UNIVERSITY OF WOLVERHAMPTON

Carbon Management Plan

2025-2035

Contents

Foreword

At the University of Wolverhampton, we are committed to driving forward sustainable change as part of our long-term Strategy 2035. Our vision is clear: to create opportunity, transform lives, and deliver a more inclusive, productive, and sustainable society. Sustainability is at the heart of this mission, shaping the way we educate, innovate and operate.

This ten-year Carbon Management Plan (2025-2035) sets out our commitment to achieving net zero carbon emissions and ensuring our campuses become environmentally sustainable spaces. Guided by our values - Ambitious, Resilient, Inclusive and Accountable - we will embed environmental, social and governance (ESG) principles across key decision-making and operational activities. By doing so, we not only reduce our carbon footprint but also enhance the positive impact we have on our students, staff and the wider community.

One of the key priorities in Strategy 2035 is Operational Excellence, ensuring that we operate as one of the most agile, efficient and sustainable universities. This Carbon Management Plan directly supports that goal by establishing a clear pathway to decarbonisation. Our approach aligns with the United Nations Sustainable Development Goals (SDGs), reinforcing our responsibility to address global challenges while delivering tangible local benefits.

We recognise that achieving net zero requires bold action, innovation and collaboration. Through pioneering research, an exceptional educational offering, and transparent governance, we will inspire the next generation of leaders and problem-solvers to tackle the climate crisis head-on. This Plan reflects our ambition and resilience in the face of environmental challenges, ensuring that sustainability remains a defining feature of our university for years to come.

Together, we will create a greener future - one that embodies our mission, strengthens our community, and positions the University of Wolverhampton as a leader in sustainable transformation.

Dr. Pete Cross
Chief Financial Officer

What is Net Zero Carbon and Why is it Important?

When greenhouse gases (GHGs) accumulate in the atmosphere, they trap heat and cause global climate change. There are many types of GHGs, including carbon dioxide (CO_2) and methane (CH_4). Because different GHGs have varying levels of impact on warming, carbon dioxide equivalents (CO_2e) are used to compare their effects in a standardised way. When we refer to carbon emissions, this includes both carbon dioxide and other greenhouse gases expressed in CO_2e.

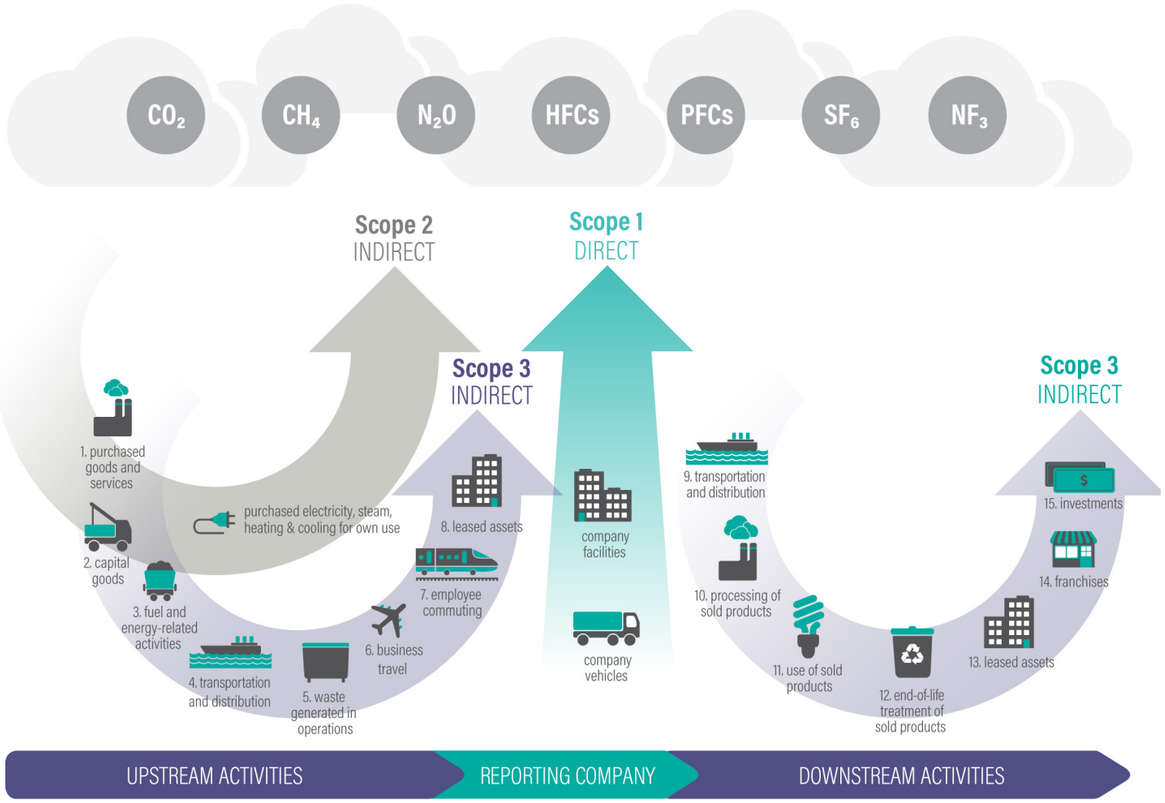


Figure 1 – Emission Scopes from the Greenhouse Gas Protocol

Most of these gases are emitted due to human activities, such as burning fossil fuels for energy and transport. Net zero carbon means balancing the amount of carbon emitted with the amount removed from the atmosphere. This can be achieved by reducing emissions as much as possible and offsetting any unavoidable emissions through actions like reforestation or carbon capture technologies. Achieving net zero is essential in tackling climate change, limiting global temperature rise, and safeguarding the planet for future generations.

