



UNIVERSITY OF
LEICESTER

Estates and
Digital Services

Heat decarbonisation: planning for action

Chrispal Anand

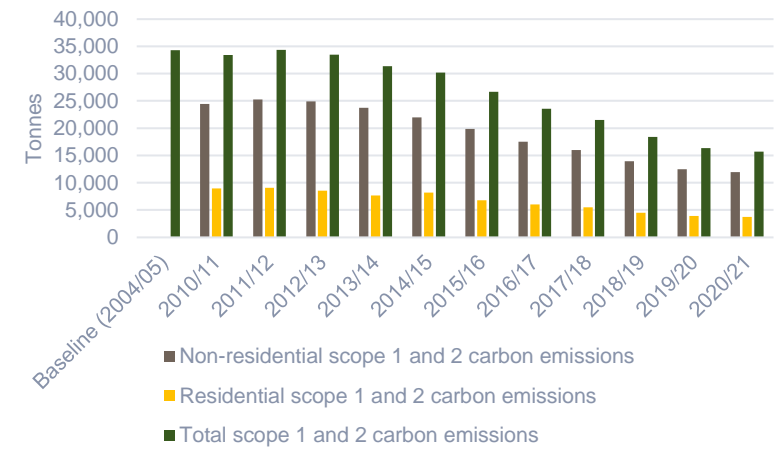


UoL – Our Net Zero Carbon journey



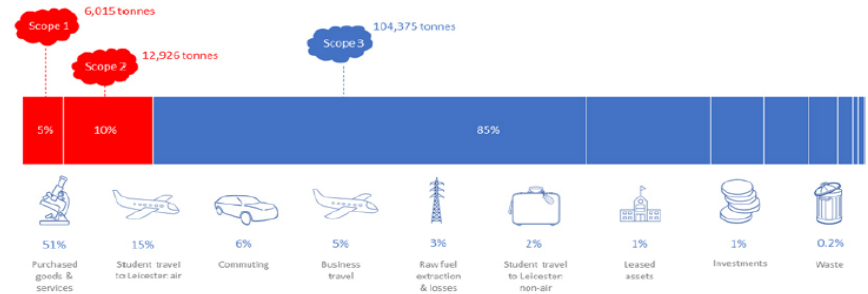
- Carbon management is nothing new ... 15+years
- Some of our successes and highlights:
 - Carbon reduction of 54% (absolute) and 76% (relative to our turnover) against 04/05 baseline.
 - 60% of the floor area is energy ratings 'A' – 'D'.
 - 29% of energy is from district low carbon heat.
 - Largest Passivhaus building in the UK
 - £5.4m+ of grants for carbon saving projects.
- Net Zero Carbon (new journey from 20/21)
 - Committed to becoming Net Zero carbon by 2040 for all scopes
 - Developed key guiding principles
 - Committed to Net Zero Plus approach

