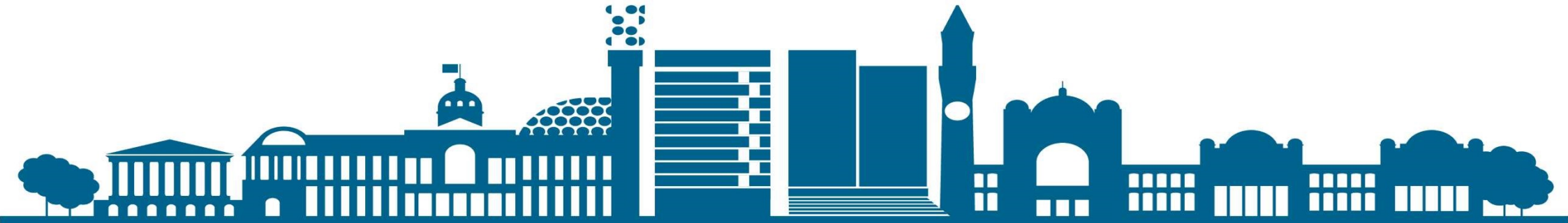
UNIVERSITY OF BIRMINGHAM

Building on strong foundations

Delivering a world-class university estate and experience for the benefit of our students, staff and visitors.



Presentation by Dan Holmes, Senior Project Manager (Capital Projects)

University introduction

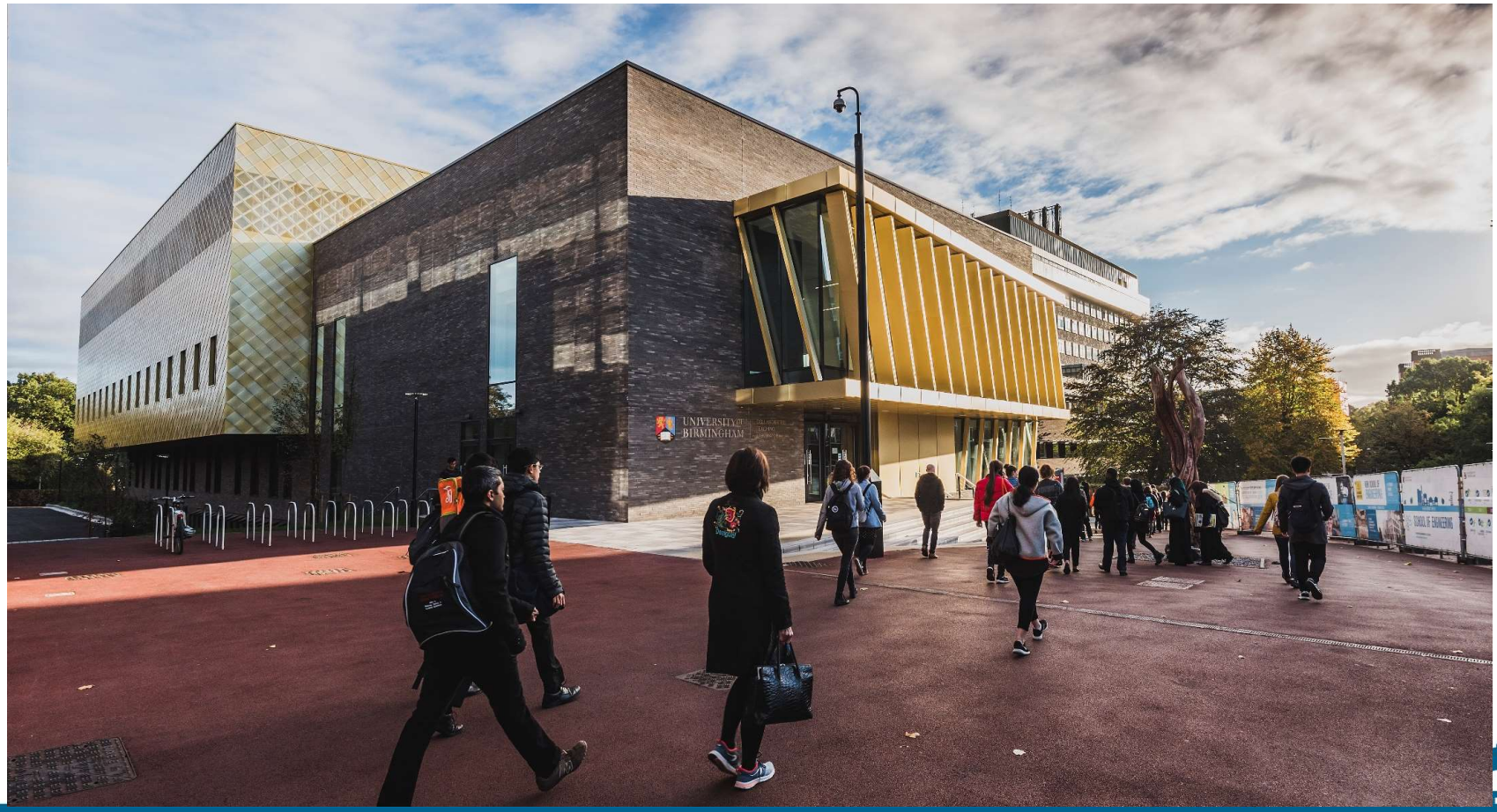
- ✓ A world-leading global University
- ✓ 34,000 students
- ✓ 7,000 staff
- ✓ We have three museums, an art gallery, botanic gardens and two concert halls, bringing cultural richness to the community
- ✓ 1 in 50 jobs in Birmingham depend on the University
- ✓ We contribute £3.5 billion to the local economy
- ✓ Educated more than 300,000 people across the globe
- ✓ Despite continued growth, we've achieved a 20% reduction in Carbon Emissions four years ahead of target