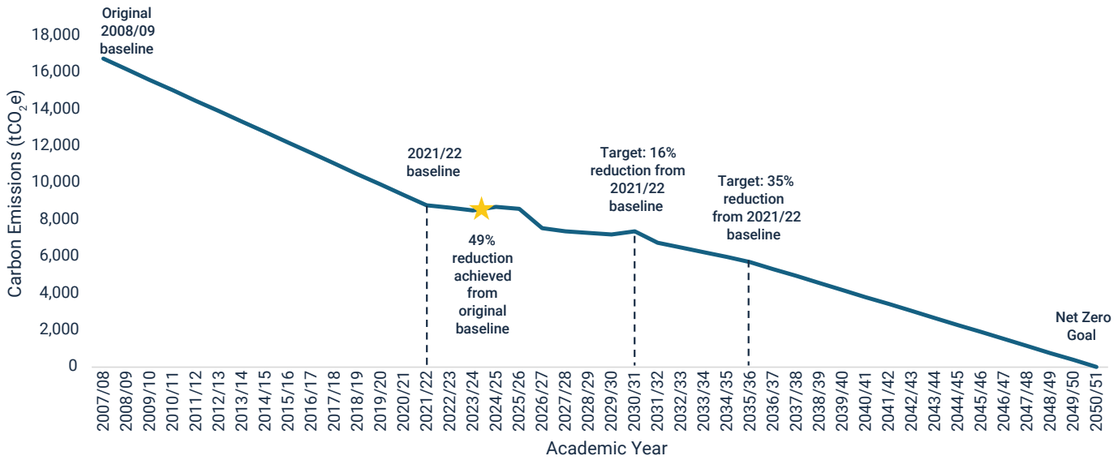
To effectively reduce our carbon footprint, we must consider emissions across three key categories:

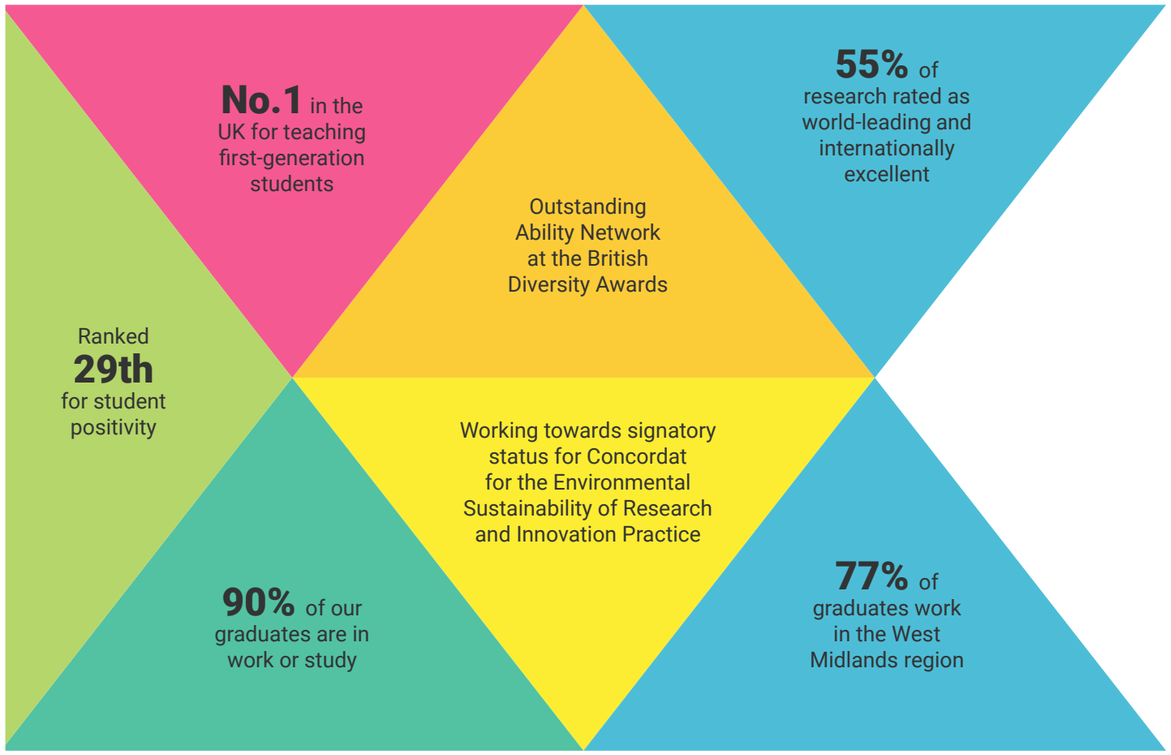
- Scope 1: Direct emissions from sources owned or controlled by the University, such as gas heating and university-owned vehicles.
- Scope 2: Indirect emissions from purchased electricity, including the energy used to power campus buildings.
- Scope 3: All other indirect emissions associated with University activities, such as supply chain emissions, business travel, waste, water usage and student and staff commuting.

Our Achievements So Far

The University of Wolverhampton's emissions have been reducing year-on-year since 2008 due to building improvements, demand reduction measure implementation and the decarbonisation of the UK national electricity grid. The 2007/08 academic year scope 1 and 2 baseline indicates total emissions of 16,746 tonnes of CO_2e. Our latest 2023-24 analysis demonstrates an overall reduction of circa 49% as the carbon emissions had almost halved to 8,512 tonnes of CO_2e.

Figure 2 – Scope 1 & 2 Carbon Emission Reductions – Progress & Ambition





CIDT
Centre for International Development and Training

UNITAR Partnership - Accelerating Sustainable Development Goals

In January 2025, the University of Wolverhampton welcomed representatives from the United Nations Institute for Training and Research (UNITAR) in Geneva to sign a milestone agreement on implementing a joint sustainability research and knowledge exchange centre. The delegation included Mr Nikhil Seth, United Nations Assistant Secretary General and Executive Director, and Mr Micheal Adalla and Ms Emily Fraser, both senior staff from the Division for Prosperity.

The University through its Centre for International Development & Training (CIDT) will leverage its expertise to design nationally and internationally significant initiatives in partnership with UNITAR. This will provide professionals, local and regional governments, researchers and businesses with first-hand exposure to research-informed sustainability solutions to societal problems, whilst facilitating a platform for diverse stakeholders to engage with international decision-making processes.

