



# Oxford University's Carbon Management Programme



@OxfordEnvSust



# Oxford University is...

One of the **world's longest established** and **pre-eminent research universities**. Teaching since 1096.

Ranked overall **Global #1** in both the 2016/17 and 2017/18 Times Higher Education World University Rankings

**Ranked #1** in the UK's latest Research Excellence Framework for the quality of its research

**£2.9 billion** annual turnover (including Oxford University Press). More than **17,000** staff across the University, colleges and OUP.



# Academic Structure of the University

## Colleges



Libraries and  
Museums

Oxford  
University  
Press

Continuing  
Education



## Central University

Mathematical,  
Physical and  
Life Sciences  
(MPLS)

Medical  
Sciences  
(MSD)

Social  
Sciences  
(SSD)

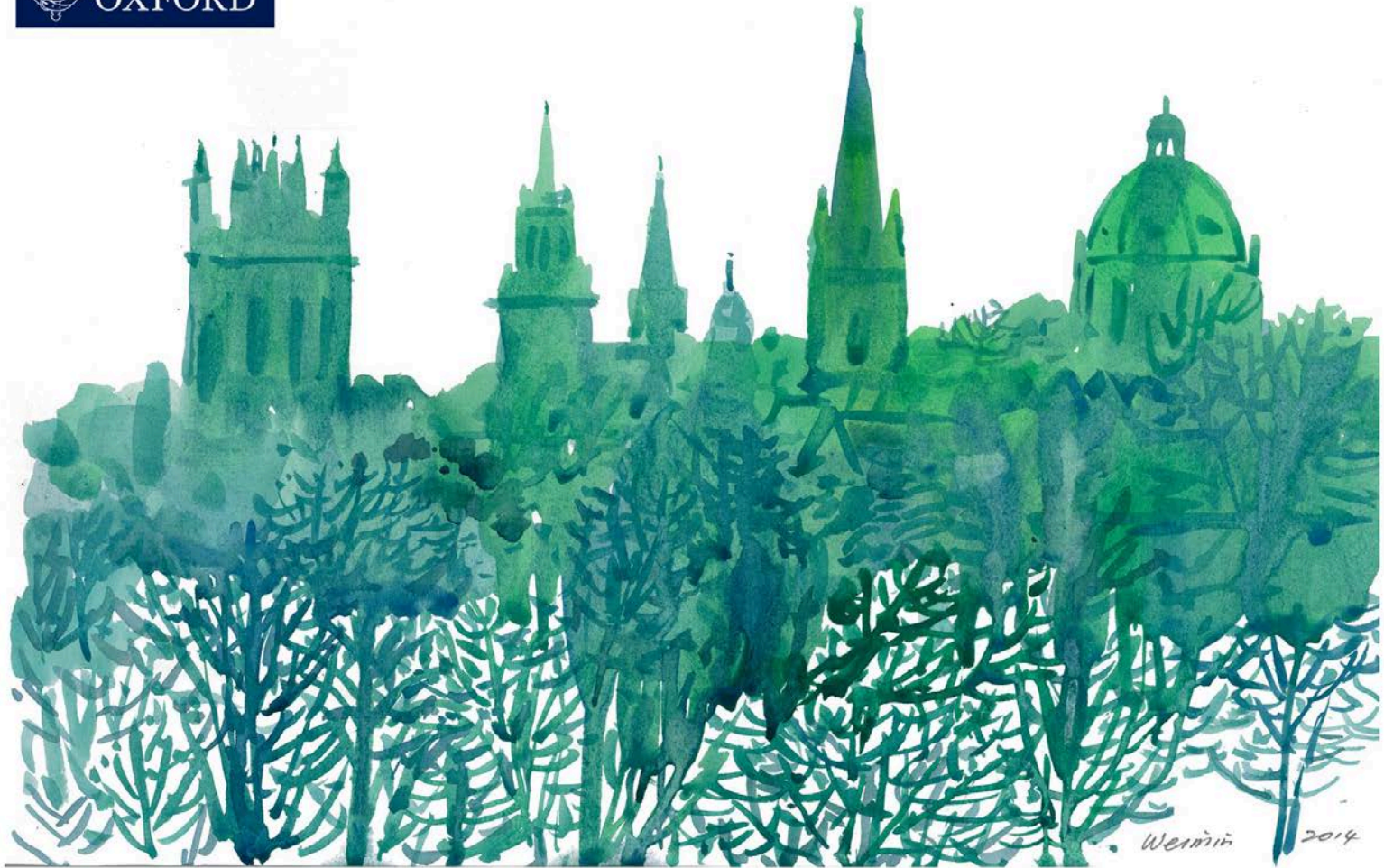
Humanities  
(HD)

Chemistry • Computer Science Earth  
Sciences • Engineering Science •  
Materials  
Mathematics • Physics • Plant  
Sciences • Statistics • Zoology...

Biochemistry • Neurosciences  
Experimental Psychology Oncology •  
Paediatrics Pathology • Population  
Health Psychiatry • Surgical  
Sciences...

Archaeology • Saïd Business School •  
Economics • Education Geography &  
the Environment Blavatnik School of  
Government Area Studies • Law •  
Politics Sociology...

Art • Classics • English  
History • Linguistics • Medieval &  
Modern Languages • Music •  
Oriental Studies • Philosophy •  
Theology & Religion...



