

Stamping out La Trobe's Environmental Footprint

*A comparative audit of La Trobe University's
environmental practices with recommendations to reduce
the University's environmental impact*

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*Elizabeth Foley
Matthew Salter
Sophie Ellis*

Buildings and Grounds Division



Executive Summary

Strong corporate environmental management has been shown to produce significant reputational and financial benefits. Universities who responsibly manage their impact on the environment will save money and those who successfully market themselves as a 'green uni' will have a distinct competitive advantage over other universities.

In 2005 ANUgreen conducted an informal assessment of the environmental activity of Australian universities and La Trobe University was ranked among the bottom three universities in Australia.

In order to define La Trobe's environmental performance more precisely, the Sustainable Transport Officer sought and received, in 2006, a Quality Initiatives Grant (QIG) to fund an audit of La Trobe's environmental-sustainability and to initiate an education/promotion program to improve and publicise the University's image. This report comprises the first two stages of the QIG – collating La Trobe's environmental activities and comparing these with activities of leading sustainable universities.

This report collates the environmental activities of La Trobe's Bundoora campus and compares these activities with those conducted by other universities. Each university is assessed in ten areas of sustainable practice, which form the headings of the bulk of the report. La Trobe is compared with university best practices and recommendations are presented for lessening the University's environmental impact.

The comparative audit found that while La Trobe excelled in some areas (sustainable transport, biodiversity and ecology, and water conservation), the University currently has NO environmental policy, environmental management plan nor environmental management section, and therefore no coordinated approach to comprehensive sustainability. This results in the University's response to environmental issues often falling below the industry benchmark.

To come up to the benchmarks set by other Australian universities, La Trobe needs to develop an environmental policy, management and management section, and related committees. This management section should include roles covering energy and water management, sustainable transport, ecology and biodiversity, waste reduction and recycling, green office program, ecologically sustainable building design, environmental risk assessment and green purchasing.

Key recommendations

1. The development of an **environment policy** by the Sustainable Resource Management Committee and ratified by the Vice-Chancellor;
2. The development of an **environmental management plan** and allocation of appropriate financial and human resources;
3. The establishment of an **environmental management section**;
4. The implementation/allocation of other recommendations made in the body of this report relating to specific initiatives (the most important of these are listed in *4. Key Recommendations*); and
5. The ongoing maintenance of existing and development of new environmental initiatives.

Research into six Australian universities has highlighted the need for La Trobe to take action in the field of environmental sustainability. Based on the success of universities with solid environmental policies, management plans and management sections, it is recommended that La Trobe develop an environmental policy, management plan and management section as soon as possible so as to become a leading sustainable institution.

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1. Background and Context

The environmental management of organisations is becoming increasingly important on the list of consumer concerns, and therefore the list of factors that shape an organisation's reputation. In a review of studies on the relationship between environmental management and corporation performance, Miles and Covin (2000) found 'there is strong support that being a good environmental steward helps create a reputational advantage that leads to enhanced marketing and financial performance.'¹

These 'concerned consumers' include university students whose choice of university will be increasingly influenced by the environmental reputation of education institutions. Where a university is able to market itself successfully as a 'green uni' it will be have a distinct reputational advantage over other institutions offering the same courses.

There is significant evidence also that 'it pays to be green'.² This financial benefit comes in the forms of both improved reputation (leading to more students) and reduced operational costs. Waste disposal, for example, is one area significant savings may be measured. Cost of waste to landfill will increase as much as twenty-fold in the next twelve months, meaning that significant investment in recycling services will reap significant financial reward.

In 2005 ANUgreen conducted an informal assessment of the environmental activity of Australian universities, based on information available on the universities' websites. La Trobe University was ranked among the bottom three Australian universities and the worst in Victoria for its environmental/sustainability content.³

It is believed that La Trobe's low ranking was due to both a lack of sustainable practices and, where environmental activities were being undertaken, a lack of central coordination and publicity (on the internet) of these activities.

In 2006 the Sustainable Transport Officer was awarded a La Trobe University Quality Initiatives Grant (QIG⁴) to assess and improve the University's environmental practices, coordination and publicity. This document is a report on the first two stages of the QIG.

The guiding vision of the work undertaken in the QIG is to see La Trobe become a leader among universities in environmentally-sustainable business practices. By following the recommendations of this report, La Trobe can achieve and surpass the benchmarks set by some of the leading sustainable tertiary institutions.

The full implementation of the QIG involved five stages:

1. Collating information on all of La Trobe's existing environmental initiatives in one central location;
2. Conducting a comparative audit of environmental activities at six Australian universities, and identifying areas for improvement at La Trobe;
3. Developing and publicising a website that informs and educates staff, students and the wider community about La Trobe's environmental practices;
4. Developing and publicising, in conjunction with the Waste Wise program, a green office program (GOP) to promote and facilitate sustainable office practices; and
5. Undertake ongoing publicity of La Trobe's environmental activities.

¹ Miles MP and Covin JC (2000). 'Environmental Marketing: A source of reputational, competitive and financial advantage' in *Journal of Business Ethics*; Feb 2000; 23, 3; ABI/INFORM Global; pg 299-311

² Ibid; and

Russo MV and Fouts PA (1997). 'A resource-based perspective on corporate environmental performance and profitability' in *Academy of Management Journal*; Jun 1997; 40, 3; ABI/INFORM Global; pg 534-559; and

³ Carpenter D (2005). Unpublished

⁴ For a full list of acronyms used in this report, see Appendix 3.

2. Aims and Objectives

The aim of this report is to provide the arguments and guidelines for the improvement of La Trobe University Melbourne (Bundoora)'s environmental management and activities to bring it in line with best practice in the tertiary education sector.

The objectives of this report are:

1. To compile a comprehensive catalogue of La Trobe's current environmental activities;
2. To conduct a comparative audit of the environmental practices (management and activities) of La Trobe and five other Australian universities, thereby identifying the areas in which La Trobe needs to 'step up to the mark'; and
3. To make recommendations for improvement in environmental management and activities at La Trobe, on the basis of benchmarks set by the other universities.

3. Methodology

Environmental Sustainability was divided into tangibly recordable categories:

- Environmental Policy and Management Plan;
- Environmental Management Section;
- Water;
- Energy and Greenhouse;
- Waste, Recycling and Purchasing;
- Green Office Program.
- Biodiversity and Ecology;
- Sustainable Transport;
- Education and Awareness;
- Sustainable Building Design;

Five Australian universities were surveyed for best practice:

- Australian National University (ANU)
- Monash University
- Edith Cowan University (ECU)
- Ballarat University (UB)
- Griffith University (GU)

These universities were chosen both because of their reputation as leading sustainable institutes and/or because of the availability of information about their activities on the internet. Information collated from the universities' websites was verified and expanded on by appropriate staff members from each university (Appendix 1).

Each university was evaluated in two ways:

1. A larger scale analysis compared environmental policies and assessed the universities' overall commitment to sustainability. This analysis falls under the general headings of University Policy and Environmental Management Section; and
2. A smaller scale comparison dealt with individual sustainability initiatives designed to combat particular environmental concerns, e.g. installation of flow restrictors and energy-efficient light globes, recycling of particular materials, etc. This evaluation identifies best practice standards for each theme, which are then used to form recommendations for La Trobe to follow to raise its environmental profile.

The following factors were taken into account when evaluating the initiatives of each university:

- The extent to which the university practices an initiative, e.g. dual-flush toilets might only be installed in half the university bathrooms as compared with a university-wide installation, or a GOP might target only one or a whole range of topics);
- The fact that some initiatives are relative to a University's location, e.g. biodiversity and ecology may not be relevant to an inner-city university; and
- A distinction between university-run initiatives and student-run initiatives (both endorsed and not endorsed by the university) – this report focuses solely on university-run initiatives.

Areas for improvement at each of the surveyed universities and La Trobe were:

- Referred to by university staff;
- Inferred from a lack of information; and
- Identified from comparison with other universities' practices and general knowledge of the environmental practices of Australian tertiary institutions.

4. Key Recommendations

Environmental Policy

The Sustainable Resource Management Committee should develop, and the Vice-Chancellor should endorse, a comprehensive environmental policy. This policy should be binding, require regular reporting on the environmental performance of the University and dictate the development of the environmental management plan and management section.

Environmental Management Plan and Funding

Following the development of an environmental policy, an environmental management plan should be developed to interpret the policy into concrete workable actions. Appropriate financial and human resources should be allocated to the implementation of the plan.

Environmental Management Section

The most important step in the management plan should be to establish a proper EMS with sufficient financial and human resources, one that is properly structured within the Buildings and Grounds Division to allow for appropriate authority and accountability.

Other Initiatives

Following the development of an environmental policy, management plan and management section, the EMS should implement the other recommendations relating to specific initiatives in this report. The most important of these are listed below:

- Use green energy wherever possible, be it through efficient use of La Trobe's cogeneration plant or through the purchase of grid energy from renewable energy providers;
- Extend recycling services to encompass more than just paper and commingled, e.g. organics, electronic equipment and fluorescent tubes;
- Establish a comprehensive green office program (GOP) to encourage and facilitate staff (and student) behaviour change across all environmental issues;
- Fund the completion of the predator-proof fence around the Sanctuary to enable the introduction of native and endangered species;
- Research and develop a comprehensive travel demand management (TDM) strategy to enable the University to better plan for increases in students by encouraging and facilitating sustainable transport, thereby decreasing the likelihood of having to resort to multi-level car parks;
- Include sustainable principles and teaching into the core curricula of ALL degrees and actively participate in the ongoing discussion among tertiary institutions about this issue; and
- Develop a binding set of ecologically sustainable design (ESD) guidelines for all new buildings and retrofits/refurbishments.

5. Comparative Audit

This section provides a brief analysis of how La Trobe compares with the other surveyed universities and recommendations for lessening La Trobe's environmental footprint in each of the focus areas.

N.B. Appendix 2 contains comprehensive details of the activities of each university in each area.

5.1 Environmental Policy and Management Plan

An ideal Environmental policy:

- Is University-wide.
- Defines clear and achievable goals.
- Takes environmental concerns into account in matters of research and development.
- Implicates issues of sustainability as vital to future generations.
- Is meaningful.

How does La Trobe compare?

La Trobe currently has no binding environmental policy. The previous policy has been redundant for some time and a new one is currently being drafted for presentation to the Sustainable Resource Management Committee.

The previous policy was a general document with no measurable objectives and no Environmental Management Plan (EMP) to action the policy. Nor were there any reporting requirements or responsible committees.

