STCA Councils – Annual Greenhouse and Energy Corporate Inventory Preparation

Introduction

This document provides information on the preparation of corporate greenhouse gas emission and energy use inventories for councils based on a methodology and calculator spreadsheet developed for the STCA councils.

The information includes a description of the data sources, the ways that the data can be derived from these sources and how the data can be input into the spreadsheet to calculate emissions and energy inventories.

The inventory calculator is designed to provide an annual inventory summary across the different categories of emission sources and various types of fuels and energy supplies.

Two different versions of the calculator spreadsheet have been developed. There is a basic version which allows input of summary information and provides aggregated inventory data. The more detailed version has greater flexibility and the capacity for different types of data, along with being able to provide a more granular output depending on what data are available. The information contained in the summary of the detailed calculator is largely the same, but there is more data in the spreadsheet available for future reference and there is an option to allocate emissions and energy between council services.

Both versions of the calculator have the same underlying methodology, which is based on those contained in the National Greenhouse and Energy (Measurement) Determination 2008.

Data Sources

Electricity

The inventories cover all electricity provided through retailers from the State grid. The electricity generated by remote area or other power supplies not connected to the grid have not been included in the scope of the inventories. Most remote area power systems are now based on renewable energy. Some may be based on a diesel or other fossil fuel generator and, if so, the energy use and emissions will be accounted for in the fuel calculations.

There are two main categories of electricity, being metered electricity and unmetered public streetlighting. Sites that consume over 150,000 kWh per annum are contestable, while, depending on retailers in the market, smaller consumption sites may also be put on contract or remain on a regulated tariff. At least one of the retailers offering contracts for higher usage sites will consider adding sites with usage as low as 50,000 kWh to a contract with high usage sites. There are several retailers to which these larger usage sites may be contracted with the two most active retailers historically having been Aurora Energy and Shell Energy (formerly ERM Power). Smaller usage sites are mostly on regulated tariffs and for all southern councils Aurora Energy is the retailer for these sites. As at June 2022 the contestable sites at two of the southern councils had Shell Energy as their retailer.

Metered Electricity

The metered electricity data can be sourced from invoices from the retailer, maybe available through a web portal provided by the retailer or third-party provider or possibly through a data download on

request to the retailer. As noted above for regulated sites Aurora Energy is the retailer for all southern councils, but some sites with usage of over 50,000 kWh per annum may be contracted to a different retailer. If the council is provided electricity from more than one retailer then data will be required from all retailers.

It is noted that while this category is called metered electricity there may be some unmetered accounts that are not for public streetlighting included in this category. These unmetered sites have fixed or very small loads. The invoices for these sites usually have an amount of kilowatt-hours for which the daily usage is calculated by TasNetworks based on the attached load and estimated hours of operation per day. There are a few sites with no nominal usage, such as where power has been connected to run a time clock or control system that uses very little electricity.

For the 2019-20 to 2021-22 inventories formatted data was provided by Aurora Energy in spreadsheets for all sites that they were retailer for in the period. It is hoped that this form of aggregated and formatted data can be provided in future and save having to collect and aggregate data from multiple invoices and accounts, particularly for councils which don't have systems set up to routinely collect this information.

It is noted that each metered connection has a unique 10-digit identifier being the National Meter Identifier number (or NMI). This needs to be used to uniquely specify the metered connection as some sites can have multiple connections at the same address or facility. For instance, a large sportsground may have with different clubrooms for various sports, which have separate electricity connections due to historic reasons, but are all at the same address. There are examples at some of the STCA municipalities, where there are several connections and NMIs sites at a site.

Most sites are on a quarterly invoicing frequency, but larger sites have monthly invoicing. Metered sites can be on a range of different tariffs, but this is not a factor in terms of preparing the emissions and energy inventories.

In summary metered electricity information needs to be sourced from electricity retailers, it will be available in invoices, but may also be available through a web portal or as a data download as discussed above.

Unmetered Streetlighting Electricity

TasNetworks provide most of the streetlighting around Tasmania on behalf of road authorities, including councils and the Department of State Growth. The electricity used by this lighting is not metered. The electricity consumption is calculated by multiplying the numbers of each light type by the input wattage for that light type and further multiplying this figure by 12.5 hours per day to give an estimated daily consumption. Actual usage varies across the year with changes in day length and factors such as cloudiness, but the usage is considered to average out at about 12.5 hours per day and this figure is used as constant across the whole of the year.

Councils are provided a monthly invoice with the numbers of the different light types and these can be used to work out electricity use. The actual electricity usage is not provided in these invoices.

The energy component of streetlighting costs is under contract which covers all of the Tasmanian councils. The tender process for this contract has previously been coordinated by LGAT. As at 2022 Aurora Energy had the retail contract for the electricity used by local government streetlighting.

The numbers of the different streetlight types and total number of lights can vary through the year, especially when there have been major upgrades to LED technology. The total numbers of lights

tend to gradually increase as the roads associated with new subdivisions are handed over to councils. In most years however there is relatively little change to numbers and types of lights. Thus, using data from an invoice from one month in about the middle of the financial year such as December or January and assuming these numbers are the same across the year will provide a reasonably accurate calculation of total electricity, provided that there has been no major changeover or upgrade of lights during the year.

It is noted that there may be more than one streetlight account for some councils and the numbers of lights need to be totalled up across all of the accounts.

The summary spreadsheets providing consolidated data from Aurora Energy for 2019-20 to 2021-22 included the numbers of the different light types as at May of the given year. The 2021-22 spreadsheets contained a listing of all the lights, but this information was not available for earlier years.

It is noted that there are two types of 14 watt LED streetlights, with earlier installations being the Sylvania make and later ones Aldridge. There is a slight difference in input watts being 17.0 watts for the Sylvania and 17.7 watts for the Aldridge. The make of light is often not included on the invoice provided by Aurora Energy or in the summary consolidated data, except for the detailed listing provided in the 2021-22 year consolidated information from Aurora which provides a full listing of each light installation. As the difference in input wattage between these two light types is relatively small, it does not make a big difference to the total amount of electricity usage if the make of the 14 watt lights is not known. The more recently installed lights are the Aldridge model.

There is some streetlighting fully owned and operated by councils, but these lights are on metered supplies and covered under “metered electricity”. Also some lighting is provided using solar power and batteries, such as for car parks; these lights are typically not connected to the grid and are not included in the inventories.

In summary unmetered streetlighting electricity use needs to be calculated from the numbers of each streetlight type, the input watts for each type and the hours per day (set at 12.5 hours per day). It is noted that a council may have several accounts for their streetlighting. A calculation can be made using the numbers of each light type for each month, or less accurately by using the data from a month in the middle of the financial year and using that as an average for the whole of the year.

Solar

Several councils have installed solar panel systems at one or more of their facilities, which are connected to a mains supply. The electricity generated by these systems is either used on site (replacing mains electricity) or is fed into the grid (feed-in or exported electricity).

The electricity retailer only records what is fed into the grid, not what is generated, as this occurs “behind the meter”, so doesn’t get picked up by the meter. Invoices from the retailer will include the amount of electricity which has been exported or fed in to the grid. For Shell Energy there is a slightly different method used in regard to allowing for electricity which is exported, but the amount exported each month is recorded on the invoice under an item called “BChannel Data”, typically in a table on the third page of the invoice.

The amount of solar power actually generated by the solar panels requires the taking of readings from the solar panel inverter at the facility where the system is located, which typically has a display panel with an accumulated generation amount, or the inverter supplier may provide a web portal where historic generation data can be accessed.

