UNIVERSITY OF CAMBRIDGE

Energy and CO_2 Strategies

Inducing Culture Change for Energy Efficiency

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Director

Estate Management

University of Cambridge

Beginnings

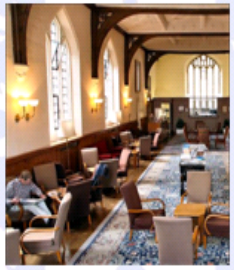
1209

Scholars fleeing from Oxford 'found' University

Most studies took place in ancient churches

1284

First college - Peterhouse - founded by Bishop of Ely



1347

First University buildings still used today by the administration

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13th / 14th Centuries

National and religious upheaval

1441

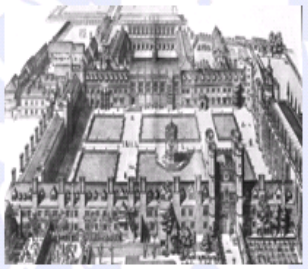
Henry VI lays foundation stone of King's

1446

King's College chapel starts

1669

Isaac Newton appointed Lucasian Professor of Mathematics



Developing his fundamental scientific principles in his college rooms at Trinity

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15th -17th Centuries

Matriculations: About 300/yr

Beginnings of expansion

1730

Senate House

1869

First women's college – Girton - founded

1874

First purpose-built science facility opened after much delay and $3,800 (33%) over estimate!!

Which supported 100 years of fundamental discovery

UNIVERSITY OF CAMBRIDGE **18th /19th Centuries** **Matriculations: 1,000/yr**

Accelerating expansion and change

1934

Saw the first main building outside the historic centre – University Library

1961

This continued after the 2nd World War with "Arts" teaching extending out of colleges to a new campus

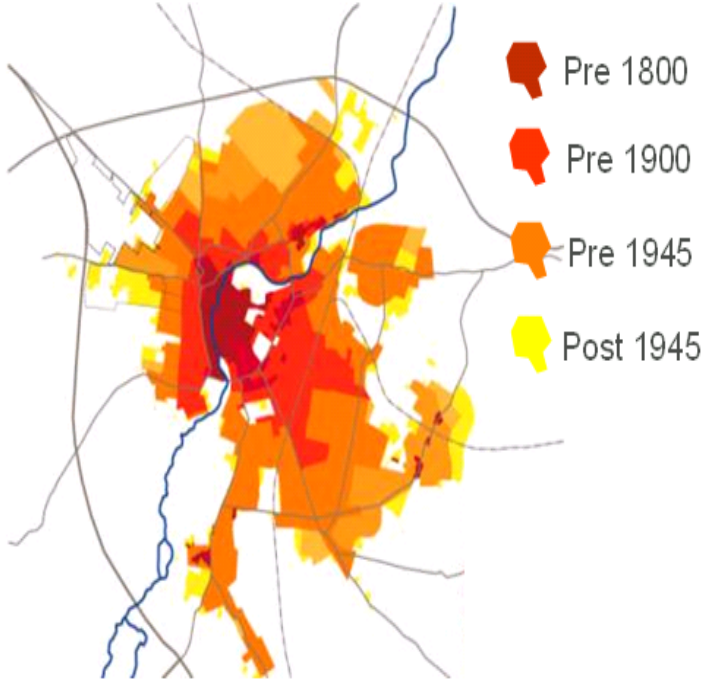
University is now doubling in size every 40 years

21st Century

Research, such as nanoscience, stretches across disciplines changing the type of facilities needed

UNIVERSITY OF CAMBRIDGE **20th + Century** **Matriculations: 6,000/yr**

Cambridge Historic Growth



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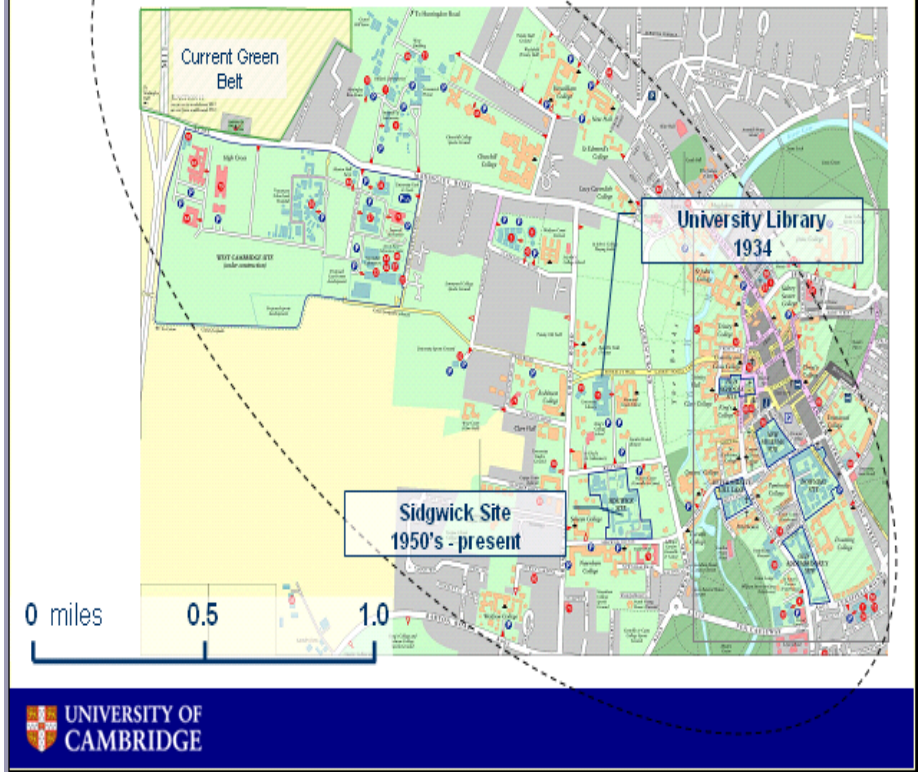
University's expansion to the north west



