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Energy Newsletter

This is the second issue of the ***Energy Newsletter***. This newsletter is produced by Facilities and Services on an "ad hoc" basis (that is, when there is information worth sharing) and its purpose is to keep areas informed about range of issues, including the status of the energy contract and energy conservation initiative being undertaken by this and other Divisions.

The Division's contact for the newsletter, as well as energy contracting matters, is Bart Meehan. Bart is also the officer responsible for coordinating the implementation of the ANU Environmental Management Plan (ANU*green*), which includes a number of energy conservation objectives. Bart can be contacted on Ext 54148 or (0416) 249 758 or by email.

Energy Contract Update

The University has finalised the tender for the supply of electricity. Following discussions with business managers and Heads of Halls of Residence, it was agreed that, given the volatility of the marketplace and current indicators that suggest a gradual increase in prices, we should establish a contract valid for a period of five (5) years. After evaluation of the tenders, the contract has been awarded to ActewAGL and will commence on 1 October 2001. The complete details of the offer are subject to commercial confidentiality restrictions and consequently, cannot be published in this newsletter. However, for budgeting purposes, you should note that the new tariff for electricity will result in an overall rise of approximately 45% against current rates.

This contract will **lock in a price for electricity supply only** for five years. You should note that a significant component of the electricity charge recovered from your area (approximately 60%) is for network charges. These charges have established by the independent regulator and are set until the 2003. In the intervening period, the charges will only increase in line with CPI. However, should the regulator approve increases post -2003 they will be passed on to the University. The charges applied to the University can also be affected by decision from government (eg. tax increases) or authorities responsible for the administration of the national market.

On a related energy matter, the University has completed negotiations on a new gas supply contract, which should see a reduction in tariff costs that translates into an annual

saving of approximately 20% based on current consumption patterns. This contract has also been awarded to ActewAGL and is valid for three (3) years from the 1 August 2001.

If you have any queries on either contract, please contact Bart Meehan, Executive Officer, on Ext 54148 or by email.

Energy Conservation Manager

The best way to save money on energy is to consume less. With that in mind, the Division has recently advertised for an Energy Conservation Manager. This position will be filled on a fixed term basis and will be responsible for working with Divisional and University staff to develop energy conservation strategies, in particular identifying opportunities to reduce energy waste at the local area.

Details of the position can be found at the following web address:

http://www.anu.edu.au/hr/anuonly/593.pdf (as at October 2002 this page is no longer available).

Power Factor Correction for the Lay Person

From time to time, you will hear F&S staff talk about power factor correction. The following description of PFC (taken from a recent ACTEWAGL publication) is a user guide for the lay person.

"Power Factor is the measure of how effectively electricity is used and is calculated as a ration of kilowatts to kilovolt amperes (kW/kVa). It compares the power available at your switchboard to the power used. If the power factor is poor, more power is required to do the work. Power factor is expressed as a number. Perfect is 1.0, good is 0.9 and a power factor worse than this may need correction.

It can be likened to a garden hose. If the hose has no leaks, then the water entering and leaving the hose is the same (power factor of 1). If, however, this a leak, some water will escape and less water will leave the hose outlet. If we had a leaky hose but wanted to maintain the same outlet of water that was being produced from the hose without a leak, we would need to increase the water pressure from the tap to increase the amount of water going into the hose. We may also need to increase the size of the hose to cater for the increase in water….

…Poor power factor increases your chances of cable overheating or failure, limits the power available for production, necessitates expensive upgrades if you want to expand, reduces equipment reliability and increases electricity bills…"

The Division is currently reviewing options to improve power factor across campus. This will improve electrical efficiency and consequently reduce consumption and costs.

Comparing Energy Generation Technologies

Given the likely increases in energy costs over the next few years, the obvious question is: are there alternative energy solutions that the University can introduce to reduce its consumption or dependence on market pricing. The following is a brief description of alternative technologies currently available:

Cogeneration: Cogeneration is the on site production of both heat and electricity in the one system. These systems usually consist of a large gas -fired reciprocating internal combustion engine used to generate electricity and located in close proximity to the equipment requiring the heat energy. Cogeneration systems have been successfully used in facilities requiring constant heat energy such as laundries, hospitals and swimming pools. There maybe possible uses for cogeneration on campus in large research schools. However, before making a decision on the viability of these systems, detailed modelling will need to completed.

