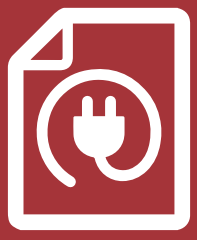


Lancaster University Energy & Utilities Plan

2017-2022

Lancaster University

"We make campus an inspiring place to be"

Contents

1 Introduction

Lancaster University is a significant energy user. Energy is critical to the campus and the services it provides to research, teaching, students and staff. Energy underpins al university life and supports our core activities.

Lancaster University recognises that its energy consumption has significant impact both financially and environmentally, and that it has a duty to minimise energy costs, reduce energy waste and carbon emissions. It also has a duty to improve the resilience of its energy supplies to enable it to better deal with supply disruptions. The university aims to address core energy requirements, providing flexible and resilient services to offset and minimise negative impact.

Lancaster University recognises the positive environmental impact it has as an institution, through the education it offers its students, the research conducted the local community, supplier and business partnerships. The university aims to maximise these positive impacts.

The Energy & Utilities Plan forms part of the overarching Facilities Sustainability Strategy, which draws together and puts into context all environmental sustainability strategies and plans within the Facilities department.

The Energy & Utilities Plan outlines Lancaster University's strategic objectives for reducing utility consumption, costs and carbon emissions.

2 Background and Context

The energy 'landscape' is changing. This includes changes to energy generation and distribution nationally and internationally, as well as regulatory, legislative, climatic, scientific, technological and commercial changes. The university aims to be responsive to these changes, to make sure that it is prepared for the future. It expects increasing levels of volatility and change as the effects and understanding of climate change and fossil fuel depletion increase.

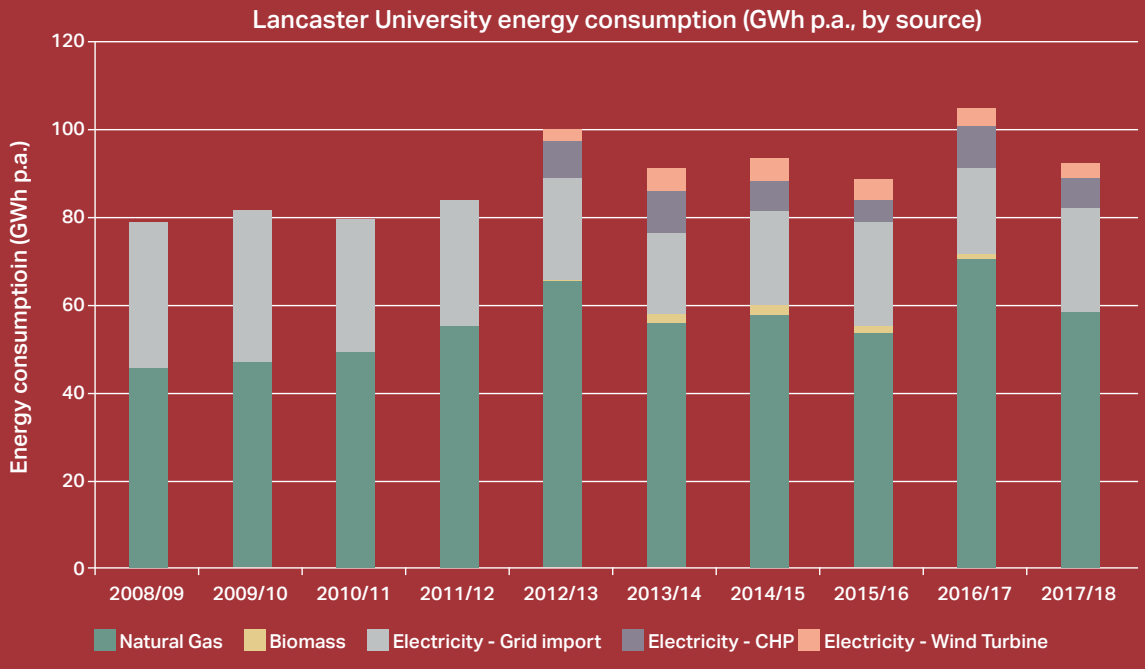
Lancaster University's Strategic Plan for 2020 (www.lancaster.ac.uk/strategic-plan) sets out how the university aims to become globally significant in a range of areas, including becoming an exemplar in practice and thinking on environmental sustainability. Specifically, the strategic plan commits the University to meeting its carbon emissions reduction targets of 43% by 2020 and 83% by 2050, (compared to 2005 emission levels).

The Energy & Utilities Plan is a key document in ensuring the delivery on this ambition and establishes overall direction for energy and utility management over the period 2017-2022. This Energy & Utilities Plan, informed by the university's understanding of the impact of its consumption, aims to capitalise on the opportunities and minimise the threats presented by changes in the future energy landscape.

