SOUTHERN COUNCILS CLIMATE COLLABORATION

CARBON AND ENERGY FOOTPRINT

KINGBOROUGH COUNCIL CORPORATE INVENTORY AND OPPORTUNITIES REPORT

Kingborough

Southern Tasmanian Councils Authority

Regional Climate Change Initiative

ABOUT THE COUNCIL CARBON AND ENERGY FOOTPRINT

The Council Carbon and Energy Footprint (CEF) has been developed as part of the Southern Councils Climate Collaboration. The Collaboration is an initiative of the Southern Tasmanian Councils Authority climate program, the Regional Climate Change Initiative. It is supporting the 12 southern councils to build capacity and capability to develop climate responses, to reduce their carbon emissions, and respond to the challenges and opportunities of a changing climate.

The Collaboration uses a common and consistent approach to work with councils to find local solutions. The approaches and resources used in the Collaboration have been developed specifically to meet the role and functions of councils and enable actions to be scaled between councils or regionally resulting in greater efficiencies and avoid duplication and maladaptive responses.

To support councils in understanding their carbon footprints and energy use the Collaboration purposely built a Tasmanian Councils Carbon Calculator that can readily be used in-house by councils to regularly update their Carbon Footprints. It can inform the development of science based targets and is leveraged from the City of Hobart's climate program that has resulted in savings on their energy bills of over $1 million annually since 2014.

The Calculator's data inputs are from sources already collected, or can be accessed by the councils, such as bills: electricity and fuel (petrol, diesel, LPG) and waste tonnages from council kerbside collection services and waste delivered to waste transfer stations or landfills. It emphasises operations and services that the councils are directly responsible for and can take action to reduce greenhouse gas emissions and energy use. It is straight forward to use and flexible, which means that councils can readily calculate their annual Footprint and track progress towards targets to reduce emissions.

The Calculator uses national carbon accounting methods set out by the Australian Government in its National Greenhouse and Energy Reporting (Measurement) Determination 2008 legislation

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- City of Hobart experiences based on its delivery of corporate energy and greenhouse targets from 2010 to 2020 and its Global Covenant of Mayors reporting commitments.

CONTENTS

AT A GLANCE

Kingborough Council's Greenhouse Gas Emissions and Energy Use

Table 1: Greenhouse Gas Emissions (in tonnes CO_2-e)

Year	Total GHG Emissions	Landfilled Waste	Non-landfill Organic Waste	Metered Electricity	Street Lighting	Fleet Fuel	Other Fuel
2019/20	6,139.8	5,204.4	-	183.7	79.6	672.1	-
2020/21	6,197.9	5,185.0	70.3	218.6	88.0	636.0	-
2021/22	6,217.3	5,155.2	109.2	207.8	79.8	665.3	-
Change 19/20 to 21/22	77.5	-49.1	109.2	24.1	0.2	-6.8	-
% change 19/20 to 21/22	1.3%	-0.9%		13.1%	0.3%	-1.0%	

Table 2: Energy Use (in gigajoules)

Year	Total Energy Use	Mains Electricity	Street Lighting	Fleet Fuel	Other Fuel
2019/20	15,875	4,409	1,910	9,555	-
2020/21	15,537	4,629	1,863	9,044	-
2021/22	15,930	4,675	1,796	9,459	-
Change 19/20 to 21/22	55	266	-114	-97	-
% change 19/20 to 21/22	0.3%	6.0%	-6.0%	-1.0%	

Table 3: Ten Highest Electricity Usage Sites in 2021/22

Site	Electricity Use (kWh)
Kingborough Sports Centre, 10 Kingston View Dr, Kingston	376,988
Council Offices, 15 Channel Hwy, Kingston	254,866
Twin Ovals, 10A Kingston View Dr, Kingston	135,716
Kingborough Community Hub, 5 Goshawk Way, Kingston	110,572
Baretta Waste Management Centre, 1922 Channel Hwy, Barretta	82,851
Kingborough Works Depot Building, 180 Channel Hwy, Kingston	50,877
Kingston Beach Oval, 34 Ewing Ave, Kingston Beach	29,464
Snug Oval, 64 Beach Rd, Snug	27,273
Kingborough Works Depot Workshop, 180 Channel Hwy, Kingston	27,106
North Bruny Community Centre, Dennes Point	25,592

