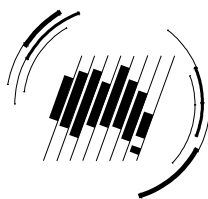




Energy Use in Commonwealth Operations 1999/2000



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Executive Summary

Total energy consumption of the Commonwealth during 1999/2000 was 8,628,307 GJ with associated greenhouse emissions of 1,629,146 tonnes of CO₂ equivalent.

This represents a reduction of 2.3% in energy consumption and 1.6% in associated greenhouse emissions over the past year. In the key buildings sector, the major indicator showed a 7.4% improvement, well on track for the Commonwealth's goal of a 25% energy intensity reduction between 1992/93 and 2002/03. The cumulative reduction in total Commonwealth energy consumption since the first reporting period in 1997/98 is 10.6% and associated greenhouse emissions 9.2%.

However these figures should be treated with some caution. Assessment of improvements in energy efficiency are complicated by changes in Commonwealth Government activity, organisational movements and property ownership. For example, defence activity has markedly increased following our involvement in East Timor, the Australian Taxation Office and the Australian Sports Drug Agency (Olympic testing) activity was higher and certain Commonwealth office buildings were sold. For these reasons energy intensity indicators have been developed, providing a clearer indication of the improvements in energy efficiency.

Based on energy intensity indicators, the Commonwealth has improved the energy efficiency of its operations, reporting reductions in eight of twelve end use categories. Of the four categories that showed increases in intensity, two remain well below the 1997/98 intensities, while the other two have increased. There are energy performance targets in three end use categories to be met in the 2002/03 financial year. For the Commonwealth as a whole, the 500 MJ/m² target for Office Central Services has been met. The 10,000 MJ/person target for Office Tenant Light and Power will be met if present trends continue. However the Department of Defence has moved further away from its 2,500,000 GJ target for Defence Establishments.

Buildings and building related activities are the predominant consumers of energy with 83% of the total. Transport operations account for another 15% and other uses, such as sporting fields and street lights, account for the rest. In greenhouse terms, buildings are even more significant because of the higher consumption of electricity relative to other energy sources. Buildings and related activities account for about 94% of energy related greenhouse emissions and transport operations for 5%. Passenger vehicles account for 8% of total energy consumption, but less than 3% of greenhouse emissions. Defence operations are not covered by the energy policy.

Electricity is the largest source of energy for the Commonwealth at 64% of the total and is associated with 89% of all energy related greenhouse emissions. Natural gas is the next most common energy source with 18% of the total and 5% of greenhouse emissions, followed by petrol at 11% of total energy and 4% of emissions.

One hundred and twenty agencies provided data for this report to fulfil the annual reporting requirement of the Commonwealth energy policy. Of these, the top energy user, the Department of Defence, was responsible for 48% of total energy use, the top 10 for 75% of use and the top 20 for 87% of use. This highlights the importance of the high energy using agencies in determining overall energy performance, but does not diminish the responsibility of smaller agencies to contribute equally.

With few exceptions, data was submitted on time and the quality of data continues to improve. There were, however, concerns over data quality from some agencies and the passenger vehicle data can be improved.

A number of agencies have made progress in their energy management programs and have been prepared to share that experience. The case studies in this report highlight the need for agencies to persist in their approach, with a plan that allows them to take advantage of all energy saving opportunities as they arise.

Introduction

This is the third annual report on energy use in Commonwealth Government operations.

The aim of each report is to present a simple picture of energy consumption and associated greenhouse gas emissions resulting from the activities of the Commonwealth during the previous financial year.

This public reporting ensures that agencies are aware of their level of energy consumption and the intensity of that consumption, and enables them to compare their energy performance with that of other Commonwealth agencies. The report tracks trends in consumption and intensity of both the Commonwealth as a whole and individual agencies to monitor progress towards performance targets. In this way agencies are kept accountable to the Government commitment to lead by example by improving energy efficiency and reducing emissions in its own operations.

Measuring energy efficiency between organisations as diverse as Commonwealth agencies is not simple. Tracking changes in the overall energy consumption of an agency without accounting for the underlying activity levels of that agency gives no indication of the relative efficiency of energy use. Last year, some agencies had increases in staff numbers to cope with the introduction of new programs. As expected, they also had increases in energy consumption. But they were not necessarily less energy efficient.

For this reason, the concept of normalised energy consumption, or energy intensity, has been introduced. Simply put, this provides a measure of how energy consumption is related to the activity levels of the agency. These energy intensities are expressed as MJ/person, MJ/m² or MJ/km where MJ is a Megajoule, a unit of energy consumption, m² represents a square metre of building space and km is the distance travelled by a vehicle.

While not perfect, normalised energy consumption, or energy intensity, is a much better indicator of relative energy efficiency because it does, to some extent, reflect activity levels. It does, however, introduce a degree of complexity to the comparison process as energy performance is peculiar to the type of activity being assessed. For example, it is reasonable to compare office buildings with each other in terms of energy performance, but it would be inappropriate to compare office buildings with a laboratory.

To address this, the concept of end use categories (similar energy performance characteristics) was introduced, with twelve categories being defined for use in the Commonwealth. Most have a defined intensity as the key indicator of energy efficiency. However for some categories, there was no appropriate intensity so total energy consumption was used.

It is reasonable to make comparisons between the year to year performance of an agency within a particular category, as measured by its energy intensity. Categories like office buildings and passenger vehicles are reasonably homogeneous and therefore one agency's performance may be compared with another. In other categories, like public buildings or laboratories, comparisons between agencies should be done with great care and with an understanding of all the factors affecting relative performance.