Recommendations

It is absolutely vital that La Trobe's Executive endorses a binding environmental policy. The University should then develop an EMP and appropriate committees for actioning the EMP.

The policy should:

- Be comprehensive, covering environmental sustainability in all areas of addressed in this report;
- Extend to all La Trobe campuses, and contractors and visitors;
- Aim to meet benchmarks/requirements of relevant state, federal and international environmental legislation/standards;
- Be strategy-focussed, not just compliance-focussed⁵;
- Recognise the importance of staff and students in driving sustainable change and incorporate environmental sustainability into staff and student education;
- Include a regular (anywhere from quarterly to annual) reporting requirement and framework; and
- Be reviewed at regular (three- or five-year) intervals.

The EMP should:

- Set meaningful objectives (e.g. SMART goals) resulting in clear guidance for activities;
- Clearly outline responsibility (committee or individual) for each objective;
- Be allocated significant financial and human resources toward its actioning; and
- Be reviewed on an annual basis.

The lead committee (Sustainable Resource Management Committee) should:

- Include representatives from:
 - University Executive (the VC);
 - Upper management
 - Environmental management staff;
 - Academic staff;
 - General staff; and
 - Undergraduate and post-graduate student bodies.
- Report regularly to the University Executive; and
- Be ultimately responsible and accountable for actioning the EMP.

⁵ Miles MP and Covin JC (2000). 'Environmental Marketing: A source of reputational, competitive and financial advantage' in *Journal of Business Ethics*; Feb 2000; 23, 3; ABI/INFORM Global; pg 299-311

5.2 Environmental Management Section

An Environmental Management Section (EMS) is the organisational area of a university, usually under the facilities management division, responsible for managing and coordinating the environmental activities of the university, as dictated by the environmental policy and outlined in the environmental management plan.

How does La Trobe compare?

La Trobe has no EMS to coordinate the environmental activities of the University. The lack of proper financial and human resources, and organisational structure, greatly limits the variety and quality of environmental initiatives actually undertaken.

Some activities such as biodiversity and ecology, and energy and water management have been part of the University's operations for some time and are therefore effective, stand-alone practices. Other activities, such as sustainable transport and environmental waste management, are more recent initiatives and have been taken on by the Buildings and Grounds Division in an ad-hoc manner.

La Trobe lacks any central management structure to properly monitor, coordinate and publicise the University's collective environmental activity. There is minimal specific funding directed at environmental business planning and environmental programs common at other universities. The absence of an EMS also makes it far more difficult to coordinate activities required by such commitments as the Greenhouse Challenge Plus and Waste Wise Programs.

While the name 'EnviroSMART' has been recently adopted as the public face of La Trobe's environmental activities, there is no actual organisational unit behind the name. The two staff (one part-time, one casual) responsible for sustainable transport and environmental waste management also take ad-hoc responsibility for the GOP, green purchasing and publicity on top of their normal duties.

With the exception of Griffith and La Trobe, every university in this study has an EMS of some description with staff specifically focused on making the institution more sustainable. The results of this can be seen where those universities with the most comprehensive EMS consequently have the most effective programs.

Recommendations

La Trobe should create an EMS with sufficient financial and human resources. This section would be responsible for coordinating – though not directly conducting – all environmental programs in the University, and for publicising such activities to staff, students and the wider community.

A more detailed breakdown of EMS staff, committees and responsibilities can be found in 7. *Suggested EMS and Committee Structures.*

5.3 Water

Best practice in water conservation involves such actions as:

1. **Preventing the contamination and damage of waterways and sources;**
(e.g. correct disposal of chemicals, specialised drainage techniques, preservation of wetland habitats and control of stormwater flow)
2. **Water saving/reduction; and**
(e.g. water-saving showerheads, flow restrictors reverse osmosis water purifiers and drought-tolerant indigenous landscaping)
3. **Water recycling.**
(e.g. rain and grey water used to water grounds and flush toilets).

How Does La Trobe Compare?

La Trobe was recognised by Yarra Valley Water in 2002 for cutting its water use by 20% over a two year period, and again in 2004 for completing its water management plan. The University's annual water consumption is monitored, which represents La Trobe's commitment to reducing its impact on water supplies.

La Trobe's major water initiative is the recycling of rain water: The gardens and the sporting grounds are watered exclusively from rainwater tanks and the University's extensive storm-water moat system. This moat and lake system is unique among the universities, and its integration with rainwater tanks provides a successful water recycling regime. The moat system also allows for the control of stormwater flow and so protecting the local Darebin Creek.

With the exception of some ornamental landscaping in the main campus centre, most landscaping is drought-tolerant and indigenous, helping to ensure minimal watering is required.

However, although La Trobe's flora does not consume much water, there are fewer strategies employed to reduce the amount of water consumed by its staff and students. Improvements are being made in some areas – for example, flow restrictors are used in the bathrooms of some areas and reverse osmosis water filtering in some science areas – but there is much that can still be done in the area of water-minimisation, through both infrastructure changes and behaviour-change programs.

Recommendations

- The continued monitoring, updating and implementing of the University's water plan;
- The installation of water-minimisation infrastructure such as water-saving taps, water-efficient toilets (dual flush and waterless urinals) and dishwashers throughout the University where practical;
- The introduction of guidelines specifying the use of these devices as a standard for all developments and retrofits; and
- Water-saving behaviours of staff to be targeted as part of the GOP.

5.4 Energy and Greenhouse

Best practice in energy conservation and greenhouse gas reduction includes:

- The setting of clear reduction objectives, and commitment with action plans towards meeting this target;
- The purchase of renewable energy;
- The maximisation of natural lighting, insulation and ventilation. This is often intertwined with Sustainable Building Design (see Section 5.11);
- Installation of energy-efficient light bulbs, motion-sensors, timers, air-conditioners and the like;
- The purchase of greenhouse-conscious products, chosen on the basis of low lifecycle impact and low/non-toxic materials;
- The promotion of sustainable forms of transport (see Section 5.8); and
- Staff behaviour change, e.g. 'Switch it Off' campaign through the GOP.

How Does La Trobe Compare?

Employing both a Manager (Electrical Systems) and a Manager (Mechanical Projects and Energy Management), La Trobe demonstrates commitment to keeping energy use to a minimum. Energy-saving technology, such as efficient air-conditioning/heating, motion sensors and T5 fluorescent tubes have been/are being installed. Efficiency measures such as running air-conditioning on economy cycle are also in place.

Roughly 70-80% of the University's electrical energy and much of the thermal energy (hot water for domestic use, water chillers and autoclaves) is supplied by the **cogeneration** plant, an on-campus, gas-powered turbine. While the plant results in significant greenhouse gas reduction (as compared with buying electricity from the grid), its financial efficiency is in question. The rest of the University's electricity comes from non-renewable sources.

La Trobe's energy programs are fairly on par with the other universities. In terms of infrastructure, the University's strategies are fairly efficient but it falls behind in terms of behaviour change. Wasteful energy behaviours on the behalf of staff may counteract the benefit of efficient T5 lighting, for example. Both strategies need to be pursued to make a positive impact.

There is also an apparent need for further research into the efficiency effectiveness of energy sourced from the cogeneration plant.

Recommendations

It is of high interest to universities to improve their sustainable image through energy improvements and thus also save money. It is therefore suggested that La Trobe not measure up to the other universities in this arena, but to strive to lead the way in energy efficiency.

La Trobe should:

- Use green energy wherever possible, be it through efficient use of La Trobe's cogeneration plant or through the purchase of grid energy from renewable energy providers Review and invest in improvements to the efficiency of the cogeneration plant, to make it more environmentally viable;
- Formalise its intent on using energy-efficient technology by adding to and formalising the University's Sustainable Design Guidelines, including maximising natural lighting, ventilation and insulation, and the use of greenhouse conscious products; and
- Target of both student and staff energy reducing behaviours through the GOP and other initiatives.

5.5 Waste, Recycling and Purchasing

Good performance in the area of waste, recycling and purchasing is demonstrated by a comprehensive employment of the principles of the 'Three Rs'. Universities should:

- Reduce e.g. print double-sided to reduce paper consumption and purchase products made from recycled material;
- Reuse e.g. redistribute unwanted furniture and reuse single-sided printouts as notepaper; and
- Recycle: paper, **commingled**, furniture, computers, printer/toner cartridges, organics, mobile phones, etc.

It is important again to note that it is not just the presence of such activities at a university, but also the extent to which these activities are employed right across the institution, that demonstrates good practice. In the area of recycling, for example, a university should have commingled facilities not only in public areas but also in each office. With regard to paper, a university should have a policy to buy recycled-content copy paper, not just do so in some areas.

How Does La Trobe Compare?

La Trobe employs just one 0.4 casual staff member (ANU and Monash both employ 3 staff) to coordinate recycling, green purchasing, GOP and waste audits. The minimal staffing in this area of the University means that waste, recycling and purchasing initiatives are limited.

La Trobe is currently working towards stage one of Waste Wise accreditation. As part of this it is developing a waste reduction action plan, and is in the process of implementing a new University wide office recycling program. The office recycling program has required the recruitment of staff 'EnviroSMART reps' who are also helping to encourage green purchasing. Facilities are in place for recycling of some materials, though not as comprehensive as some of the leading universities in this field.

The EnviroSMART staff have, on top of their normal duties, liaised with Procurements and Business Services (PBS) with regard to tenders, recycled paper and IT and mobile phone recycling. EnviroSMART has been successful in negotiating a cheaper recycled-paper price and encouraging staff to purchase the recycled paper. The 'paper campaign', however, be more effective if a similar strategy to ECU was followed, i.e. the purchase of recycled paper is enforced as university policy.

La Trobe's intentions, as formalised through its Waste Wise membership, are good, though the realisation of these intentions is likely to be very slow. A single casual staff member employed for environmental waste management reflects the likelihood that the entire activities of the 2007 year will consist of maintaining the recycling program. The enormous responsibility of liaising with EnviroSMART reps has fallen on this staff member, who therefore has insufficient time and resources for other initiatives.

Recommendations

- The extension of recycling services to encompass more than just paper and commingled, e.g. organics, electronic equipment, fluorescent tubes, the extension of oil and battery recycling to other areas of the University;
- A clearer distinction between, and greater resources for, GOP and waste management duties to allow for recycling/waste reducing initiatives outside the scope of the office recycling program;
- The development and enforcement of University policy that requires the purchase of recycled paper and other green products; and
- GOP behaviour-change campaigns focussing on specific waste generating behaviour, e.g. paper coffee cups and printing single-sided; and
- Annual waste audits to monitor the University's waste output.