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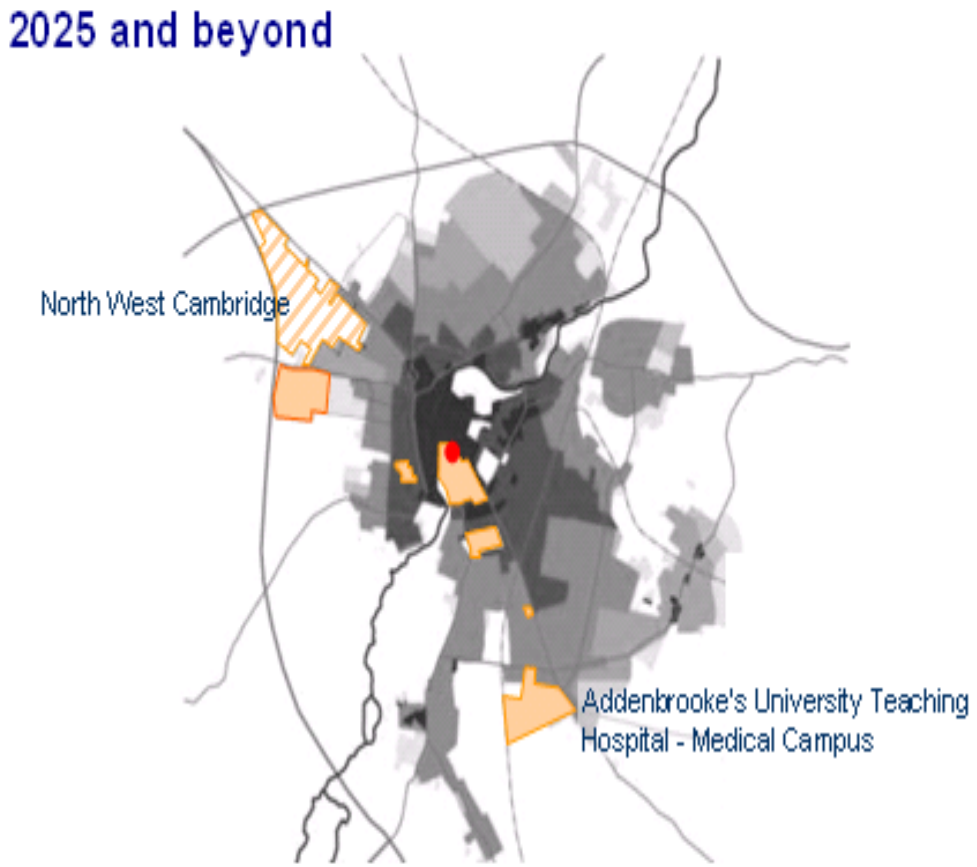
University of Cambridge

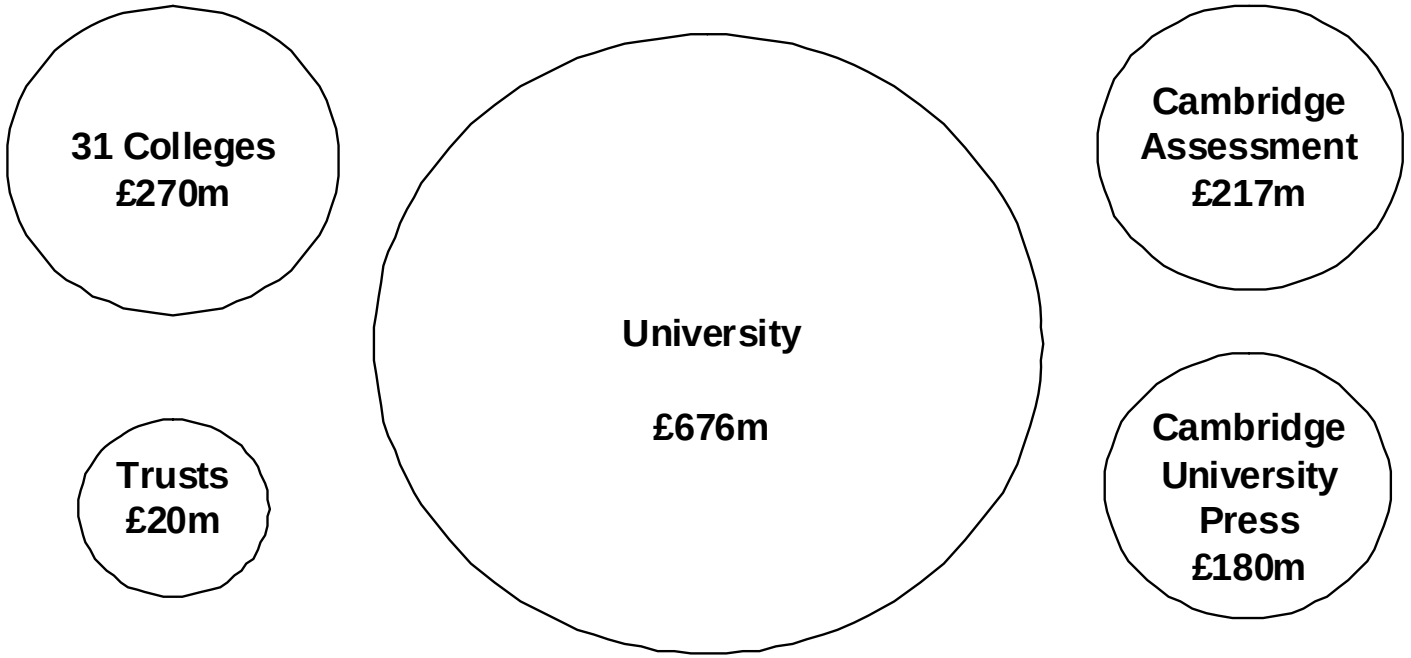
- **800 year anniversary**
- **Collegiate organization**
  - 31 Independent Colleges
  - 18,000 students
  - 8,000 FTE employees
- **Six Schools**
  - Arranged into over 150 departments, faculties, schools and other institutions
  - Accommodated with 330+ buildings (most dedicated to Dept's)



University of Cambridge

‘Greater’ Cambridge University

Components and Annual Income (2007-08)