Table 4: Solar Power Systems and Generation in 2021/22

Site	Capacity (kW)	2021/22 Electricity (kWh)	2021/22 Electricity (GJ)
Kingborough Sports Centre, 10 Kingston View Dr, Kingston	100.0	10,045*	36.2
Council Offices, 15 Channel Hwy, Kingston	50.4	62,065	223.4
Twin Ovals, 10A Kingston View Dr, Kingston	12.0	15,436	55.6
Kingborough Community Hub, 5 Goshawk Way, Kingston	20.0	27,791	100.0
Baretta Waste Management Centre, 1922 Channel Hwy, Barretta	15.6	19,606	70.6
North Bruny Community Centre, Dennes Point	20.1	25,460	91.7

*Note: This system commenced operation during the 2021/22 year.

Table 5: Solar Power Generation, Use and Export 2019/20 to 2021/22

Year	Solar Generation (GJ)	Solar Power Used on Site (GJ)	Solar Power Export (GJ)
2019/20	597.2	496.0	101.2
2020/21	526.6	430.4	96.2
2021/22	577.5	488.0	89.4

KINGBOROUGH COUNCIL – CARBON INVENTORY AND OPPORTUNITIES REPORT

INTRODUCTION

This Carbon and Energy Footprint (CEF) provides a summary of the Kingborough Council's corporate greenhouse gas emissions and energy consumption over the three financial years 2019/20, 2020/21 and 2021/22. It also provides some potential opportunities to reduce emissions, energy use and/or associated costs.

The CEF inventory covers all of the significant sources which result from the council's operations and from its role in the management of wastes generated in the municipality.

The sources include:

- Use of fuels, which generate carbon dioxide and minor amounts of other greenhouse gases when combusted such as in vehicle engines, generators or gas fired heating or hot water systems.

  These are known as Scope 1 emissions, which are directly emitted from owned or controlled sources.

- Electricity used in metered supplies to council sites and that used by unmetered public lighting assigned to the council. These emissions do not arise directly from the council's own operations, they are created in the generation of electricity. While nearly all of Tasmania's electricity is generated from hydroelectricity and wind, this does not mean that the electricity in Tasmania has net zero emissions. At times some electricity (including from coal fired power stations) is imported via Basslink, the gas-fired power stations at Bell Bay are operated when required and there are some greenhouse gas emissions associated with hydroelectricity including methane emissions from storage reservoirs.

  These are known as Scope 2 emissions which are indirect through the purchase of electricity.

- Waste that is managed or controlled by the council, including from kerbside collection and waste which is delivered to council managed waste transfer stations. The waste related emissions covered in this Footprint are those from the treatment, processing or disposal of the waste, including landfill gas and emissions from composting operations.

  These emissions have been calculated as equivalent to Scope 1 emissions at the facilities which process the waste. The emissions generated by contractors engaged by the council to collect or transport waste are not included.

This Footprint does not include emissions generated in the provision of goods and services to the council apart from those listed above. These "third party" emissions could be considered to be part of the council's greenhouse gas emissions footprint. However, it is challenging to obtain such information, as many providers do not currently have relevant data. In addition, councils purchase a wide range of goods and services meaning that there would need to be engagement with numerous providers to calculate these emissions.

A summary of greenhouse gas emissions and energy usage for the 2021/22 is provided initially, followed by a summary for the three years 2019/20 to 2021/22, and a list of general opportunities to reduce emissions and energy.

