



# CITY OF HOBART

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# ENERGY EFFICIENCY TOUR



City of HOBART

# BACKGROUND

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The City of Hobart has achieved significant reductions in its greenhouse gas emissions and energy use in recent years resulting in savings of \$1million per annum compared to business as usual. In March 2016 the City coordinated a tour of its building and assets to share knowledge and information on its energy actions with other southern councils.

The tour was a practical, hands on and informative look at the City's energy saving programs and projects by officers who are responsible for the management of and undertake energy improvements to the City's buildings and assets. The tour was aimed at officers from southern councils who were also responsible for maintenance and management of council offices, depots/sheds, waste management facilities, recreational assets, fleet and lighting (street and open space). These notes are based on the tour.

# INTRODUCTION

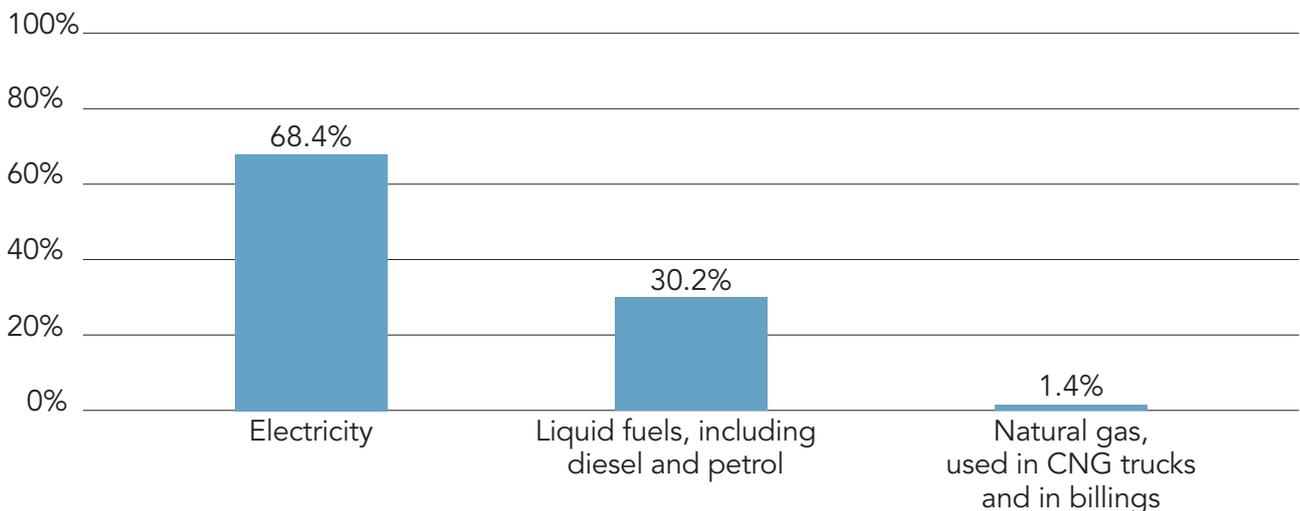
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The City of Hobart provides over three hundred different services to around 50,000 residents, 6000 businesses, 46,000 workers and 900,000 visitors each year. By upgrading and making changes across its assets and operations, the City has successfully improved the energy efficiency of these services. It has committed to reduce its energy use to 35% below 2009 levels by 2020. It has currently reduced its annual energy consumption has been reduced by 26% and produced savings of around \$1million each year.

