Further reading and references**

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

**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*.*](https://www.environment.gov.au/climate-change/climate-science-data/climate-science/greenhouse-effect#:~:text=Enhanced%20greenhouse%20effect,to%20warming%20of%20the%20Earth.)

Australian Government administers:

* [Emissions Reduction Fund via the Clean Energy Regulator](http://www.cleanenergyregulator.gov.au/ERF)
* [National Greenhouse and Energy Reporting (NGER) scheme](http://www.cleanenergyregulator.gov.au/NGER/Forms-and-resources/Calculators)
* [NGER Emissions and Energy Threshold Calculator](file:///C%3A%5CUsers%5Cmiddlem%5CAppData%5CLocal%5CMicrosoft%5CWindows%5CINetCache%5CContent.Outlook%5CGU3D398B%5C%E2%80%A2%09http%3A%5Cwww.cleanenergyregulator.gov.au%5CNGER%5CForms-and-resources%5CCalculators)
* [*Ozone Protection and Synthetic Greenhouse Gas Management Act 1989 and regulations*](https://www.legislation.gov.au/Series/C2004A03755)

**Australian Government**:information for business including energy, Access online: <https://www.energy.gov.au/business>

**Australian Government**:energy management for business – building owners and tenants. Access online: <https://www.energy.gov.au/business/industry-sector-guides/building-owners-and-tenants>

**Australian Government**:Climate Active Carbon Neutral Standard for Organisations. Access online: <https://www.industry.gov.au/data-and-publications/climate-active-carbon-neutral-standard-for-organisations>

**Australian Pork**: information on GHG emissions and reduction opportunities in pork production, Access online: <https://www.australianpork.com.au/environmental-practices/greenhouse-gases>

**Australian Prudential Regulation Authority**: draft Prudential Practice Guide CPG 229 Climate Change Financial Risks (CPG 229), Access online: <https://www.apra.gov.au/consultation-on-draft-prudential-practice-guide-on-climate-change-financial-risks>

**Australian Securities and Investments Commission**: *19-208MR ASIC updates guidance on climate change related disclosure,* Access online: <https://asic.gov.au/about-asic/news-centre/find-a-media-release/2019-releases/19-208mr-asic-updates-guidance-on-climate-change-related-disclosure/>

**Beyond Zero Emissions**:an independent, solutions-focused think tank. Access online: <https://bze.org.au/>

**Business Victoria**:Optimise performance of your commercial refrigeration and cooling equipment. Access online:<https://business.vic.gov.au/business-information/sustainability/cut-energy-costs>

**CDP**: Putting a price on carbon, The state of internal carbon pricing by corporates globally. Access online: <https://www.cdp.net/en/research/global-reports/putting-a-price-on-carbon>

**CDP**: Engaging the Chain: Driving Speed and Scale,Global Supply Chain Report 2021. Access online: <https://www.cdp.net/en/research/global-reports/engaging-the-chain>

**Carbon Trust**: Access online: <https://www.carbontrust.com/resources/briefing-what-are-scope-3-emissions>

**Centre for Climate and Energy Solutions**:The business of pricing carbon, how companies are pricing carbon to mitigate risks and prepare for a low-carbon future. Access online: <https://www.c2es.org/wp-content/uploads/2017/09/business-pricing-carbon.pdf>

**Centre for Policy Development**: Updated Hutley opinion on directors’ duties and climate risk. Access online: <https://cpd.org.au/2019/03/directors-duties-2019/>

**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/>

**ClimateWorks**: Decarbonisation Futures, provides a guide for Australian Government and business decision makers on priority technologies, deployment pathways and benchmarks for achieving net zero emissions. Access online: <https://www.climateworksaustralia.org/project/decarbonisation-futures/>

**ClimateWorks**: Australian industry energy transitions initiative. Access online: <https://www.climateworkscentre.org/project/australian-industry-energy-transitions-initiative/>

**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/>

**Compare**:an independent Victorian Government energy price comparison site including solar. Access online: <https://compare.energy.vic.gov.au/>