[www.admin.ox.ac.uk/estates/environment/](http://www.admin.ox.ac.uk/estates/environment/)



ENERGY AND CARBON MANAGEMENT



SUSTAINABLE TRAVEL



EMISSIONS AND DISCHARGE



SUSTAINABLE BUILDINGS



WASTE AND MATERIAL RESOURCES



BIODIVERSITY



WATER



SUSTAINABLE PURCHASING



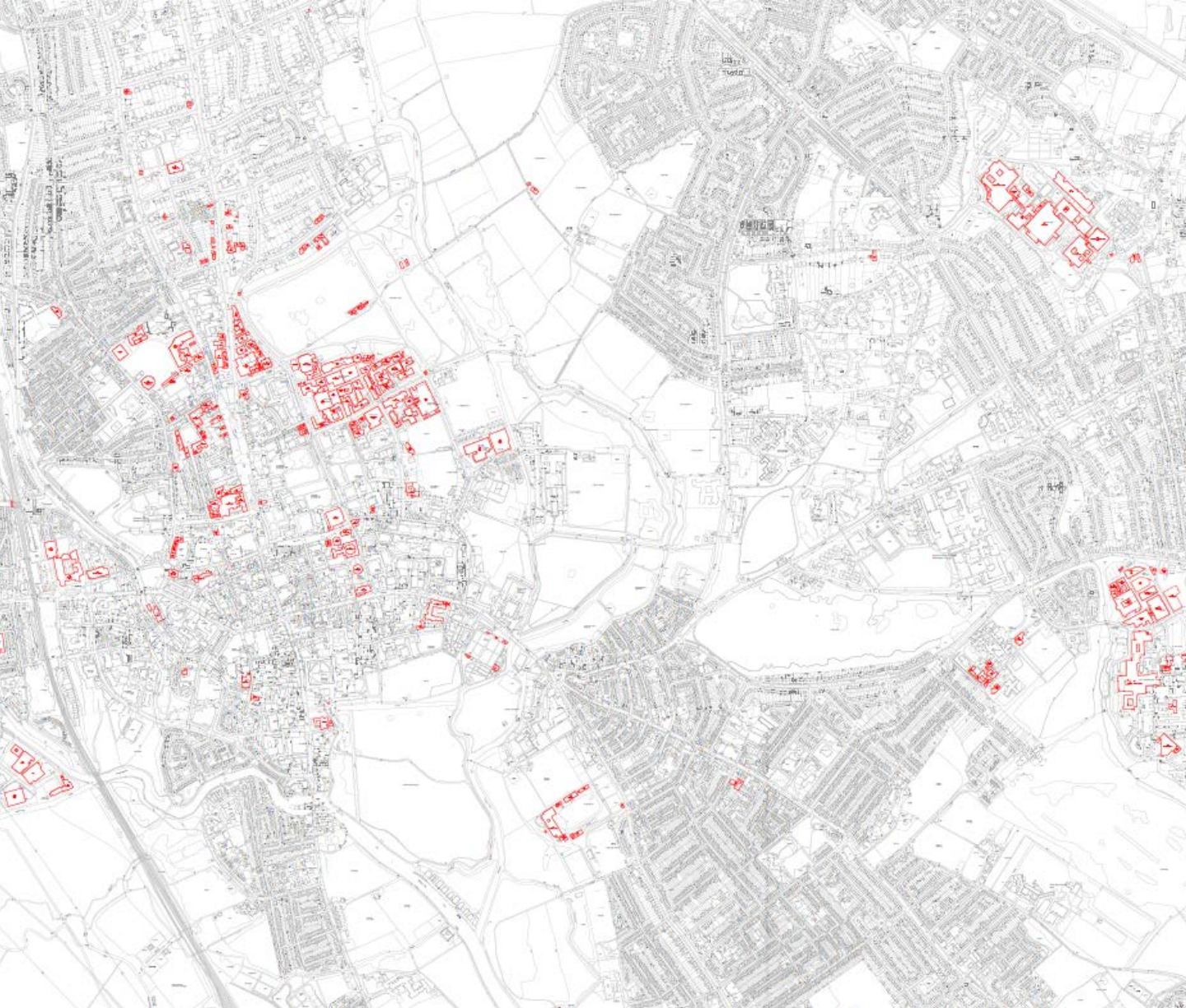
EDUCATION, RESEARCH AND KNOWLEDGE  
TRANSFER



