

# GREENHOUSE GAS EMISSIONS AND ENERGY USE ANNUAL REPORT 2014 | 2015



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 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 2014/15 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 2020, while that for energy use is 35% over the same timeframe. The Council also endorsed an Energy Savings Action Plan to work towards these targets.

In 2014/15 the City's GHG emissions were reduced by 520 tCO<sub>2</sub>-e to a total of 18,120 t CO<sub>2</sub>-e. A reduction of 11.6% reduction has been achieved since 2009/10. The City is on track to meet the 2020 target of 17,000 tCO<sub>2</sub>-e.

Energy use was reduced by 10.4% in 2014/15 to 71,800 gigajoules and is now 26% below that consumed in 2009/10. This is well in advance of the reduction needed to achieve the 35% reduction target for 2020.

A number of energy efficiency projects were completed in 2014/15. These projects included the upgrade of about 2,100 streetlights, funded through an Australian Government grant, with 80 watt mercury vapour lights being replaced with 18 watt LED technology. In addition there were major projects at the Hobart Aquatic Centre, the City's administrative buildings and an energy efficient lighting upgrade at three of the City's multi-storey car parks.

The total cost of the projects was about \$2.8 million with expected savings of about \$460,000 per annum.

Further projects to reduce energy use and GHG emissions are planned for 2015/16, including more energy efficient lighting projects and a 100kW photovoltaic system at the Hobart Aquatic Centre.





## 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 2014/15 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.

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 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 buildings using natural gas and 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 related to those emissions generated in the processes of generating, transmitting and distributing electricity used by the City.

The Scope 2 emissions have been based on a standardised emissions coefficient for electricity of 0.23 tCO<sub>2</sub>-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 very significant impact on comparing one year's emissions with another.

Greenhouse gas emissions are measured in tonnes of carbon dioxide equivalent (tCO<sub>2</sub>-e) and typical sized car being driven 15,000 kilometres per year emits about 4 tCO<sub>2</sub>-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 with mileage as 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 60,000 tCO<sub>2</sub>-e per annum, of which about 7,500 tCO<sub>2</sub>-e/yr were from water and sewerage operations.

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 collection and 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 will only have 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 2020 from 2010 levels.