While actual generation data from one of these sources is preferred, an approximate estimation of generation can be made if the capacity of the solar panel system in kilowatts is known. This is done by using an annual estimation of kilowatt-hours generated per kilowatt of capacity (in the range of 1,200 to 1,300 kWh/kW for southern Tasmania).

In summary, data on electricity exported (or fed in) to the grid is provided on retailer invoices, or may be available from a web portal or data download. The data for the electricity which has been generated by the solar panel system must be either sourced from readings of the inverter or may be available from a web portal. The amount of generation can be estimated if neither of these data sources is available.

Fuel Usage

The data for fuels used by councils is required to be separated into those quantities used in the fleet such as cars, utes, trucks and plant such as graders, and the amounts used in "stationary" uses such as piped natural gas and bottled LPG used in buildings. The main reason for the two different categories is that there are slightly different emission factors used depending on the way in which the fuel is combusted. In fleet use fuel is mainly used in internal combustion engines, while for stationary uses, such as LPG being used to heat water or barbeques, the fuel is burnt at atmospheric pressure.

Fleet Fuel

Councils typically have an arrangement with one or more providers for their fleets' fuel needs. These providers generally have record keeping systems which enable the download of records for fuel use by individual vehicles and trucks which are filled at service stations and for bulk fuel deliveries to works depots or other storage facilities. Nearly all fuel for the southern councils' fleets is diesel or petrol, with smaller amounts of 10% ethanol blend (E10) petrol also used. In addition to the main liquid fuels there are a couple of councils with forklifts at their depots, which use bottled LPG.

In addition to the traditional liquid fuels, a small number of the vehicles in council fleets use plug in electric technology, either battery only vehicles or plug in hybrid vehicles, which have a battery that can be charged from a mains supply, in addition to a liquid fuel engine. These vehicles will generally be charged at a council owned facility using a metered supply, but they may on occasion be charged at a third party owned charger. Electricity that is provided by such third-party charging needs to be included in the fleet's energy use. The electricity from charging at council facilities is accounted for under the Metered Electricity category of energy supply. The quantity of electricity being used by electric vehicles is currently small due to low numbers of these vehicles. This is however expected to grow as councils increase the number of electric vehicles and trucks in their fleets once they become cheaper and more readily available in the form of models which suit council operations.

In summary, fleet fuel usage can either be obtained from invoices for fuel purchases or may be from the retailer as a data download.

For electric vehicles the data will be dependant on how any third party owners of vehicle chargers provide information of the amount of electricity used, with invoices being the most likely source.

Stationary Fuel

The fuel that has the most widespread use in buildings and other "stationary" purposes is bottled LPG or LPG delivered to permanent on site storage tanks. The quantity of LPG is provided on the

invoices provided by the supplier and the supplier may have a database from which they can provided downloads on request.

For bottled LPG the standard cylinders have nominal sizes in kilograms, which have to be converted to litres for the inventory calculations. The amount of LPG deliveries to onsite tanks is also provided on invoices from suppliers (and is usually given in litres), or it may be possible to request consolidated annual data from the supplier.

The other type of fuel that is used in some quantity is piped natural gas. However, the reticulation network is limited in extent and only some councils have access to the network. TasGas and Aurora Energy are the main two retailers and provide regular invoices with the quantity of gas measured in gigajoules.

There may be other fuels used for stationary uses, such as heating oil and wood. None of the southern councils reported significant use of either of these fuels for the 2019/20 to 2021/22 period. If there is use of such fuels data will need to be accessed from invoices.

In summary for stationary fuel use, most data will need to be obtained from invoices, but there may be potential to get download of data from LPG and natural gas retailers.

Waste

The waste streams covered by the inventory are landfilled waste and green waste or other organic waste which is recycled, such as through composting. The calculation does not include the standard kerbside recycling service material (ie paper, cardboard, food and drink containers) or hard waste collection (this is primarily considered to be inert material when disposed to landfill).

The emissions that are calculated are those from the treatment or disposal process, ie those that are generated from the breakdown of the wastes. Emissions from transport of waste or fuel or energy used at the treatment or disposal facility by third parties are not included in the calculations.

The data source will depend on how the waste services are provided.

For councils with their own weighbridges, the data collected from the weighbridge can be used to determine the tonnes of waste to landfill and self-haul green waste that is being composted. For landfills owned by councils where there is no weighbridge it may be possible to estimate the quantity of waste to landfill from landfill surveys which measure the consumption of air space and then converting this volume to tonnes of waste by using standard factors for cover fill ratios and the effect of compaction.

Where the disposal or treatment of waste is by a third party, then the council will need to seek data from the provider. The data may be included in invoices or, if not, it will need to be sought from the provider directly. In some instances due to the way waste is collected, there may need to be an estimate of what proportion of waste was collected on behalf of the council. This would be the case where some is collected on behalf of the council and some for private commercial businesses, but both end up in the same collection vehicle before being measured at a weighbridge.

Where the amount of waste that is collected is reported in cubic metres, the quantity needs to be converted to tonnes by use of a suitable conversion factor. Most waste is now measured at a weighbridge upon entry to a landfill, so it is more likely to be recorded by weight rather than volume.

For where waste is ultimately treated or disposed of at different facilities for a given council, then the quantities going to each facility is required to be known. The reason for this is that the various

receiving facilities may generate different amounts of greenhouse gas emissions for a given quantity of waste.

It is noted that green waste which is shredded or mulched and used for surface application, such as landscaping, is considered to have no emissions resulting from the breakdown of the material.

Green waste which is shredded and used as daily or intermediate cover fill at a landfill is taken to be landfilled waste, as it will generate similar emissions to other waste going to landfill. So, this quantity needs to be included under the waste to landfill.

While composting of kerbside green waste only and food organics and green waste combined generate the same emissions per tonne of material, there is a difference in the composition of the kerbside general refuse due to the diversion of food waste reducing the general waste's landfill gas potential.

In summary waste data needs to be obtained for waste going to landfill and green or organic waste that is being composted. The source of data will depend on how the service is provided. Councils with their own facilities will have direct access to the data, while those councils serviced by third party providers will either need to source the data from invoices or may be able to obtain directly as a data download from their providers.

Methodology Description

Fuel

The greenhouse emissions and energy for fuels are calculated by firstly working out the total consumption by fuel type (such as petrol, diesel, LPG or natural gas) and usage method (ie transportation use, including type of vehicle or plant it is used in, or stationary use).

These quantities are in litres for liquid fuels, gigajoules for natural gas and kilograms for solid fuels (if any are used for stationary purposes).

These quantities are then multiplied by factors that are established and set in the National Greenhouse and Energy (Measurement) Determination, which are updated each year. These factors have remained largely constant in recent years, except for when the global warming potential factors for methane and nitrous oxide have been changed. While most of the emissions from fuel combustion are in the form of carbon dioxide, there are minor contributions from both methane and nitrous oxide.

For most fuel types the only difference in emissions is whether the use is in transportation or is in a stationary use. However for diesel the emissions factors vary slightly for pre-2004 and post-2004 light vehicles and utes, and also with the different Euro classifications of truck engines. From an analysis of the detailed data for some councils, a single diesel emissions factor has been selected for all fleet diesel use based on 75% being used by Euro iv or later trucks and 25% by post-2004 vehicles such as utes. As the differences in emissions between these categories of uses is low this assumption is considered to be a reasonable compromise for aggregated fuel data, rather than attempting to assess how much is used by each category of fleet.

For bottled LPG there is a need to convert the quantity from the numbers of bottles of nominal kilogram ratings to litres as the emissions and energy factors are calculated per litre.