5.6 Green Office Program

A major component of sustainability in a tertiary institution is staff education and behavioural change. Environmental management plans carried out without the understanding and support of staff, risk having minimal impact. Increased awareness and simple lifestyle changes, especially in large institutions such as universities, have a profound effect on the conservation of resources. Additionally, thousands of University staff mingle with tens of thousands of students on a daily basis, providing an excellent chance for them to model sustainable practices in everyday behaviour. The result can be exponential as sustainable education and behaviour is passed from staff to students and then filters into the wider community for years to come.

A comprehensive GOP:

- Encompasses a wide variety of themes such as recycling, water, energy, purchasing, greenhouse, travel and awareness;
- Focuses on behavioural change;
- Provides training, ongoing support and extensive resources available for the staff involved; and
- Uses both a top-down (management dictates behaviour change) and bottom-up (office reps encourage and facilitate behaviour change) approach.

How Does La Trobe Compare?

La Trobe's GOP was kick-started in late 2007 through both the QIG and the Waste Wise office recycling program. In a broad sense the program will aim to target other themes as well, but as the full implementation of the recycling program (bins, signage and audits) is not expected to be completely University-wide until late 2007, themes outside the recycling/purchasing field are not expected to be covered soon.

Reps have been recruited from most areas of the University (some areas have multiple reps) and trained to facilitate the office recycling program in their office. Some resources have been made available (posters, tips, fact files, problem solving resources and a green purchasing guide), but the development of other much needed resources is slow due to funding.

With the office recycling program, has used a combination of top down and bottom up approaches to successfully encourage behaviour change. This approach puts it at an advantage of those universities who use only a bottom-up approach.

However, in terms of scope, La Trobe is far behind. The current GOP centres on recycling and some purchasing only, and is the only one of among the surveyed universities that has not dealt with other issues. The lack of coordinating staff means that EnviroSMART reps are encouraged to pursue other topics themselves, but do not have extensive support from a coordinator nor the aid of top-down managerial support for other campaigns.

At present, Green Office duties are covered by the single casual Environmental Waste Management, staff member, with limited assistance from the STO. Additionally, the funding for the initiation of the project was supplied by a grant, so both funding and staff are now too limited to endorse other sustainable themes.

Recommendations

- Establish a comprehensive green office program (GOP) to encourage and facilitate behaviour change across all environmental issues;
- That further staffing and resources be allocated to fast track the progress of the GOP (separate to waste management projects), and ongoing resources made available to continue the GOP; and
- Conducting regular reviews of the program once it is in full swing, so that it grows in its effectiveness.

5.7 Biodiversity and Ecology

Maintaining a balance between a university and the natural landscape of its grounds forms an integral part of achieving sustainability. To conserve biodiversity, a university should aspire to integrate indigenous flora and fauna into its landscape and ensure endangered species are well-protected. When new development is necessary, the natural layout of the land and its features should be accommodated.

As biodiversity is often not relevant to inner-city universities, not all universities were surveyed on this topic.

How Does La Trobe Compare?

Since its inception in the 1960s La Trobe has demonstrated a strong commitment to restoring the landscape back to its pre-colonial, pre-farmland state. This commitment is seen most strongly in the work of the Melbourne Wildlife Sanctuary to restore and manage about 120 hectares of woodland and grassland in the Melbourne Wildlife Sanctuary and three crown reserves. Biodiversity is actively incorporated into the activities of the main campus landscaping.

Most of La Trobe's biodiversity strategies focus around plant life rather than animals. Unfortunately, a lack of funding has resulted in an incomplete protective fence around the Melbourne Wildlife Sanctuary. Once this fence is completed, the Melbourne Wildlife Sanctuary will introduce a greater array of native and endangered species.

Through the efforts of the Melbourne Wildlife Sanctuary, La Trobe does comparably well against other universities. All the universities discussed here utilise different strategies under the broad theme of biodiversity, and ideally, best practice would incorporate them all.

Recommendations:

- Funding to complete the predator-proof fence around the Sanctuary to enable the introduction of native and endangered species; and
- Ongoing assessment of biodiversity and ecology strategies.

5.8 Sustainable Transport

Universities should aim to boost both staff and student use of sustainable forms of travel by incorporating the following strategies:

- Extensive walking and cycling infrastructure: paths, secure storage, showers and change-rooms and security;
- Carpool program, including significant incentives;
- Regular communication with public transport authorities to improve access to the University;
- Strong sustainable transport education program (e.g. TravelSmart) including individual communication with students, travel groups, distribution of access maps, website, presence at events (e.g. O-Week), etc. and
- Purchase of fleet vehicles in compliance with the Green Vehicle Guide⁶ or other sustainable standards and subscription to Greenfleet (or similar emission off-set scheme).

How Does La Trobe Compare?

La Trobe has the most extensive and successful sustainable transport program of the universities in this study. This is due to the hiring of a Sustainable Transport Officer and ongoing participation in the state government's travel behaviour change program, TravelSmart. 11% of enrolling students in 2005 were prompted to use sustainable transport through the TravelSmart education program. Compared to other universities, La Trobe spends considerable energy on promoting sustainable transport to the University community.

La Trobe currently has Australia's biggest carpool database, however its incentives are not as attractive as others, with only 67 priority spaces for its 5000 members and no parking permit discounts. The percentage of members who carpool, therefore, is not as high as it would be with more incentives.

The most significant shortfall in La Trobe's sustainable transport activities is the absence of a long-term travel demand management (TDM) strategy. A comprehensive TDM strategy would enable the University to better plan for increases in students, integrate more sustainable transport and decrease the likelihood of having to resort to multi-level car parks.

To demonstrate its ongoing commitment, the University needs to commit to ongoing budgets for the TravelSmart program and significant project budgets for cycling infrastructure. La Trobe has comparatively little bike storage (over 1000 people cycle regularly to campus; storage for only 400 is provided) and access from off-campus to the University is not cycling friendly.

Recommendations

- La Trobe's commitment to sustainable transport should be formalised through such documents as a TDM strategy, a cycling strategy and a green access plan;
- Commit to ongoing funding of the TravelSmart program;
- Investigate additional carbon off-set schemes such as planting trees at the University's own Melbourne Wildlife Sanctuary;
- Develop a bicycle users group (BUG) to inform cycling policy and encourage a culture of cycling; and
- Partner with relevant stakeholders and financial commit to continually improve cycling access to the University and cycling infrastructure at the University.

⁶ <http://www.greenvehicleguide.gov.au/>

5.9 Education and Awareness

Environmental education and awareness takes two forms:

- Academic education in the form of degrees, course units and research focussed on sustainability; and
- Broad education in the form of publicity of environmental initiatives and promoting sustainable behaviour to staff and students.

How does La Trobe Compare?

La Trobe offers courses in environmental science and environmental management (waste and ecology), and a number of units in sustainable practice (e.g. natural tourism, health and sustainability, etc.). Unlike other institutions, La Trobe does not have a research centre nor research programs focused on the full gamete of sustainability topics (as compared with UB's National centre for Sustainability). Importantly, the Melbourne Wildlife Sanctuary provides a comprehensive education service to local schools and general community.

La Trobe is increasingly working to promote its sustainable behaviour and educate staff and students about sustainable behaviour. The QIG and Buildings and Grounds recently funded the development of the EnviroSMART website and the recruitment of EnviroSMART staff reps who are helping to facilitate office behaviour change.

With the exception of its commitment to research, La Trobe compares very well to the other universities. Education and awareness of the environment to staff and students is consistent, though it might be boosted by the running of more regular events like the recently successful 'Ride to Uni Day'.

Recommendations:

- Include sustainable principles and teaching into the core curricula of ALL degrees and actively participate in the ongoing discussion among tertiary institutions about this issue;
- Increase opportunities for research into sustainability and investigate the development of a sustainable research institute; and
- A greater promotion of the various programs available at the Melbourne Wildlife Sanctuary.

5.10 Ecologically Sustainable Design

The development of new and retrofitting of old buildings should be conducted within ecologically sustainable design (ESD) guidelines. These guidelines should be mandatory for all developments and enforced by the University.

Guidelines should include:

- Use of building materials, furniture and equipment that are, where possible, recycled, non-toxic and low maintenance;
- Use of materials with low life cycle 'cost';
- Maximum utilisation of natural lighting, ventilation and insulation;
- Harvesting of rain water;
- Water and energy efficient equipment and technology;
- Consideration for the natural landscape; and
- Waste Wise contractors.

How Does La Trobe Compare?

While there are a number of individual initiatives happening at La Trobe (such as retrofitting lecture theatres with motion sensors and installing energy-efficient air-conditioning), La Trobe currently does not have a set of sustainable building design guidelines. Unlike other universities, La Trobe does not incorporate design standards into an environment policy.

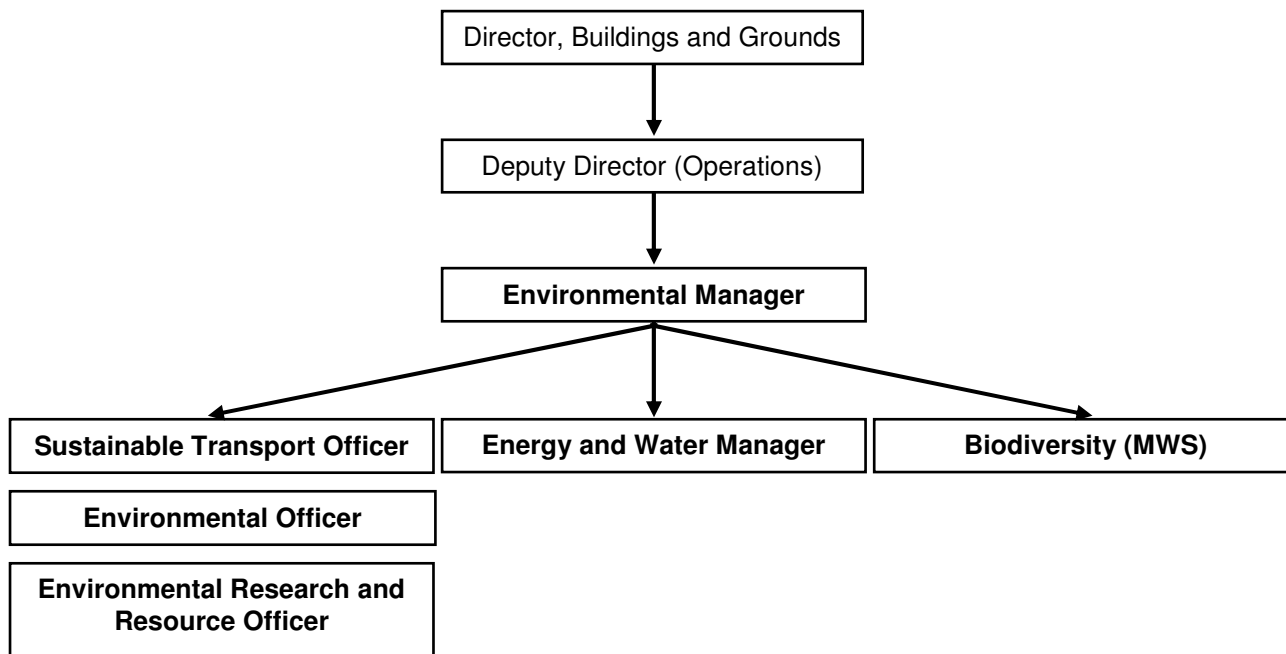
Recommendations:

- Develop a set of sustainable building design guidelines that encompass water, energy, greenhouse, biodiversity and waste issues;
- Conduct a comprehensive study of how existing buildings could be retrofitted to be more sustainable;
- Incorporate sustainable building design requirements in tenders specifications and contracts for building and maintenance contractors.