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

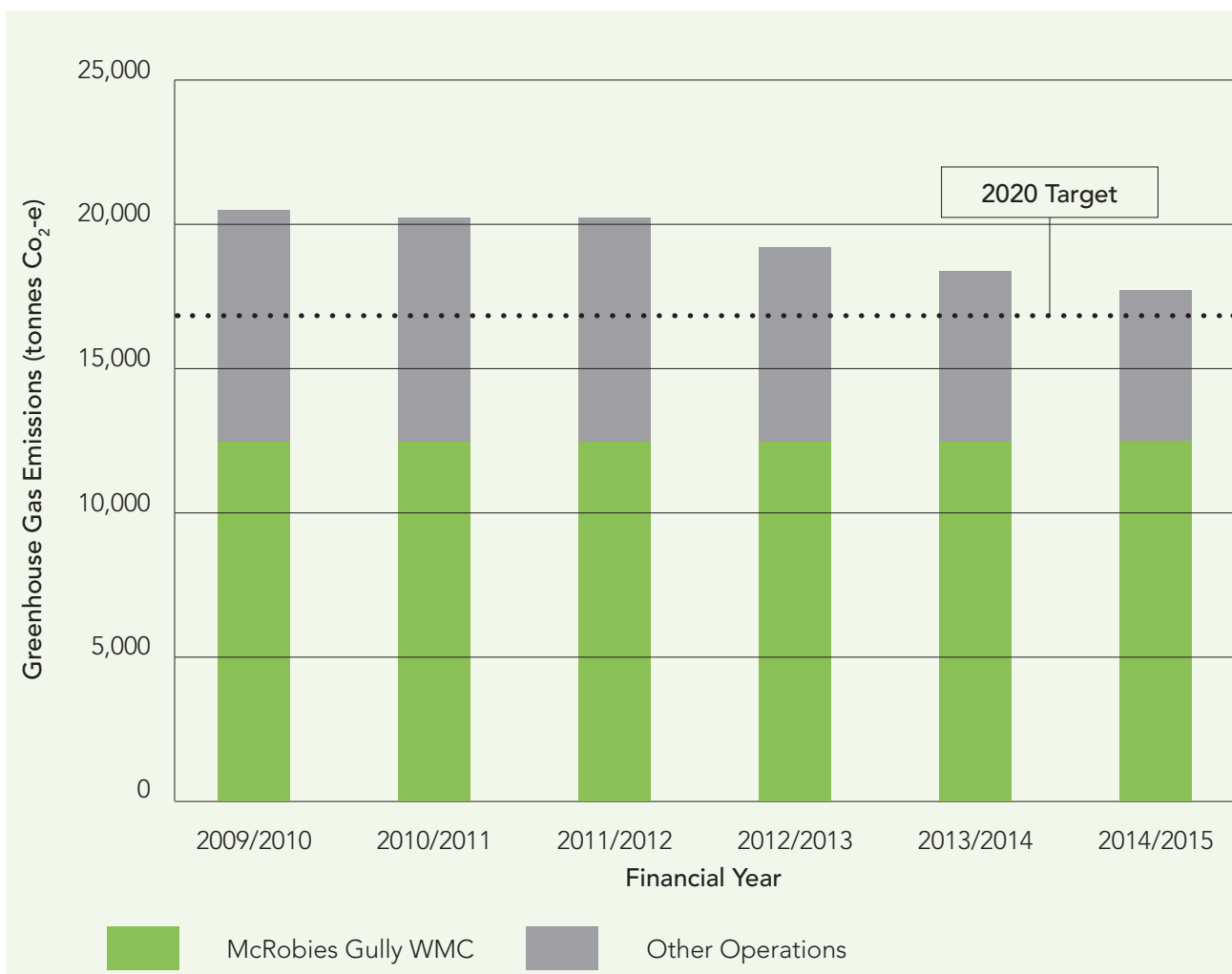




## 4. GREENHOUSE GAS EMISSIONS IN 2014/15

The City's corporate greenhouse gas emissions for the 2014/15 year were 18,120 t CO<sub>2</sub>-e, including the Scope 2 indirect emissions from electricity use, a reduction of 520 t CO<sub>2</sub>-e on the previous year and 2,370 tCO<sub>2</sub>-e or 11.6% since 2009/10.

The graph below displays emissions data over the past 6 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 provides the emissions amounts as used in the graph.

YEAR	GREENHOUSE GAS EMISSIONS (TONNES CO <sub>2</sub> -E/YR)		
	TOTAL	MCROBIES GULLY WMC	OTHER OPERATIONS
2009/2010	20,490	13,110	7,380
2010/2011	20,238	13,178	7,060
2011/2012	20,252	13,244	7,008
2012/2013	19,199	13,307	5,892
2013/2014	18,640	13,369	5,271
2014/2015	18,120	13,419	4,701

The emissions from McRobies Gully Waste Management Centre have been increasing slightly, while emissions from energy use and other operations have been dropping.

The most significant 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 the emissions are still rising at a rate of about 60 tCO<sub>2</sub>-e per year or about 0.5% per annum.

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 more than 45,000 tCO<sub>2</sub>-e per year.

Emissions from the City's other operations have been lowered over recent years. A reduction of 571 tCO<sub>2</sub>-e was achieved in 2014/2015 compared to the previous year, and "other operations" emissions have been reduced by about 2,680 tCO<sub>2</sub>-e (or 36%) since 2009/2010.

A major area of reduction in 2014/15 was the emissions from the City's fleet of vehicles and plant. A graph showing the trend over the last five years in fleet related emissions is provided in Appendix A.

