# University of Leeds Pathway to Net Zero Emissions by 2030: Figures and tables accessible document

## Figure 1, page 6: University of Leeds timeline to net zero

A timeline for the University of Leeds Pathway to Net Zero Emissions, showing the key interventions taking place between the academic years 2020 to 21 and 2030 to 31.

The start and end dates for each stage in the timeline are placed in several tables, grouped by step. The date range covers academic years.

Immediately following the approval of the Net Zero Plan in 2021/22 work will start to develop detailed programme plans for each intervention. Programme of delivery is subject to change based on year 1 feasibility studies and strategy development.

### Scope 3

| Date (starting in academic year) | Intervention |
| --- | --- |
| 2021 to 2022 | Business travel policy development |
| 2022 to 2030 | Business travel policy implementation (linked to business travel policy development) |
| 2021 to 2023 | Scope 3 carbon footprinting completed |
| 2023 to 2030 | Development and trials of scope 3 reduction plan |
| 2023 to 2024  | Electric vehicle charging upgrade |
| 2023 to 2030  | Interventions to encourage staff to switch to electric vehicles (linked to electric vehicle charging upgrade) |

### Decarbonising

| Date (starting in academic year | Intervention |
| --- | --- |
| 2021 to 2023 | Agree strategy for off-site renewable energy  |
| 2023 to 2025 and 2027 to 2029 | Procurement of off-site renewable energy |
| 2021 to 2023 | Agree strategy for electrical supply upgrade |
| 2022 to 2030 | Electrical supply upgrade programme (linked to electrical supply upgrade strategy) |
| 2021 to 2024  | Agree energy strategy |
| 2024 to 2030 | Electrification programme (linked to energy strategy) |
| 2023 to 2024 | Electrode steam boiler install |
| 2026 to 2029 | Western Campus heat loop |

### Demand reduction

| Date (starting in academic year | Intervention |
| --- | --- |
| 2021 to 2025 | Solar PV installation on campus |
| 2021 to 2028 | Car and van fleet replacement programme |
| 2022 to 2029 | LED programme, building rationalisation and other identified low cost activities |
| 2022 to 2030 | Light refurbishment programme |
| 2023 to 2027 | 8000m2 deep refurbishment programme |

### Offsetting and balancing emissions

| Date (starting in academic year | Intervention |
| --- | --- |
| 2022 to 2023 | King Lane woodland planted |
| 2026 to 2027  | Strategic offsetting plan defined |
| 2030 to 2031  | Credible offsets in place (linked to strategic offsetting plan) |

## Figure 2, page 9: University of Leeds greenhouse gas (GHG) reporting emissions sources

The following list details the sources of greenhouse gas emissions at the University of Leeds and whether they are: in Scope 1 or 2 to be tackled through the Net Zero pathway between 2021 and 2031; in Scope 3 to be tackled through the Net Zero Plus strategy implemented after 2030; or not in scope.

### Net Zero

#### Scope 1 (direct emissions from owned or controlled sources)

* Natural gas
* Diesel oil
* Biomass
* UoL vehicle fleet
* GHGs used in research
* Refrigerant gasses
* Agriculture

#### Scope 2 (indirect emissions from the generation of purchased energy)

* Grid electricity
* Purchased heat

#### Scope 3 (business travel and commuting)

* Business travel
* Staff and student commuting

### Net Zero Plus

* Supply chain
* Student travel linked to University activities
* Student travel to and from home
* Home working
* Waste & recycling
* Water & water treatment

### Out of scope

* Students living in private accommodation
* Visitor travel

## Figure 3, page 12: University of Leeds historical emissions, Scope 1 and 2 only

The amount of Carbon Dioxide Equivalent (carbon dioxide plus other greenhouse gases) in tonnes emitted by the University of Leeds, broken down per year, between 2005/06 and 2019/20. These are Scope 1 and Scope 2 emissions that will be tackled by the Net Zero Pathway.

The data shows that the highest level of emissions were in 2005/06 (64,142 tonnes Carbon Dioxide Equivalent). There was a slight decrease in emissions between 2005/06 and 2006/07, followed by a small and steady year-on-year increase until 2011/12. Between 2011/12 and 2019/20, there has been an overall decrease in emissions (from 64,135 to 43,661 tonnes Carbon Dioxide Equivalent). In 2019/20, the farm came under University of Leeds ownership which added 7,795 tonnes Carbon Dioxide Equivalent to the level of emissions.