UoL Annual Carbon Emissions



UoL – Our Net Zero Carbon journey

- Our new baseline year for NZC is 2018/19



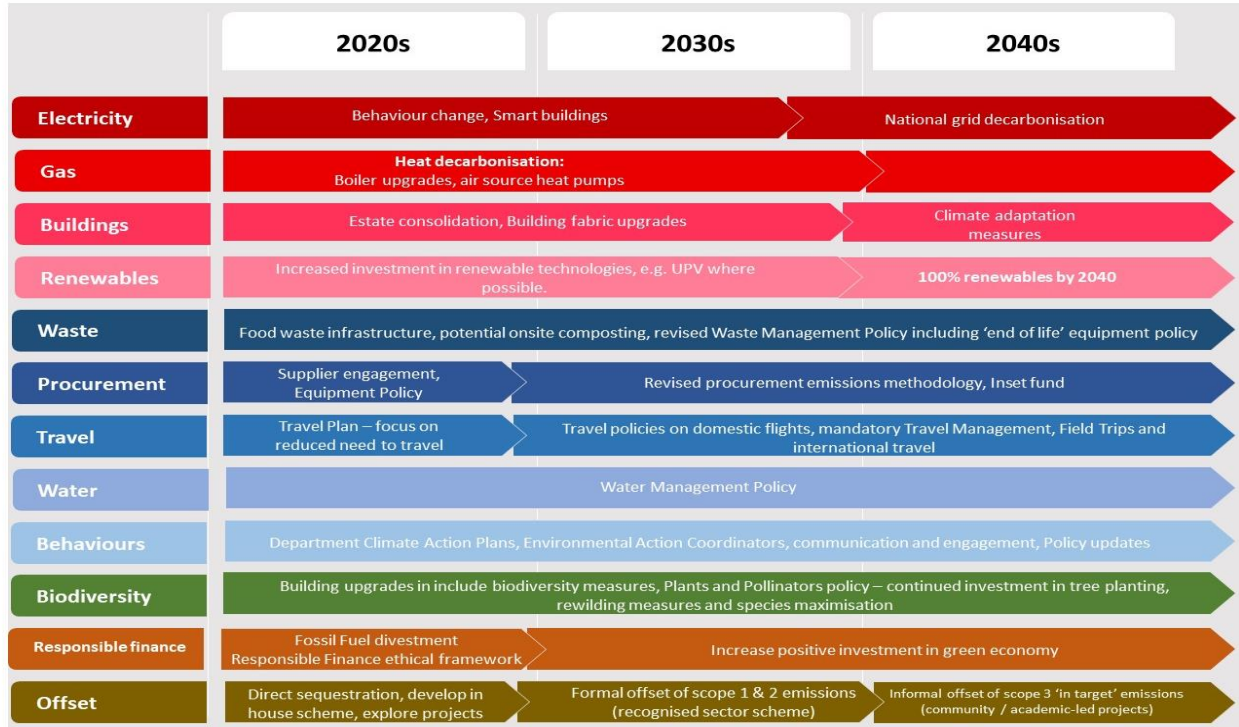
- Our Net Zero Plus approach
 - We’ve committed to reducing all our greenhouse gas emissions before offsetting.

Figure 2—2 University measured carbon emissions 2018/19.

Measure	Avoid	Mitigate	Plus
<ul style="list-style-type: none"> • Annual reporting • Improved data collection 	<ul style="list-style-type: none"> • Efficient buildings • Renewable energy • Behaviour change • Updated policies 	<ul style="list-style-type: none"> • Offset residual emissions 	<ul style="list-style-type: none"> • Biodiversity • Resilient estate • Responsible finance • Advocacy