The report is structured to address these objectives. There is an initial discussion on aggregate energy consumption and associated greenhouse emissions by end use category and by energy source for the Commonwealth as a whole. This is presented for the current reporting year and with trends over the last three reporting years. The performance of each

end use category is then examined in detail, focussing on energy intensities where appropriate to the category.

This is followed by a summary of some case studies of energy efficiency initiatives undertaken during the year and also the key outcomes of the recently completed review of the Commonwealth energy policy.

Detailed summaries of performance in the first three reporting years are provided in the Annexes, firstly by portfolio, and then for each agency. Agency summary sheets include their comments on their own performance and, where agreed, the agency energy management contact. This move to link more closely agency comments with their data is a result of feedback received from agencies during the review process. The only other major change from previous years is the presentation of end use category data as league tables in ascending order of energy intensity. Tenant Light & Power data is also presented in alphabetical order for ease of reference. Changes to some tables have been made to simplify the presentation and to accommodate the additional year of reporting data.

The report is based on end use category summary data provided by each agency. This level of data detail is sufficient for the report objective of showing consumption and intensity levels and trends, and tracking agency progress towards targets. It is not sufficient, however, for any detailed analysis of processes or technologies associated with agency performance. The philosophy underpinning the policy is that agencies are best placed to determine their own responses and solutions to energy efficiency issues affecting their own organisation. The policy sets outcomes based goals and uses the reporting system to monitor progress towards those goals.

The deadline for agencies to provide data for this report is the end of October and is followed by a short period of data checking and validation before making the report ready for tabling. Some errors in previous year's data were identified and corrected. As a result, data included for previous reporting years is not always consistent with the data previously published. Data correction and analysis will continue, and additional interpretations and presentation details may be included in the published version of the report to be released early next year.

Performance Outcomes

Summary of Commonwealth Energy Use and Greenhouse Emissions

Total reported energy consumption of the Commonwealth during 1999/2000 was 8,628,307 GJ with associated greenhouse emissions of 1,629,146 tonnes of CO₂ equivalent.

Table 1 provides a summary of energy consumption and associated greenhouse emissions by end use category. Greenhouse gas emissions are calculated by applying national average greenhouse coefficients to the total consumption of each of the fuel type in the category. These coefficients may be found in Annex C.

Table 1 - Total Commonwealth Energy Consumption and Greenhouse Gas Emissions for each End Use Category

End Use Category	Energy Use		Greenhouse Emissions	
	GJ	% Total	tonnes	% Total
Climate Controlled Stores	68,209	0.79	12,777	0.78
Other Uses	77,065	0.89	13,238	0.81
Antarctic Bases	77,806	0.90	5,438	0.33
Law Courts	103,831	1.20	22,574	1.39
Public Buildings	322,377	3.74	55,839	3.43
Office - Central Services	518,163	6.01	97,117	5.96
Other Transport	615,702	7.14	42,024	2.58
Passenger Vehicles	690,217	8.00	45,705	2.81
Other Buildings	696,777	8.08	153,553	9.43
Laboratories	881,470	10.22	169,341	10.39
Office - Tenant Light and Power	1,308,210	15.16	337,966	20.74
Defence Establishments	3,268,480	37.88	673,575	41.35
Total	8,628,307		1,629,146	
Defence Operations	19,833,061	69.68	1,382,242	45.90
Grand Total	28,461,368		3,011,388	

The energy consumption of defence operations is appended to Table 1 to complete the picture of total energy consumption by the Commonwealth. Despite its significant contribution to the Commonwealth total, Defence operational fuel consumption does not fall within the ambit of the Commonwealth energy policy for anything other than the reporting requirement. Levels of consumption can vary widely depending on operational priorities and increased significantly this year as a result of activities in East Timor. Therefore, except where otherwise explicitly stated, Defence operational fuel consumption will be excluded from subsequent analysis in this report.

Total energy consumption varies in response to Government priorities and activity levels. Consumption increased as a result of Government responses to the Olympics (increased drug testing, security etc), to East Timor and to the requirements of introducing the new

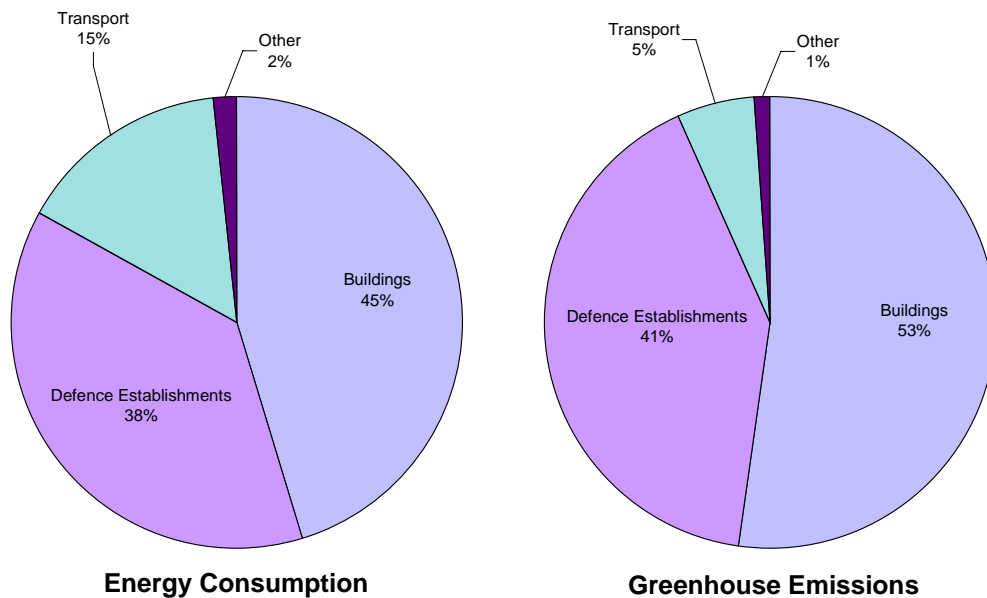
tax system. Reported energy consumption has decreased as a result of the sale of Commonwealth office buildings for which the Central Services energy consumption is no longer able to be reported

