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UWE Bristol University of the West of England
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CarbonCredentials
LEARNING AND LEGACY THE ROLE OF EDUCATION IN CREATING HEALTHIER, HAPPIER CITIES
EAUC 20th Annual Conference 25th - 26th May 2016

Martin Oakes, Carbon Reduction Manager

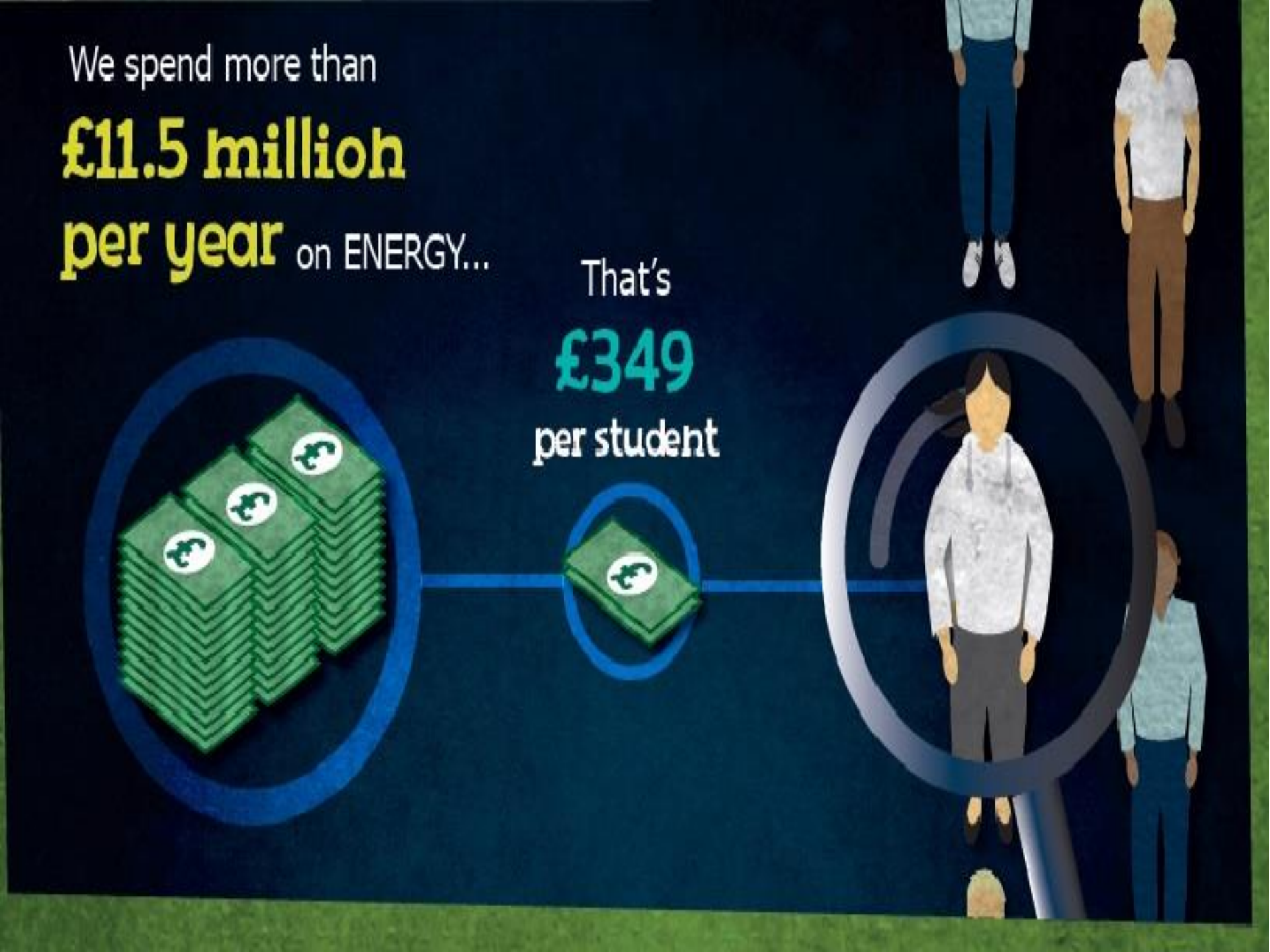
Andy Nolan, Director of Sustainability

Key Facts

- Students
  - UK 33,369
  - China 5,848
  - Malaysia 4,548
  - Total 43,765
- Staff - Total 8,471 – including 3,924 academic and research staff across UK, China and Malaysia

