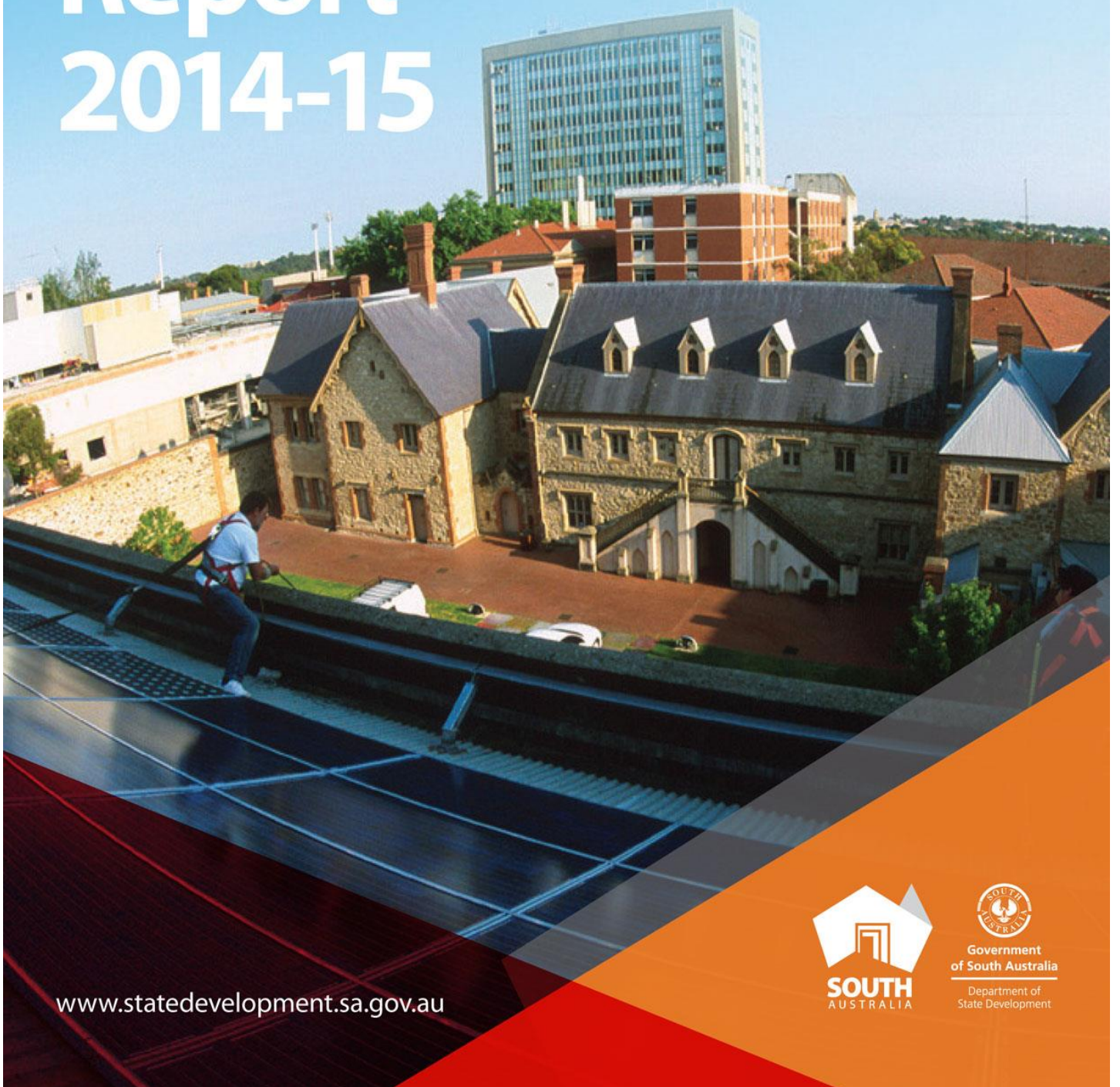


South Australian Government Buildings

# Energy Efficiency Report 2014-15



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# 2014-15 ANNUAL ENERGY EFFICIENCY REPORT

## Reporting on the South Australian Government Buildings Energy Strategy

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### Executive Summary

#### Highlights for 2014-15

- The energy efficiency of government buildings has improved by 22.1 per cent since 2000-01 and is on track to meet the 2020 milestone of 30 per cent.
- The greenhouse gas emissions intensity of government buildings has reduced by 41.6 per cent since 2000-01.
- Eighty per cent of leased government buildings (based on total floor space) have a National Australian Built Environment Rating System (NABERS) base building energy rating of 4 stars or higher.

