

Managing your Campus to Benefit from the Carbon Reduction Commitment

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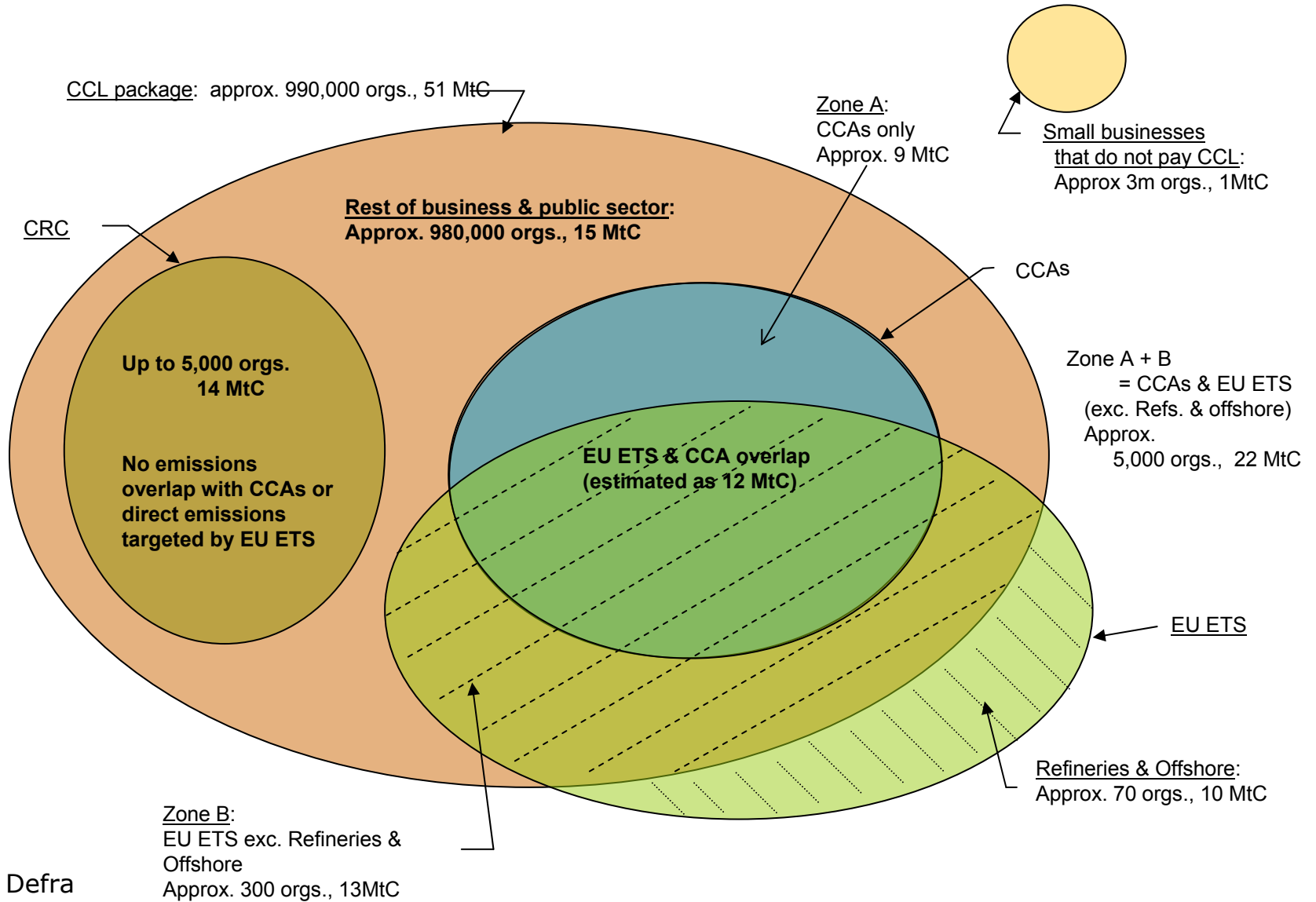
Chris Cunningham, The University of Manchester

Carbon Reduction Commitment Scheme Basics

**Alan Aldridge
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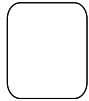
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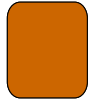
Source: Defra

- ▶ **UK wide scheme for 'large non-energy intensive' users**
- ▶ **Qualification threshold:**
 - ▶ Over 6,000 MWh from ALL half hour meters [70kVA in NI] includes mandatory AND voluntary HH meters
- ▶ **Once captured the emissions covered are:**
 - ▶ 'Core sources':
 - ▶ Electricity: Half hour meters; Profile classes 5-8
 - ▶ Gas: All daily read meters; plus over 73.2 MWh pa.
 - ▶ Other emission sources for at least 90% of all emissions Once per period e.g. 2010-2012; covers small emitters
- ▶ **Exclusions:**
 - ▶ All transport emissions
 - ▶ Over 25% emissions in Climate Change Agreements
 - ▶ Direct emissions sources covered by EU ETS