An important aspect of the Commonwealth energy policy is that departments and agencies are expected to be responsible for, and report on, only that energy consumption over which they have direct control. Tenants in multi storey buildings, for example have virtually no control over the energy consumption of building central services like air conditioning, lifts, domestic hot water etc that is operated by the building owner and possibly shared by many tenants. While tenants are expected to be responsible for the energy consumption of their own light and power, they are not required to be responsible for the energy consumption of the building central services unless they have agreed to this in their lease agreement. Therefore, the only office building central services energy consumption that is included in this report is for office buildings where the Commonwealth is the building owner or where the Commonwealth, as a tenant, has agreed to assume responsibility for such consumption. As office buildings are sold, the energy consumption of the building central services are no longer reported.

As a result, a large amount of central services energy consumption is unreported. The Commonwealth occupies around 2.5 million square metres of office space but is responsible for the central services energy consumption of only just over 1.1 million square metres of space. . With the continuing sale of the Commonwealth office estate unreported energy consumption will continue to increase as a percentage of total consumption.

Like defence operational fuels, the energy consumption of central services in privately owned office buildings is estimated for information only and is excluded from any analysis in this report.

Figure 1 shows the energy use and greenhouse emissions of four broad end use groups. This figure clearly shows how important building energy performance is to determining the overall greenhouse emissions of the Commonwealth. While transport operations represent 15% of total energy consumption, they are responsible for only 5% of total energy related greenhouse emissions. This becomes even clearer when it is considered that both the Defence Establishments group and the Other Group is mostly building related.

Figure 1 - Energy Use by End Use Group

Buildings includes Office - Tenant Light and Power, Office - Central Services, Public Buildings, Law Courts, Climate Controlled Stores, Laboratories and Other Buildings

Transport includes Passenger Vehicles and Other Transport

Other includes Other Uses and Antarctic Bases

Defence Establishments includes Defence Establishments only

Energy Use by Agency

The goal of the energy policy is to reduce Commonwealth energy consumption and associated greenhouse emissions through improving the efficiency of energy use. The energy consumption of agencies can vary greatly depending on underlying activities during the reporting period and therefore the raw energy consumption of an agency says very little about its energy efficiency. The focus of this report is on energy intensity expressed as energy consumption per unit.

Table 2 - Total Energy Use of the 20 Highest Energy consuming Departments and Agencies

Agency	Total Energy	
	GJ	% of C'wth
Department of Defence	4,136,720	47.94
Commonwealth Scientific and Industrial Research Organisation	788,633	9.14
Centrelink	475,020	5.51
Australian Antarctic Division	366,139	4.24
Australian Taxation Office	321,512	3.73
Australian Broadcasting Corporation	248,828	2.88
Joint House Department	168,585	1.95
Australian Federal Police	157,725	1.83
Australian Customs Service	122,852	1.42
Australian Nuclear Science & Technology Organisation	85,368	0.99
Commonwealth Law Courts	73,095	0.85
Health Insurance Commission	72,732	0.84
National Gallery of Australia	70,876	0.82
Australian Sports Commission	62,057	0.72
Parks Australia -- Wildlife Australia	61,452	0.71
Department of Foreign Affairs and Trade	60,370	0.70
Property Group*	50,395	0.58
Department of Immigration and Multicultural Affairs	49,900	0.58
Bureau of Meteorology	47,918	0.56
Australian Bureau of Statistics	46,105	0.53
Total for Top 20 Agencies	7,466,281	86.5
Total for Commonwealth	8,628,307	

* This is the central services energy consumption of Commonwealth owned office buildings

However the greatest opportunities for achieving significant reductions in the Commonwealth energy consumption are with the largest energy consumers. Table 2 lists the 20 highest energy using agencies in the Commonwealth, which together account for 87% of total Commonwealth energy consumption. Some agencies, like the Australian Taxation Office have reported significant changes in energy consumption. In the case of the Tax Office, its increase resulted from increased staff numbers and occupied floor area. Significantly, while the Tax Offices' energy consumption increased, its energy intensities generally decreased - an indication of the continuing success of its energy management program. Full details of the energy performance of all energy reporting agencies are included in the Agency data sheets in Annex A.

Energy Use by Source

This section examines the relative contribution of different fuel types to overall Commonwealth energy consumption and greenhouse emissions. Defence operational fuels are included in the overall total of Commonwealth energy use in Table 3 and then excluded from subsequent tables and comments.

Table 4 shows the fuel type split for total energy consumption without Defence operational fuels and Table 5 concentrates on fuel use for general transport operations.

Because passenger vehicles and their fuel sources have been the subject of several inquiries over the past year, Table 6 presents the fuel source data for that end use category only.

