

GREENHOUSE GAS EMISSIONS AND ENERGY USE ANNUAL REPORT 2017-18



City of **HOBART**



TABLE OF CONTENTS

1. SUMMARY	4
2. INTRODUCTION	6
3. BACKGROUND	8
4. GREENHOUSE GAS EMISSION IN 2017–18	10
5. ENERGY CONSUMPTION IN 2017–18	14
6. WORKS PLANNED FOR 2019–20	18
APPENDIX A	22
STRATEGIC MEASURES: FLEET GHG EMISSIONS AND BUILDING ENERGY EFFICIENCY 2009–10 TO 2017-2018	
APPENDIX B	22
CITY OF HOBART GREENHOUSE GAS EMISSION AND ENERGY REDUCTION PROJECTS – SUMMARY LIST 2017–18	

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 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 2017-2018 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 2019-2020, and the target for energy use is for 35% lower usage over the same timeframe. The Council has endorsed a second Energy Savings Action Plan (for the period 2018 to 2020) 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 this report in line with this change, along with the emissions target and are thus not directly comparable with information provided in reports prior to the 2015-2016 year.

In 2017-2018 the City's emissions were reduced to a total of 19,105 tCO₂-e or 618 tonnes CO₂-e lower than the previous year. A reduction of 14.3% has been achieved since

2009-2010. The City remains on track to meet the revised 2020 target of 18,497 tCO₂-e.

Energy use was reduced by 0.6% in 2016-2017 to 67,258 gigajoules and is now 31.2% below that consumed in 2009-2010. This remains ahead of the reduction needed to achieve the 35% reduction target for 2019-2020.

A number of energy efficiency projects were completed in 2017-2018. These projects included a range of works at the Doone Kennedy Hobart Aquatic Centre (DKHAC), including the installation of numerous mechanical plant and valve changes, and some modifications to control systems to reduce pumping costs and improve heat transfer efficiency. The domestic hot water system at DKHAC was upgraded and now uses the heat pump system for water heating with natural gas backup.

Several energy efficiency projects were undertaken in the Town Hall including improved heating systems in several meeting rooms and the main foyer, along with better ceiling insulation in the main auditorium. Two of the three main air conditioning units were replaced in the Hobart Council Centre building with more energy efficient modern units. Heating of offices in the Hobart Central Car Park was upgraded to heat pump technology. A project to upgrade the public space lighting at Mawson Place to LED technology was completed in October 2017.

In addition to this work further upgrading of building lighting to LED technology was undertaken in the Hobart Council Centre offices, Town Hall and Clearys Gates works

depot, along with that in those public toilets which were upgraded during the year. The total investment in these the various projects was about \$1,050,000 with expected cost savings of about \$165,000 per annum.

In terms of renewable energy, 20kW of solar panels were installed at Hobart Central Car Park.

Further projects to reduce energy use and emissions are planned for 2018-2019, including the installation of an extra 175 kilowatts of solar panels on the City's buildings, completion of the solar panel system on Centrepoint Car Park, upgrades to building management control systems in the Town Hall and Hobart Council Centre buildings, optimisation of newly installed heating and related mechanical plant works at the DKHAC and further upgrade of lights with energy efficient LED technology in City owned buildings and public lighting.

An Energy Savings Action Plan has been endorsed by the Council 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 2017-18 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 on 1 July 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 both its Scope 1 and Scope 2 greenhouse gas emissions.

Scope 1 emissions are those directly emitted including combustion products from fuel use such as 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).

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

Scope 2 emissions are 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 a 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 2019-2020 from 2009-2010 levels.



