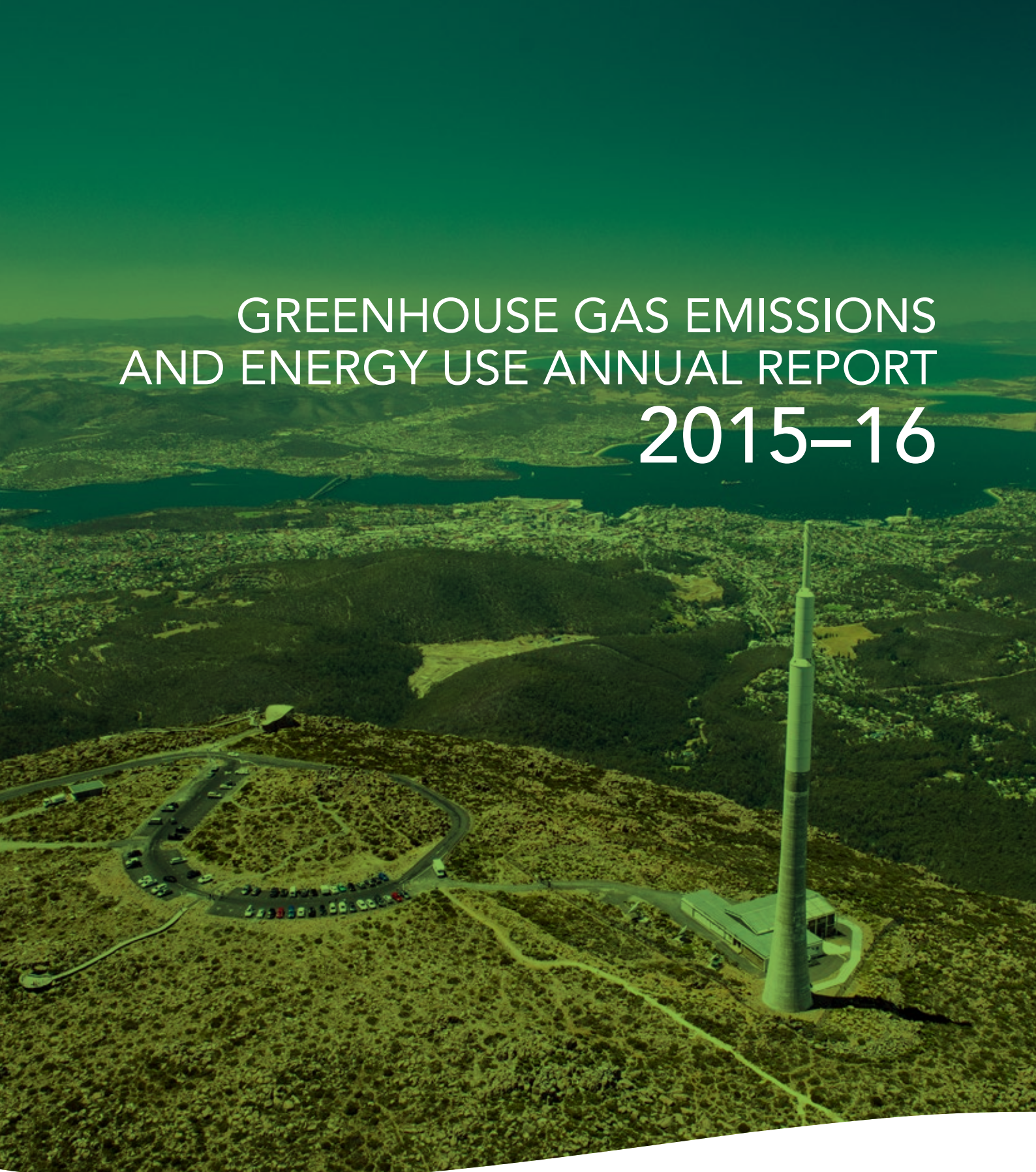


GREENHOUSE GAS EMISSIONS AND ENERGY USE ANNUAL REPORT 2015–16



City of **HOBART**



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1. SUMMARY

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 2015–16 financial year.

In 2014, the Hobart City 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 work towards these targets.

As a result of changes internationally, the global warming potential of methane has been revised upwards from 21 to 25 in the National Greenhouse Accounts Factors. This has affected the City's reported GHG 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 previous reports.

In 2015–16 the City's GHG emissions were reduced by 433 tCO₂-e (tonnes of carbon dioxide equivalents) to a total of 20 018 tCO₂-e. A reduction of 10.2% has been achieved since 2009–10. The City is on track to meet the revised 2020 target of 18 497 tCO₂-e.