Professor Prashant Pillai, Pro Vice-Chancellor (Research and Knowledge Exchange) said: "We're delighted to sign this agreement with UNITAR, which is very much in line with the 2035 vision of the University. The University of Wolverhampton and UNITAR share common goals and objectives with regards to enhancing global education and research collaboration to transform lives and deliver a more inclusive, productive and sustainable society."

The alliance agreement approved by UN Assistant Secretary-General Mr Seth, our Vice Chancellor Professor Ebrahim Adia as well as the Chair of Board of Governors Ms Angela Spence allows to bring together cross-disciplinary research and knowledge exchange centres and expertise to formally and actively make effective progress towards accelerating sustainable development goals.

Our Carbon Reduction Commitment

We have committed to net zero scope 1 and 2 carbon emissions by 2050, with interim targets to reduce emissions by at least 16% by 2030 and at least 35% by 2035 (compared to the 2021/22 baseline). These targets are embedded in our Strategy 2035 KPIs.

The University of Wolverhampton is actively increasing the emissions accounting for scope 3 and aims to calculate all scope 3 related emissions both upstream and downstream. However, we have identified some levers to reduce scope 3 indirect emissions and detailed them in the Scope 3 Emissions section of this report.

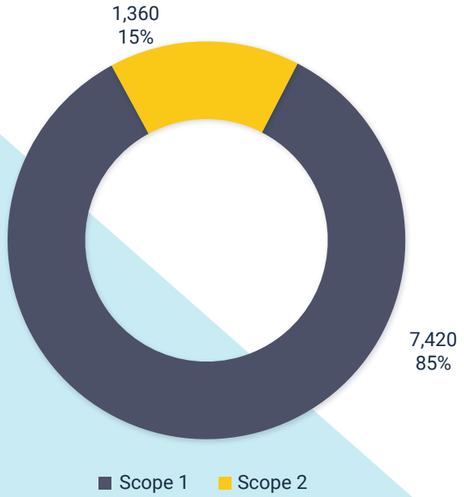
Figure 3 – Baseline Carbon Emissions (in tCO_2e)

Baseline Emissions

We have elected the 2021/22 academic year as the baseline position from which to create a decarbonisation pathway. This is a year representative of our activities, with accurate data to build on.

The current baseline and commitment to net zero covers our scope 1 and 2 emissions:

- Scope 1: Direct emissions from sources owned or controlled by the University, such as gas heating and University-owned vehicles.
- Scope 2: Indirect emissions from purchased electricity, including the energy used to power campus buildings.

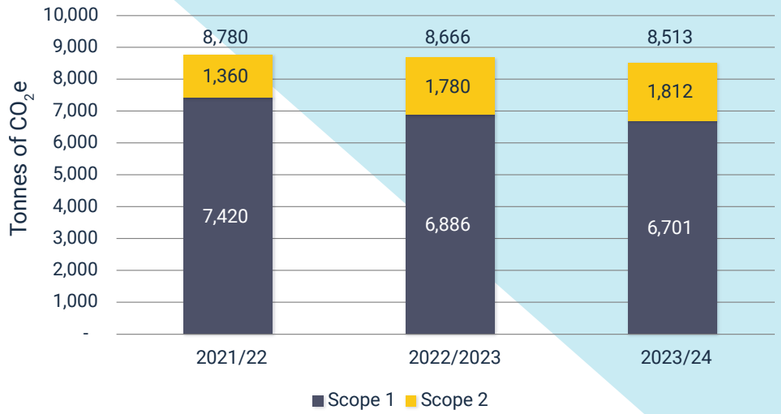


Achieving the Targets

Carbon Emissions

We have calculated scope 1 and 2 carbon emissions annually since 2007/08 and have re-baselined our trajectory in 2021/22:

Figure 4 – Carbon Emissions per Year



Between the 2021/22 baseline year and the latest carbon assessment in 2023/24, we achieved a reduction of 3% from decreasing our consumption of natural gas.

To meet the 2035 targets, we need to reduce our scope 1 and 2 carbon emissions by 3,073 tonnes.

To align with the targets, the University has worked with a specialist consultant on a comprehensive decarbonisation plan to identify impactful actions.

To address this carbon reduction target, several levers will be implemented:

1. Reducing Energy Demand
2. Switching to Less Carbon-Intensive Energy
3. On-Site Energy Generation

1. Reducing Energy Demand

We have set up an ambitious improvements programme including switching to LED lighting, upgrading boilers to more efficient models, replacing stored hot water with instant hot water, upgrading fixed speed pumps to inverter driven variable speed motors, replacing windows and enhancing building fabric. These maintenance actions are expected to reduce scope 1 and scope 2 emissions by 1% year on year.

We have developed a new Estates Masterplan to create much more connected, vibrant and dynamic campuses which prioritise the student experience and support them to achieve the best outcomes. The plan also allows us to repurpose environmentally unsustainable buildings, release resources to invest in the student experience and support the University's long term financial sustainability.

Other actions to help reduce energy demand include education, behavioural change and initiatives to tackle Scope 3 emissions.

2. Switching to Less Carbon-Intensive Energy

The University relies mainly on natural gas for its heating. Due to their efficiency, switching to heat pumps allows a reduction of carbon emissions while still meeting the buildings' energy needs and occupants comfort.

The Walsall Campus Project

The Walsall Campus has specialised facilities for the education of sport, teaching and health courses. In the first stage of our decarbonisation strategy, we will electrify the Walsall Campus' to a centralised heating system, with the support of Public Sector Decarbonisation Scheme funding. The following decarbonisation measures will be implemented by 2026:

A. Cascading Heat Pump System

A cascading heat pump system is an efficient way to generate high temperatures by using two heat pumps in stages. The cascading heat pump system will replace the gas fired Combined Heat and Power (CHP) and boiler heating plant currently in operation. This system runs on electricity and works by using the properties of refrigerants to transfer heat energy. In this case, the first stage is an air source heat pump (ASHP), and the second stage is a water source heat pump (WSHP).

