Level One Energy Audit

For

Undisclosed Site

Presented April 2006

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Executive Summary

This report presents the outcome of an energy efficiency review of the ------ Building ------- Adelaide.

The review focused on the potential for achieving energy savings within all aspects of building services including air conditioning, ventilation, domestic hot water and lighting.

Total electricity consumption by the Building in calendar year 2005 was 2,484.78 GJ, at an outlay of approximately $97,625 (excluding GST). The energy use is summarised in the Table below:

Annual Energy Summary for 2005				
Energy Type	**Consumption**	**Outlay (excl. GST)**	**Average Cost**	**CO_2 - e (tonnes)**
Electricity	627,236 kWh [(1)]	$94,371	$0.1505 per kWh	602.1
Natural gas	226,728 MJ	$3,254	$0.0144 per MJ	16.7
Total	**2,484,777 MJ**	**$97,625**		**618.9**
Energy Performance Indicator [(2)]	484.7 MJ/m^2			

Notes: [(1)] kWh =3.6 MJ
[(2)] Based on total floor area = 5,127 m^2

An unofficial Australian Building Greenhouse Rating gave the Building a 4 star rating on a 1 to 5 star rating scale. This is classed as an excellent result, and indicates that the Building is functioning in a relatively highly energy efficient manner.

Nevertheless, several potential energy efficiency measures were identified as providing a financially viable return on investment. These include the installation of a Building Management System for time schedule control of the air conditioning and other selected appliances. The Building Management System would also provide a viable avenue to achieve a reduction in ETSA Utilities' charges through the management of air conditioning electrical load at times of peak demand.

The new electricity contract to commence on 1/7/06 is expected to reduce electricity costs by $21,500 per annum.

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Terminology

Term	Reference
Watt (W); kW (=1000 W)	Active or true power; the measure of instantaneous electrical load
kVA	Apparent power
Power factor	Ratio of active power to apparent power (kW/kVA)
kWh	Electrical energy consumption. A constant electrical load of 1 kW for 1 hour will consume 1 kWh
BMS	Building Management System
HVAC	Heating, Ventilation and Air Conditioning
EPI	Energy Performance Indicator
CDD	Cooling Degree Day
Emission Factor for Natural Gas	CO_2-e tonnes for natural gas full fuel cycle emissions for users in SA under 0.1PJ/annum is 74.2 kg/GJ Greenhouse Challenge: *Factors and Methodologies Version 3-December 2001*, Australian Greenhouse Office
Emission Factor for Electricity	CO_2-e tonnes for electricity full fuel cycle emissions for electricity purchased in SA is 1.109 kg/kWh Greenhouse Challenge: *Factors and Methodologies Version 3-December 2001*, Australian Greenhouse Office
Dead band	The temperature range in which no heating or cooling energy is used.
UPS	Un-interruptible Power Supply
IRR	Internal Rate of Rate. The discount rate needed to be applied to a project's financial return to achieve a zero net present value over the period of the project.

1 Introduction

Energyfocus Pty Ltd was engaged to undertake an energy efficiency review of the --------- Building located at ---------- Adelaide.

The Building complex houses ---------- administration staff, --------- and 4 tenants (----------, ----------. ----------, ----------).

The energy efficiency review dealt with all aspects of building energy use, including ventilation and air conditioning system (HVAC), domestic hot water and lighting.

The site investigation was carried out in February 2006.

Mr --------- Manager Facilities made available relevant energy consumption data and building services information. This assistance is greatly appreciated.

Photo of the Building Removed

Figure 1 Corner of ------- and ------ frontage

2 Building Overview

The main office area consists of 4 levels, with the following areas:

Ground Floor	1340 m^2
1st Floor	1262.5 m^2
2nd	1262 m^2
3rd	1262m^2

This building is a solid concrete structure with the western façade enclosed by an extensive glass frontage on levels 2 to 4.

The total gross floor area of the Office Building is 5,127 m^2. This area includes the coffee shop on the ground floor with an area of 57 m^2. ------- occupies an area of approximately 200 m^2.

There is also a basement car park, with entrance from ------ Street.

2.1 Occupancy Hours

The office area is generally occupied from 9 am to 5 pm, Monday to Friday.

The -------- office space is occupied continuously.

2.2 Heating Ventilation & Air Conditioning Systems

The Building complex is served by a total of 38 air conditioning units of varying type and cooling/heating capacity. A schedule of air conditioning appliances is given in Table 1.