UNIVERSITY OF BIRMINGHAM
1909

Celebrating success

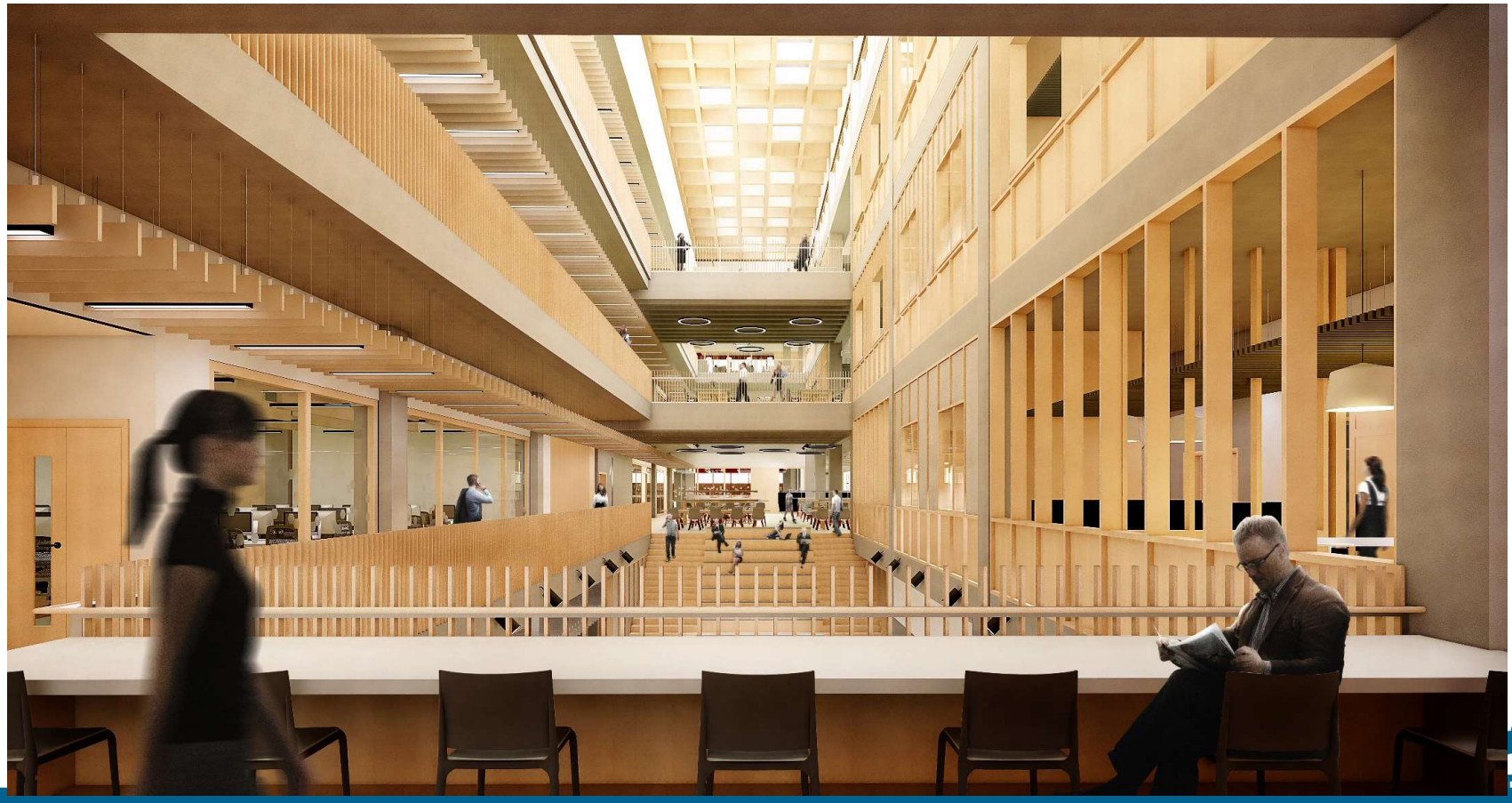
Green Heart, opened in January 2019

Transforming education



CTL, opened in October 2018

Creating inspiring places

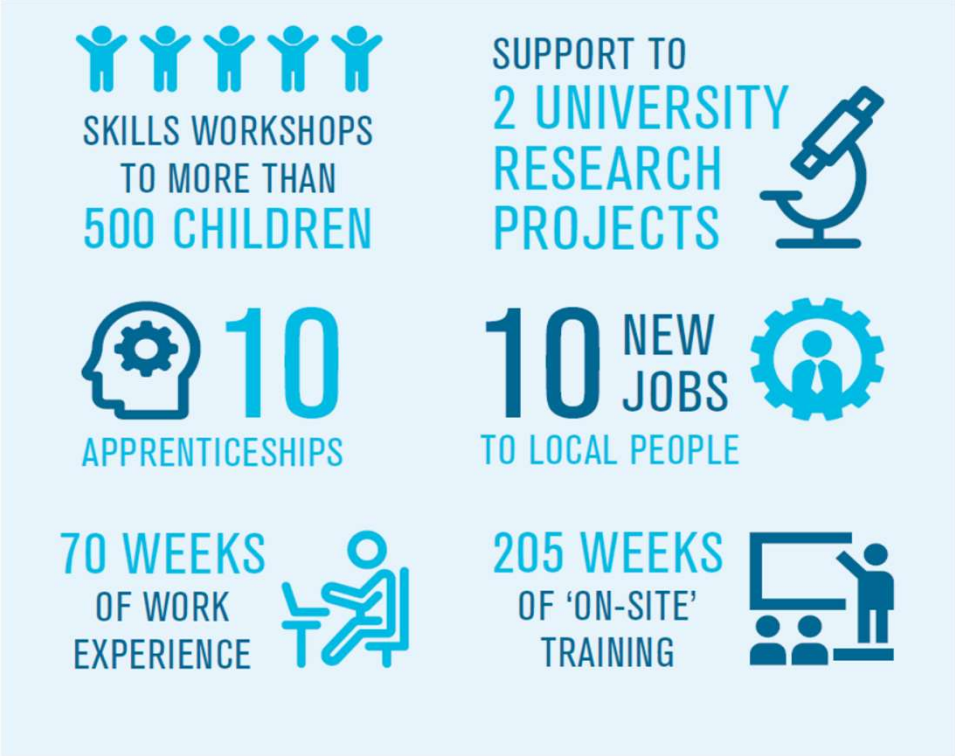


School of Engineering, opening in 2020

We’re committed to the city

The Exchange, opening 2021

Demonstrating impact, delivering social value



We are delivering regional jobs, apprenticeships and skills workshops to people living and working within the region.

Continued growth & major development

- Molecular Sciences
- Arrivals Building
- Tysley

International ambition

Dubai Phase 2, opening 2021

Birmingham Life Sciences Park

Life Sciences Park, opening 2021

Value

By 2026, the students enrolling at UoB will be younger than the iPhone.

These are students that have never experienced a world without technology and its constant connectivity to WIFI or 4G.