SUMMARY FOR 2021/22

Greenhouse Gas Emissions

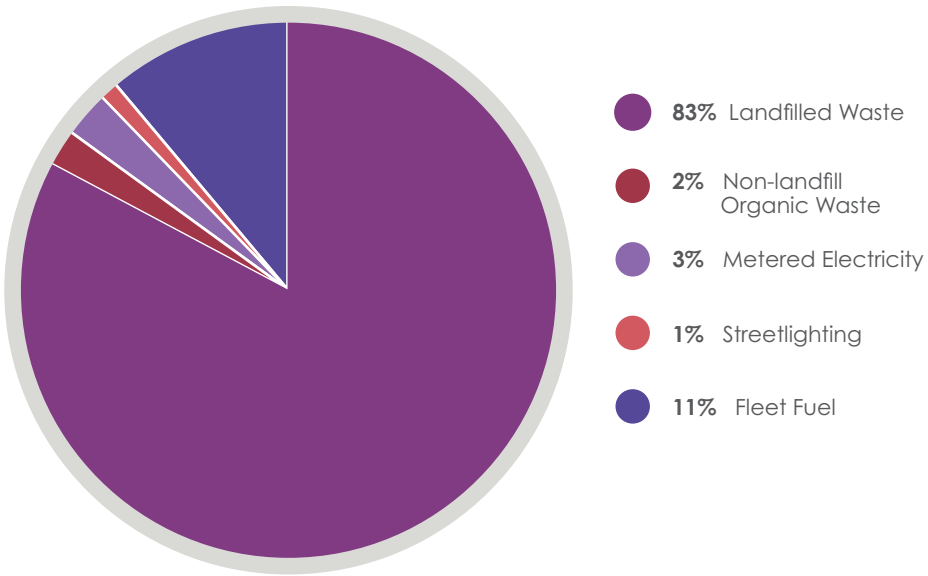
The greenhouse gas emissions from Kingborough Council's corporate operations totalled 6,217 tonnes carbon dioxide equivalent (tCO_2-e) in the 2021/22 financial year.

Of this total almost 83% of emissions were from waste managed by the council that was disposed of to landfill. The total amount of 10,846 tonnes of landfilled waste includes the kerbside collection and dropped off at the waste transfer stations. The food organic and garden organic waste (FOGO) kerbside service collected 2,374 tonnes of material which generated 109 tCO_2-e of greenhouse gas emissions (1.8% of total emissions) from composting of this waste. The emissions from composting are about 10% of those that would occur if the waste was disposed of to a landfill with gas collection.

The next largest category of emissions was from fuel being used by vehicles and plant. The emissions generated from this source were 665 tCO_2-e in 2021/22 (10.7% of the total), with about 94% from use of diesel and the rest from petrol.

Emissions from metered electricity were 208 tCO_2-e, while an amount of 80 tCO_2-e was from electricity used by unmetered public streetlighting. Together these comprised about 4.6% of the emissions total. Excess electricity from the solar panel systems at six council facilities reduced emissions by 4.0 tCO_2-e using the state coefficient for electricity and this has been incorporated into the metered electricity information.

Figure 1. Greenhouse Gas Emissions Percentage by Category for 2021/22 Year



Energy Use

The total net energy use in corporate operations was 15,930 gigajoules (GJ) in 2021/22. For comparison the typical energy usage of a household with a three-bedroom house and two cars is about 100 GJ, with annual use of about 30 GJ for electricity in the house and 35 GJ per car.

