SOUTHERN COUNCILS CLIMATE COLLABORATION

# CARBON AND ENERGY FOOTPRINT

## BRIGHTON COUNCIL CORPORATE INVENTORY AND OPPORTUNITIES REPORT

Brighton Council

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.

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**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 | 11,604.5 | 11,252.0 | 1.1 | 50.5 | 54.3 | 246.4 | 0.2 |
| 2020/21 | 11,670.4 | 11,252.0 | 1.1 | 80.5 | 27.6 | 309.0 | 0.2 |
| 2021/22 | 3,494.3 | 2,963.6 | 61.7 | 112.2 | 25.6 | 266.6 | 64.6 |
| Change 19/20 to 21/22 | -8,110.2 | -8,288.5 | 60.6 | 61.8 | -28.7 | 20.2 | 64.4 |
| % change 19/20 to 21/22 | -69.9% | -73.7% | | 122.4% | -52.9% | 8.2% | 39,779% |

**Table 2: Energy Use (in gigajoules)**

| Year | Total Energy Use | Mains Electricity | Street Lighting | Fleet Fuel | Other Fuel |
|---|---|---|---|---|---|
| 2019/20 | 6,027 | 1,211 | 1,303 | 3,510 | 3 |
| 2020/21 | 6,695 | 1,704 | 585 | 4,404 | 3 |
| 2021/22 | 7,963 | 2,525 | 575 | 3,797 | 1,066 |
| Change 19/20 to 21/22 | 1,936 | 1,314 | -728 | 287 | 1,063 |
| % change 19/20 to 21/22 | 32.1% | 108.5% | -55.9% | 8.2% | 39,779% |

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

| Site | Electricity Use (kWh) |
|---|---|
| Brighton Council Chambers and Offices, 1 Tivoli Rd, Old Beach | 180,400 |
| Works Depot, 2 Cobbs Hill Road, Bridgewater | 126,667 |
| Brighton Civic Centre, 25 Green Point Road, Bridgewater | 110,910 |
| Pontville Football and Cricket Club, 325 Brighton Rd, Pontville | 73,892 |
| 205 Brighton Road, Brighton | 56,670 |
| Pontville Community Centre, 371 Brighton Road, Pontville | 27,828 |
| Bridgewater Coronation Hall, 25 Old Main Road, Bridgewater | 24,802 |
| Brighton Oval, 325 Brighton Rd, Pontville | 24,770 |
| Bridgewater Parklands, 2B Eddington Street, Bridgewater | 19,506 |
| Pontville Memorial Hall, 325 Brighton Road, Pontville | 17,664 |

**Table 4: Solar Power Systems and Generation**

| Site | Capacity (kW) | 2021/22 Electricity (kWh) | 2021/22 Electricity (GJ) |
|---|---|---|---|
| Brighton Council Offices, 1 Tivoli Rd, Old Beach | 65.5 | 83,752 | 301.5 |
| Brighton Civic Centre, 25 Green Point Rd, Bridgewater | 50.0 | 5,199 | 18.7 |
| Works Depot, 2 Cobbs Hill Road, Bridgewater | 30.0 | 38,725 | 139.4 |
| Old Beach Cricket Club, 84 Jetty Rd, Old Beach | 7.0 | 1,495 | 5.4 |

**Table 5: Solar Power Generation, Use and Export 2019/20 to 2021/22 (in GJ)**

| Year | Solar Generation (GJ) | Solar Power Used on Site (GJ) | Solar Power Export (GJ) |
|---|---|---|---|
| 2019/20 | 389.3 | 253.8 | 135.5 |
| 2020/21 | 389.1 | 253.6 | 135.4 |
| 2021/22 | 465.0 | 286.4 | 178.6 |

# BRIGHTON COUNCIL – CARBON INVENTORY AND OPPORTUNITIES REPORT

## INTRODUCTION

This Carbon and Energy Footprint (CEF) provides a summary of the Brighton 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 Brighton Council's corporate operations totalled 3,494 tonnes carbon dioxide equivalent ($tCO_2$-e) in the 2021/22 financial year.

