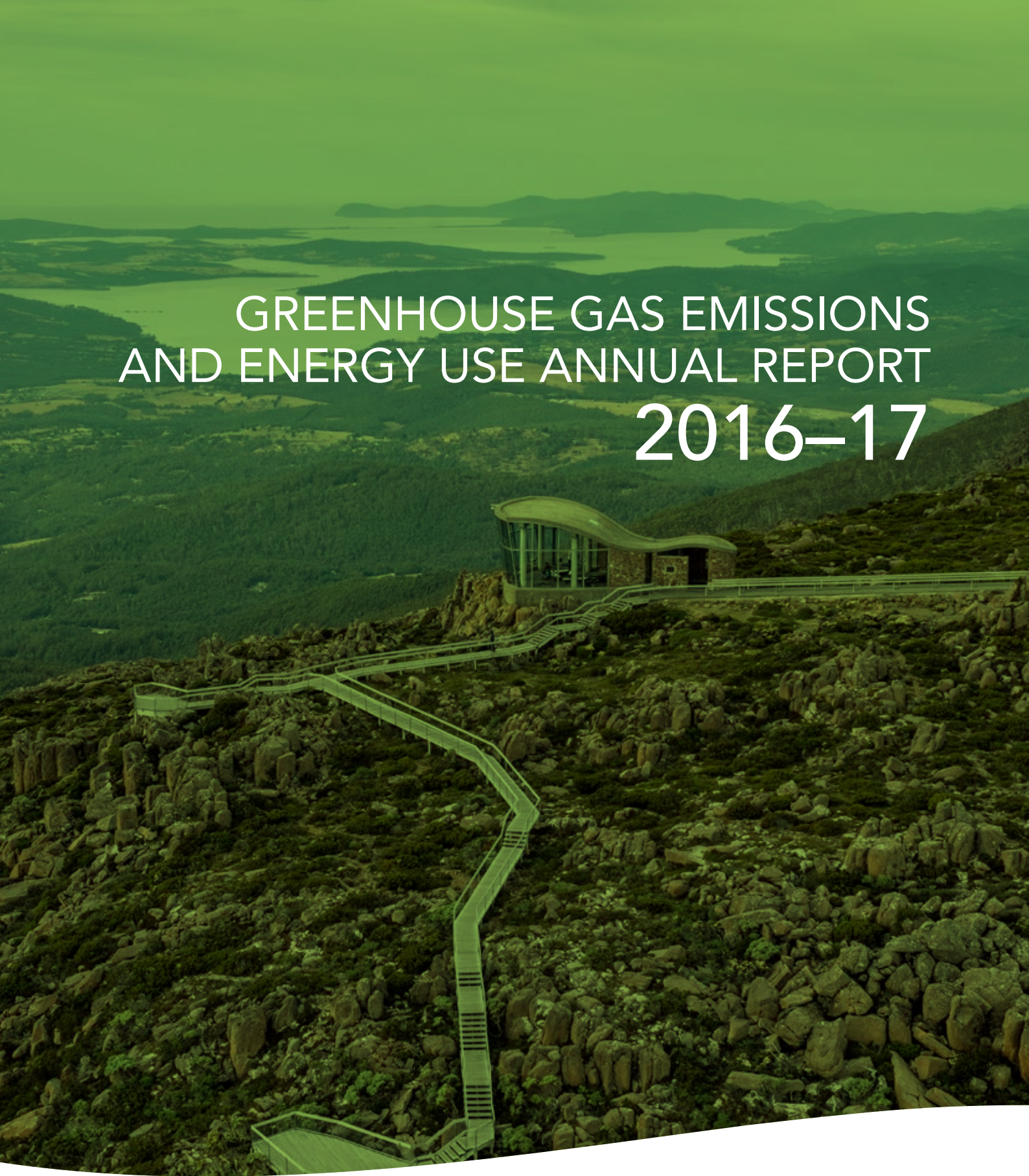


GREENHOUSE GAS EMISSIONS AND ENERGY USE ANNUAL REPORT 2016–17



City of **HOBART**



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1. SUMMARY

The City of Hobart has strategic objectives to improve its corporate environmental sustainability and to show leadership in addressing and responding to the impacts of climate change.

As part of its environmental management and strategic measurement systems, the City of Hobart monitors its corporate greenhouse gas (GHG) emissions and energy use. This report provides a summary of emissions and energy information for the 2016–17 financial year.

In 2014 the Council set new targets for GHG emissions and energy use. The emissions target is for a 17% reduction from 2010 levels by 2019–20, and the target for energy use is 35% over the same timeframe. The Council also endorsed an Energy Savings Action Plan to support work towards these targets, along with other plans and strategies in regard to waste management and climate change mitigation.

As a result of changes internationally the global warming potential of methane was revised upwards from 21 to 25 in the National Greenhouse Accounts Factors in 2015. This has affected the City's reported greenhouse gas emissions. Values for past years have been adjusted in line with this change, along with the emissions target and are thus not directly comparable with information provided in reports before 2015–16.