In 2016/17 we changed our reporting methodology to more accurately account for energy losses (and their associated emissions) for supplied heat and electricity, which resulted in a slight increase in reported emissions in 2016/17 versus the previous year.

The following table contains the data in the chart:

| Year | Carbon Dioxide Equivalent emissions from the University estate in tonnes (Scope 1 and 2) |
| --- | --- |
| 2005/06 | 64,142 |
| 2006/07 | 59,737 |
| 2007/08 | 60,455 |
| 2008/09 | 60,467 |
| 2009/10 | 62,906 |
| 2010/11 | 63,920 |
| 2011/12 | 64,135 |
| 2012/13 | 57,006 |
| 2012/14 | 54,372 |
| 2014/15 | 52,664 |
| 2015/16 | 45,524 |
| 2016/17 (note: methodology for scope 1 changed) | 48,479 |
| 2017/18 | 45,889 |
| 2018/19 | 42,830 |
| 2019/20 | 43,661 plus 7,795 (scope 1 - Agricultural emissions) relating to the University Farm |

## Figure 4, page 13: University of Leeds historical emissions, Scope 1, 2 and 3.

The amount of Carbon Dioxide Equivalent (carbon dioxide plus other greenhouse gases) in tonnes emitted by the University of Leeds, broken down per year, between 2005/06 and 2019/20. These are scope 1, scope 2 and scope 3 (business travel and commuting) emissions that will be tackled by the Net Zero Pathway, as well as other scope 3 emissions that are covered by net zero plus. Scope 3 emissions have been reported since 2012/2013 and are not available prior to this period.

In addition to the trends described for Figure 3, the data shows that there have been year-on-year fluctuations in emissions from business travel and commuting emissions in Carbon Dioxide Equivalent tonnes between 2012/13 and 2019/20 with the highest level in 2018/19 (20,090 Carbon Dioxide Equivalent tonnes). This dropped by almost half in 2019/20 due to the impact of the COVID-19 pandemic. Other scope 3 emissions covered by net zero plus have increased overall between 2012/13 and 2019/20 (from 72,358 to 110,117 Carbon Dioxide Equivalent tonnes), including an increase during the COVID-19 pandemic.

In 2016/17 we changed our reporting methodology to more accurately account for energy losses (and their associated emissions) for supplied heat and electricity.

The following table contains the data in the chart. Please note, the second column contains a repeat of data from figure 3 showing emissions covered by scopes 1 and 2.

| Year | Emissions from the University estate in Carbon Dioxide Equivalent tonnes (Scope 1 and 2) | Emissions from business travel and commuting emissions in Carbon Dioxide Equivalent tonnes (Scope 3) | Other supply chain emissions in Carbon Dioxide Equivalent tonnes (Scope 3) |
| --- | --- | --- | --- |
| 2005/06 | 64,142 | N/A | N/A |
| 2006/07 | 59,737 | N/A | N/A |
| 2007/08 | 60,455 | N/A | N/A |
| 2008/09 | 60,467 | N/A | N/A |
| 2009/10 | 62,906 | N/A | N/A |
| 2010/11 | 63,920 | N/A | N/A |
| 2011/12 | 64,135 | N/A | N/A |
| 2012/13 | 57,006 | 16,763 | 72,358 |
| 2012/14 | 54,372 | 14,545 | 73,042 |
| 2014/15 | 52,664 | 16,763 | 88,247 |
| 2015/16 | 45,524 | 18,111 | 97,206 |
| 2016/17 (note: methodology for scope 1 changed) | 48,479  | 17,772 | 84,261 |
| 2017/18 | 45,889 | 17,174 | 87,887 |
| 2018/19 | 42,830 | 20,090 | 102,869 |
| 2019/20 | 43,661 plus 7,795 Scope 1 - Agricultural emissions (Scope 1) from the University Farm | 11,026 | 110,117 |

## Figure 5, page 15: University of Leeds carbon footprint 2020 baseline

Our 2020 baseline Carbon Dioxide Equivalent (carbon dioxide plus other greenhouse gases) emissions from different sources making up a total of 174,415 tonnes. We will use this baseline to measure progress against commitments to net zero and net zero plus.

