

High Level University of Worcester Decarbonisation of Heat Plan 2020-2030

Introduction

1. The UK has a 2050 net zero target and Higher Education can make a major contribution to enabling our country to reach this target. The HE sector can influence local communities and businesses.
2. The first carbon management plan (CMP) was adopted by the University in May 2007. Much was achieved during the lifetime of the CMP. This Heat Decarbonisation Plan focusses on this important contributor to our carbon emissions and is necessary to align with the University net zero carbon target to be carbon neutral by 2030 and our declaration of a Climate Emergency in July 2019. The purpose of the HDP is to describe how we intend to replace fossil fuel reliant systems with low carbon alternatives. Our priority areas are Heat and what monitoring needs to be in place to help identify necessary works.
3. This revision aligns to the [University Strategic Plan 2019](#) and the [Sustainability Strategy 2020-2030](#). Specifically, in the sustainability strategy Theme 3: Mitigation, adaptation and resource efficiency.

Context and Scope

4. The university is based on 4 main campuses, three based in the City and Lakeside Campus in Holt Heath about 8 miles north where our outdoor learning and activity centre are based. The university has around 1,200 staff and 11,000 students, including 1000 bed spaces in residential halls on two of its major sites. The University has many activities including general teaching spaces, offices, laboratories, halls of residences, conference and catering facilities and the Students' Union. We are developing our Severn Campus to accommodate a new medical School facility by refurbishing a newly acquired property.



Net Zero Carbon

5. Analysis of the University's carbon footprint and the likely trajectories for all carbon scopes in a 1.5 degree warming scenario have confirmed that the University needs to reduce total Scope 1, 2 and 3 emissions by 50% against a 2018/19 baseline.

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| | Emissions (tCO2e) |
|------------------------|-------------------|
| Scope 1 | 1,833 |
| Scope 2 | 1,399 |
| Scope 3 | 18,701 |
| Total emissions | 21,933 |

- Most of the University's emissions fall into Scope 3. The remaining emissions will need to be balanced with carbon removals, such as soil health and carbon sequestration and tree planting in managed woodlands. The carbon targets set by the University are as follows: 5% p.a. reduction in carbon emissions in Scopes 1, 2 & 3, against a 2018-19 baseline, from 2020 to 2030.

These will achieve a 50% reduction in emissions by 2030 compared to 2018-19 levels. Annual SMART carbon reduction targets and other quantitative and qualitative targets will be set as milestones towards reaching this overarching target, along with carbon off setting schemes.

We have a sustainable [construction and refurbishment strategy](#), which is currently under review to bring it into align with the recently agreed net zero targets.

Buildings

- Since May 2007 we have undertaken several audits, condition surveys and energy reviews. We invested in removing some buildings from a heat network on the St Johns Campus and installing individual boiler controls and plant, because at the time this was the most carbon/cost effective measure. However, we are now at the stage to take on an overarching approach, with individual detailed surveys to help the University plan and cost investments and strategies for the next 10 years. The information Worcester City sits on a geothermal source gives added opportunities for zero carbon heat. We spend around £1million in energy costs annually.
- We have 4 main sites 3 based in Worcester City and Lakeside about 8 miles north. In summary data from 2018-19 is shown below.

| | Total number of sites ↓ | Total number of buildings ↓ | Total site area (hectares) ↓ | Total grounds area (hectares) ↓ | Total playing fields area (hectares) ↓ | Total gross internal area (m2) ↓ |
|-------------------------|-------------------------|-----------------------------|------------------------------|---------------------------------|--|----------------------------------|
| University of Worcester | 9 | 65 | 86 | 73 | 23 | 89,268 |

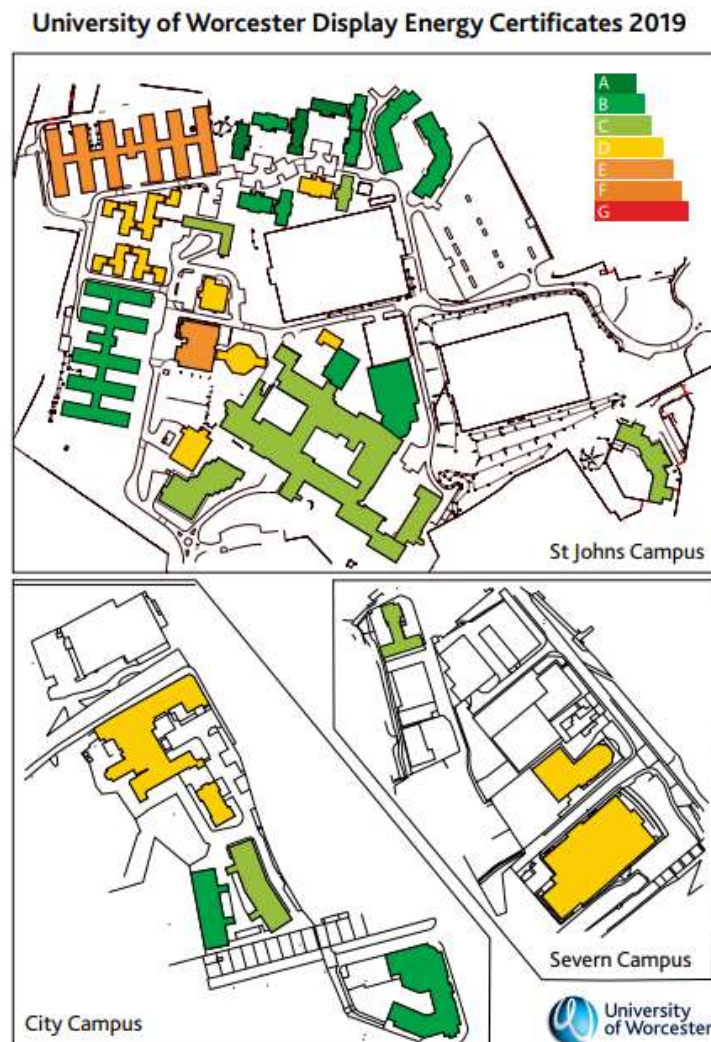
In terms of energy and water consumption.