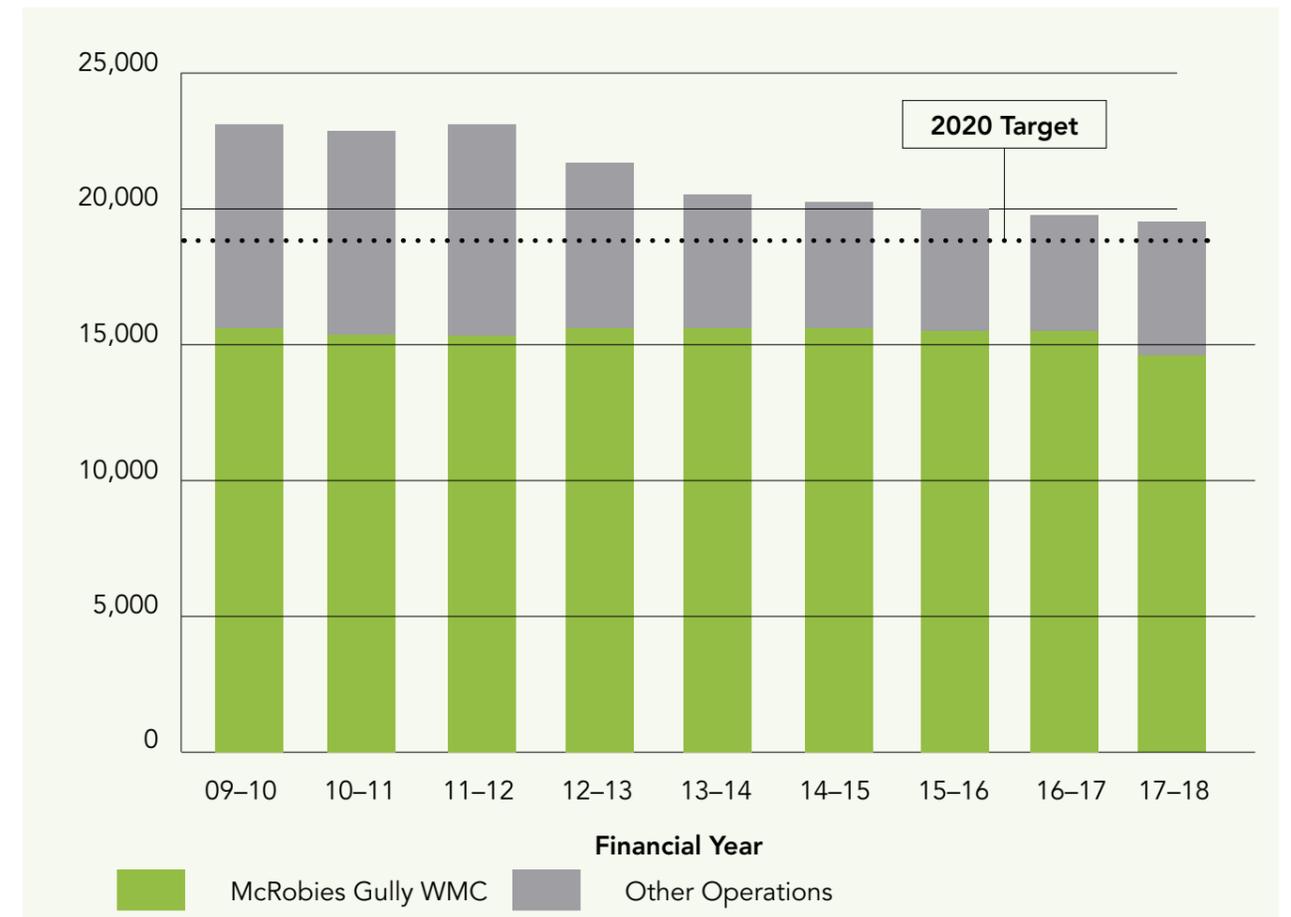


4. GREENHOUSE GAS EMISSIONS IN 2017–18

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 2017-2018 year were 19,105 t CO₂-e, including the indirect emissions from electricity use, a reduction of 618 t CO₂-e on the previous year and 3,180 tCO₂-e or a 14.3% drop since 2009-2010.

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 CO2-E/YR)			
YEAR	TOTAL	MCRORIES 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
2017-18	19,105	14,697	4,408

The emissions from McRobies Gully Waste Management Centre have been relatively stable since 2009-2010 though decreasing over the past 5 years, while emissions from energy use and other operations have been dropping more significantly in percentage terms.

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. So even though the amount of waste being landfilled has dropped by 57% over the past five years, emissions have only dropped by 9.4% from its peak as most of the emissions are generated by waste previously disposed at the site.