Table 1

Location	Designation	Area served	Type	Time schedule
3rd floor roof	ACC-1	Ground Floor ----South	Ducted split	0800 – 1700 hrs
2nd floor roof	ACC-19	Ground floor – ---- Street	Ducted split	
3rd Floor roof	ACC-2	1st Floor – N.W. next to lift	Ducted split	0800 – 1700 hrs
3rd Floor roof	ACC-3	1st floor – -----	Ducted split	0800 – 1700 hrs
3rd Floor roof	ACC-4	1st floor – South Financial counselling	Ducted split + motorised damper	0800 – 1700 hrs
2nd floor roof	ACC-5	1st floor receptionist east	Ducted split	0800-1700 hrs
2nd floor roof	ACC-6	1st floor-Conference room West	Cassette type	Manual control
2nd floor roof	ACC-7	1st floor-Conference room West	Cassette type	Manual control
2nd floor roof	ACC-8	1st floor ----- Room	Cassette type	Manual control
2nd floor roof	ACC-9	2nd floor – ----Room	Cassette type	Manual control
3rd floor roof	ACC-10	2nd floor- North East zone	Console unit	Manual control
3rd floor roof	ACC-11	2nd floor – central North zone	Ducted split	0800-1700 hrs
3rd floor roof	ACC-12	2nd floor – central South zone	Ducted split	0800-1700 hrs
3rd floor roof	ACC-13	2nd floor – South East zone	Ducted split	manual
3rd floor roof	ACC-14	2nd floor – East zone	Ducted split	0800-1700 hrs
3rd floor roof	ACC-15	2nd floor – South zone	Ducted split	0800-1700 hrs
3rd floor roof	ACC-16	2nd floor – North West zone	Ducted split	0800-1700 hrs
3rd floor roof	ACC-17	2nd floor – South West zone	Ducted split	0800-1700 hrs

Table 1 continued

Location	Designation	Area served	Type	Time schedule
3rd floor roof	APAC S7	2nd floor – South zone - mid	Ducted split	Manual
3rd floor roof	ACC-18	3rd floor –---------	Ducted split	0800-1700 hrs
3rd floor roof	PAC 1	3rd floor –------ reception	Package unit	0800-1700 hrs
3rd floor roof	PAC 2	3rd floor – central	Package unit	0800- 1700 hrs
3rd floor roof	PAC 3	3rd floor – East	Package unit	0800 -1700 hrs
3rd floor roof	APAC S16	3rd floor --------	Package unit	0800 -1700 hrs
3rd floor roof	APAC S21	3rd floor ---------	Package unit	0800-1700 hrs
43 -------- St	AC-1	Ground Floor – office	Package unit	0730- 1700 hrs
43 -------- St	AC-2	1st Floor – office	Package unit	0730- 1700 hrs
43 -------- St	AC-3	----------	Split system	0730- 1700 hrs
-------		-------- Northern	Ducted split	
3rd Floor roof		----------	Ducted split	Manual
2nd Floor roof		------- Coffee Shop	2 off Cassette units	Manual
3rd Floor roof		Side street	2 off Cassette units	Manual
2nd floor roof		The ----------	2 off Cassette units	Manual
2nd floor roof		Library	Cassette	Manual
2nd Floor roof		------ Video tape room	Cassette	

Figure 2 3rd Floor roof showing some of the air conditioning units

After-hours override switches are provided for the air conditioning units that are time scheduled. For the manually controlled units it would appear that generally these appliances are turned off at the end of the working day.

Figure 3 Micro Air TX 1 Time switch, thermostats and after-hours override switches

The basement car park is served by a ducted exhaust system located in the sub-basement. This system is time scheduled off overnight and at weekends.

Toilets are fitted with exhaust fans, which are controlled via a timer.

Outside air is ducted to the split air conditioning units.

During the site survey, staff noted that there is some variability in room temperature (either too hot or too cold), particularly on the 2nd and 3rd floors. In some instances this maybe due to inappropriate location of thermostats. For instance, in the Northern end of Level 3, a thermostat is located in an ------ room. This room is apparently closed and unused for a large part of the day. Relocating the thermostat to a more representative location in the office area would improve comfort conditions for staff.

Staff members made mention of radiant heat from the western atrium area on the 1st floor during summer afternoons, although blinds are provided. The atrium would certainly increase Building heat load during summer.

2.3 Lighting

Lighting is predominantly conventional 36 Watt fluorescent fittings. The basement car park light fittings are triple 36 Watt lamps. Single, double and some triple fluorescent lamp fittings are in use throughout the office area and most passageways. Compact fluorescent down lights are also used in the main foyer and some corridor areas.

Office lighting is manually controlled by staff. Generally lighting in unoccupied areas was noted as being turned off during the survey. Staff members appear to be conscientious in switch off lighting in vacant areas.

Movement detector switches control lighting in the stairwells.