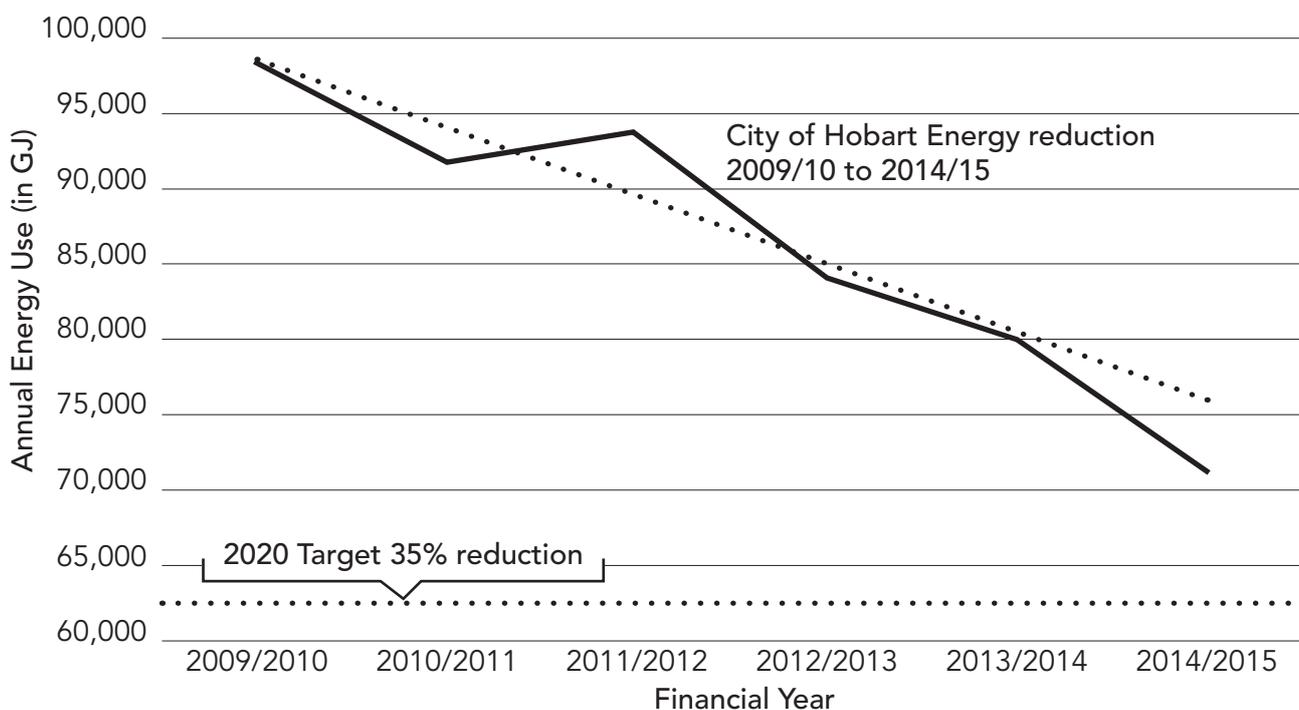
The City has annual allocation of \$100,000 for minor projects where there are demonstrable savings. For larger projects, business cases are developed and presented to Council or grant funding is sought. In 2014/15 the City spent about \$2.8 million on energy efficiency projects with expected savings of about \$460,000 per annum.

Energy efficiency is an important objective City of Hobart Strategic Plan. It is delivered by the internal Energy Management Team through the Energy Savings Action Plan 2014- 2017 that focuses on energy use activities within the City's operations. The City's environmental management system (third party certified to ISO 14001) also includes consideration of operational energy use. Energy saving initiatives within these activities are described below and were shared through the energy efficiency tour.

## Major energy sources used by the City



### City of Hobart Energy reduction 2009/10 to 2014/15



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.