COMMUNITY

## WHAT IS COVERED BY ENVIRONMENTAL SUSTAINABILITY?





## Estate

250 Buildings, 49 listed

13 main sites

40% GIA growth since 2000

Capital projects £120m pa

## Expansion

1,000 graduate rooms

1,000 staff housing units

6 campus masterplans

## Carbon Management Plan

33% by 2020 against 2005

18.5% achieved to 2017

£1m annual spend

New target developed for 2030

100% wind power

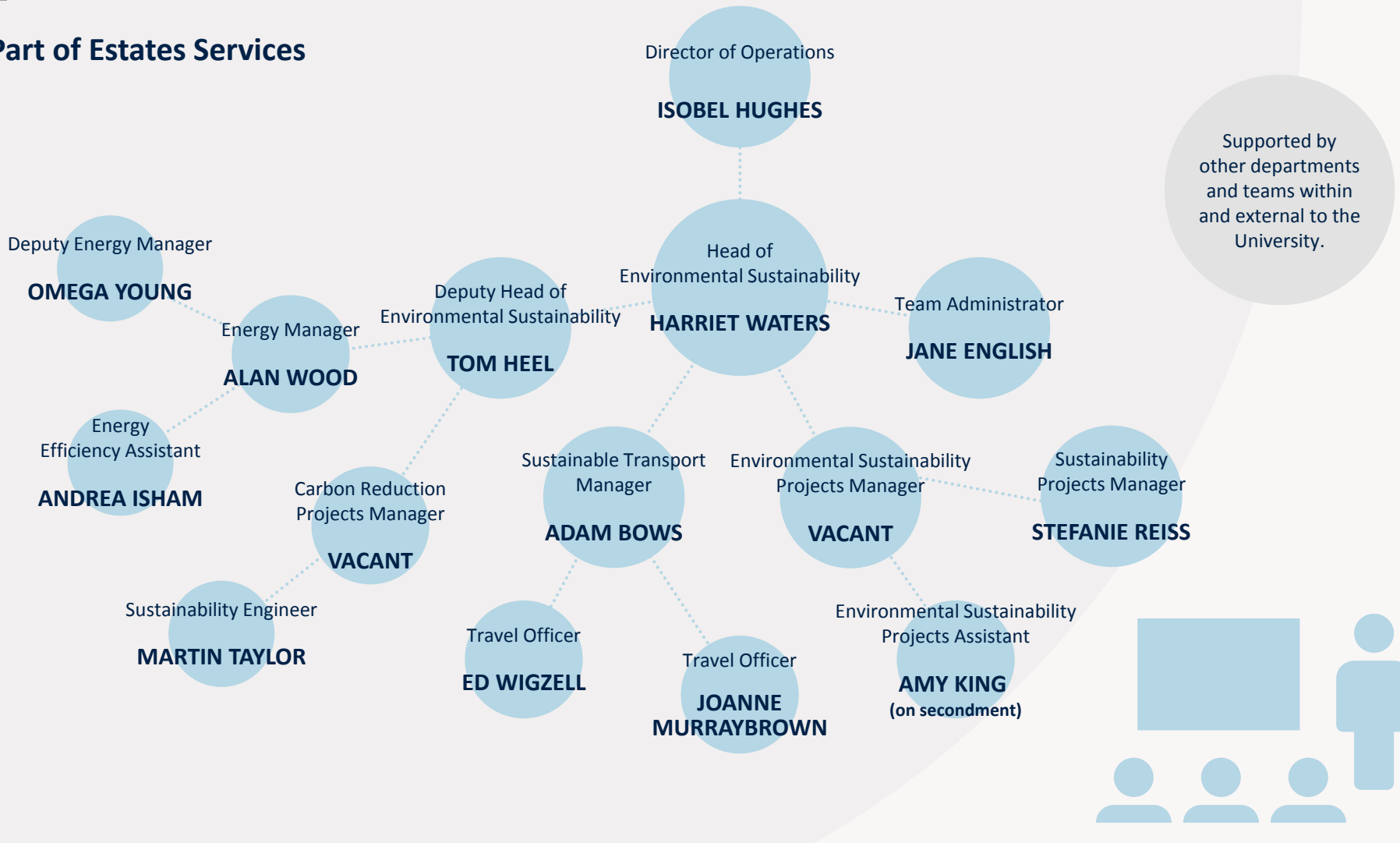
Departmental cost

# CONTEXT

ENVIRONMENTAL SUSTAINABILITY at OXFORD



# Part of Estates Services



## HOW IS IT MANAGED DAY TO DAY?





## ENERGY AND CARBON MANAGEMENT

Encouraging energy efficient practices and investing in the estate to reduce carbon emissions.

# FACTS AND FIGURES

**£3.7 million**

Invested in our carbon reduction programme



**£6 million**  
allocated further



**54x**

more on-site energy including ground source heat pumps and solar PV than in 2005/06



**133**  
kg CO<sub>2</sub> per m<sup>2</sup>



2005/06



**143**  
kg CO<sub>2</sub> per m<sup>2</sup>



2009/10



+14%

After peaking in 2009/10 our estate emissions reduced to:

**91**  
kg CO<sub>2</sub> per m<sup>2</sup>



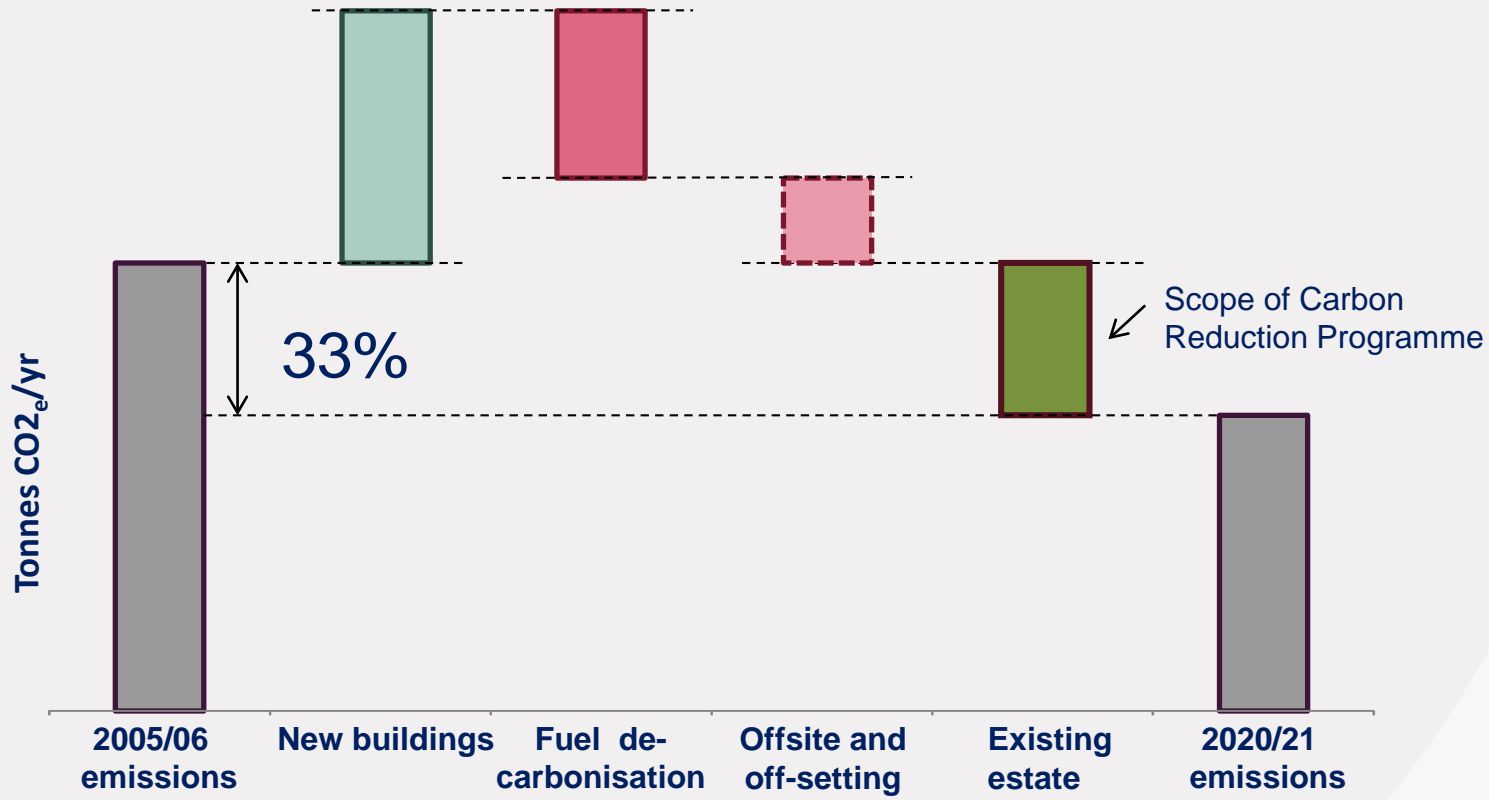
2016/17



+33%

At the same time the size of our estate increased by a third.

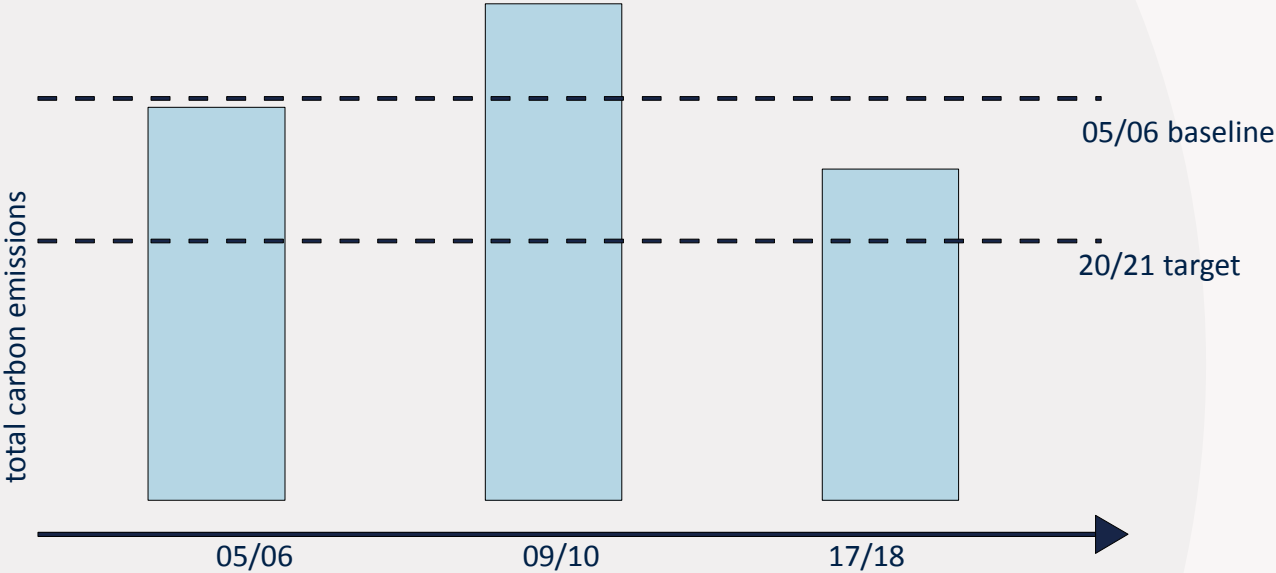
## ENERGY AND CARBON MANAGEMENT



# BREAKING DOWN THE CHALLENGE

# FACTS AND FIGURES

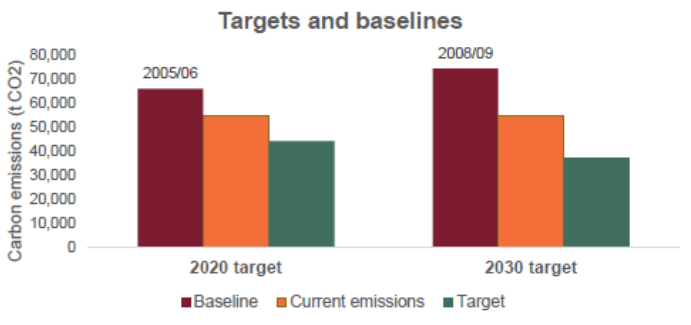
Our total emissions are lower than the baseline for the first time (-18%) but we are still on a challenging journey to meet our 33% reduction target by 2020/21