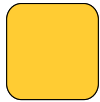
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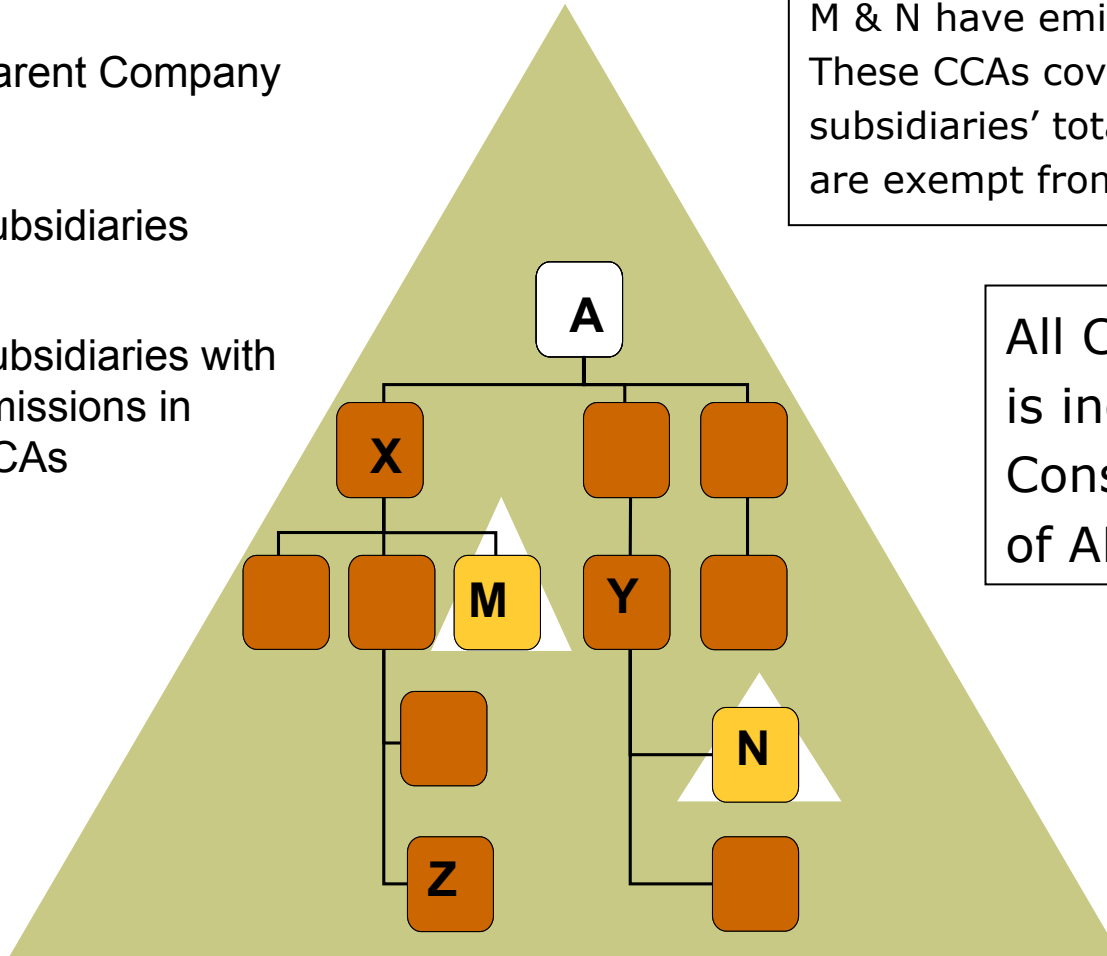
Parent Company



Subsidiaries



Subsidiaries with emissions in CCAs



In this company structure, subsidiaries M & N have emissions covered by CCAs. These CCAs cover more than 25% of the subsidiaries' total emissions, therefore they are exempt from CRC.

All Central Government is included
Considering inclusion of ALL schools [colleges?]

- ▶ **2008 Qualification year - are you captured?**
- ▶ **2009 Confirmation and registration
Base year for emissions**
- ▶ **2010 Introductory phase starts
January and July - Fixed Price Sale [pay up!]**
- ▶ **2011 January - Sale
July - fund recycling [double payment]**
- ▶ **2013 Cap + trade phase; Sealed bid auction
Cap advised by Committee on Climate Change**
- ▶ **2020 Estimated saving 1.2 MtCO₂ [TOO small!]**

- ▶ **Based on 2009 emissions adjusted for Bonus / penalty in league table [5,000 organisations]**

- ▶ **League table based on position in league table for each of 3 metrics = ranking say 1 [bottom] to 5,000 [top]:**
 - 60%** ▶ Absolute reductions vs. average reductions since 2009
 - ▶ Early action based on status at End of 2009 and applied only to introductory phase 2010 - 2012

 - 20%** ▶ Provision of Automatic Meter Reading AMR and associated metering and software [=a**M&T**] ex. mandatory meters
 - ▶ Covered by Energy Efficiency Accreditation Scheme

 - 20%** ▶ Growth metric = CO₂ / £ [turnover or revenue]

- ▶ **Adjustment to +/- 10% in 2010 increasing 10% every year up to +/- 50%; Could be 100%**

- ▶ **Say Carbon purchased of £120,000 = 10,000 tCO₂**
[National total say £300M = 25 MtCO₂]
- ▶ **League table:**
 - ▶ 1st Absolute reduction; 300th Early action; 1,000th Growth
 - ▶ Score = $(0.6 \times 5,000) + (0.2 \times 4700) + (0.2 \times 4,000) = \mathbf{4,675}$
 - ▶ Assume overall rank is then 200th out of 5,000
 - ▶ Based on year 3 [+/-30%] = bonus of **27.6%**
- ▶ **Recycled funds** [assume 10,000 tCO₂ emitted]
 - ▶ Recycling payment score = $10,000 \times 1.276 = \mathbf{12,760}$
 - ▶ Assume total score of all participants = 25M
 - ▶ Recycled funds = $\text{£}300\text{M} \times 12,276 / 25,000,000 = \mathbf{\text{£}153,120}$

- ▶ Implemented by Climate Change Bill
Consultation on draft secondary legislation Summer 2008
- ▶ Only direct participants and immediate agents can purchase carbon credits. Secondary carbon market - wider involvement
- ▶ Can sell or bank excess carbon
- ▶ Purchase only safety valve with EU ETS; May be minimum price
- ▶ Can request annual gas and electricity statement from utility supplier. 10% upward adjustment for estimated readings.
- ▶ Green tariffs do NOT affect the results - based on grid supplied
- ▶ Self certification with 20% audit
- ▶ Regulated by EA/SEPA/DoE; Managed by EA
- ▶ NO top slicing for Carbon Trust / Salix
NO recycling by Energy Efficiency 'tokens