**CSIRO**:State of the Climate, biennial State of the Climate report series draws on the latest climate research, encompassing observations, analyses and projections to describe year-to-year variability and longer-term changes in Australia’s climate. Access online: <https://www.csiro.au/en/research/environmental-impacts/climate-change/state-of-the-climate>

**Dairy Australia, WestVic Dairy**:climate change and energy resources for dairy including **‘**Saving energy on dairy farms’. Access online: <https://www.dairyaustralia.com.au/land-water-and-climate>

**Ellen MacArthur Foundation**: Completing the Picture: How the Circular Economy Tackles Climate Change. Access online: <https://circulareconomy.europa.eu/platform/sites/default/files/emf_completing_the_picture.pdf>

**ENCORD (European Network of Construction Companies for Research and Development)**:Construction CO2 e Measurement Protocol. A Guide to reporting against the Green House Gas Protocol for construction companies. Access online: <https://ghgprotocol.org/sites/default/files/ENCORD-Construction-CO2-Measurement-Protocol-Lo-Res_FINAL_0.pdf>

**IPCC**: *Climate Change 2014: Synthesis Report*. Contribution of Working Groups I, II and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Core Writing Team, R.K. Pachauri and L.A. Meyer (eds.)]. IPCC, Geneva, Switzerland, 151 pp. Access online: <https://www.ipcc.ch/site/assets/uploads/2018/05/SYR_AR5_FINAL_full_wcover.pdf>

**IPCC**: Summary for Policymakers. In: Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [Masson-Delmotte, V., P. Zhai, A. Pirani, S. L. Connors, C. Péan, S. Berger, N. Caud, Y. Chen, L. Goldfarb, M. I. Gomis, M. Huang, K. Leitzell, E. Lonnoy, J.B.R. Matthews, T. K. Maycock, T. Waterfield, O. Yelekçi, R. Yu and B. Zhou (eds.)]. Cambridge University Press. In Press. Access online: <https://www.ipcc.ch/report/ar6/wg1/downloads/report/IPCC_AR6_WGI_SPM_final.pdf>

**NSW Government**:*Electricity metering and monitoring guide*. Access online: <https://www.energysaver.nsw.gov.au/get-energy-smart/find-technology-guide-your-equipment/electricity-metering-and-monitoring-guide>

**RE100**:a global initiative bringing together the world’s most influential businesses driving the transition to 100 per cent renewable electricity. Access online: <https://www.there100.org/>

**Science Based Targets initiative**: 2018 *Value Change in the Value Chain: Best Practices in Scope 3 greenhouse gas management*. Access online: <https://sciencebasedtargets.org/resources/files/SBT_Value_Chain_Report-1.pdf>

**Science Based Targets initiative**: 2020 *Foundations for science-based net-zero target setting in the corporate sector*. Access online: <https://sciencebasedtargets.org/resources/legacy/2020/09/foundations-for-net-zero-executive-summary.pdf>

**State Government of Victoria**: Agriculture Victoria. Free, practical tools and resources to inform and educate the agriculture industry about weather and climate patterns, carbon emissions, and energy use on farms. Access online: <https://agriculture.vic.gov.au/climate-and-weather/understanding-carbon-and-emissions>

**State Government of Victoria**: Agriculture Victoria. The Victorian Government has commenced the On-Farm Action Plan Pilot as part of its commitment under the [Agriculture Sector Emissions Reduction Pledge](http://agriculture.vic.gov.au/climate-and-weather) to provide practical information, tools and services to support farmers to understand and reduce emissions. Access online: <https://agriculture.vic.gov.au/climate-and-weather/policy-programs-action/on-farm-action-plan-pilot-program>

**State Government of Victoria**:Agriculture Victoria. ‘Making cent$ of carbon and emissions on-farm’ High-level booklet focuses on practical actions that farm businesses can take now to improve their emissions performance. Access online: <https://agriculture.vic.gov.au/climate-and-weather/understanding-carbon-and-emissions/making-cents-of-carbon-and-emissions-on-farm>

**State Government of Victoria**: Department of Environment, Land, Water and Planning. High level information and a range of links on Victorian Government climate change action and adaptation priorities. Access online: <https://www.climatechange.vic.gov.au/victorian-government-action-on-climate-change>