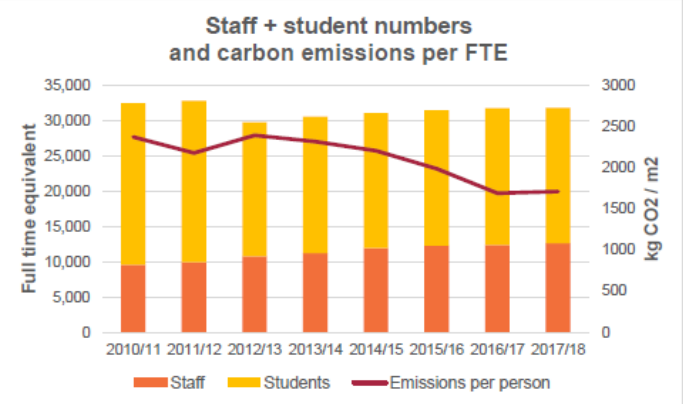
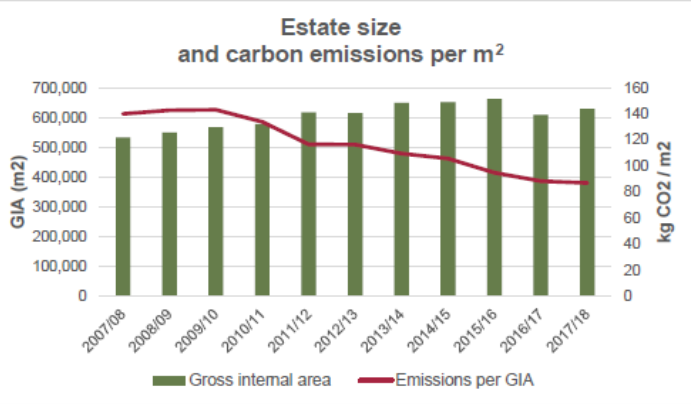
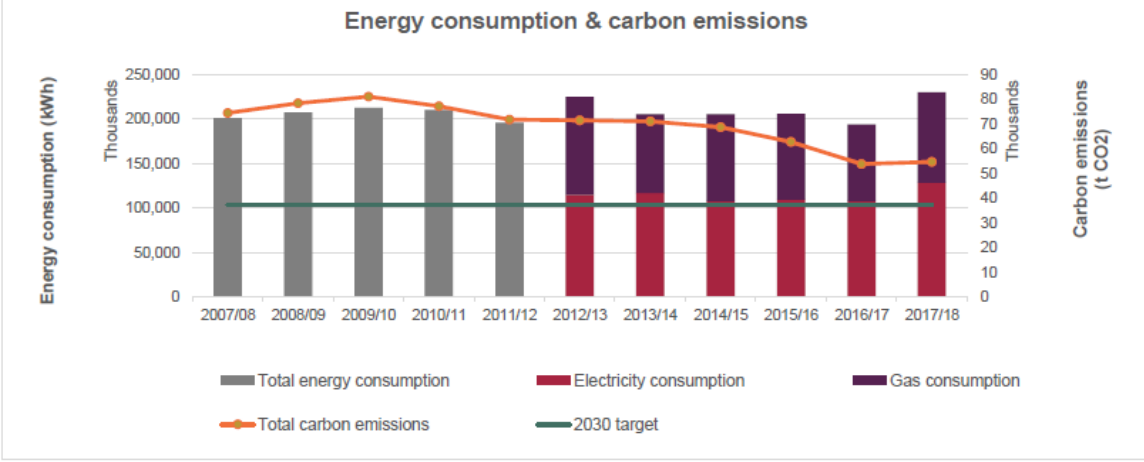
## ENERGY AND CARBON MANAGEMENT

# FACTS AND FIGURES

## Background information and key performance indicators



**Note:** For 2017/18 the area of the estate for which energy consumption information has been reported grew by 25%. This significant change is due to improvements in data availability for space embedded within the hospital sites. This is reflected in the increase in consumption metrics and affects the decarbonisation trend. Moreover, the estate as a whole has grown by 3.2%.



DEC rating	No. of buildings	Floor area (m <sup>2</sup> )	% of estate
A	2	4,114	0.6%
B	24	68,874	10.4%
C	41	156,048	23.6%
D	20	56,654	8.6%
E	20	100,382	15.2%
F	6	12,292	1.9%
G	40	192,795	29.1%
TBC	0	0	0.0%
<b>Total*</b>	<b>153</b>	<b>591,159</b>	<b>89.34%</b>

**Note:** DEC's are renewed annually. Numbers vary depending on how many DEC's are in progress. Ratings may also vary as DEC's are a relative measure by sector and final scores are dependent on comparable buildings assessed in a given year.



# ENERGY AND CARBON MANAGEMENT

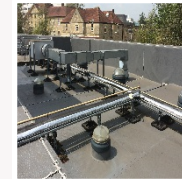


# CARBON MANAGEMENT PROGRAMME



Behaviour change

Building Systems  
Optimisation



Renewable Energy

Plugged Load



Building Fabric



ENERGY AND CARBON MANAGEMENT

ENVIRONMENTAL SUSTAINABILITY at OXFORD



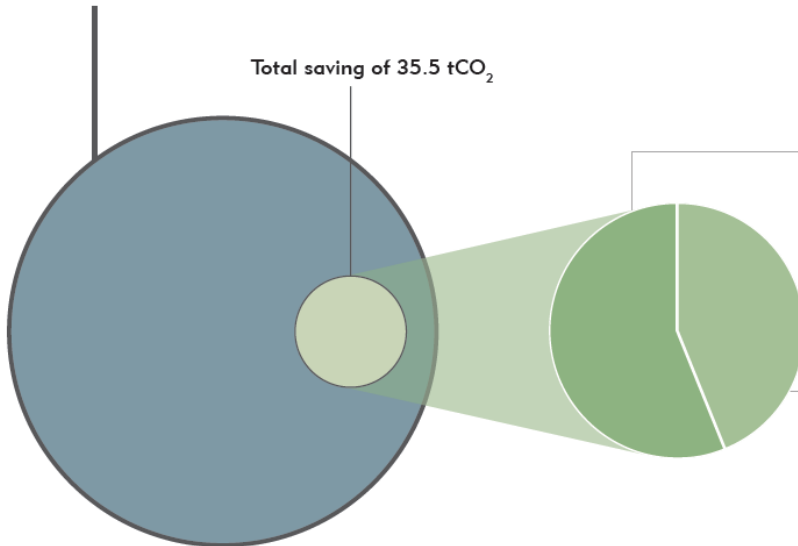
# BUILDING SYSTEMS OPTIMISATION

## University of Oxford Henry Wellcome Building for Molecular Physiology Building Management System Optimisation

Overall calculated energy saving of approximately £6,395. Work carried out in 2016/2017.



Typical annual tCO<sub>2</sub> created by the  
Henry Wellcome Building for Molecular Physiology



Total saving of 35.5 tCO<sub>2</sub>

### Air Handling Unit no.1 Timeclock Adjustment

The timeclocks for Air Handling Unit no.1 have been changed so that they better match the occupation and usage of the building.