The following table contains the data in the chart:

| Emissions source | 2020 baseline greenhouse gas emissions in tonnes Carbon Dioxide Equivalent  | Which Scope? |
| --- | --- | --- |
| Scope 1 Agricultural Emissions |  7,795  | Scope 1 (net zero) |
| Scope 1 and 2 Emissions - University Estate |  43,661  | Scope 1 and 2 (net zero) |
| Business travel |  13,427  | Scope 3 (net zero) |
| Staff commuting |  4,970  | Scope 3 (net zero) |
| Student commuting |  1,693  | Scope 3 (net zero) |
| Construction |  28,987  | Scope 3 (net zero plus) |
| Business Services |  22,708  | Scope 3 (net zero plus) |
| Other manufactured products |  19,394  | Scope 3 (net zero plus) |
| Other procurement |  8,827  | Scope 3 (net zero plus) |
| Food and Catering |  7,188  | Scope 3 (net zero plus) |
| ICT |  7,421  | Scope 3 (net zero plus) |
| Manufactured fuels, chemicals and gases |  4,410  | Scope 3 (net zero plus) |
| Other supply chain |  3,173  | Scope 3 (net zero plus) |
| Waste, wastewater and water supply |  761  | Scope 3 (net zero plus) |
| TOTAL | 174,415 |  |

## Figure 6, page 17: University buildings 2019/2020 baseline emissions by energy source

Our 2020 baseline Carbon Dioxide Equivalent (carbon dioxide plus other greenhouse gases) emissions from heating and powering our buildings, split by energy source. Approximately 80% of these emissions (34,939 tonnes Carbon Dioxide Equivalent) are linked to natural gas consumption, the remainder (8,013 tonnes Carbon Dioxide Equivalent) is grid electricity.

## Figure 7, Page 18: Buro Happold methodology

Four models were used by engineering consultants Buro Happold to simulate the impact of proposed interventions to reach net zero by 2030. The models were applied sequentially in order to inform our proposed net zero pathways. The following list details each model and what they do.

### Demand Model

* Baseline annual demands
* Calculates post-retrofit demands
* Calculates retrofit costs
* Calculates technology installation and costs

### Retrofit Model

* Estimates achievable space heating, hot water and electricity demand reduction in surveyed buildings
* Calculates capital cost of retrofit

### Energy model

* Simulates operation of the energy network and proposed ambient loop

### Techno-Economic Model

* Performs cashflow and carbon modelling based on forecasts of fuel price and carbon factors
* Calculates cost of offsetting to meet net zero greenhouse gas emissions by 2030

## Figure 8, page 22: Emissions reductions – Light retrofit and waste to energy

The projected reductions in scope 1 and 2 emissions that would be delivered by scenario A - light retrofit and waste to energy. The top line of the area chart shows the baseline emissions in tonnes Carbon Dioxide Equivalent (carbon dioxide plus other greenhouse gases), while the bottom line of the area chart shows the projected emissions after interventions. The area chart shows what proportion of emissions reductions would be driven by each intervention, as well as when those reductions would be delivered between 2021 and 2030. It shows that with all interventions in place, emissions would be reduced to zero by the 2030 academic year, with steep drops in 2026 driven by off-site renewable energy and in 2029 driven by offsetting.

## Figure 9, page 24: Emissions reductions – Light retrofit and full electrification of heat

The projected reductions in scope 1 and 2 emissions that would be delivered by scenario B - light retrofit and full electrification of heat. The top line of the area chart shows the baseline emissions in tonnes Carbon Dioxide Equivalent (carbon dioxide plus other greenhouse gases), while the bottom line of the area chart shows the projected emissions after interventions. The area chart shows what proportion of emissions reductions would be driven by each intervention, as well as when those reductions would be delivered between 2021 and 2030. It shows that with all interventions in place, emissions would be reduced to zero by the 2030 academic year, with steep drops in 2026 driven by off-site renewable energy and in 2029 driven by offsetting.

## Figure 10, page 26: Emissions reductions – Expanded retrofit and full electrification of heat

The projected reductions in scope 1 and 2 emissions that would be delivered by scenario C - expanded retrofit and full electrification of heat. The top line of the area chart shows the baseline emissions in tonnes Carbon Dioxide Equivalent (carbon dioxide plus other greenhouse gases), while the bottom line of the area chart shows the projected emissions after interventions. The area chart shows what proportion of emissions reductions would be driven by each intervention, as well as when those reductions would be delivered between 2021 and 2030. It shows that with all interventions in place, emissions would be reduced to zero by the 2030 academic year, with steep drops in 2026 driven by off-site renewable energy and in 2029 driven by offsetting.

