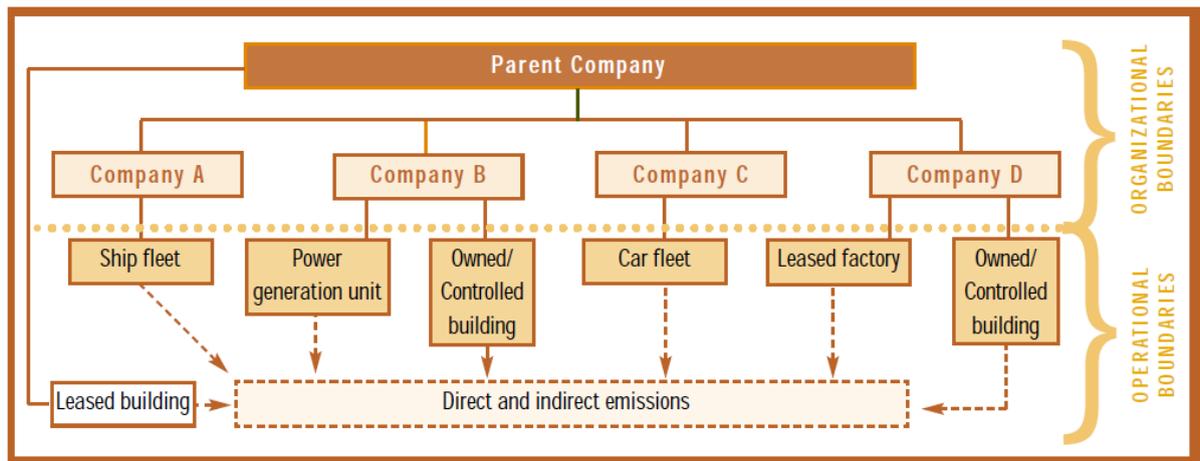


## Module 2. Accounting boundaries

### The inventory boundary

One of the principles of the GHG Protocol is ‘completeness’, in which it states: “All relevant emissions sources within the chosen boundary need to be accounted for so that a comprehensive and meaningful inventory is compiled.”<sup>23</sup>

The GHG Protocol describes **two types of boundaries, organisational and operational** – refer to Figure 1.



**Figure 1. Organisational and operational boundaries (for a complex organisation)<sup>24</sup>**

Organisational boundaries provide clarification when organisations vary widely in their structures, operations and ownership. Operational boundaries define the Scope of direct and indirect emissions within the established organisational boundary. The combination of the organisational and operational boundaries together constitutes the **inventory boundary**.

The selection of the boundaries is dependent on the characteristics of the company, the intended purpose of information and the needs of the inventory users/audience. When deciding on the inventory boundary, a number of factors should be considered, such as:

- Organisational structures: control (operational and financial), ownership, legal agreements, joint ventures, etc.
- Operational boundaries: on-site and off-site activities, processes, services, and impacts.
- Business context: nature of activities, geographic locations, industry sector(s), purposes of information, and users of information.

### Organisational boundaries

The organisational boundary defines which organisations or parts of organisations are included or excluded for the purposes of GHG accounting and reporting. Two approaches that can be used to set organisational boundaries are ownership or control. They are described below.

- **The Control approach**

Under the control approach, a company accounts for 100% of the GHG emissions from operations over which it has control. It does not account for operations in which it owns an interest but has no control. When selecting this approach, organisations must choose between ‘operational control’ and ‘financial control’. The difference between operational and financial control for government entities is examined in the *GHG Protocol for the U.S. Public Sector*<sup>25</sup>.

<sup>23</sup> Ref: The GHG Protocol: <http://www.ghgprotocol.org/files/ghgp/public/ghg-protocol-revised.pdf>, p.8

<sup>24</sup> Source: The GHG Protocol: <http://www.ghgprotocol.org/files/ghgp/public/ghg-protocol-revised.pdf>, p.25.

<sup>25</sup> Refer to Table 3.1 of the Standard on page 20

Under NGER, the entity with operational control is deemed responsible for reporting of emissions from that organisation. This is defined as an organisation which has the authority (or greatest authority) to introduce and implement operating policies, health and safety policies or environmental policies.

- **The Equity Share approach**

Under the equity share approach, a company accounts for GHG emissions from operations according to its share of the equity (ownership/economic interest) in the organisation. Other equity holders will account for GHGs associated with their own shares.

