

ENERGY SAVING ACTION PLAN

University Of Wollongong Main Campus

Prepared by



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Energy Saving Action Plan for The University of Wollongong

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2. Summarised list of Energy Saving Projects

Attachments:

1. Energy Audit Report (Separate Document)

Energy Saving Action Plan for The University of Wollongong

1.Introduction

1.1.Overview of Operations

The University of Wollongong is a University of international standing with an enviable record of achievement in teaching and research. It has twice been named Australia's University of the Year and has been ranked the nation's top university for educational experience and graduate outcomes for the past five years.

Its operations reported in this Energy Savings Action Plan relate to the main campus of the University, located in Northfields Ave, Gwynneville. During the base year this site consumed over 116,000 GJ of energy across a campus of almost 170,000 m² and had a student population of over 16,000 equivalent full time students.

1.2.Background History of energy savings within the organisation

A comprehensive review of lighting systems across the campus has been carried out. The majority of recommendations from these have been implemented across the campus. In addition, a number of air conditioning projects including a chilled beam system and other programs have been completed. It is estimated that these are accruing savings of approximately 9,300 GJ per annum. A series of other projects with the potential to save 3,553 GJ per annum are at various stages of processing.

The preparation of a series of design standards, which address (among other matters) the energy efficiency aspects of new developments and refurbishments has been commissioned.

1.3.Introduction to energy savings within the organisation

This Energy Savings Action Plan has been developed by the Buildings and Grounds Division of the University, being the division responsible for ensuring the efficient operation of buildings throughout the Campus. A level 3 energy audit of the site has been conducted, together with a site-wide metering review and integration of energy management works and reviews conducted previously. Prior to the preparation of this Plan, the University established an energy management policy, set up energy procurement procedures and completed a number of energy management projects across all of its sites. Refer also to section 1.2 above.

1.4.How the plan integrates with existing business operations

The University is committed to achieving optimum energy efficiency over all of its activities. The Buildings and Grounds Division will have the responsibility to implement the actions of the Energy Savings Action Plan as an integral part of their responsibilities. The Division will undertake regular reviews of activities and monitor its implementation and ongoing energy efficiency performance of the site and will provide regular reports to management as to their status. Management is committed to reviewing and updating the program annually.

1.5.Signoff of the plan

I certify that this Savings Actions Plan has been prepared in accordance with the Guidelines issued by the Minister for Utilities. I am authorised to submit this Plan, on behalf of the University of Wollongong, to the Department of Utilities and Sustainability.

Signed for the University of Wollongong by : _____

Position : _____

Date: _____

Energy Saving Action Plan for The University of Wollongong

2.Schedules and Details

2.1.Site Identification

The site subject to this Action Plan consists of the Main Campus of the University of Wollongong located at the Northfields Ave, Gwynneville. A Level 3 energy audit was conducted as part of the preparation of this Plan and industry benchmarks (MJ/m² and MJ/Student) have been used. Refer to Table 1 for further site identification information.

Table 1: Site Identification Details

Site Number	National Meter Identification (Electricity and Gas)	Level of review conducted	Site Location and Description
1	<p>Electricity</p> <p>NEEE 00910 NEEE 003522 NEEE 003066 NEEE 0044560 NEEE 003065 NEEE 073067 NEEE 003069 NEEE 003068 NEEE 2615-6</p> <p>Gas</p> <p>Supply pt No 102906100001</p>	Level 3 energy audit using industry benchmarks	Northfields Ave, Gwynneville

2.2. Baseline Energy Use

Table 2 provides a summary of the baseline energy consumption for the base year of 2005. The consumption refers to the accounts listed in Table 1. As the University has a progressive construction and refurbishment program (refer to Appendix 1), the preferred business activity indicator preferred for this site is based on building area. Further, it is proposed to adjust the baseline index in line with the changes in services provided in the buildings (eg. expansion of air conditioning). To this effect, the Technical review has included a breakdown of benchmarks based on the services provided in each building to enable simple future adjustments to targets and baselines (refer to the Technical Review). In future, it is also proposed that energy used directly by external tenants, for which the University has no control, will be metered and deducted from the University baseline index.