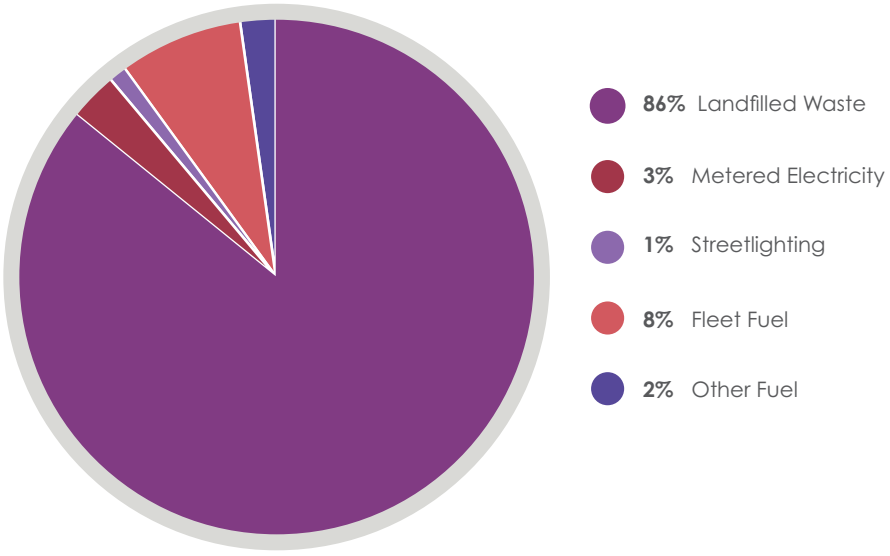
Of this total about 86% of the emissions (3,025 $tCO_2$-e) were from disposal and treatment of waste managed by the council. This waste includes that disposed to landfill (6,235 tonnes), the food organics and garden organics (FOGO) waste kerbside collection (1,317 tonnes), which is composted at the Pure Living Soil facility and green waste from the council's own parks operations (24 tonnes).

The refuse is disposed of at the Southern Waste Solutions landfill at Copping. While this landfill has landfill gas collection, there are residual emissions of methane which it is not possible to collect. There are 61 $tCO_2$-e emissions associated with composting of the FOGO waste and 1 $tCO_2$-e of emissions from the council's parks green waste. Composting emissions are about 90% less than those from a landfill with gas collection.

The next largest category of corporate emissions was from fuel being used by vehicles and plant. The emissions generated from this source were 267 $tCO_2$-e in 2021/22 (about 8% of the total). Most of these emissions were from major plant and large trucks with 215 $tCO_2$-e from diesel and 51 $tCO_2$-e from use of petrol. In addition, 2% of total emissions (64 $tCO_2$-e) were contributed by the use of LPG at several council sites, primarily sporting facilities.

The emissions from the use of metered electricity were 112 $tCO_2$-e, while an amount of 26 $tCO_2$-e was from electricity used by unmetered public street lighting. Together electricity use comprised about 4% of the emissions total. Electricity exported to the grid from solar panel systems at council facilities reduced emissions by to 7.9 $tCO_2$-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 by Brighton Council corporate operations was 7,963 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 usage of about 30 GJ for electricity in the house and about 35 GJ per car.

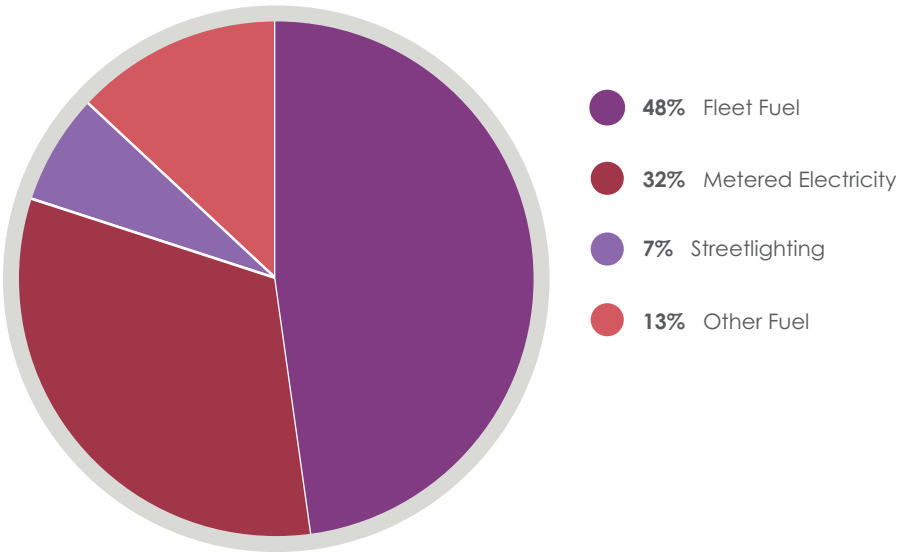
Fleet fuel use was the single biggest category with 3,797 GJ having been used, which represented about 48% of the total energy consumption. Stationary fuel use, ie LPG used at council facilities, was 1,066 GJ or about 13% of the total.