In 2017/18 Lancaster University used 92.4 GWh of energy from a variety of sources, resulting in emissions of 18,098 tonnes CO2e.

The Energy & Utilities Plan forms part of the overarching Facilities Sustainability Strategy which draws together and puts into context all environmental sustainability strategies and plans within the Facilities department, including the Travel Plan, Ecology Plan, Behaviour Change Plan, Carbon Management Plan, Waste Plan and Energy & Utilities Plan. In addition, the Facilities Sustainability Strategy establishes the context and contribution of specific plans and strategies to the Facilities ISO 14001 Environmental Management System (EMS) and broader Facilities and University Strategies, such as the Estates Masterplan. The Facilities Sustainability Strategy comprises Facilities' contribution to the University's Environmental Sustainability Plan, which establishes the University's ambitions and addresses the environmental commitments made in the University Strategic Plan for 2020.

Climate science is rapidly developing, as is our understanding of the impacts of climate change. Lancaster University will review its Energy & Utility Plans and associated objectives and targets regularly in light of these changes.



3 Strategic Objectives

3.1 Scope

The scope of this strategy extends to all utilities generated or procured centrally by Lancaster University and the systems using those utilities. The utilities include biomass (woodchip), district heating, electricity, LPG, natural gas, oil and water.

The scope further includes the interface between the University's operations, and its research, teaching and engagement activities as they relate to utility systems, utility consumption and their impacts.

Excluded from this strategy are utilities supplied to tenants (except tenant recharging), utilities consumed in travel (such as business travel) and energy embedded in goods, services, or buildings.

3.2 General Principals

Lancaster University has a number of principal strategic objectives that can categorised as follows:

Compliant

The university will remain fully compliant with all energy and environmental legislation. It will:

- Be informed and prepared to meet legislative changes.
- Ensure ISO 14001:2015 management system is robustly applied and the university is not at risk of legal challenge, reputational damage or restricted in its sustainability contribution to a global climate challenge.

Highly Efficient

The university will:

- Proactively minimise utility wastage and demonstrate best value consumption whilst ensuring that utility usage reliably supports the university's core activities.
- Be 'data aware' in its approach to performance management, using its new Energy Information System to analyse, model and forecast data to inform decisions and prioritise improvements.
- Recognise that data analyses and forecasts only provide a lens through which efficiency and performance viewed, supplementing this with wider sector and campus knowledge.

Resilient, Flexible

The University will:

- Increase flexibility in its energy system, including in its generation, distribution, demand and storage systems. This flexibility will help to the university to become resilient and demand led.

Low or Zero Carbon

The University will significantly reduce its carbon emissions by:

- De-carbonisation of its energy supplies and generation systems.
- Investment into utilities infrastructure to reduce carbon.
- Promoting opportunities to become a Net Zero-Carbon university before 2050 to align with the COP24 targets of limiting temperature rise to less than 1.5°C.

Technology, Innovation and Research

The University will actively seek out opportunities to:

- Improve promotion, design, operation and management of utilities infrastructure and systems.
- Influence and support research and 'Living Lab' learning.

3.3 Strategic Objectives

The University's strategic objectives are to:

- Achieve the targets outlined in its energy and carbon policy, currently 83% reduction in CO2 emissions by 2050, compared to 2005.
- Update those targets to reflect the latest climate science. This will likely mean greater CO2 emissions reductions, achieved before 2050.
- Become an exemplar in practice and thinking.
- Minimise its energy consumption and costs.
- Increase its energy resilience.
- Increase support for research, teaching and engagement around energy and carbon. This includes support for a Living Lab.

4 Funding

The Utilities Plan will utilise existing university capital funding allocations to Facilities, approved by the Capital Planning Group (CPG), to progress delivery plans and associated actions where possible.

The following capital budgets will be utilised:

- The Carbon Reduction and Renewable Energy Budget.
- The Strategic Maintenance Investment Programme (MIP).
- The Facilities Minor Works Budget.

It is recognized however that this funding is not sufficient to meet all university ambitions to reduce carbon emissions and the Utilities Plan will capitalise on external financial funding opportunities available for some projects. Potential sources include:

- Salix Finance.
- Research grant funding.
- Heat Network Delivery Unit funding.
- Equipment suppliers offering Pay As You Save (PAYS) funding.
- Organisations offering energy efficiency capital funding.
- Organisations offering general funding.
- Community owned renewable energy schemes, aimed at staff, students and alumni.

The University will conduct a forecasting exercise outlining projected emissions to 2050 under a range of scenarios, taking account of projected growth, renewables deployment, staff engagement and energy efficiency measures. The outcome will be used to assess any gap between the University's ambitions and business-as-usual, and inform the energy action plans and capital budgets.