Table 2: Baseline Energy Use

Baseline Energy Use		
University of Wollongong	Main Campus	Comments
Baseline Start Date	01-Jan-05	
Baseline End Date	31-Dec-05	
Baseline energy use per annum (GJ)	116,771	
Greenhouse Emissions (tonnes)	7,217	
Is baseline representative of normal Energy Use	Yes	
Impact of variation on Energy use per annum	Nil	
Baseline energy use corrected for variation (GJ)	116,771	
Baseline Activity Indicator 1	Building gross floor area (m ²)	Note 1
Quantity of Site Business Activity Indicator 1 per annum	169,967	m ²
Baseline Energy use Key Performance Indicator 1 (KPI 1)	687	MJ/m ²
Business Activity Indicator 2	Equivalent Full Time Students	Note 1
Quantity of Site Business Activity Indicator 2 per annum	16,179	EFTS
Baseline Energy use Key Performance Indicator 2 (KPI 2)	7,217	MJ/EFTS
Demand		
Baseline summer peak Electrical use (kVA)	6,161	Note 2
Baseline winter peak Electrical use (kVA)	4,742	Note 2
Note 1: The university sector uses two Business Activity Indicators, gross building floor area and equivalent full time students. Gross building floor area is the index most applicable to measuring energy performance.		
Note 2: Summer & winter peak electrical use is based on the summation of the monthly peak for the nine supplies to the site		

2.3. Energy Management Review

Table 3 provides an overview of the status of energy management procedures and systems existing at the University at the time of preparation of this submission. An external review was also conducted during 2005 (refer to the attached Technical Report for an overview of the results), which resulted in a rating of 1.5 stars on a scale of 1 to 5. A number of issues have been addressed since that time and a number are also planned following the Technical Review. Refer to Table 4 for the actions proposed to address this issue.

Table 3: Energy Management Review

Area	Review Area	Rating					Comment
		Low	Moderate	Minimum Sustainable	Industry Leader	Best Practice	
A	Senior Management Support						Targets set. Design standards introduced. Formal policy released.
B	Understanding of energy saving potential						Comprehensive review undertaken.
C	Energy Targets and key performance indicators						General use of KPIs only. Steps are in place to correct this.
D	Energy Metering and monitoring						Extensive metering on the site is largely inaccurate. No comparison with targets or other forms of monitoring. Steps are in place to correct this.
E	Energy Management Reporting						Informal reporting associated with specific actions/proposals.
F	Energy Supply Management						Formal procedures are in place for energy procurement.
G	Operating and maintenance procedures						Progress is being made in some areas but not a comprehensive program.
H	Accountability for Energy Management						An executive level manager is responsible for energy management
I	Training and Awareness Procedures						Informal activity

Area	Review Area	Rating					Comment
		Low	Moderate	Minimum Sustainable	Industry Leader	Best Practice	
A	Senior Management Support						Targets set. Design standards introduced. Formal policy released.
J	Compliance with legal and other regulatory requirements						Compliance within allowable limits

2.4. Energy Management Actions

Table 4 lists the actions proposed to be implemented at the University to address the shortcomings in the procedural and technical issues affecting the energy efficiency of its operations. Refer to the Technical Report for a detailed list of specific energy management projects covering both technical and procedural/management issues.

Table 4: Energy Management Actions

Proj No	Application	Energy Management Action	Responsibility	Planned Completion Date	Actual Completion Date
A1	Senior Management Support	Conduct a regular review of energy policies and related documents to ensure currency.	C Hewitt D Low	Annually	
A2		Routinely audit results, targets and revise the program as appropriate	C Hewitt	Annually	
B1	Understanding of energy saving potential	Implement identified cost-effective energy management projects			
B2		Step 1 – Secure funding for the projects falling within the hurdle rate	C Hewitt	Mar-07	
B3		Step 2 – Develop a detailed implementation program	C Hewitt	Progressive to Dec 2010	
B4		Step 3 – Obtain quotes/ commission design consultants etc, as appropriate	C Hewitt	Progressive to Dec 2010	
B5		Step 3 - Confirm the predicted performance of each project and implement	C Hewitt	Progressive to Dec 2010	
B6		Step 4 – Test, Commission, and confirm the results achieved	C Hewitt	Progressive to Dec 2010	
B7		Implement maintenance/ monitoring procedures to ensure the continued performance of the projects	C Hewitt	Progressive to Dec 2010	
B8		Routinely audit facilities to identify additional/new improvements	C Hewitt	Every 4 years	
B9		Review all proposed new services, buildings, purchasing decisions etc to ensure that energy efficiency is optimised	C Hewitt	Ongoing	