How It Works:

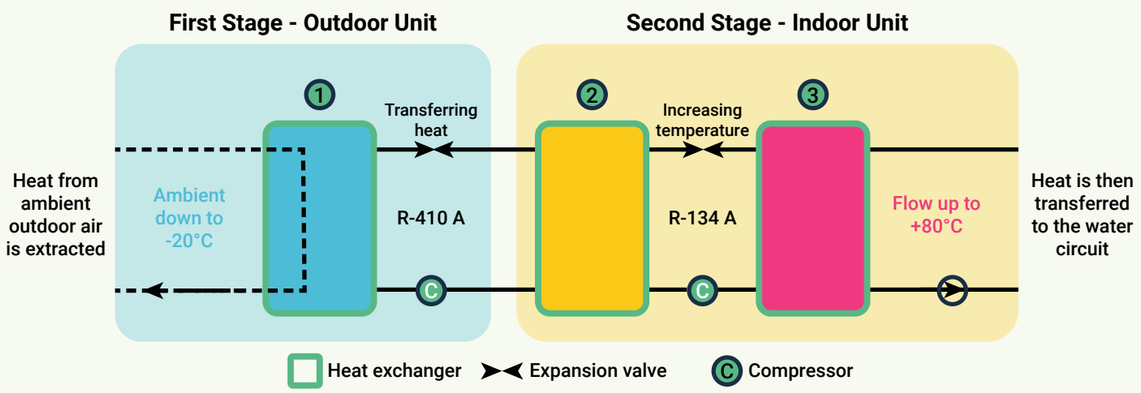
- **First Stage** – Air Source Heat Pump (ASHP)
  - The ASHP absorbs heat from the outside air, even in cold weather.
  - It uses a special fluid called a refrigerant, which evaporates at low temperatures, turning into a gas.
  - A compressor (powered by electricity) increases the pressure of this gas, raising its temperature to a maximum of 45°C.
  - This heat is then transferred to a water circuit instead of being directly used.
- **Second Stage** – Water Source Heat Pump (WSHP)
  - The WSHP takes the heat from the pre-heated water and boosts its temperature further.
  - It uses a different refrigerant, which absorbs the heat from the water, evaporates, and then gets compressed to increase its temperature up to 78°C.
  - The high-temperature heat is used to heat buildings and water.

Why It's Efficient:

- **Phased Temperature Increase**: Each heat pump works within an optimal temperature range, making the process more efficient than a single heat pump trying to do the full heating job.
- **Higher Efficiency:** Heat pumps transfer heat rather than generate it, making them much more efficient than traditional heating. The cascading setup further improves efficiency by reducing the strain on each heat pump.

The installation of the cascading heat pump system will help remove several gas-fired heating plant, including CHP units, boilers, and water heaters.

How the cascading heat pump system will work



B. Valve & Pipe Insulation

The insulation of valves and pipes allows gas consumption savings by reducing the heat losses along the heating distribution network. New insulation will ensure a more efficient use of the heat pump system and thus allowing energy, carbon and financial savings.

C. Split Units controls

The installation of split unit controls on the current split unit air conditioning equipment will help rationalise the energy consumption by adding controllers that:

- Turn air conditioners off in vacant rooms
- Run the air conditioners at constant cooling temperatures, considering the incoming and outcoming air temperature (often allowing up to 25% of energy savings)
- Optimise the cycle technology

D. Solar PV

Maximum available roofs have been identified for the installation of solar panels based on their orientation, shading, access, building structure and feasibility of installation. The installation of the solar PV will provide to the Walsall Campus a significant amount of renewable electricity production, mitigating the cascading heat pump grid electricity consumption.

How does it save carbon emissions?

By focussing on electrification measures such as heat pumps, the University benefits from reduced emissions from the wider decarbonisation of the UK's electricity grid. The UK's electricity grid is becoming increasingly green due to renewable energy generation including wind, solar and hydro power.

Grid Decarbonisation

The UK has come a long way on its journey to decarbonise the power sector over the past decades, and coal was completely phased out in September 2024. The Government's election manifesto promise is to have clean power in the UK by 2030.

The new National Energy Systems Operator (NESO) has advised the Government that clean power is a huge challenge but is achievable by 2030. It will require doing things differently and will only be achieved with bold action and sustained momentum, between now and 2030.

NESO has defined a clean power system is one that has at least 95% low-carbon generation, with less than 5% strategic reserve of gas.

Figure 5 – Share of the UK's Electricity Supplied per Energy Type[1]