Electricity

The emissions associated with electricity are calculated each year and set in the Greenhouse and Energy (Measurement) Determination for each State and Territory.

For Tasmania, while electricity is considered to be net zero emission or close to that, at time the gas-fired power station at Bell Bay is operated and there are times when electricity is imported via Basslink. In addition there are methane emissions from the hydro impoundments from submerged vegetation that is breaking down. Thus the coefficient calculated for Tasmania is greater than zero. For 2019/20 the value was 0.15kgCO_2-e/kWh, for 2020/21 it was 0.17kgCO_2-e/kWh and for 2021/22 it was 0.16kgCO_2-e/kWh. This factor is significantly lower than the average for the National Electricity Market, which was about 0.7kgCO_2-e/kWh in 2021/22.

Metered Electricity

For metered electricity the emissions are calculated by multiplying the electricity use in kilowatt-hours (kWh) by the state electricity coefficient for that year.

For energy use the amount of kilowatt-hours is multiplied by 0.0036 to convert to gigajoules which a more general measure of energy that can enable a comparison with fuel energy usage.

Streetlighting

For unmetered streetlighting, as this electricity is not metered a calculation of electricity use is required based on the numbers of the different types of streetlights.

The number of each light type is multiplied by the input watts for that type and then multiplied by 12.5 hours per day and the number of days in the year. The amounts for each light type are then added together to get a total annual electricity consumption.

This total figure is then multiplied by the state greenhouse gas coefficient for electricity to calculate emissions and the kilowatt-hour total by 0.0036 to convert to gigajoules.

Solar

To calculate the impacts of solar photovoltaic systems, there is a need for data both on the electricity being generated and that being fed into the grid. The latter is obtained from the retailer, using meter data which measures the feed in amount. The amount being generated can be obtained from the inverter or in some instances a web portal. If however this is not available the inventory calculator estimates the amount of generation based on the kilowatt capacity of the system. The calculation is based on data across 15 systems used at the City of Hobart over several years and is adjusted for the insolation rate (ie the energy from the sun) at a centrally located weather station for each municipality. The amount of electricity generated is in the order of 1,200 to 1,300 kWh per year for each kW of solar panel capacity.

For solar power systems, the electricity which is generated and used on site is taken to have zero greenhouse gas emissions. The electricity that is used on site has replaced electricity from the grid and is “behind the meter”, so this electricity does not appear on the invoices from the retailer.

Solar power, which is exported or fed into the grid, is taken as replacing electricity that would otherwise need to have been generated with emissions as per the state greenhouse coefficient for electricity.

On this basis these emissions are subtracted from the overall council emissions total. Similarly energy in the form of electricity exported to the grid, is subtracted from the total electricity usage from the

mains, to calculate a net electricity consumption figure. As above the kilowatt-hour total is multiplied by 0.0036 to convert to gigajoules.

Waste

Landfilled Waste

The methodology for landfilled waste has been developed for the STCA councils to meet the following criteria:

1. The method recognises the central role that councils play in managing much of the waste in their respective municipalities, such as the types of waste services that are provided;
2. Data is readily available to support the method used, noting that some councils do not have good historic waste data;
3. The method provides relatively comparable results for councils which manage waste in a range of ways, and have different waste facilities with some councils not owning the landfill being used for disposal;
4. The method gives an emissions quantity that varies in proportion to the impact of changes in waste management such as the introduction of a green waste collection service; and
5. The method allows for whether the landfill(s) receiving the waste have landfill gas collection or not.

The method selected is based on calculating the future lifetime projected greenhouse gas emissions from the waste. The reasoning for this is that at the point which the waste is placed in the landfill, the emissions are then destined to occur. Using this "future emissions" approach thus only requires the current year's waste data for the inventory with no need for extensive historic data.

The waste quantity is taken to be all that waste that is managed by the council or on behalf of the council by contractors, at waste receival facilities and through kerbside collection services. While this includes waste generated by some sectors of the community (ie not just the waste generated by the corporate operations of the council), the council is considered to have a central role in the extent and type of waste services are provided, including recycling options, and determining which landfill the waste will go to. This latter issue is important as the emissions vary greatly depending on whether there is landfill gas collection or not at the landfill receiving the waste.

The emissions are calculated based on the quantity of waste in tonnes and whether there is a kerbside green waste or organics collection service provided. The reason for this is that if such a service is provided the general refuse has a different composition with lower proportions of garden and food waste and as a result generates less landfill gas emissions per tonne of waste.

The factors for emissions for landfilled waste are based on default waste composition values for Tasmania contained in the National Greenhouse and Energy (Measurement) Determination.

Green Waste and Food Organic Waste

In southern Tasmania there are primarily three ways that green waste is processed and used, being composting, mulching and use in landscaping or similar and using as cover fill in landfills. Food waste managed through council services is largely processed by composting.

The emissions from composting are calculated by using the tonnes of waste being composted by an emissions factor set in the Determination which in 2022 was 0.046 tonnesCO_2-e/tonne of waste. These emissions are of small amounts of methane and nitrous oxide generated in the composting process.

For green waste which is mulched and then used for surface landscaping or similar there is taken to be no emissions.

For green waste which is shredded and then used as cover fill at a landfill and is later buried, this is taken to have the same emissions as landfilled waste.

Using the Inventory Calculator

Introduction

The calculator has been set up so that it covers one annual inventory in the spreadsheet. To compare several years of inventories data will need to be transferred into a suitably structured spreadsheet for analysis and presentation. A 3 year summary spreadsheet has been prepared for each council for the 2019-20 to 2021-22 years, which provides an example of how a time series of the information and graphs can be prepared.

Two versions of the calculator spreadsheet have been developed. There is a basic version with one worksheet for data input using mostly aggregated data. The other alternative is a more detailed version set up to enable specific data such as electricity use at each facility and fuel use by each vehicle or item of plant, though it does have some options which enable aggregated totals to be input for some categories depending on the format of the input data.

Greenhouse Emissions and Energy Footprint Basic Calculator

The basic calculator has one worksheet for entry of all data specific to the council's inventory (the "Data Input" worksheet). The factors used in the calculations are contained in two worksheets ("Factors and Tables" and "NGER & GHG Acct Factors") and the other worksheets incorporate the calculations using the council data and the factors. All worksheets except the Data Input worksheet are protected so that the formulae in these sheets can not be overwritten.

Data Input Worksheet – Instructions for Data Entry

The table below displays the whole of the Data Input worksheet showing the overall format of that sheet. The sections following this table provide instructions on how to fill in this worksheet.