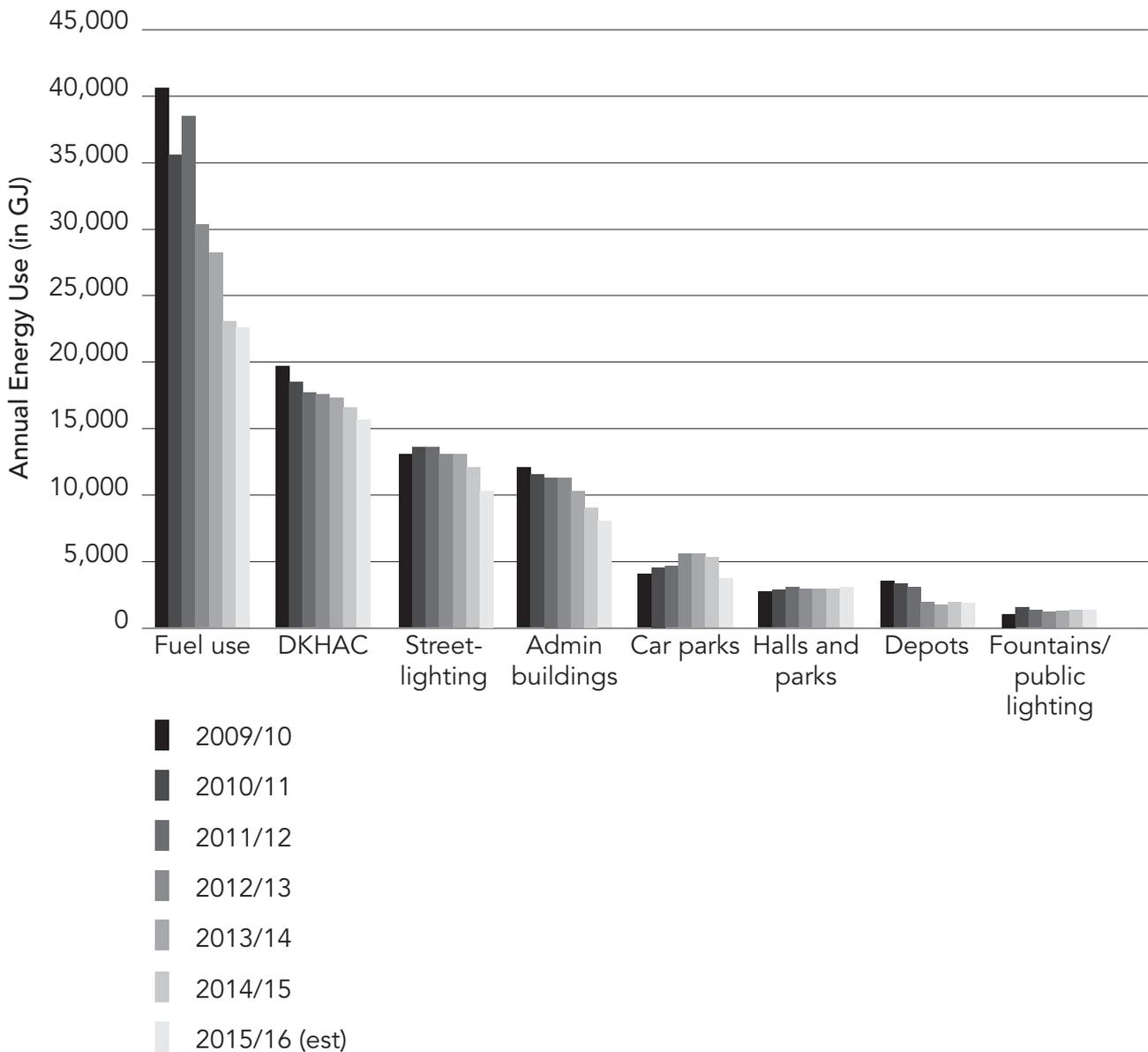
The major energy using activities are building operations, street lighting and vehicles and plant. The following table lists broad categories of uses and amount of energy used by each category.

### Energy use of Council Assets 2009/10 to 2014/15

	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16 (EST)
Fuel Use	40,515	35,828	38,319	30,820	28,035	22,672	22,500
DKHAC	19,603	18,348	17,627	17,513	17,183	16,604	15,700
Streetlighting	13,320	13,680	13,683	13,378	13,201	12,210	10,300
Admin buildings	12,874	11,880	11,272	11,516	10,433	9,026	8,000
Car Parks	4,116	4,564	4,680	5,179	5,378	5,103	3,700
Halls and Parks	2,777	2,821	3,028	2,990	2,938	2,998	3,000
Depots	3,536	3,337	3,035	1,972	1,746	1,890	1,800
Fountains/Public Lighting	1,006	1,549	1,344	1,265	1,278	1,332	1,300
<b>Total</b>	<b>97,747</b>	<b>92,006</b>	<b>92,988</b>	<b>84,553</b>	<b>80,192</b>	<b>71,835</b>	<b>66,300</b>