Table 3 - Total Commonwealth Energy Consumption and Greenhouse Gas Emissions by Energy Source
(including Defence Operational Fuels)

Energy Source	Energy Use		CO2 Emissions	
	GJ	% Total	tonnes	% Total
Heating Oil/Fuel Oil	1,994	0.01	139	0.00
Greenpower	23,208	0.08	-	-
AVGAS	73,433	0.26	4,993	0.17
Special Antarctic Blend	76,974	0.27	5,388	0.18
LPG	88,993	0.31	5,286	0.18
Gas Oil	268,454	0.94	18,792	0.62
Petrol	908,009	3.19	59,929	1.99
Natural Gas	1,538,209	5.40	83,679	2.78
Electricity	5,554,811	19.52	1,444,251	47.96
Automotive Diesel	9,832,155	34.55	685,301	22.76
Aviation Turbine Fuel	10,095,127	35.47	703,630	23.37
Total	28,461,368		3,011,388	

Table 4 - Total Commonwealth Energy Consumption and Greenhouse Gas Emissions by Energy Source
(excluding Defence Operational Fuels)

Energy Source	Energy Use		CO2 Emissions	
	GJ	% Total	tonnes	% Total
AVGAS	1,439	0.02	98	0.01
Heating Oil/Fuel Oil	1,994	0.02	139	0.01
Aviation Turbine Fuel	9,659	0.11	673	0.04
Greenpower	23,208	0.27	-	-
Special Antarctic Blend	76,974	0.89	5,388	0.33
LPG	88,993	1.03	5,286	0.32
Automotive Diesel	156,557	1.81	10,912	0.67
Gas Oil	268,454	3.11	18,792	1.15
Petrol	908,009	10.52	59,929	3.68
Natural Gas	1,538,209	17.83	83,679	5.14
Electricity	5,554,811	64.38	1,444,251	88.65
Total	8,628,307		1,629,146	

Table 5 - Transport Energy Consumption and Greenhouse Gas Emissions by Energy Source

Energy Source	Energy Use			CO2 Emissions	
	GJ	Units	% Total	tonnes	% Total
Natural Gas	86		0.01	5	0.01
LPG	1,033	(40,000 L)	0.08	61	0.07
AVGAS	1,439	(43,000 L)	0.11	98	0.11
Aviation Turbine Fuel	9,659	(262,000 L)	0.74	673	0.77
Automotive Diesel	117,240	(3,037,000 L)	8.98	8,172	9.31
Gas Oil	268,454	(6,000 t)	20.56	18,792	21.42
Petrol	908,009	(26,550,000 L)	69.53	59,929	68.31
Total	1,305,919			87,729	

Table 6 - Passenger Vehicle Energy Consumption and Greenhouse Gas Emissions

Energy Source	Energy Use			CO2 Emissions	
	GJ	Units	% Total	tonnes	% Total
Natural Gas	86		0.01	5	0.01
LPG	848	(33,000 L)	0.12	50	0.11
Automotive Diesel	42,425	(1,099,000 L)	6.15	2,957	6.47
Petrol	646,858	(18,914,000 L)	93.72	42,693	93.41
Total	690,217			45,705	

Automotive diesel is used in many light commercial vehicles, four wheel drives and mini buses that are included in the passenger vehicle category.

Trends in Energy Consumption and Greenhouse Emissions

Figure 3 illustrates the changes in energy consumption by end use category over the three reporting periods. These results are presented numerically in Table 7. Of particular note is the relative size of the consumption of each end use category and its move from last year.

Last year's favourable trend in energy consumption is continuing albeit at a lower rate. In the past 12 months total energy consumption fell by 2.3% resulting in a total reduction of 10.6% since 1997/1998.

Figure 3 - Energy Consumption for each End Use Category

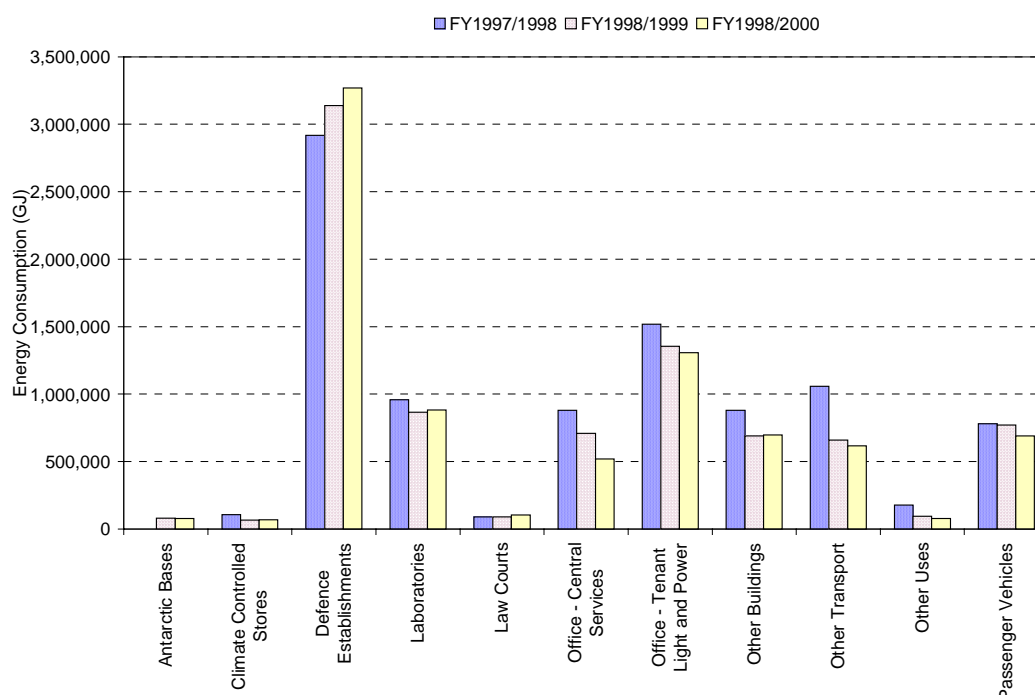


Table 7 - Energy Consumption Moves for Each End Use Category

End Use Category	Energy Use (GJ)			% Move
	1997/98	1998/99	1999/00	Last Year
Climate Controlled Stores	104,800	65,054	68,209	4.85
Other Uses	178,365	94,306	77,065	- 18.28
Antarctic Bases		79,644	77,806	- 2.31
Law Courts	88,829	90,327	103,831	14.95
Public Buildings	286,059	319,905	322,377	0.77
Office - Central Services	880,202	706,640	518,163	- 26.67
Other Transport	1,057,525	658,759	615,702	- 6.54
Passenger Vehicles	780,451	769,951	690,217	- 10.36
Other Buildings	880,488	689,563	696,777	1.05
Laboratories	957,326	863,925	881,470	2.03
Office - Tenant Light and Power	1,518,605	1,354,179	1,308,210	- 3.39
Defence Establishments	2,917,752	3,139,887	3,268,480	4.10
Total	9,650,402	8,832,140	8,628,307	- 2.31
Progressive Reduction	0.0%	-8.5%	-10.6%	

As will be seen later, much of this reduction comes from improvements in energy intensity, indicating that the Commonwealth is indeed becoming more efficient in its energy use.