- ▶ **Is your organisation captured?**
- ▶ **Assess coverage needed to achieve 90% of emissions**
 - ▶ Optimise this to suit your organisation
 - ▶ Ensure you have accurate meter readings for 2008
 - ▶ Ensure you have a system for accurate meter readings in 2009
- ▶ **Assess resource and expertise needed to implement the legal requirements over the next few years**
- ▶ **Consider strategy for approach and evaluate impact of different options**
- ▶ **Consider EEAS accreditation and AMR installation by end of 2009**
- ▶ **Determine cash flow and profit/loss implications**
- ▶ **Assess opportunity to use CRC to gain investment and reduce energy costs**

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A route to compliance for carbon reduction commitment

A guide to meeting the requirements for verification

i-prophets
energy services ^{PLC}



Introduction and Objectives

Richard Hipkiss IEng ACIBSE
i-Prophets Energy Services

Objective 1: To cover the practical implementation of the Carbon Reduction Commitment

Objective 2: To highlight where automatic monitoring and targeting can ease compliance and provide opportunity

Focus on the evidence requirements

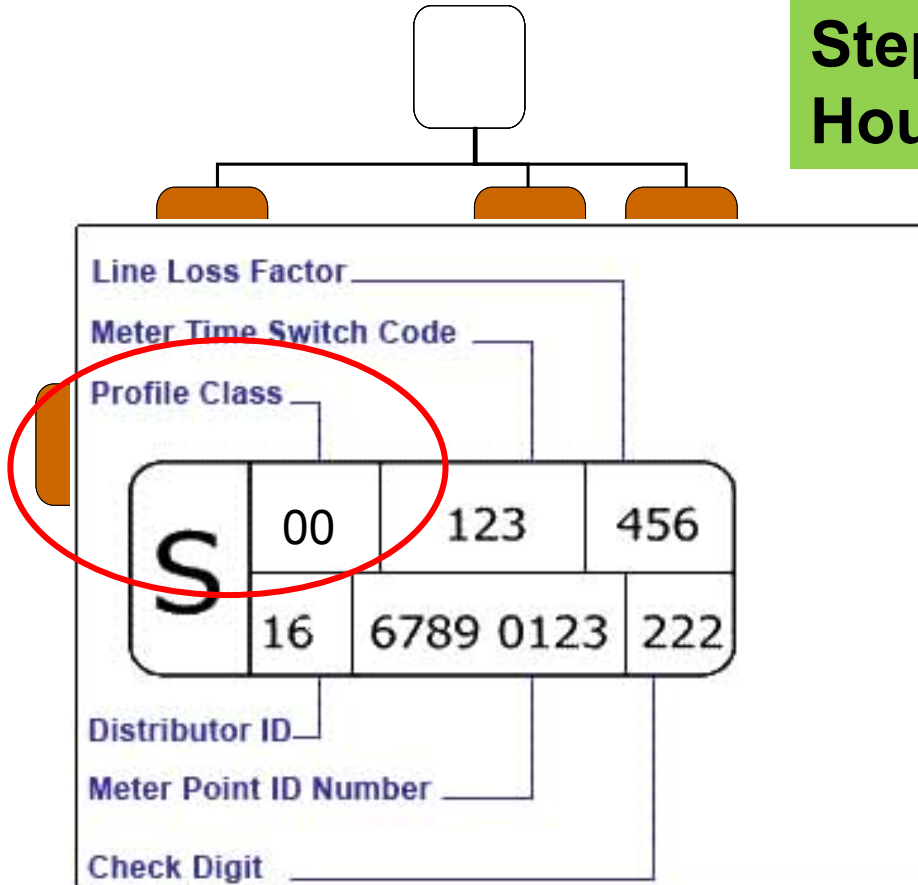
The evidence pack will include:

- organisation details (i.e. organisation name, contact details);
- annual organisation-wide CO2 emissions;
- annual organisation-wide AMR metric
- annual organisation-wide growth metric

Developing a strategy

Step 1: Define the organisation

Step 2: Identify Mandatory Half Hourly Metered Sites



Is total $>6,000\text{MwH/pa}$ AND
 $< 25\%$ covered by Climate
Change Agreement?

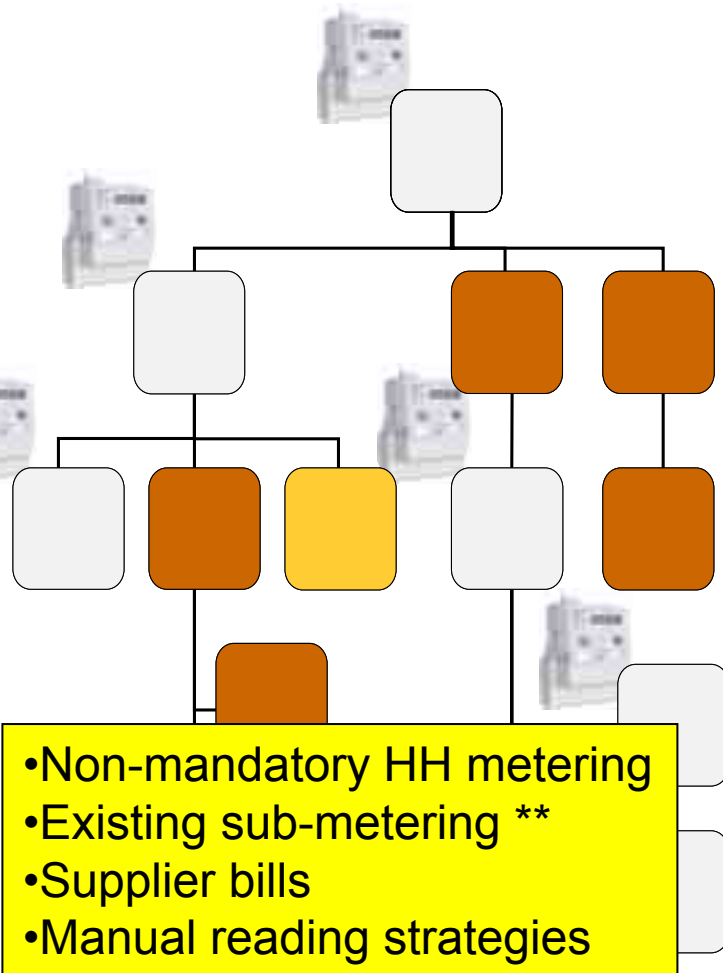
Developing a strategy

Step 1: Define the organisation

Step 2: Identify Mandatory Half Hourly Metered Sites

Step 3: Define all utility information required

Step 4: Consider how information will be gathered?