# INITIATIVES TO IMPROVE ENERGY EFFICIENCY

City of Hobart Energy Savings 2009/10 to 2014/15

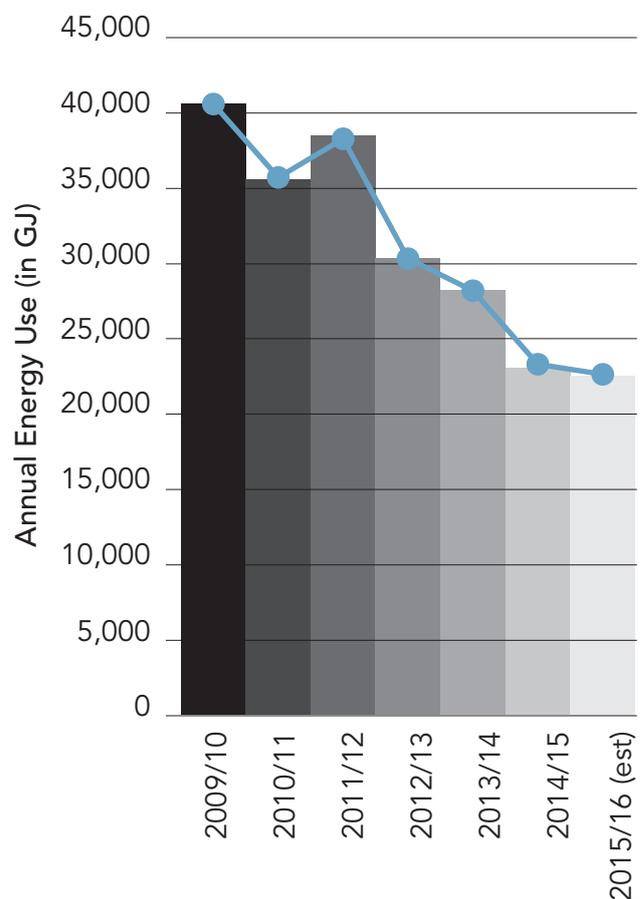


# VEHICLES AND PLANT

The largest City of Hobart energy use category (35 % or 28,035 GJ) is vehicles and plant such as cars, trucks and bulldozers. Refuse and recycling collection, civil maintenance, civil construction and Waste Management Centre operations are the services using the most energy. There has been a 44% reduction in fuel use across vehicles and plant since 2010.

## Energy use has been reduced by:

- reviewing the use of fleet vehicles and plant to reduce running hours or kilometres travelled (for example reducing the frequency of City waste management trips and undertaking several road maintenance works at the same time in one area)
- considering fuel efficiency in purchasing decisions
- making changes to most of the kerbside waste & recycling fleet
- providing driver education programs to encourage fuel efficient driving
- Inclusion of a plug in hybrid electric vehicle in the City's fleet and several diesel hybrid trucks
- Closure of asphalt plant with external providers about twice as energy efficient



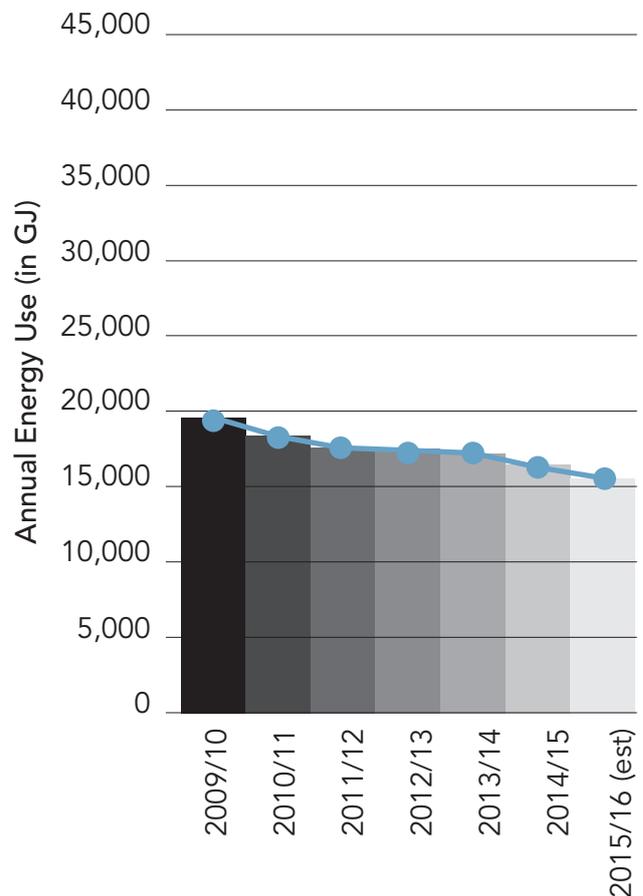
In 2014 a plug-in hybrid electric vehicle was purchased for use by the Environmental Health Officers. The Holden Volt cost around \$50,000 and is using 1.9 litres of fuel per 100km. Savings in fuel use are in the order of 400 litres per annum and cost savings for fuel, about \$500 per annum.

# DOONE KENNEDY HOBART AQUATIC CENTRE

With an Olympic size pool, 25 metre pool, large gym, spa, sauna, steam room, café, parking and a range of services including child minding and school holiday programs, this facility has the highest annual electricity use of any City site (20% or 17,000 GJ - about the same as over 500 typical houses each consuming 32 GJ). Overall, energy savings of about 25% compared to five years ago, are being achieved and a further 10% savings are considered achievable over the next 2-3 years through further measures.

