Accelerating change – How can we 'Be More Pirate'?

ASBP HEALTHY BUILDINGS CONFERENCE 27.2.2020

CULLINAN STUDIO

Carol Costello

The twin crises of climate breakdown and biodiversity loss are the most serious issue of our time. Buildings and construction play a major part, accounting for nearly 40% of energy-related carbon dioxide (CO2) emissions whilst also having a significant impact on our natural habitats.

UK Architects Declare Climate and Biodiversity Emergency

The research and technology exist for us to begin that transformation now, but what has been lacking is collective will. Recognising this, we are committing to strengthen our working practices to create architecture and urbanism that has a more positive impact on the world around us.

UK Architects Declare Climate and Biodiversity Emergency

We will seek to:

—— Raise awareness of the climate and biodiversity emergencies and the urgent need for action amongst our clients and supply chains.

—— Advocate for faster change in our industry towards regenerative design practices and a higher Governmental funding priority to support this.

—— Establish climate and biodiversity mitigation principles as the key measure of our industry's success: demonstrated through awards, prizes and listings.

—— Share knowledge and research to that end on an open source basis.

—— Evaluate all new projects against the aspiration to contribute positively to mitigating climate breakdown, and encourage our clients to adopt this approach.

—— Upgrade existing buildings for extended use as a more carbon efficient alternative to demolition and new build whenever there is a viable choice.

—— Include life cycle costing, whole life carbon modelling and post occupancy evaluation as part of our basic scope of work, to reduce both embodied and operational resource use.

—— Adopt more regenerative design principles in our studios, with the aim of designing architecture and urbanism that goes beyond the standard of net zero carbon in use.

—— Collaborate with engineers, contractors and clients to further reduce construction waste.

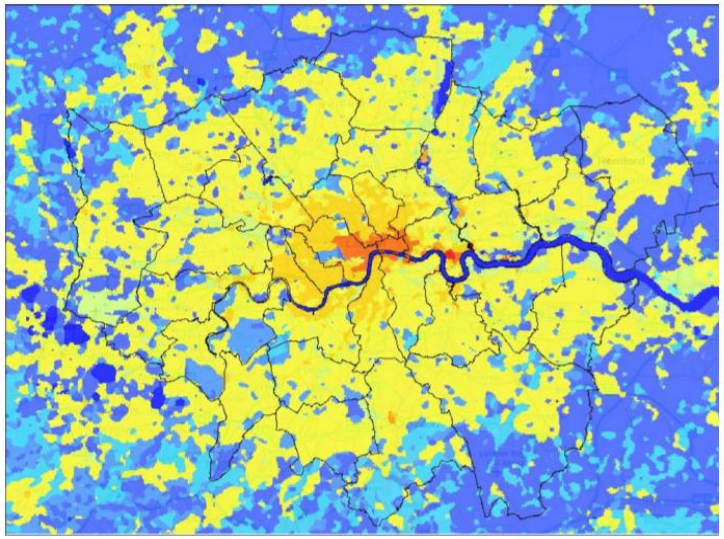
—— Accelerate the shift to low embodied carbon materials in all our work.

—— Minimise wasteful use of resources in architecture and urban planning, both in quantum and in detail.

‘Raise awareness and advocate for change’