Electricity consumption at metered sites was 2,525 GJ or just under 32% of the total energy usage. Electricity used for unmetered public street lighting totalled 728 GJ (7.2% of total use).

Four of the council's facilities had solar panel systems as at June 2022, of which two commenced operation during the year. Total electricity generated in the 2021/22 year was 129,171 kWh (465 GJ) and of this 49,613 kWh (179 GJ) was fed into 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

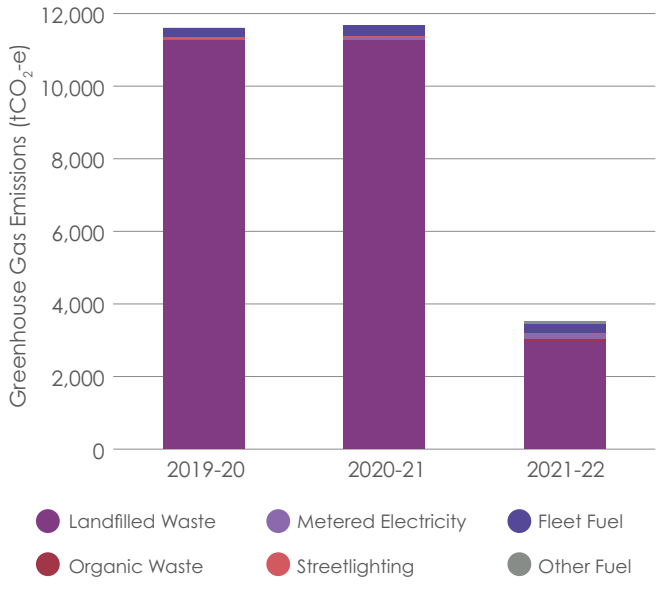
## Greenhouse Gas Emissions

The council's corporate greenhouse emissions have been assessed for the three years from 2019/20 to 2021/22. During this period there have been significant impacts on the use of council facilities resulting from COVID related restrictions including the operations of sporting and community facilities. However, having information over the three year period provides a baseline for assessing future changes to the council's emissions.

The total greenhouse gas emissions from the council's operations decreased significantly over the three years. The emissions in 2019/20 were 11,605 $tCO_2$-e, remaining basically constant at 11,670 $tCO_2$-e in 2020/21 and then dropping by about 70% to 3,494 $tCO_2$-e in 2021/22.

The largest component of the emissions is that from waste, which comprised 96-97% of emissions in the first two years, and then dropping to 87% in 2021/22. Emissions from fleet fuel use rose slightly between 2019/20 and 2021/22 when they comprised about 8% of that year's emissions. Electricity use contributed about 1% of emissions in each of the first two years, but the percentage increased to 4% of the total due to the reduction in waste emissions.

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




The trend in emissions from waste to landfill is similar to that in overall emissions total, with a decrease from 11,252 $tCO_2$-e in 2019/20 to 2,964 $tCO_2$-e in 2021/22. The major factor in this reduction was the transfer of waste disposal from the Peppermint Hill landfill, which does not have landfill collection to the Copping landfill where the gas is collected and used mostly to generate electricity or is flared. The introduction of the FOGO kerbside collection service also had a major impact by diverting waste from landfill to composting. The emissions from composting are about 90% lower than from a landfill with gas collection. The emissions from the council's parks green waste were almost unchanged at about 1 $tCO_2$-e in each year, while the composting of the FOGO collection waste generated about 61 $tCO_2$-e in 2021/22.