## Energy use has been reduced by:

- installing highly efficient heat pumps to extract energy from treated wastewater effluent that passes near the Centre.
- installing a 100kW rooftop solar photovoltaic system.
- installing variable speed drive controllers on fans and pumps to reduce air and water flow rates while still meeting operational requirements.
- installing new air dampers to enable separate control of heating and external air flow entering the building, by enabling recirculation of air when the Centre is not occupied.
- upgrading much of the lighting inside and outside the Aquatic Centre, gym and aerobic space, reception, change rooms and walkways to LED lighting and installing photo electric control for the car park lights.
- Trial of a retrofitted magnetic strip based flexible plastic panels to windows to test a cheaper option than new double glazed windows and a better payback.



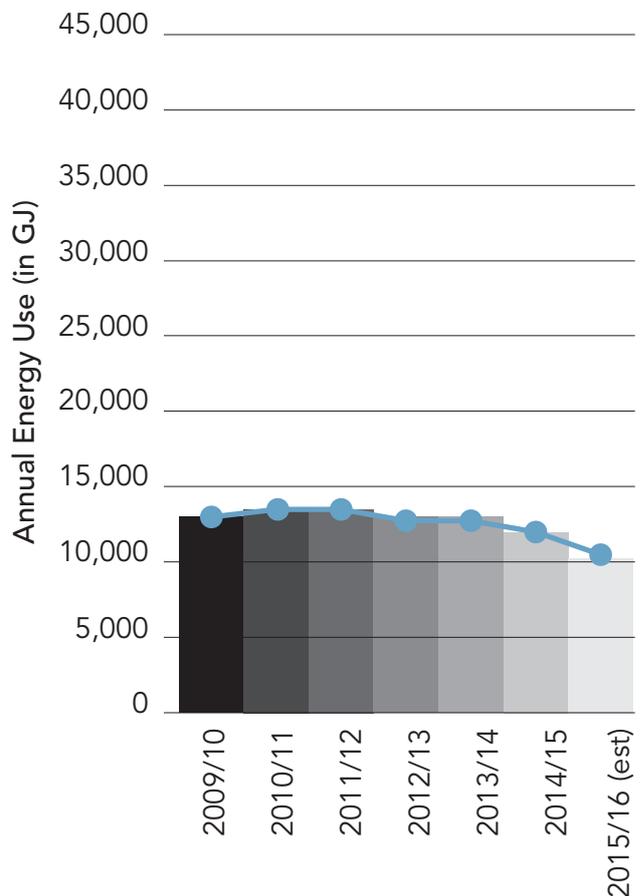
In 2015, a 100kW solar photovoltaic system costing \$90,000 was installed on the roof of the Aquatic Centre and is expected to reduce costs by \$15,000 each year. View how it is performing.

# STREET LIGHTING

Street lighting comprises 16% (13,200 GJ) of energy used by the City and has seen large energy improvements thanks to LED technology becoming more efficient, reliable and cost effective. Controls for lighting such as timers, motion sensors and photoelectric cells have also become cheaper, as have maintenance costs, giving further financial benefits. In all, there are over 5,000 street lights in the City of Hobart. About 300 streetlights and a similar number of other public lights are metered, owned and managed by the City. The rest are unmetered and managed by TasNetworks and billed to the City.

## Energy use has been reduced by:

- upgrading the majority of the 300 City-owned metered street lights to LED, including the central CBD area and Wapping, Salamanca Square and some lights along the Sandy Bay sea wall.
- replacing 2,300 TasNetworks' 80-watt mercury vapour lights in suburban streets with 18 watt LED lights.
- including a 10 year maintenance and defects liability period in tender specifications to ensure that higher quality fittings have been offered.



To date, total savings from upgrading 2,300 street lights has been almost 2,880 GJ per annum (equivalent to the electricity consumption of about 90 typical households). 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.