Energy use was reduced by 3% in 2015–16 to 69 700 gigajoules and is now 28.7% below that consumed in 2009–10. This is well in advance of the reduction needed to achieve the 35% reduction target for 2019–20.

A number of energy efficiency projects were completed in 2015–16. These projects included the installation of 100 kW (kilowatt) solar panels on the roof of the Doone Kennedy Hobart Aquatic Centre, along with new systems to better control air flow, reducing heat losses, and an upgrade to energy efficient lights at the main entrance to the centre.

In addition to this work:

- a further 200 TasNetworks streetlights with 80 watt mercury vapour lights were replaced with 18 watt LED (light-emitting diode) technology lights
- fluorescent light tubes were replaced with LED tubes at several facilities
- heating, lighting and hot water system works were undertaken at the Clearys Gates Depot
- new LED lights installed as part of the Franklin Square refurbishment project.

The total investment in these projects was about \$900 000, with expected savings of about \$190 000 per annum.

Further projects to reduce energy use and GHG emissions are planned for 2016–17, including:

- installation of approximately 300 kW of solar panels on the City's buildings
- continuation of energy retrofit works at the Clearys Gates Depot
- an upgrade of the Mawson Place cardinal lights to LED with improved controls
- further replacement of lights with energy efficient LED lighting systems in City owned offices, depots and community buildings.



2. INTRODUCTION

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

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 2015–16 financial year.

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

This report uses 2009–10 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 GHG emissions and about 25% of energy use.



GREENHOUSE GAS EMISSIONS

The City measures its Scope 1 and Scope 2 GHG emissions.

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

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

GHG 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.

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 mix of renewable hydro and wind, natural gas (Bell Bay) and coal based electricity imported via Bass Link and can have a significant impact on comparing one year's emissions with another.

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 1000 million joules. For comparison, a medium sized car travelling 15 000 kilometres per year uses about 40 GJ/yr, while a four-person household using electricity for heating and hot water consumes about 25–30 GJ/yr.

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 factor of 25 for methane.

Between the years 2000 and 2010 the City reduced its GHG 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 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 only 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 for lowering 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.

The City has an internal Energy Management Team which coordinates both energy and GHG reduction related projects. The City has an environmental management system (third party certified to ISO 14001), which includes consideration of energy use and GHG emissions, along with other environmental impacts of the City's operations.