Lighting level measurements are provided in Table 2.

AS 1680.2 recommends a minimum lighting level in office areas of 320 Lux. Areas near the Western atrium receive a high level of ambient light.

Table 2

Location	Lux level
Basement car park	190
	196
	150
	205
Ground floor	
entrance foyer	171.3
foyer	81.5
office area	540
Reception	374
office area	286
1st floor	
office	573
office (adjacent western atrium)	711
kitchen	645
2nd floor	
	451
	704
	528
	357
	760
	384
3rd floor	
	375
	570
	601

2.4 Office Appliances

Most PCs in use have flat LCD monitors, which are significantly more energy efficient than conventional monitors. Photocopiers are either turned off manually overnight, or are switched off via in-built timers.

The kitchen on the 1st floor was not in use at the time of inspection, and the hot water urn was noted as being off. A number of refrigerators are in use.

2.5 Domestic Hot Water

Two natural gas fired storage hot water units located in the sub-basement provide domestic hot water.

Figure 4 Domestic hot water units

3 Electricity

3.1 Electricity Supply and Metering

A single electrical feed serves the building complex. A "smart" billing meter, with modem, is located in the main switch room in the basement. The meter logs kW, kVA, kVAr and power factor parameters at 30 minute intervals.

3.2 Electricity Tariff

The current tariff for the Building is given in Table 3. The incumbent retailer is Tru Energy. A new contract with Tru Energy commences on 1st July 12006. It is understood that energy rates under the new contract are 5.175 and 3.569 cents/kWh, peak and off peak, respectively.

These rates are considered to be very competitive in the SA market, and will result in a significant reduction in the energy component charge, calculated at $21,500 per annum (based on total peak and off peak consumption for 2005.

Table 3

Energy Component (Tru Energy)	Charge (excl. GST)	Comments
Peak kWh	$0.101650 per kWh	Peak period: 0700 hrs to 2100 hrs, working days
Off peak kWh	$0.035660 per kWh	Off peak period: 2100 hrs to 0700 hrs, working days, and all day on weekends and public holidays
Meter provider charge	$50 per month	For supply of "smart" meter
Data forwarding fee	$21.97 per month	Meter Data Agency fee for daily remote reading of meter
Network charge (ETSA Utilities)		
Peak kWh	$0.023273 per kWh	
Off-peak kWh	$0.018593 per kWh	
Annual demand charge[1]	$3.868200 per kVA per month	Based on an "Agreed Maximum Demand" = 380.4 kVA
Supply charge	$744.62 per month	
National Electricity Market Manager Company (NEMMCO)		
Ancillary Services	$0.000499 per kWh	This charges varies marginally from month to month
Pool Fees	$0.000392 per kWh	As above

Total peak and off peak energy rates are currently $0.125814 and $0.055144 per kWh, respectively.

The ETSA Utilities network component is low voltage kVA demand. This is the most appropriate and least cost network tariff for the current load.

3.3 Electricity Consumption & Load

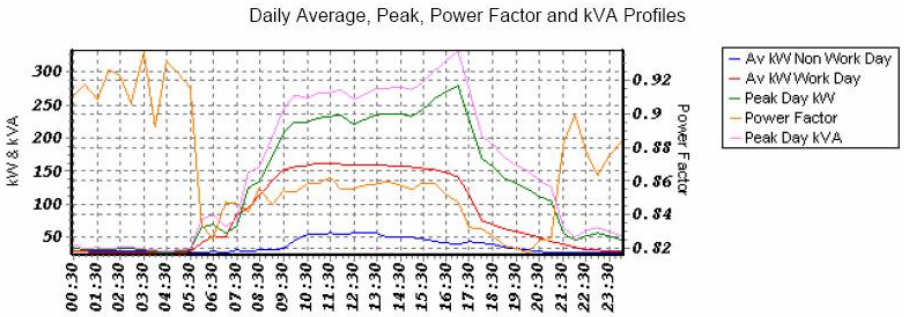
Figures 5 to 8 show load profile and consumption reports for calendar years 2004 and 2005, as provided by ETSA.

[1] Agreed Maximum Demand is set by the highest demand recorded during December to March, between 1200 hrs and 2000 hrs on working days. Should the Agreed Maximum Demand be exceeded, then the Agreed Maximum Demand ratchets up to this new level.

(i) Calendar Year: 2004

Load Profile removed to protect the identity of the Building

Figure 5



Statistics

Annual Demand:	280.2 kW / 330.6 KVA on 19/02/2004 during half-hour to 5:00 pm
Anytime Demand:	276.9 kW / 322.0 KVA on 3/03/2004 during half-hour to 12:00 pm
Peak Consumption:	430,291.6 kWh
Off Peak Consumption:	185,075.5 kWh
Total Consumption:	615,367.1 kWh
Work Days:	252
Non Work Days:	114

Hours for Annual Demand: 12:00 pm to 8:00 pm on working days between December and March.