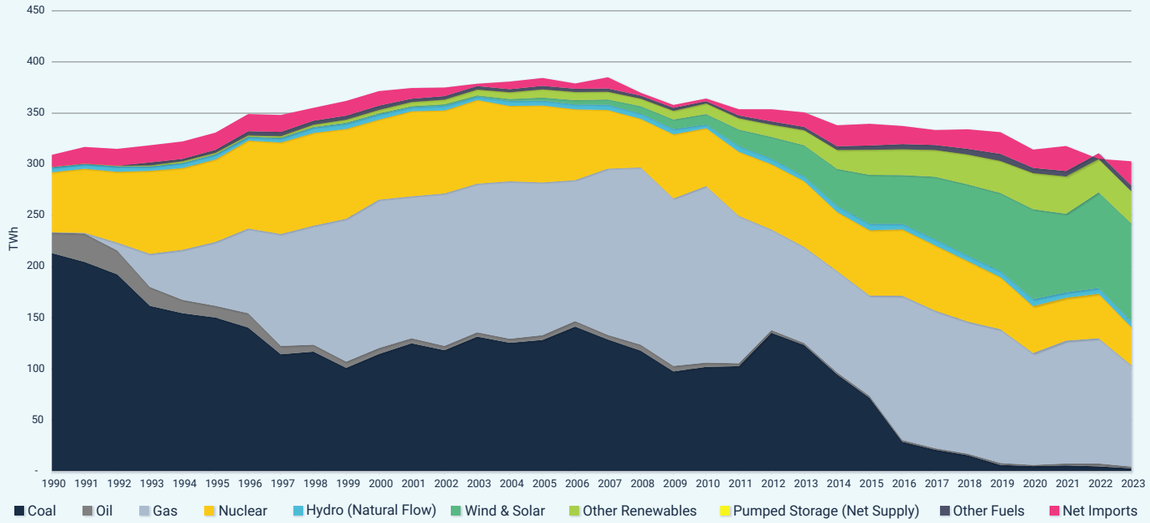
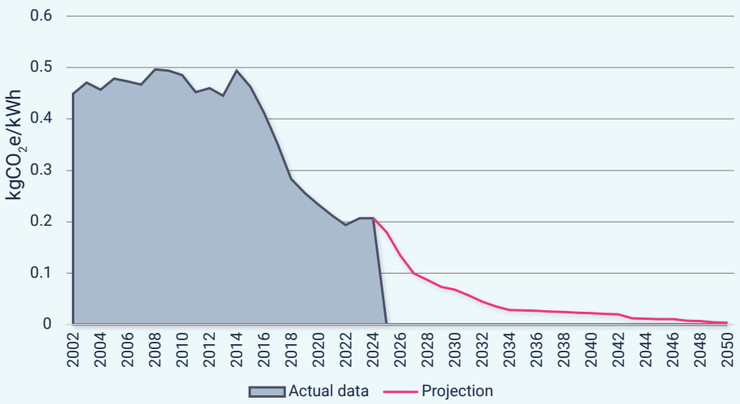


Figure 6 – Historical Electricity Emission Factors & Projection to 2050



UK Electricity Emission Factors

To be more cautious than the Government's ambition, we have modelled the electricity emission factors of the UK by:

- Using the latest published DEFRA electricity emission factors
- Forecasting the future electricity emission factors by using the percentage of decrease planned by the government[2]

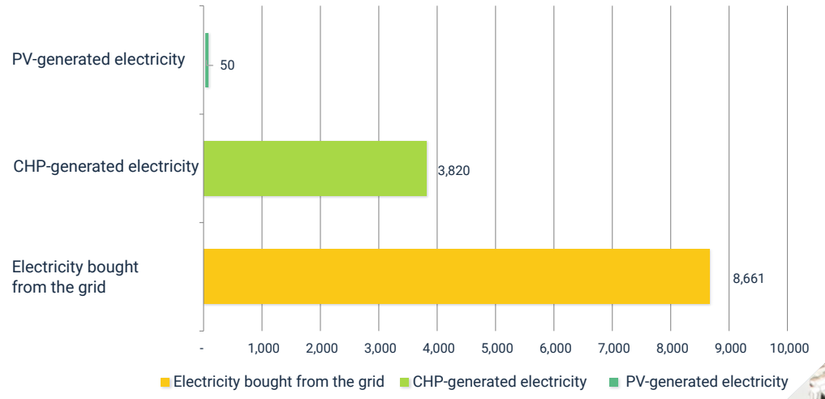
[1] Source: Department for Energy Security and Net Zero - UK Energy in brief 2024

[2] Source: HM Treasury Green Book Supplementary Guidance. The emission factors available in Table 1 were not directly used as they were inconsistent with the 2024 data. Only the variation from one year to another was used as the hypothesis.

3.On-Site Energy Generation

We have solar panels installed in several University locations already. In the academic year 2023/24, on-site PV-generated electricity represented circa 50 MWh. Scheduled installations will contribute with a further 800 kWp installation. The University also benefits from the Combined Heat and Power system (CHP) at the City Wulfruna (South) campus, which generated circa 3,313 MWh of electricity in 2023/24.

Figure 7 – University of Wolverhampton Electricity Mix (MWh)



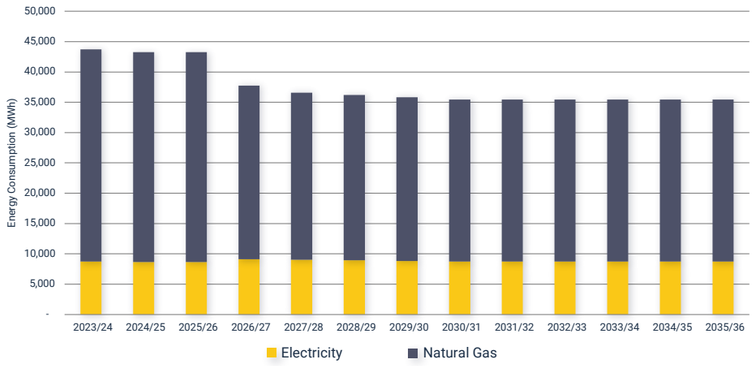
Further on-site energy generation could play a pivotal role in helping us towards our net zero targets. An assessment was conducted by our consultants to identify the most feasible and financially viable places to install rooftop solar as well as solar carports.