Where the percentage of equity share is different to the percentage of legal ownership, the percentage of equity overrides the legal form. This approach is not commonly used to determine the organisational boundary for local governments.

More details on the definitions are available on page 18 of the *GHG Protocol Corporate Standard*.

#### **Setting organisational boundaries: an example**

Council A owns over 200 facilities and assets on Council-owned land and wants to assess whether to include several leased premises in its boundary: Sports Pavilions A and B, Child-care centre C, Community hall D and Commercial building E.

Council decides to adopt the operational control measure since it owns all premises listed above. As Council A funds all building upgrades and sets the terms of the lease for buildings A, C and D, these are all included in the boundary. Council does not have any control over health and safety policies at building E and is not required to manage the building, and thus excludes E from its inventory.

Council is unsure whether it has operational control over building B, and elects to consult with community members whose general expectations were for Council to include this building in its inventory. The building also contributes 3% of Council's total GHG emissions, therefore Council decides to include it in the boundary.

## Operational boundaries

The operational boundary defines which emissions sources are included or excluded and how those sources are categorised. They are set after the organisational boundaries have been defined.

This involves the following **steps**:

1. identifying emissions associated with the organisation's operations;
2. categorising them as direct and indirect emissions;
3. choosing the Scope of accounting and reporting for indirect emissions.<sup>26</sup>

Having first identified the various sources of emissions (see *Emissions sources in the workplace*), they then need categorisation. There are two primary categories of emissions:

- **Direct** – emissions from sources owned or controlled by the organisation.
- **Indirect** – emissions due to the organisation's activities, but occurring from sources owned or controlled by another organisation.

Setting operational boundaries requires the use of carbon accounting **Scopes**.

<sup>26</sup> Ref: GHG Protocol: <http://www.ghgprotocol.org/files/ghgp/public/ghg-protocol-revised.pdf>, ch 4, p. 24.

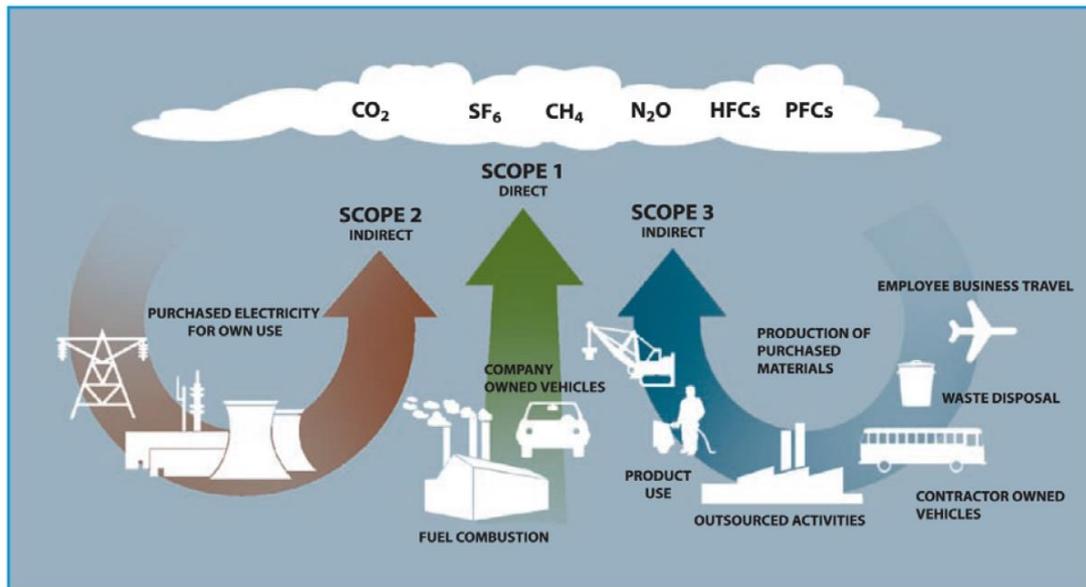


Figure 2. Scopes with example GHG emissions<sup>27</sup>

## Scopes

The concept of Scopes has been introduced by the GHG Protocol to:

- categorise direct and indirect emissions;
- avoid double counting of emissions (i.e. more than one organisation reporting the same emissions);
- improve transparency;
- provide utility for different reporting needs and goals.

There are three Scopes defined for carbon accounting and reporting purposes. Together they provide a comprehensive accounting framework for managing and reducing direct and indirect emissions.