University of Cambridge

- **£500M capital projects currently in development**
  - Number of major refurbishment & rebuild projects
  - Minimum 10% renewable energy installed per project
  - New building designs aim to achieve “Excellent”
  - Assessed according to the Building Research Establishment Environmental Assessment Method (BREEAM)

Drivers for Energy Efficiency – Global to Local

- **EU Energy Performance of Buildings Directive**
  - Energy Performance Certificates (EPCs) for new buildings
  - Display Energy Certificates for ‘Public’ Buildings
- **UK Carbon Reduction Commitment**
  - Emissions Trading for large non-energy intensive organisations from 2010
- **HEFCE**
  - funding expected to be dependent on carbon reduction
- **Local Council**
  - Cambridge Climate Change Charter
  - Local Authority Town and Country Planning Requirements

Drivers for Energy Efficiency – for Cambridge

- **Contain rising energy costs**
  - Electricity - £7.9m
  - Gas - £1.9m
  - Water - £0.4m
  - 2007/08 figures below, set to rise again in 2008/09
- **Maintain and enhance reputation for excellence in teaching, learning and research**
- **Prepare for future changes in legislation, e.g. ready for CRC**
- **Improve relations with stakeholders, including Student Body**
- **Healthier and more comfortable working environments**

Partnership & Collaboration

❖ International Networks

- IARU – International Alliance of Research Universities (10)
- GULF – Global University Leaders Forum (20)
- Engage in benchmarking, target setting and sharing of best practice

❖ National Networks – Benchmarking and sharing UK best practice

- Russell Group – 20 research intensive Higher Education Institutions in UK
- HEEPI – Higher Education Environmental Performance Improvement
- EAUC – Environmental Association for Universities and Colleges
- Carbon Trust – Government agency promoting carbon reduction
- Salix – Funding body for public sector energy saving

Action and Achievements

- **Worked with Carbon Trust**
  - Piloted the Higher Education Carbon Management Programme
- **Led development of Salix Funding model in UK HE Sector**
  - Now being rolled out by HEFCE as Revolving Green Fund
- **First Class Honours from Green League**
  - Awarded by independent national organisation of students
  - 8th Place in 2007
  - Equal 5th Place in 2008
- **Green Gown Awards**
  - Awarded by EAUC/HEEPI for environmental achievements in UK
  - Highly Commended 3 times in 4 years

Some of the Academic Activity on Sustainable Energy

Cambridge Environmental Initiative

- Facilitate and support interdisciplinary environmental research within the University

Cambridge Programme for Sustainability Leadership

- Provide training to business leaders on social, environmental and economic issues
- Partners included Prince of Wales, Business in the Community, Al Gore Climate Project
- Published *'Carbon Management – a practical guide for suppliers'* with Carbon Trust

Cambridge Centre for Energy Studies

- Multidisciplinary researchers in Judge Business School link to business and government

The Cambridge University Energy Network

- Students and researchers share interest in the generation and consumption of energy

The Cambridge Centre For Climate Change Mitigation Research

- Research climate-change mitigation through economic instruments/technological change.

The Centre for Sustainable Development

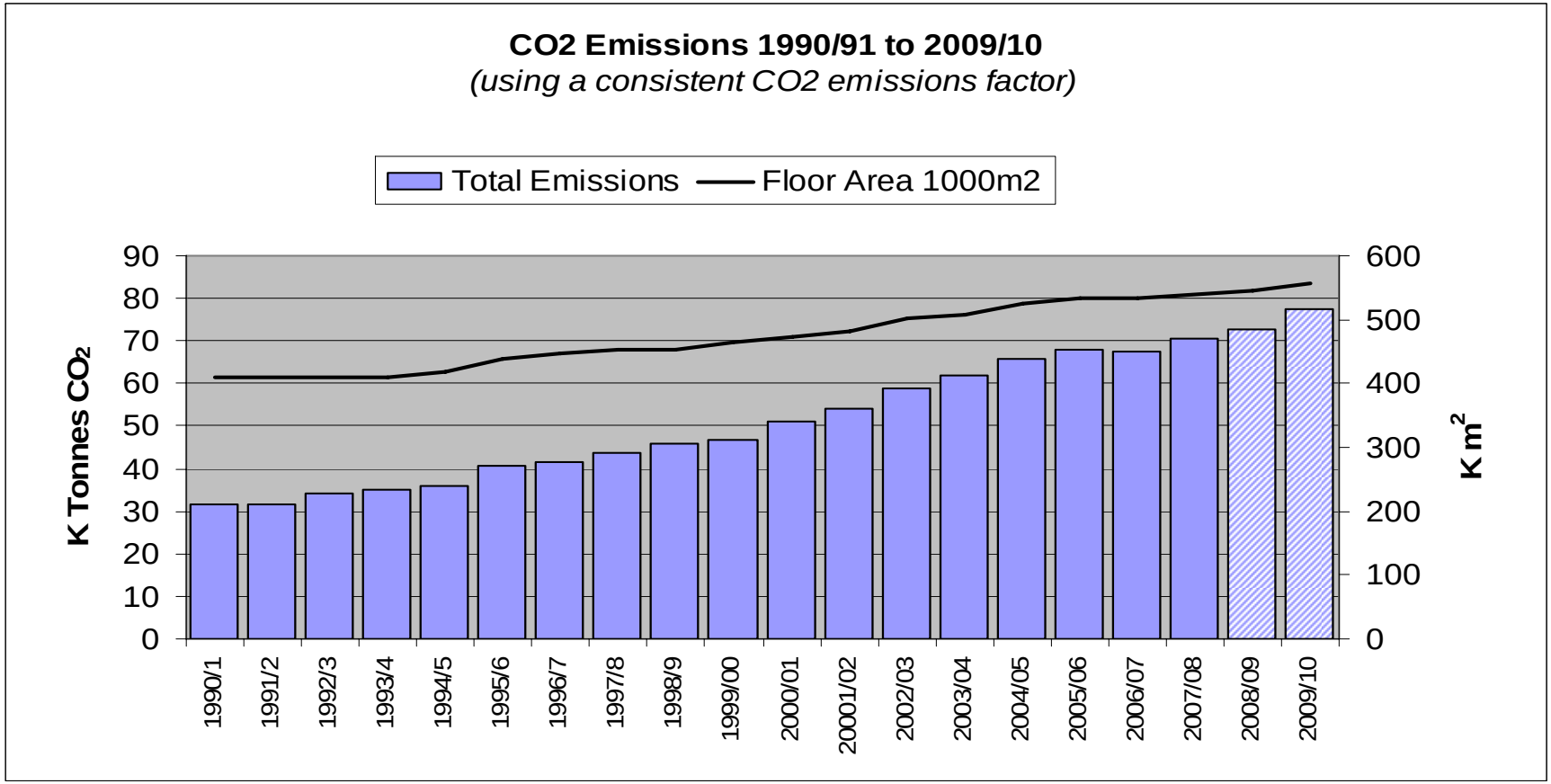
- Focal point for Engineering related research and teaching in sustainable development
- Host the Engineering for a Low Carbon Future lecture series