Proj No	Application	Energy Management Action	Responsibility	Planned Completion Date	Actual Completion Date
A1	Senior Management Support	Conduct a regular review of energy policies and related documents to ensure currency.	C Hewitt D Low	Annually	
A2		Routinely audit results, targets and revise the program as appropriate	C Hewitt	Annually	
C1	Energy Targets and key performance indicators	Establish KPIs and appropriate targets for buildings, major energy user systems.	C Hewitt	Dec-07	
C2			D Low		
C3					
C4		Monitor and report/communicate KPIs to management and personnel responsible for each area of energy use.	C Hewitt D Low	Annually	
		Update targets routinely to reflect changes in services or activities and the results of energy management works	C Hewitt D Low	Annually	
		Set up procedures for alarming consumption levels outside acceptable bands for each KPI	C Hewitt D Low	Dec-07	
D1	Energy Metering and monitoring	Implement a metering/monitoring strategy across the site, and extend it to other sites on a progressive basis.	C Hewitt	Dec-07 then progressive	
D3					
D5		Determine seasonal and annual targets for each metered point	C Hewitt	Dec-07	
D6					
D8		Monitor and analyse readings to ensure targets are met	C Hewitt	Ongoing	
		Set up a reporting program to end users and those responsible for energy use and efficiency to provide feedback on performance	C Hewitt	Dec-07 then annually	
	Implement a management information process to provide feedback and regular discussion at management meetings on the relative performance of components of the site.	C Hewitt	Dec-07		
E1	Energy Management Reporting	Establish a management reporting system to provide feedback on: Energy performance and KPIs Progress on implementation programs Progress on energy auditing and reviews Progress on the ESAP and other energy management programs in operation Recommendations for rectification of identified problems or for new proposed works	C Hewitt D Low	Dec-07	
E2					
E3					
E4					
E5					
E6					
E7		Implement University feedback information system	C Hewitt D Low	Ongoing	

Proj No	Application	Energy Management Action	Responsibility	Planned Completion Date	Actual Completion Date
A1	Senior Management Support	Conduct a regular review of energy policies and related documents to ensure currency.	C Hewitt D Low	Annually	
A2		Routinely audit results, targets and revise the program as appropriate	C Hewitt	Annually	
F1	Energy Supply Management	Routinely review the procurement procedures in place for energy sources	C Hewitt	Ongoing	
F2		Implement a review process for new services and systems which incorporate a full life cycle cost analysis of options	C Hewitt	Dec-07	
G1	Operating and maintenance procedures	Implement changes to operating and maintenance procedures identified in the energy audit	C Hewitt	Dec-07	
G2					
G3					
G4		Conduct regular review of processes and procedures to ensure optimum efficiency is maintained	C Hewitt	With regular audits	
G5		Upgrade systems and tools to enable more effective monitoring of performance of systems and contractors	C Hewitt	Dec-07	
		Upgrade BMS manuals to reflect the current structure of the systems Facilitate access to the BMS and key control parameters for staff and contractors to ensure more effective monitoring, control and fault finding Implement operating and performance targets for systems controlled by the BMS and the associated contractors	C Hewitt	Dec-08	
G6		C Hewitt	Dec-08		
H1	Accountability for Energy Management	Establish an energy monitoring and management working party Delegate responsibility of energy efficiency to appropriate party. Agree on a set of performance parameters (KPIs) and targets with each of the above personnel	Energy Working Party	Dec-07	
H2					
H3					

Proj No	Application	Energy Management Action	Responsibility	Planned Completion Date	Actual Completion Date
A1	Senior Management Support	Conduct a regular review of energy policies and related documents to ensure currency.	C Hewitt D Low	Annually	
A2		Routinely audit results, targets and revise the program as appropriate	C Hewitt	Annually	
I1	Training and Awareness Procedures	Develop and implement a training/awareness procedure appropriate for: Staff Students Maintenance & operation personnel	Energy Working Party	Dec-08	
I2					
I3					
I4					
I5					
I6					
	Review and updated procedures and materials as appropriate	Energy Working Party	Dec-08		
J1	Compliance with legal and other regulatory requirements	Review all regulatory and voluntary requirements regarding all energy matters	C Hewitt	Ongoing	
J2		Set in place procedures to ensure all regulatory requirements are met and exceeded where applicable	C Hewitt	Ongoing	
J3		Review voluntary requirements/options and recommend their implementation as appropriate	C Hewitt	Ongoing	

Refer to Appendix 2 for a summarised list of proposed energy saving projects and the Technical Review document for a detailed list.