The settings are now as follows:

Mon – Fri: 0800 – 1800

Sat – Sun: 1000 – 1100 & 1600 – 1700

### Air Handling Unit no.2 Timeclock Adjustment

The timeclocks for Air Handling Unit no.2 have been changed so that they better match the occupation and usage of the building.

The settings are now as follows:

Mon – Fri:

Full Ventilation: 0800 – 1900

Three Quarters: 1900 – 2300

Minimum Speed: 2300 – 0800

Sat – Sun:

Three Quarters: 0800 – 1900

Minimum Speed: 1900 – 0800

35.5t CO<sub>2</sub> is equivalent to the CO<sub>2</sub> emitted  
from 5.9 households for one year

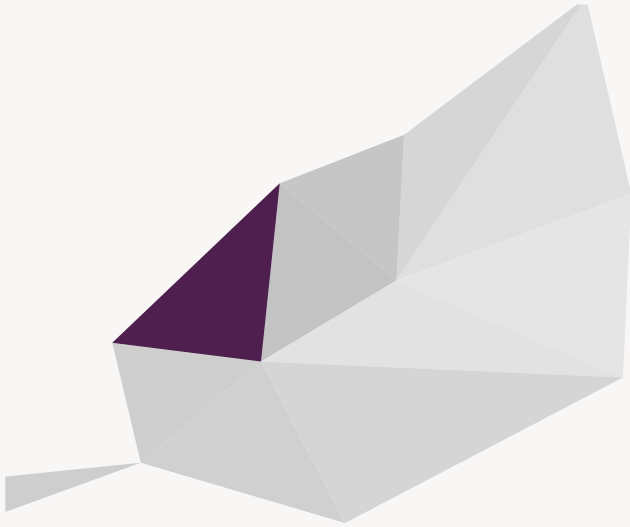
# ENERGY AND CARBON MANAGEMENT

ENVIRONMENTAL SUSTAINABILITY at OXFORD







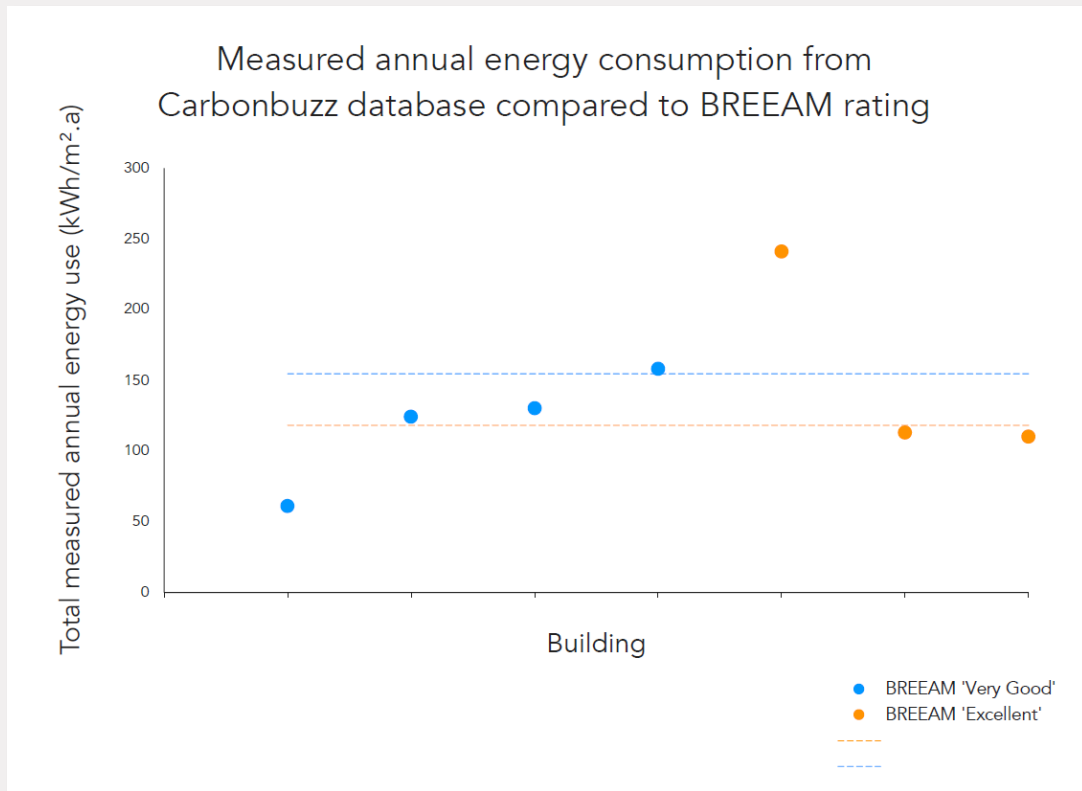


## SUSTAINABLE BUILDINGS

Making full use of available space and designing and refurbishing buildings in line with the University's Sustainable Building Philosophy.