Energy – Measure It to Manage It

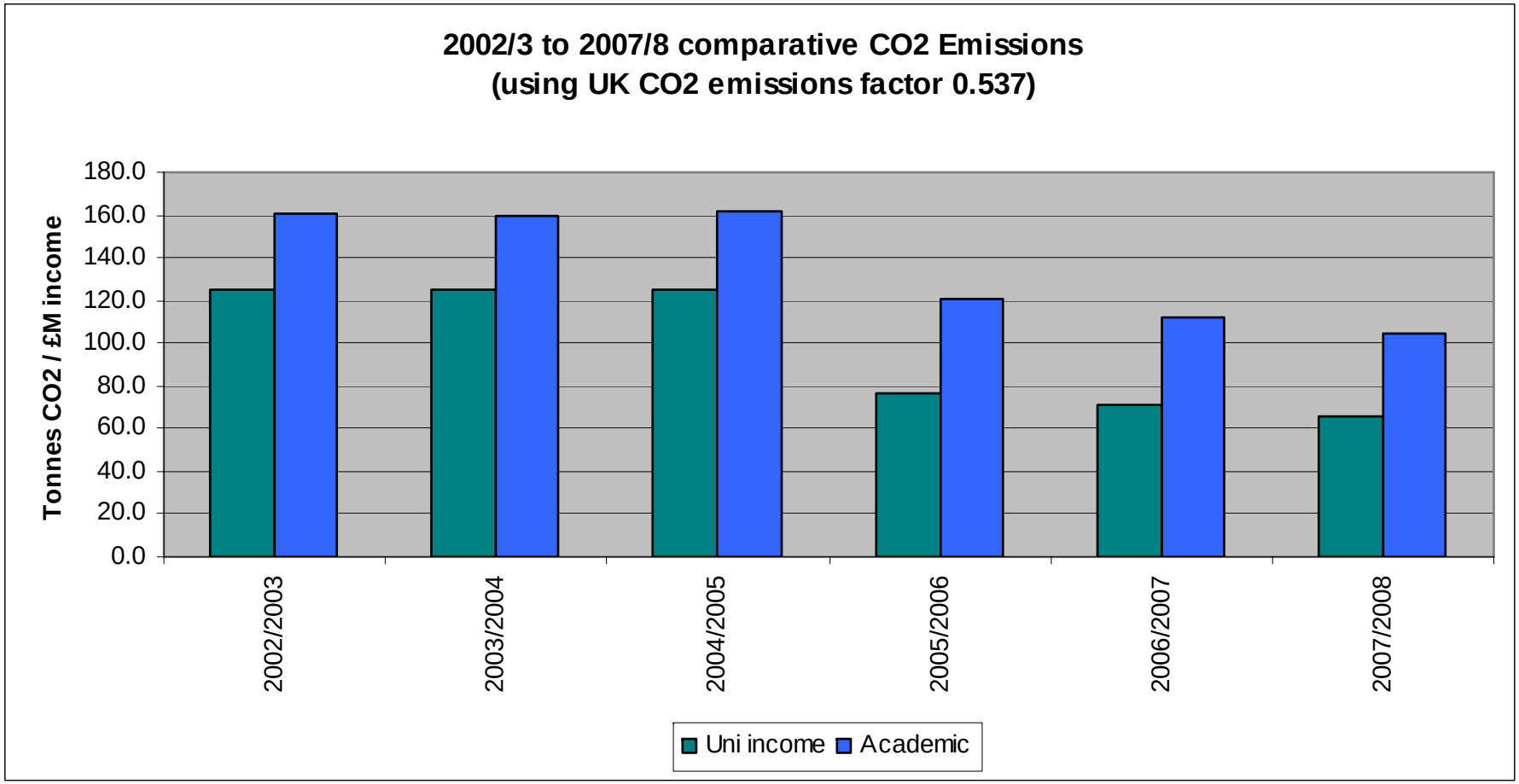
- **Dedicated Energy Team (5 members of staff) make use of metering**
- **Remote monitoring of 99% of University's electricity usage**
  - Meters provide data on usage half-hour every half-hour
  - From mandatory and voluntary billing meters, University owned sub-meters
- **Remote monitoring of 80% of water usage in the University estate**
  - Meters provide data on usage every 15 minutes
  - Very useful for spotting leaks
- **Smart metering of gas projected for the future**
- **Proprietary software packages used to collate and analyse data**
  - From suppliers' bills, automatic meters and in house meter reads
  - Uses comprehensive and versatile suite of reporting tools
  - Web reporting tool allows online access to data and simple reports