In 2016–17 the City's GHG emissions were reduced by 295 tCO₂-e to a total of 19,723 tCO₂-e from the previous year. A reduction of 11% reduction has been achieved since 2009–10. The City remains generally on track to meet the revised 2020 target of 18,497 tCO₂-e.

Energy use was reduced by 2.9% in 2016–17 to 67,700 gigajoules and is now 30.8% below that consumed in 2009–10. This is well ahead of the reduction needed to achieve the 35% reduction target for 2019–20.

A number of energy efficiency projects were completed in 2016–17. These projects included the installation of a further 302kW of solar panels on the roof of the Doone Kennedy Hobart Aquatic Centre (DKHAC), in addition to the previously installed 100kW system and installation of solar panel systems at another eight of the City's facilities. The control system at the Aquatic Centre was replaced and the opportunity used to optimise the control of some systems. Planning continued on the upgrade of heating systems to incorporate the use of natural gas.

In addition to this work significant upgrading of building lighting to LED technology was undertaken in the Hobart Council Centre offices, Town Hall Annex offices and the Trafalgar Car Park, while a number of heating systems in the Town Hall and the Clearys Gates works depot were replaced with more efficient equipment. Work also commenced on replacing the public space lighting at Mawson Place with LED technology.

The total investment in these the various projects was about \$1,010,000 with expected cost savings of about \$235,000 per annum.

Further projects to reduce energy use and GHG emissions are planned for 2017–18, including the installation of solar panels on two of the City's multi-storey car parks, improved building management control systems in the Town Hall and Hobart Council Centre buildings, installation of high efficiency gas boilers and related mechanical plant works at the DKHAC, completion of the works to upgrade the Mawson Place cardinal lights to LED and further upgrade of lights with energy efficient LED technology in City owned buildings and public lighting.

A new Energy Savings Action Plan has been developed for the 2018 to 2020 period, identifying further projects to reduce the City's energy use.



2. INTRODUCTION

As part of its environmental management and strategic measurement systems, the City of Hobart monitors its corporate greenhouse gas (GHG) emissions and energy use. This report provides a summary of emissions and energy information for the 2016-2017 financial year.

The City has been measuring and undertaking projects to reduce its greenhouse gas emissions since 1999. During this period the City was involved in the Cities for Climate Protection™ program until the Program's closure in 2008. Since then the City has developed its own program to continue reducing emissions and saving energy, which is coordinated by its Energy Management Team.

The City uses 2009-2010 as the baseline year for reporting as water and sewerage assets and operations were transferred to what is now TasWater as at 30 June 2009. The operation of water and sewerage assets previously comprised a significant proportion of the City's greenhouse gas emissions and about 25% of energy use.



GREENHOUSE GAS EMISSIONS

The City measures its Scope 1 and Scope 2 greenhouse gas emissions.

Scope 1 emissions are those directly emitted including combustion products from fuel use such as in vehicles (diesel and petrol) or facilities using reticulated natural gas, along with those emissions from the City's McRobies Gully Waste Management Centre, consisting of landfill gas emissions (methane) and from composting operations (methane and nitrous oxide).

Scope 2 emissions are related to those emissions created in the processes of generating, transmitting and distributing the electricity used by the City.

The Scope 2 emissions have been based on a standardised emissions coefficient for electricity of 0.23 tCO₂-e per megawatt-hour (MWh). This has been chosen to eliminate fluctuations resulting from annual changes in the coefficient for Tasmania. These fluctuations are caused by variations in its energy generation mix of renewable hydro and wind, natural gas (Bell Bay) and largely coal based electricity imported via Bass Link and can have a very significant impact on comparing one year's emissions with another.

Greenhouse gas emissions are measured in tonnes of carbon dioxide equivalent (tCO₂-e). For comparison a typical sized car being driven 15,000 kilometres per year emits about 4 tCO₂-e/yr.

ENERGY USE

Various sources of energy are used by the City including liquid and gaseous fuels, along with electricity. The unit of energy used in this report is the gigajoule (GJ) or 1,000 million joules. For comparison a medium sized car travelling the distance noted above uses about 40 GJ/year, while a 4 person household using electricity for heating and hot water consumes about 25-30 GJ/year.

3. BACKGROUND

When the City joined the Cities for Climate Protection™ program in 1999, its emissions were almost 70,000 tCO₂-e per annum, of which about 10,000 tCO₂-e/yr were from water and sewerage operations. These values are based on the revised global warming potential (GWP) factor of 25 for methane.

Between the years 2000 and 2010 the City reduced its greenhouse gas emissions by over 60%. This was achieved primarily through improvements to its solid waste facilities, which involved capturing landfill gas for electricity generation and diversion of green waste to reduce future emissions, along with use of digester gas from its wastewater treatment plants (since transferred to TasWater).

Only limited further improvements can be made in reducing landfill gas emissions as landfill gas capture has been extended across all suitable areas of the McRobies Gully site. Waste can generate emissions for over 30 years after it has been landfilled, so reducing waste in any given year has a minor impact on that year's emissions as most are generated from waste disposed previously.