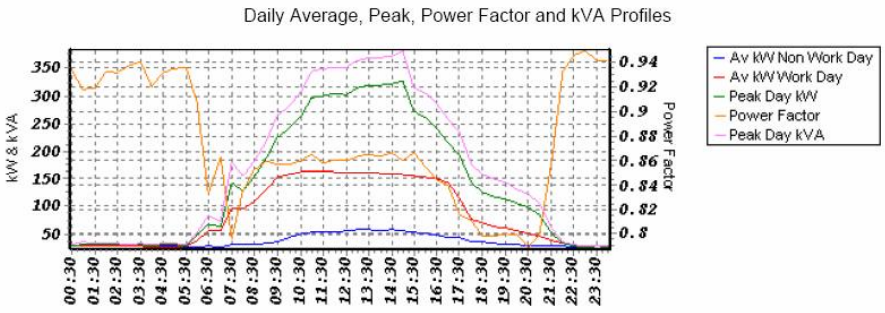
Hours for Peak Consumption: 7:00 am to 9:00 pm during working days.

Figure 6

(ii) Calendar year: 2005

Load Profile removed to protect the identity of the Building

Figure 7



Statistics

Annual Demand:	326.9 kW / 380.4 KVA on 11/01/2005 during half-hour to 3:00 pm
Anytime Demand:	303.1 kW / 352.0 KVA on 11/01/2005 during half-hour to 12:00 pm
Peak Consumption:	431,250.2 kWh
Off Peak Consumption:	191,528.2 kWh
Total Consumption:	622,778.4 kWh
Work Days:	250
Non Work Days:	115

Hours for Annual Demand: 12:00 pm to 8:00 pm on working days between December and March.

Hours for Peak Consumption: 7:00 am to 9:00 pm during working days.

Figure 8

Annual consumption is summarised below.

	2004	**2005**
Peak kWh	430,291.6	431,250.2
Off peak kWh	185,075.5	191,528.2
Total	615,367.1	622,778.4

Electricity usage in 2005 increased by 1.2 % compared to the preceding year.

Agreed Maximum Demand increased from 330.6 kVA in 2004, to 380.4 kVA in 2005. This spike in load at 3 pm on 11/01/2005, due presumably to air conditioning appliances running at full load on a hot day, resulted in the Agreed Maximum Demand "ratcheting" up to 380.4 kVA. This has resulted in an increase of $192 per month ($2,311 per year) in network charges.

Base load (overnight and weekend load) is approximately 25 kVA.

(iii) Monthly Consumption

Monthly billing data for the Building is shown in Table 4 and graphically in Figure 9 for the period December 04 to November 05.

Total outlay, including GST, for this period was $103,808.

Table 4

Date	Days in Interval	Peak kWh	Off Peak kWh	Total kWh	Maximum Demand	Outlay (incl. GST)
31/12/2004	31	38,753	16,457	55,210	289	$8,696.30
31/01/2005	31	39,573	18,994	58,568	380	$9,112.10
28/02/2005	28	38,859	13,402	52,261	337	$8,674.81
31/03/2005	31	39,314	16,160	55,474	326	$8,912.45
30/04/2005	30	35,772	15,545	51,317	301	$8,351.35
31/05/2005	31	32,793	14,683	47,476	217	$7,853.96
30/06/2005	30	35,390	15,057	50,448	231	$8,256.22
31/07/2005	31	36,400	16,297	52,697	278	$8,887.38
31/08/2005	31	39,508	14,270	53,778	242	$9,241.05
30/09/2005	30	34,888	14,360	49,248	243	$8,542.63
31/10/2005	31	31,667	16,134	47,801	232	$8,183.09
30/11/2005	30	38,781	14,178	52,960	270	$9,096.79
Total	**365**	**441,698**	**185,538**	**627,236**		**$103,808.13**

Its can bee seen that monthly consumption for this period is relatively flat, varying between about 47,800 and 58,500 kWh, with highest usage during the summer months. The summer peak would be attributed to increased air conditioning usage.

Off-peak usage accounts for approximately 30% of total annual consumption.