Growth of the Estate – and Energy Use

Over the last 2 decades business – and emissions – have been booming



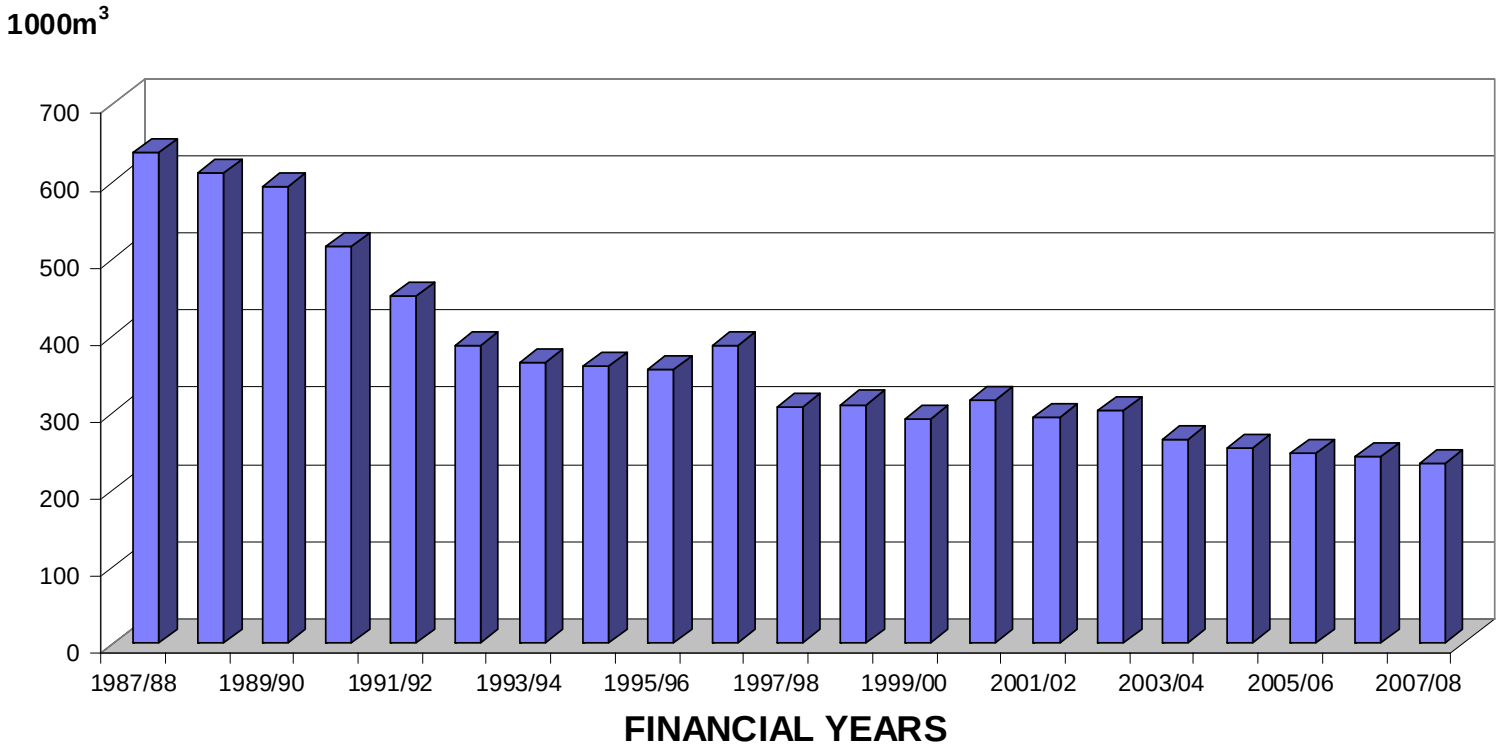
Benchmarking CO_2 Emissions



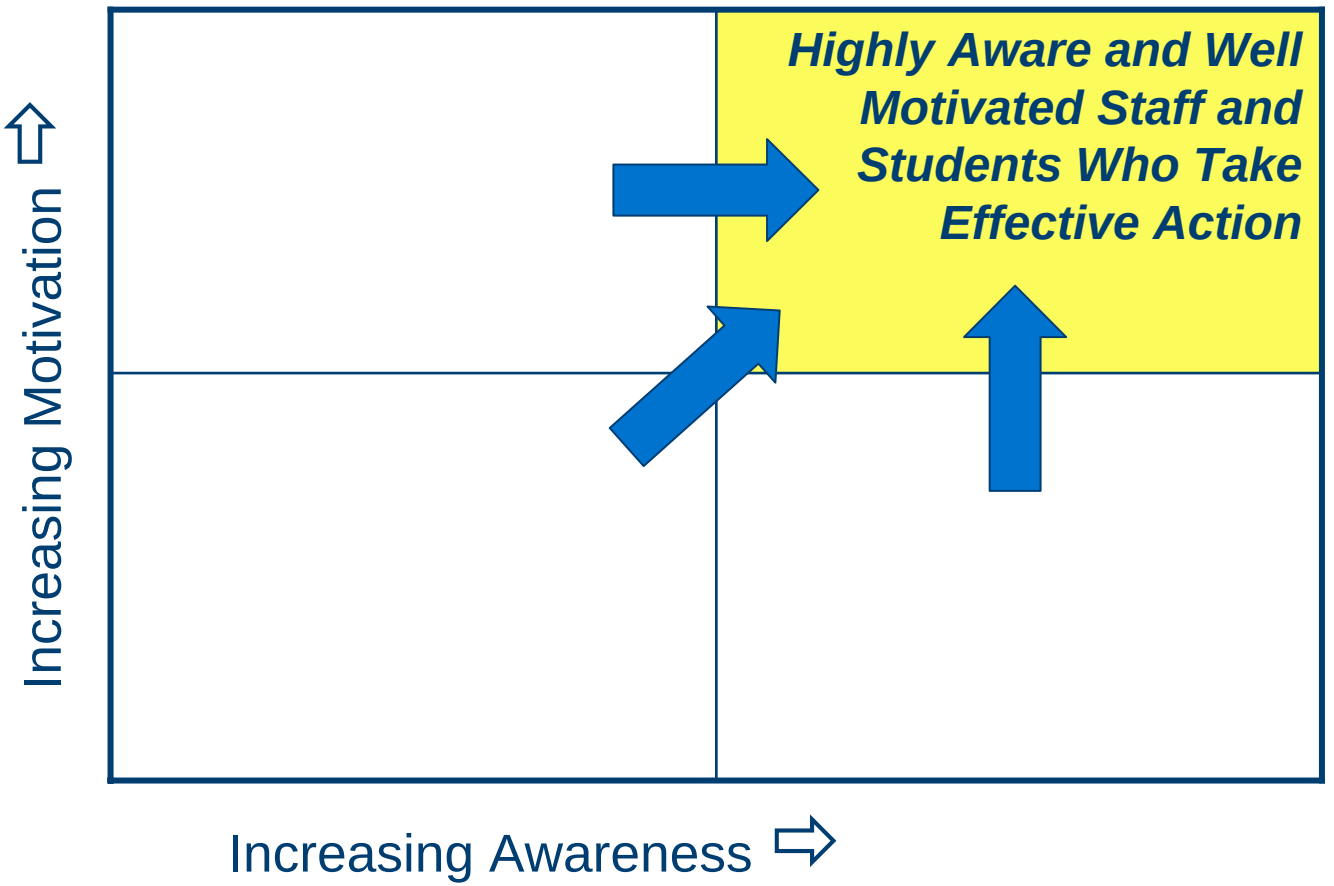
Water – A long running success story

CHART 1 ANNUAL WATER CONSUMPTION

1987/88 TO 2007/08



To Induce a Culture of Energy Efficiency



The Communications Plan

The EM Energy Team have:

- **Set up a Network of energy champions who…**
  - Disseminate good housekeeping advice
  - Email information to all Departmental staff (no single list for whole University)
  - Display Posters in Departmental buildings