**The Scopes are defined as:**

*Scope 1: Direct GHG emissions – emissions from sources owned or controlled by the organisation.*

*Scope 2: Electricity/Energy indirect GHG emissions – emissions from the generation of electricity, steam, heating/cooling which is purchased or imported by the organisation.*

*Scope 3: Other indirect GHG emissions – emissions from other sources related to the activities of the organisation.*

Table 2 expands on these definitions:

Scope	Emissions type	GHG Reporting	Includes emissions from the following types of activities
1	Direct	Mandatory	<ul style="list-style-type: none"> <li>• <b>Generation of electricity, steam and heating/cooling.</b> Emissions resulting from the combustion of fuels in stationary sources inside the organisational boundary, such as natural gas combustion for heating.</li> <li>• <b>Transportation of materials, products, waste and employees.</b> Emissions resulting from combustion of fuels in company owned/controlled plant and vehicles.</li> </ul>

<sup>27</sup> Source: The GHG Protocol: <http://www.ghgprotocol.org/files/ghgp/public/ghg-protocol-revised.pdf>, p.26.

			<ul style="list-style-type: none"> <li>• <b>Fugitive emissions.</b> <i>Emissions resulting from intentional or unintentional releases of GHGs, such as methane emissions from landfills or refrigerant leaks from air conditioning units.</i></li> </ul>
2	Indirect	Mandatory	<ul style="list-style-type: none"> <li>• <b>Purchase of electricity, steam and heating/cooling.</b> <i>Emissions resulting from the combustion of fuels in stationary sources outside of the organisational boundary.</i></li> </ul>
3	Indirect	Optional – but increasingly considered a key component of carbon inventories	<ul style="list-style-type: none"> <li>• <b>Materials and fuels.</b> <i>Emissions resulting from the extraction, production and distribution of purchased materials and fuels.</i></li> <li>• <b>Transport related activities.</b> <i>Emissions resulting from the transportation of goods, employees, products and waste.</i></li> <li>• <b>Electricity related activities (not included in Scope 2).</b> <i>Emissions resulting from the extraction, production and transportation fuels consumed in the generation of electricity. Also resulting from electricity transmission and distribution losses.</i></li> <li>• <b>Leased assets, franchises and outsourced activities.</b> <i>Emissions resulting from contractual arrangements. These may be Scope 1, depending on whether the Equity or Control approach was applied in setting the Organisational boundary.</i></li> <li>• <b>Waste disposal.</b> <i>Emissions resulting from the disposal of waste generated by: operations, production of materials or fuels, end of life disposal of sold goods.</i></li> </ul>

**Table 2 - The three Scopes for setting operational boundaries<sup>28</sup>**

### *Scope 3 sources: an in-depth look*

Scope 3 emissions include ‘all other’ indirect emissions sources and have no pre-set boundaries. The *Corporate Value Chain (Scope 3) Accounting and Reporting Standard* (World Resources Institute & WBCSD, 2013) outlines a list of categories of Scope 3 sources that should be considered in a carbon inventory. When considering which of these sources to report on, one must set appropriate limits (inclusions and exclusions) to obtaining data with regard to effort, time and cost. Inclusions and exclusions will be set in accordance with the intentions (carbon accounting drivers) of the organisation and the relevance and materiality of each emissions source.

For example, if an organisation is reporting its emissions to comply with Australian regulations, it may choose not to include any emissions under Scope 3. If an organisation is reporting for voluntary reasons, it may choose to include as many Scope 3 sources as it can reasonably measure.

Identifying Scope 3 emissions requires consideration of the organisation’s supply chain or value chain<sup>29</sup>, including both upstream and downstream activities:

1. **Upstream** – the activities of suppliers of goods and services to your organisation, including outsourcers.
2. **Downstream** – the activities of consumers who receive the goods and services of your organisation.

These two would be in addition to your own organisation’s activities which may be included under Scope 3.

<sup>28</sup> Ref: The GHG Protocol: <http://www.ghgprotocol.org/files/ghgp/public/ghg-protocol-revised.pdf>, p.p.27-30.

<sup>29</sup> Info: [http://en.wikipedia.org/wiki/Value\\_chain](http://en.wikipedia.org/wiki/Value_chain) & [http://en.wikipedia.org/wiki/Supply\\_chain](http://en.wikipedia.org/wiki/Supply_chain)

Decisions on which sources are to be included in the inventory should take into account the following factors:

- The **size** of the Scope 3 emissions from a given source, relative to Scope 1 and 2 emissions.
- The **contribution** of those emissions towards the organisation's risk exposure.
- The **interest** of stakeholders in that particular source.
- The **potential** for the organisation to reduce those emissions or influence their reduction.