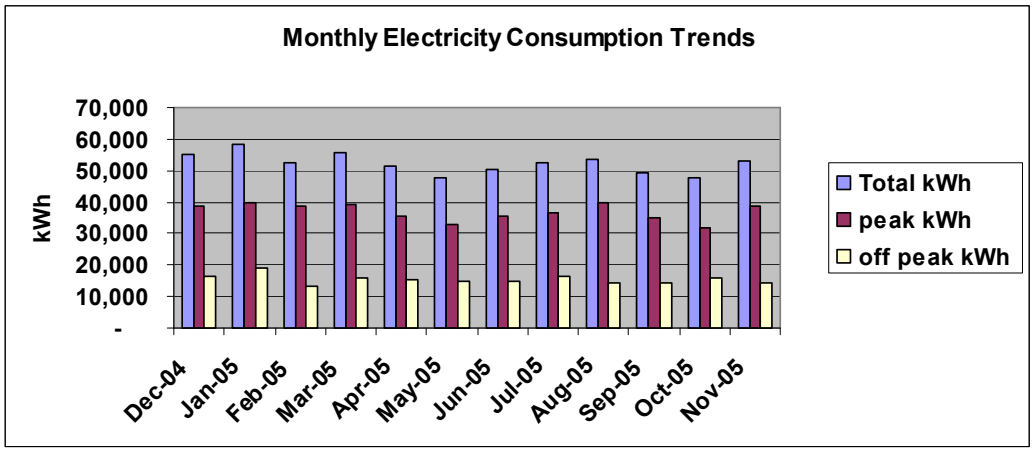


Figure 9

(iv) Monthly Maximum Demand

Figure 10 shows monthly maximum demand trends for the period December 04 to November 05. It can be seen that demand is highest during the summer months.

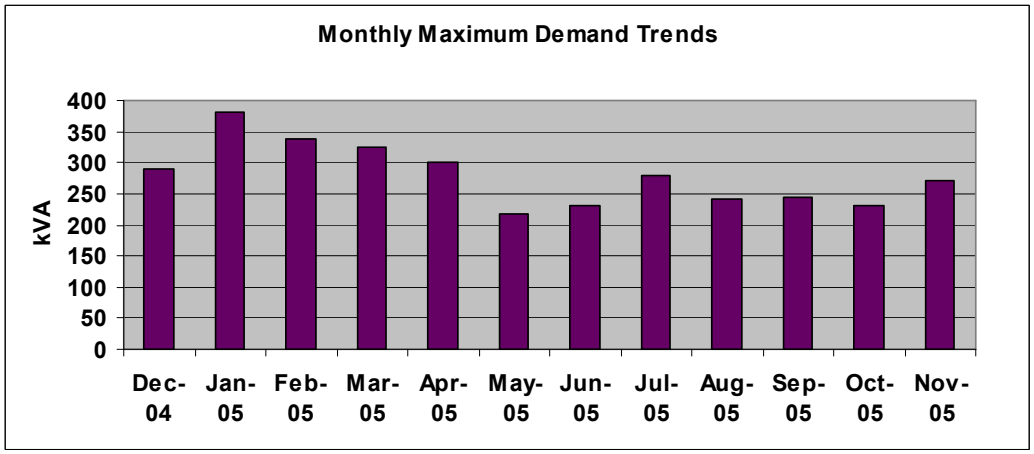


Figure 10

(v) Distribution Board "Spot" Electrical Load Measurements

Table 5 summarises the results of spot measurements of electrical load, taken during the survey on the main distribution boards in the basement switch room.

Table 5

Distribution Board	kW
Ground	2.63
Sub basement DB 2	42.18
Ground floor G1 (riser no. 2)	31.95
MSSB1 (air conditioning)	24.22
MSSB2 (air conditioning)	72.04
Tenant DB & Meter board	40.92
Basement DB	10.57
Total	**224.50**

A separate measurement was taken on the basement car park exhaust fan, being 2.2 kW.

3.4 Electricity Consumption by Category

Based on the results of the walk-through audit of the Building, the "spot" kW measurements on individual distribution boards, combined with the load profile analysis, an estimate of annual electricity consumption by end-use category has been determined. This is given in Figure 11.