**State Government of Victoria**: Department of Environment, Land, Water and Planning 2019, *Victoria’s Climate Science Report 2019*. These reports are required every five years. Access online: <https://www.climatechange.vic.gov.au/__data/assets/pdf_file/0029/442964/Victorias-Climate-Science-Report-2019.pdf>

**State Government of Victoria**: Department of Environment, Land, Water and Planning Victoria’s GHG Emissions Report is published annually. Access online: <https://www.climatechange.vic.gov.au/victorias-greenhouse-gas-emissions-and-targets>

**State Government of Victoria**: Department of Environment, Land, Water and Planning, February 2020, *Recycling Victoria*. Access online: <https://www.vic.gov.au/sites/default/files/2020-02/Recycling%20Victoria%20A%20new%20economy.pdf>

**State Government of Victoria**: Department of Environment, Land, Water and Planning, May 2021, *Victoria’s Climate Change Strategy* includes the state’s emissions reduction targets for 2025 and 2030 and emission reduction pledges for emissions sectors. Access online: <https://www.climatechange.vic.gov.au/victorian-government-action-on-climate-change>

**State Government of Victoria**: Department of Environment, Land Water and Planning. Victoria’s renewable energy targets. Access online: <https://www.energy.vic.gov.au/renewable-energy/victorias-renewable-energy-targets>

**State Government of Victoria**: Department of Environment, Land Water and Planning. Victorian Energy Upgrades (VEU) program. Access online: <https://www.energy.vic.gov.au/energy-efficiency/victorian-energy-upgrades>

**State Government of Victoria**:Department of Health and the Department of Families, Fairness and Housing 2022. Health and human services climate change adaptation action plan 2022-26. Access online: <https://www.health.vic.gov.au/environmental-health/climate-change-strategy>

**Sustainable Australia Fund**: is a provider of finance for businesses to upgrade their buildings to achieve savings through energy efficiencies, as well as addressing climate change. Access online: <https://sustainableaustraliafund.com.au/>

**Sustainability Victoria**: Information for business on reducing energy use. Access online: <https://www.sustainability.vic.gov.au/>

**Task Force on Climate-related Financial Disclosures 2017**: *Recommendations of the Task Force on Climate-related Financial Disclosures*, Access online: <https://assets.bbhub.io/company/sites/60/2020/10/FINAL-2017-TCFD-Report-11052018.pdf>

**United Nations**:2015 Paris Agreement. Access online: <https://unfccc.int/sites/default/files/english_paris_agreement.pdf>

**United States Environment Protection Agency**: Understanding Global Warming Potentials. Access online: <https://www.epa.gov/ghgemissions/understanding-global-warming-potentials>

**Victorian Managed Insurance Authority 2021**:Climate Risk Management Service, Access online: <https://www.vmia.vic.gov.au/tools-and-insights/climate-change>

**We mean business coalition**: A global not-for-profit 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>

**World Resources Institute and World Business Council for Sustainable Development**:*Technical Guidance for Calculating Scope 3 Emissions*, 2013, serves as a companion to the Scope 3 Standard to offer companies practical guidance on calculating their Scope 3 emissions, Access online: <https://ghgprotocol.org/sites/default/files/standards_supporting/Intro_GHGP_Tech.pdf>

# **Appendix A –** **Greenhouse gas substances**

Greenhouse gas substances 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 | CHF3 |
| 2 | HFC‑32 | CH2F2 |
| 3 | HFC‑41 | CH3F |
| 4 | HFC‑43‑10mee | C5H2F10 |
| 5 | HFC‑125 | C2HF5 |
| 6 | HFC‑134 | C2H2F4 (CHF2CHF2) |
| 7 | HFC‑134a | C2H2F4 (CH2FCF3) |
| 8 | HFC‑143 | C2H3F3 (CHF2CH2F) |
| 9 | HFC‑143a | C2H3F3 (CF3CH3) |
| 10 | HFC‑152a | C2H4F2 (CH3CHF2) |
| 11 | HFC‑227ea | C3HF7 |
| 12 | HFC‑236fa | C3H2F6 |
| 13 | HFC‑245ca | C3H3F5 |