Data for Scope 3 emissions sources may often be collected from outside of the organisation or from less reliable documentation internally. It is therefore accepted by the GHG protocol that it may tend to be of lower quality and accuracy. Data availability and reliability may influence which Scope 3 activities are included or excluded from the inventory.

For non-regulatory reporting, exclusions may be made from any Scope if those exclusions are justified and transparently reported. Justifications for including or excluding sources are given below.

All exclusions must be clearly stated and justified when documenting or reporting on the carbon inventory. A table is a suitable format for such information, or it may be included in the boundary diagram.

### The concepts of relevance and materiality

Two tests guide the inclusion or exclusion of emissions sources within the operational boundary of an organisation:

- The materiality of a source – applicable to both direct and indirect emissions (Scope 1, 2 and 3)
- The relevance of a source – applicable to Scope 3 emissions only.

#### Materiality

According to the NCOS for Organisations, if a relevant emissions source is material, it must be included in the boundary unless sufficient justification is provided to show that the source cannot feasibly be assessed. The NCOS states that an emissions source that constitutes 1% of the total inventory is considered to be material. In addition, the total amount of emissions to be excluded from the boundary must not exceed 5% of the total carbon accounts.

The availability of data can be considered when assessing materiality. If data from an emission source is not available, an approximation of data (such as using known case studies or input-output factors) can be used to assess materiality in the absence of more reliable data. If the source is estimated to be material, the organisation may put steps in place to gather better data. Interim estimates of emissions can be used in the meantime to include the source in the inventory. Conversely, if the source is deemed immaterial, the organisation can choose not to include it in the inventory, provided justification for exclusion is appropriately documented.

If a Scope 1 or 2 emissions source is deemed material, it must be included in the inventory.

Most emissions from local governments will be attributed to emissions from landfill, electricity and gas use from facilities and parks, plant and vehicle fuel use, contractor fuel use, employee commuting and purchased goods and services.

#### Relevance

The NCOS for Organisations further defines the **relevance principle** included in the GHG Protocol to specify a test to decide which Scope 3 emissions sources are to be considered 'relevant'. Under the 'Relevance Test', sources are deemed relevant when any two of the following conditions are met:

- the Scope 3 emissions from a particular source are likely to be large relative to the organisation's Scope 1 and Scope 2 emissions
- the Scope 3 emissions from a particular source contribute to the organisation's greenhouse gas risk exposure
- the Scope 3 emissions from a particular source are deemed relevant by key stakeholders
- the responsible entity has the potential to influence the reduction of Scope 3 emissions from a particular source

- the Scope 3 emissions are from outsourced activities that were previously undertaken within the organisation's boundary or from outsourced activities that are typically undertaken within the boundary for comparable organisations.

If a Scope 3 emissions source is deemed relevant AND material (see below), it should be included within the emissions inventory.

#### Example of inclusion

Emissions from flights are a Scope 3 source (unless the organisation is an airline). A sales organisation which flies its staff for meetings might find the emissions related to those flights could constitute 50% of its total GHG emissions if included in its inventory. They might therefore choose to include emissions sourced from air travel within their inventory, and consider opportunities for emissions reductions through alternative travel modes or increasing the use of video conferencing.

#### Example of exclusion

Scenario: emissions related to leakage of refrigerant from a single refrigerator in the organisation's canteen cannot be calculated because no data is available and the fridge cannot be moved.

Since the emissions from this fridge are likely to be less than 1% of their total emissions inventory and there aren't any reasonable options available to reduce those emissions, it may be worth declaring them 'immaterial'. They may thus be excluded.

### Documenting your inventory boundaries

Organisational and operational boundaries should be clearly reported so that stakeholders can clearly identify what the boundary encompasses. If emissions sources have been excluded from the boundary based on materiality or a lack of viable data, this should also be clearly documented. By documenting data gaps, an organisation can plan procedures and systems to fill these gaps in future emissions inventories. For guidance on filling data gaps, refer to *Emissions sources in the workplace* below to understand what data needs to be collected for each source.

An example of a representation of a Council's operational boundary is provided below.