The 2013 *Government Buildings Energy Strategy* (GBE Strategy) is the South Australian Government’s key strategic document for managing energy use and improving energy efficiency within government buildings. The GBE Strategy has three objectives:

- To achieve South Australia’s Strategic Plan Target 61 (“to improve the energy efficiency of government buildings by 30 per cent by 2020).
- To reduce energy costs to government, compared to business as usual.
- To reduce greenhouse gas emissions associated with the operation of government buildings.

The GBE Strategy identifies energy efficiency opportunities that arise at key milestones in the life of a government building, and specifies 41 actions to assist implementation of the Strategy. This report fulfills the reporting obligations established in the Strategy as follows:

- Executive Summary - Action 15 (Sustainability in procurement)
- Section 2 - Action 36 (Progress against the objectives)
- Section 3 - Actions 36 (Progress against the objectives), and 39 (Energy efficiency and demand management opportunities)
- Section 4 - Action 8 (NABERS rating of leases)

## Action 36 - Progress against the objectives of the GBE Strategy

### *Achieving South Australia's Strategic Plan Target 61 (SASP T61)*

An improvement in energy efficiency is defined as the percentage reduction in energy intensity compared to the baseline year. Energy intensity is measured by energy use (in GJ) per floor area (m<sup>2</sup>). Since 2000-01, the energy efficiency of South Australian Government owned and leased buildings has improved by 22.1 per cent. Although less than the 2013-14 improvement of 23.8 per cent, the result remains ahead of progress required to reach the 2020 target of 30 per cent.

### *Reducing energy costs to government, compared to business as usual*

In 2015 the Government established the Government Buildings Energy Efficiency Investment (GBEEI) Program. This program requires all government departments to investigate cost-effective energy efficiency opportunities at government-owned buildings. Departments will work with Energy Services Companies to find upgrade opportunities to improve energy efficiency, reduce greenhouse gas emissions and minimise energy costs associated with the operation of their buildings. Details of building upgrades, and the contribution they make to improving energy efficiency and greenhouse gas emissions, will be reported in the Annual Energy Efficiency Report from 2016.

### *Reducing Greenhouse Gas emissions intensity*

Compared to the baseline year, the South Australian Government has reduced its Greenhouse Gas (GHG) Emissions Intensity (CO<sub>2</sub>-e/m<sup>2</sup>) from the operation of government buildings by 41.6 per cent. This is a moderate reduction on the 42.0 per cent result in 2013-14. The reduction in emissions intensity since 2000-01 has been achieved as a result of:

- changing emissions factors across reporting years, owing to South Australia's commitment to invest in cleaner energy sources, and improved distribution networks
- improved energy efficiency practices in government buildings
- a focus on both energy efficiency and GHG reduction by many departments

## Action 8 - NABERS Ratings for Office Leases

The Department of Planning, Transport and Infrastructure manages a strong profile of energy efficient office building leases on behalf of government departments, with 80 per cent of the floor space of leased CBD buildings (over 2 000 m<sup>2</sup>) occupied in 2014-15 having a NABERS energy rating of 4.0 or more stars.

## Action 15 - Sustainable Procurement

As in previous years, procurement works included the upgrade and installation of sustainable features such as energy efficient lighting and solar photovoltaic (PV) systems. An energy life cycle assessment tool developed by the Department for Health and Ageing is being tested, and guidelines for the tool will be developed.

## Action 41- Review the Government Buildings Energy Strategy

In November 2015, the South Australian Government and the Adelaide City Council announced a joint vision to establish the world's first carbon neutral city; *Carbon Neutral Adelaide*.

A review of the GBE Strategy will occur in 2016. It is anticipated that the GBE Strategy review will incorporate significant realignment to include strong support of the Carbon Neutral Adelaide goal and GBEEI opportunities.

## 1. Introduction

The *South Australian Government Annual Energy Efficiency Report 2014-15* (AEER) has been prepared by the Energy Markets and Programs Division of the Department of State Development. This annual report provides a summary of the whole of government progress against the objectives of the *Government Buildings Energy Strategy* (GBE Strategy).