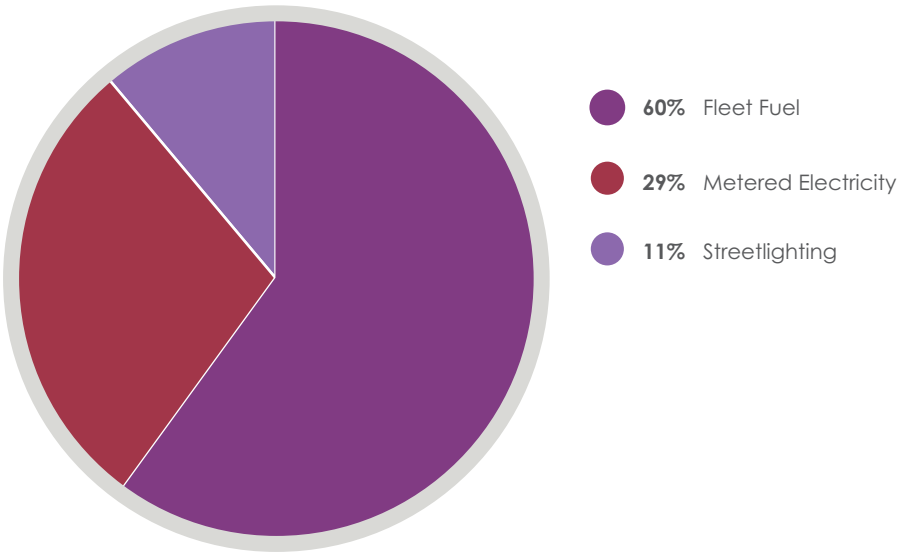
Fleet fuel use was the single biggest category with 9,459 GJ used representing 59% of the total energy consumption. About 94% of the fuel energy was provided by diesel, with the remainder from petrol.

Metered electricity consumption was 4,675 GJ and electricity used for unmetered public streetlighting totalled 1,796 GJ.

The council had six solar panel systems installed at its facilities as at June 2022. In the 2021/22 year total generation was 160,405 kWh (577 GJ) and of this 24,842 kWh (89 GJ) was fed in to the grid.

While electricity is measured in kilowatt-hours (kWh) this unit is specific to electricity only. To more generally compare different types of energy used by the council the unit of gigajoules (GJ) is used, with 1,000 kWh equating to 3.6 GJ.

Figure 2. Energy Use Percentage by Category for 2021/22 Year



SUMMARY OF 2019/20 TO 2021/22

Greenhouse Gas Emissions

The council's corporate greenhouse gas emissions increased by 1.3% between the 2019/20 and 2021/22 years, from 6,140 tCO_2-e to 6,217 tCO_2-e.

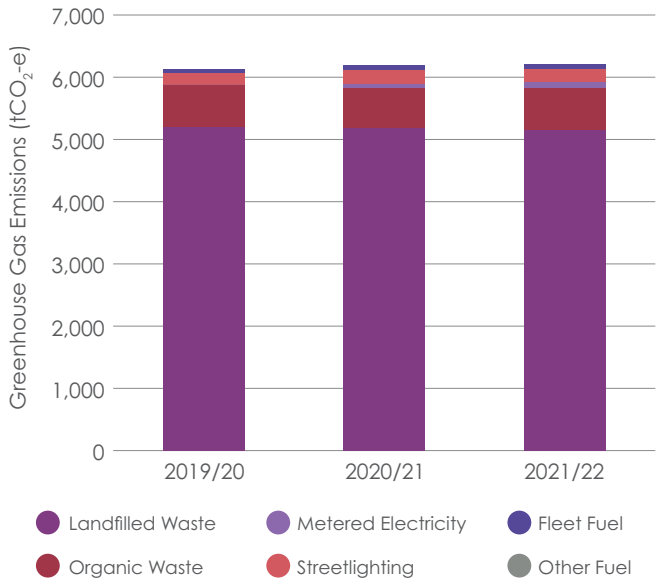
The increase in emissions was primarily due to a rise in the usage of metered electricity and a small increase in overall waste emissions. There was a reduction in emissions from a lower quantity of waste to landfill, but this was more than offset by the emissions from the composting of FOGO waste. Composting of such waste does however generate 90% lower emissions than landfilling even when the landfill has gas collection, so the overall increase in waste emissions was most likely from increases in waste being generated.

Greenhouse gas emissions from fleet fuel use decreased by about 1%, which was due to a reduction in diesel consumption with only a small change in petrol usage.

The emissions related to metered electricity were 13% higher with about half of this increase due to the rise in the greenhouse gas coefficient for electricity during the period. Streetlighting related emissions were constant, with the 6% increase in Tasmania's greenhouse gas coefficient for electricity being offset by a reduction in electricity use.

A table summarising the data for the three years is provided in At a Glance.