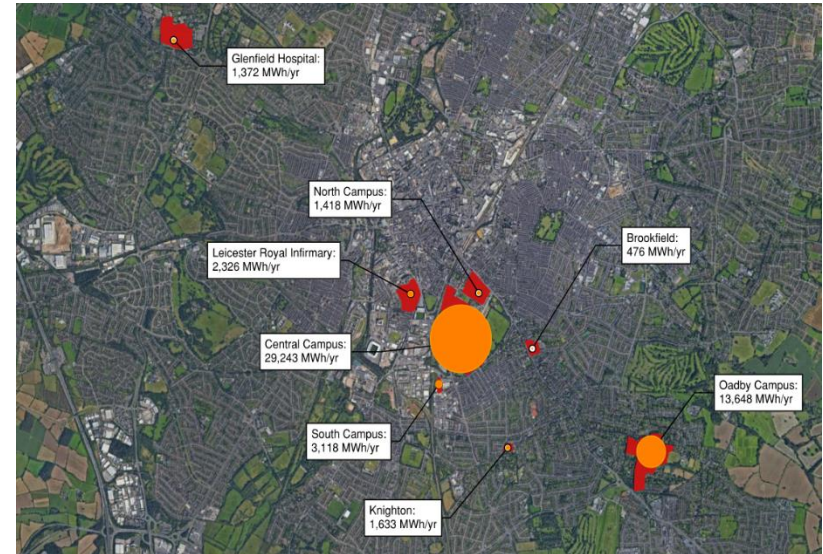
UoL – Our Net Zero Carbon journey

- Net Zero Plus Plan



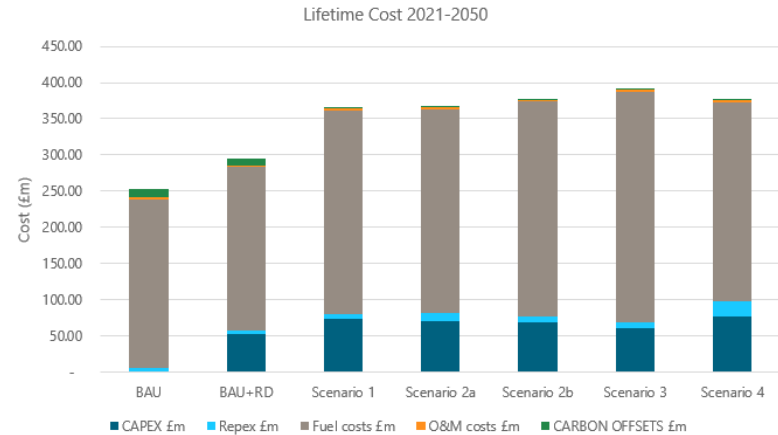
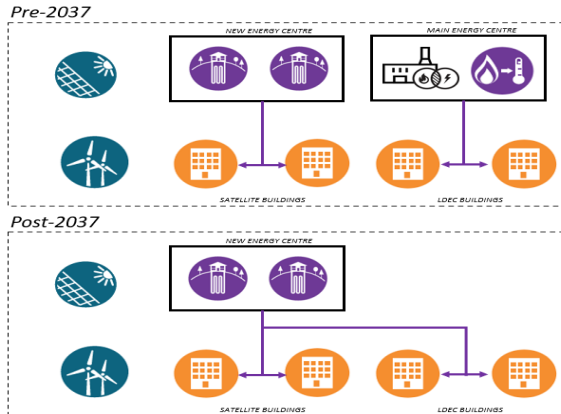
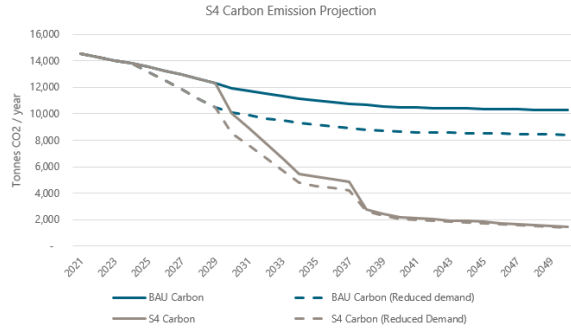
UoL – Our Net Zero Carbon journey

- First Heat Decarbonisation Plan (HDP)
 - During 2021 as part of the PSDS 1, UoL commissioned Buro Happold to produce Heat Decarbonisation Plan 1.
- HDP1 (RIBA Stage 0) included:
 - energy demand analysis and modelling;
 - demand reduction;
 - technology review;
 - scenario planning options;
 - Offsetting;
 - CAPEX, Fuel Cost, O&M Cost and Offsetting Cost



UoL – Our Net Zero Carbon journey

- Using techno-economic modelling 4 scenario options were considered:



UoL – Our Net Zero Carbon journey

- Key conclusions from HDP1 - RIBA Stage 0 Plan
 - Energy Demand Reduction (EDR) should be first before heat decarbonisation to reduce demand and running cost
 - Heat Decarbonisation Plan (HDP) for central campus is constrained by district heating scheme until 2037
 - Energy Demand Reduction only for Central Campus site until 2035 due to district heating scheme network
 - Site specific HDP + EDR is required
- HDP2 + EDR to be developed and completed for each site in 2 Phases
 - Phase 1: 2 Halls of Residence Sites (pilot)
 - Phase 2: Remaining sites excluding Central Campus (EDRP only)

