

# South Australian Government Annual Energy Efficiency Report

2008 - 09



Government of South Australia

Department for Transport,  
Energy and Infrastructure

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Front Cover image: Flinders Medical Centre redevelopment

## Executive Summary

The *South Australian Government Annual Energy Efficiency Report 2008-09* has been prepared in accordance with the verification and reporting requirements of the *South Australian Government 2002 Energy Efficiency Action Plan*. The Annual Energy Efficiency Report specifically reports on the Government's progress towards South Australia's Strategic Plan target, 3.13: *Improve the energy efficiency of Government buildings by 25 per cent from 2000-01 levels by 2014*.

### **Performance of Government Building Energy Efficiency**

Since 2000-01, the South Australian Government has achieved a 12.5 per cent overall energy efficiency improvement in its (owned and leased) buildings. This is halfway towards achieving South Australia's Strategic Plan target 3.13 (SASP T3.13).

There are currently 15 portfolios, comprising all agencies of Government, which report energy consumption and business measures. Portfolios reported individual improvements in energy efficiency (since 2000-01) of up to 53 per cent.

These energy efficiency improvements can generally be attributed to portfolios moving to more energy efficient buildings, undertaking building upgrades or refurbishments that utilise more efficient equipment, adopting behavioural change programs, and increasing the output of services, people or space without a significant effect on their total energy consumption.

The extent to which the results of individual portfolios influenced the overall Government target was a function of the portfolios' percentage of total Government energy consumption.

### **Other Reporting Changes 2008-09**

The previous *Annual Energy Efficiency Report 2007-08* reported an overall energy efficiency improvement of 10.8 per cent. Since that report was prepared, two new portfolios have commenced reporting, some agencies have incorporated new entities or sites which were not reported on previously, altered their reporting structures and corrected errors in energy and business measure data. The changes are detailed in the following sections.

# 1. Introduction

The South Australian Government Annual Energy Efficiency Report 2008-09 has been prepared in accordance with the Verification and Reporting requirements of the 2002 Government Energy Efficiency Action Plan. This report is the ninth in the series of South Australian Government Annual Energy Use reports, although the report has been renamed the South Australian Government Annual Energy Efficiency Report to reflect the changes in the South Australia's Strategic Plan (SASP) in 2007.

This report relates to SASP target 3.13, which is to *“Improve the energy efficiency of Government buildings by 25 per cent from 2000-01 levels by 2014.”*

## 1.1 Scope of the Strategic Plan target

As per the guidelines of the Energy Efficiency Action Plan, Government buildings under SASP T3.13 include all non-commercial agencies. The definition of non-commercial is any Agency in the *General Government* Sector of the South Australian budget papers, published annually by the Department of Treasury and Finance (DTF). A list of the South Australian Government Controlled Entities is available on the Treasury and Finance web site at [www.treasury.sa.gov.au](http://www.treasury.sa.gov.au).

For the purposes of this report, the following portfolios are included:

- Department of Health (Health);
- Department of Education and Children's Services (DECS);
- Department of Justice (Justice);
- Department of Further Education, Employment, Science and Technology (DFEEST);
- Department for Families and Communities (DFC);
- Department of the Premier and Cabinet (DPC);
- Department for Transport, Energy and Infrastructure (DTEI);
- Primary Industries and Resources SA (PIRSA);
- Department for Environment and Heritage (DEH);
- Department of Water, Land, Biodiversity and Conservation (DWLBC);
- Environment Protection Authority (EPA);
- Department of Treasury and Finance (DTF);
- Department for Trade and Economic Development (DTED);
- Department for Planning and Local Government (DPLG); and
- Defence SA (Defence).

## 1.2 Energy Efficiency Reference Group

The Energy Efficiency Reference Group (EERG) was established by Cabinet to oversee the implementation of SASP T3.13 across Government, via the Energy Efficiency Action Plan. The EERG meets monthly, with representatives from senior management from all portfolios. It is co-chaired by Cabinet Office (DPC) and Energy Division (DTEI).

### **1.3 Verification and Reporting Requirements**

An integral component of the Energy Efficiency Action Plan is reporting and publishing results. By reporting energy efficiency improvements and significant energy management initiatives in the agency annual reports there is a public record of performance against the SASP target.

An Independent Verification exercise is undertaken annually by a third party to provide assurance concerning the accuracy and robustness of the performance being reported by Government. KPMG undertook independent verification of performance in 2008-09.

In 2008-09, as part of the independent verification exercise, KPMG verified the accuracy and identified the weaknesses in energy consumption and business measure data reported by portfolios. The 2009 Independent Verification Report is available publicly at <http://www.dtei.sa.gov.au/energy/>.

### **1.4 Information Availability**

Since the introduction of the new energy efficiency target in 2006-07, additional collection of information has been required, particularly business measures at the site level. In 2008-09 the vast majority of this information is now available. Further processes are being investigated to ensure all information is readily available. A significant improvement has been made in data recording and collection.

## 2. Government Energy Efficiency Performance

### 2.1 Introduction

Determining the South Australian Government's energy efficiency performance in its buildings requires weighting and aggregating the performance of all portfolios according to their proportion of total government building energy consumption. The process for assessing portfolios' energy efficiency performance was agreed by the EERG in February 2007. Details can be found in Appendix C.

For the purposes of monitoring the progress of SASP T3.13, a 'Government building' is defined as a building in which public sector employees work, or where Government administered services and activities are either partly or completely carried out (in the general Government sector). Government buildings do not include infrastructure such as water pumps or air monitoring stations, and these are therefore not included in the measurement of SASP T3.13.

### 2.2 Business Measures

The calculation of energy efficiency improvement in South Australian Government portfolios requires the use of business measures.

Business measures are measures of, or proxies for, agency's output. For example, subject to data availability, a hospital might record its activity in terms of occupied patient bed days or a school might count FTE students. In some cases a proxy might be used, such as the area occupied by an agency or staff numbers. This is on the basis that there is a correlation between the number of people employed in an agency or the area it occupies and its output.

In this way, an energy efficiency improvement could be said to have occurred if an agency increased its building floor area or its staffing levels without an equivalent increase in its energy use.

For example, Agency A occupied a building of 2,000 m<sup>2</sup> (business measure value) and used 15,000 Giga-Joules (GJ) of energy in the 2008-09 year. As a result, the energy efficiency performance of the building is:

$$15,000/2,000 = 7.5 \text{ GJ per m}^2 \text{ or } 7,500 \text{ MJ per m}^2$$

If the same calculation was undertaken for 2000-01, an energy efficiency improvement can be determined. Where the energy use per area was higher in the base year than in 2008-09, energy efficiency has improved.

Business measures used by agencies to calculate progress towards SASP T3.13 in the 2008-09 year include:

- Number of people (staff) occupying the building (occupancy);
- Area occupied by an agency (m<sup>2</sup>); and
- Number of buildings.

Some portfolios also report additional business measures (in addition to area or occupancy measures) that are not used in the calculation of SASP T3.13 including:

- Number of occupied bed days (in hospitals);
- Number of visitors (in public buildings); and
- Number of full time equivalent employees (FTE's);

Further information on the calculation of energy efficiency improvement is provided in Appendix C, including the business measures used by individual agencies, which are displayed in Table C2 in Appendix C.

### **2.2.1 Selection of Business Measures for Inclusion in SASP T3.13**

In some cases, agencies reported on more than one business measure for each end-use category. For the purposes of this report, the business measure that reflected, as closely as possible, improvements in energy efficiency was selected.

It is worth noting that if different business measures were used to calculate the energy efficiency of an agency, such as number of students instead of area in an educational facility, the agency's, and possibly the whole of Government efficiency improvement figure may be different.

## **2.3 End-use Categories**

For the purposes of reporting on the OSCAR online system, agencies were required to allocate their chosen business measure to a specific end-use category. End-use categories define the type of business, or activity, undertaken within agencies which consume energy. End-use categories enable data reported by portfolios to be disaggregated into similar operational types. This allows the comparison of identical end-use categories across Government portfolios.

The following end-use categories were used by agencies for 2000-01 and 2008-09 reporting:

- Custodial Facilities
- Educational Facilities
- Hospitals
- Laboratories
- Law Courts
- Office Buildings Combined Services
- Office Central Services
- Office Tenant Light and Power
- Other Buildings
- Other Healthcare Buildings
- Other Healthcare Facilities
- Police, Fire and Emergency Services
- Public Buildings



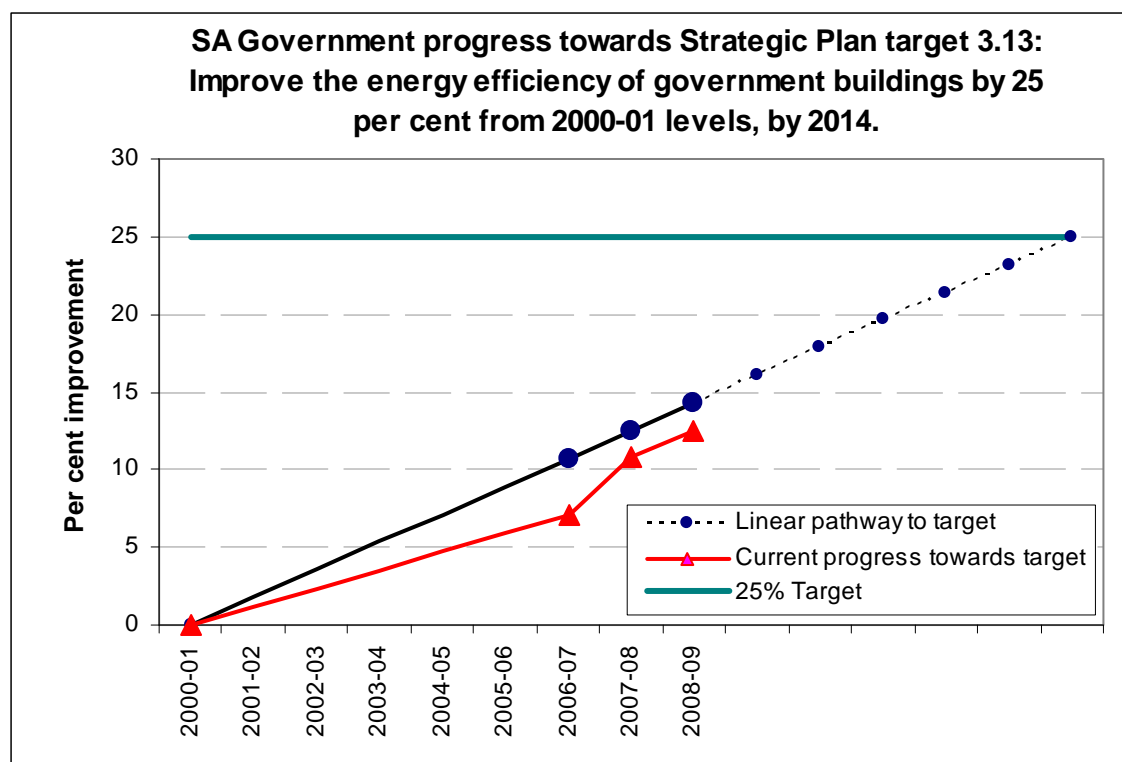
## 2.4 Whole of Government Performance

In 2008-09, the energy efficiency of South Australian Government buildings had improved by 12.5 per cent from 2000-01, as calculated in Table 2.4. Figure 2.4 shows this progress is slightly behind a linear pathway towards SASP T3:13<sup>1</sup>, which would require a 15 per cent improvement.

**Table 2.4: Total Aggregated Energy Efficiency**

2008-09				
	Total Energy Use (GJ)	Total Business Measure	Aggregate Energy Efficiency	Per cent Energy Efficiency Improvement
Area	2,182,422	4,848,069	450.2	11.79
Buildings	88,349	42	2,103,547.6	15.74
Occupancy	90,413	8,577	10,541.3	27.30
Total Aggregated Energy Efficiency (weighted by 2008-09 energy consumption)				12.53

**Figure 2.4: Whole of Government Performance**



The SA Government Annual Energy Efficiency Report 2007-08 reported an improvement of 10.8 per cent. When the 2007-08 progress is re-calculated using revised information, including corrected errors and alteration of reporting structures, the figure does not change.

Between 2000-01 and 2007-08, energy efficiency was estimated to be improving at an average rate of 1.2 per cent per annum<sup>1</sup>. The increase of 12.5 per cent in 2008-09 is primarily due to

<sup>1</sup> Please note that no business measure data was collected for the intervening years 2000-01 to 2006-07. The linear pathway was determined theoretically, and the current progress line uses 2000-01, 2006-07, 2007-08 and 2008-09 data.

significant energy efficiency measures undertaken in the Health and DECS portfolios. This increase changes the average forward progress to 1.6 per cent per annum.