Given the limited potential for further waste related savings, the primary focus to lower the City's carbon footprint has shifted to reducing emissions from energy use. In 2014, the Council set targets to reduce GHG emissions by 17% and energy use by 35% by 2019–20 from 2009–10 levels.

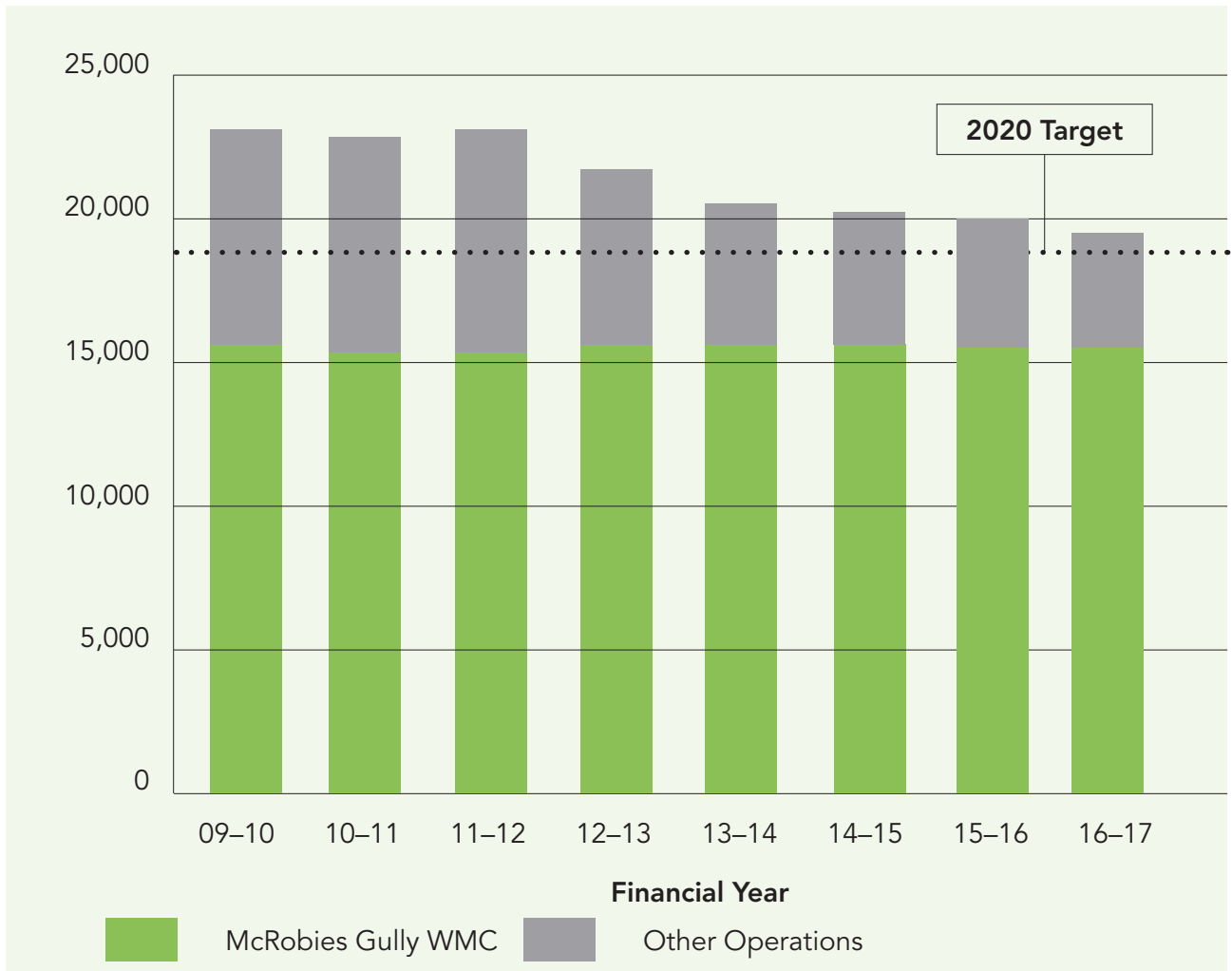


4. GREENHOUSE GAS EMISSIONS IN 2016–17

In regard to greenhouse gas emissions, internationally there was agreement to adjust the global warming potential (GWP) factors for some greenhouse gases in 2015, based on better understanding of their impacts. The most significant of these changes was the increase in the GWP for methane from 21 times that of CO₂ to 25 times. The reporting of the City's emissions has been adjusted to allow for these changes to the GWP factors for greenhouse gases.

Using this revised basis, the City's corporate greenhouse gas emissions for the 2016–17 year were 19,723 t CO₂-e, including the indirect emissions from electricity use, a reduction of 295 t CO₂-e on the previous year and 2,562 tCO₂-e or an 11% drop since 2009–10.

The graph below displays emissions data over the past 8 years, with the emissions related to the waste activities at McRobies Gully Waste Management Centre and those resulting from the City's other operations and facilities shown for each year.