Name of Council	

Input Year of Inventory	

Metered Electricity

Annual electricity usage		kWh

Unmetered Streetlighting Electricity (Note: May be several streetlighting accounts)

Light Type	**Numbers**
Incandescent 60 watts	
Incandescent 100 watts	
Mercury vapour 50 watts	
Mercury vapour 80 watts	
Mercury vapour 125 watts	
Mercury vapour 250 watts	
Mercury vapour 400 watts	
Fluorescent 1x20 watts	

Fluorescent 1x40 watts	
Fluorescent 2x20 watts	
Fluorescent T5 2x24 watts	
Fluorescent 2x40 watts	
Fluorescent 3x40 watts	
Fluorescent 4x20 watts	
Fluorescent 4x40 watts	
Compact Fluorescent (CFL) 32 watts	
Compact Fluorescent (CFL) 42 watts	
Sodium vapour 70 watts	
Sodium vapour 100 watts	
Sodium vapour 150 watts	
Sodium vapour 250 watts	
Sodium vapour 400 watts	
Sodium vapour 2x400 watts	
Metal Halide 70 watts	
Metal Halide 100 watts	
Metal Halide 150 watts	
Metal Halide 250 watts	
Metal Halide 400 watts	
LED 14 watts	
LED 14 watts (Aldridge)	
LED 17 watts	
LED 18 watts	
LED 20 watts	
LED 25 watts	
GE 250 LED 30 watts (GE 250)	
LED 30 watts (Aldridge)	
LED 75 watts	
LED Floodlight 155 watts	
LED 175 watts	
LED Floodlight 200 watts	
LED 240 watts	
LED 265 watts	

Solar

Total capacity of solar panel systems		kW
Annual feed in electricity		kWh
Annual total generation (from inverter)		kWh

Fuel - Stationary Use at Buildings and Facilities (excludes fleet usage)

LPG		litres
Natural Gas		GJ
Heating Oil		litres
Diesel		litres
Wood		tonnes

Fuel - Fleet and Vehicle Use

Total Annual Diesel		litres
Total Annual Petrol		litres
Total Annual E10 Petrol		litres
Total Annual LPG		litres
Electricity Use (not from council metered sites)		kWh

Waste

Item	Amount	Units
Destination landfill for general waste (Landfill 1)		
Quantity of waste going to Landfill 1		Tonnes
Destination landfill for general waste (Landfill 2)		
Quantity of waste going to Landfill 2		Tonnes
Quantity of green waste dropped off processed by composting		Tonnes
Quantity of green waste dropped off & being mulched only		Tonnes
Quantity of kerbside green waste (not FOGO)		Tonnes
Method of processing green waste (not FOGO)		
Quantity of kerbside FOGO waste		Tonnes
Method of processing FOGO waste		

Name of Council

There is a drop down list of the twelve southern councils and the relevant council name must be selected from the list, as it is used elsewhere in the spreadsheet and must be in the form as in the list.

Name of Council	

Input Year of Inventory

This item has a drop down list of financial years (currently set up for 2009/2010 to 2025/26). The year of the inventory must be selected from this list. The year is used to identify the relevant Tasmanian electricity greenhouse gas coefficient.

Input Year of Inventory	

Metered Electricity

There is a box to enter in the total annual metered electricity usage. This is to include all electricity as per retailer information except for unmetered streetlighting and is to include data from all retailers for the year (such as if there are different providers for contestable and regulated sites, or there was a change in provider during the year). As indicated the total is to be in kilowatt-hours, which is the standard unit used in electricity invoices. The total usage is to exclude any electricity exported or fed in to the grid from solar, this is incorporated in the Solar section.

Annual electricity usage		kWh

Unmetered Streetlighting Electricity

The table under this heading lists all of the types of lights that are included in the TasNetworks list as at June 2022. The input cells shown below only include the first three rows of the table as an example, with the full list provided in the data input table shown in the Introduction to this section.

Light Type	**Numbers**
Incandescent 60 watts	
Incandescent 100 watts	
Mercury vapour 50 watts	

The council may have several accounts for streetlights and the numbers need to be totalled up for each light type across all of the accounts. The numbers of streetlights of each type vary across the year but this basic version of the spreadsheet uses the same number across all 12 months. It is suggested that the numbers of lights from invoices in the middle of the financial year such as December or January could be used. In the aggregated data supplied by Aurora Energy through the STCA the numbers are provided for May in each year. Where there are no lights of that type just leave the cell blank – no need to enter a zero.

Solar

The following table shows the three data input cells for solar panel system information.

Total capacity of solar panel systems		kW
Annual feed in electricity		kWh
Annual total generation (from inverter)		kWh

The first data input for solar is the total capacity of all of the solar panel systems installed at the council. Where the kilowatt rating of an individual system is not known then a nominal amount of 275 watts per panel could be used, though this may be an underestimate for more recently installed panels, which are likely to have higher wattage ratings. This figure is used to estimate generation from the panels where there is no data on the actual electricity generation.

It is noted that the calculation of electricity being generated is for the full 12 months. If a system was installed during the year the generation over the year will be less than this figure. For these systems the capacity should be multiplied by a factor based on the month the solar panel system started generating electricity as per the following table.

Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
0.979	0.930	0.860	0.769	0.663	0.543	0.413	0.294	0.195	0.114	0.056	0.023

For example if a 10kW system was installed and first started generating electricity in November then the amended capacity of that year is 10 kW x 0.663 = 6.63 kW, which will allow for the fact the system was only generating electricity for part of the year.

The capacity of the system is to be based on the total rating of the solar panels. In some instances the inverter may have a slightly lower capacity in kilowatts than that of the panels, but this has only a very small impact on the total kilowatt-hours that are generated over a year.

The second row of the solar data input is the total amount of electricity fed into the grid in kilowatt-hours for the year. This information will need to be aggregated from the various sites with solar and across different retailers (if applicable). This information is included in the quarterly or monthly

invoices as feed in electricity. For the retailer Shell Energy, which calculates the feed in tariff somewhat differently, the feed in electricity is shown at the line "BChannel Data" on the invoices.

The feed in electricity has been included in the summary Aurora Energy spreadsheets provided for the 2019/20 to 2021/22 years (though for a couple of councils it appeared that not all exported electricity was picked up in the Aurora Energy database query, so that info would need to be checked against the invoices for the sites with solar to make sure they are all picked up).

The third row of the solar data input is the total amount of solar power being generated. If this data is available from directly reading the inverters and/or a web portal with historic data then this information should be used. If this is not available this cell is to be left blank and an estimate of generation will be calculated from the capacity of the solar cells in the first solar data input cell.

Fuel - Stationary Use

This section is only for non-fleet fuel use such as bottled LPG for hot water services or cooktops or natural gas used for heating.

Fuel - Stationary Use at Buildings and Facilities (excludes fleet usage)

LPG		litres
Natural Gas		GJ
Heating Oil		litres
Diesel		litres
Wood		tonnes

For LPG the data must be in litres. The bottled gas is typically sold in cylinders with nominal kilogram ratings. The following table provides the litres for standard cylinder sizes.

LPG (bottle size)	Litres
3.7kg	7.3
8.5kg	16.7
15kg (forklift)	29.4
18kg (forklift)	35.3
45kg	88.0
90kg	176.0
210kg	411.0

For bulk deliveries of LPG to onsite storage the quantity is typically provided in litres, if however it is provided as kilograms, then the amount must be multiplied by 1.961 litres per kg to convert to litres.

The LPG data is to include both the amount from cylinders and that delivered from tankers to fixed onsite storage facilities and from all providers.

For natural gas the data is normally provided in gigajoules (GJ). For this cell the amount of gigajoules needs to be totalled across all of the facilities. It is noted that there may be data from more than one retailer for the year, as different sites may be with different retailers or there could have been a change of retailer during the year. As at June 2022 there were two natural gas retailers in Tasmania, TasGas and Aurora Energy.

While no council noted more than minor amounts of heating oil, diesel or wood used as fuel for stationary uses in the 2019/20 to 2021/22 period (with none being sufficient to include in the

inventories) these items have been included in case they are relevant or used in significant amounts in other years.

Fuel – Fleet and Vehicle Use

The data required for this section is the total usage of each fuel type for the year. The 10% ethanol blend (E10) petrol has a slightly lower emission factor than standard petrol, so is included as a separate input. The different octane rating variations of petrol have the same factors for emissions and energy, so separate totals for these different grades of petrol are not required for the calculations. Similarly for diesel, all the grades of diesel will need to be combined to a single total amount.