- University turnover circa £570m/yr
- Tuition Fees: £250m
- Funding Grants: £110m
- Research: £105m
- Surplus: £25m
- Estate Revenue Budget: £35m/yr


Carbon emissions have reduced by
4.5% since 2008/2009...
...whilst the amount of buildings have increased by 12%


We spend more than
£11.5 million
per year on ENERGY...
That's
£349
per student

Carbon Management Plan
6 Key Tests

Estates and Operations

1. Meet Carbon reduction targets
2. Reduce energy cost
3. Generate revenues
4. Improve efficiency
5. Improve resilience of energy systems
6. Student Experience

Carbon Management Plan
The Challenge

Estates and Operations

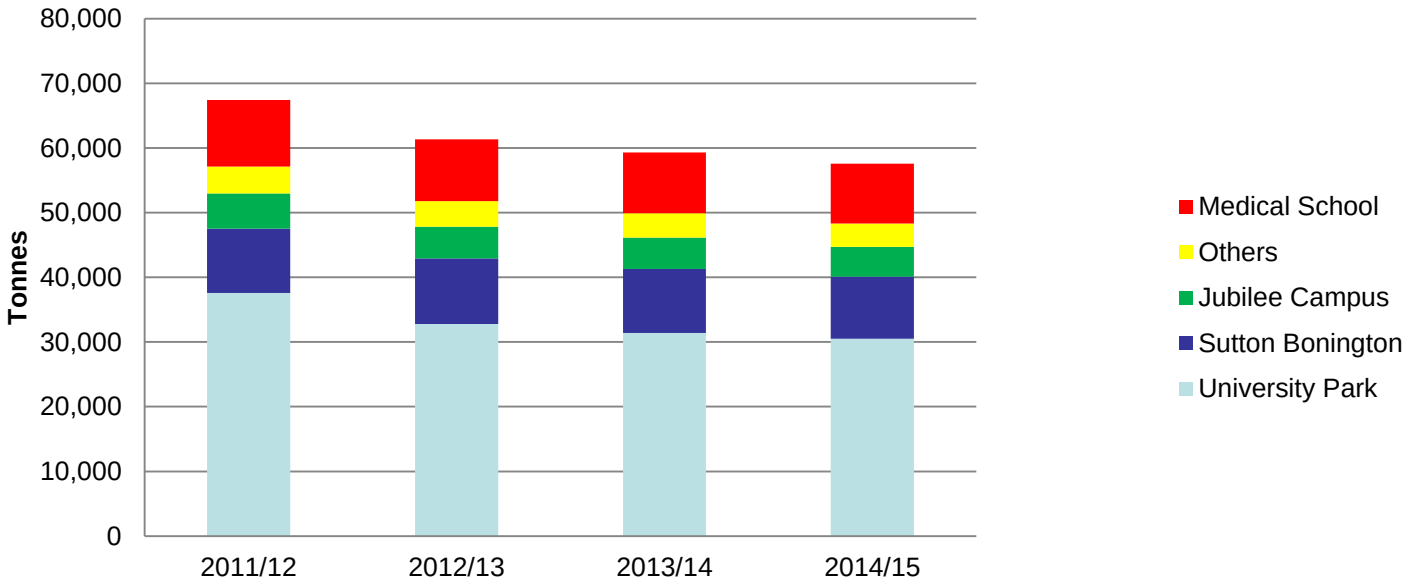
- The University is expanding, more new buildings.
- We have more energy intensive research.
- We all have more electrical Devices/ Gadgets.
- We do more (extended opening hours 24/7!)
- We have greater expectation of our buildings.