Developing a strategy

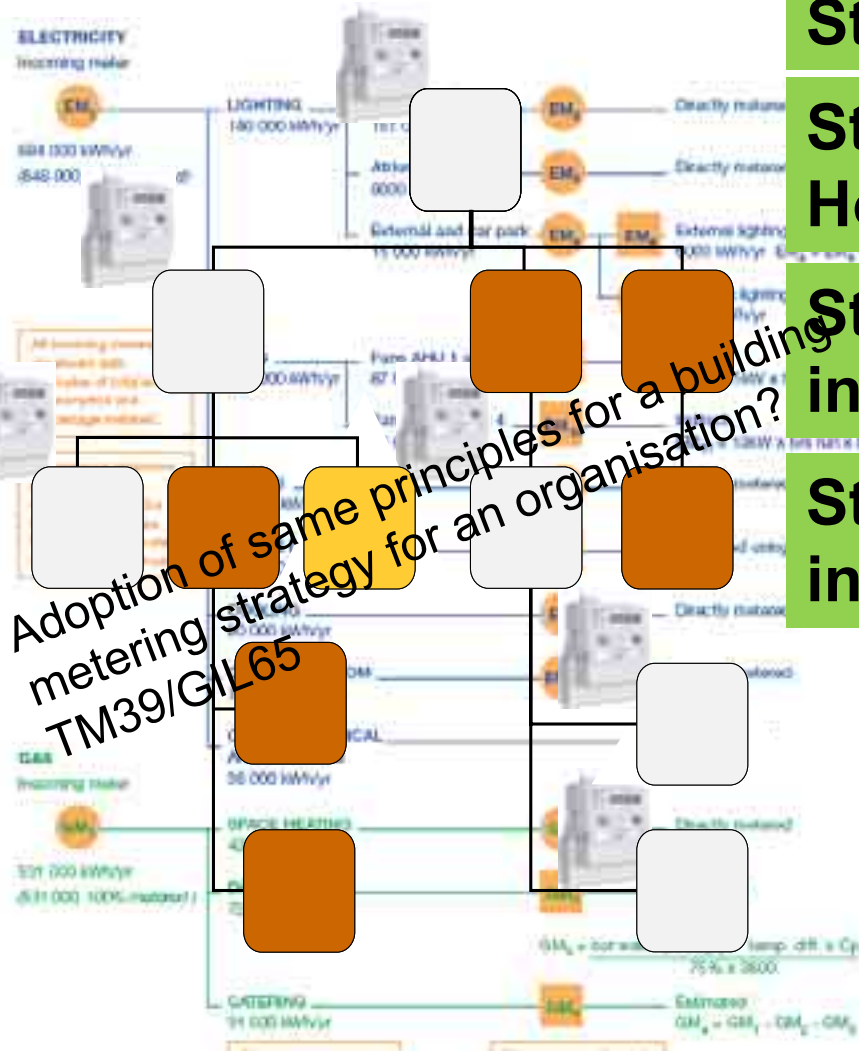
Step 5: Overall Strategy

Step 2: Identify Mandatory Half Hourly Metered Sites

- Enables identification of total emissions from all sites/fuels

Step 3: Information Requirements

Step 4: Consider how information will be gathered?



Adoption of same principles for a building metering strategy for an organisation?
TM39/GIL65

Benefits of a **M&T** Strategy

Implementation of a metering strategy through a **M&T**

- Lower admin cost through less resource
- Removal of room for error through estimation/manual read
- Possible early adoption bonus for league table
- Additional use of league table for internal use..

The objective of the Carbon Reduction Commitment is to reduce emissions; measurement is only the collection of data, the quality and availability of data will drive reduction targets