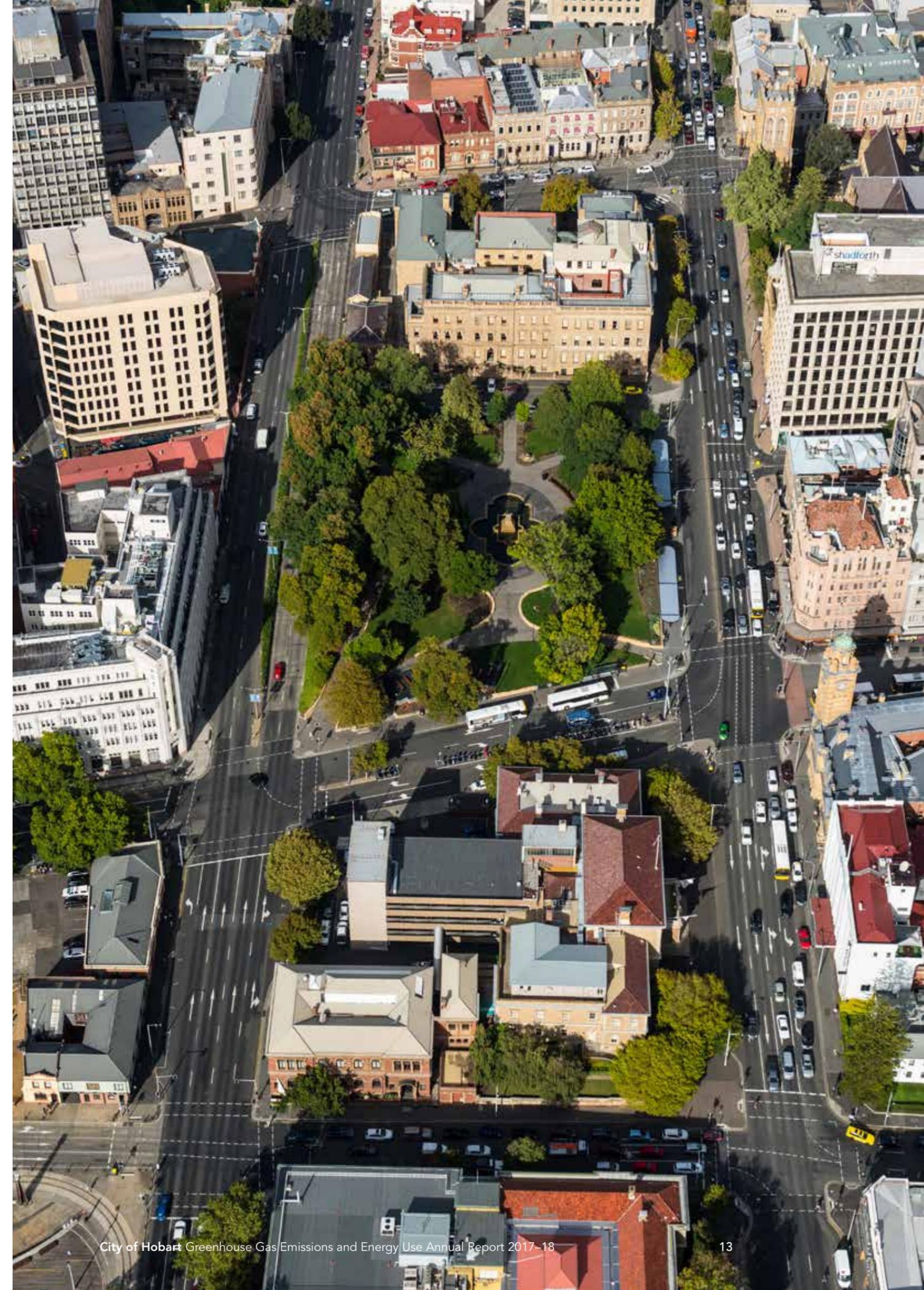
Landfill gas collection has been extended across all suitable areas of the site to minimise these emissions, but there is a limit to the proportion of gas that can feasibly be extracted. Without gas collection the emissions from the buried waste would be over 50,000 tCO₂-e per year.

The lower emissions in 2017-2018 resulted from the continuing reduction in the quantities of waste being received and a change to the emissions factor for composting operations.

Emissions from the City's other operations have been lowered over recent years. A reduction of 48tCO₂-e was achieved in 2017-2018 compared to the previous year for these "other operations", and these have been reduced by about 1,893 tCO₂-e (or 29%) since 2009-2010.

The emissions from the City's fleet of vehicles and plant in 2017-2018 was virtually the same as that in the previous year. Fleet related emissions are trending lower over time, with some fluctuations. A graph showing these emissions since 2009-2010 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 a 14.3% reduction by 2017-2018 it is on track to achieve the target.





5. ENERGY CONSUMPTION IN 2017-18

The major energy source used by the City is electricity, which comprised 58.2% of the total energy use in 2017-2018. Liquid fuels, including diesel and petrol and bottled LPG, used in vehicles and mobile plant make up about 36.8%, with the remaining 5.0% is natural gas used in CNG trucks and in facilities connected to the reticulated natural gas system.