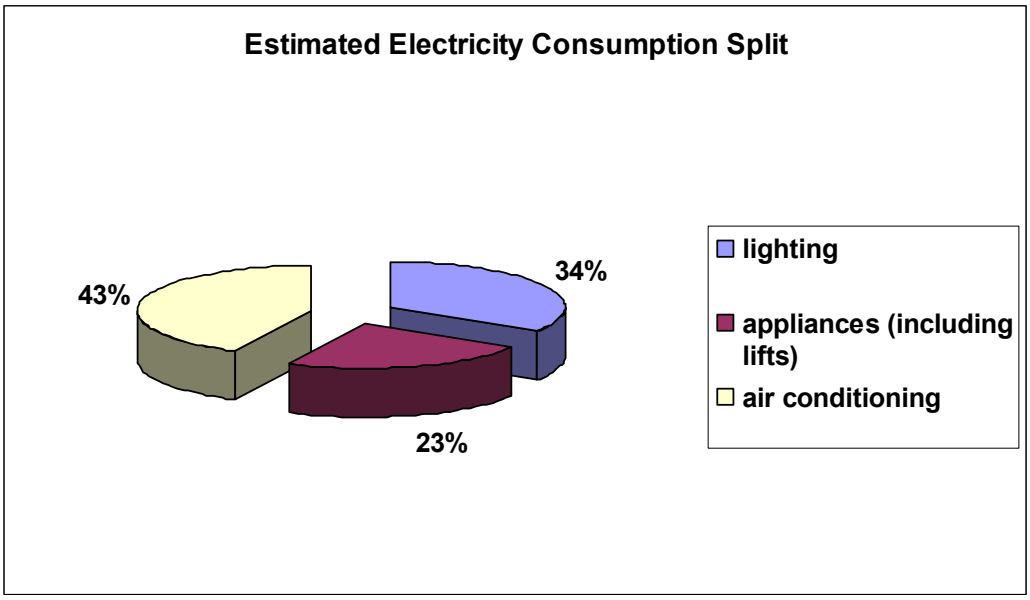


Figure 11

Air conditioning and ventilation can typically account for up to 60% of energy use in commercial office buildings. The 43% estimate in this case is an indication that the air conditioning appliances in the Building are used relatively efficiently, and is perhaps a reflection of staff being generally "energy conservation aware" and not leaving air conditioning running un-necessarily.

Total tenancy consumption, based on a sample of monthly tenancy meter readings, was determined to be 77,300 kWh per annum, or 12% of total consumption.

4 Natural Gas

Natural gas is only used by the domestic hot water appliances. Consumption for the 12 months period ending October 05 was 226,728 MJ, at an outlay of $3,253 (including GST). Refer Table 6.

Table 6

Date	Days in interval	MJ	Outlay (incl. GST)
1/10/2004	86	54,550	$779.35
12/01/2005	103	64,477	$917.70
12/04/2005	90	49,341	$711.70
11/07/2005	90	54,263	$777.80
5/10/2005	86	60,003	$869.65
Total	455	282,634	$4,056.20
Annual	**365**	**226,728.37**	**$3,253.87**

5 Annual Energy Consumption Summary

Annual energy use for 2005 by the Building is summarised in Table 7. Total outlay was $97,625, excluding GST.

Equivalent greenhouse emissions amounted to 619 tonnes CO_2-e.

Table 7

Annual Energy Summary for 2005 – ----------				
Energy Type	**Consumption**	**Outlay (excl. GST)**	**Average Cost**	**CO_2 - e (tonnes)**
Electricity	627,236 kWh [(1)]	$94,371	$0.1505 per kWh	602.1
Natural gas	226,728 MJ	$3,254	$0.0144 per MJ	16.7
Total	2,484,777 MJ	$97,625		618.9
Energy Use Index	484.7 MJ/m^2			

Notes: [(1)] 1 kWh =3.6 MJ;
[(2)] Derived from a gross floor area of 5,127 m^2.

6 Energy Efficiency Benchmark

Based on the information gathered as part of the audit process (energy consumption, floor area, occupancy hours, and number of personal computers) an unofficial Australian Building Greenhouse Rating (ABGR) was undertaken on the whole Building.

The ABGR is widely used throughout Australian to benchmark the energy efficiency performance of office buildings in terms of greenhouse emissions. The outcome of the Rating is shown in Figure 12. The ABGR of 4 stars is considered as “excellent”. Most Adelaide office buildings rate between 1.5 and 3 stars.