The City's target for reduction in greenhouse gas emissions between 2009/2010 and 2019/2020 is 17% and with 11.6% reduction by 2014/15 it is currently on track to achieve the target.



## 5. ENERGY CONSUMPTION IN 2014/15

The major energy source used by the City is electricity, which comprised 68.4% of the total energy use in 2014/2015. Liquid fuels, including diesel and petrol, used in vehicles and mobile plant make up about 30.2%, with the remaining 1.4% is natural gas used in CNG trucks, in buildings with services connected to the reticulated natural gas system and bottled LPG.

The City's energy use has been reducing over recent years. The amount used in the 2009/2010 year was close to 97,000 GJ. In 2014/15 use had declined to about 71,800 GJ or a 26% reduction over 5 years. The reduction was broad based, though there has been increases at some sites, where additional infrastructure has been installed.

The building average energy intensity has been reduced from 374 MJ/m<sup>2</sup>/yr to 290 J/m<sup>2</sup>/yr (ie 22.5% since 2009/10). A graph showing the trend in building energy efficiency is 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 2009/2010 with the dotted target line showing the straight line trajectory that the City would have to follow to meet its 35% reduction target by 2019/2020. Currently the reduction in energy use is ahead of schedule with the actual result tracking well below the target line.



The cost of energy to the City in 2014/15 was about \$2.9 million per year or about 2.2% 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.

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.

CATEGORY	ENERGY USE 2013/14	ENERGY USE 2014/15	CHANGE
Vehicles and Plant	28,035 GJ	22,672 GJ	-19.1%
Hobart Aquatic Centre	17,183 GJ	16,604 GJ	-3.4%
Street Lighting (Metered & unmetered)	13,201 GJ	12,210 GJ	-7.5%
Civic and Administrative Buildings	10,433 GJ	9,026 GJ	-13.5%
Multi-Storey Car Parks	5,378 GJ	5,103 GJ	-5.1%
Community Halls and Parks	2,938 GJ	2,998 GJ	2.1%
Depots, Waste Management & Nursery	1,746 GJ	1,890 GJ	8.2%
Public Space Lighting and Fountains	1,278 GJ	1,332 GJ	4.2%
<b>Total</b>	<b>80,292 GJ</b>	<b>71,836 GJ</b>	<b>-10.4%</b>

The following sections provide information on factors affecting energy use and projects completed during 2014/15. A table summarising the projects is provided in Appendix B.

## VEHICLES AND PLANT

Vehicle and Plant is the largest category with 31.6% of the City's 2014/15 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. There was a very significant reduction of 19% in fuel use from 2013/14. This was due to a number of reasons, 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;
- Changes to litter bin servicing arrangements has had a major impact on the distance travelled by collection vehicles and allowed a reduction in the number of trucks;
- Alterations to civil maintenance practices, now based on working in specific areas each month has meant lower mileages;

- At McRobies Gully Waste Management Centre, lower quantities of waste being received and the new Waste Transfer Station and Resource Recovery Centre have all contributed to a reduction in plant (bulldozer and compactor) use, saving fuel;
- Plant has been replaced with energy efficient alternatives such as solar powered variable message signboards with LED lights (all signboards have now been converted to solar powered LED);
- Flashing warning lights on vehicles have been converted to LED, which eliminates need to run the engine when lights are on for extended periods; and
- Driver education programs have continued with the aim of more fuel efficient driving techniques.

## HOBART AQUATIC CENTRE

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

A 3.4% reduction in energy use was achieved in 2014/15. Several measures were taken during the year to improve efficiency at the site including:

- An energy efficient renewal of the Aquatic Centre's main heating system with more efficient heat pumps;

- Installation of variable speed drives and controls on the effluent and heating circulation water systems, during periods of lower demand;
- Installation of variable speed drives on the main pool circulating pumps (7 in total) to reduce energy use when the Centre is closed; and
- Upgrade of the Centre's reception area lights to LEDs, reducing energy use and maintenance costs.