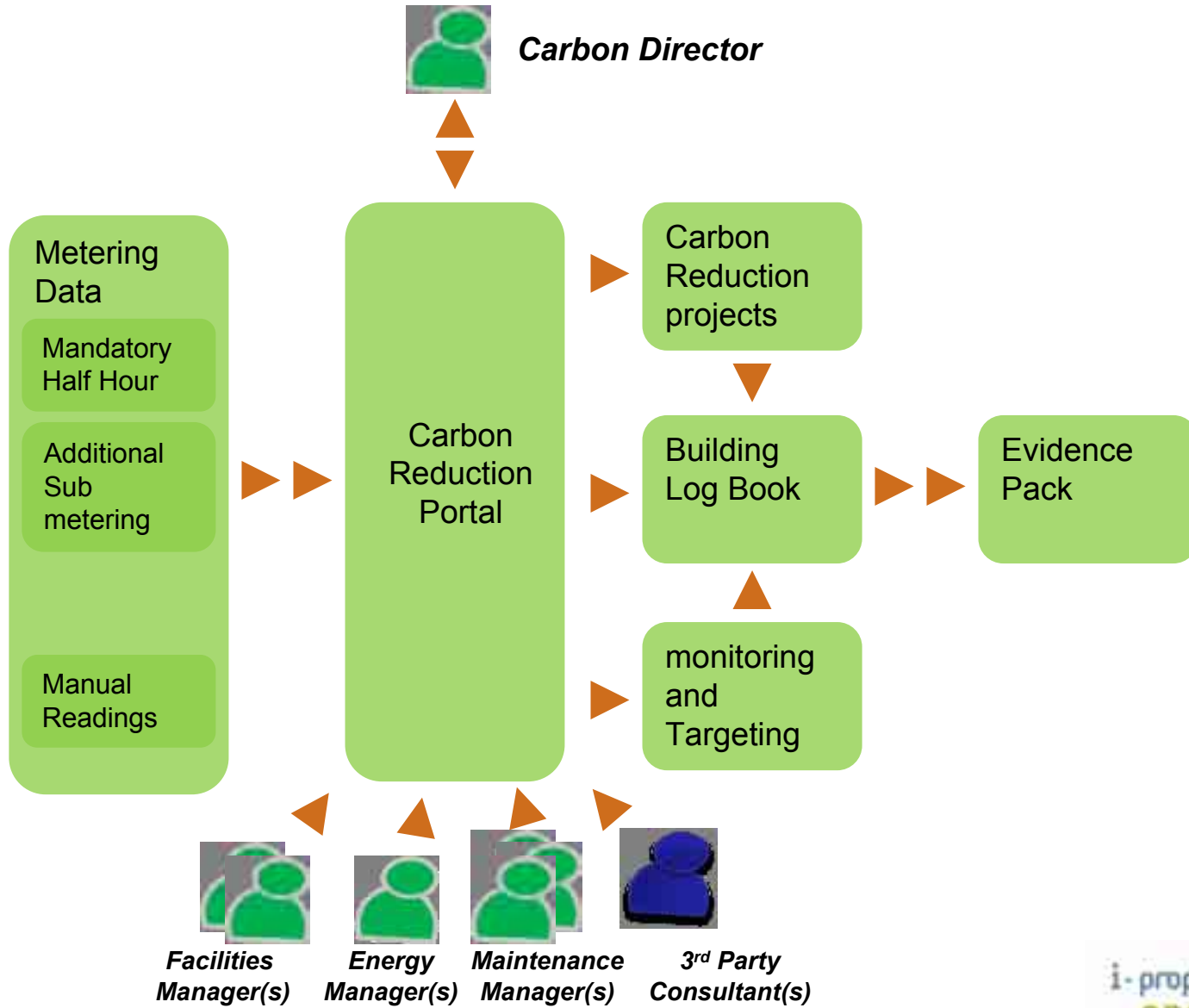
Other considerations with a **M&T**

In addition to the data;

- Need to track growth metric
- Call to audit 'special events'
- Requirement to log meter breakdowns/gaps in data
- Changes to organisational change

How Practically?

Holistic strategic implementation with aM&T



Additional advantages of using aM&T

Possibility to utilise for a greater opportunity

- Production of Display Energy Certification per building
- Collation/Creation of Energy Performance Certification

With wider development to the core of an organisational wide Energy Management Strategy



Conclusions and closure

The Carbon Reduction Commitment is an **Opportunity** not a threat

- Quite daunting for the Higher Education Sector
- a **M&T** can provide a time and cost saver with additional benefits
- Building log books can provide an audit trail

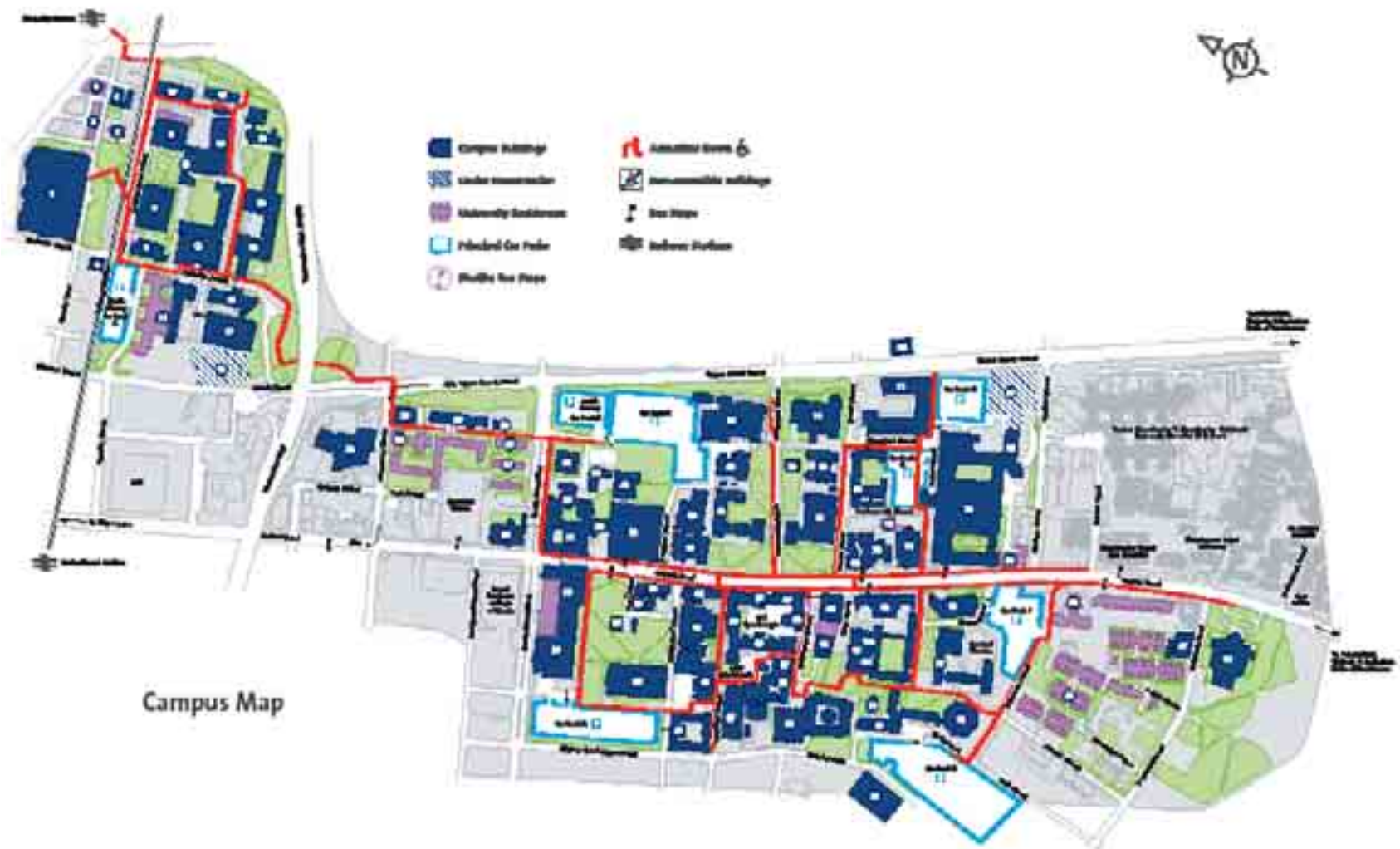
Preparation is **the** key factor

Conclusions and closure



EU Emissions Trading and Carbon Reduction Commitment

Chris Cunningham BEng(Hons) C.Eng MCIBSE
Assistant Mechanical and Energy Engineer