6. Suggested EMS and Committee Structures

EMS Structure

The following suggested positions and EMS structure are similar to those which appeared in the 2006 Buildings and Grounds committee restructure proposal⁷.



Environmental Manager (Fulltime)

Responsible for directing and overseeing the operations of the EMS, legislative compliance, environmental reporting and other management activities

Sustainable Transport Officer (Fulltime)

Responsible for maintaining the carpool service, implementing the TravelSmart program, overseeing infrastructure development and other sustainable transport activities.

This position already exists on a part time basis. It is suggested that the position be made full time and duties maintained pretty much as is. With the addition of other roles, the Sustainable Transport Officer can focus specifically on sustainable transport; currently he is involved in green purchasing and other general environmental projects.

Environmental Officer (Fulltime)

Responsible for implementing the WasteWise program, coordinating recycling and the GOP, liaising with regard to green purchasing, conducting waste audits and other related activities

Most of these duties are currently spread very thin over 1 casual staff member with excess tasks being taken up by the Sustainable Transport Officer. This position should be expanded to a fulltime, permanent staff member.

Environmental Resource and Research Officer (Fulltime)

Responsible for managing and writing grant applications, applying for environmental awards, liaising with students and researching for larger projects as directed by other staff.

⁷ La Trobe University, Buildings and Grounds Division, 2006. Discussion Paper: "Committee Structures- Buildings and Grounds Division".

Energy and Water Manager (Fulltime)

Responsible for monitoring energy and water usage and implementing changes to make the University more efficient in these areas.

This position already exists in the Buildings and Grounds Division under the title of 'Manager for Mechanical Projects and Energy Management'. The position should come under the EMS or at least sit on the relevant environmental committees.

Biodiversity

All biodiversity and ecological work is currently undertaken by the Melbourne Wildlife Sanctuary and Landscaping staff. It is suggested these staff be involved on the relevant environmental committees and the EMS decision-making processes.

Other necessary duties of an EMS

Other responsibilities that would need to be conducted by an EMS include:

- Environmental risk assessment (identifying risks associated with non-compliance against environmental legislation and activities of potential environmental harm⁸); and
- ESD building compliance.

Environmental Committees

A number of committees are necessary to ensuring best environmental practice.

Sustainable Resource Management Committee

This recently set-up committee is currently overseeing the writing of an environmental policy. It is suggested that, in addition to the development of policy, this committee formulate the structure, layout, budget and establishment of the management plan and EMS. Once a formal EMS is established and operational, this committee should expand to additionally include representatives from:

- EMS;
- Occupational Health and Safety;
- Procurements and Business Services;
- Student Accommodation;
- all major academic units; and
- major student bodies.

The aim of the committee would be to set the agenda/goals for the EMS (i.e. implementing the management plan), receive feedback on issues of sustainability from the University community and advise the Vice-Chancellor on environmental matters.

Waste Wise Committee

Directed by the Environment Officer, this committee currently meets bi-monthly with the aim of gaining and maintaining Waste Wise accreditation.

Greenhouse Challenge Committee

This committee would set and oversee the achievement of specific greenhouse gas emission reduction goals, toward fulfilling the University's commitment to the Greenhouse Challenge Plus.

⁸ Carpenter D and Meehan B.

7. Conclusion

La Trobe University has a fantastic opportunity to join the frontline in environmental sustainability among tertiary education institutions. A comparative audit of six Australian universities shows that while the University excels in some areas of environmental activity, the overall management of environmental sustainability is greatly hampered by the lack of a binding environmental policy and an EMP, and a lack of financial and human resources (in the form of an EMS) to action such documents.

This report calls on the University to recognise the need to meet the benchmarks and best practice standards set by other Australian universities. In a global environment increasingly conscious of the need to ensure our environment is protected and preserved for future generations, the time has never been better for La Trobe to become a recognised leader in environmental sustainability. The benefits of this will reverberate in financial gains, reputation, recruitment of staff and students and provide ample opportunity for the development of education and research.

8. Appendix 1 – Sources

Websites:

ANU: <http://www.anu.edu.au/facilities/anugreen/index.html>

Monash: <http://www.adm.monash.edu.au/ohse/environment/>

ECU: <http://www.ecu.edu.au/fas/EcoECU/>

UB: http://www.ballarat.edu.au/vfed/business_services/sustainability/sustainability.shtml

Griffith: <http://www.gu.edu.au/ofm/sustainability/>

University contacts:

ANU: David Carpenter, Sustainability Office Manager

Monash: Belinda Towns, Sustainability Reporting Manager

ECU: Melanie Barter, Environmental Officer

UB: Anna Lohse, Sustainability Officer

Griffith: Nino Cragolini, Engineering Manager

Additional References

The following references were consulted but have not appeared elsewhere as footnotes.

University of Ballarat, Annual Report 2006, pp. 6-9

9. Appendix 2 – Comparison of Universities

Table 5.1: Environmental Policy and Management Plan

University	Policy	EMP	Committees	Reporting measures	Notes
ANU	YES, endorsed by VC	Reviewed every five years.	Environmental Management Planning Committee includes representatives from: <ul style="list-style-type: none"> • University executive (the VC); • University upper management; • Administrative staff; • Academic staff; and • Under- and post-graduate student bodies. 	Committee reports annually to the VC evaluations against EMP objectives.	<ul style="list-style-type: none"> • Policy addresses both best environmental practice in university operations and promotes teaching and research for sustainability. • Significant funding is allocated to following the EMP.
Monash	YES, endorsed by VC	Both a three year strategy and annual plans	Environmental Policy Committee includes representatives from: <ul style="list-style-type: none"> • Upper management; • University staff; and • Student bodies. Four environmental sub-committees: <ul style="list-style-type: none"> • Greenhouse Challenge Plus Committee • Waste Wise Committee • Green Purchasing Committee • Water Conservation Committee 	Committee reports directly to the VC four times each year.	<ul style="list-style-type: none"> • Policy extends to all Monash campuses and international activities. • Aims to meet benchmarks/requirements of relevant state, federal and international environmental legislation. • Sets meaningful objectives resulting in clear guidance for activities. • Incorporates principles of sustainability into all areas including teaching, research, consultancy and community engagement.
ECU	YES, endorsed by VC	Comprehensive in dealing with over a dozen areas of sustainability, clear objectives and a defined timeline.	Environmental Committee includes representatives from: <ul style="list-style-type: none"> • University executive (the VC); • University upper management; • Executive officer (Environment Officer) • Administrative staff; • Academic staff; and • Under- and post-graduate student bodies. 	Committee reports directly to the VC.	<ul style="list-style-type: none"> • Aims to meet commonwealth and state legislation. • Scope of the policy extends to contractors and visitors.

University	Policy	EMP	Committees	Reporting measures	Notes
UB	Drafted (to be endorsed by University Council in June 07)	To be completed upon endorsement of policy.	None	Annual sustainability reporting framework	<ul style="list-style-type: none"> • Policy recognises the important role of staff and students in driving sustainable change • incorporates sustainability into the planning and design of new buildings, operations, reporting, and culture • FOUR mutually-enforcing policies: <ul style="list-style-type: none"> ○ Education for Sustainability; ○ Sustainability Research; ○ Community Engagement for Sustainability; and ○ The overarching Sustainability Policy.
Griffith	Statement limited to Office of Facilities Management (OFM) operations	Limited to OFM operations	Environmental Management Committee includes representatives from: <ul style="list-style-type: none"> • OFM staff 	Bi-monthly environmental audits; section in annual OFM report	<ul style="list-style-type: none"> • Aims to meet commonwealth and state legislation; • Focus is on minimising risk associated with legislative non-compliance, not on strategic environmental sustainability advancements; • Good emphasis on education all OFM staff about legislation and requirements.
La Trobe	None	None	<ul style="list-style-type: none"> • Sustainable Resource Management Committee – currently drafting policy and EMP • Waste Wise Committee 	None	A new policy is currently being drafted. The old, redundant policy had no firm and measurable objectives nor any EMP to action it.