Carbon Management Plan Targets and progress

Estates and Operations

2005/6 baseline CO2 emissions of 62,063t. 2020 target 41,000t

Carbon Dioxide Emissions



Carbon Management Plan
What are we doing

Estates and Operations

- **We build to highest levels of** BREEAM accreditation

- **Efficiency gains**
- Plant Replacement- Boilers/chillers/pumps/fans
- Building Fabric- Walls/Roofs/windows
- Controls-on/off/ temp setbacks/ lighting/ Inverters for speed control
- Fume cupboards (Ventilation process)

- **Generation and larger infrastructure Projects**
- CHP
- Wind Turbine
- PV Array
- High efficiency central chilled water plant

Fume Cupboards

Estates and Operations

Many of our standard Fume Cupboards operated 24 hrs a day, 7 days a week and used a total of 60,000 kWh of gas and electricity a year.

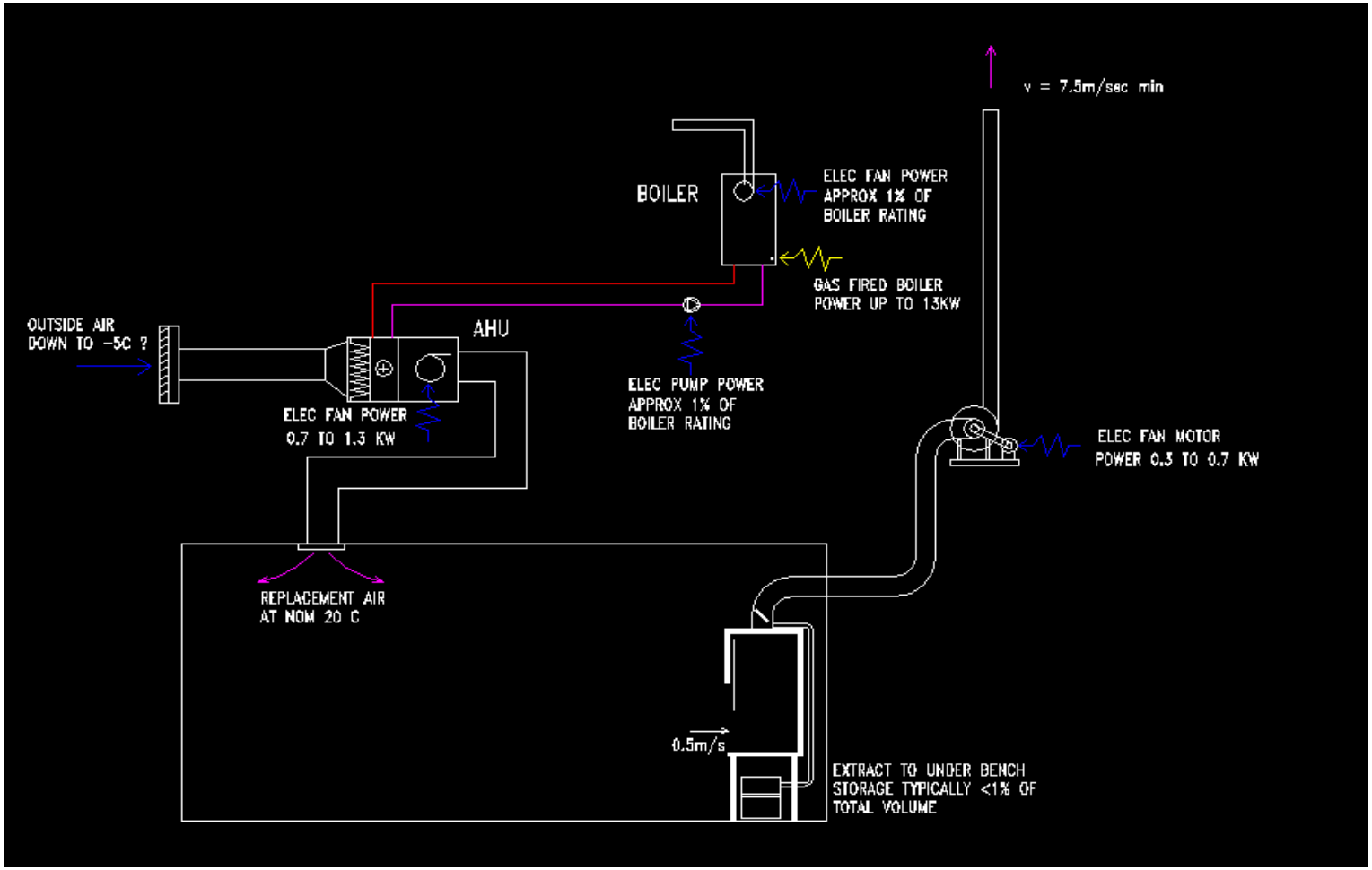
Cost over £2,600

Almost 15 tonnes of CO2

About the same amount of energy to power and heat a large domestic property

Fume Cupboard and associated energy use