Campus Map

Fallowfield Campus



- Principal Car Parks
- Accessible routes

Allen Hall

- 1. Main Entrance
- 2. Terrace
- 3. Store
- 4. Reception
- 5. Main Entrance
- 6. Valley Hall
- 7. Bohemia House
- 8. The Cottage
- 9. Storage rooms

Green Park

- 10. Computer Reception
- 11. Lounge Bar
- 12. Bitter Suite
- 13. Terrace
- 14. Tree Court
- 15. Little Court
- 16. Green Court
- 17. The Mill
- 18. The Linen

Old House

- 19. Café House
- 20. Espresso Bar
- 21. Beach Court
- 22. Maple Court
- 23. Holly Court
- 24. Spencers Court
- 25. Chestnut Court

Woodhouse Hall

- 26. Main Entrance
- 27. Atrium
- 28. Seminar
- 29. Lindsay
- 30. Morley
- 31. Cromwell
- 32. The Magazine

McConnell Hall

- 33. Assembly Building
- 34. Poplar Court
- 35. Willow Court
- 36. The Pine Walk
- 37. Ardleigh Gate
- 38. The Pine Pavilion

Ardsley Bldg

- 39. Ardleigh Gate
- 40. The Pine Pavilion

Chamber

- 41. Courtyard
- 42. Security Office
- 43. In-house Security Office
- 44. Security Office
- 45. Bohemia Grounds
- 46. Lodge/Bar House
- 47. Lodge/Bar House
- 48. Linen House
- 49. Linen House

Michael Smith Building



A 24 hour Life Sciences building opened April 2004. Lighting Controls were value engineered out of the construction costs



MIB Building

A 24 hour Life Sciences building opened May 2006 fitted out extensively fully automatic occupancy / daylight controls



The offices are have a façade wall with solar blinds which track the sun path.

The office heating / cooling is provided by a Thermodeck system.

Does it save energy ? More metering required to prove the case.

University Place



SCAN Blocks 1, 2 & 3

Offices, Classrooms, Catering Facility

Large Lecture / Conference Theatre

Power and Lighting Boards fitted with Elster A1700 Meters

12 water meters installed for leaking and legionella monitoring

Non – Invasive Ultrasonic Heater Meters will shortly be installed. Value engineered out even though the build is only just about to be fully handed over

Student Accommodation Block and Computer Cluster

Accommodation :- Electric Heating and DHW

56 Whole Current Elster A1700 Meters for flats

Computer Cluster :- Power and lighting

3 CT operated Elster A1700 Meters



Chemistry Extension (Bus linked EX-OR Lighting Controls through out)



John Ryland's Deansgate Library



The old listed building has been refurbished. A new extension has been built requiring 24 hour conditioned air for book storage

Boiler House refurbishment



The LTHW boilers have been renewed and heat linked to two existing and two new buildings.

The EU ETS does not encourage heat linking.

New buildings with separated gas fired plant enable New Entrant Carbon Allowances

EU Emissions Trading Scheme

**UMIST and Victoria University of Manchester
merged in October 2004**

Prior to merger both organisations included in the EU ETS

After the merger

Major campus building works have effected the ETS Permits

No additional allowances for centrally linking heating plant

Additional work checking supplier invoices

Supplier invoices missing or estimated

Manual meter reads have to be recorded each month

Meter reads sent to supplier each month

Carbon Reduction for ETS

Major Boiler House refurbishment (old steam boilers had no economisers)

Heat linking buildings to maximise boiler operating efficiency

Heat linking will benefit the installation of CHP

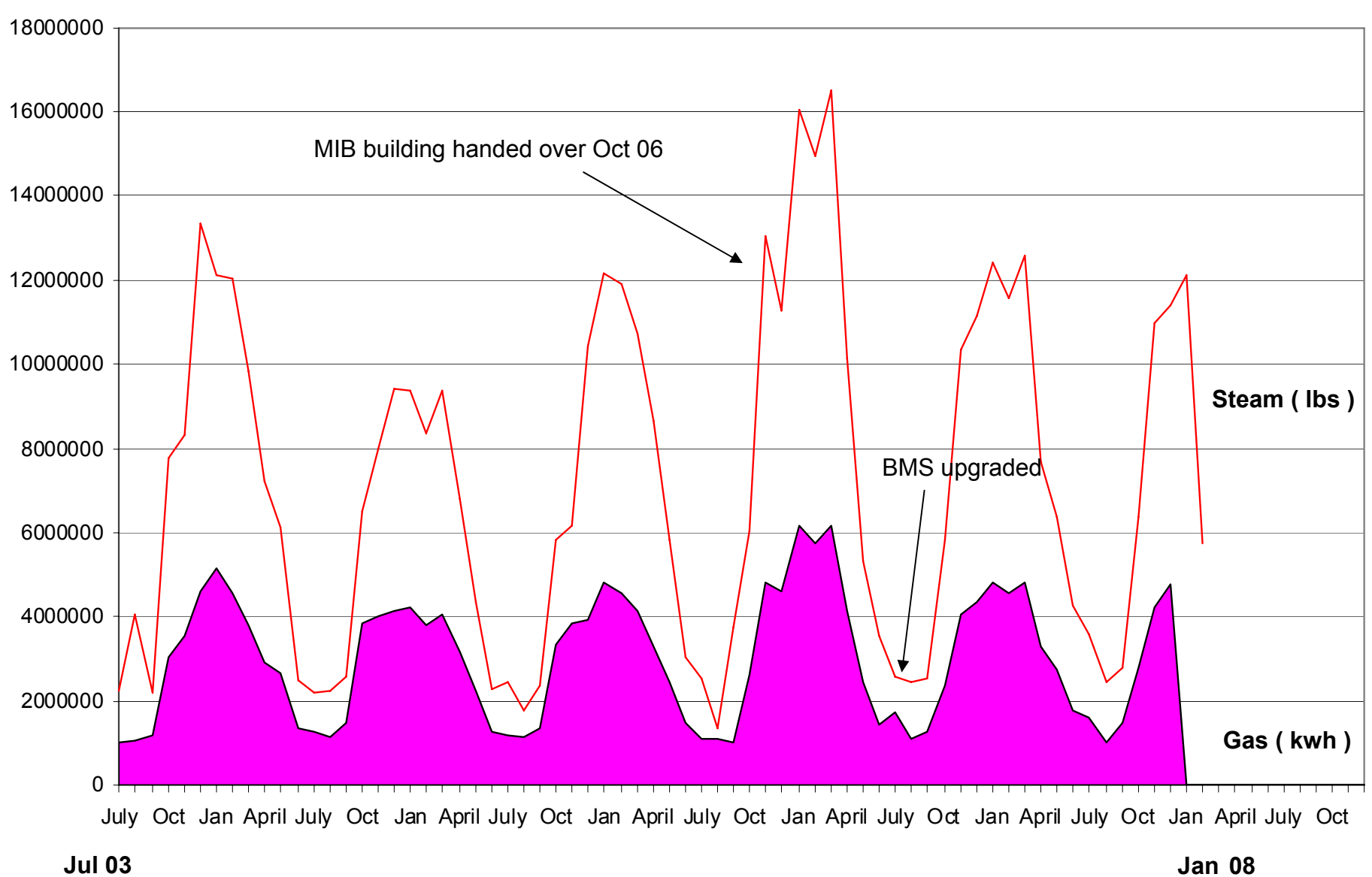
Close monitoring of gas and steam consumption (Half Hour Metering)