In addition a trial of retrofitted double glazing was undertaken to determine the feasibility of the glazing system to reduce energy losses.

## 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.

About 2,100 streetlights on the TasNetworks' system were upgraded from 80 watt mercury vapour to 18 watt LED lights during 2014/15. This project was the major component of an energy efficient street lighting upgrade in Hobart and Glenorchy City Council areas funded through an Australian Government grant.

These lights were replaced in the period March to May 2015 with a resulting reduction of energy use of about 700MWh or 2,500GJ per year. Only some of this reduction appeared in the 2014/15 totals, with the full impact to occur during 2015/16.



## **CIVIC AND ADMINISTRATIVE BUILDINGS**

In the City's civic and administrative buildings, including the Town Hall, Council Centre and Travel Information Centre, a reduction of 13.5% in energy use was achieved in 2014/15.

Significant projects completed during 2014/15 in these buildings included:

- Replacement and upgrade of the air conditioning and heating system in the main Town Hall building, with this work being completed in April 2015 and optimisation work continuing into 2015/16;
- Upgrading of the lighting to LED in the Town Hall for some of the corporate offices and in the basement carpark, reducing both energy use and maintenance costs;
- Completion of the hot water service upgrade in the Council Centre building, with the circulating hot water service being replaced with local instantaneous systems; and
- An energy retrofit of the Tasmanian Travel Information Centre was completed, including modifications to the air conditioning system, additional roof insulation and a lighting upgrade to LED.

## **MULTI-STOREY CAR PARKS**

The City owns or leases several multi-storey car parks being the Argyle St, Centrepoint, Salamanca, Hobart Central and Trafalgar Car Parks. In 2014/15 a 5% reduction in energy use was achieved through projects to reduce electricity used in lighting the buildings.

The main project was to replace existing old fluorescent lighting with LED lights controlled by motion sensors. This project included lights in the Salamanca Car Park, Hobart Central Car Park and lower floors of the Centrepoint Car Park. The project was undertaken in the second half of the financial year and the full impact on savings will show up in the 2015/16 consumption.

An energy reduction of 16% of total car park lighting will be achieved over a full year. The new installations are designed to comply with current lighting standards, thus improving light levels in some areas of the car parks.

## **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, such as Franklin Square. There was a slight increase in usage in this category in 2014/15 of 2%.

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.

## **DEPOTS, WASTE MANAGEMENT & NURSERY**

There was an 8% increase in energy use in these facilities in 2014/15. This is largely attributable to the new Waste Transfer Station and Resource Recovery Centre at the McRobies Gully Waste Management Centre. These facilities have enhanced the level of service and increased waste diversion, particularly for that material arriving in light vehicles. The new buildings have a number of energy efficient features, but are additional facilities on the site and thus have resulted in additional energy use.

The lights in the main workshop at the Clearys Gates Depot were upgraded in June 2015, resulting in a 50% cost decrease in workshop lighting costs.

### **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.

There was a small increase (4%) in usage with the full year impact of the Railway Roundabout fountain renovation, which more than offset the savings from a lighting retrofit of the Burnett St Underpass and completion of a lighting upgrade to LED technology in Salamanca Square.

## 6. WORKS PLANNED FOR 2015/16

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; and
- providing driver and operator training in more fuel efficient techniques.

### 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 2015/16 include:

- Optimisation of the main heating system replaced in 2014/15;
- Installation of a 100kW photovoltaic system to provide renewable energy to the site;
- Installation of control dampers on the main air handling systems to reduce energy use when there is low demand; and
- Replacing the direct electrical air heating for the change rooms with an air handling unit using hot water from the more efficient main heat pump based system.

### CIVIC AND ADMINISTRATIVE BUILDINGS

Work on optimising the new Town Hall air conditioning and heating system is to be completed to maximise energy efficiency gains from the new system.