  - Have training tailored to their requirements
  - Facilitate 2 way flow of information
  - Are provided with plug-in energy monitors to help identify wastage
- **Created website:**
  www.admin.cam.ac.uk/offices/em/maintenance/energy
  - Source of information and resources (e.g. downloadable posters)
  - Access to data on energy use of individual buildings

Energy Champions Can Measure ‘Plug’ Loads

Example Poster

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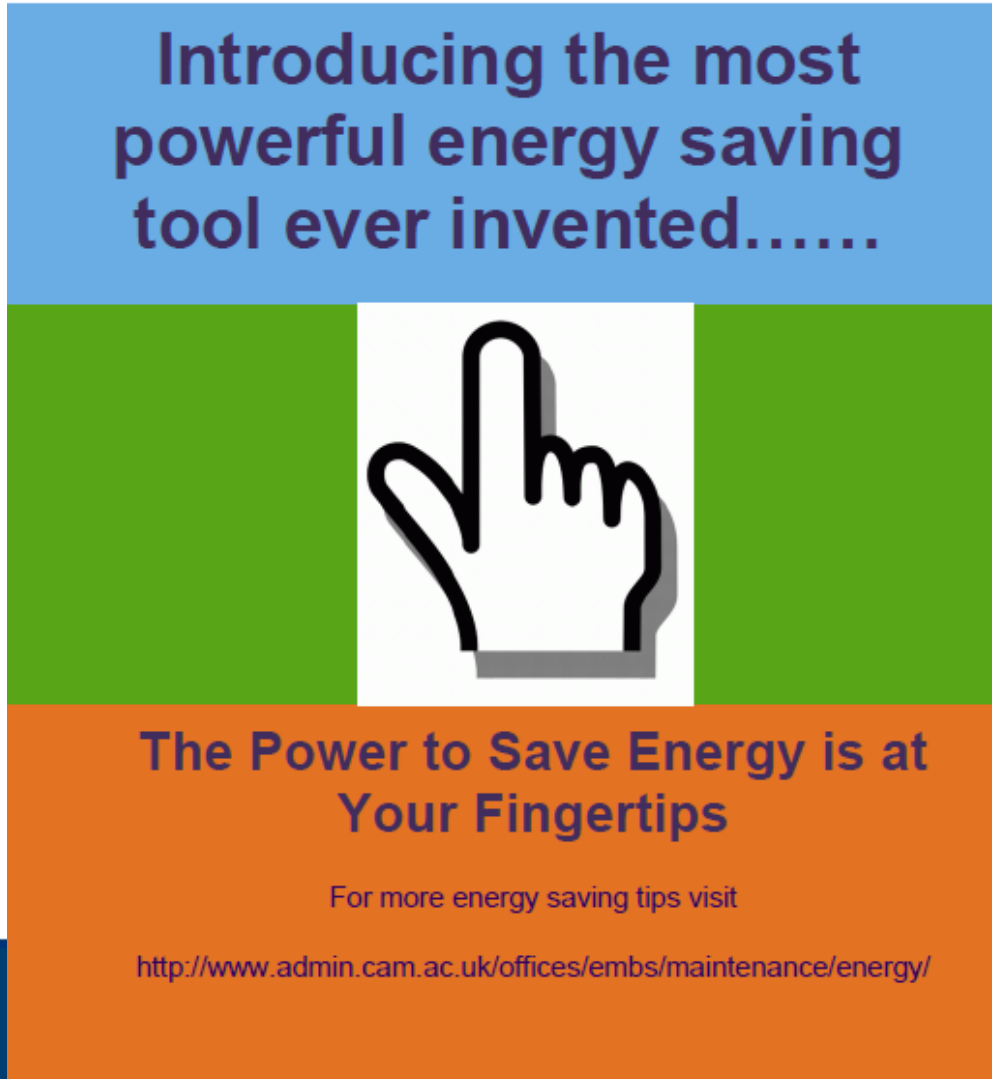
800 YEARS
1209 - 2009

- This and others available to download from the University website
- Designed to encourage good housekeeping with lights and appliances