Replacement / Up grading of Building Management Systems

Building Management System SMART reporting

Staff training for new technology (Inverters, Lighting Controls)

Sackville Campus Steam / Boiler Gas Consumption (Replacement steam meter installed Oct 04)



Carbon Reduction Commitment

The university will be included in the CRC

Annual Electric Consumption 125 Million kwh

Annual Gas Consumption 170 Million kwh

Over 1 Million Cubic Metres of Water

Utility Meters

- **51** Code 5 Half Hour Fiscal Metered Supplies (95 % of the electric usage)
- Over **100** Non Half Hour Sites (meter exchange in progress to change all to AMR meters)
- **92** Fiscal Gas Meters
- **88** Fiscal Water Meter

University Sub Meters (Electric)

Most electric meters installed by United Utilities Metering

The new buildings have between 40 to 118 sub meters

Electric meters are installed to the same standards as Fiscal Meters

Health and Safety

Accuracy

Remote communications

Ethernet (enables real time half hour monitoring)

PSTN Modems

GSM Modem

Radio 184 MHz (enables real time half hour monitoring)

Modbus

University Sub Meters (Water, Gas, Steam and Heat)

Objective :- to provide half hour data from all types of meters

All pulse outputs are automatically downloaded to a dedicated Energy Management Data Collector

Radio and hard wired pulses stored in memory local buffers

No meter data is collected via the Building Management System

The university has tried to standardise the meter manufacturers

Spirax Sarco for variable area steam meters (high accuracy / high cost)

Actaris water, gas and heat meters (scaleable optical pulse pick up for best profile resolution)

Non – Invasive Ultrasonic Meters to avoid disruptions (high cost however cost effective for pipe work > 100mm, avoids system drain downs)

Coherent Data Collection Software

Radio and hard wired pulses stored in memory local buffers

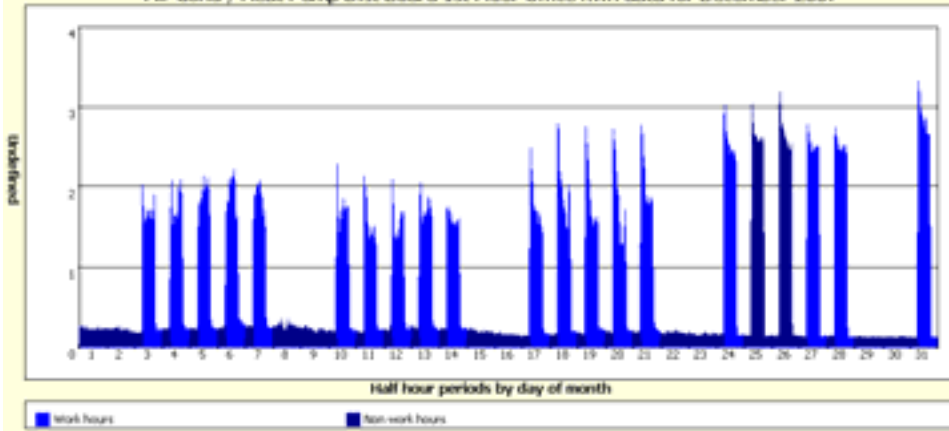
No meter data is collected via the Building Management System

Staff and students have remote access to data

The data collector has

- **Has scaleable high / low consumption alarms**
- **Programmable e-mail alerts**
- **Allows web access for staff and students**

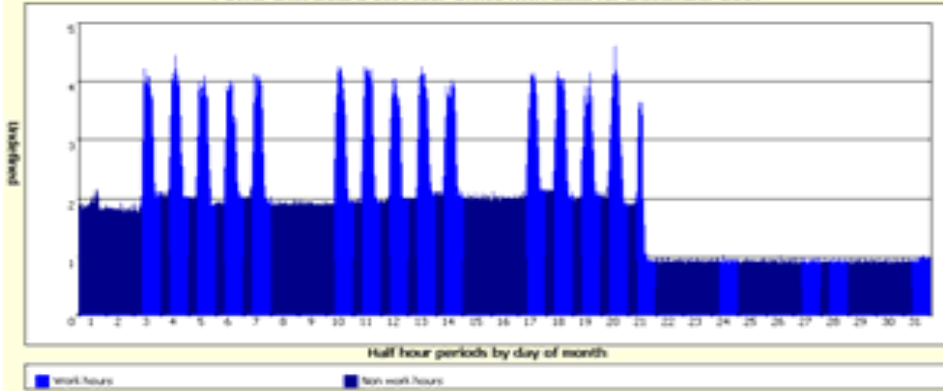
Air Cond / Heat Pump Dist Board 1st Floor Office kwh data for December 2007