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

|  |  |  |
| --- | --- | --- |
| Item | Perfluorocarbon | Chemical formula |
| 1 | Perfluoromethane (tetrafluoromethane) | CF4 |
| 2 | Perfluoroethane (hexafluoroethane) | C2F6 |
| 3 | Perfluoropropane | C3F8 |
| 4 | Perfluorobutane | C4F10 |
| 5 | Perfluorocyclobutane | c‑C4F8 |
| 6 | Perfluoropentane | C5F12 |
| 7 | Perfluorohexane | C6F14 |

The [National Greenhouse Accounts Factors](https://www.industry.gov.au/data-and-publications/national-greenhouse-accounts-factors) provides methods that help businesses estimate their GHG emissions. The Commonwealth Government publishes revised factors every year.

# **Appendix B –** **Action plan template**

You can use this template to list actions you can take to improve the way you control your GHG emission risks.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Action required | Objective | Action owner (who) | Target completion date | Date action reviewed | Additional comments (post review) |
| Look at [Sustainability Victoria’s energy efficiency and reducing emissions webpage](https://www.sustainability.vic.gov.au/energy-efficiency-and-reducing-emissions) | Reduce Scope 2 GHG emissions | Dominique | 30/09/2023 |  |  |
|  |  |  |  |  |  |
|  |  |  |  |  |  |
|  |  |  |  |  |  |
|  |  |  |  |  |  |

# **Contact EPA**

#### epa.vic.gov.au

Ph 1300 372 842 (1300 EPA VIC)

|  |  |  |
| --- | --- | --- |
| Head office: 200 Victoria Street Carlton 3053 | West MetroLevel 2, 12 Clarke Street Sunshine 3020 | South WestWest 1, 33 Mackey StreetNorth Geelong 3215 |
| Southern MetroLevel 3, 14 Mason StreetDandenong 3175 | North East27–29 Faithfull StreetWangaratta 3677 | Gippsland8-12 Seymour StTraralgon 3844 |
| North MetroBuilding One, 13a Albert Street Preston 3072 | North WestLevel 1, 47–51 Queen StreetBendigo 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](https://www.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](https://www.sustainability.vic.gov.au/%22%20%5Ct%20%22_blank)



   

 [epa.vic.gov.au](https://www.epa.vic.gov.au/)

 Environment Protection Authority Victoria

 GPO BOX 4395 Melbourne VIC 3001

 1300 372 842

1. Department of Environment, Land, Water and Planning, 2021 [↑](#footnote-ref-2)
2. Department of Health and the Department of Families, Fairness and Housing, 2022 [↑](#footnote-ref-3)
3. <https://www.ipcc.ch/report/ar6/wg1/> [↑](#footnote-ref-4)
4. Department of Environment, Land, Water and Planning [↑](#footnote-ref-5)
5. The ‘state of knowledge’ is the body of accepted knowledge that is known or ought reasonably to be known about the harm or risks of harm to human health and the environment and how to eliminate or reduce those risks. [↑](#footnote-ref-6)
6. 7 World Resources Institute and World Business Council for Sustainable Development [↑](#footnote-ref-7)
7. 8 United States Environment Protection Agency [↑](#footnote-ref-8)
8. 9 NGER 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). [↑](#footnote-ref-9)
9. 10 Ellen MacArthur Foundation 2019 [↑](#footnote-ref-10)
10. 11 IPCC, 2014: Climate Change 2014: Synthesis Report; IPCC, 2021: Summary for Policymakers. In: Climate Change 2021: The Physical Science Basis [↑](#footnote-ref-11)
11. 12 CDP, 2021. [↑](#footnote-ref-12)
12. 13 Emissions intensity is a ratio comparing the GHG emissions of an activity or economic sector to the economic value it generates. For example, tonnes of CO2-e per dollar of revenue earned, tonnes of CO2-e per megawatt-hour of electricity consumed, or tonnes of CO2-e per tonne of steel produced. Emissions intensity reductions can be an important part of GHG management and measurement. But since modest improvements in intensity combined with increases in activity can produce increases in total emissions, absolute emissions outcomes need to be kept in view. [↑](#footnote-ref-13)