the EDGE Edge Debate 96 – 9th January 2020

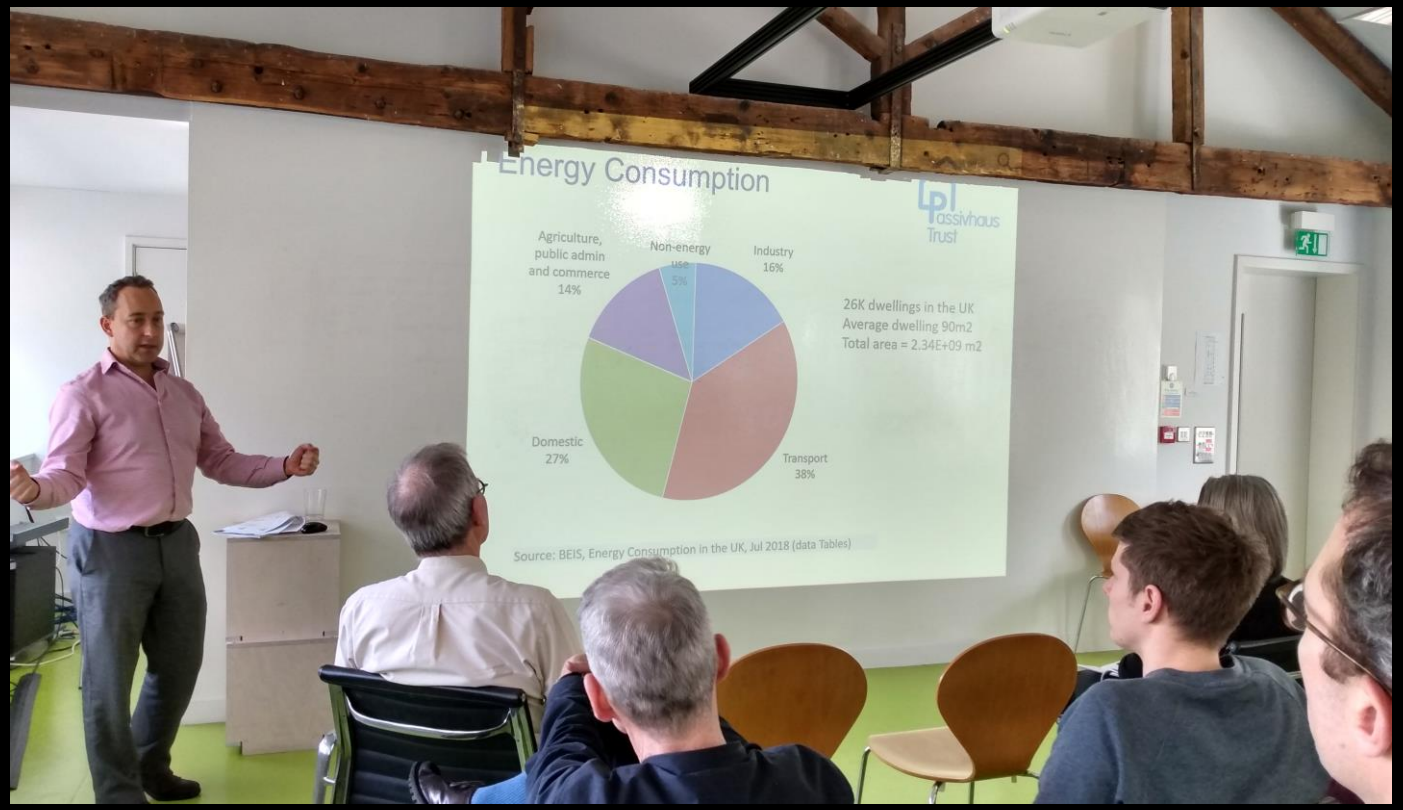
Climate Responsive Urbanism:



How can professionals meet the challenge of urban densification in a time of climate change?

Robin Nicholson has been campaigning through the EDGE and other organizations for many years, and mentoring younger members

‘share knowledge and research on an open basis’



We are co-located with the Sustainable Development Foundation and benefit from knowledge transfer events hosted in our retrofit office in Islington

Net Zero Operational Carbon

Ten key requirements for new buildings

By 2030 all new buildings must operate at net zero to meet our climate change targets. This means that by 2025 all new buildings will need to be designed to meet these targets. This page sets out the approach to operational carbon that will be necessary to deliver zero carbon buildings. For more information about any of these requirements and how to meet them, please refer to the: UKGBC - Net Zero Carbon Buildings Framework; BBP - Design for Performance initiative; RIBA - 2030 Climate Challenge; GHA - Net Zero Housing Project Map; CIBSE - Climate Action Plan; and, LETI - Climate Emergency Design Guide.

Low energy use

1. Total Energy Use Intensity (EUI) - Energy use measured at the meter should be equal to or less than:
   - **35 kWh/m²/yr** (GIA) for residential[1]