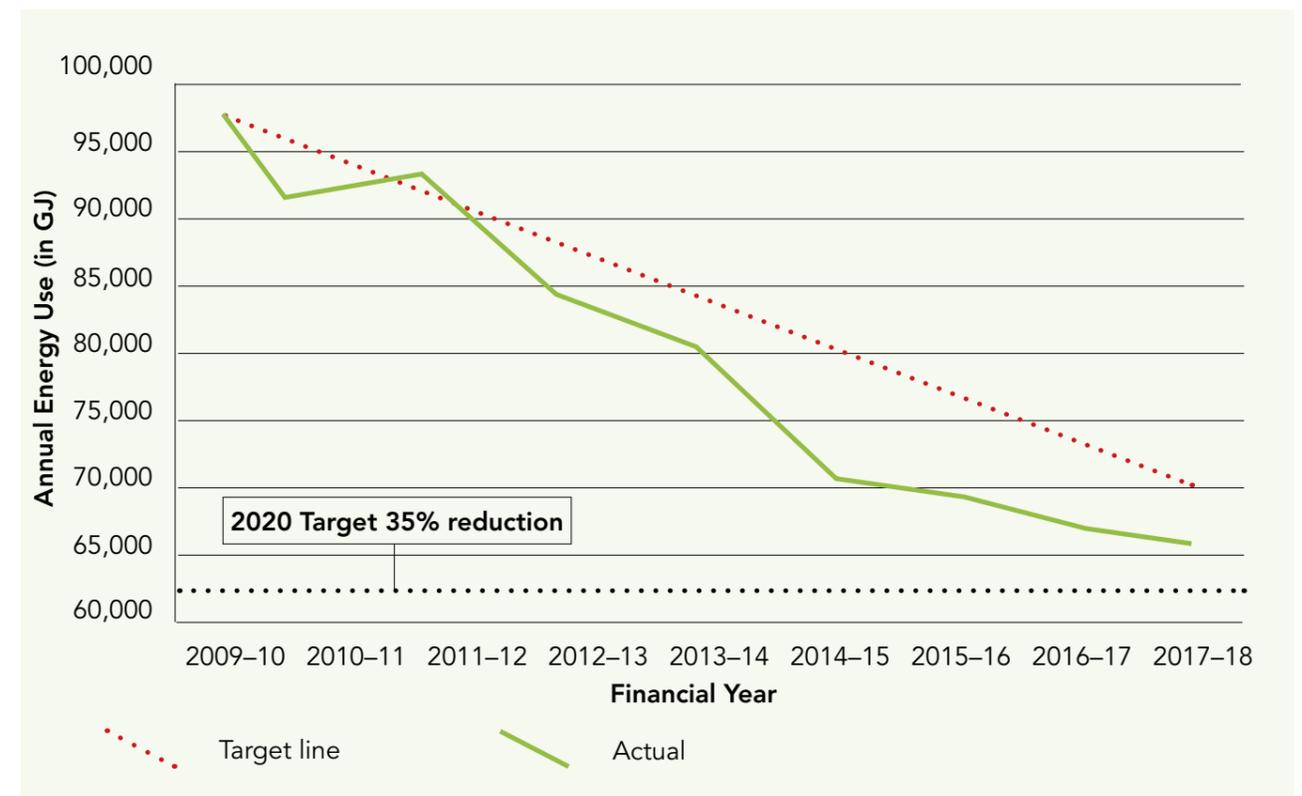
The City's energy use has been reduced over recent years, largely as a result of energy efficiency measures and installation of solar panels producing renewable energy. The amount of energy used in the 2009-2010 year was close to 97,700 GJ. In 2017-2018 use had declined to about 67,260 GJ or a 31.2% reduction over 8 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 240 MJ/m²/yr (ie 35% since 2009-2010). 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 2009-2010.

The graph below shows energy use since 2009-10 with the dashed target line showing the straight trajectory that the City would have to follow to meet its 35% reduction target by 2019-2020. The actual result is tracking ahead of the target line, though savings are becoming more difficult to achieve as the more cost effective and larger scale energy efficiency works are completed. It is anticipated that the 35% target may be achieved in 2018-2019 as the full year impacts of projects completed over the past two years are realised.

While the reduction in 2017-2018 was lower than that achieved in previous years this was affected by the upgrade works at the Doone Kennedy Hobart Aquatic Centre. This is the City's largest single energy using facility. A number of interim operating changes were needed during the project to ensure DKHAC could remain open and provide an appropriate level of service to customers. It is estimated that these changes resulted in approximately an extra 1,000GJ of energy use by the backup boiler to support operations. The upgrade works incorporated a number of energy efficiency improvements, which are expected to reduce energy use at DKHAC by up to 15% in 2018-2019.



The cost of energy to the City in 2017-2018 was about \$2.3 million or about 1.7% 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 2016-2017 and the baseline year of 2009-2010 is also included.