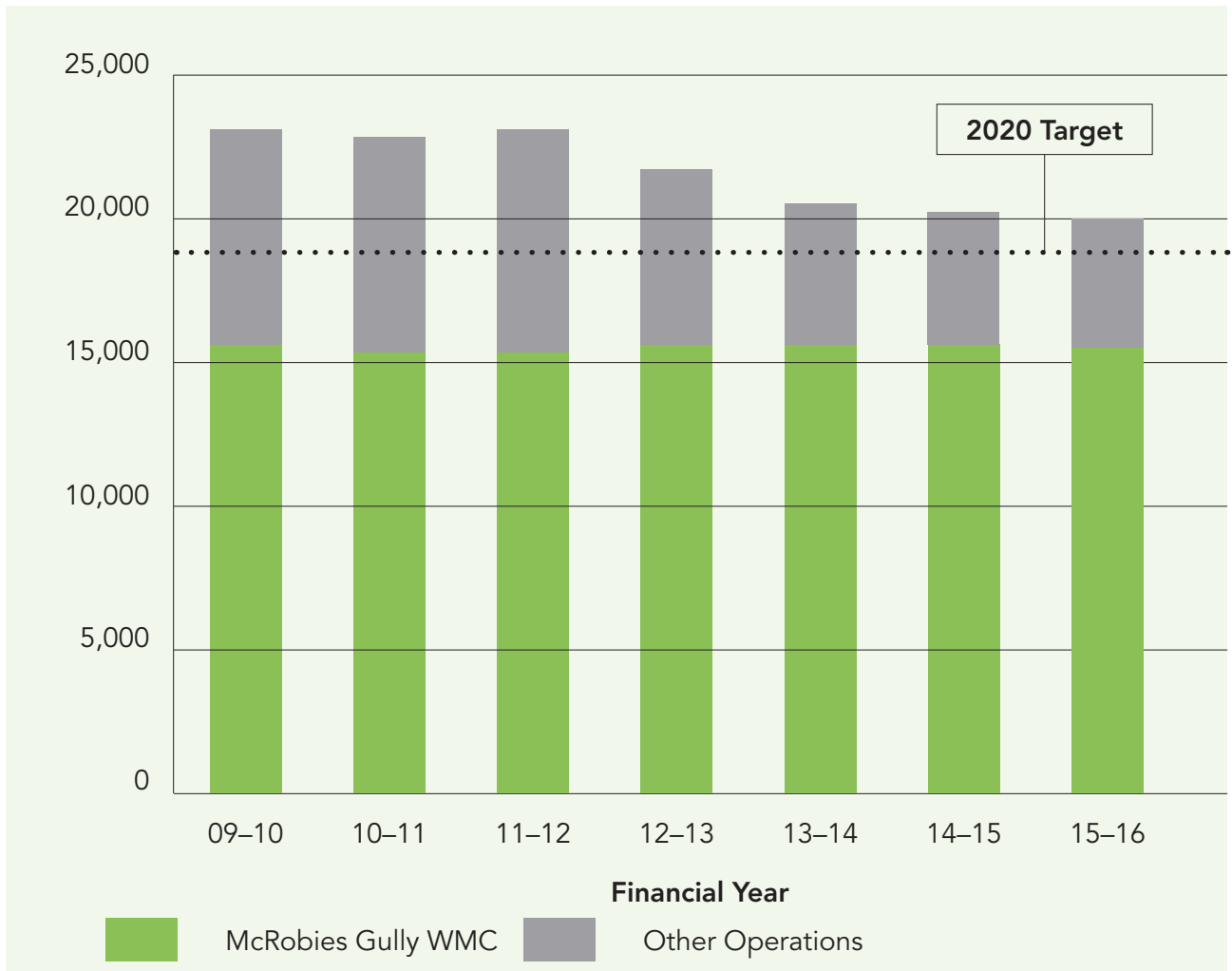


4. GREENHOUSE GAS EMISSIONS IN 2015–16

In regard to GHG emissions, internationally there has been agreement to adjust the global warming potential factors for some greenhouse gases, based on better understanding of their impacts. The most significant of these changes has been the increase in methane from 21 times that of CO₂ to 25 times. The reporting of the City's emissions over the past seven years has been adjusted to allow for the recent changes to the global warming potential factors for greenhouse gases. Thus, the values contained herein are not directly comparable with those presented in the 2014–15 report.

Using this revised basis, the City's corporate GHG emissions for the 2015–16 year were 20 018 tCO₂-e, including the indirect emissions from electricity use, a reduction of 433 tCO₂-e on the previous year and 2267 tCO₂-e, or 10.2%, since 2009–10.

The graph below displays emissions data over the past seven 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

The emissions from McRobies Gully Waste Management Centre have been relatively stable though starting to decrease over the past three years, while emissions from energy use and other operations have been dropping more significantly.

The largest source of the City's GHG 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%, emissions are still be generated by waste previously disposed at the site.

Landfill gas collection has been extended across 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.

Emissions from the City's other operations have been lowered over recent years. A reduction of 114 tCO₂-e was achieved in 2015–16 compared to the previous year, and 'other operations' emissions have been reduced by about 1714 tCO₂-e (or 27%) since 2009–10.

The emissions from the City's fleet of vehicles and plant increased in 2015–16 compared to the previous year. This is, however, considered to be due to fuel usage data being incorrectly attributed to its year of use over the past couple of years. Fleet-related emissions are moving lower with a graph showing the trend over the past six years provided in Appendix A.

The City's target for reduction in GHG emissions between 2009–10 and 2019–20 is 17% and with 10.2% reduction by 2015–16 it is currently on track to achieve the target.