A copy of the GBE Strategy can be viewed or downloaded at: [www.sa.gov.au/ Topics/ Water, energy and environment/ Government energy efficiency initiatives](http://www.sa.gov.au/Topics/Water_energy_and_environment/Government_energy_efficiency_initiatives). The Government Buildings Energy Group (GBE Group) includes representatives from all departments and is responsible for overseeing implementation of the Strategy.

The three objectives of the GBE Strategy are:

- *to achieve SASP T61 (to improve the energy efficiency of government buildings by 30 per cent by 2020)*
- *to reduce energy costs to government compared to business as usual*
- *to reduce greenhouse gas emissions associated with the operation of government buildings.*

The GBE Strategy, which covers the period 2013 – 2020, was approved by Cabinet in December 2013. It addresses the broader issue of sound energy management in government buildings and has an increased focus on health and education buildings, which account for over 75 per cent of total energy used in government buildings. There are 41 actions in the GBE Strategy, and a progress report on all actions is to be provided annually to the Government's Senior Management Council (SMC) along with the AEER. Once noted by Cabinet, the AEER will be made publically available on [www.sa.gov.au](http://www.sa.gov.au).

### 1.1 Calculation of Energy Efficiency

For the purposes of monitoring the progress of SASP T61, 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 T61.

The improvement in energy efficiency is measured by comparing the energy intensity in the current year with that in the baseline year (2000-01). Energy intensity is defined as *energy use per floor area* (GJ/m<sup>2</sup>). An explanation of the methodology used to calculate energy intensity in this report is contained in Appendix A.

### 1.2 Calculation of Greenhouse Gas Intensity

The Commonwealth Department of the Environment (DoE) publishes National Greenhouse Accounts (NGA) factors annually for both electricity and natural gas and these are used in the greenhouse gas (GHG) calculations for this report. Greenhouse gas intensity is expressed as *kilograms of carbon dioxide-equivalent per floor area* (kgCO<sub>2</sub>-e/m<sup>2</sup>). The methodology used to calculate greenhouse gas intensity, is outlined in Appendix A, while the NGA factors are shown in Appendix B.

### 1.3 Impact of Changes to Calculation Factors and Methods

As in previous years, departments continue to improve data collection and calculation methods, and additional or corrected data gives rise to revisions to previously reported results. The impact on the previously reported 2013-14 results has been small.

The whole of government energy efficiency result for 2013-14 has been revised from 23.78 to 23.83 per cent due to corrections to previous data and recovery of previously unavailable data. Similarly, the whole of government 2013-14 emissions intensity improvement has been revised from 41.9 to 42.0 per cent.

Appendix A further explains the calculation method.



## 2. Whole of Government Reporting – Action 36

### 2.1 South Australian Government Result – Energy Efficiency Improvement – Action 36

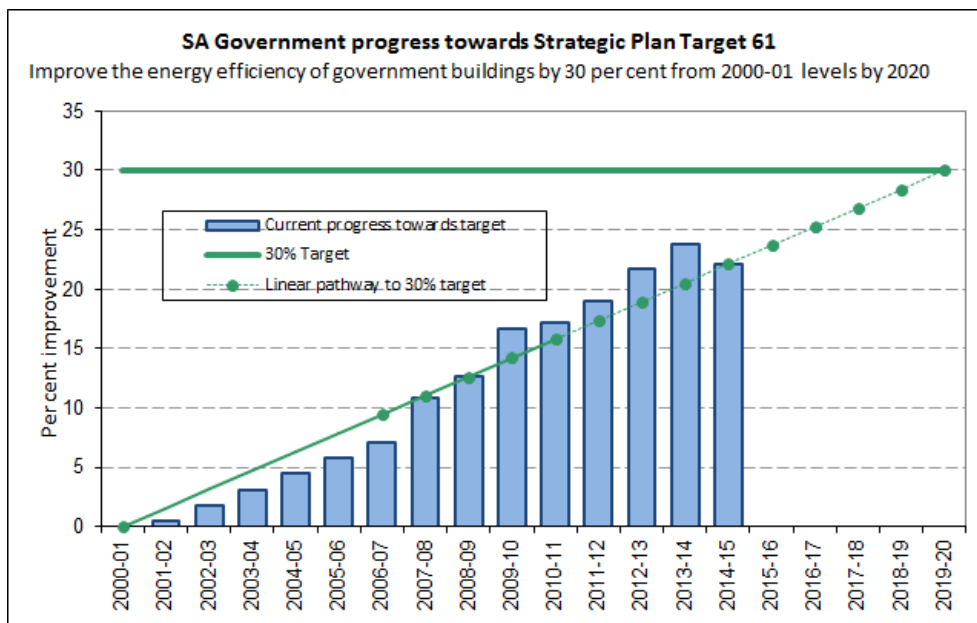
Since 2000-01 the amount of energy consumed by government buildings has reduced by 9 per cent. At the same time building floor area increased by 16 per cent. Energy intensity (MJ/m<sup>2</sup>) is 22.1 per cent lower than in 2000-01.