Estates and Operations



Fume Cupboards possible Energy/ Carbon savings

Estates and Operations

- Can the fume cupboard be turned off over night and weekends? 75% saving
- Fixed reduction in face velocity eg 0.5m/s to 0.4 m/s subject to risk assessments. 20% saving
- Safe working sash height reduced from 500mm to 400mm. 20% saving
- Full variable volume FC extract system with auto sash closer. 60 to 75% saving

Sutton Bonington Campus. Main Boiler House CHP Plant

Estates and Operations

2 x 400kW Combined heat and power plant.

Total installed cost of £1.35m

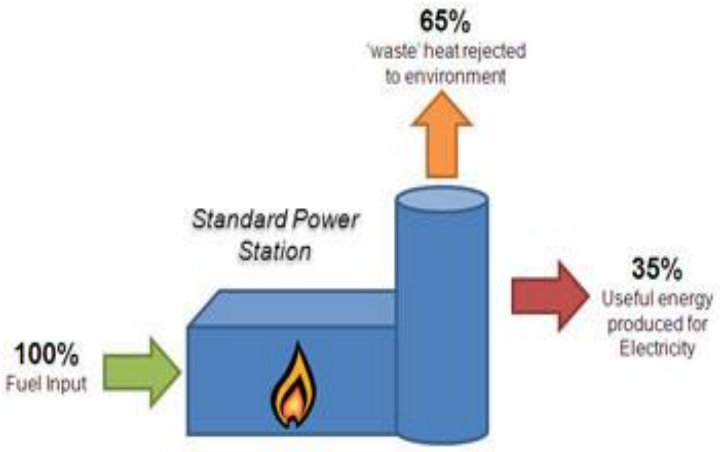
Annual fuel cost saving £260K

Annual Carbon saving 1,150 t CO2

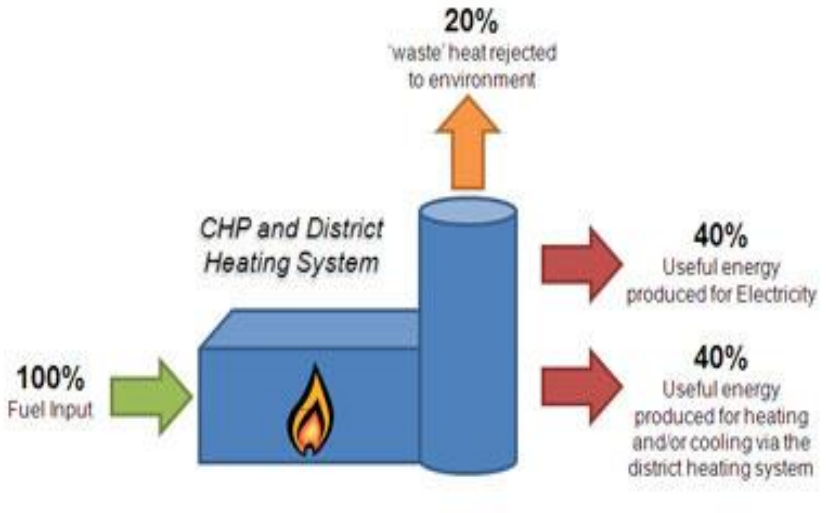
CHP Basis

Estates and Operations

CHP is the simultaneous production of heat and electricity from a single fuel source, in this case Natural gas.
Unlike a conventional power station the heat is used which enables overall significant energy/ carbon savings