The large reduction in Office Central Services is mostly due to the continuing sale of Commonwealth office buildings. Central Services energy consumption is only reported for those office buildings where the Commonwealth has direct responsibility for that consumption. Typically, this responsibility rests with the building owner.

The increase in energy consumption in the Law Courts category is a result of the first full year of reporting for the new Commonwealth Law Court building in Melbourne. This building is Commonwealth owned and with total building energy consumption being reported, there is an apparent increase in reported consumption. Previously the law courts occupied leased space, where Central Services consumption was not reported. In addition, the building energy intensity is well above the average for this category. The building's management team is now addressing this issue.

The decrease in Other Uses is due to an improvement in data monitoring that allowed energy consumption in this area to be transferred to more appropriate categories.

While not large in percentage terms, the 4% increase in energy consumption in the Defence Establishments category translates to a significant increase in overall energy use for the Commonwealth. Defence Establishments account for nearly 40% of total consumption and for the second year in a row, consumption has increased. It is expected that the Defence energy management program foreshadowed in last years report will soon address this adverse trend.

Table 8 - Moves in Greenhouse Emissions for Each End Use Category

End Use Category	Greenhouse Emissions (te CO2)			% Move
	1997/98	1998/99	1999/00	Last Year
Climate Controlled Stores	22,248	12,718	12,777	0.5%
Other Uses	22,569	13,665	13,238	-3.1%
Antarctic Bases		5,570	5,438	-2.4%
Law Courts	21,691	21,879	22,574	3.2%
Public Buildings	50,712	56,142	55,839	-0.5%
Office - Central Services	157,820	139,162	97,117	-30.2%
Other Transport	72,539	44,816	42,024	-6.2%
Passenger Vehicles	51,531	51,017	45,705	-10.4%
Other Buildings	213,826	156,329	153,553	-1.8%
Laboratories	187,966	164,202	169,341	3.1%
Office - Tenant Light and Power	392,749	348,722	337,966	-3.1%
Defence Establishments	600,645	641,473	673,575	5.0%
Total	1,794,297	1,655,695	1,629,146	-1.6%
Progressive Reduction	0.0%	-7.7%	-9.2%	

With the reduction in energy consumption, there is a reduction in associated greenhouse gas emissions. This is not a direct relationship as the level of greenhouse emissions also depends on the fuel mix. There was a very small increase in electricity as a proportion of

total consumption last year, up from 63.6% to 64.4% of total, and this was enough to limit the reduction in overall greenhouse emissions to 1.6%. Total reductions since the first year of reporting in 1997/98 are now 9.2%. Table 8 shows the trends in greenhouse emissions.

In Table 9, the energy consumption and associated greenhouse emissions of the different energy sources is shown for each source of energy used by the Commonwealth. The share of the total consumption taken by each fuel type has been quite steady with the main movers being gas oil, reflecting additional ship trips to Antarctica and greenpower that started from a base of zero and now represents 0.3% of total.

Table 9 - Moves in Energy Consumption and Greenhouse Emissions for Each Energy Source

Energy Source	Energy Use (GJ)			CO2 Emissions (tonnes)		
	1997/98	1998/99	1999/00	1997/98	1998/99	1999/00
AVGAS	6,047	5,694	1,439	411	387	98
Heating Oil/Fuel Oil	91,799	2,615	1,994	6,398	182	139
Aviation Turbine Fuel	10,253	7,986	9,659	715	557	673
Greenpower	-	1,714	23,208	-	-	-
Special Antarctic Blend	-	79,148	76,974	-	5,540	5,388
LPG	77,339	123,975	88,993	4,594	7,364	5,286
Automotive Diesel	761,174	372,762	156,557	53,054	25,981	10,912
Gas Oil	-	73,796	268,454	-	5,166	18,792
Petrol	1,073,857	996,801	908,009	70,875	65,789	59,929
Natural Gas	1,582,511	1,550,879	1,538,209	86,089	84,368	83,679
Electricity	6,047,422	5,616,770	5,554,811	1,572,330	1,460,360	1,444,251
Total	9,650,402	8,832,140	8,628,307	1,794,465	1,655,695	1,629,146

Energy End Use Intensity

As discussed in the introduction, energy intensity is a far better indicator of energy efficiency in operations than energy consumption. Table 10 summarises the aggregate Commonwealth performance for each end use category and, where appropriate, the range and average of the energy intensity most appropriate to each category. The performance of all agencies in each end use category over the three years of reporting is detailed in Annex A and league tables of current year agency performance in each end use category are included in Annex B.

Many agencies commented that their data quality was compromised by lack of adequate metering. Energy management programs can only be effective if agencies know where their energy is consumed and for this reason, the need for effective metering systems has always been a highlight of the energy policy. Agencies will continue to be encouraged to install metering systems, as this is one of the most efficient ways of monitoring and managing energy use.

Some end use categories, such as Other Transport or Other Uses are so diverse as to make it impossible to define any single indicator of energy performance and so only their total energy consumption is included in Table 10. Defence Establishments continue to be reported in terms of total energy consumption, although the Department of Defence is being encouraged to move towards intensity based reporting.