Figure 3. Annual Greenhouse Gas Emissions from 2019/20 to 2021/22

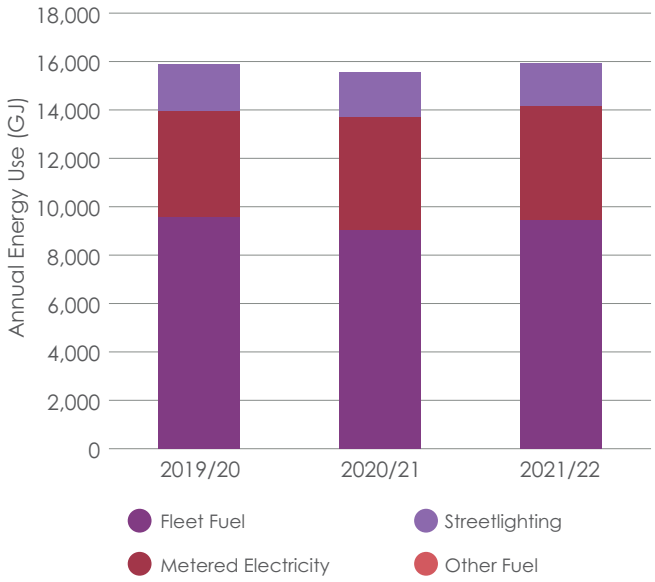


Energy Use

Over the period 2019/20 to 2021/22 the overall energy use was largely unchanged with an increase of 55 GJ or 0.3%, with a rise in metered electricity consumption offset by reductions in the other categories.

Fleet fuel energy use decreased by about 1% over the period from 9,555 GJ to 9,459 GJ. The use of diesel, which comprises the majority of fuel use, fell by 1.8%, while petrol consumption rose by 13.5%.

Figure 4. Annual Energy Use from 2019/20 to 2021/22



Streetlighting energy use decreased by 6% from 2019/20 to 2021/22) despite there being an additional 58 streetlights, due to over 100 older technology lights having been replaced with lower energy use LED lights.

A table with the energy usage data for the three-year period is provided in At a Glance.

OPPORTUNITIES FOR REDUCING GREENHOUSE GAS EMISSIONS AND ENERGY USE

WASTE

The biggest source of greenhouse gas emissions is waste to landfill, even though there is landfill gas collection at the Jackson Street landfill. The introduction of the FOGO collection service and associated diversion of this waste from landfill has generated a significant reduction in landfill emissions. While residents typically divert much of their green waste to such a collection service when it is introduced it can take some time for residents to transfer a higher proportions of food waste from general refuse. Thus it is considered that an ongoing education program could assist in maximising future food waste diversion rates.

The state-wide waste levy commenced on 1 July 2022 at $20 per tonne of waste to landfill, and the levy will rise to $40 per tonne in 2024 and $60 per tonne in 2026. This levy will improve the economics for actions which divert waste from landfill disposal and a review of potential waste reduction actions should be undertaken in light of the introduction of the levy.

The council's direction in waste management is contained in its 2017 Waste Management Strategy. It is noted that the last year noted in the action plan within the Strategy is 2021/22 and that, if it has not already done so, it would be good for the Strategy and the associated actions to be reviewed and updated.

FUEL

Along with being a significant contributor to greenhouse gas emissions fleet fuel use is a major component of the council's energy consumption. This is typical of local government due to the amount of vehicle and plant usage needed to deliver the services being provided to the community.

There are several options to reduce greenhouse gas emissions from fleet operations. The two main categories are fuel substitution from fossil fuels to electricity or other low emission technology and the other is to take actions to reduce the consumption of diesel and petrol.

In regard to fuel substitution the technology considered to have the most potential at this time is battery powered electric vehicles and plant. The other main alternative of hydrogen fuel cell technology is far less advanced and is more problematic given the issues with distribution and storage of hydrogen and that there is little "green" hydrogen currently being made.

While electric vehicle technology is advancing, there are several issues which mean that currently it is not generally viable for the council's fleet. These issues include the purchase cost, supply constraints, a limited range of vehicles available in Australia, particularly in the commercial and utility types of vehicles, and travel range of electric vehicles, though this is improving.