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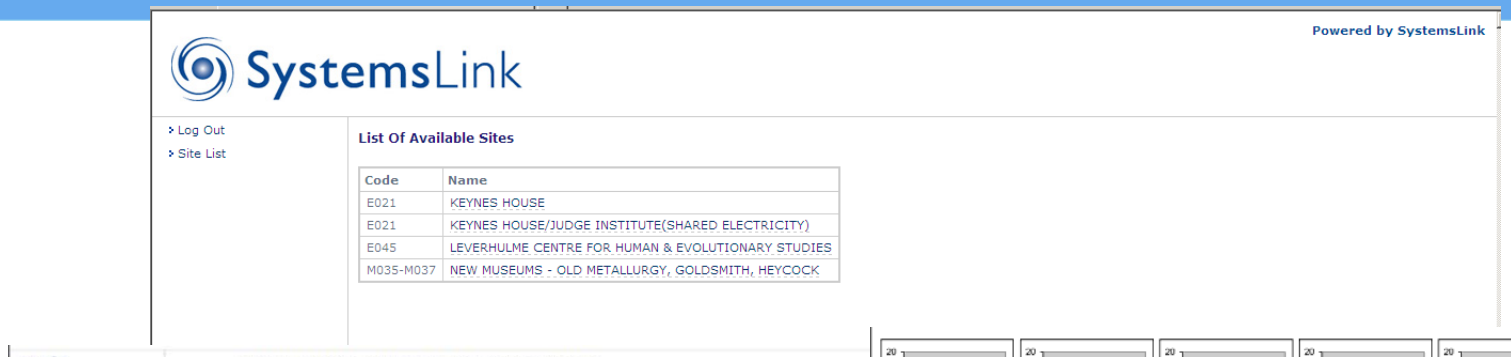
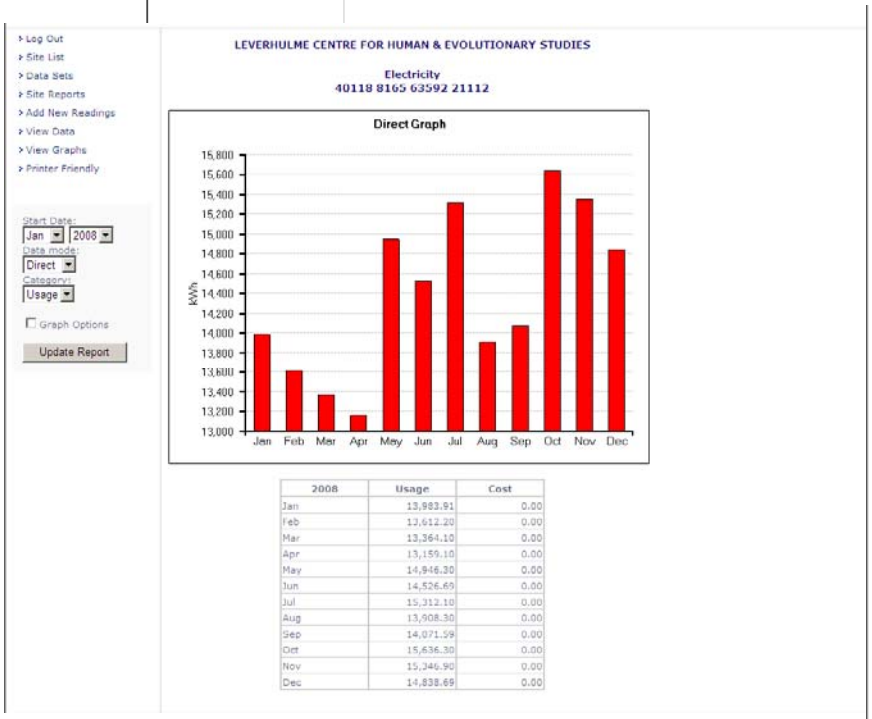
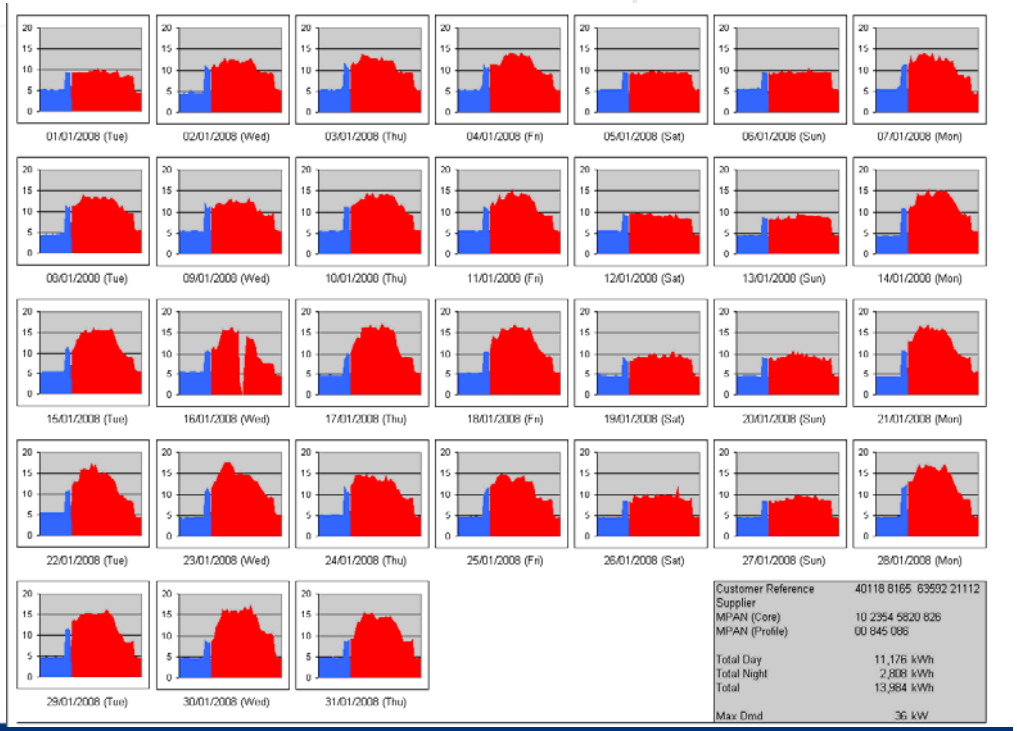
Web Reports on Energy Usage







Other Strands of the Communications Plan

- **Targeted Campaigns**
  - Partnership with other local organisations, including Cambridge City Council
  - Annual Energy Efficiency Week in late October
  - “Switch off” days, usually on a Friday
- **EM Energy Team meet regularly with Academic Departmental Staff**
- **Supporting College & Student sustainability activities**
  - Providing information and assistance to relevant research projects
- **Articles in EM and University Newsletters**
- **Presentations given by EM Energy Team to:**
  - Student Sustainability Network
  - Engineering for a Low Carbon Future
  - Cambridge Built Environment Sustainability Project
  - Town and Gown

Regional Action

- Worked in partnership with local organisations to promote energy conservation within the Cambridgeshire area

- Focussed on one day at the end of National Energy Efficiency Week

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SAY GOODBYE TO STANDBY!