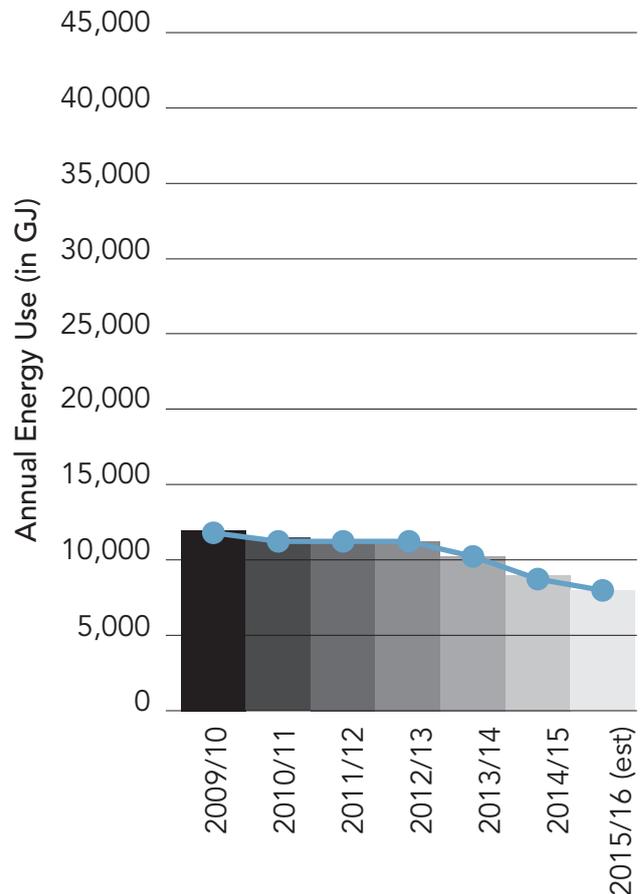
It is expected that the remaining street lights will undergo energy efficient upgrades over the next five years, as the cost of LED technology lowers and suitable models for main road lights become available.

# ADMINISTRATION BUILDINGS

The City's Administrative buildings, including the Town Hall, Council Centre and Tasmanian Travel and Information Centre use about 13% (10,500 GJ) of the overall City's overall energy. The City's energy program has reduced energy use in these by 30%.

## Energy use has been reduced by:

- refurbishing the Town Hall Annex with better insulation, low emissivity glass windows and improved heating and cooling by heat pumps using treated effluent.
- retrofitting the basement car park and some internal office space by replacing fluorescent tube lights with LED tubes.
- upgrading to a more energy efficient air conditioning system in the main Town Hall building and extending it to areas previously serviced by direct electric panel heaters.
- installing higher efficiency components such as new chillers and compressors in the Council Centre building, allowing direct electrical heater banks to be decommissioned and enabling improved temperature control of the system.
- replacing the previous recirculating hot water service in the Council Centre building with a heat pump hot water service for showers in the building and installing new systems in the Council Centre building to deliver hot water more efficiently to hand basins and sinks. The local hot water units no longer have storage (and legionella concerns) so can be set to a lower standard use temperature such as 40°C.
- Undertaking a heating and lighting energy retrofit project in the Tasmanian Travel and Information Centre.



Over recent years, various upgrades have led to a reduction in electricity use of about 35% in the Council Centre and 10% in the Town Hall. A 45% reduction was achieved in the Tasmanian Travel and Information Centre in 2014 through a energy retrofit project including lighting upgrades, additional insulation and improved controls installed for the air conditioning system. In all, these improvements cost \$13,000 and reduced annual operating and maintenance costs by about \$7000.

# 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 that use 7% (5,400 GJ) of the City's energy. Energy efficiency projects in this area have focused on lighting and annual lighting energy use has been reduced by 16%. The new installations are energy efficient but also designed to comply with current lighting standards, and have thus improved light levels in some areas of the car parks.

## Energy actions being implemented:

- upgrading old fluorescent lighting with LED light fittings controlled by motion sensors in the Salamanca Car Park, Hobart Central Car Park and lower floors of the Centrepont Car Park.
- replacing fluorescent tubes with LED tubes in the existing fittings in the Argyle Street Car Park and upper floors of the Centrepont Car Park.
- investigating the effectiveness of installing solar panels on a number of car parks.
- installing Power Factor Correction.

Through a range of initiatives, the City of Hobart has reduced the energy consumption of five multi-storey car parks within the City by 35% (550MWh per annum). Initiatives include replacing old fluorescent lighting with LED lights controlled by motion sensors and installing Power Factor Correction. The electricity cost savings are about \$85,000 per annum and maintenance savings about \$60,000 per year as LED lights last longer than fluorescent tubes

## Car Parks Energy Use per m<sup>2</sup> Floor Area

	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16 (est)	
Car Parks energy per m <sup>2</sup>	66.4	67.5	69.2	67.7	59.3	56.3	40.8	
Car Park Area	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16	Spaces
Argyle St Car Park	21,634	21,634	21,634	30,480	30,480	30,480	30,480	1,180
Centrepont Car Park	14,094	19,781	19,781	19,781	19,781	19,781	19,781	782
Hobart Central Car Park	12,605	12,605	12,605	12,605	12,605	12,605	12,605	462
Salamanca Square Car Park	13,626	13,626	13,626	13,626	13,626	13,626	13,626	240
Trafalgar Car Park	-	-	-	-	14,144	14,144	14,144	544
<b>Total</b>	<b>61,959</b>	<b>67,646</b>	<b>67,646</b>	<b>76,492</b>	<b>90,636</b>	<b>90,636</b>	<b>90,636</b>	