5. ENERGY CONSUMPTION IN 2015–16



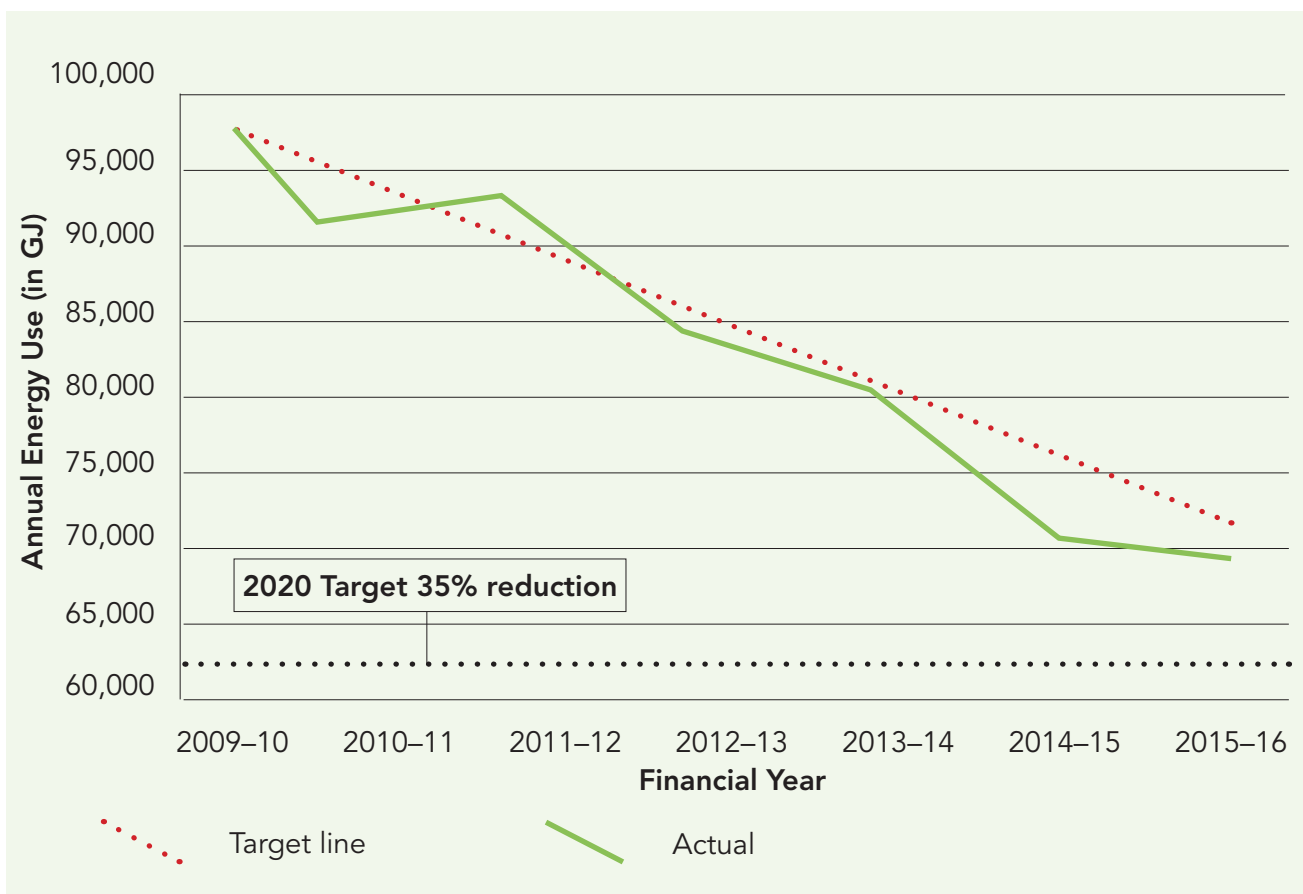
The major energy source used by the City is electricity, which comprised 62.9% of the total energy use in 2015–16. Liquid fuels, including diesel and petrol and bottled liquefied petroleum gas used in vehicles and mobile plant make up about 35.6%, with the remaining 1.5% natural gas used in compressed natural gas trucks and in buildings connected to the reticulated natural gas system.

The City's energy use has been reducing over recent years. The amount used in the 2009–10 year was close to 97 700 GJ. In 2015–16 use had declined to about 69 700 GJ, or a 28.7% reduction over six years. The reduction has been broad based, though there have been increases at some sites where additional infrastructure has been installed.

Average energy intensity for the City's buildings has been reduced from 370 MJ/m²/yr (megajoule per square metre per year) to 261 MJ/m²/yr (i.e. 29% 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 tracking well ahead of the target line.



The cost of energy to the City in 2015-16 was about \$2.6 million or about 2% of the City's overall annual budget. This has 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 and a comparison with usage in 2014-15 and the baseline year of 2009-10.

CATEGORY	ENERGY USE 2009-10	ENERGY USE 2014-15	ENERGY USE 2015-16	14-15 TO 15-16 CHANGE
Vehicles and plant	40 515 GJ	22 672 GJ	25 769 GJ	13.7%
Hobart Aquatic Centre	19 603 GJ	16 604 GJ	15 737 GJ	-5.2%
Street lighting	13 320 GJ	12 210 GJ	10 330 GJ	-15.4%
Civic and administrative buildings	12 874 GJ	9026 GJ	8028 GJ	-11.1%
Multi-storey car parks	4116 GJ	5103 GJ	3709 GJ	-27.3%
Community halls and parks	2777 GJ	2956 GJ	2861 GJ	-3.2%
Depots, waste management and nursery	3536 GJ	1890 GJ	1842 GJ	-2.6%
Public space lighting and fountains	1006 GJ	1374 GJ	1404 GJ	2.2%
Total	97 747 GJ	71 836 GJ	69 680 GJ	-3.0%

The following sections provide information on factors affecting energy use and projects completed during 2015–16. A table summarising the projects is provided in Appendix B.