Table 5.2: Environmental Management Section

University	EMS	Organisational Structure	Staff	Roles	Notes
ANU	YES	Part of the Facilities & Services Division	8-9 EFT	<ul style="list-style-type: none"> • Sustainability Office Manager • Energy and Water Conservation Manager (includes Ecologically Sustainable Design (ESD) and buildings) • Recycling and Cleaning Manager • Assistant to Recycling Manager (computer recycling and furniture redistribution) • Environment Officer (includes Green Office and Sustainable Transport) • Environmental Risk Officer • Heritage Officer • Biodiversity Projects Manager • Green Steps Coordinator (self-funded) • Interns (2-3 students) 	ANUgreen staff meet quarterly as part of the Environmental Management Planning Committee, which plans and directs the implementation of ANU's environmental policy. ANU contributes approximately \$1.2 million p.a. towards ANUgreen, which includes both wages and the funding of environmental projects. This amount is not inclusive of money spent on academic research into sustainability.
Monash	YES	Part of OHS&E (Occupational Health, Safety and the Environment); regular liaison with Facilities and Services and the Monash Environment Institute	7 EFT	<ul style="list-style-type: none"> • Environmental Advisor - Recycling, Green Purchasing, Environmental Officer Training • Environmental Advisor - Water, Energy, Trade and Hazardous Waste, Compliance • Environmental Advisor – Facilities and Services • Green Office Coordinator • Green Campus Coordinator • Waste Audit Coordinator • Triple Bottom Line Reporting • Environmental intern 	The Monash EMS is not fully encompassed under one department. The majority of staff are employed under the heading of OHS&E (Occupational Health, Safety and the Environment) though they do liaise with staff from Facilities and Services and the Monash Environment Institute (MEI) research centre. Duties and projects are assigned amongst these positions by a series of committees, particularly the Environment Policy Committee, which oversees the implementation of the environment policy objectives.
ECU	YES	Part of the Facilities and Service Centre	1 EFT	Environment Officer	The Environment Officer works closely with the Environment Committee who determine the direction of initiatives is accordance with the environmental policy.
UB	YES	Sustainability Office is part of the National Centre for Sustainability, and the position reports directly to the Vice Chancellor's Office	1 EFT	Sustainability Officer works closely with student volunteers and staff from the National Centre for Sustainability.	The Sustainability Officer deals with all recycling, water and energy conservation, etc. As a small university with fewer staff, it can be quicker and often less complicated to initiate change, and initiatives need not be on a large scale to have a lasting effect. Funding for projects is provided by individual schools or comes from grants. Including wages and projects funded through schools, the University roughly spends up to \$110,000 p.a. and is awarded approximately \$70,000 p.a. in grants.

University	EMS	Organisational Structure	Staff	Roles	Notes
Griffith	None		Currently no staff are employed specifically for environmental management.	3 staff from the Engineering Services Department take on environmental tasks as side projects to their regular duties, which mainly include administration and the continuation of existing initiatives, e.g. that waterless urinals continue to be included in all development and retrofitting. Their main focus is currently on water and energy conservation.	In the past, Griffith employed one full time staff member, whose main focus was the promotion and enforcement of sustainable design guidelines, as well as co-ordinating the GOP. The University is yet to employ a replacement and it is unclear whether this will happen in the future. The GOP is at a standstill though it is possible that the Griffith Eco-centre may take on the responsibility of maintaining this project. Due to the lack of staffing, it is clear that the University does not allocate a large amount of money to environmental initiatives.
La Trobe	None	A few staff under the Buildings and Grounds Division	1 full time 2 part time/casual (this does not include Wildlife Sanctuary staff)	<ul style="list-style-type: none"> • Manager – Mechanical Projects and Energy Management • Sustainable Transport Officer • Environmental Waste Management 	'EnviroSMART' staff report to the Deputy Director (Operations). They are not guided by any environmental policy nor management plan, but primarily work in accordance with state government program (Waste Wise and TravelSmart). The University commits about \$80,000 per year plus more money for appropriate infrastructure. About \$30,000 per year is obtained in grants.

Table 5.3: Water Strategies

University	Water Quality Preservation	Water Reduction	Water Recycling	Notes
ANU	<ul style="list-style-type: none"> • Warning labels on drains to prevent contamination of creek water. • Stormwater sediment traps⁹ are located in some areas. 	<ul style="list-style-type: none"> • Water-saving showerheads, flow reduction valves and waterless urinals • Vacuum pumps, reverse osmosis machines and dedicated process cooling. • Reduced garden watering during water restrictions • Drought tolerant landscaping. 	<ul style="list-style-type: none"> • Recycled water is used on 2 ovals • Observatory waste water is used on its gardens. 	ANU's water practices include all three components of best practice, though the main focus is on water reduction. This priority has resulted in placing ANU as a leader in the area of water. This is most likely attributable to the presence of a full time Energy and Water Conservation Manager. ANU's main water reduction strategy is the utilisation of water-minimising equipment, although most of these devices have a limited distribution across campus.
Monash	<p>The Cooperative Research Centre for Catchment Hydrology (also referred to as the Water Studies Centre) runs research programs associated with the four following themes:</p> <ul style="list-style-type: none"> • Catchment and Salt Balance • Waterway Management and Erosion Control • Urban Hydrology • Flood Hydrology 		Grey water collected from car park run-off and swimming pool back-wash is used for watering sports fields and flushing toilets.	Most of Monash's water initiatives fall under the umbrella of research conducted at the Water Studies Centre, which has been running since 1992. Monash also has a designated Water Conservation Committee which oversees water reducing and recycling initiatives.
ECU		<ul style="list-style-type: none"> • Water saving showerheads in Student Villages. • Waterless urinals are to be extended throughout most of the University in 2007. • Low water consumption vegetation at 2 campuses. 	A grant funded program to recycle water from cooling towers for watering gardens is currently being implemented.	At present, most water initiatives at ECU are in the early stages of progression, and it appears that ECU will continue to extend the reach of these current initiatives before introducing any new ones.

⁹ For definitions of words in bold, see Appendix 4.

University	Water Quality Preservation	Water Reduction	Water Recycling	Notes
UB		<ul style="list-style-type: none"> • Aqua Locks installed in showers and taps across all campuses. • Waterless urinals and sensor taps being trialled in low use areas. • Air conditioners are being progressively upgraded to closed units systems. • A WaterWise program will be implemented in 2007 to target staff water-use behaviours. 	Rainwater collection tanks at student residences for toilets and gardens.	Due to a recently awarded Community water grant, UB plans to extend its water conservation initiatives in 2007.
Griffith		<ul style="list-style-type: none"> • The Griffith landscape consists mainly of indigenous, drought tolerant species. • Rain sensors and timers reduce the watering of sports fields. • Annual water-efficiency management plans are prepared for the Nathan campus. 	<ul style="list-style-type: none"> • Rainwater collection tanks used for toilets (more so at the Gold Coast campus) 	Griffith's commitment to water conservation appears to be the strongest of its environmental activities. As well as employing strategies such as water-saving appliances and landscaping, Griffith has water-specific design guidelines and an annual water management plan. Griffith also contributes towards water research through the Australian Rivers Institute.
La Trobe		The La Trobe landscape consists mainly of indigenous, drought-tolerant plants, with the exception of some ornamental landscaping in the main campus centre.	<ul style="list-style-type: none"> • All water used on gardens comes from rain water tanks and the moat system • Flow restrictors for bathrooms have been installed in some areas of the University, mostly the Colleges¹⁰. • La Trobe's biochemistry department uses reverse osmosis water filters, and for extra pure water Milli-Q systems are used. 	La Trobe was recognised by Yarra Valley Water in 2002 for cutting its water use by 20% over a two year period, and again in 2004 for completing its water management plan. The University's annual water consumption is monitored, which represents La Trobe's commitment to reducing its impact on water supplies. La Trobe's major water initiative is the recycling of rain water, though some water minimisation strategies are in place. La Trobe's Albury-Wodonga and Mildura campuses have a partnership with Murray-Darling Freshwater Research Centre.

¹⁰This can not be extended to the whole campus as the University's fire hoses are hooked up to the same water mains.

Table 5.4: Energy and Greenhouse

University	Building Design	Behaviour Change	Other Reduction Strategies	Notes
ANU	<ul style="list-style-type: none"> ESD standards apply to all planning and construction work, encompassing: building fabric, insulation, windows (glazing and frames), external doors, lighting (intensity and control), heating, ventilation, air-conditioning, hot water, pipe work & duct work, operation & maintenance manuals, water, materials & waste, finishes and transport. 	<ul style="list-style-type: none"> Staff energy-use was targeted as part of the Green Office Program (GOP). 		ANU's energy strategies are focused on reducing energy-use through the enforcement of fixed-design guidelines. These restrict all new developments and retrofits of any kind to ESD standards.
Monash		<ul style="list-style-type: none"> Staff energy use targeted in the Monash GOP. The Green Campus co-ordinator targets student energy use. 	<ul style="list-style-type: none"> Monash has purchased 10% renewable energy for all campuses for the past three years. 	As a signatory to the Greenhouse Challenge Plus program, all Monash campuses have a target energy decrease by 20% to be reached by 2010. This target has been officially endorsed by the Vice Chancellor, and will be put into practice through an Energy Management Plan.
ECU	<ul style="list-style-type: none"> Building design standards utilise natural lighting. 	<ul style="list-style-type: none"> Policy: Computers to be switched off overnight. 	<ul style="list-style-type: none"> Movement sensors and dimming system used for office lights T5 lighting in most buildings 3% of power is purchased through Western Power's Earth Friendly initiative (Offset scheme). 	ECU focuses on three energy saving strategies: utilisation of natural sunlight and energy-efficient devices; a renewable energy offset scheme; and the targeting of staff behaviour. Though many of the initiatives introduced as part of these strategies are not as comprehensive as they could be (T5 lighting not in all buildings, only 3% of ECU's energy is covered by the offset scheme), ECU's intention is established, and since the initiatives have been implemented, it will not be hard to expand them.
UB	<ul style="list-style-type: none"> Progressive upgrade to energy efficient gas boilers; All lighting is being upgraded to T5 bulbs. 	<ul style="list-style-type: none"> The GOP is undertaking a Switch Off behavioural change program. 	<ul style="list-style-type: none"> Students are piloting a carbon neutral project. Entropy carpet on library floors. Energy use is monitored. New student residences have been built with a solar design, compact fluorescent lighting, hydronic heating and movable shades on windows. 	UB actively monitors its energy use, and plans to introduce a reductions target during 2007. The University aims to meet these reductions through a combination of energy efficient technology and 'Switch it Off' behavioural change activities. It is likely that all new developments will be consistent with the University's plan to gradually implement T5 lighting and energy efficient gas boilers throughout the campus.