| | Total energy consumption (kWh) ↓ | Total fuel used in HE provider owned vehicles (litres) ↓ | Total generation of electricity exported to grid (kWh) ↓ | Total water consumption (m3) ↓ | Total renewable energy generated onsite or offsite (kWh) ↓ |
|-------------------------|----------------------------------|--|--|--------------------------------|--|
| University of Worcester | 15,332,737.000 | 17,543.000 | 44,796.000 | 65,547.000 | 137,141.000 |

Academic year 2018/19 ▼

- Display Energy Certificate information for key building on our three main campuses is shown below.

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9. We have complete data on energy billing and carbon going back to 2005/6 more details can be found [here](#) and we have most significant buildings connected to a BMS and sub metering and monitoring software, with an energy officer in post to manage this area. Some information on heat demand is available on key buildings but we are looking to do more work to gather this granular data. Most of the heating is from gas fired boilers, we have a CHP plant on Severn Campus in the Arena and LPG heats the few small buildings on Lakeside campus. As noted earlier an existing district heating network on St Johns campus was partially decommissioned and we are hoping within our new decarbonisation plans to reinstate this and look at geothermal as its heating source. We are also keen to investigate installing a Heat network on Severn Campus with the possibility of working with the City Council and other partners. The proximity of the River Severn gives low temperature heat and cooling potential.

Resources

10. There is an experienced team in place at the university, headed by the Senior Pro Vice Chancellor (Students). The Director of sustainability has been the fund manager for Salix RGF and SEELs funding and the energy officer takes the day to day responsibility to monitoring, measuring and reporting. The energy officer is a full member of EMA. We have an agreed route for reviewing new decarbonisation projects with students, maintenance staff and others also encouraged to propose ideas. Governance structures are in place and we recently gained ISO5001:2018 accreditation along with ISO14001:2015.
11. We do require additional expert energy auditing resources and access to expertise to review novel and innovative technologies. We require assistance in developing heat networks and deep geothermal and hydrogen technologies.

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We are aware of the risks associated with drilling boreholes and the considerable costs associated with this and require support and expertise in this area. To make fast progress on additional project identification, programming and technical tendering/specification is also required. This will require funding.

Previous energy efficiency projects and existing low carbon heating technology

12. We have installed and removed air source heat pumps, have a gas fired CHP which has taken several years to effectively commission, and have successful PV and solar thermal installations with more planned. Some recently refurbishments have included thermal efficiency and airtightness of buildings.
13. We are planning to install air source heat pumps in a current project at Severn Campus and low carbon heating is now always considered in our refurbishments. We have monitoring and verification plans and put resources into careful commissioning of buildings post occupancy in all seasons. The University has won a few awards most recently for the Art House at City Campus which gained RICS SKA Gold and won a Green Gown award in 2019.
14. Additionally, we have many successful behaviour change programmes on campus with both students and staff including a few years ago winning an international inter halls energy competition. Off campus we have worked with our Students' Union and Worcester Bosch to look at decision making in student houses of multiple occupation. More on this project can be [found here](#).