VEHICLES AND PLANT

Vehicle and plant is the largest single category with 37% 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. An increase from 2014–15 is considered to be fuel usage being incorrectly attributed to the previous year. Reduction in fuel use is still on track to achieve the 2019–20 target. 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
- replacement of petrol light vehicles with more efficient diesel-fuelled alternatives, where suitable models have been available
- at McRobies Gully Waste Management Centre—a further drop in the amount of waste being received has contributed to a reduction in plant (bulldozer and compactor) use, saving fuel
- driver education programs that have the aim of more fuel efficient driving techniques.

DOONE KENNEDY HOBART AQUATIC CENTRE

The Doone Kennedy Hobart Aquatic Centre is a high energy user due to long opening hours, significant heating requirements and mechanical plant systems such as circulating pumps and fans.

A 5.2% reduction in energy use was achieved in 2015–16 compared to the previous year. Several measures were taken during the year to improve efficiency at the site, including:

- installation of 100 kW (kilowatt) of solar panels
- installation of air flow control dampers to reduce heat losses when the centre is not operating
- replacement of the main entrance floodlights

- installation of a self-cleaning filter on the treated effluent used to source heating for the centre, which has reduced pumping energy and improved heat exchanger performance.

STREET LIGHTING

Street lighting in the Hobart municipal area is largely managed and operated by TasNetworks and includes about 5000 lights on roads around Hobart. In addition, there are several hundred street lights on metered supplies, which are owned and operated by the City.

About 2100 streetlights on the TasNetworks' system were upgraded from 80 watt mercury vapour to 18 watt LED (light-emitting diode) lights during 2014–15, with a further 200 replaced in 2015–16.

Electricity consumption from street lighting was reduced by 15.4%, largely as a result of 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, Council Centre and Tasmanian Travel and Information Centre, a reduction of 11.1% in energy use was achieved in 2015–16.

Significant projects completed during 2015–16 in these buildings included:

- replacement of fluorescent light tubes with LED tubes in several areas of the Town Hall and Council Centre offices
- upgrading of the lighting to LED fittings in the Town Hall for some of the corporate offices, reducing both energy use and maintenance costs
- replacing part of the Council Centre building's air conditioning equipment, which had reached the end of its useful life, with more energy efficient technology.

MULTI-STOREY CAR PARKS

The City owns or leases several multi-storey car parks: Argyle Street, Centrepont, Salamanca, Hobart Central and Trafalgar. In 2015–16 a 27.3% reduction in energy use was achieved through projects that reduced electricity used in lighting these buildings.

Most of these savings resulted from the full year impact of projects undertaken in the previous year, such as new LED lights controlled by motion sensors in the Salamanca Car Park, Hobart Central Car Park and lower floors of the Centrepont Car Park. Further reductions were achieved in 2015–16 by replacing the tubes in newer fluorescent light fittings with LED tubes in Argyle St Car Park and the upper floors of Centrepont Car Park.

Significant maintenance cost savings will also be achieved as the LED lights have a significantly longer life than 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 parks and historic parks, such as Franklin Square. There was a reduction in usage in this category in 2015–16 of 3.2%.

There was much lower electricity use in Franklin Square during 2015–16, with the site shut down during the refurbishment of the park. There will be some ongoing savings from the refurbishment, as the area lights and those in the fountain were replaced with LED technology and a new pump installed for the fountain. An energy audit was undertaken at the Washington Street community building and works identified to reduce energy use at that site.

Several public conveniences were upgraded during the year and lights were replaced with energy-efficient LED fittings.

DEPOTS, WASTE MANAGEMENT AND NURSERY

The overall usage at these sites was slightly lower (reduction of 2.6%) compared to the previous year, though a 15% drop was achieved at the Mornington Nursery and small reduction at the City's Clearys Gates Depot.

An energy audit of the Clearys Gates Depot was undertaken and a wide range of projects identified. Some of these were implemented in May and June 2016, including replacing a hot water cylinder with a heat pump system in the main office, installation of an on-demand hot water service in the Parks office, new insulation under the floor in part of the main offices and upgrade of some internal and external lights to LED. A project to replace a number of direct electric heaters with more energy efficient heat pumps started.

In addition, a project at Mornington Nursery involved the installation of thermal storage in the greenhouse to store heat captured during the day for release at night.

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 higher than in 2014–15, with no significant energy efficiency projects undertaken in this category of use during the year.