Note: Increased floor area in multistorey carparks by 46%  
 - Extra Centrepont floors, Argyle St extn and Trafalgar car park (Total about +1500GJ)sschmidth

# COMMUNITY HALLS AND PARKS

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A range of improvements have been made in recent years to improve the energy efficiency of City owned sporting facilities, parks and community services, including the City Hall, local community halls, sporting facilities, and local and historic parks such as Franklin Square.

## **Energy use has been reduced by:**

- replacing hot water services with heat pump hot water systems at the North Hobart Oval, New Town Oval, TCA Ground, Queens Walk Oval, Queenborough Oval, Sandown Park Sportsground and South Hobart Soccer Ground.
- converting the hot water service at Clare St Oval to instantaneous gas.
- upgrading the lighting at a number of City sporting facilities and parks, including North Hobart Oval, Franklin Square, Cascade Gardens and University Rose Gardens.

The Mathers House facility underwent an energy retrofit in 2013. Energy efficient lighting was installed, the heating system was upgraded from direct electricity to heat pumps and the hot water systems were converted from electric to natural gas. Collectively the changes have led to annual savings of over 30% in energy use and cost.

# COUNCIL DEPOTS AND WASTE MANAGEMENT

## CLEARYS GATES DEPOT

Built in a disused quarry, the Cleary's Gates depot is the base for the roads and parks maintenance, city cleansing, waste collection, fleet and a number of other services provided by the City. There are several workshops, warehouse storage spaces, offices and parking for City's vehicles and major plant. The closure of the City's Hot Mix (bitumen plant) in 2012, improved facilities at McRobies Gully and the refurbishment of the Railway Roundabout has resulted in an almost 50% reduction in energy use.

### Energy use has been reduced by:

- installing timer controls on the off peak heating system and optimising the number of hours the heating operates.
- improving lighting efficiency, with induction fluorescent lights having been installed in the main workshop at the Clearys Gates Depot. The tubes for these lights have a life of 80,000 to 100,000 hours (or about 30 years life) and use about 50% less energy.
- replacing the amenities hot water service with a heat pump hot water system.
- conducting an audit which revealed that the site energy use could be reduced by a further 40-50% through changes to internal and external lighting, heating and hot water services. Actions identified in the audit are being implemented.

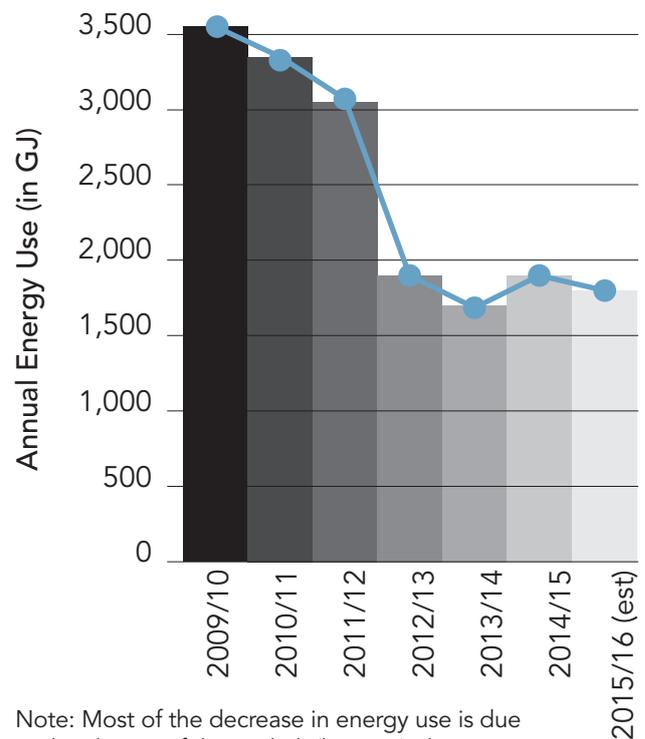
## MCRIBES GULLY WASTE MANAGEMENT CENTRE

This facility houses the Waste Transfer Station, the Resource Recovery Centre, a commercial composting facility, landfill gas and conversion to energy equipment, recycling and landfill services.