Table 10 - Summary of Commonwealth End Use Category Performance

End Use Category	Total Energy		Key Indicator	Target	Performance Range		
	GJ	%			Lower	Upper	Average
Office - Tenant Light and Power	1,308,210	15.2	MJ/person/annum	10,000	4,035	28,769	11,702
Office - Central Services	518,163	6.0	MJ/m ² /annum	500	102	1,020	455
Public Buildings	322,377	3.7	MJ/m ² /annum		14	3,114	1,158
Law Courts	103,831	1.2	MJ/m ² /annum		224	919	602
Climate Controlled Stores	68,209	0.8	MJ/m ² /annum		304	3,441	698
Laboratories	881,470	10.2	MJ/m ² /annum		560	2,356	1,048
Other Buildings	696,777	8.1	MJ/m ² /annum		12	4,124	1,007
Passenger Vehicles	690,217	8.0	MJ/km		1.9	5.9	3.3
Other Transport	615,702	7.1	GJ				
Defence Establishments	3,268,480	37.9	GJ	2,500,000			
Antarctic Bases	77,806	0.9	GJ				
Other Uses	77,065	0.9	GJ				
Total	8,628,307						

Targets are currently set in three end use categories as indicated in Table 10. The targets for Office Tenant Light & Power, and Office Central Services are set in intensity units and the Defence Establishments target is an absolute consumption level. These targets are to be met by 2002/03. The Australian Greenhouse Office is developing Passenger Vehicles targets to apply from 2003.

Targets have not been set in other end use categories because the diversity of operations within these categories makes a sensible uniform target impossible. Consideration is being given to setting agency specific targets in these categories however as the administrative effort is likely to be high, a rigorous cost-benefit analysis would need to be performed.

Meanwhile, the requirement for all new buildings and major building upgrades to comply with strict energy performance guidelines and the requirement for agencies to show leadership in their approach to energy management should ensure that efficiency improvements are realised in these categories.

Table 11 - Commonwealth Moves in End Use Category Intensity

End Use Category	Energy Use Intensity			Intensity Units	% Move
	1997/98	1998/99	1999/00		Last Year
Office - Tenant Light and Power	13,557	12,634	11,702	MJ/person/annum	- 7.38
Office - Central Services	537	483	455	MJ/m ² /annum	- 5.75
Public Buildings	1,342	1,309	1,158	MJ/m ² /annum	- 11.57
Law Courts	550	538	602	MJ/m ² /annum	11.91
Climate Controlled Stores	1,174	663	698	MJ/m ² /annum	5.34
Laboratories	1,111	996	1,048	MJ/m ² /annum	5.19
Other Buildings	1,385	1,021	1,007	MJ/m ² /annum	- 1.39
Passenger Vehicles	3.8	3.7	3.3	MJ/km	- 9.08
Other Transport	1,057,525	658,759	615,702	GJ	- 6.54
Defence Establishments	2,917,752	3,139,887	3,268,480	GJ	4.10
Antarctic Bases	-	79,644	77,806	GJ	- 2.31
Other Uses	178,365	94,306	77,065	GJ	- 18.28

Table 11 shows how the Commonwealth has progressed in improving its energy efficiency over the past three years and in particular, how energy efficiency changed from last reporting year. This table should be read in conjunction with Table 7 and Figure 3 as the size of the moves should be considered alongside the relative contribution that the category makes to overall Commonwealth performance. For example, the improvement in Tenant Light & Power intensity becomes more significant when it is appreciated that this category contributes more than 15% to total consumption.

Office Buildings - Tenant Light and Power

Description

This category covers energy used for tenant operations in buildings whose primary function is office space. It includes tenancy lighting, office equipment, supplementary air conditioners, boiling water units etc. However, additional building factors that contribute to higher energy consumption, such as server rooms, or localised areas of extended operating hours, are not separated from the office consumption. Agencies also do not report on a building by building basis but on the aggregate performance of their entire building estate.

The key indicator in this category is MJ/person/annum, recognising that the overall energy efficiency is a combination of the efficient use of the space with the energy efficiency of the space. A mandatory performance target of 10,000 MJ/person/annum has been set.

Performance Against Target

The average energy intensity has fallen by more than 7% in the past year and is now on track to meet the 10,000 MJ/person target in 2002/03. Partly, this is due to a further improvement in building productivity, in particular, the average floor area per person, which is now below 23 m²/person. However, unlike last year, the reduction in Tenant Light & Power intensity is greater than the reduction in average floor space per occupant, indicating that lighting system and/or office equipment efficiency has improved.

On a cautionary note, there are still many buildings where tenant energy consumption is not measured directly, but is calculated by formula from the total building consumption. This situation is most common in buildings currently or formerly owned by the Commonwealth and introduces a significant level of uncertainty into the figures for both Tenant Light & Power and Central Services. Such formulae are usually agreed between the building owner and the tenants and commonly involve the building owner agreeing to accept responsibility for a fixed percentage of consumption with the balance allocated to each tenant in the same proportion as their occupied floor space.

Calculating energy consumption by formula removes much of the incentive to introduce energy efficiency measures from both tenants and building owners. It is difficult to justify investing in efficiency measures, if the energy consumption formula apportions a significant part of your savings to other tenants or the building owner. Energy contract negotiations, fitouts and upgrades all present opportunities for low cost meter installations and should not be foregone.

Office Buildings - Central Services

Description

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.

The Property Group of the Department of Finance and Administration reports the Central Services energy consumption of Commonwealth-owned buildings.

Factors that might contribute to higher Central Services energy use, such as high tenancy loads, localised areas of extended operating hours or climate are not separately identified.