Table 2.1: 2014-15 Result for Government Buildings Energy Efficiency Intensity

Total Energy Use (GJ)		Total Area (m <sup>2</sup> )		Energy Intensity (MJ per m <sup>2</sup> )		2014-15 Energy Efficiency Result (Per Cent Improvement compared to 2000-01 Baseline)
2000-01	2014-15	2000-01	2014-15	2000-01	2014-15	
2 517 200	2 280 600	4 823 000	5 609 600	521.9	406.6	<b>22.10%</b>

The decrease in efficiency compared to the previous year may be attributable in part to the weather patterns for the year. August 2014 and April through to June 2015 recorded lower than average temperatures, while November 2014 through to March 2015 were above average, with February being the second warmest on record both for South Australia and nationally. Figure 2.1 demonstrates the 2014-15 energy efficiency result is still on track to achieve the 2020 target of 30 per cent.

Figure 2.1: Annual Progress against Target for SASP T61



## 2.2 South Australian Government Result – Greenhouse Gas Reduction – Action 36

Compared to the baseline year, GHG emissions are calculated to have reduced in intensity by 41.6 per cent. The total emissions from government buildings in the 2014-15 year were 162 000 tCO<sub>2</sub>-e lower than in the baseline year, which is the equivalent of the average annual emissions of around 51 000 cars<sup>1</sup>.