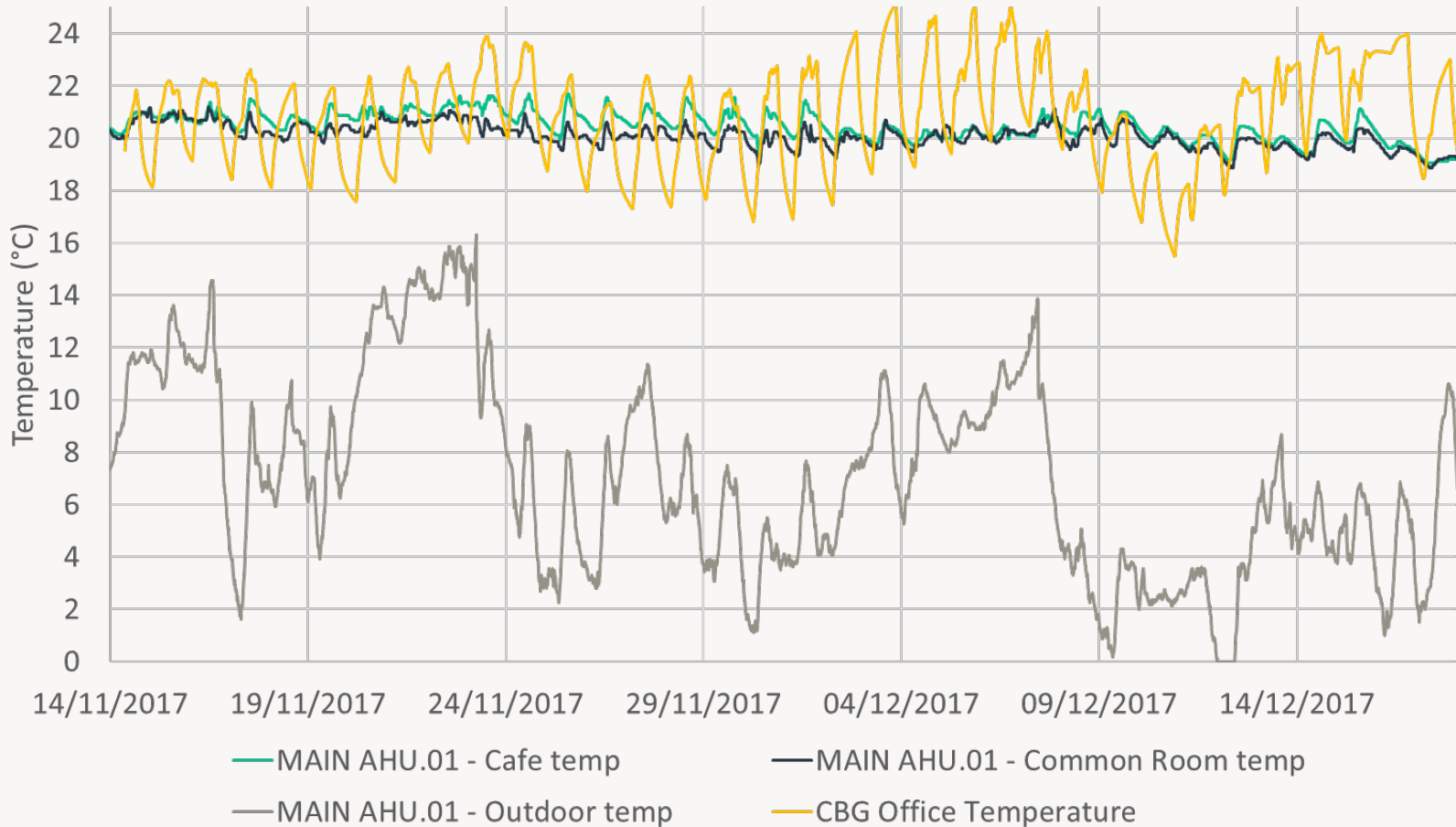
## Others share our experience



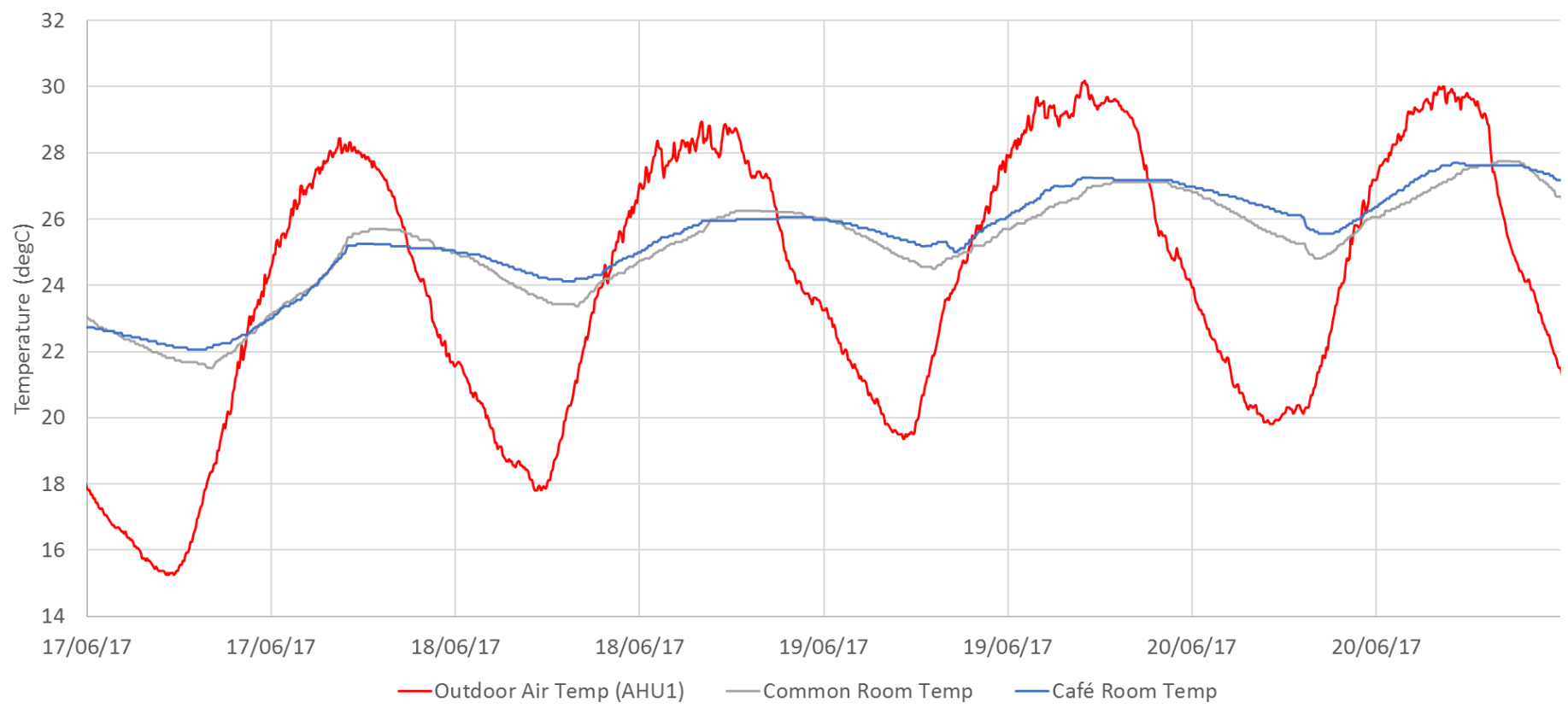
## DELIVERING TARGETS



Kellogg Hub Temperatures (5-minute readings)



# WINTER COMFORT



# BENEFITS

ENVIRONMENTAL SUSTAINABILITY at OXFORD




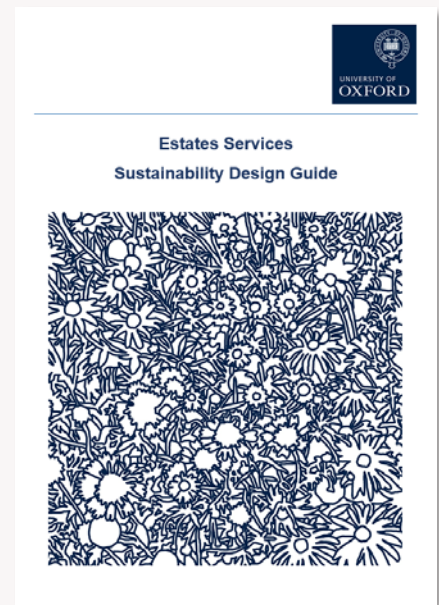


## Filling the gaps...

- simple format
- 24 guidance notes (BREEAM 114)
- one stop shop - hyperlinked for quick reference
- from feasibility onwards regardless of value (critical)

### 2.5. Passive design

Issue	Passive Design
Responsibility	Architect / Passivhaus Consultant/Designer
Rationale	<p>Simplifying architectural forms and early consideration of passive opportunities to design out risks can have a significant impact on the deliverability of stable and comfortable internal environments. This approach can also be a driver for reducing capital costs. Stable environments minimise the need for heating and cooling, reduce the requirement for, size and cost of services, delivering comfort for the lowest energy input.</p> <p>Issues such as solar gain, which can be costly to mitigate actively (cooling) or passively (external solar shading/blinds), can be designed out with careful attention to orientation and glazing ratio's. This has significant benefit both to the capital and operational building costs and prevents locking in comfort problems for University staff and students for the lifetime of the building.</p>