Fuel - Fleet and Vehicle Use

Total Annual Diesel		litres
Total Annual Petrol		litres
Total Annual E10 Petrol		litres
Total Annual LPG		litres
Electricity Use (not from council metered sites)		kWh

The only vehicle related LPG use reported by councils in the 2019/20 to 2021/22 period was bottled LPG used to power forklifts at works depots. As for other bottled LPG use, the number of cylinders must be multiplied by the relevant litres per cylinder.

The fleet "Electricity Use" data input cell is for electricity used in vehicles which was not from one of the council's own metered sites (as that is already included in the metered electricity amount). This would be electricity sourced from third party charging stations, such as may happen on trips outside of the municipality. While southern councils had very few plug-in electric vehicles as at June 2022, this is expected to increase and so this has been included largely for future inventories.

Waste

The following table shows the input cells for both waste to landfill and green and food organics waste, for both the waste collected at kerbside and self haul waste.

Waste

Item	Amount	Units
Destination landfill for general waste (Landfill 1)		
Quantity of waste going to Landfill 1		Tonnes
Destination landfill for general waste (Landfill 2)		
Quantity of waste going to Landfill 2		Tonnes
Quantity of green waste dropped off processed by composting		Tonnes
Quantity of green waste dropped off & being mulched only		Tonnes
Quantity of kerbside green waste (not FOGO)		Tonnes
Method of processing green waste (not FOGO)		
Quantity of kerbside FOGO waste		Tonnes
Method of processing FOGO waste		

The first input for waste is the Destination landfill for general waste (Landfill 1). There is a drop down list which has the five landfills currently used for waste disposal by councils in southern Tasmania. This needs to be selected from the list as it is used in the calculation of the emissions coefficient.

The second input is the total amount of waste to Landfill 1 that is managed by the council such as through waste transfer stations, drop off at a landfill or a kerbside collection service (including such services provided by contractors engaged by the council). It also includes any green waste that is mulched and used in a landfill as daily cover. The waste amount must be provided in tonnes, so if the data is based on volume or number of skip bins it must be converted to a tonnage value.

There is the option in the calculator for those councils which may dispose of waste to two different landfills (under Landfill 1 and Landfill 2), with the tonnage to each landfill required along with the selection of the relevant landfill from the drop down menu.

Following the landfill data there are two data input cells for the quantity of green waste that is dropped off at a council facility. The first is for the quantity (in tonnes) that is composted and the second is for that which is mulched (or shredded) only and is used for surface application purposes such as landscaping. If the green waste is shredded and used for daily cover at a landfill this needs to be included in the total for waste going to landfill, as it will generate significant emissions once buried.

The next data input cell is for the quantity of green waste collected at kerbside (where the service is for green waste only). If the service includes food organics then this quantity should be zero and data entered under the FOGO line items further down the table. The data input "Method of processing green waste (not FOGO)" cell provides a drop down list of options for how this waste is processed such as composting or mulching.

The data input cells below the green waste inputs are for where there is a combined food and garden organics (FOGO) kerbside collection service. The first cell is for the quantity of FOGO waste and the second has a drop down menu for the processing method, which as at June 2022 was composting for all councils providing this service.

Summary Worksheet

Once the Data Input worksheet has been fully populated the results from the calculations are brought together in the Summary worksheet. The other worksheets in the spreadsheet have the calculations and factors used to convert the input data into emissions and energy. All worksheets except for the Data Input sheet are write protected.

Greenhouse Emissions and Energy Footprint - Detailed Calculator

There is a version of the calculator which allows greater flexibility for incorporating more detailed data, allows direct input of Aurora Energy data from consolidated spreadsheets that they have provided for the 2019-20 to 2021-22 years and also has the option of allocating emissions and energy use to different council services, if this is desired.

Cells highlighted in pale blue are calculation or results cells and are protected. Data mustn't be entered into these cells as they have calculations or results. Most of the cells available for data input are highlighted in a pink background, but some cells have other colours, which are referenced specifically in the various worksheets where there are multiple alternatives for data entry.

Summary Worksheet

The "Summary" worksheet contains the results of the calculations undertaken in the various sectoral worksheets.

There are 3 data input cells highlighted in a pink background on this worksheet. The first two are at rows 7 and 9 as below:

Name of Council	

Input Year of Inventory	

The first of these has a drop down menu which has a list of the 12 STCA councils. The relevant council needs to be selected from this list, as the calculations use this as an input and it needs to be in the format as per the drop down list.

The second is the year of inventory. A drop-down menu is provided with a list of years from 2009/10 to 2025/26. The year must be selected from the drop-down list to ensure that it is in the correct format for the calculations. For years beyond 2021/22 an update to the relevant State electricity greenhouse gas emission coefficients will be required to enable the calculations to be undertaken (as listed in "NGER & GHG Acct Factors" worksheet at rows 15 to 17).

At row 51 of the "Summary" worksheet there is a further data input cell, which has a drop-down menu with Yes or No, and this is to note whether service activity allocation of electricity sites and fuel use has been made elsewhere in the spreadsheet, as discussed in later sections. This is an optional calculation and the summary totals of emissions and energy are worked out separately to the service activity analysis. The default value is "No".

Activity Category Data Provided?	No

Electricity Worksheets

There are three electricity worksheets, one for sites which are invoiced monthly and are typically for larger consumption and/or contestable sites, one for quarterly sites, which are the lower consumption regulated sites and a third worksheet which can be used if Aurora Energy consolidated data has been provided in a spreadsheet formatted as per the data provided for the 2019/20 to 2021/22 inventories.

One of the main reasons for having separate monthly and quarterly data entry is that monthly sites may be contracted to a retailer other than Aurora Energy, so this worksheet can provide separate data entry. The other reason is that the worksheet can display the data for each month while only quarterly entries are included in the "Electricity – Quarterly" worksheet.

Electricity – Monthly

The "Electricity – Monthly" worksheet has four options for data input as per the following table:

Single Total
Aggregated by Site
Aggregated by Month
By Site and Month

At the pink highlighted data input cell in line 12 as shown below the relevant option must be selected from the dropdown menu.

Method of Data Input (Drop Down Menu)	

If consolidated Aurora Energy data is available, then the By Site and Month option should be selected, noting that data from other retailers will need to be added in manually. Other data entry options are discussed below.

If the "Single Total" is selected, then a total of all annual electricity use at monthly sites needs to be input at cell on line 14 with orange highlighted background.

Input Aggregated Total Consumption (kWh)	

If the "Aggregated by Site" is selected (this is for where the total annual amount for each site has already been worked out in another spreadsheet), this uses the annual totals for each site. The Site and NMI for each site needs to be entered along with the annual total at column D under "Input Site Annual Totals" (highlighted in green). It is noted that there are formulae in the Site and NMI cells highlighted pink, which extract data from the Aurora spreadsheet if this is pasted into the Electricity Data worksheet, but these can be over written. The "Activity Category" can be filled in from the drop down menu if the option of allocating emissions and energy to service activities is being included.

If the "Aggregated by Month" is selected (this is for where the total monthly usage across all sites has been calculated elsewhere) then the monthly data needs to be entered at row 17 in the cells with purple background as per the extract below (noting that the Calculated Total must not be used as it has a formula totalling up the months):

Input Aggregated Monthly Electricity (kWh)	**Calculated Total**	**Jul**	**Aug**	**Sep**
Aggregated Monthly Data For All Sites	-			

If the "By Site and Month" option is selected then the cells can either be populated by:

1. Entering the Aurora data to the Electricity Data worksheet (as described in detail in a later section), or
2. Inputting data manually to each row commencing at row 20 into the Site, NMI, Activity category (if using this) and the monthly data (all in the cells highlighted pink) columns for each metered site.