Fleet fuel emissions increased slightly from 246 $tCO_2$-e in 2019/20 to 267 $tCO_2$-e in 2021/22 (or just over 8%). Diesel consumption increased by about 12.5%, which was partially offset by a 7% reduction in the usage of petrol.

Emissions from the use of LPG at council's sites increased by about 64 $tCO_2$-e, with the rise largely attributable to outdoor sporting facilities.

Emissions from metered mains electricity usage rose by 122% over the same period. The large majority of this was due to an increase in electricity consumption, with a minor portion of the increase due to a 6% rise in Tasmania's greenhouse gas coefficient for electricity. The largest increases were at some of the sporting facilities, the works depot and the council offices.

Emissions from electricity used for streetlighting fell by 53% due to changeover of a large number of streetlights to LED from less energy-efficient technologies.

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

## Energy Use

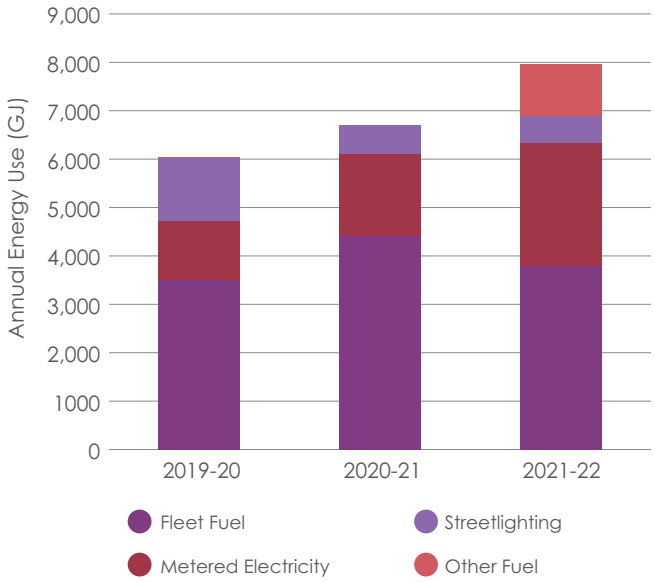
From 2019/20 to 2021/22, overall energy use increased from 6,027 gigajoules (GJ) to 7,963 GJ, or a rise of over 100%, with all types of energy use increasing except for electricity used by unmetered public street lighting.

Fleet fuel varied between about 50% and 65% of energy use over the period, while the contribution from LPG used at facilities increased from a small amount to about 13% in 2021/22. The remainder of energy use was sourced from electricity.

Fleet fuel use rose by 287 GJ, equivalent to an 8% increase, with the rise in diesel consumption partially offset by a drop in petrol use.

The use in LPG at council sites increase by 1,063 GJ, with about 90% of the consumption occurring at sporting facilities.

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




Metered electricity usage increased by 1,314 GJ (aver 100%) between 2019/20 and 2021/22. There were significant increases in consumption at a number of sporting and community facilities, along with the works depot and the council offices. At least some of this increase is likely to have been due to the reduced usage of facilities in 2020 from the impacts of COVID-related restrictions on council services.

Electricity used for unmetered public streetlighting decreased by about 53% over the three years, which largely was a result of about 900 streetlights being changed from mercury vapour or compact fluorescent to more energy-efficient LED technology between 2019/20 and 2021/22.

A table with the energy usage data for the three-year period is provided in the 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 Copping landfill. Along with the change of disposal site from the landfill at Peppermint Hill to that at Copping, the introduction of the FOGO collection service and associated diversion of this waste from landfill has meant significantly lower emissions being generated. While residents typically divert much of their green waste to a FOGO collection service when it is introduced, it can take some time for residents to transfer a higher proportions of food waste from general refuse. Ongoing education of residents will likely support the maximisation of 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. While this levy will increase the cost of waste disposal, it will also improve the economics for actions which divert waste from landfill disposal.

**It is considered that a review of further potential waste reduction actions may be warranted in light of the introduction of the levy to minimise overall waste management costs, if the council is not already taking action on this front.**

## FUEL

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

Trucks and major plant are typically the largest users of fuel for councils for works such as road maintenance.

