



K E E L E
U N I V E R S I T Y

KEELE UNIVERSITY ENERGY POLICY

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ENERGY AND SUSTAINABILITY RESEARCH AT KEELE

The University has several research areas that focus on energy and sustainability. Solid Oxide Fuel Cell (SOFC) technology led by Professor Mark Ormerod has demonstrated that SOFC can run on biogas, with a useful power output at significantly lower levels of methane production than is possible with conventional heat engine. SOFC uses gases such as methane from chicken slurry, anaerobic digestion of waste and potentially coal bed methane. This technology reduces greenhouse gas emissions and also results in the clean destruction of ammonium and other pollutants. Modern exploitation of coal beds by Professor Peter Styles does not involve mining the coal but with little environmental impact removes the methane gas from the coal seams. After it has been burned to generate energy the carbon dioxide emitted can be sequestered into the coal seams, thereby reducing CO₂ emissions into the atmosphere. The Institute for the Environment, Physical Sciences and Applied Mathematics also undertakes research into geothermal energy sources and the environmental impact of wind farm energy generation.

LEGAL FRAMEWORK

This document complies with legislation and publications relevant to specific areas:

- Part L2 Building Regulations: Conservation of fuel and power in buildings other than dwellings (1st April 2002)
- New statutory requirement to Part L (proposed 2006)
- EU Building Performance Initiative (proposed 2006)
- HEFCE M16/96 Energy Management Study in the Higher Education Sector (May 1996)
- European Union Emissions Trading Scheme directive.

The above key areas of legal requirement are designed to achieve compliance with the commitment of the United Kingdom and the European Union to deliver significant cuts in greenhouse gas emissions.

The UK is now committed to reducing emissions of the six greenhouse gases (thought to be responsible for heating up the atmosphere) by 12.5% below their 1990 levels over the next ten years. To reaffirm its position on climate change, the government has made its own pledge to cut carbon dioxide emissions by 20% by 2012. CO², which is believed to be the biggest cause of global warming and is created through the burning of fossil fuels. These UK plans could cut greenhouse gas emissions by 21.5% by 2008 - 2012.

The Government has set no specific target for universities but, as with schools, the DETR would like to see a 10% reduction in carbon dioxide emissions between 2000 and 2010.

KEELE UNIVERSITY'S KEY COMMITMENTS

1. To eliminate unnecessary waste in conjunction with legislation and Building Research Establishment (BRE) and other relevant guidance.
2. To ensure that measurement and verification of energy use, and the testing of equipment efficiency are co-ordinated and performed effectively.
3. To recognise the local and national implications associated with wiser management of fossil fuels, water and pollution control, from both environmental and financial aspects.
4. To implement and maintain a commitment to continual energy and environmental improvements and to communicate this at all levels.
5. To aim to reduce its energy consumption and greenhouse gas emissions in line with government targets.
6. To aim to minimise water usage by implementation, where practical, of the use of relevant aspects of sustainable urban drainage schemes (SUDS) initiatives.
7. The energy policy will be actioned with immediate effect and reviewed to reflect changes in the Estates Strategy.

ENERGY MANAGEMENT STRATEGY

Overall Aim

Whilst legislation and regulations will enforce improvement in standards, the University's strategic approach is based on adopting a proactive regime, which will both meet and, where possible, exceed all applicable requirements and develop solutions to energy issues.

Energy Management

Performance targets

Site performance targets will be set and published by the Energy Manager using appropriate benchmark methods, or by alternative acceptable methods.

Performance measurement

Energy consumption will be recorded each month for all sites. Where appropriate, and without incurring unnecessary cost, sub-metering will be installed to record energy supplied from each source to individual buildings or departments to allow comparison against performance targets. Automated meter reading technologies will be developed, enabling efficient and accurate data monitoring and collection.

Building works

All significant building projects shall, where appropriate, be designed as a minimum to comply with building regulations and incorporate the latest design guidance from the Commission for the Built Environment (CABE). Energy performance of such buildings should aim to achieve a Building Research Establishment Environmental Assessment Method (BREEAM) rating of Good or Very Good.