The achievement of SASP T3.13 is likely to be contingent on the successful implementation of a number of large projects within the Health portfolio as it accounts for 52.1 per cent of total government energy use. Importantly, the new Royal Adelaide Hospital is expected to be fully operational in 2016, two years after the current end date for the SASP T3:13. This may have an effect on the capacity for the South Australian Government to achieve the 25 per cent improvement target by 2014.

### **Coverage of Government Building Energy Use**

More than 99 per cent of the South Australian Governments' known building energy consumption in 2008-09 has been captured in this report. Most portfolios were able to collect both building energy use and business measure data for 100 per cent of their identified sites. Where energy and business measure information were identified as being incomplete, including sites in the portfolios of Justice and PIRSA, progress to identify information has been made although coverage is not yet complete.

Two new government agencies have been included in the 2008-09 report for the first time – the Department of Planning and Local Government (DPLG) and Defence SA.

## 3. Energy Efficiency Performance by Portfolio

### 3.1 Portfolio Performance

This section reports on progress made by each portfolio. Table 3.1 and Figure 3.1 list portfolios in the order of their proportion of total SA Government energy use.

The percentage of portfolio contribution to SASP T3:13 (Column C) was calculated by multiplying the portfolio's proportion of total government energy consumption (Column B) by their individual energy efficiency improvement (Column A).

**Table 3.1: 2008-09 Individual Portfolio Progress towards the 25 per cent Improvement Target**

Portfolios	Per cent Individual Energy Efficiency Improvement (A)	Portfolio proportion of total SA Government energy use (B)	Per cent Portfolio contribution to SASP T3.13 - 2008-09 (C)
Health	14.7	52.1%	7.6
Education and Children's Services	8.1	14.7%	1.2
Justice	9.0	9.6%	0.9
Transport, Energy and Infrastructure	15.0	5.7%	0.9
Families and Communities	21.4	2.7%	0.6
Premier and Cabinet	13.9	4.0%	0.6
Environment and Heritage	43.3	0.7%	0.3
Further Education, Employment, Science and Technology	3.1	6.9%	0.2
Primary Industries and Resources SA	3.3	2.7%	0.1
Water, Land and Biodiversity Conservation	53.0	0.1%	0.1
Trade and Economic Development	19.0	0.0%	0.0
Environment Protection Authority	7.9	0.1%	0.1
Planning and Local Government	0.1	0.1%	0.0
Treasury and Finance	-14.4	0.6%	-0.1
Defence SA	0.0	0.0%	0.0
<b>TOTAL SA GOVERNMENT</b>		<b>100</b>	<b>12.5</b>

It should be noted that DTF experienced a significant decrease in energy efficiency in 2008-09 due to the creation of Shared Services. This included the transition of functions and staff from other agencies across government.

The Health portfolio is the largest consumer of building energy use in the South Australian Government, using 52.1 per cent of the Government's energy. As a result, a 14.7 per cent energy efficiency improvement in the Health portfolio has contributed 7.6 per cent (of the 12.5 per cent) energy efficiency improvement across government.

The other large energy consuming agencies include DECS, Justice and DFEEST.

**Figure 3.1: SA Government Energy Efficiency Improvement and Target Contribution 2000-01 to 2008-09**

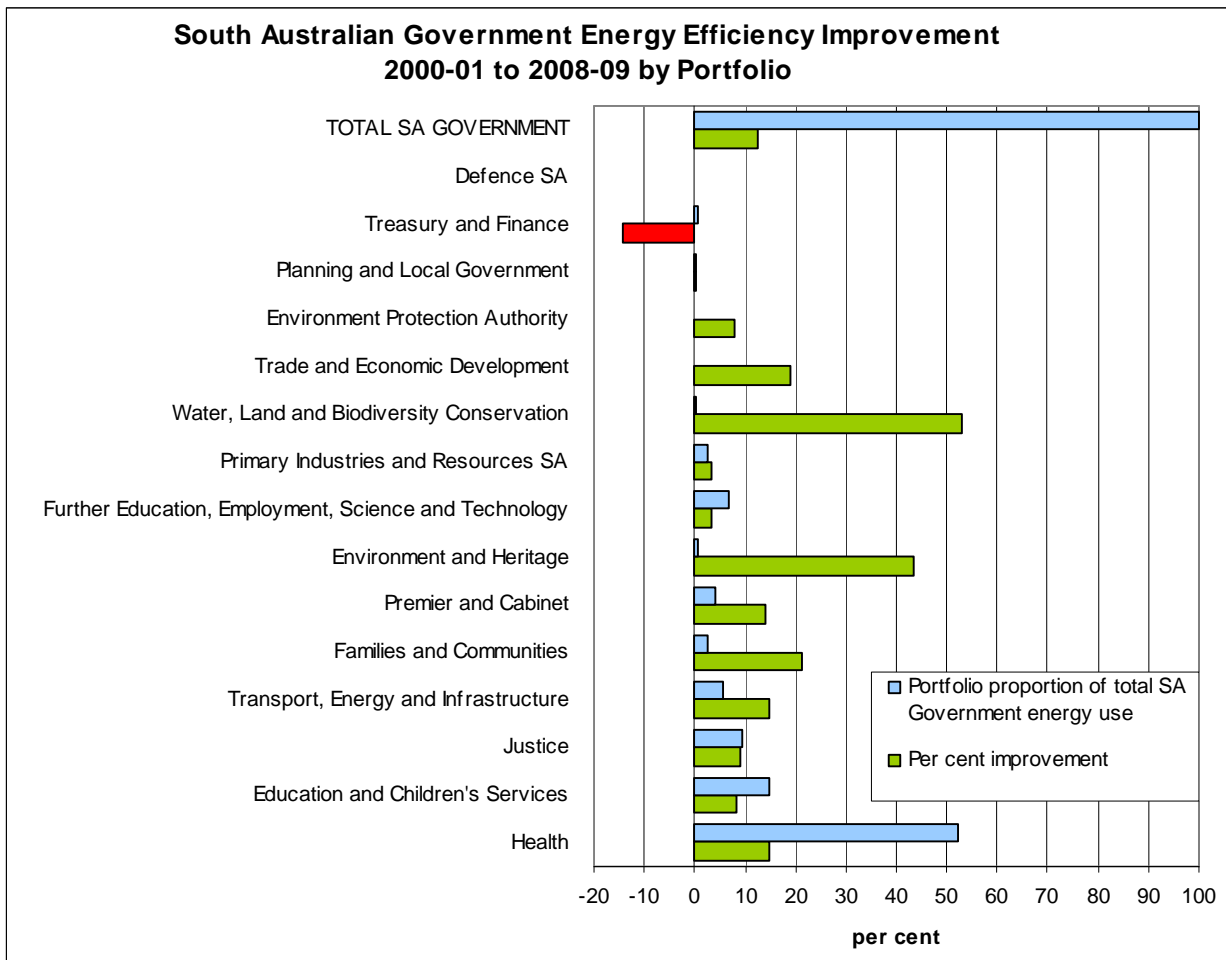


Figure 3.1 demonstrates that two portfolios, DEH and DWLBC, achieved more than a 25 per cent improvement in building energy efficiency. As Defence reported its energy usage for the first time, it does not register an energy efficiency improvement. Although DPLG reported as a separate portfolio for the first time in 2008-09, it does show a slight improvement as the divisions within DPLG were previously part of PIRSA and all historical data has been transferred from PIRSA to DPLG.

A more detailed overview of each of the portfolio's energy efficiency performance and their planned initiatives are provided in Chapter 4, Portfolio Progress 2000-01 to 2008-09.

### Baseline Revisions

It is acknowledged that portfolio structures change over time and therefore the portfolio baseline and subsequent years' energy figures will need to be revised to represent the structure of the portfolio for the given reporting period. Baselines can be adjusted in legitimate circumstances according to specific procedures developed by the EERG.

The need to revise baselines between portfolios has been acknowledged as an important requirement under this program. The 2002-03 Independent Verification Report contained a recommendation that a standard procedure be developed and implemented by the EERG for this purpose.

Under this procedure, which was developed by the EERG, agencies are not able to revise baselines due to changes in operational characteristics, such as staff number changes, and productivity (service level) fluctuations, or acquisition or disposal of sites. Untenanted sites, a change in tenancy or size of floor space occupied are also not recognised as legitimate circumstances to warrant changes.

Baseline changes are available where:

- Change occurs in portfolio structure (and particular sites must be transferred from one portfolio to another);
- A site was previously excluded from reported data or is a new site or entity; and
- Data for a site previously reported was either an estimate or reported incorrectly and actual data is now available.

Where a portfolio has made a modification to its baseline energy use data in the 2008-09 financial year, a brief explanation is provided in its overview.

### Changes to the 2007-08 Energy Efficiency Results

The energy efficiency target was measured for the second time in 2007-08. This involved a significant data collection process of both energy consumption and business measures. Since last year, agencies have undertaken a review of their data and reporting procedures to improve on the information they previously provided. As a result, the energy efficiency figures reported in the 2007-08 report have been recalculated as per the table below.

The revised figure is mainly due to baseline data changes for particular agency sites. Very few baseline changes occurred during 2008-09 and the figure has not changed significantly.

**Table 3.2: 2007-08 Individual Portfolio Progress towards the 25 per cent Improvement Target**

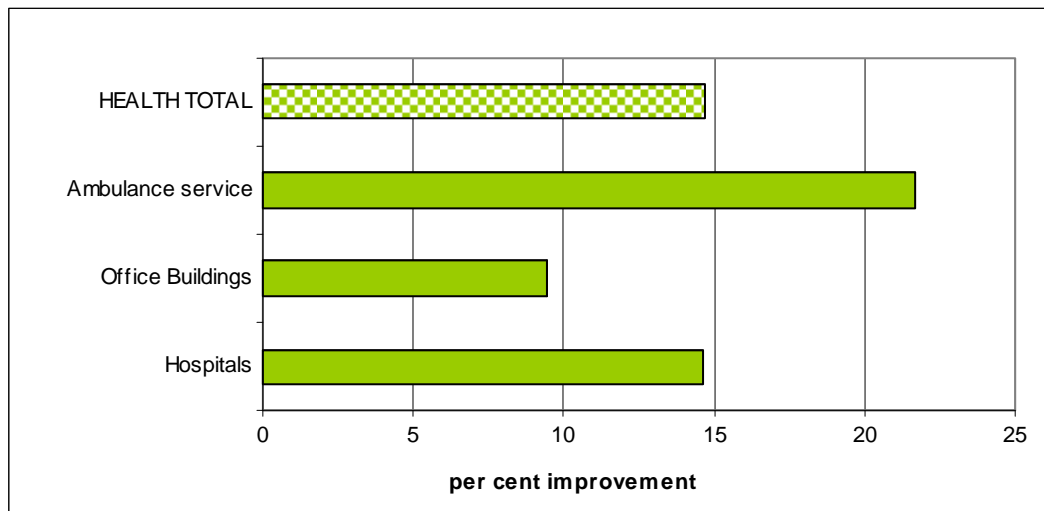
Portfolios	Per cent Individual Energy Efficiency Improvement (A)	Portfolio proportion of total SA Government energy use (B)	Per cent Portfolio contribution to SASP T3:13 - 2007-08 (C)
Education and Children's Services (high schools, primary and some pre-schools)	4.3	15.0	0.6
Primary Industries and Resources SA	9.2	3.0	0.3
Justice	9.7	9.0	0.9
Health	11.2	52.0	5.9
Further Education, Employment, Science and Technology	11.2	6.0	0.7
Premier and Cabinet	11.9	4.0	0.5
Transport, Energy and Infrastructure	16.7	7.0	0.9
Treasury and Finance	20.6	0.5	0.1
Trade and Economic Development	19.0	0.0	0.0
Families and Communities	19.0	3.0	0.5
Environment Protection Authority	25.1	0.0	0.0
Environment and Heritage	47.7	0.5	0.3
Water, Land and Biodiversity Conservation	50.5	0.0	0.1
<b>TOTAL SA GOVERNMENT</b>		<b>100.0</b>	<b>10.8</b>

## 4. Portfolio Progress 2000-01 to 2008-09

Chapter four presents the energy efficiency performance of each portfolio between 2000-01 and 2008-09.

### 4.1 Department of Health

**Figure 4.1: Health Building Energy Efficiency Improvement 2000-01 to 2008-09**



#### Overview of Performance to 2008-09

Health is a very large consumer of gas and electricity, accounting for 52 per cent of all building energy consumed by the South Australian Government. As a result, Health is a key portfolio in achieving SASP T3:13. The improvement is based on calculations using area (m<sup>2</sup>) as the business measure.

Between 2000-01 and 2008-09, Health achieved a 14.7 per cent improvement in building energy efficiency. This equates to a 7.6 per cent improvement in the Government's overall energy efficiency. Hospitals, which constitute more than 95 per cent of the Health portfolio's energy consumption, expanded their occupied space by nearly 152,500 m<sup>2</sup> between 2000-01 and 2008-09, while increasing their consumption of energy by a much lower proportion. This resulted in a decrease in the energy consumption in hospitals per square metre from 1315 MJ/m<sup>2</sup> to 1122 MJ/m<sup>2</sup>, and an overall efficiency improvement of 14.7 per cent.