Conventional power station

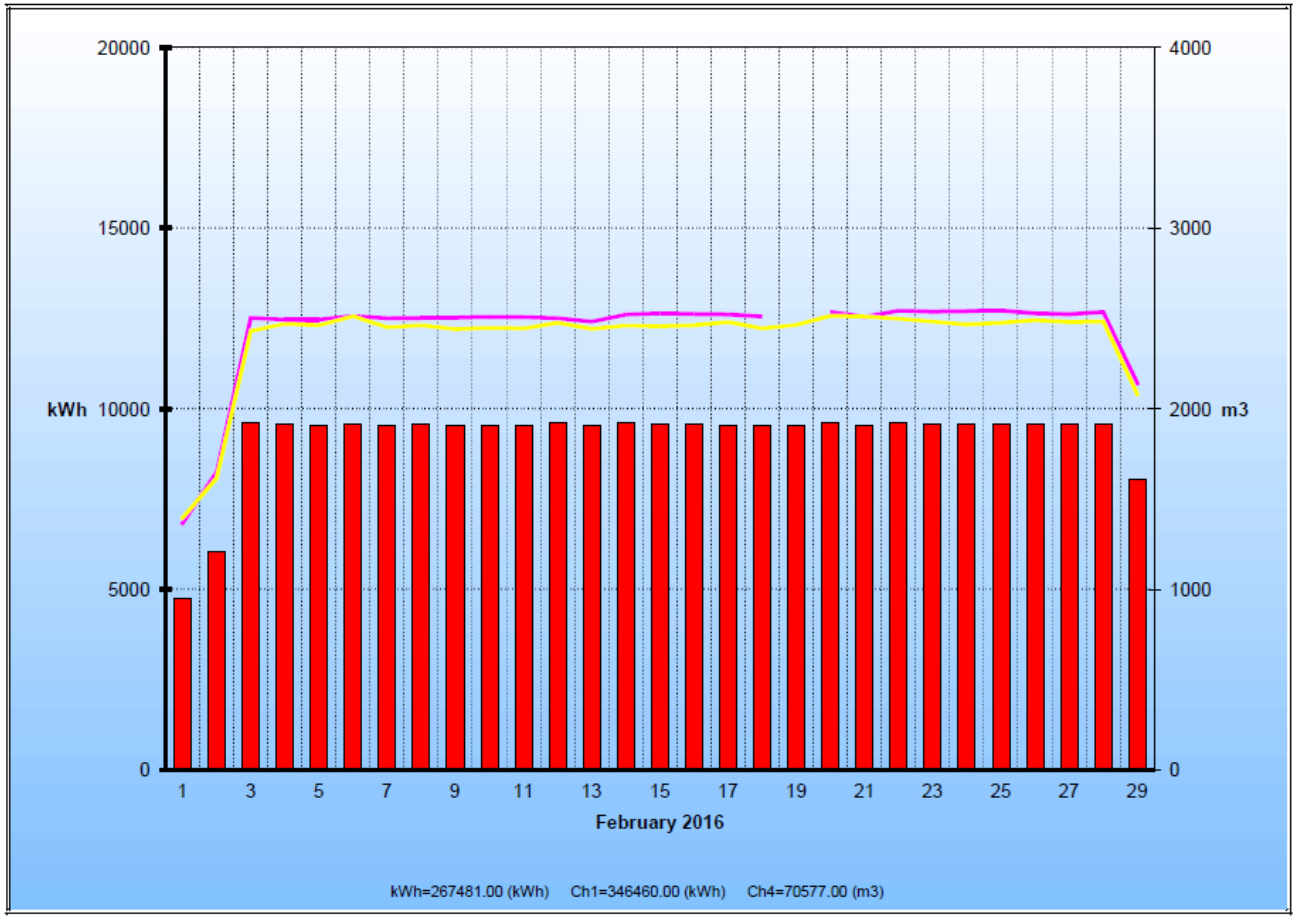


Combined heat and power

CHP 2 Metering Data (Elcomponent Output)