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 technologies and the other is to minimise 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, 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, including capital cost, 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 FBT 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/diesel alternatives.

**Over the next few years it is anticipated that battery-electric options will become the preferred technology as prices drop, the types of vehicles and plant that are battery powered expands and battery capacity increases.**

Actions which could be taken to reduce fuel consumption include:

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

There is a significant consumption of LPG at council facilities. Typically a large proportion of LPG use is for the supply of hot water or to provide space heating, with smaller amounts used for cooking appliances.

**Given the relative cost of LPG and electricity, there may be potential in investigating switching services and appliances from LPG to electricity as the energy source.**

For space heating heat pumps can be very energy efficient, as they can transfer three times the energy of that in the electricity that is used. For hot water services there are solar and heat pump-based systems, which can replace gas water heaters. Given the low greenhouse gas coefficient for electricity, switching to these alternatives would result in large percentage drop in the associated emissions.

# ELECTRICITY

While electricity use makes a relatively small contribution to council's greenhouse gas emissions, it comprises about 40% of the total energy use.

A table is provided in At a Glance listing the ten sites that used the most electricity in 2021/22 year. In total these sites combined consumed 88% of the metered electricity total. Thus these are the sites where potential for savings is likely to be the most significant, where there haven't been recent major upgrades to or significant energy reduction works at the facilities.

**The main options to reduce electricity use are to undertake energy-efficiency upgrades and to install renewable energy 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 particular actions which are financially viable depend on the type of fittings, equipment and appliances that are installed and how many hours a year the facility operates.

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 such as refrigerators with higher energy star rating models
- Reducing leaks and draughts in buildings
- Installing insulation in the ceiling cavity for buildings which do not have insulation and the roof space is readily accessible
- Installation of skylights may reduce the need for lighting during the daytime

**Many buildings, particularly those built more than several years ago, will have poor thermal efficiency thus requiring more energy for heating and cooling. With the possible exception of installing ceiling insulation, it is generally not cost effective to undertake specific works to improve the situation such as the installation of double glazing or insulation in walls or floor. 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 use is to install renewable energy generation at council facilities. The only economically viable technology is currently solar panels with small scale wind generation generally not being cost effective.

As at the end of June 2022, there were four council facilities at which solar panel systems were installed including a 65.5 kW system at the council offices, a 50 kW system at the Brighton Civic Centre (commenced operating in March 2022), a 30 kW system at the works depot and a 7 kW system at the Old Beach Cricket Club (commenced operation in May 2022).

Given the likely future increases in electricity prices, the viability of installing solar PV systems should be reviewed for some of the other sites with higher electricity use, such as:

- Sporting Facilities,
  325 Brighton Rd, Pontville
- Pontville Community Centre,
  371 Brighton Road, Pontville
- Bridgewater Coronation Hall,
  25 Old Main Road, Bridgewater
- Pontville Memorial Hall,
  325 Brighton Road, Pontville

These sites each have usage of over 15,000 kWh per annum and all appear to have good solar access 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 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 at a site is during daylight hours, such as offices and works depots. It is likely not to 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 usually not cost effective, but this may be option to consider if there are frequent outages of mains electricity and the facility needs to have a more reliable power supply. The battery can provide power during the outages, as long as the site 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 about $400 per year.**

## Electricity Tariffs

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

The tariff that has in the past applied to most council sites is the small business tariff (tariff 22). There is the alternative of a peak/shoulder/off-peak tariff (tariff 94) which may well achieve lower costs for sites with significant usage at night (such as park lighting) or a facility mostly used on weekends. The shoulder (7am to 10pm on weekends) and off-peak (10pm to 7am all days) charges are significantly lower than the standard business rate.

**There may be value to the council in undertaking a tariff review to ensure that each site is on the most cost-effective charges.**

## Streetlighting

As at June 2022 over 90% of the unmetered streetlights that the council pays for had been upgraded to energy-efficient LED technology. There were still 12 mercury vapour lights and 9 compact fluorescent lights remaining, which could also be replaced with LED lights. The other non-LED lights are sodium vapour lights (65 in total) which are relatively energy efficient. TasNetworks is replacing this older technology with LED as the existing lights fail, which over time will further reduce electricity use.

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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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