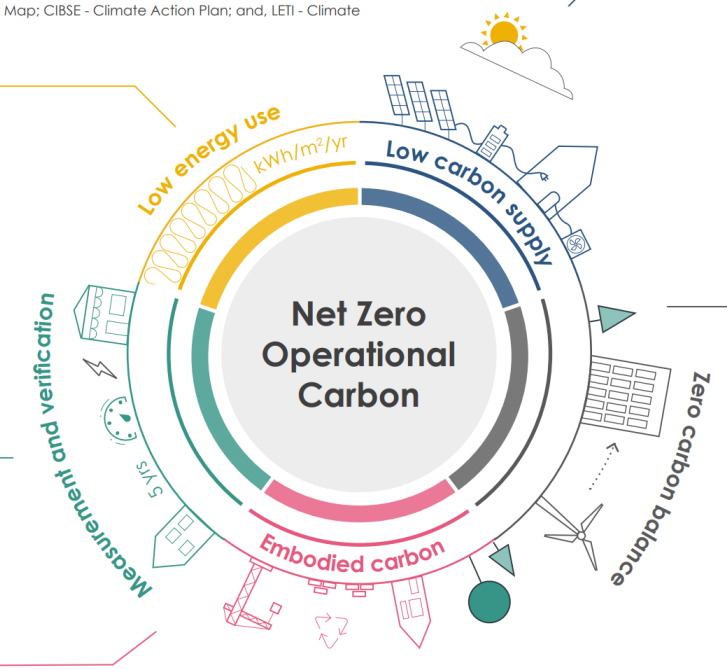
   For non-domestic buildings a minimum DEC B (40) rating should be achieved and/or an EUI equal or less than:
   - **65 kWh/m²/yr** (GIA) for schools[1]
   - **70 kWh/m²/yr** (NLA) or **55 kWh/m²/yr** (GIA) for commercial offices[1,2]
2. Building fabric is very important therefore space heating demand should be less than **15 kWh/m²/yr** for all building types.

Measurement and verification

3. Annual energy use and renewable energy generation on-site must be reported and independently verified in-use each year for the first 5 years. This can be done on an aggregated and anonymised basis for residential buildings.

Reducing construction impacts

4. Embodied carbon should be assessed, reduced and verified post-construction.[3]



Low carbon energy supply

5. **Heating and hot water should not be generated using fossil fuels.**
6. The average annual carbon content of the heat supplied (gCO_2/kWh) should be reported.
7. On-site renewable electricity should be maximised.
8. Energy demand response and storage measures should be incorporated and the building annual peak energy demand should be reported.

Zero carbon balance

9. A carbon balance calculation (on an annual basis) should be undertaken and it should be demonstrated that the building achieves a net zero carbon balance.
10. Any energy use not met by on-site renewables should be met by an investment into additional renewable energy capacity off-site OR a minimum 15 year renewable energy power purchase agreement (PPA). A green tariff is not robust enough and does not provide 'additional' renewables.

Notes:

Note 1 – Energy use intensity (EUI) targets
The above targets include all energy uses in the building (regulated and unregulated) as measured at the meter and exclude on-site generation. They have been derived from: predicted energy use modelling for best practice; a review of the best performing buildings in the UK; and a preliminary assessment of the renewable energy supply for UK buildings. They are likely to be revised as more knowledge is available in these three fields. As heating and hot water is not generated by fossil fuels, this assumes an all electric building until other zero carbon fuels exist. (kWh targets are the same as $kWh_{elec\ equ}$). Once other zero carbon heating fuels are available this metric will be adapted.

Note 2 – Commercial offices
With a typical net to gross ratio, 70 kWh/m² NLA/yr is equivalent to 55 kWh/m² GIA/yr. Building owners and developers are recommended to target a base building rating of 6 stars using the BBP's Design for Performance process based on NABERS.

Note 3 – Whole life carbon
It is recognised that operational emissions represent only one aspect of net zero carbon in new buildings. Reducing whole life carbon is crucial and will be covered in separate guidance.