Estates and Operations

CHP2 Elec



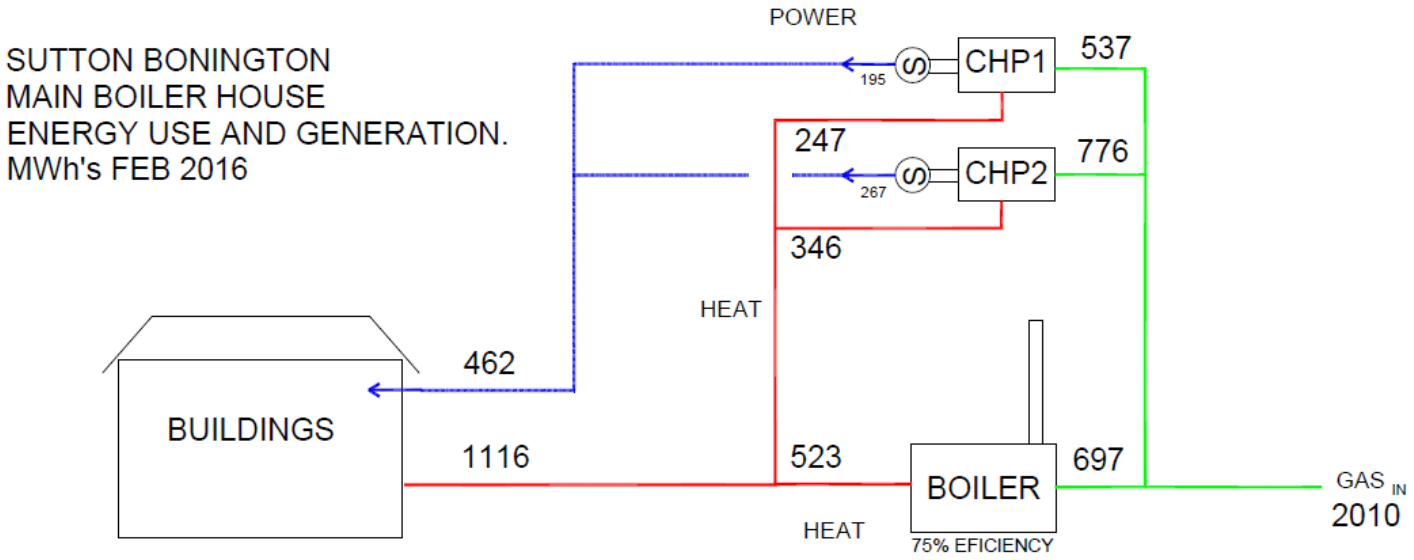
CHP Metering Data (Elcomponent Output)

Estates and Operations

Sutton Bonington CHP Scheme Performance assesment (Feb 2016)							
Notes Service and Ignition issues on CHP1							
		max possible	actual %	kWh	%	£	CO2 t
Elec output CHP1 kW	A1	297600	65.4	194583	36	15566.6	90
Gas input CHP1 kW	B1			537042	100	9666.76	99
Heat output CHP1 kW	C1			246580	46	5917.92	61
Elec output CHP2 Kw	A2	297600	89.9	267481	34	21398.5	124
Gas input CHP2 kW	B2			776347	100	13974.2	144
Heat output CHP2 kW	C2			346460	45	8315.04	85
Boiler Gas heat top up	E			696833		12543	129
Total Boiler house Gas	F			2010222		36184	372
Overall operating energy cost and carbon compasion							
With CHP	F					36184	372
Without CHP	A1+A2 + C1+C2 + E					63741	490
Savings						**27557**	**118**
(Based on meter data from Elcomponent)							

Boiler House
Energy Use (Feb 2016)

Estates and Operations



ENERGY COST

with CHP= 2010MWh of Gas at 1.8p = £36,180

without CHP= 1116/0.75 of Gas at 1.8p = £26,784
plus 462MWh of Elec at 8.0p = £36,960

Net savings = £27,564

CARBON

at 0.185Kg = 371 t CO2

at 0.185Kg = 275 t CO2
at 0.464Kg = 214 t CO2

= 118 t CO2

Sutton Bonington Vets School 1000m2 Photo Voltaic Array

Estates and Operations

- Maximum output of 145kW with estimated annual yield of 127,115kW.
- Total installed cost of £200K
- Annual fuel cost saving of £23K including the Gov't feed in tariff.
- Annual Carbon saving 60 t CO_2