### Energy use has been reduced by:

- installing energy efficient features in the new buildings. For example, buildings have been designed with natural ventilation systems to improve airflow and reduce heating and cooling requirements (in particular the Tip Shop).

- reducing tip face sizes and reducing the use of plant which has, in turn, reduced emissions.
- reducing landfill waste quantities received resulting in a reduction in plant (bulldozer and compactor) use.



Note: Most of the decrease in energy use is due to the closure of the asphalt (hot mix) plant.

In 2014/15 the Waste Management Centre site, including the transfer station and recycling centre, used around 330GJ of electricity. The amount of electricity generated on site (from landfill gas) for the same period was around 26,280 GJ, enough to power around 800 average homes. The landfill gas is captured and used to generate electricity at a facility owned by AGL. The electricity is exported to the State grid (a similar system has been installed at the Glenorchy landfill site).

# ADDITIONAL INFORMATION

Greenhouse Gas Emissions and Energy Use  
Report 2014-15  
Energy Savings Action Plan 2014-2017  
[hobartcity.com.au/Environment/Climate\\_and\\_Energy/Improving\\_Energy\\_Use\\_and\\_Reducing\\_Emissions](http://hobartcity.com.au/Environment/Climate_and_Energy/Improving_Energy_Use_and_Reducing_Emissions)

## ENERGY EFFICIENCY HIGHLIGHTS FOR 2014/2015

ENERGY EFFICIENCY HIGHLIGHTS FOR 2014/2015	COST	ANNUAL COST SAVINGS*	ANNUAL ENERGY SAVINGS
TasNetworks Street Lighting – 80W MV to 18W LED	\$1,230,000	\$210,000	2,500 GJ/yr
Multi Storey Car Parks – Lighting Upgrade	\$530,000	\$60,000	950 GJ/yr
Hobart Aquatic Centre – Main Heating System Replacement	\$500,000	\$60,000	1,100 GJ/yr
Town Hall – Main Building Air Conditioning Upgrade	\$350,000	\$35,000	450 GJ/yr
Aquatic Centre – Circulating Pumps Variable Speed Control	\$90,000	\$24,000	500 GJ/yr
Council Centre – Air Conditioning System Refurbishment	\$61,500	\$13,000	270 GJ/yr
Salamanca Square – Energy Efficient Lighting Upgrade	\$49,000	\$7,000	23 GJ/yr
Council Centre – Hot Water System Replacement	\$40,000	\$15,000	360 GJ/yr
Fleet – Ongoing replacement of fleet with more fuel efficient vehicles	Vehicle costs	~\$20,000	~500 GJ/yr
Clearys Gates Depot – Workshop High Bay Lights	\$15,000	\$3,000	50 GJ/yr
Travel Centre– Air conditioning modifications, LED Lights & Insulation	\$13,000	\$7,500	165 GJ/yr
Town Hall – Offices and Car Park Lighting to LED	\$5,500	\$3,500	25 GJ/yr
Burnet St Underpass – Conversion to LED Lights	\$2,200	\$1,000	13 GJ/yr
<b>TOTALS</b>	<b>\$2,886,200</b>	<b>\$459,000</b>	<b>6,906 GJ</b>

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

# POWER FACTOR CORRECTION

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While power factor correction does not reduce energy use, it can lower maximum demand and save on electricity costs. The power factor is the ratio of real power to apparent power and is related to how an item of equipment uses electricity. The power factor of electricity is affected by the types of load at a site. Electric motors typically have a power factor of about 0.8, while for direct electric heaters it is 1.0. Power factor correction equipment can be used to increase the power factor. Some electricity tariffs include a maximum demand component which is measured in kVA (kilovolt-amps), as opposed to kW (kilowatts), and if a site is on one of these tariffs power factor correction can have a payback period of about 4-5 years.

Such equipment has been installed at the Hobart Aquatic Centre, Council Centre and some car parks and more equipment may be installed at other sites in the future.

# METERING DATA

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For Hobart's larger use sites, metering data is available at 15 minute intervals. This data can be used to identify potential energy savings, such as a high overnight loads. For some sites Hobart has also installed sub-meters to help in further identifying where energy use is occurring and potential for saving energy such as through improved controls.

Hobart Town Hall,  
Macquarie Street,  
Hobart,  
Tasmania 7000 Australia  
**t** (03) 6238 2711  
**f** (03) 6238 2186  
**e** [coh@hobartcity.com.au](mailto:coh@hobartcity.com.au)  
**w** [hobartcity.com.au](http://hobartcity.com.au)