The results will appear at the cells near the top of the page. If the greenhouse emissions show up as "N/A" then check that the Year of Inventory has been selected on the Summary worksheet.

Electricity – Quarterly

The "Electricity – Quarterly" worksheet is largely structured in the same way as the monthly worksheet and has four options for data input as per the following table:

Single Total
Aggregated by Site
Aggregated by Quarter
By Site and Quarter

At the pink highlighted data input cell in line 13 as shown below.

Method of Data Input (Drop Down Menu)	

If consolidated Aurora Energy data is available, then the By Site and Quarter option should be selected. Other options are discussed below.

If the "Single Total" is selected, then a total of all annual electricity use at monthly sites needs to be input at cell on line 15.

Input Aggregated Total Consumption (kWh)	

If the "Aggregated by Site" is selected (which is used where annual totals for each site have been calculated elsewhere), then the Site and NMI for each site needs to be entered along with the annual total at column D under "Input Site Annual Totals" (highlighted in green). It is noted that there are formulae in the Site and NMI cells highlighted pink, which extract data from the Aurora spreadsheet if this has been copied and pasted into the Electricity Data worksheet, but these can be over written. The "Activity Category" can be filled in from the drop down menu if the option of allocating emissions and energy to service activities is being included.

If the Aggregated by Quarter is selected (which would be used if all sites have been totalled up for each quarter) then the quarterly totals data needs to be entered at row 18 in the cells with purple background as per the extract below (noting that the Calculated Total must not be used as it has a formula totalling up the quarters):

Input Aggregated Monthly Electricity (kWh)	**Calculated Total**	**1st Qtr (Jul - Sep)**	**2nd Qtr (Oct - Dec)**	**3rd Qtr (Jan - Mar)**	**4th Qtr (Apr - Jun)**
Aggregated Monthly Data For All Sites	-				

If the "By Site and Quarter" option is selected then the cells can either be populated by:

1. Entering the Aurora data to the Electricity Data worksheet (as described in detail in a later section); or
2. Inputting data manually for each row commencing at row 21 in the Site, NMI, Activity category (if using this) and the monthly data (all in the cells highlighted pink) columns for each metered site.

The totals of energy and emissions will appear at the cells highlighted in blue near the top of the worksheet. If the greenhouse emissions show up as "N/A" then check that the Year of Inventory has been selected on the Summary worksheet.

"Electricity Data" Worksheet

This worksheet has been developed to enable data from the Aurora Energy consolidated spreadsheet to be copied and pasted into this worksheet which then manipulates the data to populate the "Electricity – Monthly" and "Electricity - Quarterly" worksheets.

This source of data can only be accessed if the "By Site and Month" and "By Site and Quarter" options are selected in the electricity monthly and quarterly worksheets.

The calculations extract the site and NMI along with the quarterly and monthly data and order the rows in ascending NMI values.

It is noted that contestable sites may be with another retailer and these sites will need to be added manually to the "Electricity – Monthly" worksheet.

The two tables from which data need to be extracted from the Aurora spreadsheet are from the "kWh Summary .." worksheet and the "Site Summary" worksheet.

The table from the "kWh Summary <year>" worksheet is to be copied and pasted to match the template in the calculator's Electricity Data works sheet at columns A to Q as per the excerpt below:

NMI/MIRN	1/07/2019	1/08/2019	1/09/2019	1/10/2019	1/11/2019	1/12/2019	1/01/2020	1/02/2020	1/03/2020	1/04/2020	1/05/2020	1/06/2020	FIN19/20
	kWh	kWh	kWh	kWh	kWh	kWh	kWh	kWh	kWh	kWh	kWh	kWh	kWh
8000345678	-	-	-	-	-	-	-	-	-	-	-	-	-
8000345679	-	4,046	-	-	1,860	-	-	1,258	-	-	-	-	7,164
8000345680	-	55	-	-	72	-	-	132	-	-	120	-	379
8000345681	-	342	-	-	294	-	-	354	-	-	358	-	1,348
8000345682	-	22	-	-	66	-	-	368	-	-	20	-	476
8000345683	-	8,406	-	-	7,377	-	-	5,486	-	-	5,351	-	26,620
8000345684	-	2,753	-	-	2,273	-	-	1,618	-	-	1,616	-	8,260

The Site Summary is similarly to be copied and pasted into the Electricity Data worksheet at columns S to W as per the excerpt below:

NMI	Account Num	Tariffs	Meter Type	Address
8000345678	50123456	TASUMSSL	INTERVAL	1 Smith Street, Hobart
8000345679	50123456	22	BASIC	2 Smith Street, Hobart
8000345680	50123456	22	BASIC	3 Smith Street, Hobart
8000345681	50456789	22	BASIC	4 Smith Street, Hobart
8000345682	50456789	22	BASIC	5 Smith Street, Hobart
8000345683	50456789	TAS22	INTERVAL	6 Smith Street, Hobart
8000345684	50456789	TAS22, TASX5I	INTERVAL	7 Smith Street, Hobart

The first of these tables provides the amounts of electricity for each NMI, while the second sheet is used to populate the site addresses for each NMI.

If the copying and pasting of these worksheets as above does not work then the data can be manually transferred from these sheets to the "Electricity – Monthly" and "Electricity – Quarterly" worksheets.

"Streelighting" Worksheet

The cells highlighted in blue at rows 3 to 5 contain the calculations totalling up the various parameters and must not be used.

The cell at B13 has a drop down menu to select the method of data entry for this worksheet, with the four options being:

Single Annual Usage Total
Aggregated by Month
By light nos & month
Aurora Streetlighting Data Table

It is noted that the "Aurora Streetlighting Data Table" is to be selected where Aurora has provided a full listing of the streetlights as per the data format shown in the relevant section below.

The "Single Annual Usage Total" options requires that a total annual amount of electricity must be calculated and inserted at cell B16 which looks like:

Input Total Annual Electricity Use (kWh)	

This will require an external calculation (similar to that within the worksheet) multiplying the numbers of each light type by the input watts for each type and by 12.5 hours per day times the numbers of days in the year.

The "Aggregated by Month" option requires a similar calculation to that for the "Single Annual Usage Total", but with a calculation for each month using 12.5 hours per day and the number of days in the month, with excerpt from the relevant table shown below:

Option 2: Input Monthly Total Electricity		**Jul**	**Aug**	**Sep**
Monthly Total Electricity (kWh)				

The "By light nos and month" method requires the pink highlighted cells from row 32 onwards to be populated with the numbers of each light type. These cells can be filled in with the numbers for each individual month over the 12 months which will give a more accurate overall calculation. If lesser accuracy is acceptable or individual monthly data is not available then numbers can be entered for one month and copied across all of the months. A small excerpt of the data entry table is provided below with the pink highlighted cells being those that need to be populated.

	Month	**Jul**	**Aug**	**Sep**
	Days per month	31	31	30
Light Type	**Input Watts**			
Incandescent 60 watts	60.0	-	-	-
Incandescent 100 watts	100.0	-	-	-
Mercury vapour 50 watts	65.0	-	-	-

If the fourth option ("Aurora Streetlighting Data Table") is selected then the Aurora Energy consolidated data must be used by copying and pasting the data into the separate "Streetlighting Data" worksheet as per the template format in that worksheet. The results are then displayed on the "Streetlighting" worksheet from row 85 onwards. The full data from Aurora was only provided for the 2021-22 year of the three inventory years for which data has been previously provided (there were only summary totals for other years) and so this method was not used for earlier inventory years. It may be that this format of data is not provided in future so this option may be of limited usefulness.