Medical School

- Energy Intensive & Expensive
- Aging Building
- 24/7 Operation
- Electrical £650K
- Steam £1.3m
- Linked to QMC

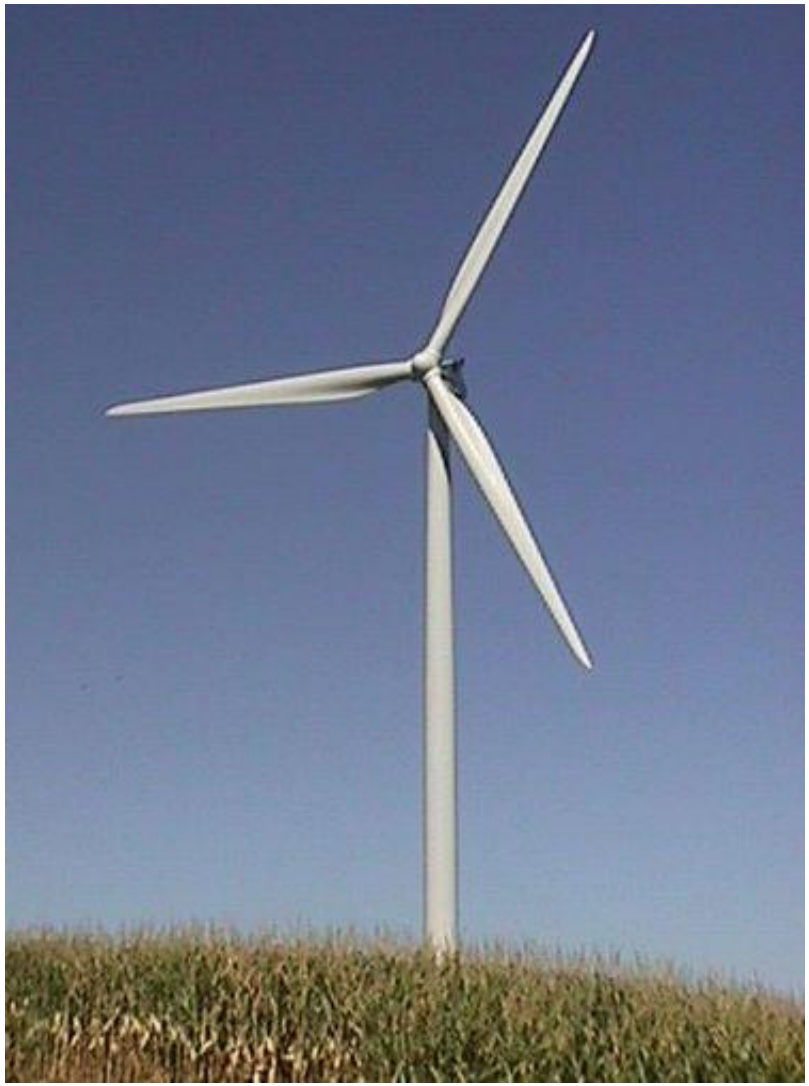
Medical School
Replacement chilled water plant

Estates and Operations

- Installation of high efficiency chilled water plant to replace steam absorption units.
- 3 off units will give an total installed duty of 2MW.
- Total installed cost of £1.45m
- Annual fuel cost saving £276K
- Annual Carbon saving 933 t CO2

Sutton Bonington. 500kW Wind Turbine

Estates and Operations



- Proposed installation adjacent to our dairy farm, subject to planning.
- Annual yield of 1,600,000kWh or approx' 15% of the site electrical consumption.
- Installed cost £1.8m
- Latest! annual fuel saving £212K included Gov't feed in tariff.
- Annual Carbon savings 754t CO2

University Park Main Campus. Proposed 2.3MW CHP Plant

Estates and Operations

- Proposal for 1.5MW and 0.8MW CHP plant.
- Total installed cost £3.2m
- Annual Fuel cost saving £413K.
- Annual Carbon savings 2,303t CO2

Sustainability contacts

www.nottingham.ac.uk/sustainability

sustainability@nottingham.ac.uk

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Any questions?

The University of Nottingham

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