Water Management

The Energy Manager has responsibility for the management of water usage. Operational procedures for its efficient use include daily monitoring of peak flows on principle meters, annual correlation surveys.

Annual Energy and Water Report

An Energy and Water Consumption Report will be prepared annually and will describe:

- i. achievements to date
- ii. plans for the following year (significant projects will appear on the Estates Implementation Plan)
- iii. adjustments required to the Energy Policy to take account of experience or changes in University activities
- iv. predicted movements in energy costs.

Operational Procedures

The procedures and practices described in the following sections will be used to optimise energy performance at economic cost.

ENERGY MANAGEMENT POLICY

Keele University will promote and encourage initiatives aimed at conserving energy and minimising the effects of its use on the environment by implementing the following:

- preventing unnecessary and wasteful use of water
- reducing greenhouse gas (CO²) emissions
- purchasing energy efficient equipment, both new and replacement
- purchasing Pure Green renewable electricity as part of the commitment to support the renewable initiative
- developing strategies in relation to the reduction of pollutants from energy production and vehicle emissions
- control of environmental conditions to minimise energy usage.

Green Energy

Keele University has taken the decision to purchase a percentage of its electricity from totally renewable resources. Currently, 66% of electricity used at Keele is from Pure Green generation capacity. In the future, efforts will be made to support electricity generated from renewable sources as the availability of this type of resource increases.

Environmental Conditions

Temperatures and humidity levels (see appendices) will be operated within limits set out in the guidelines of the Fuel and Electricity (Heating Control) Amendment Order 1980. These levels shall only be raised following approval by the Head of Estates (see Appendix A).

With the exception of local controls, for example thermostatic radiator valves, all environmental settings shall be maintained and adjusted by CFM Estates to meet the requirements of building users.

Energy Saving Projects

CFM Estates will develop plans which will aim to reduce energy demand and consumption. These may include:

- minimisation of air-conditioned areas
- utilisation of passive ventilation
- use of solar energy
- maximising daylight within buildings
- on-site generation of combined heat and power
- use of energy-efficient building structures and fabrics
- improvements to the energy efficiency of engineering services and plant
- installation of low-energy lighting with automatic controls
- motor speed controls
- geo-thermal heating and cooling
- use of biomass plant
- installation of sustainable urban drainage schemes
- procurement of energy-efficient portable electrical equipment
- improving thermal insulation to walls, roofs, floors, pipes and services
- decentralisation of boiler plant
- purchase of energy-efficient replacement equipment
- taking advantage of grants and initiatives.

The above proposals shall be evaluated from both a cost and environmental perspective, taking due account of Life Cycle Costing.

Equipment Purchasing

The purchasing policy of the University shall be sympathetic to the consumption of the energy during the life of this equipment. Consideration should also be given to new ideas and technology where practical.

Student and Staff Awareness

The end users of the site's utilities - with an informed and disciplined approach - are able to make the most direct and positive impact on savings in consumption of utilities, particularly electricity which, in turn, reduces emission of greenhouse gases. The Energy Manager will actively seek the support of staff and students, and will provide training and statistical data to maximise the benefits of this initiative.

Communication

The communication of matters concerning the control of energy consumption by end users or budget holders will be undertaken by CFM Estates.

Maintenance

Operational Estates Managers shall ensure that procedures are in place to:

1. Establish a good standard of inspection and maintenance
2. Regularly check boiler consumption, efficiency and thermostatic controls
3. Regularly check and maintain taps, valves and pipe work to ensure they are leak-free
4. Regularly clean and service heat exchangers and ventilation plant filters
5. Inspect, repair and keep in good condition all thermal insulation
6. Ensure that any maintenance or commissioning activity resulting in the need to temporarily use energy inefficiently shall be completed as soon as practically possible

Electrical heating

In addition to being considerably more expensive than gas, because it is a secondary fuel, the use of electricity for space heating produces twice the amount of carbon emissions than typically produced by a gas-fired space heating plant, therefore electrical heaters shall not be used in any University premises except where they:

- are installed as part of a fixed heating system
- are issued by the Energy Manager or Engineering Maintenance Managers in order to maintain safe environmental temperatures.