The following table lists the emissions amounts as displayed in the graph.

GREENHOUSE GAS EMISSIONS (TONNES CO ₂ -E/YR)			
YEAR	TOTAL	MCROBIES GULLY WMC	OTHER OPERATIONS
2009–10	22 285	15 984	6301
2010–11	21 986	15 997	5989
2011–12	22 092	16 043	6049
2012–13	21 757	16 218	5539
2013–14	21 160	15 887	5272
2014–15	20 621	15 750	4701
2015–16	20 018	15 432	4587
2016–17	19 723	15 267	4456

The emissions from McRobies Gully Waste Management Centre have been relatively stable since 2009–10 though decreasing over the past 4 years, while emissions from energy use and other operations have been dropping more significantly.

The largest source of the City's greenhouse gas emissions is the McRobies Gully landfill. Refuse takes more than 30 years to fully decompose once it is buried. Thus even though the amount of waste being landfilled per year has dropped by 50% over the past four years, emissions have only dropped by 7% as most of the emissions are being generated by waste previously disposed at the site.

Landfill gas collection has been extended across all suitable areas of the site to minimise these emissions, but there is a limit to the proportion of gas that can feasibly be extracted. Without gas collection the emissions from the buried waste would be over 50,000 tCO₂-e per year.

A rise of about 85 tCO₂-e in emissions in 2016–17 resulted from increased composting related emissions due to the higher quantity of green waste received as a result of the introduction of the kerbside collection service. However if this waste had been landfilled over time it would have resulted in about 500 tCO₂-e of emissions, so there are significant benefits to composting compared to landfilling.

Emissions from the City's other operations have been lowered over recent years. A reduction of 130tCO₂-e was achieved in 2016–17 compared to the previous year for these "other operations", and these have been reduced by about 1,845 tCO₂-e (or 29%) since 2009–10.

The emissions from the City's fleet of vehicles and plant in 2016–17 was virtually the same as that in the previous year. Fleet related emissions are trending lower over time, with some fluctuations. A graph showing the emissions since 2009–10 is provided in Appendix A.

The City's target for reduction in greenhouse gas emissions between 2009–10 and 2019–20 is 17% and with an 11.0% reduction by 2016–17 it is generally on track to achieve the target.



5. ENERGY CONSUMPTION IN 2016–17



The major energy source used by the City is electricity, which comprised 60.6% of the total energy use in 2016–17. Liquid fuels, including diesel and petrol and bottled LPG, used in vehicles and mobile plant make up about 36.6%, with the remaining 2.8% is natural gas used in CNG trucks and in facilities connected to the reticulated natural gas system.

The City's energy use has been reduced over recent years, largely as a result of energy efficiency measures. The amount used in the 2009–10 year was close to 97,700 GJ. In 2016–17 use had declined to about 67,700 GJ or a 30.8% reduction over 7 years. The reduction has been relatively broad based, though there have been increases at some sites, where additional infrastructure has been installed or there has been increased utilisation of a facility.

The building average energy intensity has been reduced from 370 MJ/m²/yr to 243 MJ/m²/yr (ie 34% since 2009–10). A graph showing the trend in building energy use is provided in Appendix A.

Fuel use has also declined significantly, with a reduction of over 30% since 2009–10.

The graph below shows energy use since 2009–10 with the dashed target line showing the straight line trajectory that the City would have to follow to meet its 35% reduction target by 2019–20. The actual result is tracking well ahead of the target line, though savings are becoming more difficult to achieve as the easier, more cost effective and larger energy efficiency works are completed.



The cost of energy to the City in 2016–17 was about \$2.4 million or about 1.8% of the City’s overall annual budget. This has been reduced from \$3.3 million in 2011–12, which was 2.9% of that year’s expenditure. In addition some of the projects have generated significant maintenance cost savings.

The major energy using activities are building operations, street lighting and vehicles and plant. The following table lists broad categories of uses and amount of energy used by each category. A comparison with usage in 2015–16 and the baseline year of 2009–10 is also included.

CATEGORY	ENERGY USE 2009-10	ENERGY USE 2015-16	ENERGY USE 2016-17	15-16 TO 16-17 CHANGE
Vehicles and plant	40 515 GJ	25 769 GJ	25 847 GJ	0.3%
Hobart Aquatic Centre	19 603 GJ	15 737 GJ	15 003 GJ	-4.7%
Street lighting	13 320 GJ	10 330 GJ	9 708 GJ	-6%
Civic and administrative buildings	12 874 GJ	8 028 GJ	7 122 GJ	-11.3%
Multi-storey car parks	4116 GJ	3 709 GJ	3 836 GJ	3.4%
Community halls and parks	2777 GJ	2 861 GJ	3 302 GJ	15.4%
Depots, waste management and nursery	3536 GJ	1 842 GJ	1 496 GJ	-18.7%
Public space lighting and fountains	1006 GJ	1 404 GJ	1 389 GJ	-1%
Total	97 747 GJ	69 680 GJ	67 704 GJ	-2.8%

The following sections provide information on factors affecting energy use and projects completed during 2016-2017. A table summarising the more significant projects is provided in Appendix B.