Open Plan 1st Floor Admin Office

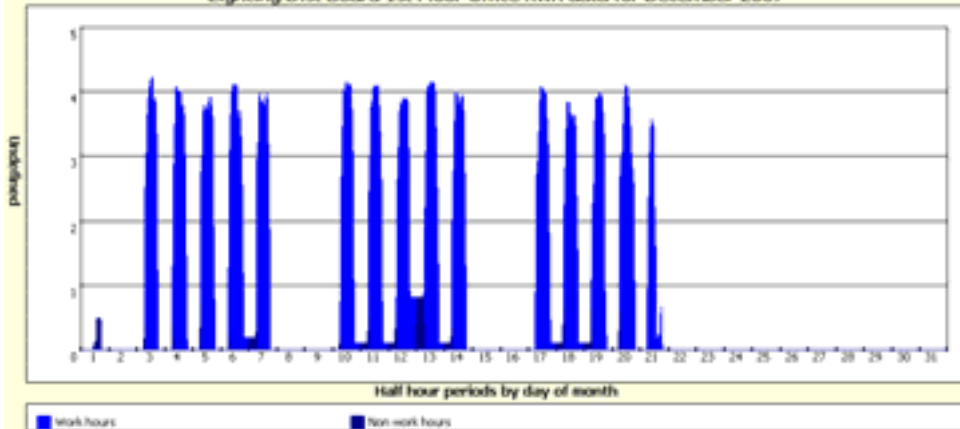
Heat pumps have no holiday shut down control. The control needs to be linked to the BMS holiday program

Power Dist Board 1st Floor Office kwh data for December 2007



With office un-occupied there is a 2kw base load

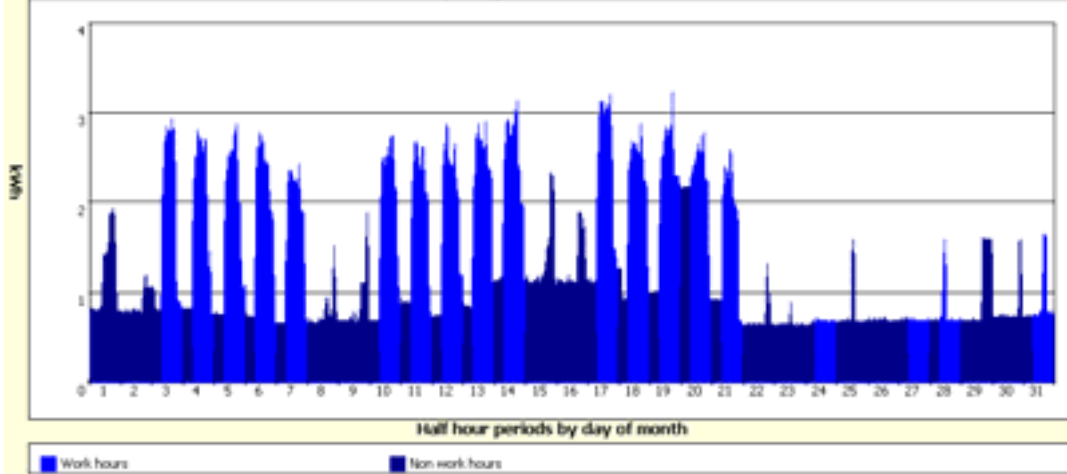
Lighting Dist Board 1st Floor Office kwh data for December 2007



EX-OR lighting controls are used through out the university.

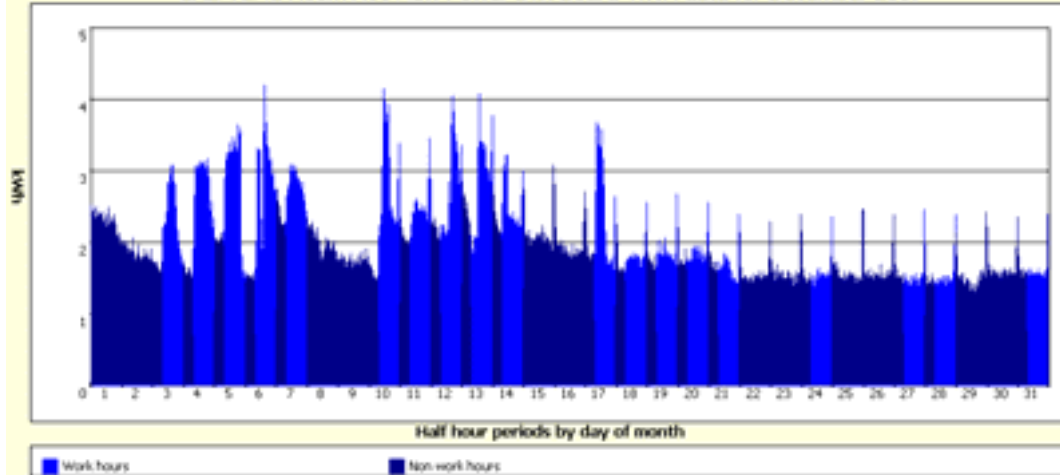
Basement Open Plan Office

CHEM ENG Room A11 New Lighting Dist Board No. KWH data for December 2007



Lighting controls were omitted from this refurbishment project

CHEM ENG Room A11 New Power Dist Board KWH data for December 2007



The base load is 3kw The power board also supplies air conditioning units

Managing your Campus to Benefit from the Carbon Reduction Commitment

Any further questions?

Thank you for attending