#### Changes in Baseline and/or Subsequent Years' Energy Use

Nil

#### Significant Energy Management Achievements

- Energy and Water Saving Fund (EWSF) - A total of \$600 000 was allocated from the Health 2008-09 minor works program for EWSF projects (allocated on dollar-for-dollar basis, with additional funding to be provided by Health Units, a total of \$1.2 million). The projects funded through the 2008-09 EWSF include additional solar hot water services at Port Pirie, Gawler and Noarlunga hospitals, a combined lighting, water saving and air-conditioning

improvement project at SA Pathology's Frome road campus and a facility wide lighting upgrade at the South Australian Ambulance Service's main administration buildings.

- Flinders Medical Centre (FMC) redevelopment - The FMC redevelopment, which will be completed in 2012-13, has set itself the ambitious target of improving site wide energy efficiency from the 2000-01 baseline by 25 per cent. As at July 2009 energy use per square metre (MJ/M<sup>2</sup>/p.a) at FMC has fallen by 9 per cent. Energy efficiency per Occupied Bed Day has improved by an even more impressive 34 per cent since 2000-01. Significant additional energy efficiency gains are expected to be achieved as the redevelopment continues through to 2012-13.
- Citi Centre - Three of the ten floors of Health's main administration building underwent a lighting upgrade during 2008-09. Lighting energy consumption on the three affected floors is calculated to be reduced by 35 per cent.
- Solar hot water (SHW) - During 2008-09 the largest SHW water system in South Australia was installed at Flinders Medical centre (FMC). SHW was also installed on an additional four country hospitals in 2008-09. At present, approximately two thirds of all country and regional hospitals and three of the seven major metropolitan sites (Lyell McEwin Hospital, Repatriation General Hospital and FMC) have SHW installed. The Glenside and Queen Elizabeth Hospital campuses will also have SHW progressively installed as part of their ongoing redevelopments. Additional SHW capacity will also be installed at the Lyell McEwin as part of the next stage of its redevelopment.

#### **Proposed New Initiatives in 2009-10 and Beyond**

- The EWSF has been extended, with funding commitment of \$600,000 per year in place for 2009-10 and 2010-11, with Health Units to provide matching funds (bringing total value of this program over 2 years to \$2.4 million).
- Health, in collaboration with the Child, Youth and Women's Health Service, have committed funds for 2009-10 for the production of a Detailed Feasibility Study to determine the potential of a Energy Performance Contract at the Women's and Children's Hospital.
- The primary strategy to improve Health's energy efficiency is to ensure it is a high priority for all major redevelopments and refurbishments. Ambitious energy targets have been established for the three major metropolitan redevelopments (Lyell McEwin Hospital, Queen Elizabeth Hospital and Flinders Medical Centre). Cumulatively these sites accounted for 28 per cent of SA Health's baseline energy use; full achievement of the energy efficiency targets established for these sites would improve Health's energy efficiency by a further 7 per cent by 2014. Achieving SASP T3:13 for the Portfolio is highly contingent on these major redevelopments achieving the energy efficiency targets established.
- Current specifications for both the Marion and Elizabeth GP Plus Centres call for facilities that achieve a 5 Star Plus Environmental rating as measured by the Greenstar Office tool. Initial estimates are that a 5 Star rating would likely see facilities with an average energy intensity of 650-800 MJ/m<sup>2</sup> per annum; which is around half the energy intensity of the average square metre of health space in 2000-01 (1,360 MJ/m<sup>2</sup> per annum). As such GP Plus facilities should assist in achieving SASP T3.13.
- In addition there are a range of other initiatives currently funded or likely to be achieved as part of other redevelopment projects (such as the Glenside redevelopment, the New North Terrace Medical Research Institute, the GP Plus projects and major upgrades at Berri, Ceduna and Whyalla) that will likely deliver further energy efficiency gain across the Health portfolio. These projects cumulatively have the potential to deliver a further 3 to 4 per cent improvement in the SA Health energy efficiency performance.

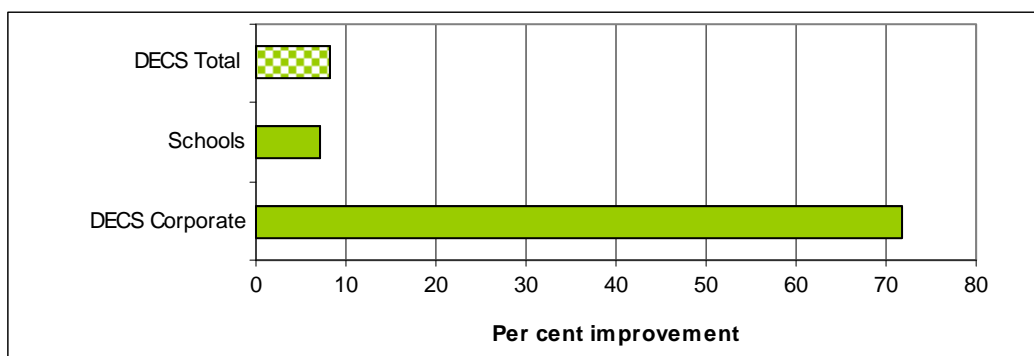
For Health to be able to deliver its proportional contribution to achieving SASP T3.13 funding of other additional energy efficiency opportunities will likely be required. Identified projects of significance in this regard are:

- Solar Hot Water (SHW) - Further funding to install SHW at one third of hospitals that do not currently have SHW services installed or planned for installation has potential to deliver large energy efficiency gains with a simple payback in the order of 7 to 8 years.
- Lighting Upgrades - preliminary analysis suggests there is considerable potential for a major lighting upgrade program to be progressively rolled out across those facilities, or buildings within facilities, more than 25 years old, that are not subject to an upcoming redevelopment. Initial estimates are that something in the order of a 3 to 5 per cent reduction in the Health's energy use might be cost effectively achieved if a lighting upgrade program was comprehensively rolled out across the portfolio.
- The Royal Adelaide Hospital (RAH) (which currently consumes 22 per cent of Health's energy use) will cease to be operational in 2016 and its replacement facility is targeting to consume less than half the energy currently consumed by the RAH and in addition, to provide 15 per cent of the sites supply from self-generated renewable power. If this ambitious target is achieved, this one project alone will improve Health's energy efficiency by approximately 11 per cent. This step change in the Portfolio's energy efficiency will not be delivered until 2016; two years after the target date established for SASP target T 3.13.



## 4.2 Department of Education and Children's Services

**Figure 4.2: DECS Building Energy Efficiency Improvement 2000-01 to 2008-09**



### Overview of Performance to 2008-09

DECS experienced an improvement in its building energy efficiency of 8.11 per cent between 2000-01 and 2008-09. As can be observed in Figure 4.2, this is primarily a result of an improvement in school (primary and secondary) building energy efficiency, which constitutes approximately 97 per cent of the portfolio's energy consumption. DECS Corporate also made a significant improvement, attributed to the promotion of sustainable behaviour management programs and the investment of energy efficiency infrastructure.

Until 2007-08, DECS was unable to report energy consumption in all pre-schools due to complexities with billing procedures. In 2008-09 the issue was addressed and DECS now have mechanisms to gather comprehensive data for next year's reporting.

### Changes in Baseline and/or Subsequent Years' Energy Use

Nil

### Significant Energy Management Achievements

Key initiatives implemented by DECS during 2008-09 included:

- Annual Green School grants – Funding of \$1 million was included in the Capital Program to support the Green School grants initiative. The 2008-09 program supported 112 schools and 400 preschools for 520 projects including implementing recommendations resulting from electricity audits, and water saving initiatives.
- Australian Sustainable Schools Initiative - The Australian Sustainable Schools Initiative South Australia (AuSSI-SA) is a joint initiative with the Department of Environment and Heritage (DEH) and South Australian Natural Resource management Boards coordinated by DECS. The Federal Department of the Environment, Water, Heritage and the Arts contributes fifty percent of AuSSI-SA funding. The program aims to support schools, staff, students and the broader community to develop whole of school and whole of community education about sustainability. Schools are encouraged to develop their knowledge, skills, values and behaviours to pursue sustainable practices. Schools are supported to 'green' themselves by creating sustainable learning and teaching environments. The program utilises a range of resources to support education for sustainability in schools. One such resource is 'Sustainable and Attainable', a web based climate change education resource

that encourages action in energy, biodiversity, waste, water, transport and air quality. The resource is available to all South Australian schools.

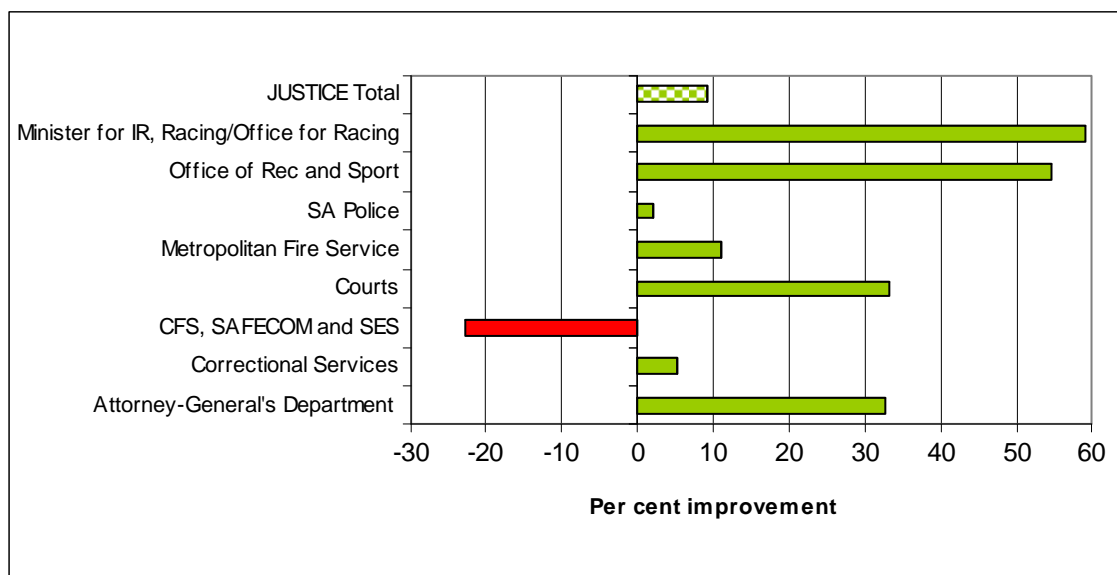
- Ecologically Sustainable Development in School and Children's Centre Facilities Protocol - Major Capital Projects, Major Capital Works, Education Works and works under the Building the Education Revolution must include the provision of a demonstration alternative energy appliance or system that can be used as part of the teaching and learning program, which could include solar photovoltaic or wind generation equipment. The Protocol also requires provision of life cycle analysis of alternative air conditioning systems; sub-metering of buildings; energy efficient appliances; high efficiency fluorescent lamps and light fittings; local user controls; timers and efficient external lighting standards.
- Preschool Utility Data - DECS has completed a utility data collection process from all DECS Preschools (>400 sites). Sites were asked to provide copies of their electricity bills so that their information can be supplied to DTEI Contract Services for renewal of the whole of government energy contract for sites consuming less than 160 MWH per year. This will also allow for preschool consumption data to be reported in OSCAR (Online System for Comprehensive Activity Reporting).
- Energy Efficiency in 31 Flinders Street - DECS undertook an audit of electrical office equipment and proposed quotas have been developed per floor. DECS is also working with the building owners and managers to gain support for National Australian Built Environment Rating Scheme (NABERS) and Australian Greenhouse Building Rating (AGBR) rating for this site. DECS Central Office is currently undergoing a trial between the 8<sup>th</sup> and 11<sup>th</sup> floors. Motion sensors have been installed to lighting in enclosed offices and meetings rooms while light sensors have been installed in the remaining floor.
- National Solar Schools Program - The SA Solar Schools Program completed in December 2008 supplied 111 DECS sites with 2kW solar panels. In July 2008, the National Solar Schools Program was launched enabling schools to apply for up to \$50,000 in funding for solar power systems, electricity efficiency installations and rainwater tanks. DECS has created a list of priorities for schools to minimise payback periods, maximise the opportunities for electricity consumption savings and work towards SASP target 3.13.

### **Proposed New Initiatives in 2009-10 and Beyond**

- Charles Campbell Secondary School and Spotless Facility Management Services have undertaken a trial of a 'load management' system at the school to control peak electrical loads. An on-site computer based control system controls the operation of the air conditioner compressors. Joint funding for the project has been provided by ETSA and the school. DECS is now investigating the implementation of the load management system at other high electricity consuming schools.
- DECS will continue to monitor and identify methods of improving energy efficiency across its offices and sites and assist sites in the management of energy efficiency targets and educational initiatives.