VEHICLES AND PLANT

Vehicle and Plant is the largest single category with 36.6% of the City's 2015-16 energy use. Much of the use is by trucks and heavy plant, including refuse and recycling collection, civil maintenance, civil construction, parks maintenance and Waste Management Centre operations activities. Fuel use in 2016-17 was virtually unchanged from the previous year, despite increases in usage such as at McRobies Gully Waste Management Centre where more green waste was received and composted. Reduction in fuel use is still trending downwards over the longer term. Work continues to be undertaken to reduce fuel use, including:

- Increasing fuel efficiency standards of new vehicles and plant, with fuel use being part of the selection criteria for purchases;
- When replacing vehicles with flashing lights, to require LED lights, which allow reduced engine use when use the lights is required for prolonged periods;
- Driver education programs have continued with the aim of more fuel efficient driving techniques; and
- Identifying areas where plant and vehicle use can be reduced.

DOONE KENNEDY HOBART AQUATIC CENTRE

The Hobart Aquatic Centre is a high energy use site due to long opening hours, significant heating requirements and the various mechanical plant systems such as circulating pumps and fans.

A 4.7% reduction in energy use was achieved in 2016-17 compared to the previous year. Several measures were taken during the year to improve efficiency at the site including:

- Installation of a further 302kW of solar panels (in addition to the existing 100kW system installed in 2015);
- Upgrade of the building management control system, with improvements to control of pool and air temperatures and reduction in pumping energy;
- Upgrade of plant room lights with more energy efficient tubes; and
- Planning of plant resiliency and sustainability improvements including use of natural gas and changes to the heating and hot water systems.

STREET LIGHTING

Street lighting in the City of Hobart area is largely managed and operated by TasNetworks and includes about 5,000 lights on roads around Hobart. In addition there are several hundred street lights on metered supplies, which are owned and operated by the City.

Approximately 200 lights were upgraded to more energy efficient lights during the year.

Electricity consumption by streetlighting was reduced by 6.0%, due to both changes to lights in 2016-17 and the full year's impact of the lights upgraded in the previous year.

CIVIC AND ADMINISTRATIVE BUILDINGS

In the City's civic and administrative buildings, including the Town Hall, Hobart Council Centre and Travel Information Centre, a reduction of 11.3% in energy use was achieved in 2016–17.

Significant projects completed during 2016–17 in these buildings included:

- Fluorescent lights were replaced with LED flat panel light in the Town Hall Annex and first floor of the Council Centre offices;
- Most of the lights in the Customer Services area of the Council Centre were upgraded to LED;
- A 25 kW solar panel system was installed on the Town Hall Annex; and
- Work commenced on replacing the heating systems in the Town Hall in Lower Ground Conference Room and the aldermen's lounge.

MULTI-STOREY CAR PARKS

The City owns or leases several multi-storey car parks being the Argyle St, Centrepont, Salamanca, Hobart Central and Trafalgar Car Parks. In 2016–17 the overall energy use increased slightly after a large decrease over the previous two years.

Lights were replaced in the Trafalgar Car Park with more efficient LED tubes. However as many of the previous lights had failed and were not working, energy use was largely unchanged though lighting levels were significantly improved. A reduction of about 40% in energy use would have been observed if the previous lights had been fully operational.

Significant maintenance cost savings will also be achieved as the LED lights have significantly longer lives than the equivalent fluorescent tubes.

COMMUNITY HALLS AND PARKS

The category of community halls and parks is very diverse, including the City Hall, local community halls, sporting facilities, local and historic parks. There was a significant increase in usage in this category in 2016–17 as a result of inclusion of gas usage by the Flame of Remembrance at the Cenotaph. Excluding the impact of the additional gas usage a reduction of about 10% occurred across this category.

The hot water services at the Horrie Gorrings Stand at North Hobart Oval were upgraded from LPG to natural gas, reducing greenhouse gas emissions and improving safety with reduced handling of gas bottles.

Solar panel systems were installed at North Hobart Oval, Mathers House and City Hall in December 2016.

Several public conveniences were upgraded during the year. Works at each facility included the upgrade of lights to energy efficient LED fittings.

DEPOTS, WASTE MANAGEMENT AND NURSERY

The overall usage at these sites was significantly lower (reduction of 18.7%) compared to the previous year, with savings achieved at a number of locations.

Many of the building heating systems at the Clearys Gates Depot were replaced with more efficient heat pumps.

Some of the external flood lights and workshop lights were replaced with energy efficient alternatives.

Solar panels were installed at Clearys Gates Depot, McRobies Gully Waste Management Centre, Mornington Nursery and the Bushland Works Depot on Huon Road.

PUBLIC SPACE LIGHTING AND FOUNTAINS

The public space lighting and fountains category includes lighting of walkways, squares and other non-street public spaces and fountains such those in Salamanca Square and at the Railway Roundabout.