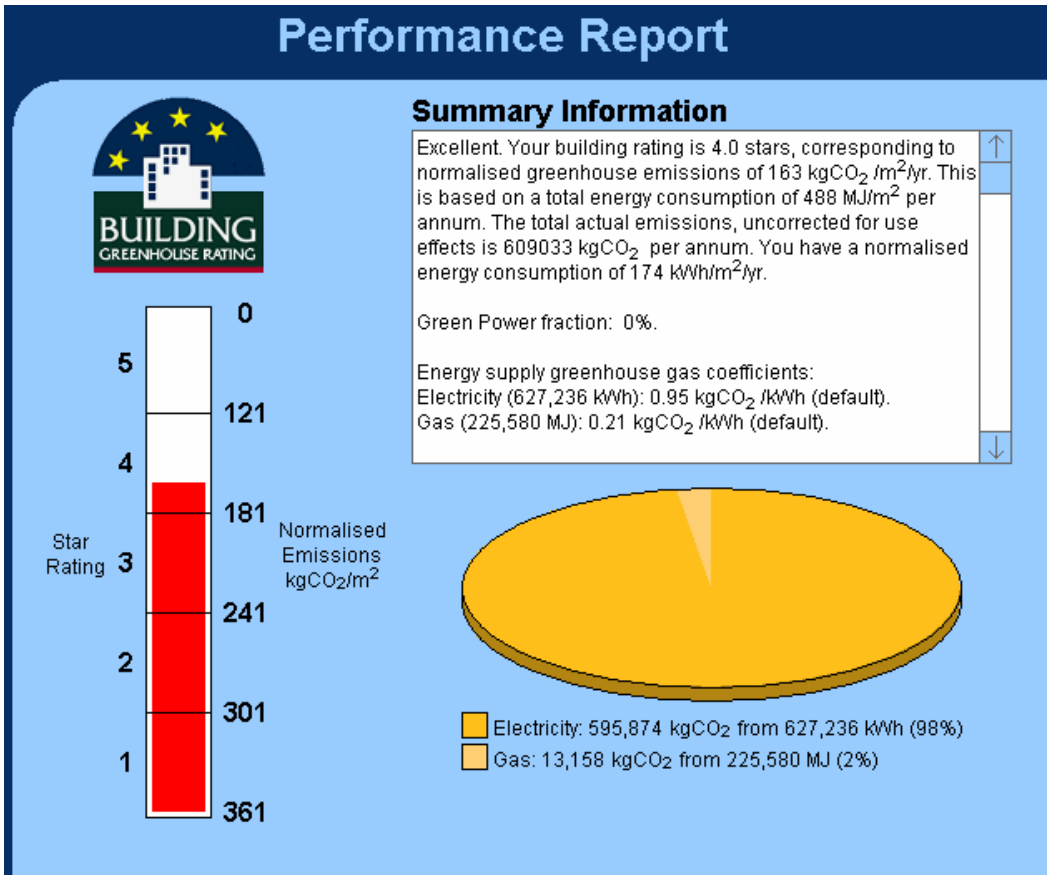

Performance Report
BUILDING
GREENHOUSE RATING
Summary Information
Excellent. Your building rating is 4.0 stars, corresponding to normalised greenhouse emissions of 163 kgCO2 /m2/yr. This is based on a total energy consumption of 488 MJ/m2 per annum. The total actual emissions, uncorrected for use effects is 609033 kgCO2 per annum. You have a normalised energy consumption of 174 kWh/m2/yr.
Green Power fraction: 0%.
Energy supply greenhouse gas coefficients:
Electricity (627,236 kWh): 0.95 kgCO2 /kWh (default).
Gas (225,580 MJ): 0.21 kgCO2 /kWh (default).
Star Rating
5
4
3
2
1
0
121
181
241
301
361
Normalised Emissions kgCO2/m2
Electricity: 595,874 kgCO2 from 627,236 kWh (98%)
Gas: 13,158 kgCO2 from 225,580 MJ (2%)

Figure 12

7 Energy & Cost Saving Measures Options

It is considered that there is limited opportunity for achieving significant savings, primarily because the Building is already relatively energy efficient.

Nevertheless a number of possible energy saving measures have been considered, and these are briefly outlined below.

Even though some measures may not be financially justified on energy cost savings alone, implementation may be warranted in terms of improved reliability and reduced maintenance costs.

Electricity cost savings estimates are based on the tariff rates, excluding GST, outlined in Section 3.2.

The various measures considered are briefly outlined below.

7.1 Power Factor Correction

ETSA provides financial incentive through the network tariff structure for consumers with non-compliant power factor[2] to install power factor correction. The power factor correction system consists of an appropriately sized capacitor bank.

The load profile data provided by ETSA shows that the Building has a power factor of 0.86 at maximum demand and is therefore power factor compliant. Power factor correction cannot be justified.

7.2 Centralised Time Scheduling of Air Conditioning Units

The various air conditioning appliances are either time scheduled by stand-alone time switches, or are manually controlled.

For the air conditioning units controlled by time switches, each time switch requires re-programming for daylight saving, and public holidays to ensure that the correct start and stop times are maintained. The back-up battery also needs to be regularly replaced. This maintenance is often overlooked by the air conditioning contractor.

A low cost Building Management System (BMS) would provide the opportunity to centralise the time scheduling of all air conditioning appliances, as well as ventilation systems (i.e. car park exhaust, fresh air fans, toilet exhaust fans), boiling hot water units and possibly common area lighting. Time scheduling programming could be via a menu located on a PC "front-end" in the maintenance manager's office.