### 4.3 Department of Justice

**Figure 4.3: Justice Building Energy Efficiency Improvement 2000-01 to 2008-09**



**NB: CFS = Country Fire Service, SAFECOM = SA Fire and Emergency Services Commission, SES = State Emergency Service**

#### Overview of Performance to 2008-09

The Justice Portfolio improved its building energy efficiency performance by 9 per cent between 2000-01 and 2008-09. The Justice Portfolio constitutes 9.6 per cent of the South Australian Government's total building energy use. Most of the portfolio's energy is consumed within the SA Police and Correctional Services agencies.

CFS SAFECOM and SES have a -23% reduction in performance due to new facilities and the expansions of emergency services sites across the state.

#### Changes in Baseline and/or Subsequent Years' Energy Use

In 2008-09, the Office for Recreation and Sport and Office for Racing were transferred from DPC to Justice.

#### Significant Energy Management Achievements

Justice has improved the performance of its operations during 2008-09. Environmentally sustainable development (ESD) principles have been adopted when re-negotiating leases, during fit-outs and in specifying the design of new facilities. They include improving building energy performance, reducing water use and reusing and recycling materials.

Key initiatives include:

- An energy audit was conducted at the Adelaide Youth Court and the outcomes were investigated in order to implement them. Occupancy sensors for air-conditioning in the Adelaide Youth Courts were also investigated. An energy audit of Forensic Science South Australia was conducted.

- Justice undertook lighting upgrades on a number of sites, delamping and replacing existing lights with T5 lighting. Further measures were implemented to increase the numbers of staff per square metre.
- A number of measures were implemented in AGD including programmed replacement schedule for photocopiers/printers in with multifunctional devices with energy saving programs. The Building Management System was upgraded in both AGD and Forensic Science SA.
- A trial of heat reflective paint at correctional services sites occurred in 2008-09.
- Justice also installed power factor correction equipment and low energy LED exit lighting at a number of sites.

#### **Other sustainability initiatives**

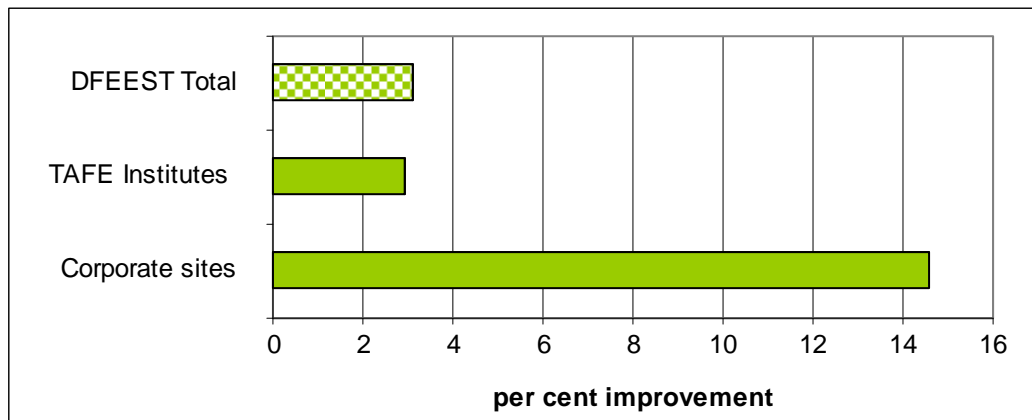
- Throughout 2008-09, Justice has ensured there is progressive replacement of single flush toilet cisterns with dual flush cisterns.

#### **Proposed New Initiatives in 2009-2010:**

- Increasing the Attorney-General's Department head office by 0.5 of an Australian Green Building Rating star to 3.5 stars, by replacing lights with T5 lighting and improving the building maintenance, hot water and air conditioning systems.
- MFS Wakefield St station to have additional solar panels installed.
- Power Factor Correction will be installed in SAPOL's Communications Building.
- Upgrades during retrofits to building maintenance, lighting, hot water and air conditioning systems.
- New SAFECOM facility at Port Lincoln will employ new efficiency techniques.
- Replacement of chillers to more flexible energy efficient units in the Sir Samuel Way building in Courts.
- Alterations and additions to the SA Police HQ and Academy involve significant energy and environmental changes from current facilities.

## 4.4 Department of Further Education, Employment, Science and Technology

Figure 4.4: DFEEST Building Energy Efficiency improvement 2000-01 to 2008-09



### Overview of Performance to 2008-09

DFEEST reported an improvement of 3.1 per cent in its energy efficiency between 2000-01 and 2008-09. DFEEST consumes 7 per cent of the South Australian Government's energy, which resulted in a contribution of 0.2 per cent to the whole of South Australian Government's efficiency improvement. This is lower than 2007-08, which saw a significant improvement in energy efficiency.

It is worth noting that TAFE SA sites, which account for 98 per cent of DFEEST's energy usage, consumed more energy in 2008-09. This increase can be attributed to adverse weather conditions and facilities and equipment.

### Changes in Baseline and/or Subsequent Years' Energy Use

Nil

### Significant energy management achievements

Key achievements in 2008/09 include:

- **Earth Hour** - a review of the building management systems (BMS) at TAFE campuses to ensure they are running at their most efficient, reducing unnecessary energy usage during after hours operations, was implemented as part of DFEEST's commitment to Earth Hour.
- A new **DFEEST Environmental Action Plan 2009-11** has been approved by the Chief Executive and will provide a strong focus for all staff on improving environmental performance.
- This plan is an integral part of DFEEST policy, with strong commitment from senior management. It is expected to result in stronger collaboration with all levels of staff to improve environmental credentials as the plan progresses. Ownership and accountability are cornerstone pillars to ensure delivery on meeting strong targets to improve environmental performance.
- The action plan has 13 key actions to drive DFEEST to a more environmentally sustainable organisation. The actions cover improved energy performance of facilities, increased recycling of waste, more efficient fleet vehicles, and reducing water usage.

### Corporate DFEEST initiatives

- The corporate occupation at 11 Waymouth St remains more efficient than previous locations, as well as reducing DFEEST's footprint by 3.8 per cent. DFEEST ICT has been instrumental in reducing printing demands by modifying printer profiles. The profile for black and white printers has been set to duplex printing. Colour printers are default set to greyscale and duplex printing.
- Continued focus on equipment utilisation will be reinforced under the new Environmental Action Plan 2009 - 11 to all staff within DFEEST.

### TAFE Adelaide North initiatives

- A cogeneration unit is located at Regency TAFE campus but is currently offline. There is a commitment to bringing cogeneration capability back online to reduce overall energy consumption at the largest site. The cogeneration unit has undergone a review to determine the level of refurbishing required or if it requires replacing.
- All Ricoh photocopier machines are now default duplex printing, as well as black and white printing. They also have a one minute energy saver mode (five minutes is the standard), and scan to email capability. Reporting is provided to monitor print usage for staff and students.

### TAFE Adelaide South initiatives

- Passageway lighting has been reduced in number by 50 per cent and the remaining globes have been replaced with efficient T5 globes, with an expected saving of 30 per cent in consumption.
- An upgrade of the BMS software at Adelaide Centre for the Arts has seen better air-conditioning and lighting controls.
- Noarlunga Campus - Upgrades of air conditioning chillers and to Building Management System are expected to result in a reduction in yearly running cost for air conditioning by 22 per cent.

### TAFE Regional

- The new Victor Harbor redevelopment will include solar panels, energy efficient lighting and a Building Management System to ensure efficient use of energy.

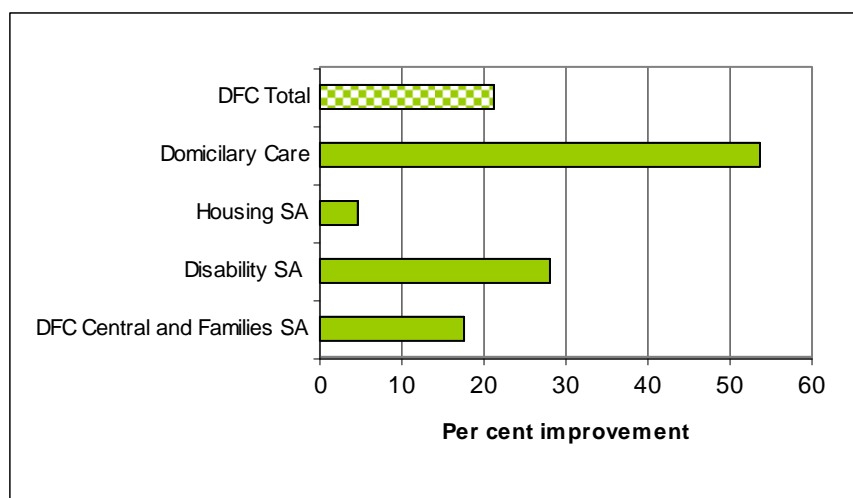
### **Proposed New Initiatives in 2009-10**

- Lighting upgrades to Mt Barker and Mt Gambier TAFE campuses are planned as a result of successful grants being obtained under the Federal Government stimulus package for TAFE.
- Gawler TAFE Campus will also have a lighting upgrade funded from DFEEST's internal minor works program.
- A new refurbishment at Mt Gambier and also at Whyalla TAFE Campuses will incorporate energy efficient lighting and water tanks.
- The cogeneration unit at Regency TAFE campus will be refurbished or replaced to enable it to come online.
- Energy and Water audits are scheduled for late 2009 to identify energy and water saving initiatives at Port Lincoln, Port Pirie and Tea Tree Gully TAFE Campuses.

- TAFE Adelaide North is investigating using a 'lock' or 'hold' print system, so that printing of documents is done after the user logs onto the printing machine. Print jobs that are not printed after a certain time period (for example, 48 hours) will be automatically deleted, saving on paper and power usage.

## 4.5 Department for Families and Communities

**Figure 4.5: DFC Building Energy Efficiency Improvement 2000-01 to 2008-09**



### Overview of Performance to 2007-08

DFC achieved an overall building energy efficiency improvement of 21.35 per cent between 2000-01 and 2008-09. Around 45 per cent of DFC's energy was consumed by Disability SA, which achieved a 28 per cent energy efficiency improvement. Housing SA reported a 5 per cent improvement in energy efficiency compared with 2007-08 in which there was a significant increase in energy usage. Domiciliary Care increased energy efficiency by 54 per cent.

DFC consumed 3 per cent of the South Australian Government's energy consumption, contributing 0.6 per cent to the whole of government efficiency improvement.

### Changes in Baseline and/or Subsequent Years' Energy Use

Nil

### Significant Energy Management Achievements

During 2008-09, DFC implemented a number of programs designed to further improve energy efficiency within the portfolio. These include:

- Completion of Stage 2 of the Print Device Consolidation Program to reduce the number of print devices within DFC. During 2008-09 the number of print devices in Riverside Centre has been reduced from 312 to 164 (53 per cent) print devices. Savings based on a reduction of 148 print devices are approximately \$137,000 per annum.
- The Print Device Consolidation Program commenced at Highgate Park in Disability SA during 2008-09, 46 print devices have been removed (49 per cent reduction) which equates to an annual saving of \$42,688 and CO<sub>2-e</sub> emission savings of approximately 10.5 tonnes per annum.
- Building a 5 star, Green star Regional Services Centre office building in Mt Gambier, fully operational by the end of 2009;
- Work has been done to change staff work behaviours and staff practices to incorporate energy efficiency and greening cultural change. For example, a 'Turn the Light Off'



campaign, switching your personal computer off at the power point before leaving the office at night, and saving energy by reducing water consumption at work;

- Working with Facility managers and DFC Building Management to improve energy efficiency in DFC sites that have been identified as consuming more than 160 MWh of energy per annum. An energy plan has been formatted for this purpose.

**Other Sustainability Initiatives include:**

- Regarding travel and fleet management, DFC has approximately 161 hybrid electric vehicles or 18 per cent, and the number of low emission fuelled vehicles in the fleet is 686 or 75 per cent of vehicles available for greening. Low emission fuelled vehicles as a percentage of the total fleet amounts to 55 per cent.
- The Greening DFC Program has been extended to the Housing SA offices at Modbury, Port Adelaide and the Parks. This has delivered achievements in energy efficiencies, waste management and print device consolidation.
- Use of the Greening Column in the DFC Buzz on-line newsletter to update staff on greening issues.
- Given the energy and cost savings that can be achieved by the use of LPG, DFC plan to set a target of 90 per cent usage of LPG, and continue to reach a target of 200 Hybrids within the DFC passenger fleet.