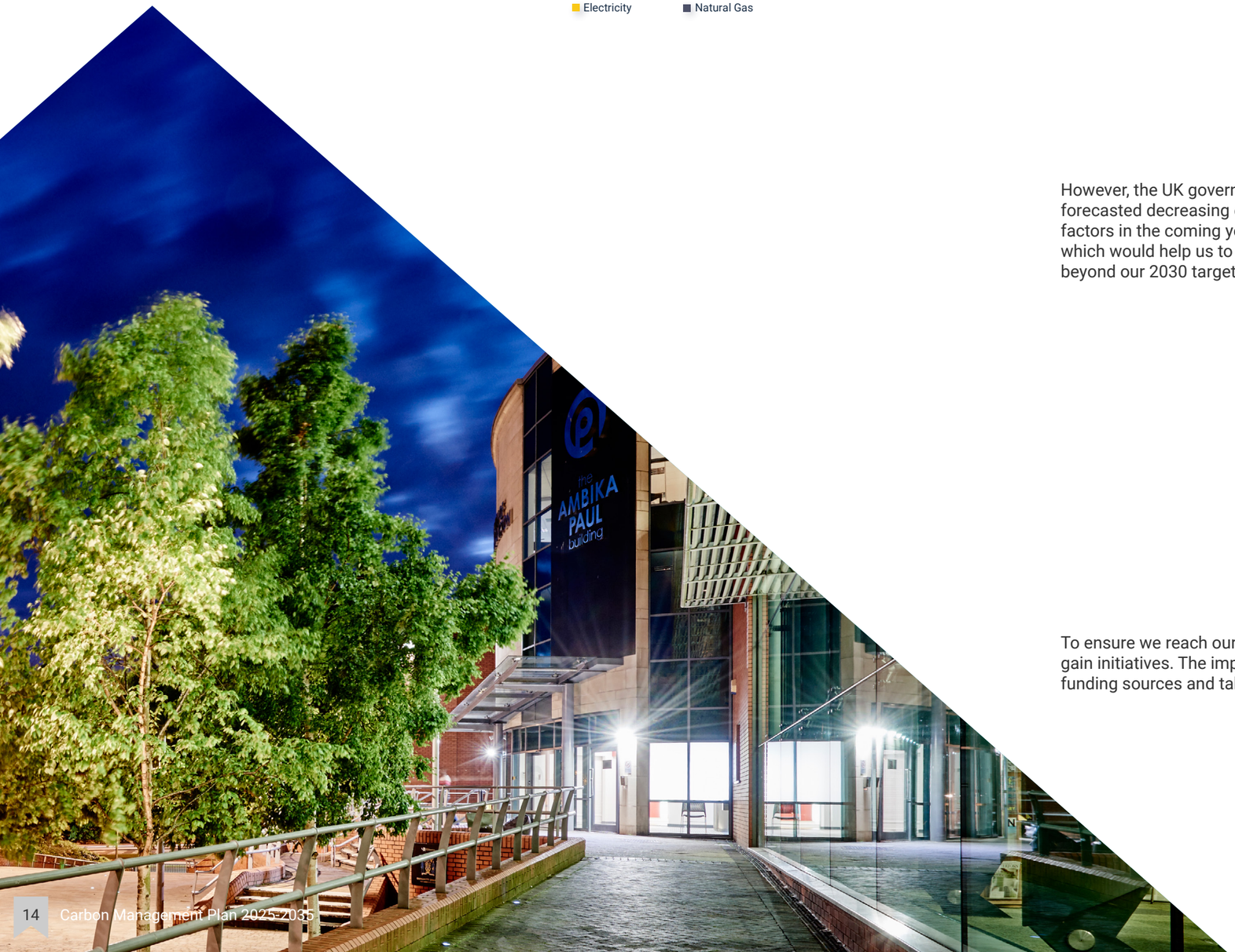
The final capacity of the solar PV is subject to detailed surveys assessing the structural suitability of the roofs and systems pending capital availability.

Energy Savings

The projects planned for 2025/26: the Walsall Campus heat decarbonisation and the Telford Campus rationalisation will allow circa 16% reduction of natural gas consumption (compared to the baseline year).Combined with the capital projects and planned preventative maintenance programme will also help to reduce the financial operational costs of energy consumption.

Figure 8 – Projection of Energy Consumption

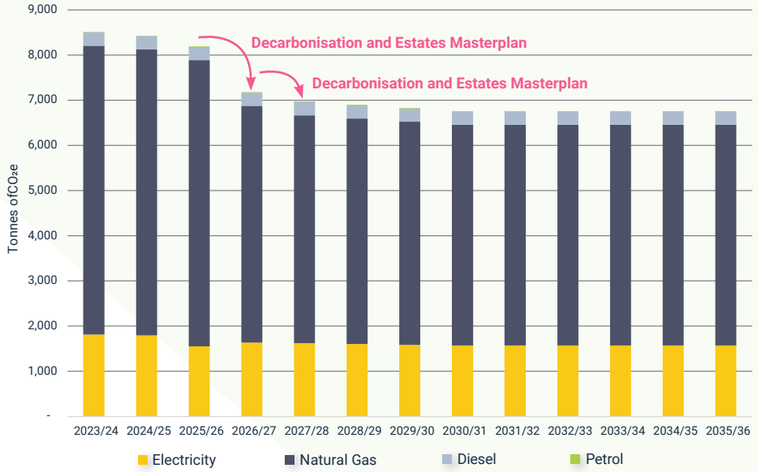




Decarbonisation Trajectory

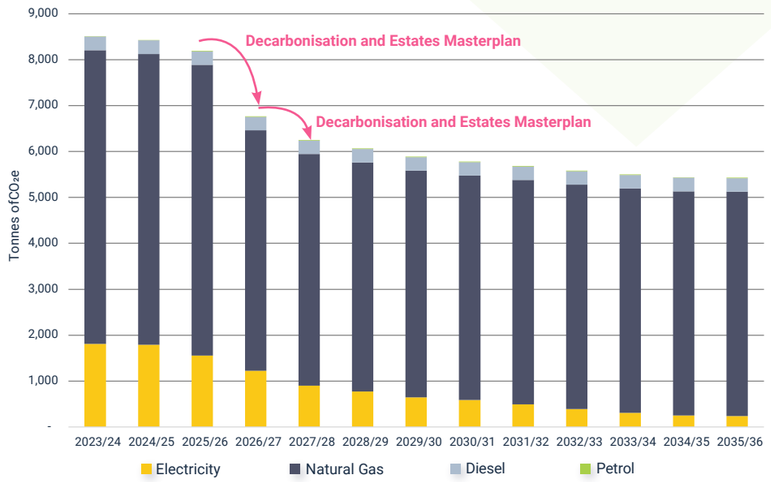
Conservative assumptions presuming that the UK-grid emission factor will remain the same, along with the Masterplan undertakings, and the Walsall Salix Project will ensure our commitment of -16% of CO_2e emission by 2030 is achieved.