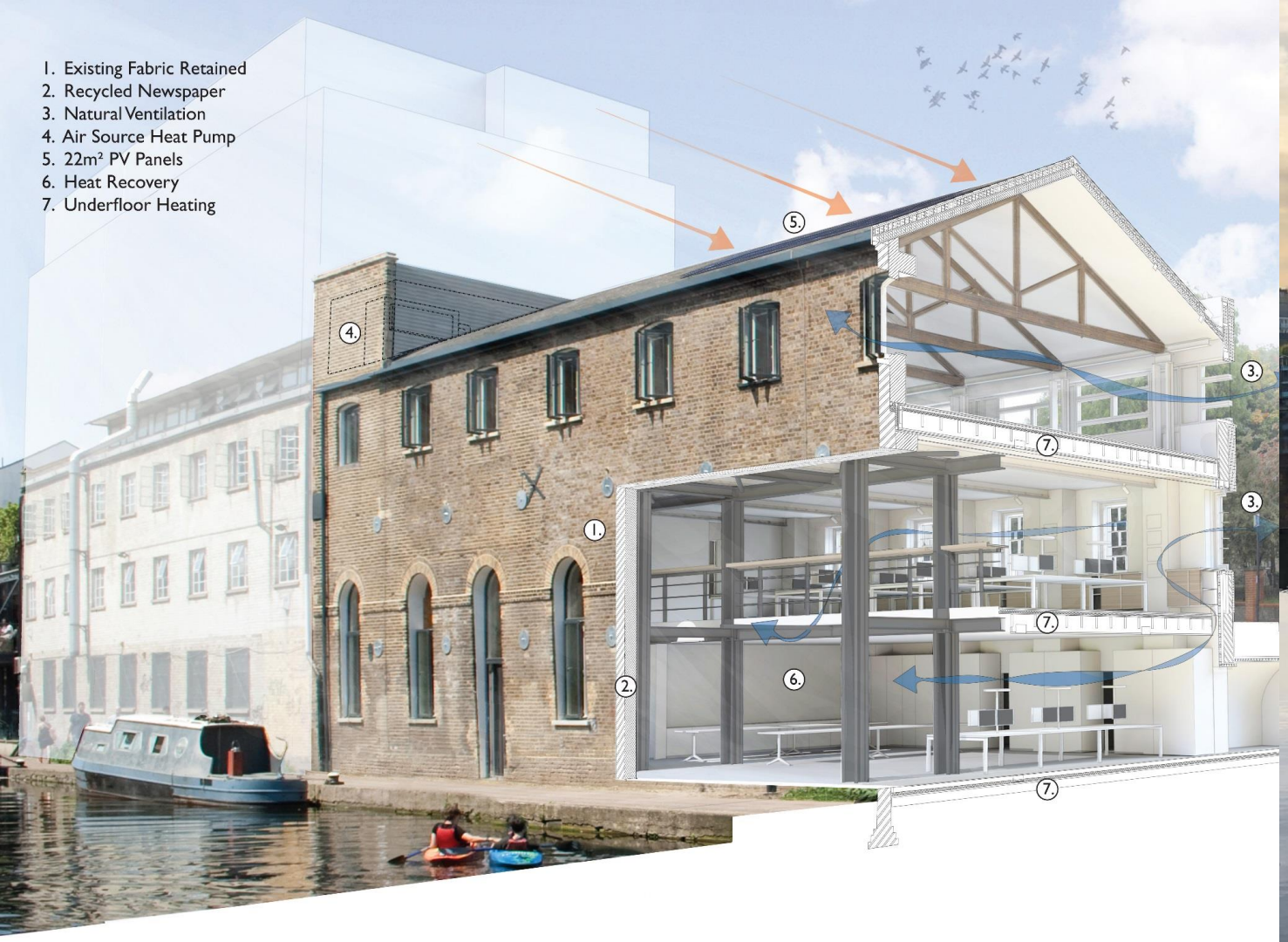
Note 4 – Adaptation to climate change
Net zero carbon buildings should also be adapted to climate change. It is essential that the risk of overheating is managed and that cooling is minimised.

Developed in collaboration with: London Energy Transformation Initiative; UK GBC; BBP Better Buildings Partnership

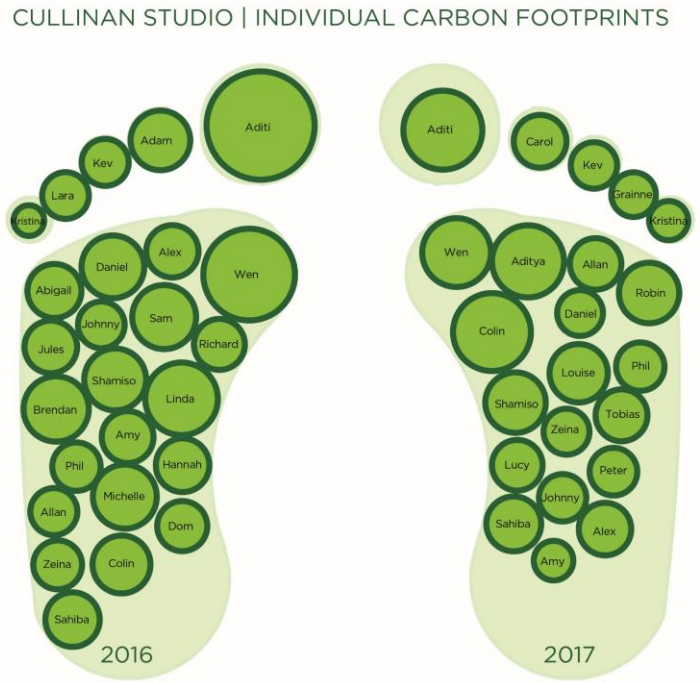
Developed with the support of: Good Homes Alliance; RIBA Architecture.com; CIBSE