The challenge

To respond to these challenges and to deliver a world-class university service, it is essential that we are able to answer the plain language questions: **'how many of these do we have, how big are they and where are they?'**

At present, we struggle to answer these plain language questions.

Within the Estates Office we have more than 40+ systems, all generating huge volumes of data. Many of these systems operate a closed protocol, making it difficult to share and in some cases access information.

As a result, at times the department is highly inefficient, wasting a significant amount of time 'hunting for data' and information.

In some cases, when the information is finally found, many have concerns over the validity of the information.

Introducing the Intelligent Estate:

The Intelligent Estate will focus specifically on using the power of estate data and emerging technologies to ensure we get more out of our strategic assets; taking us from good to great.

Vision:
By 2026, we will have one-version of the truth for all of our estates data, enabling colleagues to answer the plain language questions, gain insights and find information quickly, accurately and completely.

Through cross-institutional partnership working, and collaboration with business and research, we will be exploring trends and correlations in our data, to advance our understanding of the relationship between user experience and the physical estate.

We will have embedded a culture of data driven decision making, resulting in a smarter performing, and more intelligent estate for the benefit of all.

To achieve this, data within the department needs to be open and easily accessible.

We will achieve this by:
To achieve this, data within the department needs to be open and easily accessible to make it easier to:

- ❑ Link
- ❑ Interpret
- ❑ Find
- ❑ and Manage information

The Result:
Optimising our estates data together with the adoption of new technologies will promote a culture of Data Driven Decision Making; resulting in a smarter performing, more intelligent Estate for the benefit of all.

Implementation of this strategy will deliver transformation of operation and service delivery, strengthening the University's position as a world-leading Institution.

Expected outcomes:

- A smarter performing estate
- Delivering operational efficiency and sustainability of the estate
- Improving space utilisation
- Increasing user satisfaction amongst occupants leading to improved wellbeing
- Mitigating risk specifically around contractor insolvency and supply chain
- Minimising construction costs

Service Transformation

Case Study: Newcastle University – The USB Building

The Urban Sciences Building (USB) at Newcastle University has been designed to improve humans understanding of the relationship between buildings and their wider environment.

As such, it is wired to more than 4,000 sensors to allow academics to see how it performs and how it interfaces with the energy, water, internet and other networks to which it is connected.

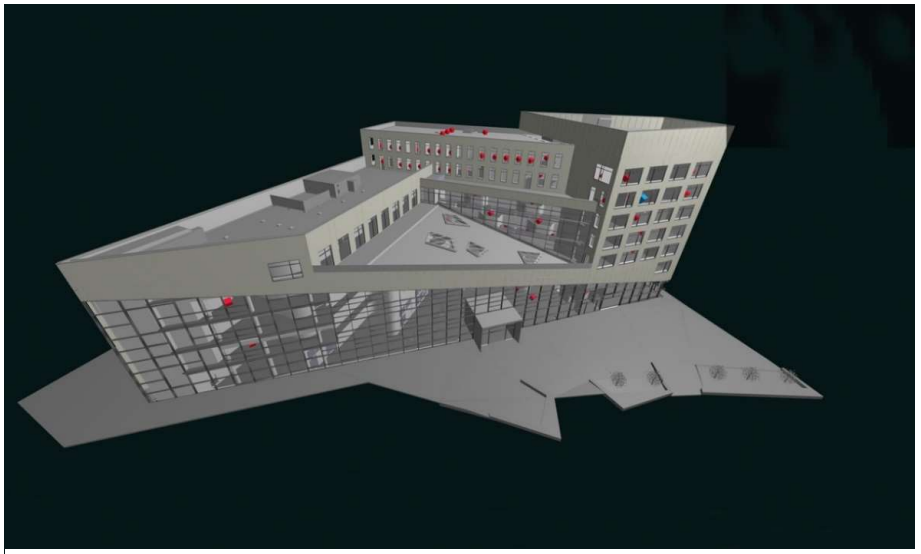
It has been designed for teaching, hosting events, laboratory research and – crucially for the university – as a facility in which to test smart technologies to promote urban sustainability.

In short, it is a living laboratory.

The building itself is monitored by thousands of smart and micro sensors, which, in tandem with connections using open internet protocols, feed the control systems that ensure optimum building operation.