Figure 9 – Emission Scope 1 & 2 without considering Decarbonisation of the Grid



However, the UK government has forecasted decreasing emission factors in the coming years, which would help us to reach beyond our 2030 target.

Figure 10 – Emission Scopes 1 & 2 considering Decarbonisation of the Grid



To ensure we reach our carbon emissions target, we will consider further actions, prioritising low-investment, high-carbon gain initiatives. The implementation of these measures will depend on available funding, and we will proactively monitor funding sources and take advantage of opportunities as they arise.

Market-Based Solutions

Green Electricity

Green electricity refers to electricity generated from renewable sources that produce little to no carbon emissions. Organisations can procure green electricity through Power Purchase Agreements (PPAs) or via the purchase of electricity backed with Renewable Energy Guarantees of Origin (REGOs) certificates.

Within the GHG Protocol framework, there are two methods for accounting for electricity-related emissions[3]:

- Location-based method – Reflects the average emissions intensity of the country's grid
- Market-based method – Reflects emissions from the electricity an organisation has purchased through its contracts with its energy supplier (e.g. PPAs or REGOs)

To ensure transparent emissions reporting, organisations are encouraged to disclose both location-based and market-based figures[4].

Since October 2021, the University has purchased green electricity using REGOs to match its annual electricity consumption. Using the market-based approach reduces our scope 1 and 2 emissions by 21% for the academic year 2023/24.

However, when using the market-based method, any electricity not covered by renewable purchases must be accounted for using the residual energy mix emission factor, rather than the average grid emission factor. The residual energy mix represents the national grid's electricity generation, excluding renewable electricity already claimed by other entities. As a result, its emission factor is typically higher than the grid-average figure.

Green Gas

Green gas are renewable and low carbon gases that replaces fossil fuels, such as biomethane, biopropane and hydrogen.

The Green Gas Certification Scheme (GGCS[5]) is responsible for issuing, transferring and retiring the Renewable Gas Guarantees of Origin (RGGOs) which are the green gas certificates.

As per green electricity, the same carbon accounting rules apply for RGGOs.

The University of Wolverhampton is continuously reevaluating the purchase green gas through RGGOs while focusing efforts first on lowering its direct gas emissions and transitioning its gas use to electricity.

[3] GHG Protocol Scope 2 Guidance
[4] HM Government Environmental Reporting Guidelines
[5] Green Gas Certification Scheme

Carbon Offsetting

Carbon offsetting is the process of compensating for carbon emissions by funding projects that remove or reduce emissions elsewhere. This helps to balance out unavoidable emissions and contributes to achieving net zero carbon.

Common carbon offset projects include:

- Reforestation and afforestation – Planting trees to absorb carbon from the atmosphere.
- Renewable energy projects – Supporting wind, solar, or hydroelectric power to replace fossil fuel-based energy.
- Carbon capture and storage – Technologies that capture emissions from industrial processes and store them underground.
- Energy efficiency initiatives – Improving energy use in communities, such as providing cleaner cookstoves or insulating homes.

While carbon offsetting can play a role in climate action, it should complement, not replace, direct efforts to reduce emissions at the source.

The projects that reduce GHG emissions outside of our operations are considered as carbon offsetting projects and should be reported as a separate figure.

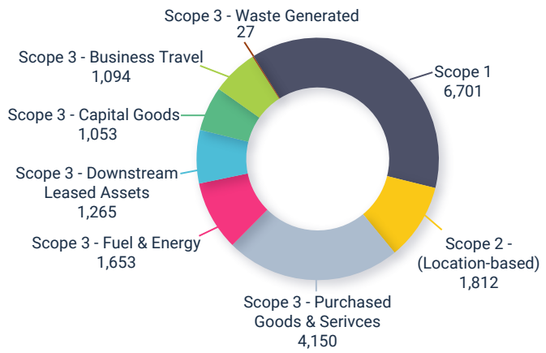
The University has not yet set any carbon offsetting commitments but we will explore offsetting our travel emissions. In line with international initiatives (such as the Science-Based Targets initiative), our goal at the University of Wolverhampton is to:

- First reduce our carbon emissions
- Then work on offsetting the remaining emissions

Scope 3 Emissions

The University is regularly expanding the emissions inventory calculations for scope 3 categories it assesses. For the year 2023/24, the scope 3 emissions inlcude most upstream emissions such as: leased assets, business travel, capital and purchased goods, etc. with a view to expand the scope to eventually include all upstream and downstream activities. Currently the scope 1, 2 and 3 were calculated as follows:

Figure 11 – Scope 3 Carbon Emissions (in tCO_2e)



The scope 3 of energy does not take into account the combustion of fuels or electricity already included in scope 1 (emissions from the combustion of fuels by source owned or controlled) and 2 (emissions from the combustion of fuels to generate electricity, steam, heating and cooling purchased and consumed by the company). It however includes the indirect greenhouse gas emissions associated with the production, transport and distribution of each type of energy.