In addition further fluorescent tubes are to be replaced with LED alternatives in other areas of the Town Hall complex. Savings of about 500GJ per annum are expected from these works.

### **MULTI-STOREY CAR PARKS**

In addition to the lighting upgrade undertaken in 2014/15, fluorescent tubes are being replaced with more energy efficient LED alternatives in the older section of the Argyle Street Car Park and the upper floors of the Centrepoint Car Park.

These projects are expected to reduce energy use at these sites by over 600GJ per annum.

A review is to be undertaken to determine whether it would be worthwhile to install power factor correction systems at Argyle St and Trafalgar Car Parks. While power factor correction does not reduce energy use, it can lower maximum demand and save on electricity costs.

### **COMMUNITY HALLS AND PARKS**

Fluorescent tubes will be replaced with LED alternatives in a number of buildings in this category during 2015/16. These buildings will include the YouthARC (part of the City Hall), offices at the North Hobart Oval, and the hall at 6 Washington Street in South Hobart.

The works on the project to refurbish Franklin Square in 2015/16 will include energy efficient lighting.

### **DEPOTS, WASTE MANAGEMENT & NURSERY**

A lighting retrofit of fluorescent tubes with LED is planned for Clearys Gates Depot and the Mornington Nursery, with the LED tubes using about 50% less energy than fluorescent and also reducing maintenance costs.

Also at Clearys Gates Depot a review is to be undertaken of external and area lighting and it is expected that this will be replaced with more energy efficient alternatives.

### **PUBLIC SPACE LIGHTING AND FOUNTAINS**

The Mawson Place cardinal lights are to be upgraded to a more energy efficient and lower maintenance technology. In addition it is planned that these lights will be colour adjustable to match events such as Dark MOFO.

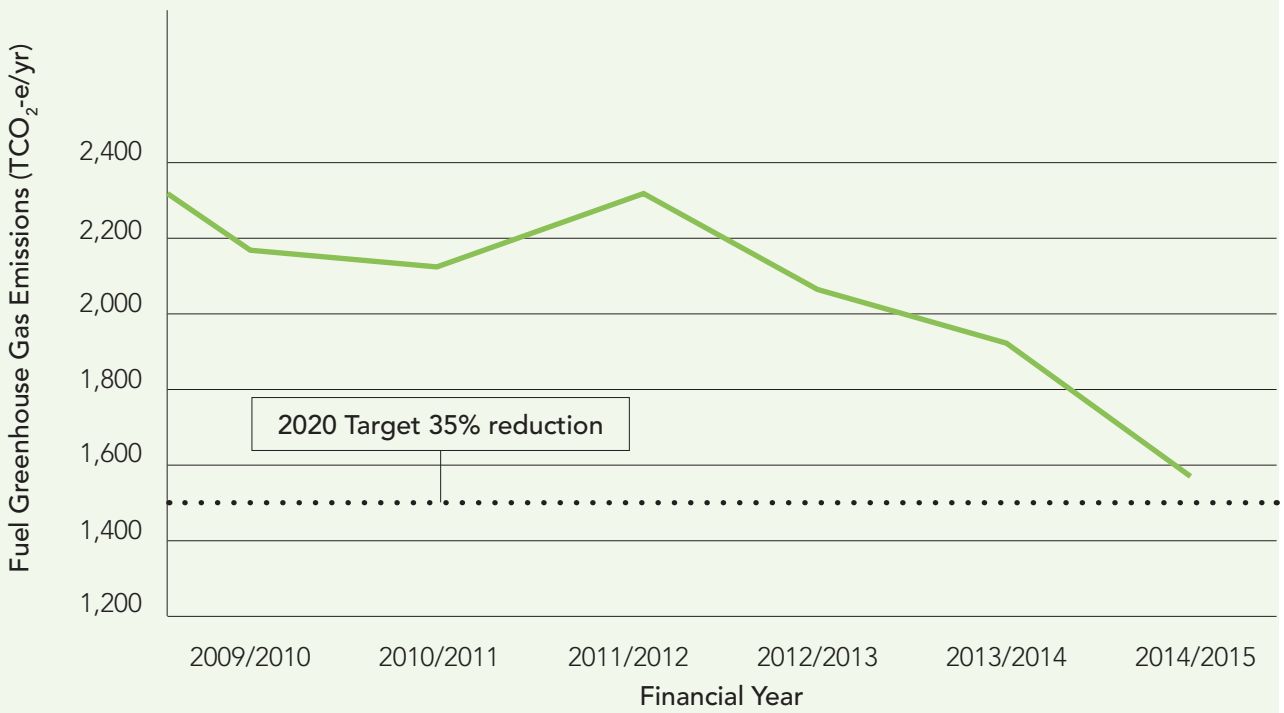
A review is to be undertaken of other public space lighting to identify further opportunities to reduce energy use.