The Engineering Maintenance Manager and their assistant shall keep permanent records of such issues and shall make proper arrangements to withdraw heaters from use when the conditions which necessitated their use have abated.

CMF Estates, when the funding is available, shall endeavour to modify these areas to eliminate the need for electrical heating.

Due to Health & Safety and fire issues, staff should not provide or bring to their place of employment any electrical heaters for use on the University's premises. Staff shall be encouraged to report instances of under-heating or over-heating to CFM Estates.

The University's Purchasing Department shall consult with the Energy Manager prior to the purchase of any electrical heating appliances.

Summary

Keele University employs approximately 1,700 members of staff and accommodates 7,000+ students, leading to the annual consumption of approximately:

13,000,000 kWh of electricity
35,000,000 kWh of gas
300,000 m³ of water

The conclusion from departments of the Government is that simple good practice and discipline can result in the reduction of fuel consumption and emission of greenhouse gases of up to the region of 30%.

There are new challenges to be met regarding the source and use of our energy, now and in the near future. These will have a direct impact on the University in the form of legislative pressures and decreasing reserves of fossil fuels will result in higher energy costs.

The purpose of this policy is to highlight strategies for improving the efficiency of energy use at Keele University through prevention of the wasteful use of energy and water, with the participation of all University staff, students and visitors.

The implementation of a sound and practical policy with sensible guidelines and achievable targets will make a substantial impact upon the reduction of our use of utilities. The level of success will be significantly reliant upon support from staff, students and visitors to achieve this aim.

ACTION PLAN - THE WAY FORWARD

Statistics

The University's total fuel consumption in 2003-04 (reference year) was approximately 50 million kWh at a cost of £2.1m. The University's target saving of 10% equates to 5 million kWh with an approximate value of £120,000 at today's prices.

In addition, the University consumed approximately 300,000 m³ of water at a cost of £318,000.

The management of these resources has an important part to play in providing a sustainable campus.

Over the last two years, energy costs have risen by more than 50%.

The strategic goal is to reduce the University's energy consumption and CO² emissions over the next FIVE YEARS (2005 to 2010), and it will concentrate on the following specific areas to achieve a total reduction in consumption of 10%:

1. Monitoring and targeting
2. Awareness / good housekeeping
3. Technical improvements
4. Estates rationalisation

1. Monitoring and Targeting

The management of energy is the means by which you learn how you have performed in the past, how you are performing today and how you could and should be performing in the future. It is an established principle that you can only manage that which you can measure. M&T therefore provides the ability to enforce this requirement in a disciplined and reliable manner, which will ensure that the University meets its commitment to planned improvements in the efficient use of energy. Part of Monitoring and Targeting (M&T) is the development of an automated meter reading and data collection system. This will enable accurate data to be compiled automatically, allowing appropriate and timely information to be made available and allow more complex analysis of energy consumption throughout the University, thus informing the decision making process.

2. Good Housekeeping - Staff and Student Awareness

Negative attitudes towards energy usage, such as 'don't pay don't care', must not prevail. Staff and Students must be encouraged to accept ownership, directed towards avoiding unnecessary waste if the aims of the University are to be realised. Creating a culture within the organisation that, where necessary, changes everyone's attitude and behaviour is therefore fundamental to its success.

Good housekeeping will be promoted through a number of mechanisms:

1. Training
2. Motivation
3. Publicity

Increasing awareness as to what is being carried out and what more can be done, why it is beneficial and how each individual can help is the key to improving the University's overall energy performance. The above suggestions should be implemented to complement the previous successful Energy Awareness Campaign.

3. Estates Rationalisation

Rationalisation of the estate in line with the provision of services will provide the opportunity to dispose of or significantly improve inefficient buildings. Whilst ensuring that it makes maximum use of its retained assets, the University has a clear objective to improve the quality of services wherever possible and it is therefore essential that its resources be utilised in the most effective manner.

4. Technical Improvements

Understanding where and how energy is consumed is vital to the preparation and evaluation of any proposal. The majority of the University's energy is produced from fossil fuels, i.e. gas, oil in boilers for space heating, low temperature hot water and domestic hot water.