The key indicator in this category is MJ/m²/annum. This recognises that building central services will typically service an entire building regardless of occupancy. An agency wide performance target of 500 MJ/m²/annum has been set.

Performance Against Target

The reported average performance of 455 MJ/m²/annum is well under target although the same cautionary note about calculated consumption referred to under Tenant Light & Power also applies here.

Note that the Commonwealth policy requires that, as far as possible, lease agreements should ensure that all building Central Services energy consumption during normal hours should be the responsibility of the building owner. No costs associated with this consumption should be recoverable from tenants, either directly, or as an outgoing. This will ensure that building owners have an incentive to improve the efficiency of their building systems.

Public Buildings

Description

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.

The key indicator in this category is MJ/m²/annum. No target has been set in this category because these buildings tend to be individual in their operational requirements.

Discussion

The energy use of the Public Buildings category has increased again this year but the energy use intensity has decreased. This is due to additional public buildings space (such as the new Screensound Australia facility) and some significant improvements in energy efficiency. The National Library, in particular, has again demonstrated the benefits of a successful energy management program and has made another significant improvement in what was already an excellent performance.

Law Courts

Description

The Law Courts category includes all types of court facilities, whether a relatively small space in a larger building or a specialised building. No performance target applies to this category because of the diverse nature of the facilities

The key indicator in this category is MJ/m²/annum.

Discussion

Although only a relatively minor contributor to the Commonwealth total energy consumption (1.2%), this category has shown the biggest increase in energy intensity. As discussed earlier, this is due to the new Melbourne Law Courts building being reported for the first time. This demonstrates the importance of approaching new building development with a clearly defined energy target and a building delivery process that addresses this target through to completion.

Climate Controlled Stores

Description

Climate Controlled Stores require close control of internal environmental conditions on a 24-hour basis to maintain the quality of the goods being stored. While cool stores and cold stores would fit into this category, these buildings are more typically maintained within a tightly controlled range around 20°C and 50% relative humidity and would generally have fairly large areas and low occupancy levels. Buildings in this category could be archives or storage repositories for libraries or art galleries but not computer suites

The key indicator for this category is MJ/m²/annum, although no target has been set in this category.

Discussion

This category has shown a slight increase in both energy consumption and energy intensity this year but, with the category accounting for less than 1% of total energy consumption, it has little impact on the overall outcome.

Laboratories

Description

This category covers all energy use in buildings which, as their primary function, are used as laboratories. For this type of facility, the key indicator is MJ/m²/annum although, again, no target has been set for the category.

Data Table

The significant increase in intensity reported for Laboratories this year is mostly due to the inclusion of floor area of Defence Department laboratories. In previous years the Department of Defence had been able to report laboratory energy consumption only and not floor area. Because the Defence Department laboratories have a higher energy intensity than the average of the other agencies in the category, the overall average was increased by their first time inclusion. Of the 5.1% increase reported, 3.8% was due to this factor.

CSIRO, which has the largest laboratory area, reported a small increase in intensity due to greater research activity and this also contributed to the increase in the average intensity.

Other Buildings

Description

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. As a result, energy performances in this category cannot in any way be compared and the key indicator of MJ/m²/annum is included more for interest than for any practical purpose.

Discussion

The energy consumption and intensity of Other Buildings has remained fairly constant since last year. With reduced overall consumption in Tenant Light & Power and Central Services, Other Buildings and Laboratories are becoming more significant in their contribution to overall performance. These categories will come under increasing consideration for the application of targets if they are not seen to improve in performance in the same way as the targeted categories.

Passenger Vehicles

Description

This category includes the energy consumption of passenger cars, light commercial vehicles and mini buses. It includes the energy consumption of Senior Executive Service vehicles but does not include short term hire cars or cars on novated leases.

The key indicator in this category is MJ/km. This indicator is used rather than the more common L/100km to account for the different fuels (petrol, diesel, LPG, natural gas) that are being aggregated in the energy consumption data.

There is no performance target set currently, but the Government intends to set fuel consumption targets for the Commonwealth fleet to apply from 2003 and to investigate and develop further options to strengthen action on fuel consumption. These initiatives are being developed by the Australian Greenhouse Office in consultation with the industry and administering departments and agencies.

Discussion

For most agencies, Passenger Vehicle data this year is unreliable. This was also the case in previous reporting periods but the structure of the revised DASFleet report this year made the inconsistencies more obvious. The main cause of the unreliability is incorrect odometer readings being entered at refuelling.

In an attempt to improve the data quality, ISR will review the DASFleet raw data, extract data that meets reliability criteria and attempt to extrapolate that data across the Commonwealth fleet. If successful, this data will be included in the final report to be published early next year.

Other Transport

Description

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 airlines, trains and buses is not included, but energy consumption of transport systems engaged exclusively for operational purposes is included. For example, energy consumption of aircraft used for surveying, and ships used for customs duty or transport and similar activities are included.

Like the Other Buildings category, this category is so diverse as to render meaningless any comparison between agencies on an energy intensity basis. Moreover, there is no single normalising factor appropriate to this category so no key indicator is defined.

Discussion

Overall energy consumption has gone down by 6.5% but this disguises some large changes by agencies reporting in this category. The Department of Defence reported a major decrease because they were not able to separate much of their general transport consumption from operational fuels as in previous years. The Australian Antarctic Division were unable to book passage for their staff and were forced to charter additional ships to transport them to Antarctica with a resulting increase in fuel use.

Defence Establishments

Description

This category covers energy consumption of all buildings and facilities that are within established Defence bases. It does not include office buildings and stores outside bases that are reported under the appropriate category.

Defence Establishments have a target based on aggregate energy consumption, recognising that Defence bases, which may contain many buildings of varying types, typically have only a single meter at the front gate. The Department of Defence is expected to install metering systems to progressively enable activity based energy reporting and monitoring leading eventually to improvements.