5 Culture and Engagement

In terms of cultural change, the Sustainability Management Group and nominated Sub-Groups will actively promote the creation and management of an environmentally sustainable culture at the university where decisions made have sustainability in mind. Cultural and behavioral change projects and initiatives may be developed as part of an integrated approach with other Faculties Sustainability Plans such as the Behaviour Change Plan. This will primarily encourage an emergence approach.

5.1 Students

A focus on awareness and engagement will be delivered by promotional initiatives such as the student 'switch'-off' competition, delivered in cooperation with an external partner and the Green Lancaster team. Run annually across all student residences, subject to UPP participation, this will raise awareness of the impact utilities saving has in support of the wider carbon reduction and sustainability agenda.

5.2 Staff

There is a strong commitment to utilities management and strategic sustainability plans and dedicated Facilities resources are in place across a number of dedicated full-time staff roles, see below:

- Energy Manager.
- Building Energy Management System Technician.
- Carbon, Environment and Sustainability Manager.
- Travel Coordinator.

Resourcing requirements will be assessed in light of delivery requirements for strategic projects and initiatives identified and additional resources will be sourced from external Consultants / Suppliers as required.

5.3 Champions

An existing network of environmental champions, invited to participate in the utility management program, will enable their local knowledge and insight to offer invaluable support in effectively communicating and delivering localised or campus wide utility management initiatives. An example of this is acting on information from the Energy Information System in order to reduce utility consumption.

5.4 Local Community

Collaboration opportunities will be proactively sought and developed, examples could include community funded renewable energy or energy efficiency projects.

5.5 Research, Teaching and engagement

Support for research and tuition, where possible, will be given in the form of access to utilities management systems, processes and data and opportunities extended for on-campus site visits and presentations to interested parties.

The use of temporary staff including interns and volunteers will be considered and training provided by internal or external providers.

6 Strategic Utility Management

Lancaster University aims to use the minimum amount of utilities necessary in order to conduct its operations whilst achieving low operating costs and reducing carbon emissions. It is recognised that no system can ever be 100% efficient, however this Energy & Utilities Plan aims to continuously improve the efficiency of the university's utilities, buildings and services infrastructure.

The efficiency of generation, distribution and use of utilities across campus prioritised across a number of key areas.

6.1 New Buildings and Major Refurbishments

The university has a master plan in terms of the development of the campus, which includes a range of new buildings as well as a rolling refurbishment program. The university previously targeted aims refurbishments to achieve BREEAM excellent, and for new builds to achieve BREEAM outstanding ratings, however opportunities to move beyond BREEAM are being explored.

Particular attention will be paid to large-scale new build projects and significant refurbishment projects. Efforts will be made to influence the utility efficiency of these initiatives at an early enough stage for them to make an equitable contribution to the University's long-term carbon targets. Specific activities include the improvement of the Minimum Standard Specifications for energy systems and buildings to reflect changes in technology, university specifications and ambitions, project reviews at design stage and post occupancy, emissions forecasting and utility system master planning.

6.2 Efficiency and Performance Management

The first phase of the Energy Information System (EIS) has now been developed and is undergoing phased implementation. EIS aims to store energy related data in a single location and make this accessible to end-users. It includes:

- Energy metering data, including wind turbine, CHP and biomass boiler.
- Building Management System (BMS) data.
- UPP accommodation metering data.
- Hazelrigg weather station data.
- Other data sets, e.g. room use/ timetable information.

Once operational, the EIS will help to achieve live visualisations of energy consumption on campus, identification of efficiency improvements and reduced energy consumption, estimated at £350,000 p.a. and 1,150 t CO2 p.a., after 3 years of EIS operations.

The EIS will support the University's research, teaching and engagement activities, including:

- Undergraduate and PhD projects in various disciplines.
- Increased grant income for research incorporating data obtained from EIS.
- Consistently higher rankings in field of energy, in the UK and globally.
- Increased number of student lectures and modules incorporating data obtained from EIS.

6.3 Infrastructure - Design, Operation and Investment

Lancaster University has successfully implemented a range of significant energy projects demonstrating its commitment to reducing its energy consumption and carbon emissions. This includes the installation of a Wind Turbine, Biomass Boiler, Combined Heat and Power plant, high efficiency gas boilers, building insulation upgrades, LED lighting & controls and energy monitoring improvements. As a result energy costs and carbon emissions have been reduced however despite this, achieving the University's carbon emissions targets remains a significant challenge.

Lancaster University aims to achieve exemplar practice in the efficiency, flexibility and resilience of its energy infrastructure. The achievement of the university's emissions reduction goals requires changes to the university's infrastructure and the management thereof. Infrastructure, in particular new buildings, will need to be designed and built to significantly higher levels of efficiency. This requires the introduction of life-cycle cost assessments for all significant projects.