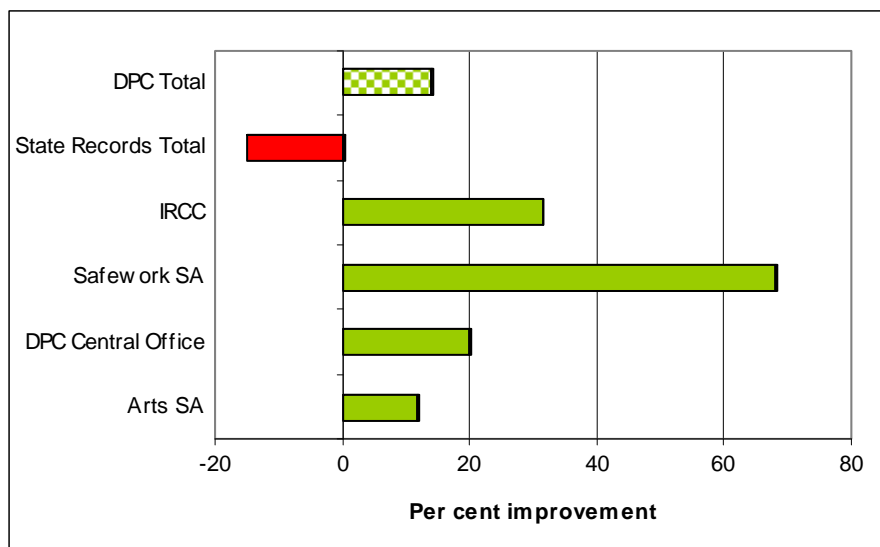
**Proposed New Initiatives in 2009-10**

The following initiatives are planned for 2009-10:

- Stage 3 of the Print Device Consolidation Program will further reduce print devices within Riverside building from 312 devices to 96 devices. This will save approximately \$183,000 in recurrent and capital costs per annum and around \$1 million dollars over five years. Given the overall savings that can be generated, the Print Device Consolidation Program is planned for expansion throughout Disability SA, Housing SA, and Domiciliary Care. Consultation with Families SA is occurring regarding the program.
- Highgate Park will reach the planned target of 55 print devices removed by the end of 2009-10. This equates to reduction from 90 to 35, a consolidation of approximately 64 per cent, a dollar saving of \$451,000 over a 5 year period and CO<sub>2-e</sub> savings of approximately 12.6 tonnes per annum.
- Extend the Green Pilot Program to other areas of DFC.
- Further work to be undertaken to implement a culture change in staff work behaviours and work practices to incorporate energy efficiencies and greening principles in making DFC a carbon neutral department.
- Continue working with Facility managers and DFC Building Services to reduce energy consumption in sites that have been identified as consuming more than 160 MWh per annum.
- Continue to use the Buzz Greening Column to inform and update staff on energy use.

## 4.6 Department of the Premier and Cabinet

**Figure 4.6: DPC Building Energy Efficiency Improvement 2000-01 to 2008-09 in buildings consuming more than 500 GJ of energy per annum.**



### Overview of Performance to 2008-09

Department of the Premier and Cabinet (DPC) achieved an overall energy efficiency improvement of 13.9 per cent in owned and leased buildings between 2000-01 and 2008-09, using area as the business measure. As a consumer of 4 per cent of the South Australian Government's energy use, this improvement contributed 0.6 per cent to the South Australian Government's overall energy efficiency target.

State Records improved its energy efficiency from 2008 levels by approximately 7 per cent but did not improve its baseline year energy usage. This is due to the installation of an air-conditioning system, to a standard required for long-term conservation of official records, at the Gepps Cross site which was occupied after 2000-01. It should also be noted that the State Records baseline energy data was miscalculated and has been corrected since the 2007/08 Annual Energy Efficiency Report.

Energy efficiency for DPC increased by 3 per cent from 2007-08. This was largely due to a decrease in energy use at large sites, such as the Art Gallery and Adelaide Festival Centre, as well as smaller sites.

### Changes in Baseline and/or Subsequent Years' Energy Use

In 2008-09, the Office for Recreation and Sport and Office for Racing were transferred from DPC to the Department of Justice.

### Significant Energy Management Achievements

- Delamping was finalised for all DPC floors in the State Administration Centre (SAC). A total of 629 tubes were removed, with estimated annual savings of \$8700 and 54,000kWh of energy.
- A comprehensive energy and water audit was completed at the Adelaide Festival Centre, with recommended actions underway. Both the South Australian Museum and the State Library of South Australia underwent energy efficient lighting upgrades in key public areas.

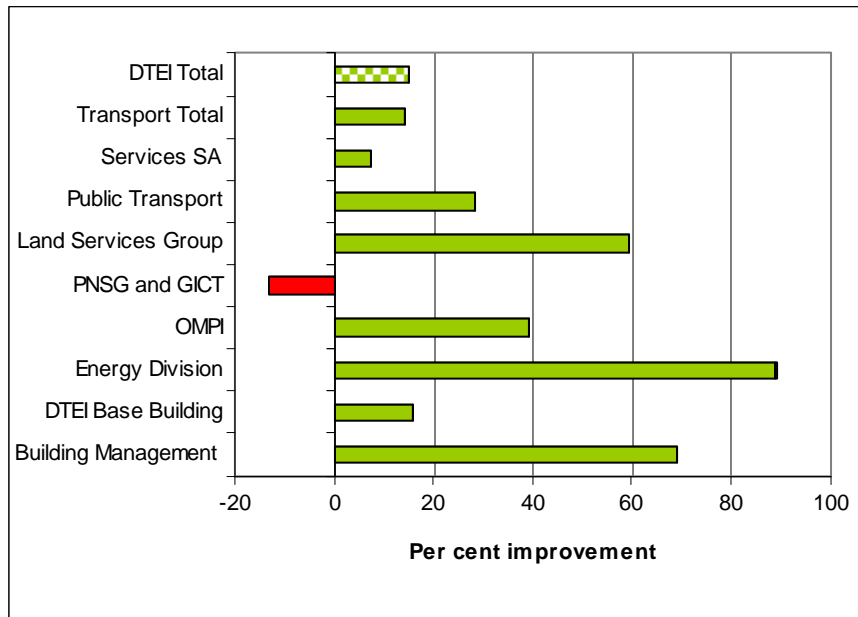
- The upgrade of the air-conditioning and lighting for the Melrose and Elder Wings of the Art Gallery of South Australia commenced after significant planning.
- A number of corporate policies and documents were developed and implemented across the department: Sustainable Office Suite; List of Sustainable Office Products; Greening ICT Policy and associated Guideline; Office Paper Procurement Policy; Environmental Sustainability Policy Statement.
- A lighting upgrade for the Riverside Centre was negotiated to be undertaken by DTEI as part of a whole-of-building lease renewal. Work commenced in late 2008.
- Where possible, motion detectors were installed in offices, kitchens, conference rooms and utility rooms at SAC and State Records Leigh Street.
- Printer rationalisation occurred on L16 SAC reducing numbers from 17 to 9 printing devices. Further rationalisation across the department has commenced.

### **Proposed New Initiatives in 2009-10**

- Investigate funding options and develop business cases to undertake the major initiatives recommended by the Adelaide Festival Centre (AFC) energy audit.
- Maintenance staff to implement minor works identified in the AFC energy audit such as checking and resetting BMS, improving car park lighting, using dampers to turn off HVAC to spaces unoccupied after hours (when performances are in progress).
- Analyse data and trends of sites with high-energy use to identify further potential for efficiency improvements, and develop business cases for carrying out associated works.
- Finalise a process to ensure the Greening ICT and Sustainable office-based printing policies are applied to procurement of office equipment. Ensure optimum energy saving settings are activated when ICT equipment is installed.
- Purchase multi-function devices to progressively rationalise multiple stand-alone printers and copiers.
- Continue to implement the DPC Sustainability and Greenhouse Gas Reduction Action Plan 2008 – 2010.

## 4.7 Department for Transport, Energy and Infrastructure

**Figure 4.7: DTEI Building Energy Efficiency Improvement 2000-01 to 2008-09**



**GICT = Government Information Communication Technology, PNSG = Parliamentary Network Support Group, OMPI = Office of Major Projects and Infrastructure.**

### Overview of Performance to 2008-09

The Department for Transport, Energy and Infrastructure improved its overall building energy efficiency by 15 per cent between 2000-01 and 2008-09, despite increasing energy usage within GICT and PNSG during 2008-09. The Energy Division reported the largest improvement since 2000-01 with 90 per cent, as a result of occupying the City Central Building Tower 1 in Waymouth Street.

Building Management achieved a 69% improvement in energy efficiency, largely due to the relocation to 211 Victoria Square in September 2008 which included a fit out that is highly energy efficient.

### Changes in Baseline and/or Subsequent Years' Energy Use

Nil

### Significant Energy Management Achievements:

- Detailed energy and water audits undertaken on five significant government owned office buildings in the Adelaide CBD. Initial 'tune up' activities have been successful to improve the NABERS energy and water ratings. Additional sustainability initiatives will be considered subject to feasibility investigations and funding as part of future asset management programs.
- A standard form of 'Green Lease' is being developed for the National Framework for Energy Efficiency work.

- DTEI participated in an initiative, being led by the Victorian Department of Human Services and including the South Australian Department of Health, ACT Health and the Green Building Council of Australia, to undertake a cost benefit analysis of the Green Star Healthcare design tool. In particular this involves determining what can be regarded as standard practice for health and the premium likely for higher levels of Green Star ratings. It is expected this will result in a framework to assist in determining environmental performance requirements for health buildings.
- For new and major refurbishment projects, a broad range of environmental measures has been incorporated into major works project procurement processes including pre-qualification criteria and briefing documentation for professional service and construction contractors, application of an ecologically sustainable development (ESD) Guide Note for 'Planning, Design and Delivery' of new buildings, and design review processes to capture environmental considerations.

### **Other sustainability initiatives**

Greening of the public transport bus fleet by:

- The use of ultra-low sulphur diesel mixed with five per cent biodiesel in the majority of the diesel fleet of buses. B20 (20 per cent) biodiesel is being used at three depots with approximately 173 buses running on this blend.
- Encouraging increased use of public transport through the Adelaide Metro Workplace program. This includes providing information and ticket sales for 30 participating organisations across metropolitan Adelaide.

A range of initiatives internal to DTEI to improve environmental outcomes:

- Fifty per cent of DTEI's vehicle fleet comprises low emission fuelled (hybrid, LPG or high efficiency diesel) vehicles. DTEI has met the Premier's 2010 target and saved over 200 tonnes of greenhouse gas emissions.
- The operation of the Green Transporter has continued - a shuttle bus service that operates between the department's Walkerville and city sites.
- Reviewed procurement processes to include reference to environmental issues which should be taken into consideration when procuring goods and services.
- DTEI has initiated an Operational Waste Management arrangement with the building owner of 211 Victoria Square that enables separation of organic, recyclable and general waste. This will be implemented when the building owner renegotiates the waste arrangements for the entire building.

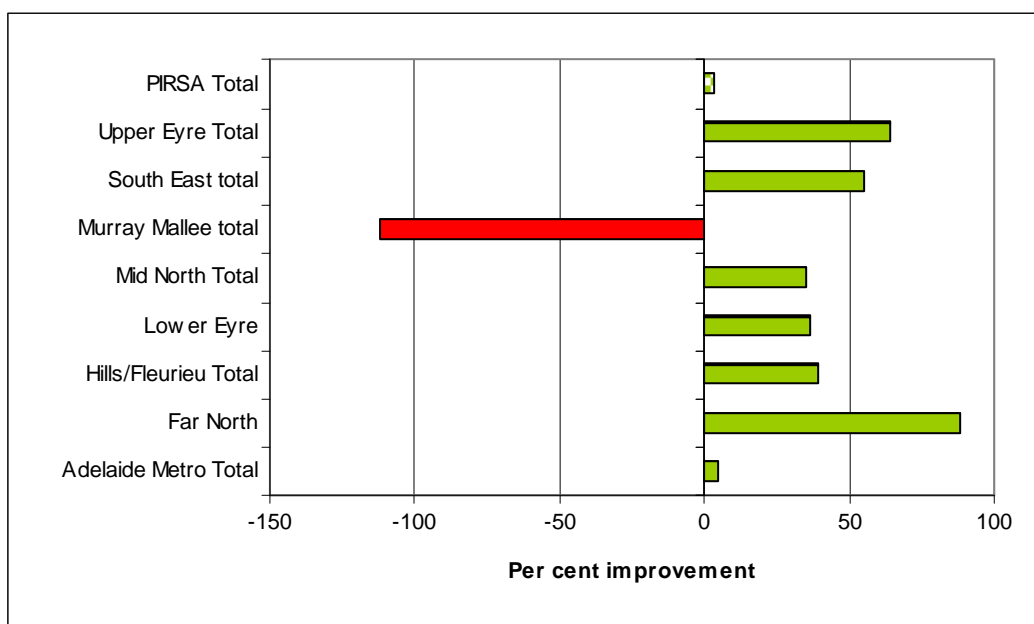
### **Proposed New Initiatives in 2009-10 and Beyond**

- Move of Walkerville staff to 77 Grenfell Street, Adelaide. The building owner of 77 Grenfell Street has committed to using reasonable endeavours to implement operational procedures which result in the base building being 4.5 stars NABERS energy rating and will maintain that rating for the term of the lease.
- Contribute to national building energy efficiency activities, including the Green Lease framework.
- Review and expand government's sustainable building policies to include specific energy targets for government-owned and leased buildings.