Thus there are some significant limitations in moving towards fleet electrification at present, though the council may wish to trial one or more vehicles to commence familiarisation with the technology. Recent changes to fringe benefits tax arrangements for electric vehicles have reduced the net cost to local government for those vehicles to which the tax applies. This factor, along with lower fuel and maintenance costs, means that overall life cycles may be similar or cheaper in some instances than the equivalent petrol or diesel alternatives.

Other actions which could be taken to reduce fuel consumption include:

- Fuel efficiency be included as a significant factor is assessing the purchase of new or replacement vehicles
- Regular maintenance of vehicles, including correct inflation pressure of tyres
- Driver education in fuel efficient driving techniques
- Optimisation of the distances being travelled by vehicles, such as route planning and reviewing the frequencies of regular activities such as inspections.
- Identify where it may be possible to reduce officer travel through the use of technology such as virtual meetings
- Regularly reviewing fuel efficiency performance (eg litres per 100 kilometres or per hour of operation) for individual items of fleet and plant to identify and rectify poor fuel efficiency operation

ELECTRICITY

While electricity use makes only a small contribution to the council's greenhouse gas emissions, it makes up almost 40% of the energy use, and typically can provide some good opportunities for savings.

The main categories of options to reduce electricity use are to undertake energy-efficiency upgrades of facilities and to install onsite renewable energy generation, such as solar photovoltaic (PV) systems.

Energy Efficiency

With respect to energy efficiency, it is usually possible to identify measures with payback periods of 5 years or less for up to 30% of the electricity used at a site, where there hasn't been a recent upgrade or works previously undertaken to reduce electricity use. The specific actions which are financially viable depend on how many hours a year the facility operates and the type of fittings, equipment and appliances that are installed.

Some of the typical actions that can cost effectively reduce energy use are:

- Upgrading all lighting to LED technology, in many instances this only involves replacing the light bulb or tube with an LED equivalent, but can involve replacing whole fittings (LEDs reduce electricity use by 60-90% depending on the technology it replaces, and also have a significantly longer life thus reducing maintenance costs)
- Installing lighting controls such as timers or motion sensors
- Replacing hot water services with solar or heat pump technology, or small instantaneous on demand systems
- Replacing direct electric space heating with heat pumps, which can also provide cooling
- Replacing appliances that are used regularly or continuously eg refrigerators with higher energy rating models
- Reducing air leaks and draughts in buildings
- Installing insulation in the ceiling cavity for buildings which do not have insulation and where the roof space is readily accessible
- Installation of skylights may reduce the need for lighting during the daytime
- For larger buildings there may be the case to install or upgrade a building management system to optimise the timing of operations or control setpoints of air conditioning and heating systems.

Many buildings, particularly those built more than several years ago, will have poor thermal efficiency thus requiring more energy for heating. With the possible exception of installing ceiling insulation, it is generally not cost effective from an energy savings point of view to undertake specific types of building fabric retrofit works to improve the situation such as the installation of double glazing or insulation in walls. However, where a building is to undergo a major refurbishment, then the opportunity should be taken to improve the energy rating of the building.

Renewable Energy

Another alternative to reduce net electricity usage is to install renewable energy generation at council facilities. The only economically viable technology is currently solar PV panels, with wind generation being much more expensive per unit of electricity for small scale systems.

As at June 2022 there were solar power systems installed at six of the council's facilities. These were a 100 kW system at the Kingborough Sports Centre, a 50kW system at the Kingborough Council Offices, a 20 kW systems at Kingborough Community Hub, Goshawk Way, Kingston and at the North Bruny Community Centre at Dennes Point, a 16kW system at the Baretta Waste Management Centre and a 12 kW system at the Twin Ovals. In the 2021/22 year these systems generated approximately 160,400 kWh of which about 85% was used on site, with the remainder being fed into the grid.