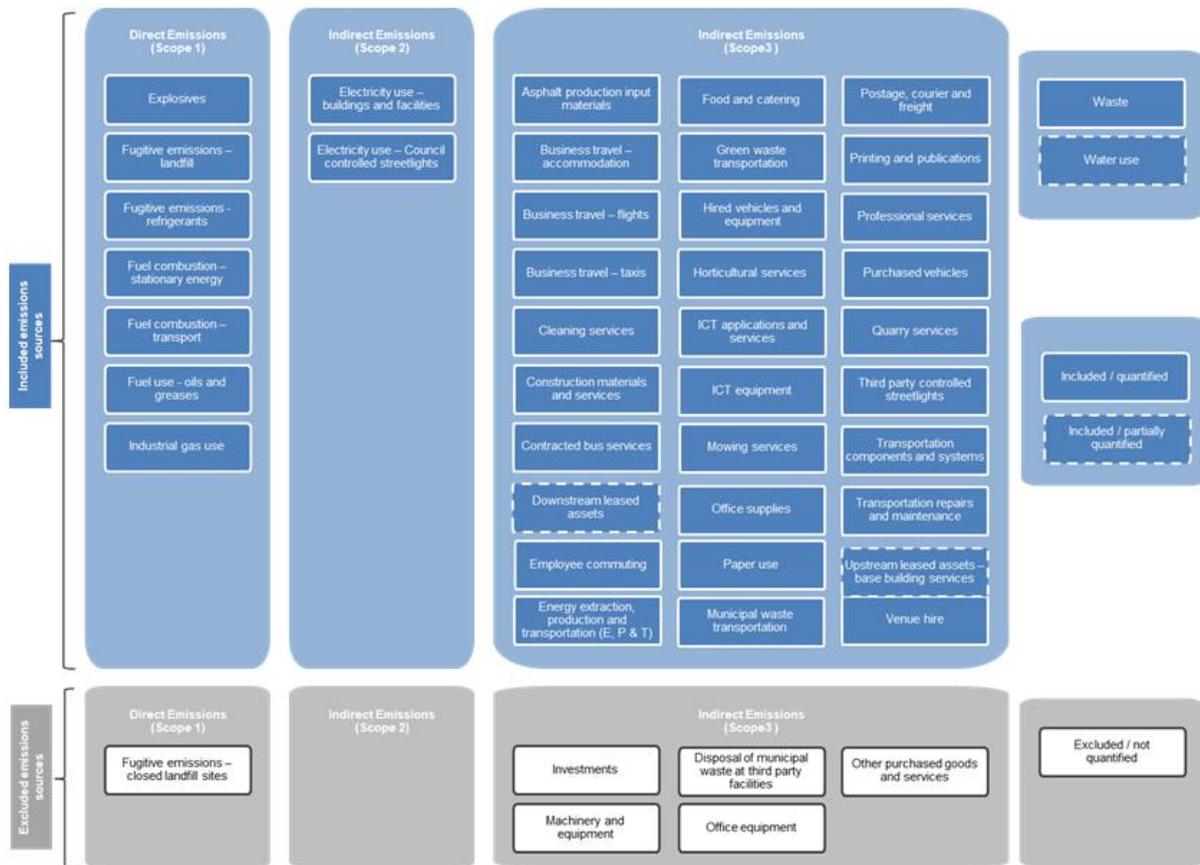


Figure 3. Example of operational boundary representation



**‘Accounting boundaries’ webinar.** Log into your OpenLearning account [here](#) to access the recorded webinar on Module 2 Accounting boundaries.



**Optional background reading and reference materials.**

- The GHG Protocol. Chapter 1: GHG Accounting and Reporting Principles – Completeness; Chapter 3: Setting Organisational Boundaries; Chapter 4: Setting Operational Boundaries: <http://www.ghgprotocol.org/standards/corporate-standard>
- The GHG Protocol. Corporate Value Chain (Scope 3) Accounting and Reporting Standard: <https://ghgprotocol.org/standards/Scope-3-standard>

## Categorising carbon reductions, removals and offsets

Emissions are categorised within the three Scopes as described in ‘*Organisational and operations boundaries*’. But how do we categorise carbon reductions, removals and offsets within an inventory?

Emission reductions are recorded separately (see ‘Reduction measures’ in Figure 7). Some examples of these carbon reductions, removals and offsets include:

- The purchase of accredited GreenPower<sup>30</sup>
- The purchase of carbon offset certificates
- The purchase of certified offsets from local or international markets.