The scheme was developed in BIM, and the BIM model is now helping with the operation of the building and showing the conditions recorded by each of the sensors (for real-time data, see: www.3d.usb.urbanobservatory.ac.uk).

Similar to data driven decision making, the operations team are altering the HVAC systems ramping them up or down depending on occupancy, CO_2 and temperature, to save energy.



Real-time visualisation of the building.

Data is commonly accessible and open, promoting opportunities for improved building and service performance.

CIBSE TM54 predicationed energy use compared to POE data from the Urban Sciences Building

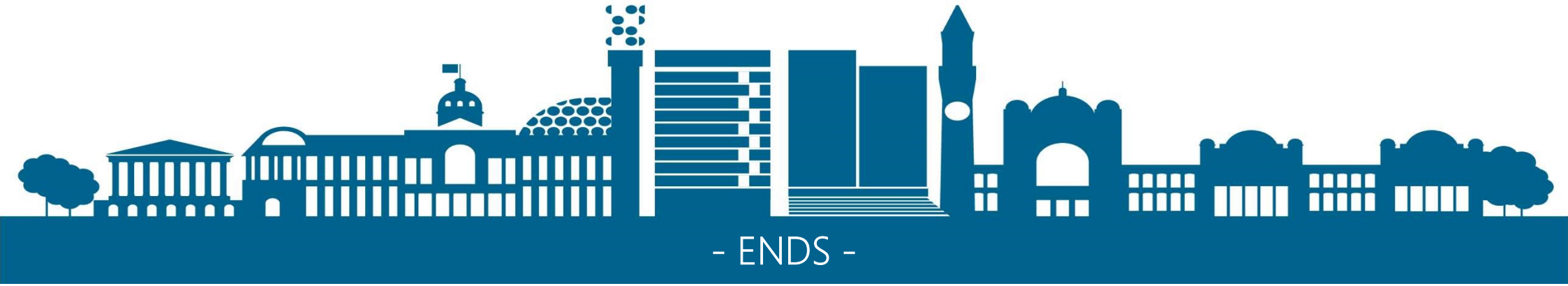
	TM54 predicted ($kWh \cdot m^{-2}$ per year)	USB actual ($kWh \cdot m^{-2}$ per year)	Difference (%)	Explanation
Lighting	9.7	15.2	+56%	Increased use resulting from increased out-of-hours and weekend use. Also lights being left on in large areas where presence detection was overridden
Lifts	1.2	1.3	+4%	Original TM54 assessment did not include allowance for weekend use
Small power	48.9	25.2	-48%	The difference assumed to be because of students using laptop batteries in communal areas, use of lower power, higher efficiency ICT, and building may not be fully up to occupancy
Server rooms	13.1	15.7	+20%	TM54 based on RFI response. University to review if load has increased from original assessment and profile
Catering	16.0	7.9	-51%	At the time of the original assessment, the intensity of use was unknown, so simple benchmarks – for example, kWh per meal – were used
Other equipment	5.4	5.2	-4%	This includes doors curtains, PV, building meters and sensors, and external lighting
DHW	6.5	10.0	+54%	Input from DHW heat pump was less than estimated, so a larger proportion has been provided via the boiler-supplied LTHW system, and energy provided by gas has increased
Heating	10.7	18.2	+70%	Model assumed a winter heating temperature of 21°C. The user controls on site have full functionality to allow users to select temperatures up to 24°C in winter. Small power gains may also be a factor
Fans	13.0	11.0	-15%	Probably a result of additional demand control functionality incorporated into the BMS
Pumps, controls and heat rejection	22.6	27.4	+21%	A fault in the first year meant the main heating and cooling pumps were set to run 24/7, rather than shut down at night
Cooling	10.6	16.4	+55%	Actual temperature data shows summer temperatures warmer than average. Also, occupants have the ability to set room minimum below the 22°C used in the assessment
Humidification	1.3	1.8	+44%	Summer temperatures warmer than normal, requiring increased cooling of fresh air and resulting in dehumidification

With two years of soft landings to run, and the building's 4,000 sensors, there is plenty of scope to fine-tune the USB's systems and to optimise its already impressive energy performance still further.

UNIVERSITY OF BIRMINGHAM

The Intelligent Estate

Delivering a smarter performing, more intelligent Estate
for the benefit of all.



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