## Figure 11, Page 28: Impact of light retrofit and full electrification of heat on emissions

The reduction in greenhouse gas emissions in tonnes Carbon Dioxide Equivalent (carbon dioxide plus other greenhouse gases) projected to be delivered by each intervention proposed for scenario B light retrofit and full electrification of heat, from our 2019/20 baseline for net zero. Baseline emissions are 71,545.94 tonnes Carbon Dioxide Equivalent (carbon dioxide plus other greenhouse gases) and it shows that off site renewable energy delivers around a third of projected emissions reductions. The interventions reduce total emissions by around two thirds, with the remaining emissions being addressed through offsetting.

The following table contains the data in the chart:

| Intervention | Reduction in tonnes Carbon Dioxide Equivalent (carbon dioxide plus other greenhouse gases |
| --- | --- |
| Grid decarbonisation | 3,527  |
| Solar PV | 178 |
| Retrofit and ASHP (incl. Western Heat Loop) | 5,840  |
| Electrification of heat | 3,985  |
| Off-site renewable energy | 24,900  |
| Commuting | 2,963  |
| Business travel | 6,627  |
| Behaviour Change | 95  |
| Offset | 23,445  |
| Total:  | 71,560 |

## Figure 12, page 31: Forecast Scope 1 and 2 emissions by year before and after interventions

Greenhouse gas emissions in Carbon Dioxide Equivalent (carbon dioxide plus other greenhouse gases) tonnes from the University estate covering every year from 2005/06 to 2029/30. The emissions included are historical between 2005/06 and 2019/20 (our baseline) and forecast between 2020/21 and 2029/30 (when light retrofit and full electrification of heat interventions will be introduced). The programme of delivery of interventions is subject to change based on year 1 feasibility studies and strategy development, and this will impact on delivered emissions reductions per year.

The chart shows an overall steady reduction after interventions are introduced and a much more significant reduction from 2027/28 due to investment in off-site renewable energy.

The chart includes a note that opportunities to accelerate investment will be reviewed in year 1 delivery.

In 2016/17 we changed our reporting methodology to more accurately account for energy losses (and their associated Carbon Dioxide Equivalent emissions) for supplied heat and electricity.

The following table contains the data in the chart:

| Year | Scope 1 and 2 Carbon Dioxide Equivalent emissions - University Estate (tonnes) |
| --- | --- |
| 2005/06 | 64,142 |
| 2006/07 | 59,737 |
| 2007/08 | 60,455 |
| 2008/09 | 60,467 |
| 2009/10 | 62,906 |
| 2010/11 | 63,920 |
| 2011/12 | 64,135 |
| 2012/13 | 57,006 |
| 2013/14 | 54,372 |
| 2014/15 | 52,664 |
| 2015/16 | 45,524 |
| 2016/17 (note: methodology for scope 1 changed) | 48,479 |
| 2017/18 | 45,889 |
| 2018/19 | 42,830 |
| 2019/20 | 43,661 |
| 2020/21 | 43,646 |
| 2021/22 | 43,244 |
| 2022/23 | 42,964 |
| 2023/24 | 43,381 |
| 2024/25 | 41,740 |
| 2025/26 | 38,376 |
| 2026/27 | 38,223 |
| 2027/28 | 6,854 |
| 2028/29 | 6,259 |
| 2029/30 | 6,152 |
| 2030/31 | 0 |

## Figure 13, page 36: Impact of interventions on scope 3 Carbon Dioxide Equivalent emissions for net zero plus

Reduction in emissions in tonnes Carbon Dioxide Equivalent (carbon dioxide plus other greenhouse gases) covered within scope 3 net zero plus that would result from each intervention propose. It shows the interventions combined would reduce the total emissions from 102,108 Carbon Dioxide Equivalent tonnes to 79,195 Carbon Dioxide Equivalent tonnes. The greatest reductions are driven by supply chain commitments to net zero, and reducing construction emissions. The greatest reductions are driven by supply chain commitments to net zero (10,211 tonnes Carbon Dioxide Equivalent), and reducing construction emissions (5,797 tonnes Carbon Dioxide Equivalent).

The following table contains the data in the chart:

| Intervention | Reduction in Carbon Dioxide Equivalent tonnes |
| --- | --- |
| ICT | 1,500  |
| Reducing construction emissions | 5,797  |
| Reducing food emissions | 863  |
| Switch to electric vehicles in supply chain | 4,542  |
| Supply chain commitments to net zero | 10,211  |
| Total remaining emissions from our supply chains after interventions | 79,195  |