CATEGORY	ENERGY USE 2009-2010	ENERGY USE 2016-2017	ENERGY USE 2017-2018	16-17 TO 17-18 CHANGE
Vehicles and Plant	40 515 GJ	25 847 GJ	25 743 GJ	-0.4%
Hobart Aquatic Centre	19 603 GJ	15 003 GJ	14 967 GJ	-0.2%
Street Lighting	13 320 GJ	9 980 GJ	9 935 GJ	-0.5%
Civic and Administrative Buildings	12 874 GJ	7 122 GJ	6,945 GJ	-2.5%
Multi-storey car parks	4 116 GJ	3 836 GJ	3 699 GJ	-3.6%
Community halls and parks	2 777 GJ	3 302 GJ	3 295 GJ	-0.2%
Depots, waste management and nursery	3 536 GJ	1 496 GJ	1 301 GJ	-13.0%
Public space lighting and fountains	1 006 GJ	1 389 GJ	1 381 GJ	-0.6%
Total	97 747 GJ	67 704 GJ	67 267 GJ	-0.6%

The following sections provide information on factors affecting energy use and projects completed during 2017-2018. A table summarising the more significant projects is provided in Appendix B.

VEHICLES AND PLANT

Vehicle and Plant is the largest single category with 38.3% of the City's 2017-2018 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 2017-2018 was slightly lower than the previous year, and is trending downwards over the longer term. Work has continued to be undertaken to reduce fuel use, including:

- Increasing fuel efficiency standards of new vehicles and plant, with fuel efficiency being part of the selection criteria for purchases;
- Driver education programs have continued with the aim of more fuel efficient driving techniques;
- Investigation of alternative technologies, such as electric vehicles; 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.

Only a 0.2% reduction in energy use was achieved in 2017-2018 compared to the previous year. The main factor contributing to the small reduction was additional energy use of about 1,000 GJ required to maintain operations during the various changes during the plant upgrade works.

Several measures were taken during the year to improve efficiency at the site including:

- Domestic hot water system for showers was changed to UV disinfection and heat pump based heating, with an overall reduction in energy use;
- Heat exchanger loops and the thermal storage tanks were removed through reconfiguration of piping, reducing pumping energy use and improving thermal performance;
- New valve actuators, variable speed drives and reconfiguration of piping to remove control valves all contributed to lower pumping energy use; and
- Some lights were replaced with more energy efficient LED alternatives.

In addition the electric backup boiler was replaced with a natural gas based system. While this will not save energy it is expected to assist in reducing energy costs when backup heating is required. While natural gas combustion will increase greenhouse gas emissions, this boiler is only expected to be used occasionally and impact on the City's emissions will be small.

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 20 lights were upgraded to more energy efficient lights during the year and electricity consumption by streetlighting was reduced by 0.5%.

TasNetworks have recently tendered for supply of lights for the next five years and a range of LED alternatives have been chosen for replacing major category lights. The availability of an LED options for these lights will result in more significant savings over coming years.

CIVIC AND ADMINISTRATIVE BUILDINGS

In the City's civic and administrative buildings, including the Town Hall, Hobart Council Centre and Tasmanian Travel Information Centre, a reduction of 2.5% in energy use was achieved in 2017-2018.

Significant projects completed in these buildings during the year included:

- Two of the main air conditioning units in the Council Centre were replaced with more efficient, modern systems;
- A number of lights in the Town Hall and Council Centre upgraded to LED, including the Town Hall parking deck and basement car park lights;
- New insulation was installed in the ceiling of the Town Hall main auditorium; and
- Heating systems in the Town Hall in some meeting rooms and Town Hall foyer were replaced with more energy efficient heat pumps and improved controls.

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 2017-2018 the overall energy use decreased by 3.6%.

Heating systems in the Hobart Central Car Park were reviewed, and the main office system at that Car Park was upgraded to a more efficient heat pump based system.

A 20kW solar panel system was installed in Hobart Central Car Park and was commissioned in early July 2018.

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 small decrease of 0.5% in this category in 2017-2018, primarily as a result of a full year's production from solar panels installed in the previous year.

Some public conveniences were upgraded during the year. Works at each facility included the upgrade of lights to energy efficient LED fittings. The internal and external lights in the Mawson Pavilion were upgraded to LED during the year.

DEPOTS, WASTE MANAGEMENT AND NURSERY

The overall usage at these sites was significantly lower, with a reduction of 13.0% compared to the previous year, with savings achieved at a number of locations.

Some savings were due to a full year's operation of upgraded building heating systems at the Clearys Gates Depot which had been replaced with more efficient heat pumps during 2016-2017.

Remaining external flood lights at Clearys Gates Depot were replaced with energy efficient alternatives.