UoL – Our Net Zero Carbon journey

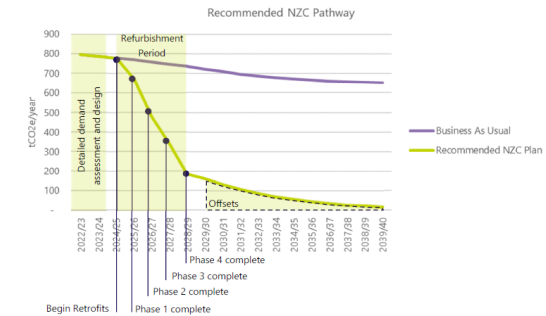
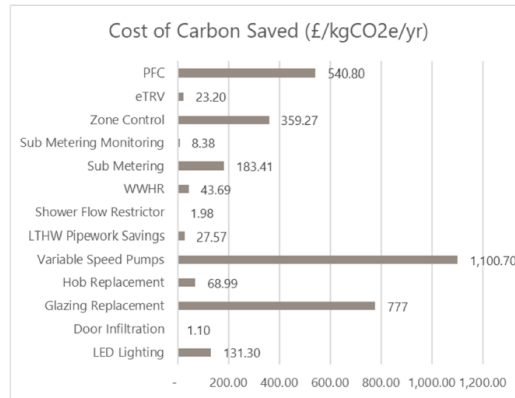
- Currently underway HDP2: John Foster Site (Halls of Residence)

Existing Estate Summary	
Number of buildings	16 buildings
Total annual energy consumption (kWh)	4,000,000
Total annual carbon emissions (tCO ₂)	800



Detailed Short Term Action Plan

- Install proposed PV array on the Student Hub
- Conduct detailed PV study for Pavilions and undertake recommendations
- Undertake enhanced metering on each block to understand a more detailed breakdown of gas and electrical consumption
- Undertake detailed assessment of each block to make individual plans for retrofit interventions
- Consider undertaking GSHP feasibility to understand if part of the load could be taken by a ground source system to improve efficiency and space planning.



UoL – Our Net Zero Carbon journey

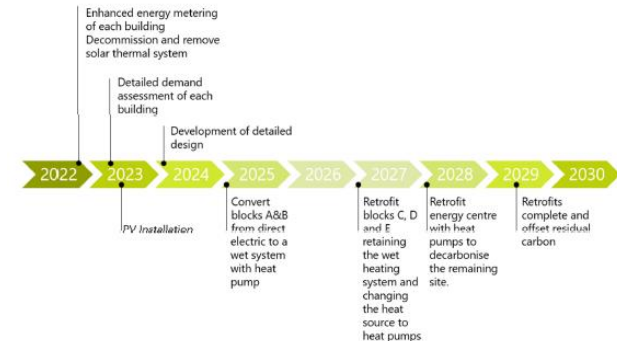
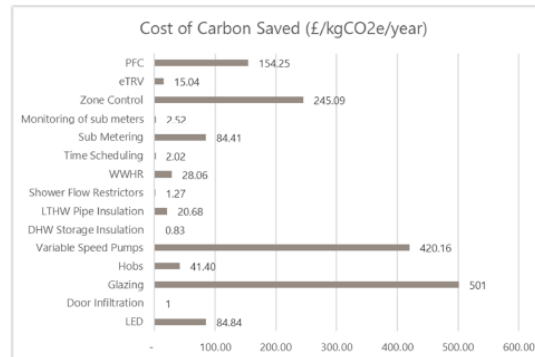
- Currently underway HDP2: Nixon Court Site (Halls of Residence)

Existing Estate Summary	
Number of buildings	10 buildings
Total annual energy consumption (kWh)	7,700,000
Total annual carbon emissions (tCO ₂)	1600



Detailed Short Term Action Plan

- Decommission and remove solar thermal system and replace solar thermal panels with photovoltaics
- Undertake Enhanced metering on each block to understand a more detailed breakdown of gas and electrical consumption
- Undertake a detailed assessment of each block to make individual plans for retrofit interventions
- Consider undertaking GSHP feasibility to understand if part of the load could be taken by a ground source system to improve efficiency and space planning.