Given the likely future increases in electricity prices, the viability of installing solar PV systems should be reviewed for those sites where there is sufficient electricity usage and where much of the electricity use is during daylight hours. Some of the sites with existing solar panel system may potentially benefit from increases to system size where there is available roof space and adequate electrical connection capacity. Some other sites where the potential for solar could be investigated are:

- Kingborough Works Depot Building and Workshop, 180 Channel Hwy, Kingston
- Kingston Beach Oval, 34 Ewing Ave, Kingston Beach
- Snug Oval, 64 Beach Rd, Snug
- Beach House and Youth Services, 98 Beach Rd, Kingston
- Sherburd Park, 1 Brightwater Rd, Blackmans Bay (though may have overshadowing from tree adjacent to building)
- Taroona Hall, 4 Batchelor Way, Taroona

These sites each have usage of over 10,000 kWh per annum and all appear to have good solar access, such as no or little overshadowing trees or infrastructure and sufficient roof area with reasonable orientation for solar access. Some of the council's smaller electricity consumption sites may also be suited, but generally the smaller the usage the less cost effective the installation. At very low usage sites there can be instances where a mains-electricity supply could be cost effectively replaced by a solar and battery combination, depending on the specific circumstances.

The cost to install a solar power system is about $1,000 to $1,500 per kW depending on site issues, with savings which average in the order of 15c/kWh, which is equivalent to about $180 per year per kW.

Solar power is more cost-effective where the predominant usage is during daylight hours. It may not be viable where most of the electricity use is at night such as metered outdoor public lighting.

At current costs, the installation of a battery to store excess electricity from the solar panels is not generally cost effective, but may be option to consider if there are frequent outages of mains electricity and the facility needs to have a reliable power supply. The battery can provide power during the outages, as long as the electrical load is not excessive relative to the battery size.

At some sites a solar panel and battery combination may potentially be used to replace a mains electricity connection and thus save the daily connection charges, which are typically in the order of $400 per year.

Electricity Tariffs

A review of electricity tariffs will not reduce energy use, but may provide an opportunity to lower energy costs.

A review of the tariffs as at June 2022 shows that fifty six of the council's sites are on the standard business tariff (22), while six are on a time based tariff (94) where energy charges vary with the time that the electricity is used and one site is on a maximum demand tariff (82).

The main alternative to the standard business tariff is that of a peak/shoulder/off-peak tariff (tariff 94) which can provide overall cheaper costs for sites with significant usage on weekends or at night (such as park lighting). While the peak rate is slightly higher than the standard business rate, both shoulder (10am to 7pm on weekends) and off peak (10pm to 7am all days) rates are significantly lower.

It is considered that a review of tariffs could be undertaken to ensure that each site is on the most economical tariff.

Streetlighting

Many of the unmetered streetlights that the council pays for (approximately 2,400 lights in total) have previously been upgraded to energy-efficient LED technology, including most of the lights on suburban streets.

As at May 2022 there were still 95 mercury vapour lights and 16 fluorescent lights, which could be replaced with LED lights saving 60% to 80% of electricity use for those lights. If all of the remaining mercury vapour and compact fluorescent lights were upgraded to LED, then this would save about 30,000 kWh per annum (equivalent to about 110 GJ).

Cost savings in network and energy charges from this change would be in the order of $4,000 per annum.

There would be energy savings from upgrading sodium vapour streetlights to LED. However, as sodium-vapour technology is itself relatively energy efficient it is not likely to be economically viable to work with TasNetworks to replace these prior to their end of asset life. When sodium-vapour lights reach the end of their useful life TasNetworks now replaces such lights with the relevant LED equivalent.

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The Corporate inventories and Opportunities Report has been prepared under the auspices of the Southern Tasmanian Councils Authority, Regional Climate Change Initiative by the 12 Councils of southern Tasmania: Brighton, Clarence City, Central Highlands, Derwent Valley, Glamorgan Spring Bay, Glenorchy City, City of Hobart, Huon Valley, Kingborough, Sorell, Southern Midlands and Tasman.

It was endorsed by the STCA Board on 23 August 2022.

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Photography unless otherwise indicated: Katrina Graham, Senior Climate Change Officer, City of Hobart.

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