Requirements	<ul style="list-style-type: none"><li>• East and West facing facades (and particularly glazed areas on them) should be minimised</li><li>• Glazed areas should be optimised for daylighting (ideally &gt;800mm from FF).</li><li>• Shading from solar gain should be considered within the façade design.</li><li>• External solar shading should be included as a last resort, designed for low maintenance and to eliminate the risk of creating pigeon roosts.</li><li>• Spaces with high occupancy or equipment gain should be located and designed to minimise solar gain and to maximise the potential for natural ventilation (where appropriate to their use).</li><li>• Thermal mass must be paired with a realistic ventilation strategy (section 2.7).</li><li>• Segregating areas (both physically and in terms of services) likely to require extended or 24 hour operation should be considered.</li></ul>
Key RIBA Stages	 1 – 4
Evidence	<ul style="list-style-type: none"><li>• Clear focus in design development from project inception.</li><li>• Specific reference in project reports from pre-feasibility onwards.</li></ul>



# SUSTAINABILITY DESIGN GUIDE



# BEHAVIOUR CHANGE



# FACTS AND FIGURES

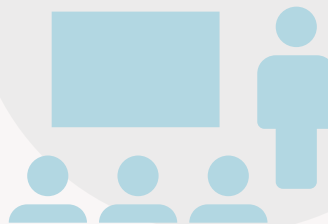


**3,245**

students signup to Student Switchoff

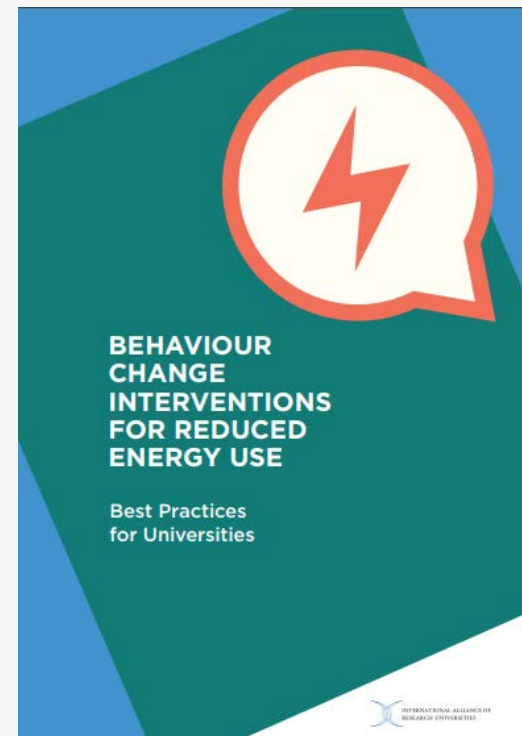
**100+**

teams have taken part in Green Impact receiving over 50 awards at our Sustainability Showcase where...



**200**

guests celebrated at the Sheldonian Theatre



# SUSTAINABLE BEHAVIOUR IN BUILDINGS

ENVIRONMENTAL SUSTAINABILITY at OXFORD





# THANK YOU

ENVIRONMENTAL SUSTAINABILITY at OXFORD