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Appendix 1: Summary of Proposed changes to the building assets at October 2006

Building	Description	Proposed Works	Scheduled Works
1	Materials Engineering	Process chiller for instrument cooling	2007
2	Engineering Extension	Refurbishment	No date scheduled
6		Demolish existing and replace with new building	2008 Start
8	Mechanical Engineering	Refurbishment including lighting, lab upgrade to PC2 and air conditioning of top floor	Start 2007
15	Austin Keane Building	Max Olsen Labs (grnd floor NE) air conditioning to be added	2007
16	Library	Part refurbishment & extension, additional air handling plant and external glass areas will impact on existing plant operation	Tenders to be issued late 2006
18	The Halpern Chemistry Building	Air conditioning to be added to the top floor	No date scheduled
19	Arts	Minor upgrade, old room air conditioners and package units to be replaced	2010
20	Communications Centre	Major upgrade	Complete 2006
31	Buildings & Grounds	Trial system to remove heat/cool peaks	No date scheduled
32	Printery and Central Store	The Printery is to be located off site and the site redeveloped as a medical research facility	No date scheduled
35	Biology/Informatics	North Wing laboratory HVAC plant replacement, air balance and converted to BMS control	2006/2007
36	Administration	Minor works, additional air conditioning to meeting room	In progress
38	Graduate School of Business	Interior refurbishment and addition of air conditioning	2007
41	Anatomy lab	Medical research anatomy lab to be refurbished and made PC2 compliant. Works include HVAC and electrical upgrade	Tenders to be issued late 2006
	Medical School	New building	Complete October 2006
	Animal Holding Facility	New building to be constructed on the West side of Robson Road	Start 2007
	Oval 2 Field House	New building with expected high lighting and air conditioning loads	Start 2007
	Western Carpark	Additional security lighting and CCTV	2007
	Creative Arts and B & G Carparks	Additional security lighting and CCTV	2007
	South West Carpark	Additional security lighting and CCTV	2007

**Energy Saving Action Plan
for
The University of Wollongong**

Appendix 2 – Summarised list of Energy Saving Projects

(Refer to the Technical Review document for a detailed list of projects)

Project Number	Measure Description	Responsibility	Cost to Implement	Savings - GJ	Total Cost savings	Internal rate of return	Time required to implement	Planned completion date
Previous Actions Over Last Five Years								
1	Completed projects across all applications	C Hewitt	1,982,374	9,321	237,181	11.9%	Complete	Complete
2	Identified projects and awaiting approval	C Hewitt	n/a	3,553	n/a	n/a		
Subtotal			n/a	12,874	90,426	n/a		
Cost-Effective Opportunities								
1	HVAC - Control Improvements	C Hewitt	258,050	6,004	79,157	30.7%	1 yr	Dec-07
2	HVAC – Boiler Systems	C Hewitt	29,900	702	4,439	14.8%	3 yrs	Dec-09
3	HVAC - Chiller and Condenser Water Systems	C Hewitt	116,700	1,260	25,844	22.1%	1 yrs	Dec-07
4	HVAC - Holiday scheduling and time of day	C Hewitt	92,650	7,205	101,507	109.6%	1 yr	Dec-07
5	HVAC - Economy Cycle, CO ₂ , Outside air and Night purge	C Hewitt	57,000	1,522	27,963	49.1%	1 yr	Dec-07
6	HVAC- Control of personal equipment and general awareness	C Hewitt	123,150	837	17,223	14.0%	3 yrs	Dec-09
7	HVAC - New or refurbished plant	C Hewitt	800	235	4,743	592.9%	4 yrs	Dec-10
8	HVAC - Other	C Hewitt	24,680	153	3,483	14.1%	4 yrs	Dec-10
9	DHW ² and Staff Amenities initiatives	C Hewitt	69,985	1,578	11,070	0	3 yrs	Dec-09
10	Specific Utilities initiatives	C Hewitt	10,000	1,879	37,587	>100%	1 yr	Dec-07
11	Lighting initiatives	C Hewitt	166,727	1,091	30,338	0	3 yrs	Dec-08
12	Office and Other Equipment initiatives	C Hewitt	Nil	477	10,000	>100%	4 yrs	Dec-10
13	Pool system initiatives	C Hewitt	40,930	1,565	12,224	0	2 yrs	Dec-08
14	Power Factor Correction initiatives	C Hewitt	80,625	348 kVA	17,100	0	3 yrs	Dec-09
15	Implement a site-wide metering program	C Hewitt	300000	n/a	n/a		1 yr	Dec-07
Subtotal			1,371,198	24,508	382,677	27.9%	1,371,198	
Total Energy Saving for Site				37,382				

(1) – Heating, Ventilation and Air Conditioning

(2) – Domestic Hot Water