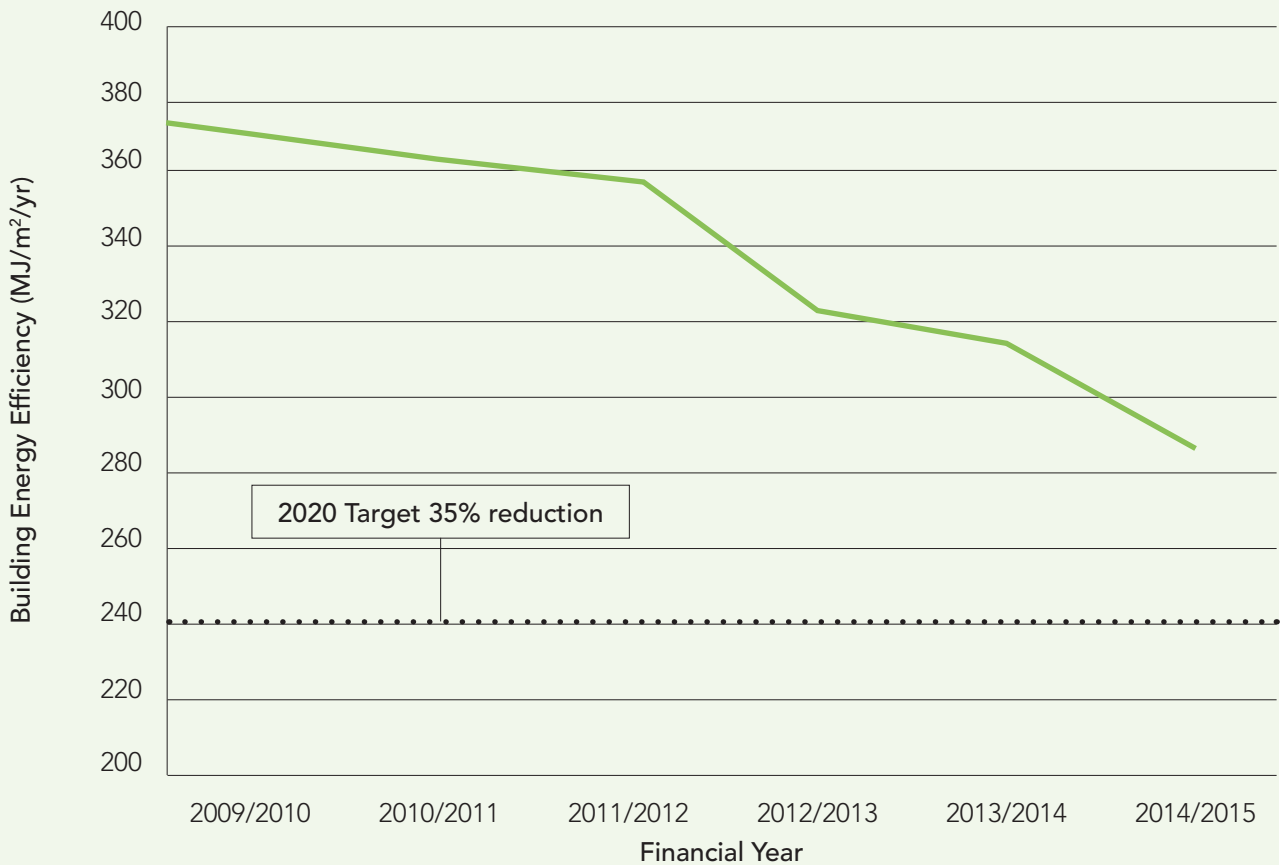
## **APPENDIX A:**

### **STRATEGIC MEASURES: FLEET GHG EMISSIONS AND BUILDING ENERGY EFFICIENCY 2009/10 TO 2014/15**

**TABLE A1: CITY OF HOBART FUEL RELATED GREENHOUSE GAS EMISSION 2009/10 TO 2014/15 BACKGROUND**



**TABLE A2: CITY OF HOBART BUILDING AVERAGE ENERGY INTENSITY 2009/10 TO 2014/15**



## **APPENDIX B:**

# **CITY OF HOBART GREENHOUSE GAS EMISSION AND ENERGY REDUCTION PROJECTS – SUMMARY LIST**



PROJECT TITLE	COST	SAVINGS*	GHG SAVINGS	ENERGY SAVINGS
TasNetworks Street Lighting – 80W MV to 18W LED	\$1,230,000	\$210,000	160 tCO <sub>2</sub> -e/yr	2,500 GJ/yr
Hobart Aquatic Centre – Main Heating System Replacement	\$500,000	\$60,000	70 tCO <sub>2</sub> -e/yr	1,100 GJ/yr
Multi Storey Car Parks Lighting Upgrade	\$530,000	\$60,000	60 tCO <sub>2</sub> -e/yr	950 GJ/yr
Fleet – Ongoing replacement of fleet with more fuel efficient vehicles	Included in vehicle cost	\$20,000 (est)	55 tCO <sub>2</sub> -e/yr (est)	500 GJ/yr (est)
Aquatic Centre – Circulating Pumps Variable Speed Control	\$90,000	\$24,000	35 tCO <sub>2</sub> -e/yr	500 GJ/yr