Scope & Category	Emission Type	Sum of tCO_2e
Scope 1	Natural Gas	6,395.6
	University Owned Vehicles	305.3
Scope 1 Total		6,700.9
Scope 2 (Location-based)	Purchased Electricity	1,811.8
Scope 2 (Location-based) Total		1,811.8
Scope 2 (Market-based)	Purchased Electricity	0
Scope 2 (Market-based) Total		0
Scope 3: 1. Purchased Goods & Services	Purchased Goods & Services	4,149.5
Scope 3: 1. Purchased Goods & Services Total		4,149.5
Scope 3: 2. Capital Goods	Capital Goods	1,053.3
Scope 3: 2. Capital Goods Total		1,053.3
Scope 3: 3. Fuel- & Energy-related Activities	WTT Electricity	596.5
	WTT Gas	1,056.4
Scope 3: 3. Fuel- & Energy-related Activities Total		1,652.9
Scope 3: 5. Waste Generated in Operations	Waste Disposal	3.4
	Wastewater	23.2
Scope 3: 5. Waste Generated in Operations Total		26.7
Scope 3: 6. Business Travel	Flights	921.5
	Hotel Stay	45.8
	Rail	11
	WTT Flights	113.3
	WTT Rail	2.8
Scope 3: 6. Business Travel Total		1,094.4
Scope 3: 13. Downstream Leased Assets	Downstream Electricity	367.7
	Downstream Gas	665.9
	WTT Electricity	121.1
	WTT Gas	110
Scope 3: 13. Downstream Leased Assets Total		1,264.7
Grand Total		17,754.1

Scope 3 data for academic year 2023/24

WTT = Well-to-Tank

Reporting & Monitoring

Regular monitoring and reporting will keep us on track, highlight areas for improvement, and reinforce our commitment to environmental responsibility. The University's ESG strategy will be overseen by the Board of Governors, with implementation delegated to key stakeholders forming the ESG Group. This group will represent their respective areas of expertise, define success metrics, and drive progress to ensure ESG principles are effectively embedded and clearly communicated.

To promote transparency and accountability, we will publish an annual ESG report outlining progress against targets, key projects delivered, and contributions to the UN Sustainable Development Goals. Carbon emissions and energy reporting will align with Streamlined Energy and Carbon Reporting guidelines.

This annual review will serve as a checkpoint to assess targets and make necessary adjustments, ensuring we remain on course to achieve our sustainability goals. Our strategy will also evolve in response to emerging University priorities, regulatory updates, and industry trends.

Useful Links

University of Wolverhampton Strategy 2035

University of Wolverhampton Environmental Social Governance

University of Wolverhampton Estates Masterplan

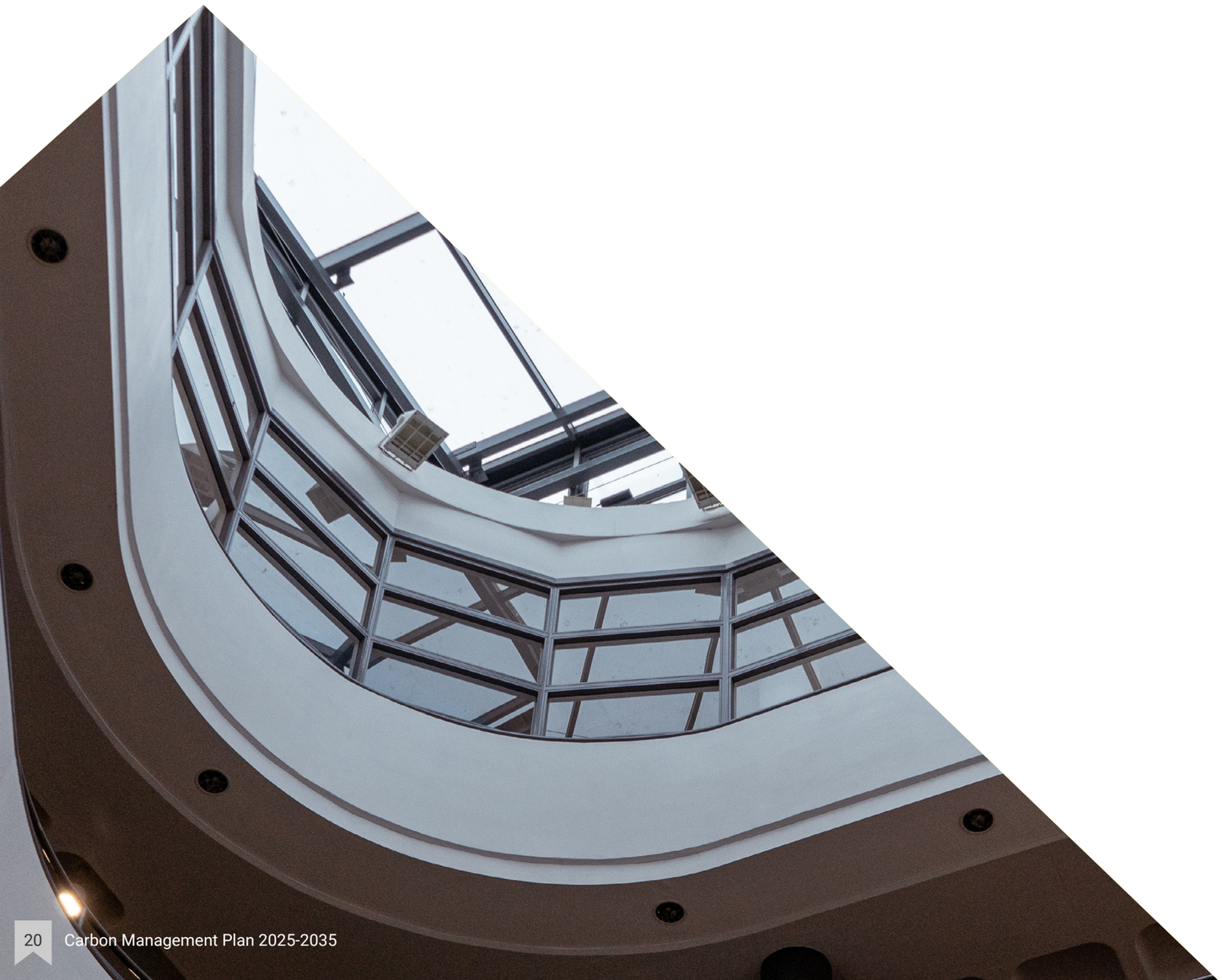
UN Sustainable Development Goals

UN Assistant Secretary-General joins us to celebrate 50 years of research

UN Assistant Secretary-General speaks at University of Wolverhampton - Video

Centre for International Development & Training

Centre for International Development & Training – Capacity Strengthening



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