Friday 21 October is
The University of Cambridge
'SWITCH OFF' DAY

A day of action to
save energy across the County

Be smart - take part
SWITCH IT OFF!

For energy saving tips follow the link at

www.cam.ac.uk/building

It's a *real* turn off!

supported by

UNIVERSITY OF CAMBRIDGE
South Cambridgeshire District Council
East Cambridgeshire District Council
Cambridge City Council
Huntingdonshire
Cambridgeshire County Council

More Culture Change

❖ Incentivisation Scheme

- Making Academic Departments more accountable for energy
- Uses data from metering and sub-metering
- Each Department given a target level of electricity use
- Target for 2008/09 based on 2006/07 usage plus 3% to allow growth
- Equivalent to 5% cut against Business as Usual
- Consumption across University expected to be contained within target
- Half year results suggest target will be achieved, saving
  - 3,100 tonnes CO_2
  - £0.69 million

❖ Competition for energy saving ideas

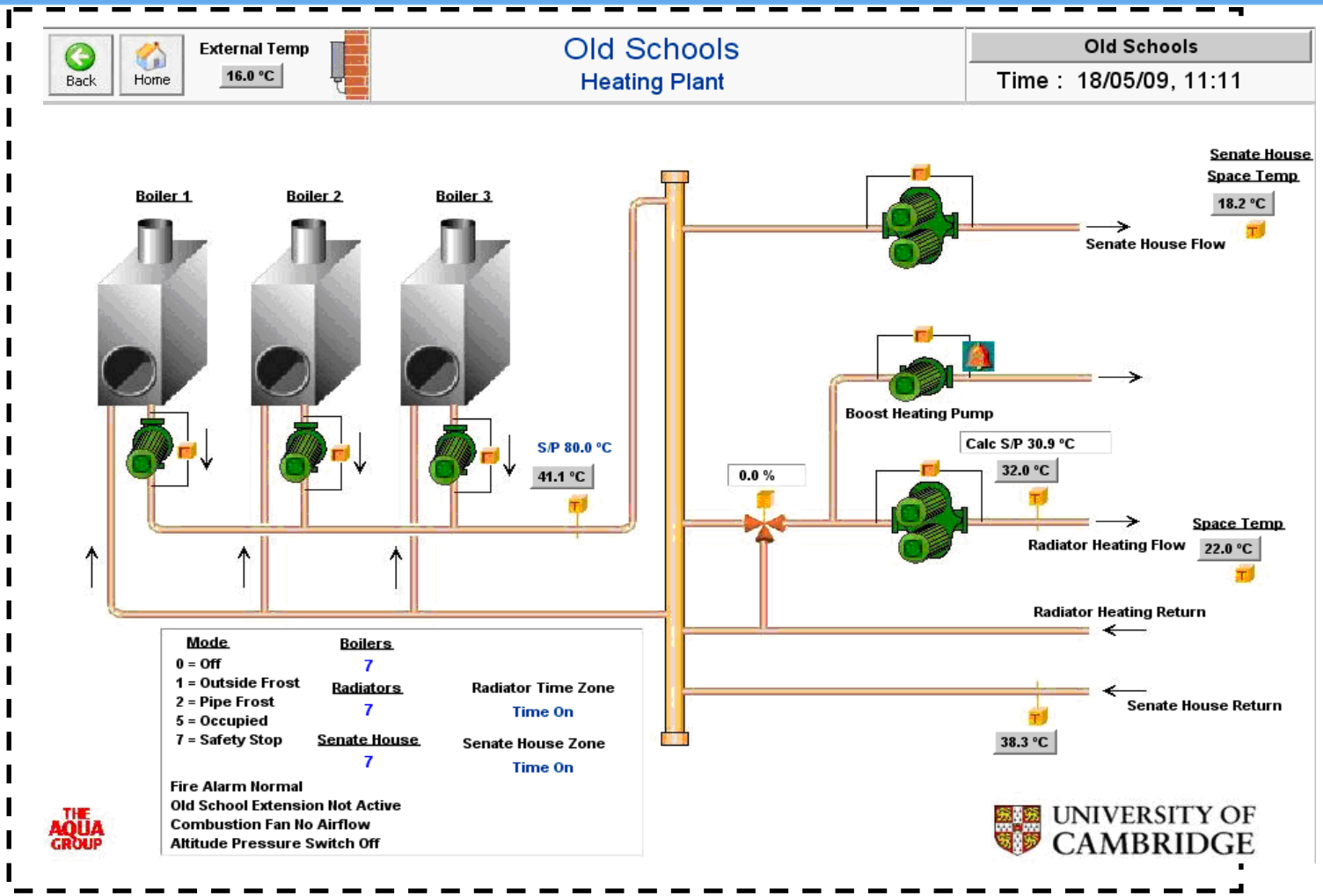
- Prize giving event to disseminate best practice

❖ Building Energy Management Systems (BMS)

- Real-time data available on line

Prizes for Energy Saving Ideas

On line Access to BEMS in Real Time



Future Developments

- **Provide building users with feedback on energy performance**
  - Aiming to stimulate behaviour change
  - Environmental Instrumentation Project – Meters Online
    - Access to more real-time data on local energy usage
    - Make energy data more publicly accessible
    - EPCs and DECs on display
  - **Working with CU Computer Laboratory**
    - OpenRoomMap – online mapping of buildings and their contents
      - Potential to include appliances and their energy use
    - Cambridge Sensor Kit – able to update local energy use every 6 seconds
      - **http://cambridgesensorkit.org/cskenergyP3/**
- **Continued Work with Salix**
- **Considering work with Clinton Climate Initiative**

1.6 tonnes CO^2/ year