Solar panels installed during the previous year at Clearys Gates Depot, McRobies Gully Waste Management Centre, Mornington Nursery and the Bushland Works Depot on Huon Road contributed savings from a full year of operation.

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 the Railway Roundabout.

Usage was marginally lower than in 2017-2018 with savings from the upgrade of the Mawson Place Cardinal Lights and some of the lights in the Elizabeth St Mall, offset by additional energy use from a full year's operation of Morrison Street streetlights, new lights in the Franklin Square bus stops and at the new Sandy Bay Retail Precinct lighting.



6. WORKS PLANNED FOR 2018–19

The following describes some of the works planned for 2018-2019 to reduce energy use by the City's fleet and facilities.

VEHICLES AND PLANT

An electrical vehicle charging station is to be installed on the Town Hall car parking deck, suitable for charging future City fleet electric vehicles and for use by members of the public.

No other 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;
- monitoring the availability of new technology such as electric, hybrid and fuel cell vehicles and plant (it appears that availability in Australia will likely increase in the next 2-3 years); and
- providing driver and operator training in more fuel efficient techniques.

DOONE KENNEDY HOBART AQUATIC CENTRE

As the DKHAC is a high energy user, this site will continue to be prioritised for energy efficiency improvements. Projects for 2018-2019 include:

- Double glazing of the windows near the 25 metre pool;
- Completing the installation of further pump variable speed drives;

- Work to optimise the plant upgrade works undertaken in 2017-2018; and
- Investigation of air tightness and works to minimise the ingress of external air.

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 2018-2019, though it is likely that an LED replacement option for higher wattage lights for standard street lighting will be available in the coming years. When these lights are to be upgraded smart controls will also be installed.

CIVIC AND ADMINISTRATIVE BUILDINGS

New building management systems are to be implemented in the Town Hall and Council Centre building, 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 remaining areas of the Town Hall and Council Centre which have less energy efficient lights. Some further solar panels are to be installed on the non-heritage area of the Town Hall.

MULTI-STOREY CAR PARKS

The installation of 31 kilowatts of solar panels at Centrepoint Car Park will be completed.

A review of ventilation fan operations including the use of carbon dioxide sensors to control

flowrates is to be undertaken at Argyle Street, Centrepoint and Salamanca car parks to identify potential savings.

The new toilets at the Argyle Street Car Park will have energy efficient lighting and hot water systems.

COMMUNITY HALLS AND PARKS

Fluorescent lights will be replaced with LED alternatives in several buildings in this category during 2018-2019, including a number of public toilets throughout the City.

Approval has been given to fund the installation of solar panels on the City Hall, Mathers House and North Hobart Oval.

DEPOTS, WASTE MANAGEMENT AND NURSERY

Projects for 2018-2019 at the Clearys Gates Depot include the installation of more energy efficient heating systems in the workshops and additional solar panels.

Further solar panels are also to be installed at the Bushland Depot and McRobies Gully Waste Management Centre.

PUBLIC SPACE LIGHTING AND FOUNTAINS

The upgrade of area lighting in Elizabeth Street Mall is to be completed. A range of public space lighting services such as in Wellington Court, North Hobart and along Castray Esplanade are to be reviewed to identify further opportunities to reduce energy use. The operations of the fountain in Franklin Square are to be reviewed for opportunities to reduce energy use.

ENERGY SAVINGS ACTION PLAN

The City of Hobart's Energy Savings Action Plan 2018-2020 was endorsed by the Council in 2017. This Plan is guiding the continuing work to reduce the City's energy use. Of the actions listed in this Plan, 12 have been completed, 26 are in progress and 33 are yet to be commenced. In addition a further eight projects not listed in the Plan have been completed.