Figure 2.2: Annual Progress for Whole of Government GHG Intensity

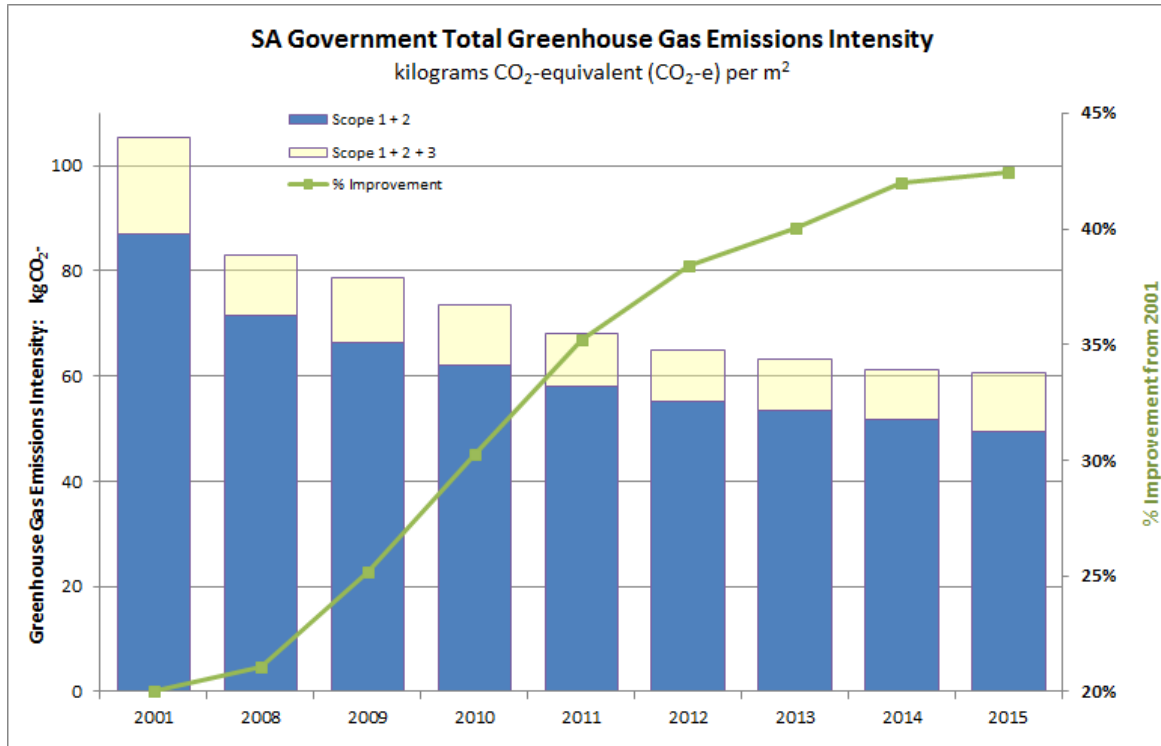


Table 2.2: 2014-15 Result for South Australian Government GHG Intensity

Total Greenhouse Gas Emissions (tCO <sub>2</sub> -e)		Total Area (m <sup>2</sup> )		GHG Intensity (kgCO <sub>2</sub> -e per m <sup>2</sup> )		2014-15 GHG Intensity change (Per Cent Improvement compared to 2000-01 Baseline)
2000-01	2014-15	2000-01	2014-15	2000-01	2014-15	
507 700	344 700	4 823 000	5 609 600	105.26	61.46	<b>41.61%</b>

<sup>1</sup> Calculation based on fuel consumption of average South Australian passenger car (10.7L/100km) driven 12 600 km per year producing 3 214 kgCO<sub>2</sub>-e per annum. (Source: ABS Cat. No. 9208.0 Survey of Motor Vehicle Use, Australia, October 2015).

Emissions conversion based on 34.2 GJ/kL energy content and 69.7 kg CO<sub>2</sub>-e/GJ. (Source: Department of Environment National Greenhouse Accounts Factors August 2015, NGA Factor for General Transport Fuel Combustion, Table 4).

## 3. Energy Efficiency and Demand Management Opportunities and Cost Reductions – Actions 36 and 39

### 3.1 General Energy Efficiency and Cost Reduction Measures

General energy efficiency activities undertaken across government during 2014-15 to reduce energy consumption and costs include:

- reprogramming Building Management Systems for public holidays and other periods of inactivity, including using weather predictions to optimise HVAC temperature settings
- programming equipment and appliances to energy saving settings
- energy modelling during the design phase of new buildings
- installing motion sensors and other lighting upgrades to more efficient options
- installing new, and augmenting existing, solar photovoltaic (PV) arrays
- analysing HVAC, lighting and other equipment upgrade opportunities to determine the most efficient option with optimal Return on Investment (ROI) payback period
- upgrading metering to determine consumption patterns and identify areas requiring attention
- rationalising equipment and investigating options to further reduce energy consumption

### 3.2 Demand Management Opportunities

Understanding the demand ('load') profile of sites with large annual energy consumption enables departments to identify where the greatest savings can be achieved, and to focus efforts on these areas.

For a large site the Agreed Maximum Demand (AMD), as negotiated with SA Power Networks (SAPN), is reflected in its demand tariff. The AMD is the highest level of energy demand (measured in kVA) expected to be required at the site. A higher AMD results in a higher charge. As demand tariffs comprise a significant portion of energy costs for large sites, determining the lowest possible level of maximum demand for a site can reduce costs. Additional charges apply when the agreed maximum is exceeded, so understanding the energy consumption patterns of a site is crucial to minimising costs.

On 1 July 2015, SAPN released updated tariff structures for business customers, and migrated affected customers over to various tariffs under the new structure, some of which have an AMD point allocated, while others accommodate more fluid demand patterns. The government's electricity contract management team has been working with departments and systematically reviewing all electricity accounts to ensure the tariff type and quantity nominated by SAPN is the most cost-effective option.

When assessing a site's demand patterns, consideration is given to:

- the cost of the AMD tariff charge (the higher the AMD, the higher the tariff charge)
- the cost of any excess charges
- the frequency with which the AMD is approached, reached, or exceeded.

It may therefore be the case that the existing AMD is the most financially viable

## 4. NABERS Ratings for Office Leases – Action 8

The Department for Planning, Transport and Infrastructure (DPTI) and Energy Markets and Programs Division (EMPD) of the Department of State Development (DSD) are responsible for the GBE Strategy reporting requirements for leasing:

*Action 8 - Report through the AEEER on:*

- *The proportion of office leases with a NABERS Energy rating, and the breakdown of ratings, from 6.0 star to 1.0 star, and those with a commitment to achieve a 5.0 star rating.*
- *The number of new or renewed leases that did not achieve a 5.0 star NABERS Energy rating, the reasons why, and any penalties imposed.*

The breakdown of NABERS Ratings for leased office buildings is shown below. Buildings with leased area greater than or equal to 2 000 m<sup>2</sup> are rated and Base Building Energy Ratings are performed.