Photovoltaics: Photovoltaics (PV) panels (commonly called solar panels) convert solar energy into electrical energy. This technology is well advanced and a recent development in the panels design, allows them to be integrated into building roofs and facades, thereby improving both the costs and aesthetic values. (Transparent PVs have also been developed for use as windows or as the outside panel of a double glazed window). PVs require additional equipment to store energy and to convert it to standard operation voltage, consequently it is still an expensive solution, due to high initial capital costs. Ideally, it a solution that is most cost effective where power supply from the mains is prohibitively high (not the situation facing the University at the moment, even with increases in the energy tariff). However, having said that, the Division will be exploring opportunities to use small scale PV solutions on campus.

Solar Power Water Heating (Domestic water heating): Sometimes confused with PV or solar panels, solar hot water heating is largely designed to heat a water source (or via a heat exchanger, to heat space) rather than generate electricity. These work well when the sun is shining, but the systems need to be backed up by gas or electricity, during inclement weather. There are several solar heating systems on campus, some of which need to be recommissioned. The Division has been investigating the viability of wider use of the systems across campus.

Gas: Gas is already used extensively across campus mainly for space heating and some domestic water heating. It can also be used as an energy source for air conditioning via the use of absorption chillers. Given that the cost of gas is reducing and it is a more environmentally friendly option than electricity, the Division has been exploring a wider use of gas as an energy source. However, this will require detailed modelling by an energy consultant.

Heat Pump: This is where energy is taken from the surroundings (usually the external atmosphere). Reverse cycle air conditioning works on this principle, with heat being extracted from the atmosphere and the compressor and then redistributed to an internal space, within a building. These types of systems are energy efficient and consequently, are used extensively on campus.

Renewable Energy Technologies: There are various renewable energy generation technologies in use in Australia. These include wind, biomass, wave, tidal and hydro power. In all cases, the demands of these technologies, either in initial capital cost, space required or noise, make them an impractical solution for use on campus. However, the University does purchase "green energy" which is sourced from these various technologies.

Comparing Central and Split Air-conditioning Systems

Over the past few years, there has been a proliferation of split air-conditioning (heat pump)systems installed by areas on campus. Areas with split systems might be interested in the outcomes of a survey of the two types of systems in high rise commercial buildings, recently conducted by a group of Hong Kong based engineers.

The survey reviewed the life cycle costing of systems and while it found the initial cost per cooling area for installing a central system is considerably higher than that of a split system, energy performance of central systems was far better. In fact, the survey indicated that the energy consumption of a split system was approximately 35% higher! In a time of increasing energy charges, this would quickly eliminate any initial savings made on the installation.

Over the past few years, there has been an increase in the number of split system airconditioning systems installed on campus. This has largely been the product of budgetary restraints, with large airconditioning plant being too expensive. The increases in electricity cost may well make the retro fitting of large airconditioning plant more viable in future. Additionally, while not excluding the use of split systems, the guidelines for consultants designing new buildings on campus, stress the importance of an energy efficient airconditioning solution. Those guidelines are located at the following website:

http://www.anu.edu.au/facilities/procedures/pdm/pdm_b4.html

Daylighting

A recent survey of US schools has found that test scores for students improved where they were located in classrooms primarily illuminated by daylight rather than artificial lighting.

The survey looked at the result of over 21000 primary school students in sample of 2000 classrooms. A similar survey on the effect of skylighting on human performance in commercial retailing operations suggested a connection between natural lighting and improved productivity.

The authors of the report concluded that the surveys in combination strongly supported the "thesis that these performance benefits from daylighting can be translated to other building types and human activities"

From the University perspective, the survey suggests that where possible we should look to use daylight as a lighting source. The additional benefit would be a reduction in energy use and consequent savings, noting that lighting contributes to approximately 30% of the energy use in most University buildings. With this in mind, the use of natural light has become a feature in the design of several new buildings on campus, including the Hancock Building Extension, Innovations Building, Sir Roland Wilson Building and Ian Ross Building. This requirement has also been specified in the design guidelines given to consultants (located at the following website: http://www.anu.edu.au/facilities/procedures/pdm/pdm_b4.html)

Where possible, the Division will also explore options for retro fitting natural light solutions in specific areas (for example, the use of skylights and light wells).

The executive summary for the survey report can be found at the following web address:

http://h-m-g.com

Energy Efficiency: start small ....

A recent article in the Environmental Manager newsletter reported comments by Peter Dobney, chair of the Energy Users Association of Australia, in which he suggested smart energy efficiency starts with a series of small activities, such as finding compressed air leaks and establishing shut down procedures to ensure that machines (including PCs) are not left running.

The Division is currently developing programs designed to brief local area managers on energy initiatives they could start in their own areas. The primary aim will be to make staff efficient energy users, by providing them with more information about the environmental and energy impacts of their actions.

The program, to be called the Green Building Project, will be developed over the next six months and progressively offered to areas.

For further information, please contact Bart Meehan, Executive Officer, Facilities and Services on Ext 54148 or by email.