Solar

The cells highlighted in blue at rows 6 to 8 contain the calculations totalling up the various parameters and must not be used.

At row 12 in the cell highlighted in orange a figure for the average estimated generation rate from solar panels is calculated using typical data and insolation rates for the specified council area. If however better data is available then this figure can be overwritten.

Annual generation per kW (in kWh)	1,225

There are two ways in which the data for each site with solar can be input, one being to enter the data for each site into the worksheet from row 16 and the other to use an extract from the Aurora Energy consolidated data spreadsheet. From past experience of inventory preparation using the Aurora Energy consolidated data, it has been found that the data provided does not always match that contained in individual invoices and this appears to be an artefact of the data query used by Aurora, so this data will need to be reviewed, if this method is used.

The first method is to populate all of the cells highlighted in pink from row 16:

- Facility (ie site address) – Column A,
- NMI (metering identifier number) – Column B,
- System Capacity in kW - Column D,
- the month that the system started generating electricity (if it started during the inventory year) – Column E,
- the Annual Generation from inverter or web portal sourced data (if this data is not available leave blank and the amount will be calculated from the standard figure for kWh per kW of panels) – Column G, and
- the quarterly amounts of export (ie feed in) electricity from retailer invoices (noting that the export or feed in electricity needs to be input as negative amounts to reflect that it is going back into the grid and be consistent with data from Aurora Energy) – Columns J to M.

The table below is an excerpt showing columns A to G.

Facility	**NMI**	**Activity Category**	**System Capacity (kW)**	**Month commenced generating electricity**	**Annual Generation (Calculated) (kWh)**	**Annual Generation (Actual) (kWh)**

Some sites may be on monthly invoicing and in this case add up the values for the 3 months in each quarter. For Shell Energy invoices the amount fed in to the grid is provided at the line reading "BChannel Data" on each invoice, as they have a different arrangement for how they account for electricity that is exported.

If the Aurora Energy consolidated data is available then the table as below can be copied and pasted into the "Solar Data" worksheet and this data will be extracted and used to populate relevant cells in the Solar worksheet. This data does not include the kW rating of the solar panel system, so this will need to be added in manually at Column D.

NMI	Account Number	Tariffs	Meter Typ	Address	FINYR21_2 kWh
8000345678	51851234	TAS22, TASX5I	INTERVAL	1 Smith Street, Hobart	- 1,200
8000456789	51851345	TAS94, TASX6I	INTERVAL	2 Smith Street, Hobart	- 2,345
8000456790	51851456	150, 22	BASIC	3 Smith Street, Hobart	- 10,914
					- 14,459

It is noted that the Aurora data query only provides an annual total of electricity exported (ie fed in) to the grid, not quarterly or monthly data, though this can be extracted using the Excel data "filter" function to select Feed in electricity from the "Bill Data Raw" worksheet of the Aurora Energy, if so desired.

For both methods if the service activity functionality is being used the Activity Category cells will be populated automatically for each NMI if this data has been entered into the "Electricity – Monthly" or "Electricity – Quarterly" worksheets.

The data for each site is totalled up and the totals provided at the cells highlighted in blue at rows 6 to 8 on the worksheet and this is used in the Summary worksheet.

Fuel

There is one Fuel worksheet which has both the stationary fuel use and fleet fuel use data entry sections, with the stationary fuel use section appearing at the top of the worksheet.

Fuel - Stationary Use

This section is only for non-fleet fuel use such as bottled LPG for hot water services or cooktops or natural gas used for heating.

The first data input cell as shown below has a drop down menu of two options, being whether data is being provided as the totals for each fuel or if it is being provided for each service activity. If fuel use is totalised for each fuel then the "Total Use of Each Fuel Type" needs to be selected. If fuel usage is allocated between services then the "Fuel Use for each Activity Category and Fuel Type" should be selected.

Data inputted for Fuel Use in different Activity Categories or Totals for Each Fuel only?	

Where the service activity split up is not being calculated and the "Totals for each fuel" option is selected then fill in the pink highlighted cells as per the table shown below:

Fuel Type (Total	Units	Total Usage (Direct Input)
LPG	litres	
Natural Gas	GJ	
Heating Oil	litres	
Diesel	litres	
Wood	tonnes	

If the option is selected where the fuel is being allocated to different activities then the data needs to be entered in the table commencing at row 23, an excerpt of which is shown below:

Category of Use	LPG (litres)	Natural Gas (GJ)
Office & Administration		
Depot Operations		
Parks		
General Fleet Operations		
Outdoor Sporting & Clubrooms		
Community Services & Halls		
Aquatic Centres & Gyms		
Carpark Operations & Vehicle Chargers		
Street Lighting (incl Metered)		
Waste Facilities & Transport		
Civil Works		
City Cleansing		
Other		

For LPG the data must be in litres. The bottled gas is typically sold in cylinders with nominal kilogram ratings. The following table provides the litres for standard cylinder sizes.

LPG (bottle size)	Litres
3.7kg	7.3
8.5kg	16.7
15kg (forklift)	29.4
18kg (forklift)	35.3
45kg	88.0
90kg	176.0
210kg	411.0

For bulk deliveries of LPG to onsite storage the quantity is typically provided in litres, if however it is provided as kilograms, then the amount must be multiplied by 1.961 litres per kg to convert to litres.

The LPG data is to include both the amount from cylinders and that delivered from tankers to fixed onsite storage facilities and from all providers.

For natural gas the data is normally provided in gigajoules (GJ). For the natural gas input data the amounts of gigajoules needs to be totalled across the relevant facilities and retailers. It is noted that there may be data from more than one retailer for the year, as different sites may be with different retailers or there could have been a change of retailer during the year.

While no council noted more than minor amounts of heating oil, diesel or wood used as fuel for stationary uses in the 2019/20 to 2021/22 period (with none being sufficient to include in the inventories) these items have been included in case they are relevant for other years.

Fuel – Fleet and Vehicle Use

This section is only for fleet fuel use, including all vehicles, mobile plant and minor plant equipment such as mowers and brushcutters (with these latter items perhaps being covered under bulk fuel deliveries). Fuel use at fixed installations such as building needs to be included in the Stationary Use section.

The first data input cell in this section (at row 46) as shown below, has a drop down menu of two options, being whether data is being provided as the totals for each fuel or if it is being provided for

each vehicle. One of these needs to be selected from the dropdown menu, so that the correct data is sourced for the calculations.

Is fuel data provided for each vehicle or only summary totals for each fuel?	

If the "Totals for Each Fuel Type Only" option is selected, then this data needs to be aggregated from the information provided by suppliers, if not supplied as totals. The table below is the one to be used where the total amount of each fuel in the basis for data input, with information to be inserted into the cells highlighted in green.

Vehicle and Plant Summary Table	
Fuel Type	**Usage (Direct Input)**
Total Annual Diesel (litres)	
Total Annual Petrol (litres)	
Total Annual E10 Petrol (litres)	
Total Annual LPG (litres)	
Total Annual Compressed Natural Gas (GJ)	
Electricity Use (not from council metered sites) (kWh)	

All grades of petrol (except for E10) are taken to have the same energy content and emissions. The 10% ethanol blend (E10) petrol has a slightly lower emission factor, so is included as a separate input to standard petrol. Similarly all grades of diesel are taken to have the same energy content and emissions.

The only vehicle use of LPG reported by councils in the 2019/20 to 2021/22 period was bottled LPG used to power forklifts at works depots.