The principle being applied here is that we first account for (and report) an organisation’s emissions within the three Scopes. This results in a total carbon footprint. We then separately account for actions which have been undertaken to reduce, remove or offset any of those emissions.

We would not include reductions such as “we now use less electricity because we turn off the lights more often, so that’s a carbon emissions reduction”. Since turning off the lights reduced the actual emissions activity in the first place, this reduction would already be reflected in your Scope 2 values (for electricity). This is a concept better understood through the carbon management principles which we will come to later.



### Optional background reading and reference materials.

- The GHG Protocol. Chapter 8: Accounting for GHG Reductions  
<http://www.ghgprotocol.org/standards/corporate-standard>

## Emissions sources in the workplace

In this section we review the specific sources of carbon emissions related to the operations of organisations/workplaces, and in particular, local governments.

Emissions sources are defined as those activities which result in the release of carbon dioxide (or other GHGs) to the atmosphere. These emissions may occur directly from that source (e.g. on site burning of natural gas) or indirectly (emissions sourced from the use of purchased electricity).

Once identified, all emissions sources must be documented and considered for inclusion in the carbon inventory (known as operational boundary).

### *Scope 1 and 2 emissions sources relevant to local governments*

An important skill necessary for developing a carbon inventory for an organisation is to identify their emissions sources. This may involve consultation with key stakeholders including management, staff and accountants. It may also involve site visits and walk-around audits and some other forms of research.

There are many potential emissions sources in the workplace. Each workplace will be slightly (or very) different depending on a range of factors such as its role, primary function, location, management etc. For local governments, common Scope 1 and 2 emissions include:

- **Purchased electricity**

Council’s operation of its facilities, parks, and public lighting is dependent on purchased electricity. Emissions associated with purchased electricity are often the dominant source of emissions in local government inventories. Note that ‘purchased’ indicates that it is generated off site (usually at a central power station) and delivered by the grid.

In Victoria, most electricity is generated by centralised, coal-fired power stations<sup>31</sup>. The emissions result from the burning of coal which heats water to create steam. The steam drives turbines, which turn the generators to produce electricity.

<sup>30</sup> Note: NCOS provides the methodology for reporting GreenPower as part of a GHG inventory in Australia.

<sup>31</sup> Ref: [http://www.australiancoal.com.au/coal-and-its-uses\\_coal-uses-overview\\_electricity-generation.aspx](http://www.australiancoal.com.au/coal-and-its-uses_coal-uses-overview_electricity-generation.aspx)

Emissions from purchased electricity are not created at the point of use. Compare this with burning gas in the canteen oven or burning fuel in the company car. For this reason, electricity is defined as a Scope 2 emissions source<sup>32</sup>. It is used within the consumer's premises or location, but the emissions are created elsewhere, by the generator.

Two 'Deep dives' (number 1 and 2) are provided in Module 3 with information on how to estimate emissions from:

- Electricity use in office buildings and other facilities; and
- Electricity use for public lighting.

- **Natural gas**

Natural gas is usually burned on site to heat the workplace, provide hot water or to operate a cooktop in the canteen. Note that natural gas is actually methane, one of the six Kyoto gases.

- **Waste and landfill emissions**

If a local government operates a landfill within the local government area, emissions from the landfill could account for a substantial proportion of total emissions. Emissions from landfill occur when organic matter in disposed waste decomposes, forming (predominantly) methane and carbon dioxide. These greenhouse gases seep through the ground into the atmosphere as fugitive emissions.

Landfills that:

- are owned and operated by Council are a Scope 1 emissions source to be included in the inventory.
- are operated by a third party are likely to be a Scope 3 emissions source if Council previously operated the landfill, or if the landfills accepts municipal solid waste (MSW). This should be confirmed using the Relevance Test.

If Council does not operate a landfill within its municipality, it should include corporate waste emissions as Scope 3 emissions in its GHG inventory.

Information on how to calculate emissions from landfills or from corporate waste is provided in 'Deep Dive 3' in Module 3.

- **Transport fuels**

Diesel, petrol, LPG and biofuels used in company vehicles such as cars, trucks, tankers, vans and buses.