- Explore options to promote implementation of cost-effective energy efficiency initiatives by South Australian Government agencies.
- Continue the replacement of CRT screens with flat screens.

## 4.8 Primary Industries and Resources SA

**Figure 4.8: PIRSA Building Energy Efficiency Improvement 2000-01 to 2008-09**



### Overview of Performance to 2008-09

Figure 4.8 demonstrates the relative energy efficiency improvements within PIRSA's regional agencies. Overall, PIRSA achieved a 3.2 per cent energy efficiency improvement in its buildings between 2000-01 and 2008-09. PIRSA consumes 3 per cent of the South Australian Government's energy consumption, contributing 0.1 per cent to the whole of government efficiency improvement.

PIRSA's energy efficiency improvement is significantly lower than the improvement in 2007-08 and is a result of increased energy usage within the Murray Mallee regional agency.

Consumption for the Murray Bridge District Office has increased considerably from 2007/08 to 2008/09. The increase is significant and may be partially explained by a significant reduction in staff numbers for the period during 2007/08 followed by full occupation in 2008/09.

PIRSA are in the process of reviewing the substantial increase in conjunction with DTEI and the Building Owner to ensure the accuracy of 2008/09 figures.

PIRSA has been unable to provide business measure data for two sites – South East Laboratories and Lower Eyre 'Other Buildings'. This is being further investigated to ensure accuracy in the energy reporting of PIRSA.

### Changes in Baseline and/or Subsequent Years' Energy Use

The Office for Planning and Office for Local Government were transferred from PIRSA to the newly created Department of Planning and Local Government.

## **Significant Energy Management Achievements**

PIRSA undertook the following energy efficiency measures in 2008-09 year:

- The owner of 101 Grenfell Street installed T5 lighting throughout the building including PIRSA tenancy as a component of the new lease arrangements.
- Established a trial of T5 lighting equipment at the Mount Gambier site.
- Power factor correction equipment installed was at the Waite site.
- A NABERS Energy Tenancy Audit was conducted at Level 15, 25 Grenfell Street. This achieved a 5-star rating.
- A 'Green and Groovy Trail' environmental awareness session was held off-site at the Waite Campus, SARDI Plant Research Centre. The session highlighted the problems with high end consumption; the global impact carbon emissions have on the environment and raised staff awareness about energy consumption.

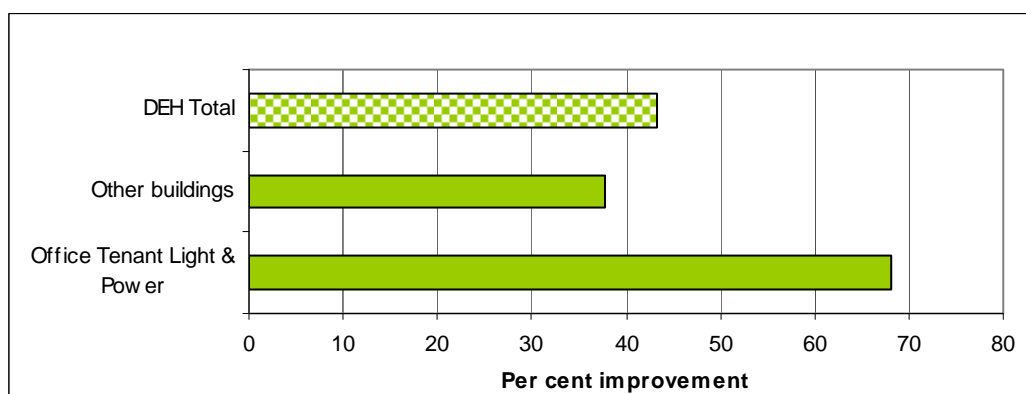
## **Proposed New Initiatives in 2009-10 and Beyond**

- If results for the trial of T5 lighting at Mount Gambier prove successful, PIRSA will investigate the potential for installation of lighting at other larger sites.
- PIRSA intends to register all sites onto a single contract established by DTEI Contract Services team and further clarify meter and business measures.



## 4.9 Department for Environment and Heritage

**Figure 4.9: DEH Building Energy Efficiency Improvement 2000-01 to 2008-09**



### Overview of Performance to 2008-09

DEH achieved an overall building energy efficiency improvement of 43.3 per cent between 2000-01 and 2008-09. A number of energy efficiency measures were introduced in the category of 'Other Buildings' throughout 2008-09, which should ensure there is an increase in energy efficiency in 2009-10. DEH consumes 0.7 per cent of the South Australian Government's energy consumption, contributing 0.3 per cent to the whole of government efficiency improvement.

### Changes in Baseline and/or Subsequent Years' Energy Use

Nil

### Significant Energy Management Achievements

DEH undertook the following energy efficiency measures in 2008-09:

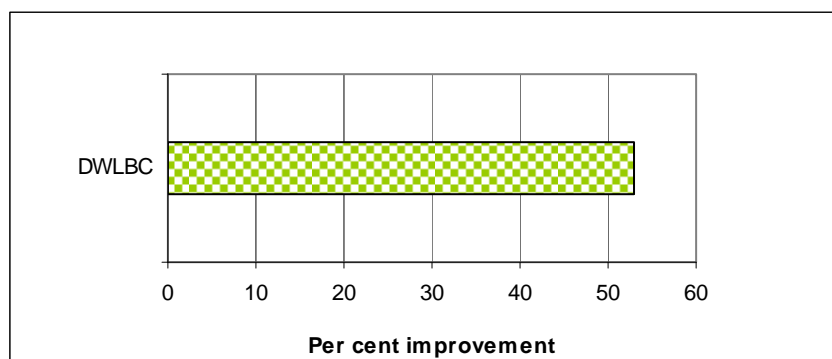
- Keswick - Completed the lighting retrofit and the installation of lighting control systems on floors one and two at 1 Richmond Road, Keswick (approx. 3,000 m<sup>2</sup>). Preliminary information suggests savings of between 30 and 40 per cent are being achieved; further investigations are required to verify this information;
- An Energy Optimiser system has been installed in the Goodman and the PBC building at the Adelaide Botanic Gardens to manage the peak air-conditioner demand. It is expected this system will generate savings of about 10 per cent of total energy use for the two buildings. The existing Metal Halide light fittings in the Goodman Building have been replaced with high output fluorescent fittings, savings expected in the order of 10 per cent of total energy usage for the Goodman Building. External Security Lighting globes also changed to energy efficient globes;
- Cleland Wildlife Park - has been retrofitted with various energy efficient lights and control systems which are expected to generate savings of 6 per cent of total park usage;
- Energy efficient lighting retrofit stage one has been completed at Black Hill Conservation Park Office Accommodation complex;
- Installation of eight smart meters at various sites has been completed to enable remote reading of energy use to monitor energy efficiency project performance and provide accurate and instant information on energy use.

### **Proposed New Initiatives in 2008-09**

- Black Hill Conservation Park – Office Accommodation Energy efficient lighting retrofit - Stage Two (subject to internal funding re-allocation).
- DEH, being a relatively small infrastructure agency has exhausted the high value/return energy efficiency gains and needs to closely evaluate further recommendations from energy audits to ensure any future investment has a reliable and valued return on investment.
- Funding previously set aside in 2008-09 to undertake investigations into Remote Area Power Systems at isolated occupied sites will now be advanced. Delays were due to decisions pending regarding DEH resource clarity and long term commitments at target sites.

## 4.10 Department of Water, Land, Biodiversity and Conservation

**Figure 4.10: DWLBC Building Energy Efficiency Improvement 2000-01 to 2008-09**



### **Overview of Performance to 2008-09**

The Department of Water, Land, Biodiversity and Conservation (DWLBC) achieved an overall building energy efficiency improvement of 53 per cent between 2000-01 and 2008-09. DWLBC is a small consumer of Government energy and contributed 0.05 per cent to the Government's overall energy efficiency improvement.

### **Changes in Baseline and/or Subsequent Years' Energy Use**

Nil

### **Significant Energy Management Achievements**

DWLBC undertook the following energy efficiency measures in the 2008-09 year:

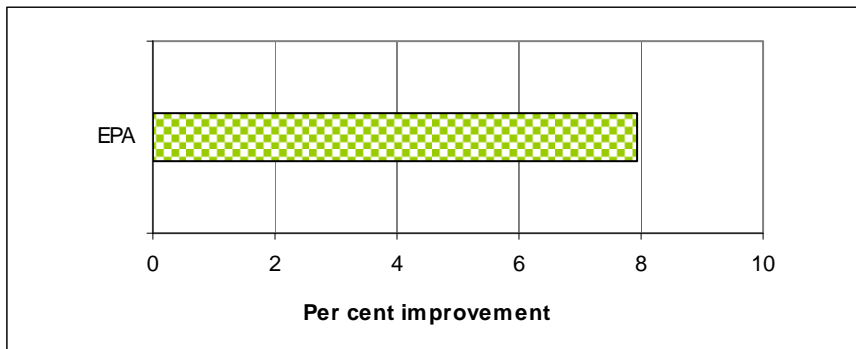
- Energy audits of all DWLBC owned accommodation were conducted. DWLBC is budgeting and prioritising the key recommendations from these audits.
- The implementation of energy efficient preventative maintenance upgrades where applicable. This includes smaller hot water services and the installation of efficient appliances and equipment.

### **Proposed New Initiatives in 2009-10**

DWLBC will begin the process of developing clear, consistent and credible information on energy efficient products and services that can motivate responsibility to all departmental employees.

## 4.11 Environment Protection Authority

**Figure 4.11: EPA Building Energy Efficiency 2000-01 to 2008-09**



### Overview of Performance to 2008-09

The Environment Protection Authority (EPA) achieved a 7.94 per cent improvement in energy efficiency between 2000-01 and 2008-09. This is significantly lower than 2007-08 in which EPA achieved a 25.1 per cent building energy efficiency improvement.

This lower energy efficiency improvement is due a double up energy usage during the EPA's transition to new accommodation.

### Changes in Baseline and/or Subsequent Years' Energy Use

Nil

### Significant Energy Management Achievements

The EPA moved to its new accommodation at the end of March 2009. This move is anticipated to reduce energy consumption due to its 6 Star infrastructure and building design and also its 5 Star rated internal fit out.

Specific aspects that will assist in meeting our reduction in energy consumption include:

- A veil on the western façade of the building to reduce solar loads while still retaining views and daylight.
- High performance glazing to north, south and east facades.
- Displacement ventilation system using raised floor – this gives individual control to occupants and reduces churn costs.
- Full height atrium to allow natural light into the heart of the building.
- Energy efficient lighting system with automatic dimming control, light switching zones not to exceed 100 m<sup>2</sup>.
- Selection of energy efficient office equipment. Kitchen / lunch room appliances were purchased based on efficiency ratings and the number of fridges were reduced from 9 to 5.
- Printers and photocopiers were reduced from 43 to 17 through the creation of printer and photocopier utility hub rooms.

It is anticipated that per person the energy consumption will be reduced not only due to the new building efficiency but also as the space per person in the new accommodation will meet

the current Government Office Accommodation Committee requirements. This means the EPA will be occupying less space.

Work commenced on the fitout of a new Radiation Laboratory at Byron Place, Adelaide to replace the current Laboratory at Rundle Street, Kent Town. The new lab will further reduce the space occupied by EPA.

#### **Proposed New Initiatives in 2009-10**

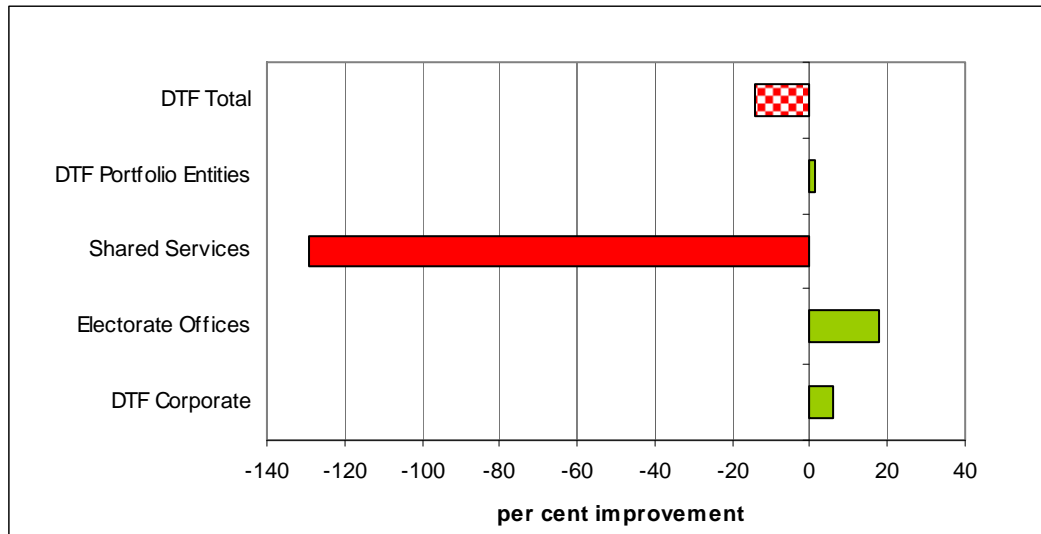
- The Radiation Laboratory fitout and relocation is expected to be complete by early October.
- EPA is continuing to work with the Building owners to identify opportunities within the base building to identify and implement further opportunities to make energy savings within Base Building functions.