Because of the number of appliances to be controlled, it would be prohibitively expensive to run control wires from a central controller to each appliance. An alternative is to use the existing electrical wiring in the Building to send "on" and "off" signals, termed power line carrier technology. This power line carrier system involves installation of a single transmitter/time switch at the main switch board, in conjunction with a receiver on each appliance to be time scheduled.

[2] A power factor < 0.85 at maximum demand is considered non-compliant under the Electricity Distribution Code

For air conditioning appliances that are currently manually controlled, a manual "on", "automatic off" control strategy could be employed using power line carrier. An "off" signal would be sent at appropriate times after normal office hours to ensure that air conditioning appliances not required to operate are switched off. After-hours override switches would still be available.

Attachment 1 outlines a Building Management System, the BCS-2004, which employs power line carrier technology. This system can also be accessed via the Web, for remote programming and monitoring. The BCS-2004 is installed and serviced by Adelaide based firm Brylyn SA.

A budget price recently quoted by Brylyn SA is $250 per appliance to be controlled, including installation and commissioning. To control up to 40 appliances a total budget of $10,000 would be required.

An accurate estimate of electricity savings if this measure were implemented is not possible. However, a 5% savings on air conditioning electricity costs is considered realistic, equivalent to about $2,000 p.a.

7.3 Peak Electrical Demand Management Options

Should a Building Management System such as, or similar to the BCS-2004 be installed, this would provide opportunities for shedding of air conditioning load when the Agreed Maximum Demand is being approached.

Attachment 2 outlines the peak demand management control strategy employed by the BCS-2004. It involves continually monitoring the electrical load via an interface to the ETSA electricity meter. The strategy involves short-term cycling off of air conditioning compressors at times of peak load, without impacting on the comfort of staff.

ETSA is encouraging demand management by its commercial and industrial consumers. Installation of a demand management system such as the BCS-2004 would justify a reduction in the Agreed Maximum Demand back to, say, and the 2004 level of 330 kVA.

Annual savings of $2,300 would be achieved through this measure. A budget of $500 would need to be allocated for the meter interface and programming.

However it would be recommended that before committing funds to such a project, agreement in principle from ETSA to a reduction in Agreed Maximum Demand, is sought.

7.4 Carbon Dioxide (CO) Based Ventilation Control of Car Park Exhaust Fan

Control of the car park exhaust fan using a carbon monoxide sensing control system is an energy efficiency option which would result in an estimated 4 to 6 hours per day reduction in fan running hours. Electricity cost savings would be approximately $430 per year. Implementation cost for a stand-alone CO control system is estimated at $3,000 to $4,000. This measure is considered financially unviable.

Should the power line carrier system be installed, the car park exhaust fan could be time scheduled via this system, allowing for fine-tuning of its running hours.

7.5 Lighting Measures

A number of lighting efficiency measures are possible, including:

(i) De-lamping one or more fluorescent lamps from fittings in areas with high ambient light levels.

(ii) Retrofitting of occupancy sensor switches to rooms where lights are often left on when vacant, for example meeting rooms and toilets.

(iii) Installation of auto transformers to selected lighting circuits. Auto-transformers are devices that automatically reduce the voltage, and hence power consumption, to fluorescent lamps, after a pre-determined warm-up period of 5 to 10 minutes.

(iv) Re-lamping using latest generation, 28 Watt, T5 fluorescent lamps and electronic ballasts. This measure usually involves replacement of the whole fitting. Capital outlay would be in excess of $100,000 if the entire complex were to be re-lamped with T5 technology. A possible strategy would be to incorporate T5 lamps in any future refurbishment project.

These measures require further investigation to properly define the scope and return on investment.

7.6 On-going Staff Energy Awareness

It was apparent during the survey that the majority of staff members are “energy aware”, through the switching off of lighting in vacant rooms and air conditioning appliances, where practical.

This conscientious attitude needs to be encouraged as a means to limit ---------- outlay on energy and impact on the environment.

7.7 Electricity Monitoring and Reporting

Should any efficiency or cost saving measure be implemented, in particular the Building Management system, it is important that the anticipated energy saving and load reduction outcomes are verified on an on-going basis.

Energyfocus, through our alliance with Metering Dynamics, leading electricity billing meter and Meter Data Agency (meter reader) provider, is able to provide an electricity reporting service. The reports are based on the 30 minute interval load readings taken by the billing meter, and received daily in our office, via Metering Dynamics. Summary reports are generated monthly, with any anomalies in consumption and load highlighted. Energyfocus currently provides a monthly energy reporting service for over 60 revenue meters.

Attachment 1 Building Management System Overview

Attachment 2 Demand Management