The fleet "Electricity Use" data input cell is for electricity used in vehicles which was not from one of the council's own metered sites (as that is already accounted for in the metered electricity amount). This is electricity sourced from third party charging stations, such as may happen on trips outside of the municipality. While councils had very few plug-in electric vehicles as at June 2022, this is expected to increase and so this has been included largely for future inventories.

If data for each vehicle and plant item is being used in the inventory, the table which starts at row 61 needs to be used. The different councils have various ways of recording details of their fleet units and thus a number of identifiers have been used for each line being Registration Number, Fleet Number, Fleet Type, Make and Model. There is no requirement for any particular identifier to be input, this information is to track each of the items of plant or vehicle is being put into the spreadsheet and allow for future reference.

An excerpt of the table of the data input cells is shown below:

Registration Number	Fleet Number	Fleet Type	Make	Model	Fuel Type	Activity Category	Amount of Fuel

The data that is required for the calculations is the "Fuel Type" (for which the relevant line from the drop down menu needs to be selected to ensure correct formatting) and the "Amount of Fuel" for

each fleet item. If the option of allocating emissions to services is being used, then the "Activity Category" needs to be selected from the dropdown menu as well.

The totals from this individual fleet item table are collated in the table at rows 50 to 55 for each fuel type.

Waste

The calculator template has three options (Methods 1 to 3) for calculating waste. One of these methods must be selected at row 9 from the dropdown menu.

The first two methods are for where it is not possible to determine the actual quantities of wastes and are based on the resident population of the council area and estimated quantities per head of population. For all of the 2019/20 to 2021/22 year inventories each of the southern councils was able to provide actual tonnages or reasonably accurate estimates. Thus, the inventories for all councils for those three years used Method 3.

Method 1 is for where the amount of waste is not known and there is no green waste collection service or composting of green waste being received, Method 2 is for where the amount of waste is not known and there is a green waste collection or composting of green waste being received, and Method 3 is for where the amounts of waste that a council manages are known via weighbridge or collection truck load cell records or can be estimated with a reasonable degree of accuracy.

Method 1 requires input of the resident population, the estimated waste generation per person per year (with 0.4 tonnes/person being a default value it there is no better data) and the destination landfill (selected from dropdown menu).

Waste – Method 1 Table

Item	Amount	Units
Resident population		persons
Estimated waste generated per person		Tonnes per year
Total mixed waste generated	-	Tonnes per year
Destination Landfill (drop down menu)		

Method 2 requires input of data as per the table below (with suggested default values for quantities per person). Where noted below that there is a dropdown menu the relevant option must be selected to reference the correct emission factors.

Waste – Method 2 Table

Item	Amount	Units
Resident population		persons
Estimated total waste generated per person (incl green waste)		Tonnes per year
Destination Landfill for general waste (Drop down menu)		
Resident population with kerbside green waste collection (excl FOGO)		persons
Estimated green waste collection per person (excl FOGO)		Tonnes per year
Green Waste Processing Method (Drop down menu)		
Resident population with FOGO waste collection		persons
Estimated FOGO waste collection per person		Tonnes per year
FOGO Waste Processing Method (Drop down menu)		

Method 3 requires the waste tonnage data for all waste streams. The following table shows the input cells for both waste to landfill and green and food organics waste, for both the waste collected at kerbside and self haul waste.

Waste – Method 3 Table

Item	Amount	Units
Destination landfill for general waste (Landfill 1)		
Quantity of waste going to Landfill 1		Tonnes
Destination landfill for general waste (Landfill 2)		
Quantity of waste going to Landfill 2		Tonnes
Quantity of green waste dropped off processed by composting		Tonnes
Quantity of green waste dropped off & being mulched only		Tonnes
Quantity of kerbside green waste (not FOGO)		Tonnes
Method of processing green waste (not FOGO)		
Quantity of kerbside FOGO waste		Tonnes
Method of processing FOGO waste		

The first input for waste is the Destination landfill for general waste (Landfill 1). There is a dropdown list which has the five landfills currently used for waste disposal by councils in southern Tasmania. The destination landfill needs to be selected from the list as it is used in the calculation of the emissions coefficient. It is noted that councils may dispose of waste to more than one landfill and calculator allows for two different landfills to be selected along with the tonnage of waste going to each landfill.

The second input is the total amount of waste (disposed of at Landfill 1) that is managed by the council such as through waste transfer stations, drop off at a landfill or a kerbside collection service (including such services provided by contractors engaged by the council). It also includes any green waste that is mulched and then used in a landfill as daily cover. The waste amount must be provided in tonnes, so if the data is based on volume or number of skip bins it must be converted to a tonnage value.

The following two rows are for where some waste goes to a second landfill (ie Landfill 2), and as above the destination landfill must be selected and the quantity of waste to that landfill inserted.

Following the landfill data there are two data input cells for the quantity of self haul green waste delivered to a landfill or waste transfer station. The first cell is for the quantity (in tonnes) that is composted and the second is for that which is mulched (or shredded) only and is used for surface application purposes such as landscaping. If the green waste is shredded and used for daily cover at a landfill this needs to be included in the total for waste going to landfill, as it will generate significant emissions once buried.

The next data input cell ”Quantity of kerbside green waste (not FOGO)” is for the quantity of green waste collected at kerbside (where the service is for green waste only). If the service includes food organics then this quantity should be zero and data entered in the kerbside FOGO waste data input cells. The data input “Method of processing green waste (not FOGO)” cell provides a drop down list of options for how this waste is processed such as composting or mulching.

The data input cells below the green waste inputs are for where there is a combined food and garden organics (FOGO) kerbside collection service. The first cell is for the quantity of FOGO waste and the second has a dropdown menu for the processing method, which as at June 2022 was composting for all councils providing this service.

Service Activity Allocation

The calculator spreadsheet includes functionality to allocate energy use and emissions to a list of services and activities provided by the council. The list used in the spreadsheet is as shown below.

Office & Administration
Depot Operations
General Fleet Operations
Parks
Outdoor Sporting & Clubrooms
Community Services & Halls
Aquatic Centres & Gyms
Carpark Operations & Vehicle Chargers
Street Lighting (incl Metered)
Civil Works
Waste Facilities & Transport
City Cleansing
Waste Disposal and Treatment
Other

The "Activity Category" data input is included in the "Electricity - Monthly" and "Electricity – Quarterly" data sheets and the "Fuel" worksheet with individual items of fleet fuel use (which all have dropdown menus for each metered electricity site and each item of fleet), along with a table for aggregated totals of stationary fuel use for each category.

Use of this functionality is completely optional and does not affect the calculation of the total amounts of emissions or energy use.

In some instances a facility or item of fleet does not fit fully within one of the categories. If the majority of use is for one category then that should be selected. If there are uses across multiple categories then for fleet the "General Fleet Operations" should be selected. For where a metered electricity site has multiple uses then "Other" is perhaps the best option to select. A description of the scope of each activity category is provided in the "Introduction" worksheet at rows 27 to 40.

For this data to be aggregated the "Yes" alternative needs to be selected at the cell at B51 in the Summary worksheet and the results are shown in the table below on that worksheet.

Factors and Tables Worksheet

This worksheet has the various factors and list for dropdown menus that are used in the calculations. There is no data input in this worksheet.

NGER & GHG Acct Factors Worksheet

The worksheet contains all of the data derived from the National Greenhouse and Energy (Measurement) Determination. This may need updating for any revisions to the data in the latest version of the Determination. One factor which will need to be added in annually is the Tasmanian greenhouse gas coefficient for electricity at row 17. The cells for the years 2022/23 to 2025/26 are not protected and data can be added when available.