

 Key features

- The University of Auckland closely monitors its energy use, and uses the data to implement targeted energy-efficiency measures

 Key benefits

- The university now uses 41% less energy per student than it did in 1981
- The university has saved more than \$100 million in energy consumption since 1981



Energy management pays off for The University of Auckland

Providing cost-effective heating, cooling, lighting and computer services for 38,000 students and more than 5,000 staff members across 218 different buildings is always going to be a challenge.

But, thanks to careful energy management, The University of Auckland now uses 41% less energy per student than it did in 1981. It has achieved the reduction by continually monitoring its energy use, and using the results to identify and introduce targeted energy-efficiency measures.

The University of Auckland has grown a lot over the last 30 years. Student numbers have tripled and the physical size of the university has doubled. The university has also extended its opening hours and introduced more than 12,000 computers, both of which have increased the demand for energy.

But despite the growth, the university's 2008 energy bill of \$8.2 million was almost \$6 million less than it would have been if it had kept using energy at the same rate as it did in 1981. By practicing careful energy management the university has reduced the amount of energy it uses for each equivalent fulltime student (EFTS) from a substantial 4,715 kWh in 1981 to just 2,781 kWh in 2008.

Reducing the amount of energy it uses for each student is estimated to have saved the university more than \$100 million since 1981 (based on 2008 energy rates).



Energy Manager, Denis Agate, carefully monitors energy use at the university's 218 buildings.

The importance of monitoring and targeting

According to environmental coordinator, Lesley Stone, the secret to The University of Auckland's energy-management success is the careful monitoring it has carried out over the last three decades.

"The saying that you can only manage what you can measure is not just a catchphrase, it is absolutely true," she says. "Monitoring and attention to detail by measuring your energy use is absolutely essential if you're going to identify problems and put solutions in place. Monitoring also gives you the data you need to assess and communicate their effectiveness."

At first the university monitored its energy use by laboriously combining spreadsheet data from many different sources. But in 2002 it invested in EnergyPro, an information management system developed by Auckland company EnergyPro Solutions.

EnergyPro makes it possible to identify where, when and how much energy is being used. The system also makes it easier to keep track of the 261 separate monthly utility invoices associated with the university's four campuses. It automatically checks the accuracy of all

the invoices and whether the correct tariff structures have been applied.

The university has also installed 870 check meters, which provide detailed information about where energy is being used within each building.

Monitoring energy consumption at such a localised level makes it possible to identify energy-savings opportunities and introduce targeted measures to save energy. Monitoring also makes it possible to assess how successful those measures have been.

The university has used the results of its monitoring to identify and introduce large-scale, high-impact energy-saving measures, as well as numerous smaller-scale measures, many of which have been surprisingly effective.

One recent major energy-saving project involved reconfiguring the heating systems on the university's city campus. Previously three centrally-located gas-fired boiler stations produced hot water that was piped to neighbouring buildings to provide heat. Now, each building has its own boiler. This change has eliminated the massive heat losses associated with reticulating hot water, as well as the 'standing' losses that occur with centralised boiler stations.

Further energy savings have been made by installing small, dedicated heating plants within buildings to provide 24-hour heating in areas that need it, rather than running the boilers continuously.

In addition, all the university's building services, such as air conditioners, chillers, fans and pumps, are now remotely controlled through the university's building management system (BMS). This means they only run when they are needed. Reducing the hours that equipment and appliances operate is a no-cost way of cutting energy use – and saving money.

Small actions, big results

When it comes to saving energy, little things can make a big difference. Just how effective small actions can be was illustrated during an energy-savings drive the university undertook during the winter of 2008. Energy use fell by 8.4%, and is expected to produce permanent energy savings of around 3.25 million kWh a year.

During the drive, staff and students were encouraged to save energy by doing things such as switching off lights and appliances when they were not being used.

The university also introduced two low-cost initiatives which proved to be very effective and are still being used. The first involved automatically shutting down computers after hours, and the second involved changing the university's cleaning regime.

According to energy manager Denis Agate, similar measures could easily be adopted by other large organisations and institutions.

"They're a really good example of how lots of small actions can really make a difference."



Modern gas-fired boilers at the city campus.

Automated PC shutdown

The university did not expect to save much energy from shutting down the 600 student computers in the library and information commons building each night. But in fact monitoring data showed that it cut energy use by 206,359 kWh during a six-month period – a saving of \$25,724.

These results were so encouraging, the university's IT staff shut down another 3,400 student computers during the two-week summer break. This saved an estimated 30,000 kWh of power.

The practice has now been adopted by many other departments in the university.

Changing the cleaning regime

Changing the university's cleaning regime to minimise night-time cleaning has been a success from both an energy-management and a human resources perspective.

Cleaners now start work up to several hours earlier than they used to, which has reduced the amount of lighting they need.

Dr Stone says this has not only cut energy use, it's been a positive change for the cleaners as well.

"It makes it safer for the cleaning staff, because they can get through their work before the early hours of the morning, when the campuses are otherwise deserted. It also means they can spend more time with their families."





The university's information commons, where computers have been programmed to shut down after hours.

Communicating with staff and students

According to Dr Stone, communicating the results of its energy monitoring programme to staff and students has been an important part of the university's energy savings initiatives.

Regular emails to faculty and unit heads keep them updated about energy use at the university generally, as well as providing more specific information about energy use within their own departments.

"We're getting more and more targeted, giving more detailed breakdowns to every group. It makes such a difference when you walk into a room with a graph and you can show people exactly where and when the energy is being used."

She says having good monitoring data makes it easier to get students and staff to take more responsibility for their own energy use by switching off lights and computer equipment.

And being able to provide them with the data that shows how effective their actions have been is a great way of motivating them to keep up the good work.

"People really enjoy it when they start to see improvements. But if they're not doing so well we don't criticise them—we work through the figures with them, to try to identify the reasons and find out what we can do to help."


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