This increase largely resulted from the opening of the New Town Bay Rowing Shed with an annual energy use of 120GJ, more than offsetting savings from projects in this category completed in 2013/14. The Rowing Shed has an energy efficient design, but has a much larger floor area than the previous buildings, resulting in greater overall energy use.

No significant new energy efficiency projects were undertaken on facilities in this category during 2014/15.

6. WORKS PLANNED FOR 2016-2017

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. The following describes projects by category.

VEHICLES AND PLANT

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

- identifying ways to reduce the 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
- providing driver and operator training in more fuel efficient techniques.

DOONE KENNEDY HOBART AQUATIC CENTRE

As the Doone Kennedy Hobart Aquatic Centre is a high energy user, this site will continue to be prioritised for energy efficiency improvements. Projects for 2016–17 include:

- further optimisation of the main heating system, including improving the resiliency of plant operations
- installation of a further 200 kW of solar panels to provide renewable energy to the site
- review of the hot water system for the showers to achieve energy savings and improved reliability

- further investigation into options and costs for double glazing of windows to reduce heat losses, with installation works proceeding where projects are financially viable.

STREET LIGHTING

The project to replace 80 watt mercury vapour with 18 watt LED lights is now complete. TasNetworks has advised that it will be replacing over 200 old 400 watt mercury vapour lights with more efficient 250 watt sodium lights during 2016–17, saving about 500 GJ per year.

CIVIC AND ADMINISTRATIVE BUILDINGS

Fluorescent lighting in the Town Hall Annex and part of the Council Centre building is to be replaced with LED panel lights to reduce energy use and maintenance costs.

A solar panel system is to be installed on the Town Hall Annex roof to provide renewable energy to the building.

A more detailed energy audit of the Town Hall is to be undertaken to identify further energy saving opportunities.



MULTI-STOREY CAR PARKS

Solar panel systems are to be installed at the Centrepoint and Hobart Central Car Parks with a total capacity of 50 kW.

A review of ventilation fan operations is to be undertaken to identify potential savings.

The outcomes of a report on power factor management at Argyle Street and Trafalgar Car Parks will be implemented. While power factor correction does not reduce energy use, it can lower maximum demand and save on electricity costs.

COMMUNITY HALLS AND PARKS

Fluorescent lights will be replaced with LED alternatives in several buildings in this category during 2016–17, including a number of public toilets.

An energy audit of the Washington Street Hall was completed in 2015–16 and lighting and hot water projects identified through that audit will be undertaken in 2016–17.

A small solar panel system (5 kW) is planned for installation at the City Hall.

Hot water services at the Horrie Gorrige Stand at North Hobart Oval are to be converted from liquefied petroleum gas to natural gas, thus reducing GHG emissions.

DEPOTS, WASTE MANAGEMENT AND NURSERY

As noted above, an energy audit of the Clearys Gates Depot was undertaken in 2015–16 and a range of savings opportunities identified.

Projects for 2016–17 at the depot are to include the replacement of underfloor and wall-mounted direct electrical heating systems with more energy efficient heat pumps, and further upgrades to interior and exterior lighting in the workshop areas and offices.

There is also to be a lighting upgrade to LED at the Mornington Nursery offices.

Solar panel systems are planned for installation at Clearys Gates Depot, McRobies Gully Waste Management Centre, the Bushland Depot and the Mornington Nursery, totalling 28 kW in capacity.

PUBLIC SPACE LIGHTING AND FOUNTAINS

The Mawson Place cardinal lights are to be upgraded to LED technology with energy savings of about 70% expected.

Other public space lighting is to be reviewed to identify further opportunities to reduce energy use.

APPENDIX A:

STRATEGIC MEASURES: FLEET GHG EMISSIONS AND BUILDING ENERGY EFFICIENCY 2009–10 TO 2015–16

FIGURE A1: CITY OF HOBART FUEL RELATED GREENHOUSE GAS EMISSIONS 2009-10 TO 2015-16

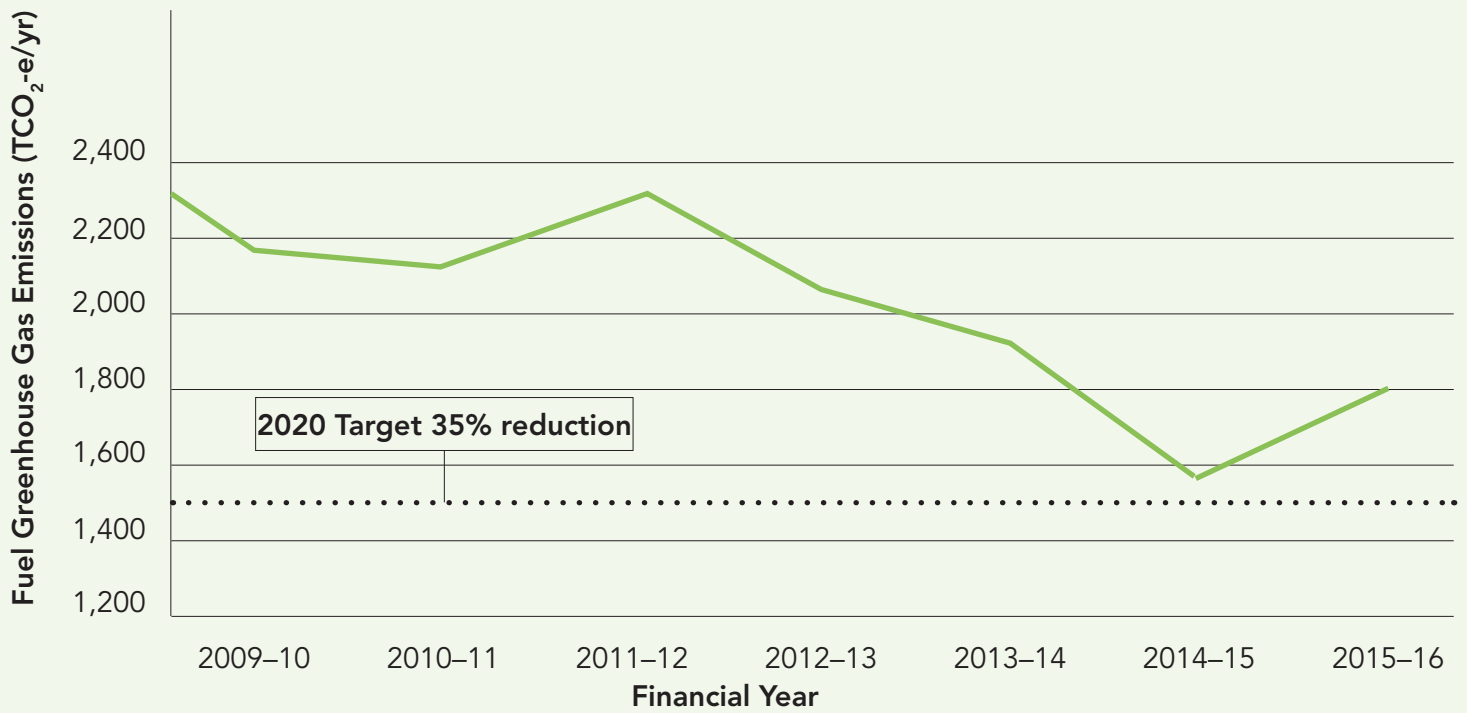
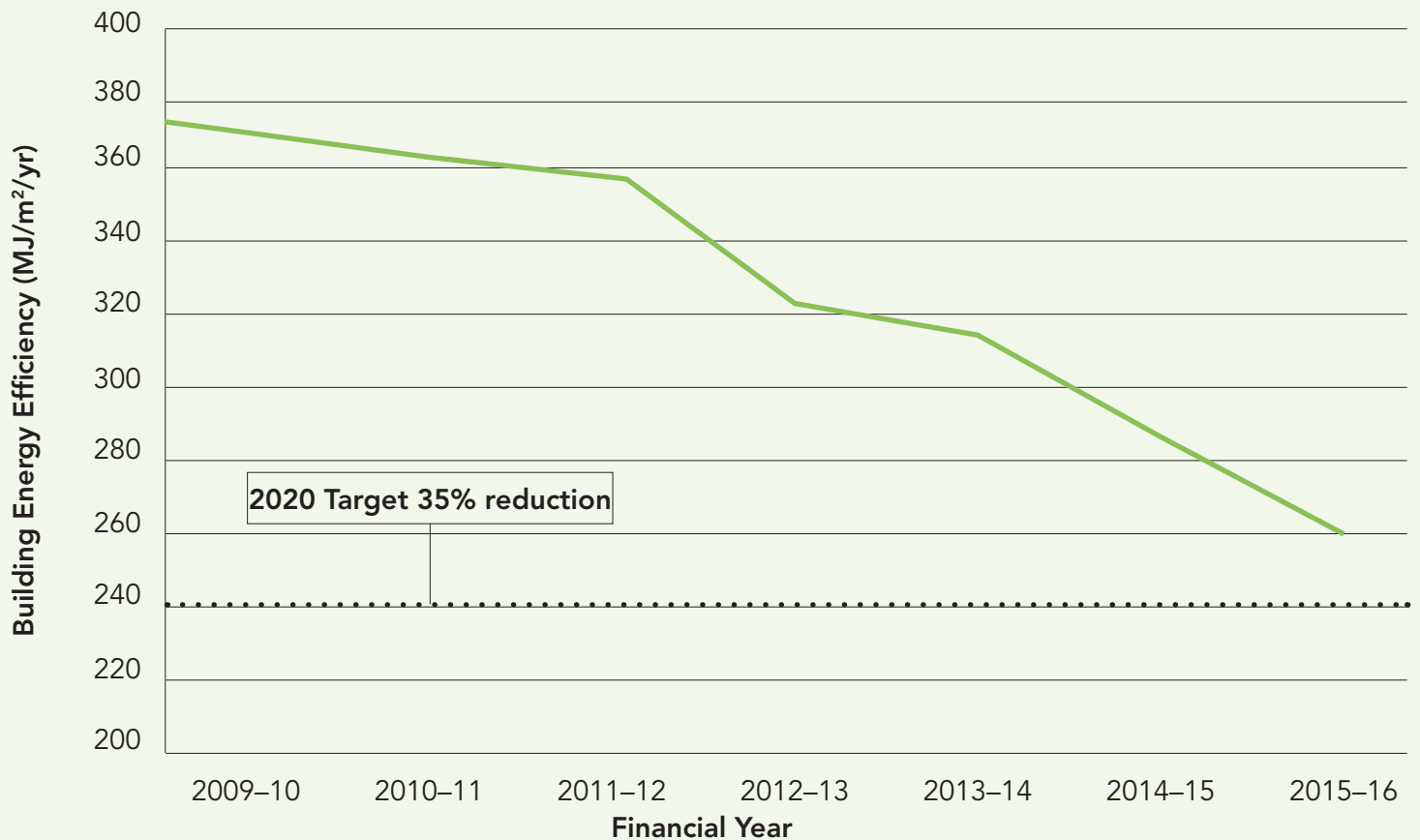