Usage was marginally lower than in 2015–16 with no significant energy efficiency projects undertaken in this category of use during the year.

6. WORKS PLANNED FOR 2017–18

The following describes some of the works planned for 2017–18 to reduce energy use by the City's fleet and facilities.

VEHICLES AND PLANT

No specific projects have been identified for this category, however work will continue on:

- identifying ways to reduce plant usage and kilometres travelled by the City's fleet;
- improving the energy efficiency of plant and fleet through replacing equipment with more fuel efficient technology;
- requiring new vehicles and plant with flashing lights to have LED lighting technology;
- continue to monitor the availability of new technology such as electric, hybrid and fuel cell vehicles and plant; and
- providing driver and operator training in more fuel efficient techniques.

DOONE KENNEDY HOBART AQUATIC CENTRE

As the Hobart Aquatic Centre is a high energy user, this site will continue to be prioritised for energy efficiency improvements. Projects for 2017–18 include:

- Double glazing of the windows near the 25 metre pool;
- Changes to the domestic hot water service to reduce energy use;
- Decommissioning of the hot water thermal storage tank will reduce heat losses;

- Changes to the heat exchangers for the main pool air heating systems will increase the efficiency of heat transfer;
- Installation of natural gas will provide improved plant reliability but also the ability to manage maximum electricity demand;
- A system will be installed to recover heat from pool water filter backwash; and
- Further variable speed drives to be installed on some pumps.

STREET LIGHTING

Street lighting is gradually being upgraded to more energy efficient technology as lights reach the end of their lives. No major upgrades are planned for 2017–18, though it is likely that an LED replacement option for higher wattage lights for standard street lighting will be available in the next few years.

CIVIC AND ADMINISTRATIVE BUILDINGS

Work to upgrade heating in the Town Hall Lower Ground Conference Room and aldermen's lounge will be completed in 2017.

New insulation is to be installed in the roof of the main Town Hall auditorium.

New building management systems are to be implemented in the Town Hall and Council Centre, which will enable improvements to control of building systems leading to energy efficiency gains at both sites.

Further lights will be upgraded to LED technology in those areas of the Town Hall and Council Centre which have less energy efficient lights.



MULTI-STOREY CAR PARKS

Solar panel systems are to be installed at the Centrepoint and Hobart Central Car Parks with a combined capacity of 50kW. These were originally planned for 2016-2017, but it has taken longer than expected to finalise the design and gain approval for suitable support structures.

A review of ventilation fan operations is to be undertaken at relevant car parks to identify potential savings.

COMMUNITY HALLS AND PARKS

Fluorescent lights will be replaced with LED alternatives in several buildings in this category during 2017–18, including a number of public toilets throughout the City.

DEPOTS, WASTE MANAGEMENT AND NURSERY

Projects for 2017-2018 at the Clearys Gates Depot include investigation of more energy efficient heating systems for the workshops and potential for more solar panels.

A range of energy efficiency works including lighting and heating are to be investigated at the Bushland Depot and cost effective measures will be implemented.

PUBLIC SPACE LIGHTING AND FOUNTAINS

A project to upgrade the Mawson Place cardinal lights to LED will be completed in 2017–18 with energy savings of about 70% expected.

Other public space lighting such as in the Elizabeth St Mall and North Hobart is to be reviewed to identify further opportunities to reduce energy use.

SOLAR PANELS

An investigation is to be undertaken into the potential for further solar photovoltaic systems to be installed at the City's facilities.

ENERGY SAVINGS ACTION PLAN

The City of Hobart's Energy Savings Action Plan, endorsed by the Council in 2014 is guiding the continuing work to reduce the City's energy use. Most of the actions identified in the Plan have either been completed or are in progress, along with further works that had been identified in the period since the Plan was approved.

A new plan is being developed for the City's plant and facilities for the 2018–20 period.

APPENDIX A:

STRATEGIC MEASURES: FLEET GREENHOUSE GAS EMISSIONS AND BUILDING ENERGY EFFICIENCY 2009–10 TO 2016–17

FIGURE A1: CITY OF HOBART FUEL RELATED GREENHOUSE GAS EMISSION 2009-10 TO 2016-17

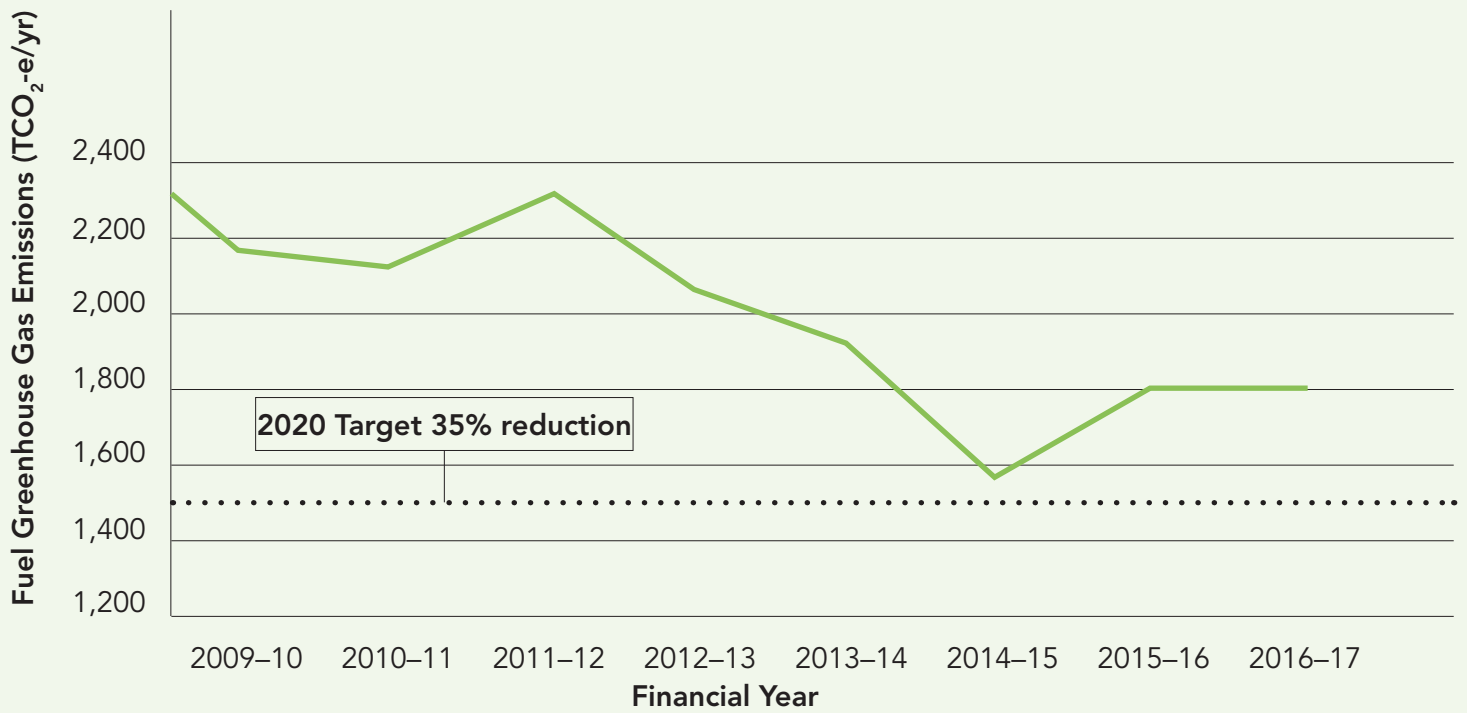
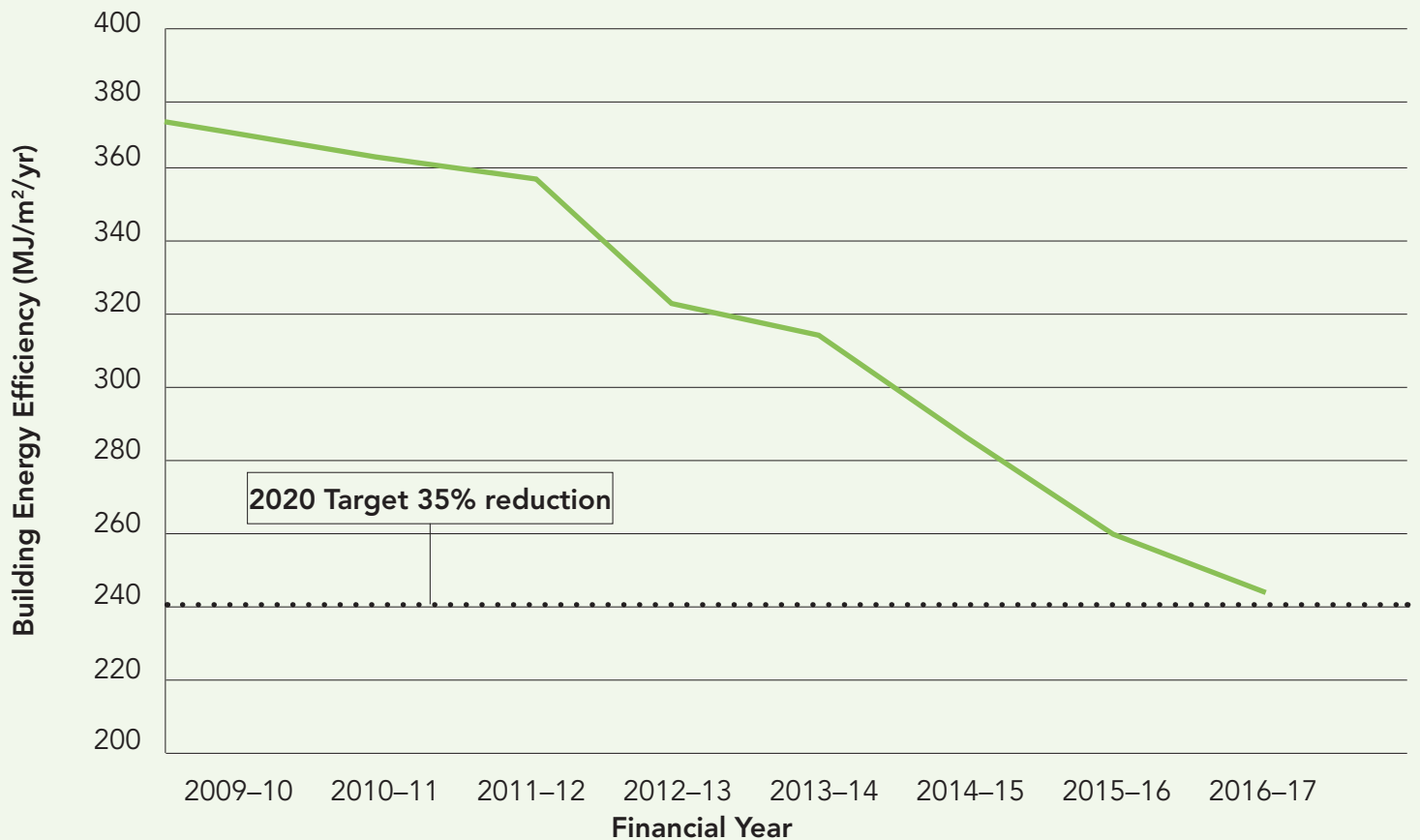