#### **Other Sustainability Initiatives include:**

- Further consideration given to the Vehicle Fleet during 2009-10 with the introduction of an additional Hybrid vehicle and reduction in fleet size and vehicle mix to maintain maximum usage and ensure the most economical vehicles are provided for the work required.

## 4.12 Department of Treasury and Finance

**Figure 4.12: DTF Building Energy Efficiency Improvement 2000-01 to 2008-09**



### Overview of Performance to 2008-09

DTF experienced a decrease in their energy efficiency between 2000-01 and 2008-09 of -14.35 per cent. This is mainly a result of Shared Services, which recorded a -129.36 per cent decrease in energy efficiency. Shared Services was established in DTF in 2007-08. Subsequently, DTF contributed -0.09 per cent to the whole of Government's efficiency improvement. DTF consumes 0.5 per cent of the South Australian Government's energy.

The significant decrease in energy efficiency in Shared Services SA is due to the continual development of Shared Services SA that includes the transition of functions and staff from other agencies across government.

### Changes in Baseline and/or Subsequent Years' Energy Use

Nil

### Significant Energy Management Achievements

DTF undertook the following energy efficiency measures in the 2008-09 year:

- Negotiated office accommodation leases to include T5 and LED lighting options.
- Converting offices/conference/meeting rooms back to sensor operated lights.
- Continual rollout of Strategic Accommodation Plan to incorporate a more efficient open plan office environment.
- Continual rollout of multi-functional devices and the reduction of printers.
- Completed the replacement of CRT monitors with flat screen monitors.
- Trialling the installation of instant hot water service units for use in kitchen/utility areas.
- Trialling the installation of fixed timers on water boiling units to limit operations between 6am and 6pm, Monday to Friday.

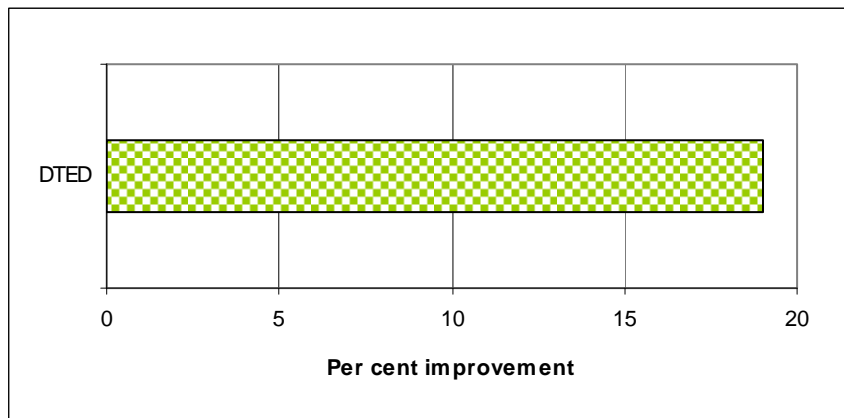
## **Proposed New Initiatives in 2009-10 and Beyond**

DTF is planning the following major initiatives:

- Engaging DTEI as building owner/manager and Spotless Property and Facilities to consider lighting options for the State Administration Centre;
- Working closely with DTEI and DPC to install an energy management tool within the State Administration Centre to assess energy use and possible improvements;
- Continue to convert offices/conference/meeting rooms back to sensor operated lights;
- Continue de-lamping of floors where appropriate;
- Assess the trial of the instant hot water service units and fixed timers on boiling water units and if successful, rollout throughout DTF

## 4.13 Department of Trade and Economic Development

*Figure 4.13: DTED Building Energy Efficiency Improvement 2000-01 to 2008-09*



### Overview of Performance to 2008-09

The Department of Trade and Economic Development achieved a 19 per cent improvement in its building energy efficiency between 2000-01 and 2008-09. This is a very slight increase in energy consumption from 2007-08. DTED contributed 0.01 per cent to the whole of government's efficiency improvement.

### Changes in Baseline and/or Subsequent Years' Energy Use

Nil

### Significant Energy Management Achievements

The following achievement was made in the 2008-09 year:

- The purchase of environmentally responsible office products and services and high energy rated electrical goods.

### Proposed New Initiatives in 2009-10 and Beyond

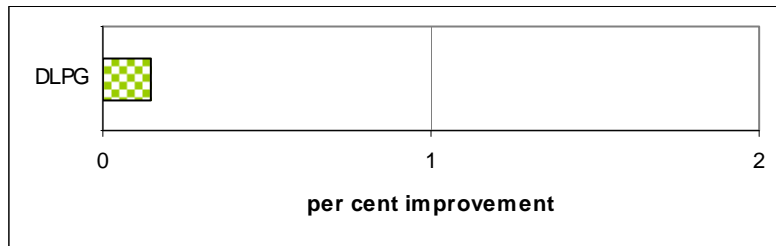
DTED will be undertaking the following building energy efficiency initiatives in coming years:

- Continue to educate staff to participate in energy saving initiatives both at work and at home (in line with DTED Greening of Government Operations Action Plan);
- Seek the provision of "green" options for energy saving initiatives in the new lease from 2010 (DTED is constrained by current fit-out until the end of its lease on 31 December 2009); and
- DTED is also implementing initiatives to increase 'green' travel.



## 4.14 Department for Planning and Local Government

**Figure 4.14: DPLG Building Energy Efficiency Improvement 2000-01 to 2008-09**



### Overview of Performance to 2008-09

Figure 4.14 demonstrates a very slight improvement in energy efficiency in 2008-09 for the newly established Department of Planning and Local Government (DPLG). The divisions within DPLG were previously part of PIRSA and all historical data has been transferred from PIRSA to DPLG. DPLG accounts for 0.09 per cent of the SA Government's energy consumption.

### Changes in Baseline and/or Subsequent Years' Energy Use

Base line data has been established and represents each of the entities within the new Department of Planning and Local Government.

### Significant Energy Management Achievements

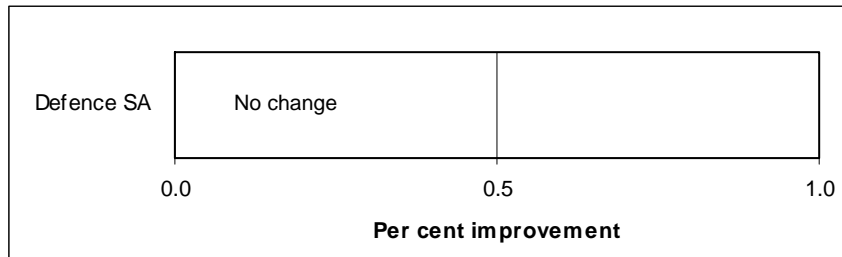
- DPLG established a Greening Initiatives Forum that investigates energy use and green procurement across the agency. Other initiatives such as waste facilities, travel and fleet management, water conservation are also being investigated.
- Members of DPLG's Greening Initiatives Forum have developed a draft terms of reference, reporting framework and an implementation plan.
- Green Building Council of Australia 5 Star Green rating for the Maritime Skills Centre at Techport Australia.

### Proposed New Initiatives in 2009-10 and Beyond

- DPLG has Executive sign off of the Greening Initiatives Forum implementation plan.

## 4.15 Defence SA

**Figure 4.15: Defence SA Building Energy Efficiency Improvement 2000-01 to 2008-09**



### Overview of Performance to 2008-09

Defence SA reported their energy usage for the first time in 2008-09. Figure 4.15 subsequently demonstrates that Defence SA has no improvement in energy consumption between 2000-01 and 2008-09. Defence SA currently occupies 2 sites and accounted for 0.03 per cent of the South Australian Government's energy consumption.

### Changes in Baseline and/or Subsequent Years' Energy Use

Base line data has been established and represents each of the entities within Defence SA.

### Significant Energy Management Achievements

- Relocation of Defence SA's administrative offices to a 4.5 star-rated building. Defence SA's administrative offices were previously located at 99 Frome St, Adelaide. During 2008-09 they relocated to Level 4, 151 Pirie St, Adelaide.
- Facilitation of private sector development of a 5 star-rated facility at Techport Australia to house the AWD Systems Centre.

### Proposed New Initiatives from 2009-10

As a new reporting agency, Defence SA is currently investigating energy efficiency measures in order to achieve an increase in energy efficiency in 2009-10.

## Appendix A - End-use Category Definitions

### **Office Buildings – Tenant Light and Power**

This category covers energy used for tenant operations in buildings where the primary function is office space. It includes tenancy lighting, office equipment, supplementary air conditioners, boiling water units etc. Additional building factors that contribute to higher energy consumption, such as computer server rooms, or localised areas of extended operating hours, are not separated from office consumption.

### **Office Buildings – Central Services**

This category covers energy used for services in office buildings common to all tenants. It includes building air conditioning, lifts, security and lobby lights, domestic hot water etc.

### **Laboratories**

This category covers all energy use in buildings that, as their primary function, are used as laboratories and research facilities.

### **Other Buildings**

The energy performance of buildings not reported elsewhere is included in the Other Buildings category. These buildings range from simple storage sheds through to radio transmitters.

### **Passenger Vehicles**

This category includes the energy consumption of passenger cars, light commercial vehicles and mini buses.

### **Other Transport**

The energy consumption of all forms of transport, other than Passenger Vehicles, is reported in this category. Energy used for general public transport such as trains and buses is not included.

### **Law Courts**

The Law Courts category includes all types of court facilities, whether a relatively small space in a larger building or a specialised building.

### **Public Buildings**

This category includes energy consumed in buildings whose primary function is to be visited by the public in significant numbers. Typical buildings in this category are public libraries, museums or art galleries. Frequently, there is a requirement to maintain close control of internal environmental conditions on a 24-hour basis in these buildings.

### **Other Uses**

This category includes the energy consumption within facilities that cannot be classified as a building, such as water pumps and air monitoring stations. These facilities are not within the scope of SASP T3:13.

### **Office Buildings – Combined Services**

This category relates to the energy consumed in office buildings where tenant services and central services consumption can not be separated. This is often the case for smaller office buildings.

### **Educational Facilities**

The Educational Facilities category includes all types of educational facilities from schools to TAFE Institutes.

### **Custodial Facilities**

The Custodial Facilities category includes all types of custodial facilities for adults or juveniles.

### **Infrastructure – Roadways**

This category includes energy consumption for street lighting, traffic lights and other facilities in the road network that are the direct responsibility of a South Australian Government agency.

### **Public Transport**

This category covers the energy consumption in vehicles and infrastructure used primarily for conveying the public, including trains, trams, buses, ferries and their operating stations. It is intended for the agencies responsible for the *operation* of the public transport system, rather than the energy consumed by individual *users* of the public transport system.

### **Hospitals**

This category covers the energy consumption in buildings and facilities primarily used as hospitals and in the delivery of health care services.

### **Other Health Care Buildings**

This category covers the energy consumption in buildings and facilities, other than hospitals, such as community health centres.

### **Other Health Care Facilities**

This category covers the energy consumption for major consumers of energy such as linen services and stand-alone food services.

### **Police, Fire and Emergency Services Facilities**

This category covers the energy consumption in buildings and facilities primarily used as police, fire and emergency services facilities such as police stations, fire stations and ambulance stations.

## Appendix B - Conversion Factors

**Table B.1: Measurement Units**

Unit	Abbreviation	Measures	Equals
Mega-Joule	MJ	energy	10 <sup>6</sup> joules
Giga-Joule	GJ	energy	10 <sup>9</sup> joules
Peta-Joule	PJ	energy	10 <sup>15</sup> joules
Metre	m	length	
Kilogram	kg	mass	
Tonne	t	mass	1000 kg
Litre	L	volume	0.001m <sup>3</sup>

**Table B.2: Energy Conversion Factors**

Energy Type	Typical Measured Units	Abbreviation	To convert to Giga-Joules, multiply by
Electricity (scope 2*)	kilowatt hour	kWh	0.0036
Natural Gas	Giga-Joule	GJ	1
LPG	Kilo-litre	kL	0.257
Heating Oil	Kilo-litre	kL	0.373
Fuel Oil	Kilo-litre	kL	0.397
Automotive Diesel	Kilo-litre	kL	0.386
Petrol	Kilo-litre	kL	0.342
AVGAS	Kilo-litre	kL	0.331
GreenPower	kilowatt hour	kWh	0.0036

\* Scope 2 Electricity emissions refers to indirect emissions from the generation of the electricity (or steam or heating/cooling) purchased and consumed by the reporting organisation.