The Energy & Utilities Plan has identified a strategic need for increased efficiency and flexibility of existing infrastructure and the improved use of consumption data to influence estate and localised energy efficiency. It outlines that opportunities for increased on-site generation and storage, together with closer collaboration with research, teaching and engagement activities of the University will provide opportunities to achieve strategic objectives; in addition, the establishment of a Living Lab will place the university at the forefront of sustainable built environment development.

Lancaster University's carbon reduction targets will require change at all levels in the organisation. The university's district heating system is a key tool for the decarbonisation of heat supply on campus. It enables the use of large Low and Zero Carbon (LZC) heat generators, and benefits from increasing the diversity of heat demand across campus. It also enables increased optimisation and scheduling of heat generation, storage and consumption.

6.4 Delivery Project Priorities

The following projects will be prioritised:

- Conversion of the district heating system to variable flow operation.
- Energy Centre separation of heating generation and distribution.
- Extensions of district heating system to the Health Innovation Campus, Infolab and wider campus.
- Feasibility study of connecting the rest of campus to the district heating system.
- Improvements to the energy metering system.
- Feasibility study for a PV Farm on campus.
- Cavity wall insulation upgrades.
- Heating controls improvement project.
- Heat pumps to deliver space heating and domestic hot water.
- Improved monitoring and control systems.
- Water borehole.

Scenario modelling will help to understand the challenges posed by LU's carbon targets, and how they relate to projected growth. The underlying energy demand profile of the campus will change considerably; demand will be increased as a result of additional (and very highly efficient) buildings and people, but at the same time it will be reduced as a result of improved efficiency through building refurbishment projects and data driven optimisations. Specific aims include; extension of the district heating system to all viable buildings on campus, design specification calling for low temperature heating systems and ultimately zero carbon generation campus before 2050.

6.5 Demand Led Supply

One of the features of highly efficient utility systems is that they are demand led.

For example, demand for heat is influenced by the University's policy on space heating which constrains both time and temperature of heating provision. Demand for heat is also influenced by a buildings occupancy, internal and external temperatures, heat gain and other factors. Energy efficiency can be improved if the provision of heating and heating control is better adapted to individual demands for thermal comfort.

The Energy & Utilities Plan aims to improve control of utility consumption progressively to reflect these factors to ensure that the optimum level of heat is provided at all times. A similar approach will be explored for other energy end-uses such as ventilation and lighting.

Demand-led utility systems imply a balance between localised and centralised control. This balance may need to evolve over time as new control systems develop, and end users become familiar with them.

7 Living Lab

This plan aims to promote and progress Living Lab projects to leverage the university's infrastructure, systems and processes to make it more attractive for research, teaching, research grant funding and private sector collaborations.

Lancaster Living Lab projects seek to develop Lancaster University as a facility for applied energy research, teaching and practise. It aims to open up the campus, its facilities, its information and its management structures and processes for students, staff and businesses to learn about and improve the way they use energy, in a safe and controlled manner. It leverages existing infrastructure and activities to support the core priorities of the university. Living Lab projects will provide Lancaster University with a unique selling point to join and lead consortia in energy related research bids and establish itself as a globally significant university in the field of energy.

Collaborations will be made with the Centre for Global Eco-Innovation, the Data Science Institute and the Faculties.

8 Governance & Review

Responsibility for management and delivery of the Energy & Utilities Plan resides with the University Energy Manager, based in Facilities. Progress in implementing the Energy & Utilities Plan is reported via Facilities line management and the Sustainability Management Group. Approval of certain specific projects within the plan will be subject to Capital Planning Group (CPG) approval and Project Executive (PEX) monitoring.

Energy & Utility Plan objectives and targets are reviewed and updated each year being incorporated into the Facilities annual ISO 14001 EMS objectives and targets. Delivery of objectives and targets will be monitored via the ISO 14001 EMS and the Sustainability Management Group.

Implementation of the Energy & Utility Plan is through annual action plans, which consist of specific projects and initiatives. Energy & Utility plan projects may be integrated with Carbon Management Plan projects and initiatives.

Examples of Energy & Utility Plan projects include efficiency improvements to the Energy Centre and district heating system, development of renewable energy proposals, utilities monitoring or student engagement in energy saving and carbon reduction projects.

A review of the Energy & Utilities Plan will be scheduled prior to 2022 or in advance of that date if other factors indicate an earlier review date is appropriate.

Lancaster University

"We make campus an inspiring place to be"

If you wish to discuss any aspect of the University's Energy and Utilities Plan, please contact:

Carbon, Environment & Sustainability manager
Facilities - Operations
Lancaster University, Lancaster LA1 4YW
Tel: 01524 593333
E-mail: facilities.helpdesk@lancaster.ac.uk