University	Building Design	Behaviour Change	Other Reduction Strategies	Notes
Griffith	<ul style="list-style-type: none"> • Digital lighting controls; • Cold water only in bathrooms; • 5 star energy efficient fridges; • Sensor detection software for heating/cooling in lecture theatres; • Low or no VOC (volatile organic compound) paints, adhesives and carpets. • Griffith's Eco Centre was designed to maximise natural lighting and ventilation, and is powered by solar energy. It has energy efficient light bulbs and rammed earth walls stabilise the temperature. 	<ul style="list-style-type: none"> • Energy use was targeted through the GOP (now defunct). 	<ul style="list-style-type: none"> • Light switches correspond to groups of lights so groups can be turned off whilst not in use. • Air conditioning is sourced from central chiller plants. 	<p>Between 2004 and 2005 Griffiths energy use per m² declined by 7.5 KWh. During this period many long-standing design guidelines were introduced that are still maintained. Though energy was targeted in the GOP program, it now relies on the staff to uphold their own energy saving behaviours, as no one is currently maintaining the GOP.</p>
La Trobe	<ul style="list-style-type: none"> • Air conditioning runs on an economy cycle in 5 University buildings. • The Bundoora campus is partway through a T5 lighting upgrade. 		<ul style="list-style-type: none"> • Roughly 70-80% of the University's electricity and much of the hot water is supplied by the cogeneration plant. • A retrofit in 2004 installed motion sensors and energy efficient air conditioning/heating in the Hooper and Szental lecture theatres. 	<p>Sustainable energy-use is not currently covered by La Trobe's EnviroSMART team. As part of the Buildings and Grounds Department, the Manager for Mechanical Projects and Energy Management introduces energy-saving technology to new and retrofitted buildings. Not all are binding design guidelines, and the extension and implementation of such would add to La Trobe's energy and greenhouse savings.</p>

Table 5.5: Waste, Recycling and Purchasing

University	Waste Reduction and Reuse	Recycling	Green Purchasing	Notes
ANU	<ul style="list-style-type: none"> ANU redistributes unwanted computers, furniture and organic waste as compost and firewood. Ex-college resident furniture is redistributed. Waste reduction was covered as part of GOP. 	<ul style="list-style-type: none"> ANU recycles an extensive range of material including paper, commingled waste, IT equipment, Styrofoam and demolition/construction waste. An organics recycling trial, anticipating a 5 tonne per week processing rate, to be introduced later in 2007. Commingled recycling stations are located in 30 outdoor areas around the Acton campus, as well as in some buildings. Separate theme in GOP. 	Targeted by GOP.	ANU's commitment to the combination of waste reduction and recycling is summarised by their declaration of being waste free by 2010. Already they are considered leaders in the waste field due to their extensive reuse strategies and their facilities for recycling more than just the typical paper and commingled items. The extent of ANU's recycling success is probably attributable to the resources allocated to this field. In addition to a full-time Recycling and Cleaning Manager, ANU also hires a part-time assistant to this role.
Monash	<ul style="list-style-type: none"> Monash bin liner policy: reduction from 110,000 in 2003 to next to none; 'Bin there, done that' campaign (GOP): staff volunteer to give up waste bins 2005 Clayton campaign: 5000 eco cups handed out. 20c discount at coffee shops for supplying own mug. 	<ul style="list-style-type: none"> Recycling services offered at Monash include: paper, commingled, ink cartridges, polystyrene, e-waste, batteries, and mobile phones. 	<ul style="list-style-type: none"> Over 70% of paper purchased in 2006 had at least 50% recycled content. All Monash libraries now use exclusively recycled paper. 	Monash's environmental waste programs are predominantly focused on reducing the amount of virgin products used. As well as offering facilities for the recycling of an exceptional range of materials, Monash actively purchases paper with recycled content, has cut down their plastic bin liner use to near nothing and also focuses on reducing staff discard behaviours through the GOP. Monash's commitment to sustainable waste strategies is formalised through their commitment to Waste Wise. A member since 2001, the University successfully maintained its programs and was recertified in 2004. The regular meeting of the Waste Wise Committee, consisting of both staff and students, contributed to this success. Monash employs teams of trained waste auditors (students) who are also hired out to other universities and TAFEs
ECU	<ul style="list-style-type: none"> "Less waste" Mini-bin campaign currently expanding. Cafes offer a 10% discount when staff/students supply their own mug. 	<ul style="list-style-type: none"> ECU recycles: paper, commingled, toner/printer cartridges, mobile phones and batteries. Commingled bins are located in staff rooms and kitchens, as well as around cafeterias at the metropolitan campuses and at student houses. 	A new recycled paper policy has resulted in 95% of all paper purchases being of post consumer origin.	In 2006, the amount of paper going into landfill was half of that of the previous year. This signifies the degree to which ECU have targeted the wasting behaviour of its staff through the GOP. Policy now dictates that all paper purchased should be recycled paper. ECU's waste programs combine a successful balance of behavioural change and management endorsed policies, which has thus led to the 50% reduction of paper going to landfill mentioned above.
UB	<ul style="list-style-type: none"> Floors in the prayer room and 	<ul style="list-style-type: none"> UB recycles paper, commingled 		Last year, through grant funding, the National Centre for Sustainability established a successful waste

University	Waste Reduction and Reuse	Recycling	Green Purchasing	Notes
	new gym are made of recycled tyres.	<p>and printer/toner cartridges.</p> <ul style="list-style-type: none"> 2 out of UB's 3 campuses have commingled bins both in office areas and in outside areas. The other campus has only outdoor commingled facilities. Library has Bokashi compost buckets. The Plumbing department recycles copper, lead, brass, steel and plastics. The recycling is done on site by students. 		management program. UB's waste strategies consist of focusing on recycling a range of materials outside the standard paper and commingled, as well as recycling and purchasing themes in the GOP. UB have formalised their commitment through Waste Wise and have their waste output monitored regularly by the National Centre for Sustainability to maintain their recycling success.
Griffith	<ul style="list-style-type: none"> The "Great Paper Chase" competition (04-05) resulted in a 31% reduction in paper use¹¹. "Give Your Bin the Butt" in one department only; 80 % of staff gave up their bins. 	<ul style="list-style-type: none"> GU recycles: paper, commingled, mobile phones and toner cartridges. Commingled bins are only located in public places. Griffith's Eco Centre composts sewerage and organic waste. 	It is recommended that staff follow a green guide for purchasing.	Griffith's main approach to waste management is through a strong focus on staff behaviour. A variety of campaigns have been introduced in previous years to encourage staff to think about their waste and to demonstrate the associated advantages of reducing their waste. These kinds of schemes such as "The Great Paper Chase" and "Give Your Bin the Butt" are consolidated through the GOP (currently at a standstill). This is complemented by a few small scale initiatives mentioned below, which while positive, do not have much impact for the future of the University's waste output.
La Trobe	<ul style="list-style-type: none"> Obsolete university furniture is sent to the maintenance department to be fixed/rebuilt and is then given away to staff and students. 	<ul style="list-style-type: none"> LTU recycles: paper, commingled and toner cartridges. Commingled recycling bins will spread to all office kitchens and communal areas with the implementation of the recycling program this year. The Maintenance department has collection areas for recycling oil, scrap metal and batteries. GOP currently targets recycling 	Investigations with Purchasing about IT recycling options and the reduction of recycled paper prices.	La Trobe is currently working towards stage one of Waste Wise accreditation. As part of this it has developed a waste management plan, and is in the process of implementing a new University wide recycling program which also encourages green purchasing (to be part of a more encompassing GOP). Facilities are in place for recycling of many materials, though not as comprehensive as some of the leading universities in this field. The minimal staffing in this area of the University means that it is unlikely that any further initiatives will be added to those listed here.

¹¹ This also resulted in a saving of \$700 which was invested in a social fund.

Table 5.6: Green Office Program

University	Approach	Themes Covered	Resources	Notes
ANU	<ul style="list-style-type: none"> • Green Office 'Champions' are recruited from each area to attend these workshops • Workshops are run monthly/bimonthly and each deals with a specific theme. 	<ul style="list-style-type: none"> • Energy conservation • Creating a green office culture. • Paper Reduction • Recycling 	<ul style="list-style-type: none"> • Posters • Schedules • Stickers • Workshop PowerPoint slides • Worksheets • 11 point plan 	<p>The program does not appear to be university-wide, currently encompassing 23 departments. However, the GOP is currently being reviewed and is being replaced by a new program called "Sustainability at Work". Its basis is similar to the GOP but aims to encompass more departments and promote sustainability more effectively.</p>
Monash	<ul style="list-style-type: none"> • University-wide (all campuses) • 250 representatives (sometimes more than one from each area) attend training modules. • The main aim of the program is to encourage staff involvement and promote culture change. 	<ul style="list-style-type: none"> • Energy • Paper reduction • Food • Recycling • Foundation of the GOP is a 10 point plan. 	<ul style="list-style-type: none"> • Assessment toolkit (assesses relative issue per department) • Staff survey • Tools/guides for assisting reps in implementing procedures • Guides for recycling, food, waste and fair trade • Stickers • Posters • Signage • TravelSmart guides. 	
ECU	<ul style="list-style-type: none"> • Aim: raise staff awareness, promote sustainable alternatives and reduce environmental impact. • Monthly activities are planned for Reps (Sometimes more than one in each area). • Activities vary and include: training/ information sessions, forums and solutions workshops. • GOP used to roll out individual campaigns such as "Give Your Bin the Butt". 	<p>The structure of the ECU GOP will undergo change in 2007 to include specific themes.</p>		
UB	<ul style="list-style-type: none"> • Aim: Staff behaviour change complemented by upgrading of facilities. • Green Champions are recruited to implement in their department. 	<ul style="list-style-type: none"> • Recycling (main focus) • Energy • Green purchasing 	<ul style="list-style-type: none"> • Posters • Fact files • Audit guides • Champion handbook. 	

University	Approach	Themes Covered	Resources	Notes
Griffith	<ul style="list-style-type: none"> • Aims: initiate culture change, reduce environmental impact and therefore save money. • Green Office Reps are provided with one initial full day of training followed by quarterly seminars/events/luncheons 	<ul style="list-style-type: none"> • Waste and recycling • Energy conservation • Greenhouse reduction • Water conservation • Staff awareness. 	<ul style="list-style-type: none"> • Introductory guide • Green purchasing guides • Information toolkits • Images • Information about incentive programs. 	Due to the lack of staffing this program is static and it is unsure which department will take over the continuation of the program. In the meantime, Reps can access resources on the web.
La Trobe	<ul style="list-style-type: none"> • Aim: changing staff behaviour • Reps are recruited from about 2/3 of the University (some areas with multiple reps), • Initial training workshop, and email forum for exchanging ideas. 	<ul style="list-style-type: none"> • Currently only recycling with some emphasis on green purchasing. • Aims to target other themes in the future, subject to funding. 	<ul style="list-style-type: none"> • Posters • Tips • Fact files • Problem solving resources • Green purchasing guide. 	La Trobe's GOP was kick-started late last year with the WasteWise office recycling program and the QIG. There is no ongoing funding to support further campaigns through the GOP.