This energy is equivalent to 37 million kWh, which represents approximately 74% of total energy consumed and produces approximately 7,000 tonnes of carbon dioxide. However, whilst electricity only represents approximately 26% of the actual consumption at 13 million kWh, equates to approximately 54% of total expenditure and produces 5,600 tonnes of carbon dioxide.

It is essential that the University invests in measures which meet with both its legislative responsibility and financial requirements. All saving initiatives will be assessed against the following criteria:

- payback period (using life cycle costing)
- revenue costs
- capital cost
- project life
- benefit to any backlog maintenance reduction
- environmental improvement
- improved sustainability

Consideration of all the above elements enables measures to be ranked accordingly. Furthermore, the selected requirements and their relative importance may be changed to facilitate any programme alterations. The proposed list of technical improvements is directed towards identifying those schemes that represent best value for money at today's prices. In addition, the energy market is volatile, with prices of commodities forever moving, generally in the direction of higher costs. These variations need to be continually reviewed to ensure that the University is well placed to gain maximum benefit.

ACTION PLAN SUMMARY

<u>ACTION</u>	<u>WHEN</u>
1) To procure the most suitable utility supplies to the University, taking into consideration cost and environmental impact	Continuous
2) To undertake an Energy Benchmarking Programme to identify poorly performing buildings based on energy consumption against suitable criteria	2006/07
3) To perform detailed energy audits on areas highlighted by the benchmarking programme	2006/07
4) To invest in a rolling programme of energy savings measures to reduce utility consumption	Continuous
5) To monitor all areas, especially those which have undergone work to improve performance and evaluate the effectiveness of such schemes	Continuous
6) To raise awareness of energy issues amongst staff and students	2006/07
7) To ensure that buildings are metered for all utilities. New meters should be capable of transmitting data to the Building Management System (BMS)	Continuous
8) To survey all areas to determine if they require sub-metering for the purpose of increasing the level of energy consumption data	2006
9) To collect and record meter readings to provide energy reports for areas and buildings across the whole site and to undertake prompt investigation of issues identified by this process.	Daily, weekly, monthly, annually as appropriate

KEELE UNIVERSITY**RECOMMENDED TEMPERATURES DURING THE HEATING SEASON**

	Minimum	Maximum
Office	18 ⁰ C	21 ⁰ C
Workshops	15 ⁰ C	18 ⁰ C
Residence	18 ⁰ C	24 ⁰ C
Air-conditioned areas	21 ⁰ C	24 ⁰ C

The above temperatures have been compiled with reference to NIFES Energy Saver and Government Best Practice Guides.

BRIEF TO EXPLAIN THE IMPACT OF THE EUROPEAN UNION EMISSIONS TRADING SCHEME (EU ETS) ON KEELE UNIVERSITY

What is the EU ETS?

The scheme is designed to reduce the amount of carbon emissions from combustion plant across the European Union as part of its commitment to the environment

The University is one of approximately 1500 UK installations that collectively emit about half of the economy's CO² and which are set to participate in the world's largest ever market in emissions allowances, with a target to reduce the UK's emissions of carbon dioxide by 20% by the year 2010.

Because Keele University has boiler plant or combustion installations with a rated thermal input exceeding 20 megawatts, it is a legislative requirement that the University adopts the EU ETS.

How does the scheme operate and affect the University?

The University has submitted details of all its combustion for the last five years by equipment that falls within the scope of the scheme and has been awarded a licence from the Department for Environmental Food and Rural Affairs (DEFRA).

The University is then allocated an allowance of CO² that it can produce; typically, this allocation is estimated to be 16% less than the current production of carbon dioxide at the University.

It is estimated that in 2006 a further reduction will be allocated of approximately 12.5%.

If the University is unable to reduce the amount of fuel it burns, then it has to purchase carbon credits from the trading market at a premium price.

If the University fails to purchase extra allowances from the trading market and burns more fuel than its allocation then it will be fined heavily (1st phase - 40 euros per unit, 2nd phase 100 euros per unit).

To escape financial penalties it is in the interests of the University to reduce its emissions of carbon dioxide by introducing energy saving schemes and disciplines to avoid waste.