The target is set at 2.5 million GJ.

Performance Against Target

Energy consumption this year has increased by a further 4% and is now 31% over target. Because Defence Establishments represent nearly 40% of total Commonwealth consumption, improved performance in this category is central to the overall outcome of the energy policy.

Defence Operations

Description

This category covers the fuel used in aircraft, tanks, ships, vehicles etc for Defence Operations. Energy use is reported but there is no intention of setting targets.

Discussion

Defence Operations accounted for a total consumption of just under 20 million GJ. This is a very large increase over the previous reporting year and is an understandable outcome of the large deployment of forces to East Timor.

Other Uses

Description

This category includes the energy consumption of facilities that do not fit into any of the other categories. Typical facilities reported under this category are sporting grounds, swimming pools, fountains, street lighting etc.

Like the Other Transport category, the Other uses category is so diverse that there is no single appropriate normalising factor and no key indicator is used.

Discussion

There has been a significant reduction in energy consumption in this category but this appears to have been a result of improved data quality rather than any improvement in efficiency.

Antarctic Bases

Description

This category includes all energy consumed in operating bases in Antarctica. It does not include the fuel used in supply ships, which has been included under Other Transport.

Overall consumption is down by 2.3% on last year.

At this stage there is no identifiable, appropriate normalising factor and so no key indicator is used.

General Discussion

Policy Review

An independent review of the policy was commissioned in May 2000 to assess the effectiveness of the current administrative framework and measures in attaining the policy objective. In particular the review was intended to ascertain whether:

- the current policy objective and provisions giving effect to the policy were clearly understood by departments and agencies;
- the policy objective was being realised by the measures in place;
- the processes were efficient and effective, or
- variation to the measures or processes were warranted, and if so in what way.

A major component of the review was a consultation process with face to face meetings arranged with twenty Commonwealth agencies that came under the policy. In addition, discussions were held with other stakeholders and there were detailed consultations with the Department of Industry, Science and Resources and the Australian Greenhouse Office.

The report of the review is being considered by Government.

It noted that Commonwealth energy end-use categories had recorded a decline in energy intensity levels since 1997-98 indicating that energy consumption savings had resulted from improved energy efficiency, although caution was urged in interpreting the results on the basis of only two years' of data. The current administrative structure did not appear to be causing any major difficulties for agencies in terms of their administration of the policy and there was general satisfaction amongst the agencies consulted with the current level of policy prescriptiveness and the mandatory requirements.

Case Studies

All agencies are accountable for their own energy management outcomes. Each agency was given the opportunity to comment on these outcomes and their comments are included in the agency data sheets in Annex A. Some agencies were prepared to go further and provide a brief outline of their successful energy management programs. These case studies have been summarised below and are included in full in Annex D.

National Capital Authority

The National Capital Authority applied the principles of Environmentally Sustainable Design to the development of the new National Exhibition Centre at Regatta Point on the shores of Lake Burley Griffin in Canberra.

The building is designed to integrate with the environment and incorporates a number of measures to improve energy efficiency such as orientation, natural lighting and an innovative mixed mode air conditioning system that will allow the building to be naturally ventilated for much of the year.

Now that the building has been completed, it will be interesting to evaluate its observed performance against design expectations; not just from the point of view of energy efficiency but also in terms of the quality of accommodation it provides.

Australian Film, Television and Radio School

The Australian Film Television and Radio School based in Sydney is a small energy user with an effective energy management programme.

By identifying energy saving opportunities and planning their implementation over a period of time, the school has been able to show regular efficiency improvements within its operational budget. A major leap forward five years ago with the installation of a building automation system has been followed by incremental improvements in lighting, office equipment and film equipment and the integration of lighting and air conditioning control systems. By having a plan and policies in place, the school has been able to take cost effective opportunities as they arise.

They have made steady progress rather than spectacular gains and have been well positioned when faced with adverse trends.

Health Insurance Commission

The Health Insurance Commission has a long running energy management program that continues to deliver benefits despite some significant structural and organisational changes in the last two years.

While they have reported an increase the energy intensity in their Other Buildings category, their improvement in the Tenant Light & Power and Central Services categories have been quite striking. The improvement is a result of addressing the less obvious but no less important contributors to energy consumption. These include lighting efficiency, providing local control for lights and controlling boiling water unit operation.

Energy Management at the National Maritime Museum.

The National Maritime Museum has adopted an energy management program based on improving the quality of delivered energy services and reaping additional benefits in terms of improved energy efficiency. They have made significant improvements in the efficiency of their main building which was performing badly and inefficiently on occupancy through lack of commissioning and inadequate systems design.

The museum has increased in energy consumption as it has expanded, but its ongoing energy management program has kept consumption increases to a minimum.

Royal Australian Mint

The Royal Australian Mint has an energy management program that incorporates a mix of technological solutions and staff involvement that has been extremely successful in reducing the energy consumption of the Mint by 30% since 1992.

Although the Mint increased its total energy consumption by 16% in the last 12 months, this was against a background of a 50% increase in production; a sure sign of an effective management program in operation.

National Standards Commission

The National Standards Commission operates a testing laboratory used for type testing measuring instruments. They are a very small organisation but have been able to develop and implement a very successful energy management program that has resulted in a steady reduction in energy consumption over the past three years.

Their program has involved some improvements in equipment but has relied heavily on active involvement of their staff.

The Working Energy Program

The Australian Greenhouse Office through its Government Operations Team developed the Working Energy Program that was launched in March this year. This program provides a suite of tools and information packages designed to assist energy managers in their work.

The program has received widespread interest and acceptance in the Commonwealth and consideration is being given to expanding its availability outside the Commonwealth.