Source: National Greenhouse Accounts (NGA) Factors, released by the Department of Climate Change, June 2009.

## Appendix C – Calculation of Energy Efficiency

### C.1 – Energy Efficiency Measurements

The 2007 update of South Australia's Strategic Plan established a target to improve the energy efficiency of Government buildings. Progress is calculated using an energy efficiency index.

Defining an index to measure changes in energy efficiency is a complex task. To begin with, energy efficiency can be defined in a number of ways. For example, many people would consider energy efficiency to be the total increase or decrease in energy usage across an organisation, however, this does not allow for organisational growth and increasing service levels.

As a consequence, organisations often use energy intensity measures to monitor their energy efficiency targets. Energy intensity is defined as the ratio of energy consumption to some measure of demand for energy services.

This document uses energy intensity measures to account for changes in the Government's energy usage while taking into consideration changes in service levels (eg expanding health and education services). Energy usage is reported as a proportion against 'business measures' such as area and number of employees. These measures are taken as indicators of output.

A number of methodologies exist for the creation of an index to track and analyse changes in energy efficiency, which accommodate the different business measures used by sub-groups of an organisation.

This report uses 'aggregate energy intensity' for those sub-groups which use the same business measure. This involves dividing the total energy use of all sub-groups by the total business measure (eg area). Section C.3 provides more details on this calculation. Aggregated intensities, however, still require weighting to accommodate different business measures, and they do not allow for analysis of different sub-groups (such as departments) within an organisation.

An alternative approach may be to examine the 'component based energy intensity' calculation whereby the energy efficiency contribution of each sub-group in government is weighted against the proportion of energy the sub-group consumed. These weighted figures are added to obtain departmental or whole of government figures. Section C.2 provides a stepped example for these calculations. It is worth noting that component based calculations are influenced by adjustments to the data reporting structure.

DTEI is continuing to investigate methodologies and indexes that are used to collate energy efficiency measures.

## C.2 - Calculating the Aggregate Energy Efficiency Improvement

Currently, agencies within Government are reporting against only three different business measures, these being area, number of buildings, and number of employees. Table C.2 on page 48 provides aggregated whole of Government data against these three business measures.

The aggregate energy efficiency figures below are calculated by summing all energy consumption within Government organisations and dividing by the sum of the common business measure.

A whole of government figure is derived by weighting the efficiency improvements by 2008-09 energy consumption and adding the proportions together.

## C.3 - Calculating a Component Based Energy Efficiency Improvement

Portfolio energy efficiency performance in 2008-09 was calculated through the following processes.

### 1. Obtain the amount of energy used per business measure (i.e. area) for both 2000-01 and 2008-09:

The energy consumed per business measure (BM) was calculated automatically by the OSCAR online system, when agencies entered the value of their business measure into their portfolio's site. These figures were then downloaded by the Energy Division and entered into a spreadsheet. The energy used per business measure is as follows:

$$\frac{[\text{Agency A Energy Use in 2000-01 or 2008-09}]}{[\text{Agency A Business Measure in 2000-01 or 2008-09}]} = \text{Number of MJ used per BM (i.e. per m}^2\text{) for 2000-01 or 2008-09}$$

*For example, Agency A in 2000-01:*

$$\frac{1500 \text{ MJ}}{500 \text{ m}^2} = 3 \text{ MJ per m}^2$$

*Agency A in 2008-09:*

$$\frac{1450 \text{ MJ}}{700 \text{ m}^2} = 2.1 \text{ MJ per m}^2$$

### 2. Calculate energy efficiency improvement for each agency:

Energy efficiency improvement for each agency within each portfolio is calculated by the following formula, using the figures in the example above:

$$\frac{[3] - [2.1]}{[3]} = 0.3$$

Then:

$$\text{Multiply } 0.3 \text{ by } 100 = 30 \text{ per cent agency energy efficiency improvement}$$

### 3. Calculate energy efficiency improvement for each portfolio:

The energy efficiency improvement of each portfolio is calculated by adding together each agency's energy efficiency improvement in proportion to its total for the portfolio:

$\frac{\text{Agency A energy use}}{\text{Total portfolio energy use}}$  multiplied by per cent Agency A efficiency improvement

+

$\frac{\text{Agency B energy use}}{\text{Total portfolio energy use}}$  multiplied by per cent Agency B efficiency improvement

= total portfolio energy efficiency improvement.

### 4. Calculate portfolio's impact on whole of government energy efficiency improvement

The approximate contribution each portfolio made to the whole of government energy efficiency improvement target was calculated by weighting each portfolio's efficiency improvement by its share of South Australian Government energy use.

Ensuring this is done in percentage terms will enable meaningful aggregation to occur regardless of the differing business measures used by portfolios in each end-use category. This is shown in Table C.1 for three portfolios using fictional numbers.

**Table C.1: Government Energy Efficiency Improvement Measurement**

	<b>Portfolio A</b>	<b>Portfolio B</b>	<b>Portfolio C</b>
<b>Per cent of total SA Government energy use</b>	50 per cent	15 per cent	10 per cent
<b>Per cent individual efficiency improvement</b>	10 per cent	20 per cent	10 per cent
<b>Per cent contribution to Target</b>	5 per cent	3 per cent	1 per cent
<b>Target (weighted energy efficiency improvement)</b>	<b>9 per cent</b>		

The first row of Table 1 shows the share of total energy consumption by each portfolio. The second row Individual Efficiency Improvement shows the energy use reductions in percentages.

The third row contribution to target is simply the first row of Table 1 multiplied by the second, for example, Portfolio B: 15 per cent x 20 per cent = 3 per cent.

Finally, the weighted energy efficiency improvement is the sum of the third row. This example shows a nine per cent improvement in energy efficiency is obtained across the three portfolios.



**Table C.2: Aggregated Whole of Government Data**

	2000-01			2007-08				2008-09			
	Total Energy Use (GJ)	Total Business Measure	Aggregate Energy Efficiency	Total Energy Use (GJ)	Total Business Measure	Aggregate Energy Efficiency	Per cent Energy Efficiency Improvement	Total Energy Use (GJ)	Total Business Measure	Aggregate Energy Efficiency	Per cent Energy Efficiency Improvement
<b>Area</b>	2,304,715	4,515,953	510.3	2,216,938	4,827,208	459.3	10.01	2,182,422	4,848,069	450.2	11.79
<b>Buildings</b>	92,368	37	2,496,432	88,349	42	2,103,547.6	15.74	88,349	42	2,103,547.6	15.74
<b>Occupancy</b>	98,060	6,763	14,500	92,022	8,509	10,814.7	25.41	90,413	8,577	10,541.3	27.30
<b>Total Aggregated Energy Efficiency (weighted by 2007-08 energy consumption)</b>							<b>10.81</b>	<b>(weighted by 2008-09 energy consumption)</b>			<b>12.53</b>

It is worth noting that unless each component is weighted equally, an aggregate energy intensity figure will differ from component based energy intensity, due to data structural effects.

## Appendix D: Energy Use tables

The South Australian Government used 2,362,790 GJ in the 2008-09 year, compared to 2,495,200 GJ in 2000-01. Table D.1 shows GJ use by end-use category and Table D.2 by Portfolio/Agency.

**Table D.1: SA Government energy use from buildings by end-use category 2000-01 to 2008-09**

End-use Category	2001 (GJ)	2002 (GJ)	2003 (GJ)	2004 (GJ)	2005 (GJ)	2006 (GJ)	2007 (GJ)	2008 (GJ)	2009 (GJ)	All Reporting Periods
Custodial facilities	77,095	69,841	69,136	71,973	71,250	75,248	73,476	75,040	75,166	658,224
Educational facilities	499,988	544,873	531,045	554,416	527,570	532,840	539,872	502,169	502,199	4,753,414
Hospitals	1,250,165	1,233,288	1,244,459	1,292,979	1,278,775	1,276,882	1,281,675	1,247,767	1,215,253	11,321,243
Laboratories	58,489	52,700	52,591	51,735	51,279	53,637	50,183	53,236	51,211	475,062
Law Courts	36,841	33,555	28,666	29,161	27,959	29,096	30,246	28,898	27,965	272,388
Office - Central Services	92,453	75,113	71,798	76,572	67,189	69,791	89,795	88,435	88,385	719,532
Office - Tenant Light and Power	172,195	150,387	120,934	131,470	132,399	127,914	126,837	125,827	124,794	1,212,829
Office buildings - combined services	35,906	30,116	13,626	27,701	25,374	26,413	26,034	25,600	25,552	236,323
Public Buildings	93,541	87,104	86,704	87,560	80,426	85,614	85,011	87,158	85,557	778,676
Other Buildings	141,385	144,053	140,299	131,683	131,394	125,762	138,058	136,286	140,466	1,229,386
Other healthcare buildings	37,142	36,895	30,832	30,192	33,853	33,789	31,840	26,895	26,170	287,606
<b>Total</b>	<b>2,495,201</b>	<b>2,457,925</b>	<b>2,390,093</b>	<b>2,485,444</b>	<b>2,427,468</b>	<b>2,436,985</b>	<b>2,473,026</b>	<b>2,397,310</b>	<b>2,362,717</b>	<b>21,944,683</b>

**Table D.2: South Australian Government energy use from buildings by Portfolio or agency 2000-01 to 2008-09**

Portfolio/Agency	2001 (GJ)	2002 (GJ)	2003 (GJ)	2004 (GJ)	2005 (GJ)	2006 (GJ)	2007 (GJ)	2008 (GJ)	2009 (GJ)	All Reporting Periods
Defence	596								596	1,192
DECS	369,973	390,208	388,311	413,872	395,887	382,532	380,275	360,397	347,587	3,447,484
DEH	32,121	20,567	20,997	20,389	21,455	14,551	19,193	16,560	17,158	182,991
DWLBC	1,815	1,815	1,997	2,356	2,249	2,246	2,238	2,524	2,472	19,712
EPA	1,694	1,497	1,633	1,493	1,525	1,432	1,459	1,385	1,398	13,515
DFC	68,809	68,562	62,499	61,859	65,673	71,372	65,434	65,100	64,553	593,863
DFEEST	156,165	174,974	159,197	151,399	144,043	163,359	172,196	150,114	162,308	1,433,755
Health	1,263,800	1,246,371	1,258,165	1,306,626	1,292,377	1,290,523	1,296,860	1,263,041	1,229,983	11,447,744
Justice	246,186	240,587	226,102	220,499	220,115	224,220	228,008	226,522	226,216	2,058,456
DPLG	2,018	2,238	2,238	2,061	1,997	1,826	1,875	2,064	2,015	18,332
DPC	106,494	99,338	97,312	97,931	91,189	96,552	95,294	97,415	94,996	876,593
PIRSA	73,910	67,316	66,261	64,263	63,757	66,448	61,879	64,382	64,451	592,666
DTED	3,461	3,373	3,196	2,835	1,639	1,456	1,257	1,122	1,154	19,493
DTEI	154,213	130,370	91,858	128,050	113,883	108,512	134,283	132,751	133,627	1,127,548
DTF	13,946	10,709	10,327	11,811	11,679	11,956	12,775	13,933	14,203	111,339
<b>Total</b>	<b>2,495,201</b>	<b>2,457,925</b>	<b>2,390,093</b>	<b>2,485,444</b>	<b>2,427,468</b>	<b>2,436,985</b>	<b>2,473,026</b>	<b>2,397,310</b>	<b>2,362,717</b>	<b>21,944,683</b>

## Glossary

**T5 Lighting:** an energy efficient fluorescent alternative to conventional fluorescent lighting. T5 is simply a collective term for a narrow-diameter fluorescent light tube.

**Eco Lighting:** a system that can be installed to reduce the energy used by the existing fluorescent lighting.

**BMS:** a Building Management System. Building Management Systems are used in buildings for automatic monitoring and control of services such as lighting, plumbing, fire services, heating and air conditioning systems. The term refers to a system that uses sensors, controls and activators.

**ESD:** Environmentally Sustainable Design. ESD incorporates sustainability principles around the use of energy, water, waste, building materials and other aspects into the design of a building.

**Scope one emissions<sup>2</sup>:** Direct (or point-source) emissions where carbon dioxide equivalent (CO<sub>2</sub>-e) is measured from the point of emission release (i.e. fuel use, energy use, manufacturing process activity, mining activity, on-site waste disposal, etc).

**Scope two emissions<sup>3</sup>:** Indirect emissions from the generation of the electricity (or steam or heating/cooling) purchased and consumed by the reporting organisation.

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<sup>2</sup> Adapted from the National Greenhouse Accounts Factors released by the Department of Climate Change, January 2008.