APPENDIX A:
STRATEGIC MEASURES: FLEET GREENHOUSE GAS EMISSIONS AND BUILDING ENERGY EFFICIENCY 2009-2010 TO 2017-2018

FIGURE A1: CITY OF HOBART FUEL RELATED GREENHOUSE GAS EMISSION 2009-2010 TO 2017-2018

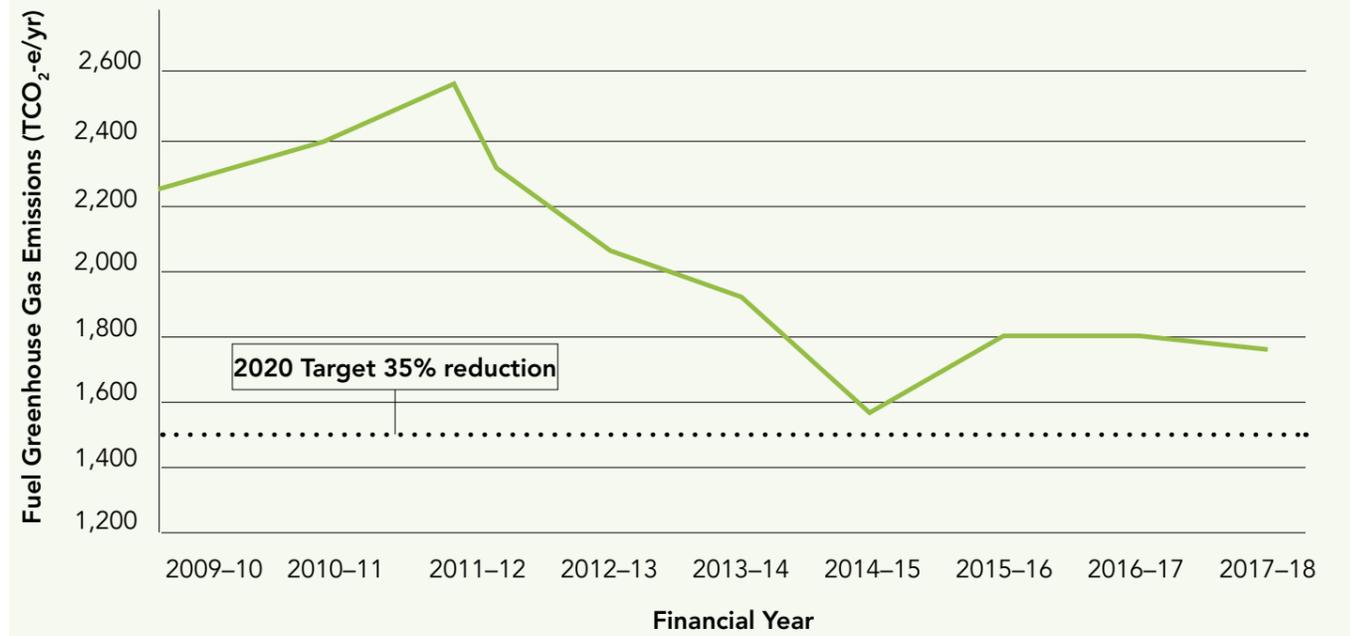
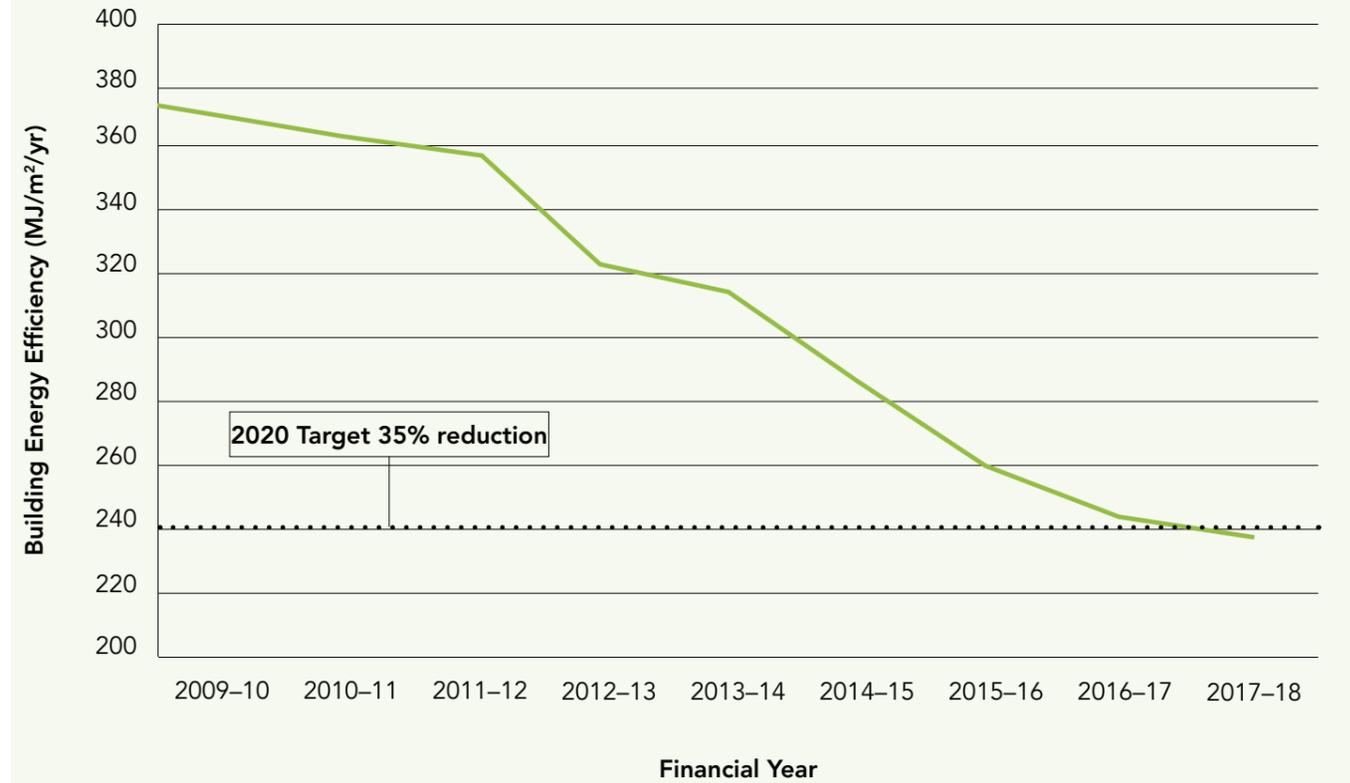