Town Hall – Main Building Air Conditioning Upgrade	\$350,000	\$35,000	28 tCO <sub>2</sub> -e/yr	450 GJ/yr
Council Centre – Hot Water System Replacement	\$40,000	\$15,000	23 tCO <sub>2</sub> -e/yr	360 GJ/yr
Council Centre – Air Conditioning System Refurbishment	\$61,500	\$13,000	17 tCO <sub>2</sub> -e/yr	270 GJ/yr
TTIC – Airconditioning modifications, LED Lights & Insulation	\$13,000	\$7,500	11 tCO <sub>2</sub> -e/yr	165 GJ/yr
Clearys Gates Depot – Workshop High Bay Lights	\$15,000	\$3,000	3 tCO <sub>2</sub> -e/yr	50 GJ/yr
Town Hall – Offices and Car Park Lighting to LED	\$5,500	\$3,500	1.5 tCO <sub>2</sub> -e/yr	25 GJ/yr
Salamanca Square – Energy Efficient Lighting Upgrade	\$49,000	\$7,000	1.5 tCO <sub>2</sub> -e/yr	23 GJ/yr
Burnet St Underpass – Conversion to LED Lights	\$2,200	\$1,000	1 tCO <sub>2</sub> -e/yr	13 GJ/yr
<b>Totals</b>	<b>\$2,806,200</b>	<b>\$459,000/yr</b>	<b>468 tCO<sub>2</sub>-e/yr</b>	<b>6,906 GJ/yr</b>

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

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