UoL – Our Net Zero Carbon journey

- Future Net Zero Carbon pathways (next 12 months):
 - HDP2 and Energy Demand Reduction - Phase 2 work is expected to commence in autumn-22 for the remaining sites
 - Currently developing a 100% electric fleet strategy by 2030
 - Embedding change – hearts and minds using Local Environmental Action Plan tool
 - Carbon Offset Policy (in line with the sector) but not before reducing utility consumption

Five themes:

- Energy
- Purchasing and resource consumption
- Travel
- Curriculum and research
- Advocacy (ethical investment, procurement, leadership)



The screenshot shows the 'Local Environmental Action Plan' tool interface. At the top is the University of Leicester logo. The title is 'Local Environmental Action Plan'. Below the title, there is a welcome message: 'Welcome to the University of Leicester's Local Environmental Action Plan (LEAP) tool. With environmental sustainability a guiding principle of the University Strategy, we are seeking to embed environmental sustainability into decision-making and activities across all functions of the University. Creating an environmental action plan for your School/Department or Division is an important step in this process. Your action plan will also support the University's commitment to reducing carbon emissions, with targets to be carbon neutral by 2030 and net zero by 2040. This tool acknowledges that environmental impacts and opportunities to make a positive contribution will vary by department, so you are encouraged to tailor the plan to your specific context. Having created your LEAP you can see the resources signposted on the tool to undertake the actions and monitor your progress. Need help getting started?' At the bottom, there is a 'LOG IN' button and a note: 'It's time to review or update your action plan'.

Carbon offset cost has been based on the Green Book, Non-traded, Central Table 3: Carbon Prices and sensitivities 2010-2100 for appraisal, 2018. The cost of carbon offset has been applied from 2033.

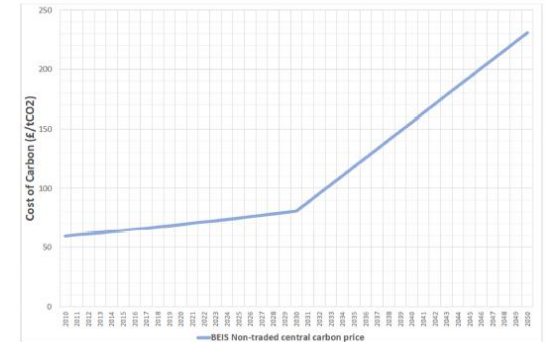


Figure 8-3 Carbon offset cost predictions

UoL – Net Zero Carbon journey .. Challenge

- Selection of LZC technologies for site specific and timing of electrification of heat
- High temperature or low temperature heat pumps?
 - Meeting DHW demand via low temperature heat pumps
- Existing infrastructure to support heat Decarbonisation transition and available electrical capacity from the grid
- Limitation of district energy services contract
 - The district scheme reduces our ability to further reduce our carbon emissions on the Central Campus until 2037.
 - Carbon emissions of heat consumed from district is stagnant.
 - No current coherent Net Zero Carbon plan for the district LDEC's (NZC target is 2035).

UoL – Net Zero Carbon journey .. Challenge

- Invest to save to optimise existing building stock
 - Investment circa. £50m+ would be required over 10 - 15 years to decarbonise the estate.
 - Need funding commitment to optimise known initiatives e.g.
 - To improve building controls for comfort/maintenance/energy and invest in better building controls
 - Replace obsolete building controllers.
 - Projects to improve sensing and zoning of heating systems in buildings.
 - Energy efficacy of M&E assets - LED lighting upgrade; ventilation plant fan upgrade, etc.
 - Fabric improvement
 - Increase onsite generation - Installation of additional PV on existing roofs

UoL – Net Zero Carbon journey .. Challenge

Potential costs

Scopes 1 & 2

Potential offset costs/ton CO₂ (BEIS data)

2030	2040	2050
£80	£156	£230

UoL annual offset costs (from 2040)

	BAU (no investment)	Heat Decarbonisation investment (£77.5M over 30 years)
Offset	£1,591,200	£343,200



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