Table 5.7: Biodiversity and Ecology

University	Wildlife	Landscape	Pest and Weed Management	Notes
ANU	<p>“Life in the Suburbs” Project:</p> <ul style="list-style-type: none"> • Construction of a feature out of rocks, logs and plants that allowed water to slowly infiltrate the soil. • Encourages native wildlife such as the whistling tree frog to re-enter the area. • Aim was to publish survey results, encourage community involvement and realise guidelines for biodiversity in the ACT. 	<ul style="list-style-type: none"> • ANU landscape consists of 10,000 trees. 		<p>An ecological survey was conducted of an urban area around a creek site. A Biodiversity Management Plan, is currently being drafted. The survey results were used to initiate a set of Urban Habitat Guidelines that now apply to the entire ACT. ANU has also recently initiated a partnership with other ACT organisations as part of a “Life in the Suburbs” biodiversity project. ANU’s commitment and subsequent initiatives are one of the most impressive and they definitely have the most promise for future biodiversity projects</p>
ECU	<ul style="list-style-type: none"> • An Environmental Management Plan is active at one campus. • Fauna management plan currently in development. 	<ul style="list-style-type: none"> • The Southwest campus landscape is predominantly made up of native vegetation (jarrah, tuart, banksia). • Another campus has low consumption vegetation. 	<ul style="list-style-type: none"> • Integrated Pest Management practices are used when possible. • Low toxicity, target specific herbicides used wherever possible at all campuses. 	<p>ECU has a very developed commitment to biodiversity. The Bunbury campus has both vegetation and fauna management plans. As well as targeting the protection of indigenous flora and fauna, ECU is also committed to low impact pest management and herbicide strategies. Whilst ANU’s policies and commitments are a lot stronger, ECU’s policies are more varied and take more facets of ecology into account.</p>
Griffith	<ul style="list-style-type: none"> • Aquatic biodiversity is researched through the Australian Rivers Institute. • 	<ul style="list-style-type: none"> • Trees and shrubs are indigenous. • Griffith’s Eco centre is built in a curving plan to minimise tree destruction and erosion. • Fuel reduction burning is practised sporadically 	<ul style="list-style-type: none"> • Pests are baited rather than poisoned • Mulching is the primary form of weed prevention 	<p>Griffith approaches biodiversity from three directions: active feral animal removal and native animal relocation; aquatic biodiversity which is researched through the Australian Rivers Institute and education programs; and environmentally-responsible landscaping and development. These three approaches result in an ongoing management of these practices rather than successive campaigns. Instead of focusing large amounts of resources on rehabilitation projects, Griffith maintains a consistent level of biodiversity.</p>

University	Wildlife	Landscape	Pest and Weed Management	Notes
La Trobe	Melbourne Wildlife sanctuary accommodates over 20 native faunal species and several species of birds.	Wildlife reserves: <ul style="list-style-type: none"> • Staff manage around 120ha of reserve land, which is home to of thousands of species of native plants. • Volunteers are responsible for the growing of plants in the Keelbundoora Nursery, as well as the manufacture of species specific nesting boxes which are used in the sanctuary and sold all over Australia. Landscape: <ul style="list-style-type: none"> • Outer Ring Rd flora is completely indigenous • Inner Ring Rd combines indigenous with ornamental plants 	<ul style="list-style-type: none"> • Low toxicity weedicide is used but the main weed prevention strategy is mulching. 	La Trobe, mainly through the Melbourne Wildlife Sanctuary, is committed to restoring the landscape back to its pre-colonial, pre-farmland state. This commitment is mirrored through the activities of the landscaping department, which also take ecological issues into account. Most of La Trobe's biodiversity strategies focus around plant life rather than animals. The reason behind this is a lack of funding which has resulted in an incomplete predator-proof fence around the Sanctuary. When this fence is completed, the Melbourne Wildlife Sanctuary will introduce a greater array of native and endangered species.

Table 5.8: Sustainable Transport

University	Walking and Cycling	Public Transport	Carpool and Car Fleet	Notes
ANU	<ul style="list-style-type: none"> Bicycle Cooperative runs an on-campus bike workshop Timely Treadlies program is a corporate bike fleet of 34 bikes, used by staff to commute around the university and into Canberra city centre. Regular free breakfasts for cyclists. Website with tips and information and cyclists e-mail forum. 	<ul style="list-style-type: none"> Website with tips and information. 	<p>An LPG trial was conducted but did not come to fruition as the resell value for LPG vehicles is low.</p>	<p>ANU has formal commitments with both Greenfleet and the Greenhouse Challenge Plus Program. Most of ANU's initiatives for the Greenhouse Challenge however, are focused on energy conservation rather than sustainable transport. ANU publicises sustainable transport on its website, including tips and resources for cycling, walking, carpooling and public transport. Outside the website, ANU has few active initiatives.</p>
Monash	<ul style="list-style-type: none"> Comprehensive website with information and tips. Regular lobbying for improvement in cycling access. 	<ul style="list-style-type: none"> Comprehensive website with information and tips. Regular lobbying for improvement in public transport. 	<ul style="list-style-type: none"> The carpool program has 2500 members. 300 priority spaces and free parking as incentives. Contributes to Greenfleet 	<p>Monash has been a member of Greenfleet since 2002, and was the first Australian university to contribute to the program for air travel as well as its car fleet. Apart from this and the carpool program, most of the university's programs are run by the Monash Student Association (MSA), which was scaled back dramatically in 2007 due to VSU. As such, many of the initiatives here are not continuing. Monash has the best incentives for carpooling and is part of the TravelSmart program.</p>
ECU	<ul style="list-style-type: none"> Lockers, showers, change-rooms, bike rails and walking guides available. New cycling club incentives: discounts at cycling and coffee shops. TravelSmart stands and the website promote sustainable travel. 	<ul style="list-style-type: none"> At one ECU campus a shuttle bus runs direct to/from the city. 35-40% of students from two campuses take public transport. 	<ul style="list-style-type: none"> Web-based carpool matching service; no incentives. 	<p>ECU works in conjunction with TravelSmart to encourage use of sustainable transport. ECU has an extensive Integrated Travel Plan which emphasises non-single occupant vehicle methods of travel to ECU campuses. Recently, the particular focus has been on promoting public transport, and the introduction of a carpool program. ECU also offers adequate facilities and incentives for walking and cycling.</p>
UB	<ul style="list-style-type: none"> Free cycling maps available Bicycle Users Group has 50 members. 	<p>Public Transport information is available online</p>		<p>UB has not participated in very many sustainable transport initiatives in the past, though information is provided for staff and students interested in it. UB have only recently formed a partnership with TravelSmart, through which they intend to pilot a series of sustainable transport initiatives in 2007.</p>

University	Walking and Cycling	Public Transport	Carpool and Car Fleet	Notes
Griffith	<ul style="list-style-type: none"> • 10% discount for staff and students at local cycling shops, • Maps and tips readily available 	<ul style="list-style-type: none"> • Buses equipped with bike racks, • Staff and students encouraged to take PT between campuses • Bus commuter group- small bunch of staff commute together. 	<ul style="list-style-type: none"> • Special carpool bays open between 8am and 10am. • Car fleet is encouraged to follow the Green Vehicle Guide • Powered by Trees Initiative- April 05- 1000 local indigenous trees were planted at Logan campus to offset emissions of the OFM fleet of 30 vehicles- an extra 400 trees were planted to combat future emissions. 	<p>Griffith is one of the few universities to target a wide range of travel options. Walking, cycling and public transport are all promoted and offered with incentives. A program similar to Greenfleet is run by the University (on-campus planting of trees clearly promotes the message of greenhouse savings to staff and students). Griffith also goes further than just an offset scheme by actively purchasing vehicles with a lessened environmental impact.</p>
La Trobe	<ul style="list-style-type: none"> • Infrastructure improvements: storage (lockers and racks) for 400 bikes, asphaltting of bike paths, installation of way-finding signs, etc. are all ongoing. • 35,000 TravelSmart maps are distributed annually to staff and students, potential students, conference delegates, etc. • Annual participation in Ride to Work Day and has instigated a new Ride to Uni Day • Writing a ten-year cycling strategy 	<ul style="list-style-type: none"> • Currently negotiating with the Department of Infrastructure to improve local public transport 	<ul style="list-style-type: none"> • The Carpool Service has 5500 members and 67 priority car spaces are offered in three car-parks. • A new staff carpool service has been launched. • Contributes to Greenfleet 	<p>La Trobe has the most extensive and successful sustainable transport programs of the universities in this study. This most likely attributable to the presence of a fulltime Sustainable Transport Officer. Most of La Trobe's initiatives are funded by a TravelSmart grant program, though the University itself does contribute to Greenfleet.</p> <ul style="list-style-type: none"> • 11% of enrolling students in 2005 were prompted to use sustainable transport through the TravelSmart education program. • Ongoing assessment and improvement of sustainable transport initiatives through the TravelSmart program.

Table 5.9: Education and Awareness

University	Education and Training	Promotions and Campaigns	Research	Notes
ANU	<ul style="list-style-type: none"> • Green Steps program for students includes training, an initial project at the ANU, and a placement with a government or industry partner • Paid internships are offered for students both in Australia as part of ANUgreen and as exchange positions in the US. 	<ul style="list-style-type: none"> • Notice boards • Environment achievement awards • Annual “greenness” reports with statistics • Comprehensive website 	<ul style="list-style-type: none"> • ANUIE encourages students to undertake research into environmental improvement 	<p>Two strategies are employed by ANU in this field. The ANUIE (ANU Institute for the Environment) instigates research into sustainability as well as running training programs for students such as ‘Green Steps’. Additionally, ANUgreen promotes and encourages sustainability through noticeboards and achievement awards.</p>
Monash	<ul style="list-style-type: none"> • Green Steps Program to train students in environmental change management. • ‘Sustainability in Teaching’ Working Group 	<ul style="list-style-type: none"> • TravelSmart • Comprehensive website 	<p>The Monash Sustainability Institute (MSI) promotes and facilitates research in the areas of:</p> <ul style="list-style-type: none"> • Water • Energy • Climate • Transport • Biodiversity/ecology 	<p>The MSI covers the majority of initiatives in this theme. Similarly to the ANUIE, the MSI incorporates research under sustainable themes with training programs for students interested in sustainability. Monash initiated the ‘Green Steps’ program which has since been taken up by 14 universities around Australia. The program was one of only three finalists nationwide for outstanding performance in the category Sustainability Education at the 2006 Eureka Awards in Sydney.</p>
ECU	<ul style="list-style-type: none"> • EcoECU works with academic departments to incorporate environmental concerns into student projects, courses etc. • Students are recruited for work experience 	<ul style="list-style-type: none"> • Campaigns have included TravelSmart and recycling. The next one will be biodiversity in 2007. • 400 subscribers to EcoECU magazine • Regular articles in the university-wide newsletter, Inside ECU. • Comprehensive website 		<p>ECU incorporates a meaningful mix of education and awareness strategies. Students are educated of environmental issues in their course, and have opportunities for work experience. ECU also encourages and promotes sustainability through a variety of campaigns and publications. Unlike Monash and ANU, ECU does not have a research institute, instead integrating sustainability into course curricula.</p>
UB	<p>UB offers a Diploma of Sustainability and the Graduate Certificate in Sustainability.</p>	<ul style="list-style-type: none"> • Newsletters are published quarterly. • Public sustainability lectures • Email reminders are distributed to all staff. • Fortnightly Sustainability Segment on ABC regional radio. • Comprehensive website 		<p>UB focuses primarily on the promotion of awareness, and all education concerns are covered by the postgraduate courses available. Awareness is not just directed at staff and students (though the focus is on staff) but the local community is also sometimes involved.</p>