FIGURE A2: CITY OF HOBART BUILDING AVERAGE ENERGY INTENSITY 2009-2010 TO 2017-2018



APPENDIX B:
SIGNIFICANT GREENHOUSE GAS EMISSION
AND ENERGY REDUCTION PROJECTS –
SUMMARY LIST 2017-2018

PROJECT TITLE	COST	SAVINGS*	GHG SAVINGS	ENERGY SAVINGS
Fleet – Ongoing replacement with more fuel efficient vehicles	In vehicle cost	\$10 000 (est)	15 tCO2-e/yr (est)	125 GJ/yr (est)
Hobart Aquatic Centre – Water Heating Pump Circuit Changes	\$72 000	\$23 000	32 tCO2-e/yr	500 GJ/yr
Hobart Aquatic Centre – Heat Exchanger Control Upgrade	\$23 000	\$5 000	11 tCO2-e/yr	180 GJ/yr
Hobart Aquatic Centre – Variable Speed Drives for pumps	\$15 000	\$8 500	11 tCO2-e/yr	170 GJ/yr
Hobart Aquatic Centre – Amenities Hot Water Upgrade	\$70 000	\$6 500	9 tCO2-e/yr	145 GJ/yr
Council Centre – Replacement/upgrade of 2 main heat pumps	\$210 000	\$15 000	11 tCO2-e/yr	180 GJ/yr
Council Centre – Stairwell and Parking office lights to LED	\$7 000	\$1 200	1 tCO2-e/yr	15 GJ/yr
Town Hall – Elizabeth St Conference Room Heating Upgrade	\$39 000	\$6 000	7.5 tCO2-e/yr	120 GJ/yr
Town Hall – Ceiling Insulation in Main Hall	\$30 000	\$4 000	6 tCO2-e/yr	90 GJ/yr
Town Hall – Heating upgrades in meeting rooms	\$26 000	\$5 500	8 tCO2-e/yr	130 GJ/yr
Town Hall – Lighting upgrade to LED in offices/meeting rooms	\$46 000	\$10 000	9 tCO2-e/yr	135 GJ/yr
Town Hall – Macquarie St Wing Main Heating Upgrade	\$28 000	\$7 500	9 tCO2-e/yr	165 GJ/yr
Hobart Central Car Park – Solar Panels (20kW system)	\$25 000	\$3 500	6 tCO2-e/yr	95 GJ/yr
Hobart Central Car Park – Office and Amenities Heating Upgrade	\$10 000	\$2 000	4.5 tCO2-e/yr	70 GJ/yr
Clearys Gates Depot – Area lighting upgrade and lights sensors	\$10 500	\$2 500	3.5 tCO2-e/yr	55 GJ/yr
City Hall – External Lighting Upgrade to LED	\$11 000	\$2 000	1.5 tCO2-e/yr	22 GJ/yr
Mawson Pavilion – External and Internal Lighting to LED	\$11 000	\$1 500	1.5 tCO2-e/yr	22 GJ/yr
Bushland Depot – Energy retrofit	\$5 000	\$1 100	1 tCO2-e/yr	15 GJ/yr
Railway Roundabout Fountain – Underpass lighting upgrade	\$3 000	\$500	0.5 tCO2-e/yr	10 GJ/yr
Mawson Place Cardinal Lights – Upgraded with LED Lights	\$147 000	\$5 000	3 tCO2-e/yr	43 GJ/yr
Totals	\$788 500	\$120 300/yr	136 tCO2-e/yr	2 287 GJ/yr

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

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