Table 4.1: NABERS Base Building Ratings for Government Leased Office Buildings as at 30 June 2015

NABERS Energy Rating (Stars)	Number with Rating	Portion of Number of Leased Buildings (%)	Area with Rating (m <sup>2</sup> )	Portion of Area (%)
6.0	0	0.0	0	0.0
5.5	1	4.0	12 200	5.9
5.0	3	11.5	48 800	23.6
4.5	7	26.9	44 400	21.5
4.0	8	30.8	63 200	30.6
3.5	1	3.8	3 500	1.7
3.0	1	4.0	2 100	1.0
2.5	0	0.0	0	0.0
<b>Not rated</b>	<b>5</b>	<b>19.2</b>	<b>32,700</b>	<b>15.8</b>
<i>Total</i>	<i>26</i>	<i>100%</i>	<i>206 900</i>	<i>100%</i>

If a building does not perform to the NABERS rating specified in the leasing agreement, the building owner is obligated to commission a review of the energy use in the base building in consultation with the tenant representatives to identify and discuss opportunities for improvements. A number of leases have penalty clauses for not reaching or maintaining a prescribed level. All agreed ratings were achieved in 2014-15.

Five leases over 2,000m<sup>2</sup> were committed to in 2014-15;

- Two new leases, one of which is 4.0 star NABERS, and the other mixed use site which is exempt from a base building rating
- Three leases were renewed, one each of 3.0, 4.0 and 4.5 stars

DPTI has a preference for departments to be accommodated in buildings with a 5.0 star NABERS base building energy rating, however this is not always commercially viable.



## Appendix A: Calculation of Energy Efficiency

An improvement in energy efficiency for a government department is measured by comparing its energy intensity in the current year with that in the baseline year (2000-01). Energy intensity is defined as 'energy use per floor area' (GJ/m<sup>2</sup>).

### Example of calculation of Energy Intensity and Energy Efficiency improvement

Department X occupied a building of 4 000 m<sup>2</sup> and used 1 500 Giga-Joules (GJ) of energy in the 2014-15 year. As a result, the energy intensity of the building is:

$$\frac{1500GJ}{4000m^2} = 0.375GJ/m^2 = 375MJ/m^2$$

Energy efficiency improvement is measured by the change in energy intensity. For example, if the energy intensity of the same building was 500 MJ/m<sup>2</sup> in the baseline year, the energy efficiency improvement is:

$$\frac{(500 - 375) MJ/m^2}{500 MJ/m^2} = 0.25 = 25\%$$

The same method is used to calculate the improvement in Greenhouse Gas Intensity

The structure of Annual Energy Efficiency Reports and data calculation methods will be continue to be reviewed to best illustrate progress towards the objectives of the GBE Strategy.

## Appendix B: Conversion Factors

Table B.1: Energy Conversion Factors

<i>Energy Type</i>	<i>Typical Measurement</i>	<i>Abbreviation</i>	<i>To convert to GJ, multiply by</i>
Electricity	kiloWatt hour	kWh	0.0036
Natural Gas	MegaJoule	MJ	0.001
LPG	kiloLitre	kL	25.7

Table B.2: Emission Factors by Fuel Type 2013-14\*

<i>Energy Type</i>	<i>Emission Factor Scope 1 kg CO<sub>2</sub>-e per GJ</i>	<i>Emission Factor Scope 2 kg CO<sub>2</sub>-e per GJ</i>	<i>Emission Factor Scope 3 kg CO<sub>2</sub>-e per GJ</i>
Electricity	-	156	30
Natural Gas	51.33	-	10.4
LPG	59.72	-	5.0

Table B.3: Annual Emission Factors for Electricity – South Australia

	<b>Electricity</b>		
<b>Financial Year</b>	<b>Emission Factor Scope 2 kg CO<sub>2</sub>-e per GJ</b>	<b>Emission Factor Scope 3 kg CO<sub>2</sub>-e per GJ</b>	<b>Full fuel cycle Emission Factor (EF for scope 2 + EF for scope 3)</b>
1999/2000	253	35	288
2010/11	180	32	212
2011/12	171	29	201
2012/13	162	30	192
2013/14*	156	30	186

Source: [National Greenhouse Accounts \(NGA\) Factors](#), released by the Department of the Environment, August 2015.

\*2013/14 is the latest estimate of the NGA factors. 2014/15 factors were not available at time of publication.