- **Refrigerants**

Refrigerants are usually hydrofluorocarbons (HFCs) (refer to table 1) and are often powerful GHGs with long lifetimes in the atmosphere. Refrigerants are found in domestic (canteen) fridges, commercial and retail chillers and fridges, office air conditioning systems and air-conditioned cars. Examples of common refrigerants found in the workplace are R22 and R134a. Appliances purchased after ~2015 onwards may use less harmful 'natural' refrigerants such as ammonia (R717) and carbon dioxide (R744). HFCs in cooling appliances can be removed by decommissioning the unit (by a qualified contractor), or reduced by treating existing refrigerants (to ensure minimal leakage). Retrofitting units to replace the HFC refrigerant with a natural refrigerant is also possible, but often expensive and not as common.

Information on how to calculate fugitive emissions from refrigerants is provided in 'Deep Dive 4' in Module 3.

### *Scope 3 sources relevant for local governments*

Once the Scope 1 and 2 emissions have been identified and quantified, Councils might want to investigate other sources which may be applicable to the organisation.

Other areas to scrutinise for emissions sources are within the supply chain: Scope 3 emissions sources. This involves looking upstream at the organisation's suppliers and downstream at the customers and outsourcers, contractors and other service providers. One considers what activities in these areas may be included in its own inventory for reasons of completeness or compliance with the intentions (drivers) of the inventory exercise.

<sup>32</sup> Note: this is for grid supplied electricity and does not apply to electricity generated onsite by (for example) a stand-alone petrol powered generator.

The following Scope 3 sources have been reported by local governments under NCOS in Victoria:

- Leased assets
- Business travel of employees
- Waste created from Council operations
- Paper use
- Contractor fuel use (including waste contractors, road construction, horticulture services, etc)
- Asphalt and cement production
- Corporate water use (explained in more detail below).

In addition, the following sources are likely to be reported by local governments in the future:

- Employee commuting
- Purchased goods and services, such as vehicles purchased, consulting services of Council, etc.

Further detail on the major sources listed above is included below.

### **Leased assets**

Local governments typically own numerous sites and assets that are leased to community groups and other organisations. These facilities are generally included in the organisational boundary. As a landlord, whether a facility is included under Council's direct or indirect emissions will depend on operational control, as described above.

At these sites, local governments may be responsible for building maintenance and management, and setting conditions on the lease (operating hours, policies, and fees). Community use typically includes sports clubs, pre-schools, community centres, and halls. Conversely, if Council leases a building to a for-profit business under a commercial agreement, the facility may not be deemed relevant to the inventory.

Local governments may have difficulty in obtaining utility bills when they are paid by a lessee. A potential solution to reduce the time and resource burden associated with collecting this data would be to require lessees to record and submit their bill data as a condition in the leasing arrangement. It is also important to remember that data collection efforts should always be reflective of how material an emissions source is. When data is not available for the most recent reporting period, a local government should consider developing a data management plan to start collecting this information for future reporting periods.

### **Business travel of employees**

This covers all staff travel for work purposes including flights, public transport use, taxis, and rental cars.

Emissions from flights can be calculated by tracking all flights made by staff over the year and entering the flights into <https://calculator.carbonfootprint.com/calculator.aspx?tab=3>.

Emissions from public transport, taxis, and rental cars can be calculated by estimating the total distance travelled by staff in each mode. For taxis, distance could be based on spend (assuming around \$1.80 per kilometre, minus a \$5 flag fall per trip). An average trip distance (around 10-20 km) can be assumed for public transport and rental car trips if the actual trip distance is unknown. EPA Victoria (publication 1562, page 29)<sup>33</sup> provides emission factors for these transport modes.

### **Waste created from Council operations**

This source is discussed in further detail in 'Deep Dive 3' in Module 3.

### **Paper use**

Organisations often track the number of reams of paper purchased for business operations. EPA Victoria provides emission factors for paper use in publication 1374<sup>34</sup>.

The key information required to account for emissions from paper use is as follows:

- Total reams of paper used, noting that one ream of paper is equal to 500 sheets of paper

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<sup>33</sup> Accessed here: <https://www.epa.vic.gov.au/~media/Publications/1562.pdf>

<sup>34</sup> Accessed here: <https://www.epa.vic.gov.au/~media/Publications/1374%201.pdf>

- The total weight of paper used – this can be calculated by assuming each ream of A4 paper weighs 2.5 kg, and one A3 sheet is equal to two A4 sheets.
- Whether the paper is imported or Australian made, as different emissions factors apply
- The recycled content of the paper, i.e. 50% recycled, 100% recycled, etc.

When the purchased paper is certified carbon neutral, there is no emissions associated with its use.