FIGURE A2: CITY OF HOBART BUILDING AVERAGE ENERGY INTENSITY 2009-10 TO 2015-16



APPENDIX B:

CITY OF HOBART GREENHOUSE GAS EMISSION AND ENERGY REDUCTION PROJECTS—SUMMARY LIST 2015–16

PROJECT TITLE	COST	SAVINGS*	GHG SAVINGS	ENERGY SAVINGS
Hobart Aquatic Centre – new air damper systems	\$100 000	\$20 000	45 tCO ₂ -e/yr	700 GJ/yr
Hobart Aquatic Centre – 100kW solar panel system	\$95 000	\$14 000	28 tCO ₂ -e/yr	450 GJ/yr
Hobart Aquatic Centre – self-cleaning effluent filter system	\$60 000	\$10 000	5 tCO ₂ -e/yr	70 GJ/yr
Hobart Aquatic Centre – external entrance lights to LED	\$10 000	\$3000	2 tCO ₂ -e/yr	35 GJ/yr
Multi Storey Car Parks – replacement with LED tubes	\$75 000	\$31 000	36 tCO ₂ -e/yr	550 GJ/yr
Fleet – ongoing replacement of fleet with more fuel efficient vehicles	Included in vehicle cost	\$20 000 (est)	30 tCO ₂ -e/yr (est)	250 GJ/yr (est)
TasNetworks streetlights: 200 lights from 80W MV to 18W LED	\$150 000	\$30 000	16 tCO ₂ -e/yr	250 GJ/yr
Office buildings – fluorescent tubes replaced with LED tubes	\$50 000	\$25 000	14 tCO ₂ -e/yr	220 GJ/yr
Council Centre – air conditioning renewal upgrade	\$70 000	\$10 000	17 tCO ₂ -e/yr	270 GJ/yr
Clearys Gates Depot – office and some external lighting to LED	\$43 000	\$11 500	10 tCO ₂ -e/yr	155 GJ/yr
Clearys Gates Depot – offices hot water service upgrade	\$17 000	\$3500	3.5 tCO ₂ -e/yr	60 GJ/yr
Clearys Gates Depot – office insulation and heat pumps	\$15 000	\$3000	3 tCO ₂ -e/yr	43 GJ/yr
Franklin Square refurbishment – new LED lights	\$200 000	\$10 000	4.5 tCO ₂ -e/yr	72 GJ/yr
Public toilets – refurbished with LED lights	\$10 000	\$3000	2 tCO ₂ -e/yr	30 GJ/yr
Mornington Nursery – greenhouse thermal mass	\$1000	\$200	2 tCO ₂ -e/yr	30 GJ/yr
Totals	\$896 000	\$194 200/yr	218 tCO₂-e/yr	3185 GJ/yr

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

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