Heating networks and opportunities on site

1. A prefeasibility study has been undertaken in Worcestershire which looked at both the potential for collaborative district heating opportunities and undertook geothermal mapping across the County. We are interested in developing this to the next stage and have had discussions and support from the City and County Council, and a local national Housing Association with street level properties and high-rise blocks in the proximity to the campus.
2. We are also interested in the development of hydrogen fuelled heat source for the proposed heat networks. The Future Heat Programme has the potential to join with other heat networks in the city of Worcester. At this initial stage we would be looking at a project CAPEX of £10 million. The technologies being considered as part of this proposal are as follows:
 - Heat Network
 - Hydrogen - production through electrolysis, use and storage
 - Deep Geothermal
 - River Source Heat pump / Hydro Electric Scheme
 - Air Source and Ground Source Heat Pumps
 - Water source heat pump at Lakeside campus

The benefits of the scheme are 35,000 tonnes of CO₂ emissions prevented over the system lifetime

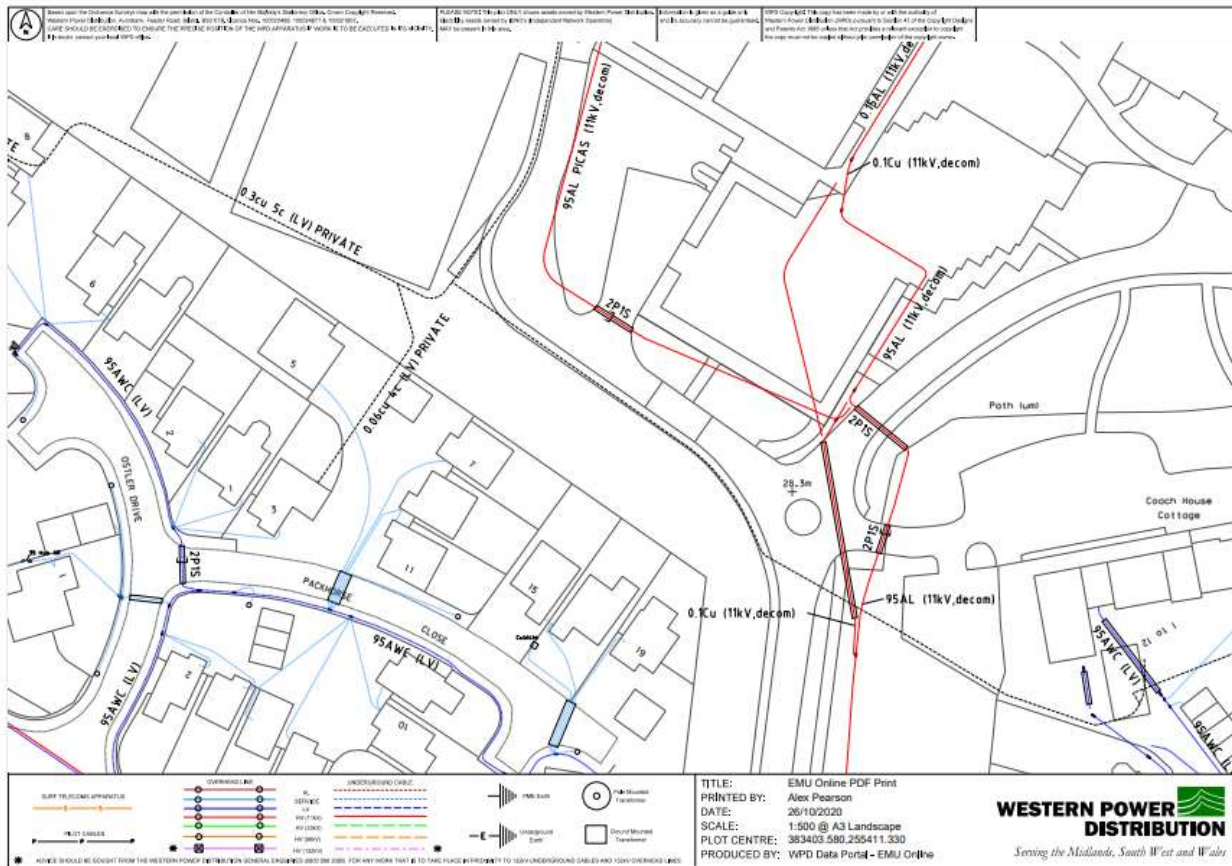
Grant Fund

3. We have applied for Category two projects at the St Johns campus. We are asking for £75,000 for detailed consultancy work.

Substation Voltage network

15. The St John Campus has a high voltage network 11kV. There is a private network at 415 volts, and this is adequate for heat pumps. The three substations covering the University appear to have enough capacity which is understood to be 2MVA spare capacity. City Campus has a substation. The Arena has HV supplies but these do not feed the rest of the Severn campus, the newly acquired site for the medical school has a HV substation.

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Key challenges

16. Whilst we have well established partnership arrangements in place we are challenged with timeframes and the need to continuously develop the campus facilities to support our teaching and research. We require dedicated expertise to focus on decarbonisation and to assist in ensuring technologies complement and allow for expansion and developments in our estate's strategy and masterplans.
17. There are significant risks associated with both developing novel technologies e.g. Hydrogen, and borehole drilling for geothermal. We do not have this expertise in house nor funding available to appoint consultants.
18. We do have well developed procurement roots and established governance procedures and a long history of successful award-winning capital development projects, built on time and to budget.

Katy Boom October 2020