University	Education and Training	Promotions and Campaigns	Research	Notes
Griffith	<ul style="list-style-type: none"> • The EcoCentre runs educational programs and provides information for school assignments and projects. 	<ul style="list-style-type: none"> • Participated in Environmental Awareness Week in 2005. This involved various events, activities and giveaways. • Comprehensive website 		As most of Griffith's initiatives in this field are managed by the Eco-centre, they were not as affected as other programs with the departure of the university's Environment Officer. The Eco-centre provides a continual source of educational material for staff, students and the community.
La Trobe	<ul style="list-style-type: none"> • Albury/Wodonga Campus offers Environmental management courses. • The Melbourne Wildlife Sanctuary runs practical teaching programs for children and tours that educate about indigenous flora and fauna, and the importance of preserving them. 	<ul style="list-style-type: none"> • Regular sustainability articles in University publications • New comprehensive EnviroSMART and TravelSmart websites • TravelSmart 		La Trobe's approaches to education and awareness, do not, like many of the other universities, centre on sustainable research. Promotion of awareness to staff and students through newsletters, the web, the limited GOP and start-of-year programs form the main initiatives of this field.

Table 5.10: Ecologically Sustainable Design

University	Policy	Guidelines	Notes
ANU	Comprehensive Ecologically Sustainable Design — Planning And Construction Standards ¹²	<ul style="list-style-type: none"> • Building fabric • Insulation • Windows (glazing and frames) • External doors • Lighting (intensity and control) • Heating • Ventilation • Air-conditioning • Hot water • Pipe work & duct work • Operation & maintenance manuals • Water • Materials & waste • Transport. 	
Monash	An objective of Monash’s environment policy is to: “Incorporate environmental considerations into all new buildings and renovations of existing structures, aiming to maximise energy and water efficiency and the use of sustainable energy sources while minimising environmental impact through choice of building materials.”		Additionally, Monash’s Greenhouse Challenge Committee has developed an energy management plan which specifically approaches building design in its strategy.
ECU	ECU’s environment policy states: “The University will incorporate sustainability principles and life cycle costing in all decision making processes”. Guidelines are specified as part of the ECU environment management plan.	<ul style="list-style-type: none"> • Specific energy targets to be met by all new developments. 	Currently trailing waterless urinals
UB		<ul style="list-style-type: none"> • Closed unit air-conditioners • T5 lighting • Energy efficient gas boilers. 	New student residences have been built with a solar design, compact fluorescent lighting, hydronic heating and movable shades on windows (reduce heat gain by 70-80%).

¹² http://www.anu.edu.au/facilities/policies/esd_standards.html

University	Policy	Guidelines	Notes
Griffith	Sustainable features have been incorporated into design guidelines.	<ul style="list-style-type: none"> • Waterless urinals • Rainwater tanks • 6/3 Litre dual flush toilets • 4 star AKSO dishwashers • Timed taps • Embedded digital lighting controls • 5 star efficient fridges • Low or no VOC (volatile organic compounds) paints, adhesives and carpets. 	Griffith Eco-centre utilises solar energy and was built using rammed earth walls and non-toxic materials. It is designed to minimise noise/vibration and dust mitigation and was specifically built in a curve to minimise tree destruction and erosion.
La Trobe	Currently no ESD guidelines	<ul style="list-style-type: none"> • Economy cycle air conditioners • T5 lighting 	<ul style="list-style-type: none"> • The Hooper and Szental retrofit in 2004 saw the installation of motion sensors and energy efficient air-conditioning/heating.

10. Appendix 3 – Acronym and Definitions

Acronyms

QIG – Quality Initiatives Grant

GOP – Green Office Program

EMS – Environmental Management Section

EMP – Environmental Management Plan

TDM – Travel Demand Management

MWS – Melbourne Wildlife Sanctuary

Water:

Aqua Locks: Water flow restrictors used on both taps and showers.

Closed units systems (A/C): The closed unit systems used in ECU's Muller air-conditioners are low consumption, saving up to 95% of water used.¹³

Dedicated process cooling: Water cooling strategy used that minimises the use of mains water.

Desert Cubes: A waterless urinal system that uses cubes to break down urine instead of flushing. This system can reduce water consumption in a standard urinal bay by as much as 151,000 litres per year¹⁴.

Flow reduction valves: An attachment used on taps to restrict the amount of water used whilst the tap is on.

Milli-Q: A filtering instrument that pumps water through 5 stage filters to remove impurities¹⁵.

Reverse osmosis: Water is produced by (essentially) filtering tap water using the principles of osmosis. It's an incredibly cheap way of cleaning up tap water (it is what boats use out at sea to make the sea water drinkable!)¹⁶.

Sensor taps: These taps run only for a short time when hand motions are sensed and use less water.

Stormwater sediment traps: A pollution control device that removes litter and sediments from a water source¹⁷.

Vacuum pumps: As an alternative to water aspirators which use running water to create a vacuum. The purpose of the vacuum is to evaporate unwanted particles from chemicals. The vacuum pumps referred to here are operated by air instead of water, thus saving water¹⁸. ANU estimates that the replacement of water aspirators with 46 vacuum pumps will save 50,000 kilolitres of water and \$62,000 each year.

Water saving showerheads: An installation that restricts the amount of water used whilst showering.

¹³ See <http://www.mullerindustries.com.au/> for details (Date Accessed 13/4/07).

¹⁴ Desert Eco-Systems. "The Problem With Urinals" <http://www.desert.com.au/problem.htm> Date Accessed: 13/4/07

¹⁵ Swift, L. Pers comm. Via Email 19/3/07.

¹⁶ Ibid.

¹⁷ Free Patents Online, 2002. "Stormwater Sediment and Litter Trap", <http://www.freepatentsonline.com/6379541.html> Date Accessed: 13/4/07

¹⁸ Blom, D. "Early Cost-Analysis Shows Cost Savings of Pumps over Water Aspirators for Roto-Evaporation Procedures" <http://www.laboratoryequipment.com/ShowPR.aspx?PUBCODE=020&ACCT=2000000100&ISSUE=0611&RELTTYPE=ISE&PRODCODE=00000000&PRODLETT=AD&CommonCount=0> Date Accessed- 11/04/07.

Energy and Greenhouse:

Central chiller plants: Instead of multiple sources of energy for air conditioning, a central source is used for all air-conditioning.¹⁹

Co-generation: By burning natural gas, cogeneration creates energy and heats water.

Entropy carpet: reduces greenhouse emissions and is made up of tiles so only the worn out bits need replacing, not the whole carpet.

Hydronic heating: a natural gas or LPG fired boiler simply heating water, which is then circulated. It is a closed system, with radiators and natural convectors providing clean natural heat by radiation and natural convection. This technique eliminates dust and allergens being blown.²⁰

Solar: Renewable source of energy that harnesses sun rays.

Split air-conditioning: Split air-conditioners work on an economy cycle to recirculate the buildings' air and then introduce fresh air (whilst still complying with comfort standards). This technology is energy efficient, with a reduction of approximately 30% in energy use.

T5 lighting: T5 fluorescent tubes. These tubes are brighter, more efficient and have a longer lifetime than conventional fluorescent tubes.

Triphosphor: This term is virtually interchangeable with T5 lighting.

Waste:

Bokashi bucket: Compacts organic waste into reusable garden compost.

Commingled recycling: Includes plastic, glass and aluminium/steel cans²¹.

Biodiversity:

Fuel reduction burning: A bushfire prevention strategy. At Griffith this is done at different times of year each time so no plant species has advantage over another²².

Integrated Pest Management: A strategy that utilises knowledge about pest life cycles to lessen the frequency of pesticide use²³.

Mulching: The use of unwanted vegetation in 'mulched' form on gardens to prevent weeds.

Sustainable Transport:

Greenfleet: A greenhouse emission offset scheme where businesses contribute money per vehicle in their car fleet and Greenfleet plant a specific amount of trees per vehicle.

TravelSmart: A government grant-based initiative working with local government and private organisations to encourage a travel behaviour-shift away from single-occupancy vehicle use.

Travel Demand Management: 'A general term for strategies that result in more efficient use of transportation resources'²⁴

¹⁹ National Climate Change Committee, 2007. "District cooling". <http://www.neec.gov.sg/building/dcs.shtml>
Date Accessed: 13/4/07.

²⁰ Hurlcon, 2003. "What is Hydronic Heating?" <http://www.hurlcon.com.au/heat/what.html> Date Accessed- 13/4/07

²¹ Visy Recycling, 2007. <http://www.visy.com.au/recycling/index.php?id=152#>. Date accessed- 13/4/07

²² Griffith University. "Landscaping and Grounds" http://www.griffith.edu.au/cgi-bin/frameit?http://www.griffith.edu.au/ofm/services/maintenance/content_landscaping.html Date Accessed 13/4/07.

²³ EPA Fact Sheets, 2007. "Integrated Pest Management (IPM) and Food Production" <http://www.epa.gov/pesticides/factsheets/ipm.htm>. Date Accessed: 13/4/07.

Other:

Environmental Management Section (EMS): A designated division of the university that facilitates and coordinates environmental projects.

²⁴Victoria transport Policy Institute. "Online TDM Encyclopedia." <http://www.vtpi.org/tdm/>. Date accessed: 01/05/07