### Contractor fuel use

Emissions from contractor fuel use are often a significant component of a local government’s Scope 3 inventory. The most practical way to estimate emissions is to get contractors to report on their total quantities of fuel used for Council work. For example:

- Asphalt contractor A reports a total of 4,500 litres of diesel used over 12 shifts of asphalt laying
- Waste contractor B reports 9,400 litres of diesel used for its waste trucks
- Horticulture contractor C reports 400 litres of ULP used during its shifts servicing Council’s parks

Total fuel use would be the sum of all listed items above, totalling 13,900 litres diesel and 400 litres ULP.

NGA emissions factors can be applied to the quantity of fuels calculated. Best practice is for Councils to use both Scope 1 and Scope 3 emissions factors when calculating emissions from contractor fuels.

### Asphalt and cement production

Emissions from asphalt production input materials comprise two main sources:

- From the embodied energy content of the bitumen (a crude oil) – with emission factors sourced from NGA factors Table 3 (Scope 1) and Table 40 (Scope 3)
- From the embodied energy of recycled asphalt, sand, and aggregate used in the asphalt – with emissions factors per tonne used provided in Transport Authorities Greenhouse Group, Greenhouse Gas Assessment Workbook for Road Projects (2013)<sup>35</sup>.

### Corporate water use

An emissions factor for water use can be calculated according to the method used by EPA Victoria in its Greenhouse Gas Inventory, referenced in *Guidance for Scope 3 Calculations* (Department of Environment, 2016).

The method combines water and wastewater and calculates an emission factor by dividing total water use from the relevant water authority by their total reported emissions. For local governments across multiple water authorities, carbon emissions and total water use should be summed across the authorities.

For example, North-East Water published net greenhouse gas emissions in their 2016-17 report as 37,737 tCO<sub>2</sub>-e and total water use as 13,824 ML. Hence the factor would be:

$$37,737 \text{ tCO}_2\text{-e} / 13,824 \text{ ML} = \underline{2.73 \text{ tCO}_2\text{-e/ML}}$$

A local government would then sum potable water use (in ML) and multiply this by the emissions factor.

### Employee commuting

A travel survey issued to all staff is the best way to estimate emissions from staff commuting to and from work. The travel survey should, at a minimum, identify the number of trips by mode of transport for every employee (scaling trips per week to average trips per year). The survey could also identify the travel distance of each trip and along user-preferences to help understand how Council can influence mode choice (for example, by building end-use facilities for cyclists to encourage more active transport).

When the total travel distance of all employees is calculated, emissions factors from EPA Victoria (publication 1562 – referenced above under business travel) can be applied to estimate emissions.

### Purchased goods and services

Emissions from services can be obtained in a relatively straightforward way – by requiring all service contractors to report their Scope 1 and 2 emissions from their energy use, transport fuel, waste, and any other

<sup>35</sup> Accessed here: <http://www.rms.nsw.gov.au/documents/about/environment/greenhouse-gas-assessment-workbook-road-projects.pdf>

activities generating a large amount of emissions. Local governments can also require contractors to manage and reduce their emissions over time. Supporting contractors to do this will make the process easier for everyone.

Embodied energy from purchased goods is the hardest source to estimate Scope 3 emissions. The upside is that accounting for these emissions will allow Council to influence its entire supply chain. You have already accounted for embodied emissions associated with asphalt production above!

Purchased goods by local governments include new vehicles, building materials (timber, cement, etc) and office equipment. Products can be purchased in the market that have been certified carbon neutral – thus no emissions result from these goods.

To estimate emissions from purchased goods, refer to the *GHG Protocol – Category 1: Purchased Goods and Services* guidance<sup>36</sup>. By managing your emissions from purchased goods and services, you are helping to amplify market demand for carbon neutral goods and services.



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**Optional background reading and reference materials.**

- The GHG Protocol. Chapter 4: Setting Operational Boundaries: <http://www.ghgprotocol.org/standards/corporate-standard>
- The GHG Protocol. Corporate Value Chain (Scope 3) Accounting and Reporting Standard: <https://ghgprotocol.org/standards/Scope-3-standard>



**Quizzes and assessments.** Log into your OpenLearning account [here](#) to access Unit 1 Module 2 quiz.

<sup>36</sup> Accessed here: [https://ghgprotocol.org/sites/default/files/standards\\_supporting/Chapter1.pdf](https://ghgprotocol.org/sites/default/files/standards_supporting/Chapter1.pdf)