FIGURE A2: CITY OF HOBART BUILDING AVERAGE ENERGY INTENSITY 2009-10 TO 2016-17



APPENDIX B:
SIGNIFICANT GREENHOUSE GAS EMISSION
AND ENERGY REDUCTION PROJECTS –
SUMMARY LIST 2016–17

PROJECT TITLE	COST	SAVINGS*	GHG SAVINGS	ENERGY SAVINGS
Hobart Aquatic Centre – 302kW Solar Panel System	\$430 000	\$80 000	85 tCO ₂ -e/yr	1400 GJ/yr
Hobart Aquatic Centre – Building Management System Upgrade	\$105 000	\$28 000	35 tCO ₂ -e/yr	600 GJ/yr
Hobart Aquatic Centre – Plant Room Replacement of LED Tubes	\$4000	\$1200	1 tCO ₂ -e/yr	20 GJ/yr
Fleet – Ongoing replacement with more fuel efficient vehicles	In vehicle cost	\$20 000 (est)	30 tCO ₂ -e/yr (est)	250 GJ/yr (est)
Council Centre – Customer Service area to LED lights	\$30 000	\$11000	8 tCO ₂ -e/yr	130 GJ/yr
Council Centre – 1st Floor Offices to LED lights	\$50 000	\$15000	16 tCO ₂ -e/yr	270 GJ/yr
Town Hall – Annex office lights to LED	\$31 000	\$8000	8.5 tCO ₂ -e/yr	130 GJ/yr
Town Hall – Solar Panels (25kW system)	\$28 500	\$4500	7.5 tCO ₂ -e/yr	115 GJ/yr
Trafalgar Car Park – Replacement with LED Tubes	\$75 000	\$20 000	15 tCO ₂ -e/yr	220 GJ/yr
Clearys Gates Depot – Office Heating to Heat Pumps	\$70 000	\$15 000	18 tCO ₂ -e/yr	290 GJ/yr
Clearys Gates Depot – Solar Panels (10kW system)	\$14 000	\$3000	3 tCO ₂ -e/yr	45 GJ/yr
Mornington Nursery – Solar Panels (3kW system)	\$4000	\$1200	1 tCO ₂ -e/yr	14 GJ/yr
McRobies Gully Waste Management Centre – 10kW Solar Panels	\$14 000	\$3000	3 tCO ₂ -e/yr	45 GJ/yr
Bushland Depot – Solar Panels (3kW system)	\$4000	\$1200	1 tCO ₂ -e/yr	14 GJ/yr
North Hobart Oval – Solar Panels (4kW system)	\$5500	\$1400	1.3 tCO ₂ -e/yr	18 GJ/yr
City Hall – Solar Panels (5kW system)	\$7000	\$1800	1.5 tCO ₂ -e/yr	22 GJ/yr
Mathers House – Solar Panels (3kW system)	\$4000	\$1200	1 tCO ₂ -e/yr	14 GJ/yr
Public Toilets – Refurbished with LED Lights	\$10 000	\$3000	2 tCO ₂ -e/yr	30 GJ/yr
Totals	\$886 000	\$230 900/yr	238 tCO₂-e/yr	3627 GJ/yr

*Note: Savings include any associated increase or reduction in maintenance costs

A number of minor projects that were completed in 2016-2017 have not been included in the list.

Hobart Town Hall,
Macquarie Street,
Hobart,
Tasmania 7000 Australia
t (03) 6238 2711
f (03) 6238 2186
e coh@hobartcity.com.au
w hobartcity.com.au