Educating our team with the best resources available
to ' learn faster than before' LETI launch of the Net Zero one -pager

‘Upgrade existing buildings as carbon efficient alternative to demolition’



Cullinan Studio low energy retrofit of our canal side office
BREEAM ‘Excellent’ Standard
Carbon footprint reduced by 40% from our previous office



measuring our personal carbon footprints since 2008 to increase carbon literacy and understand impact of actions

‘include whole life carbon modelling and POE as part of our basic scope’

NATIONAL AUTOMOTIVE INNOVATION CENTRE

Renewable energy generation and total net energy use for the whole building

Peak renewable energy generation (kWpeak) Optional	230
Total on-site renewable energy generation (kWh/yr) Mandatory Projects over £1m	7.08
Net final energy consumption, regulated only (kWh/m2/yr) [4] Mandatory Projects over £1m	61.95
Net primary energy consumption, regulated (kWh/m2/yr PE) [2] Optional	117.51
Net final energy consumption, all (regulated and unregulated) (kWh/m2/yr) [3] [4] Optional	123.55
Net primary energy consumption, all (regulated and unregulated) (kWh/m2/yr PE) [2] [3] [4] Optional	306.62
Net carbon emissions, all (regulated and unregulated) (kgCO2eq/m2/yr) [5] Optional	49.07

3.2. Provide a breakdown of the building's whole life embodied carbon performance.
Optional

Element	Design life (years)	Embodied / whole-life carbon ($kgCO_2eq/m^2$) [1]
Whole building	60	1,080
Structure	60	369
Envelope	60	146
Services	60	300
Fit-out	60	264

National Automotive Innovation Centre

SocialValue Report

RLB Rider Levett Bucknall

SPC **Social**Profit Calculator

Introduction

Project Description

The National Automotive Innovation Centre (NAIC) at the University of Warwick is driving the future of the automotive industry from the heart of the United Kingdom. A beacon for automotive research it brings together the brightest minds from industry and academia, to develop future vehicles and mobility solutions.

Research on the campus will focus on technologies to reduce the dependence of cars on fossil fuels and cut carbon emissions.

RLB was brought in as the lead consultant, engaged by the University of Warwick to provide full design services for the delivery of NAIC providing Project Management, Quantity Surveying and Commercial Management, Employer's Agent and Principal Design Services.

The NAIC is the largest research centre of its kind in Europe, with 33,000m² space dedicated to automotive innovation. It will be home to 1,000 staff working across design, engineering and research, as well as future engineers on degree programmes.

RLB have produced a Social Value Report outlining the social and economic impact that has been created following the development of the NAIC for the West Midlands, and outside the UK.

Project
NAIC

Value/Turnover
£85,000,000

Total Social Value
£176,770,087

Total Social Value
£176,770,087

Highlights

SROI
£21,081,049

Economic Impact
£155,689,038

Total Social Value
£176,770,087

Social Value Ratio
£1 : £2.08

Operational Asset Value
(Over 25 years)
£453,250,846

Calculating Your Value

The Social Profit Calculator (SPC) calculates the social, economic and environmental value of a project using two key analysis frameworks; Social Return on Investment (SROI) and Economic Impact. The total Social Value of a project is calculated by combining the SROI and Economic Impact value.

The SROI value comprises:

Fiscal Savings to UK Government and taxpayers associated with reduced cost for welfare benefits, health services, education, emergency services, housing, and social care.

Economic Benefits to HMRC associated with Tax, National Insurance and Earnings due to reduced worklessness and sickness days.

Wellbeing Improvements associated with employment and skills development, qualifications, education support, school and community engagement, and improvements to physical and mental health.

Environmental Benefits associated with reducing, recycling and diverting waste, reducing CO2 emissions, as well as ecological protection.

The Economic Impact value comprises:

Local Multiplier 3 (LM3) which accounts for how a project impacts upon local economies through spend on supply chain and employment.

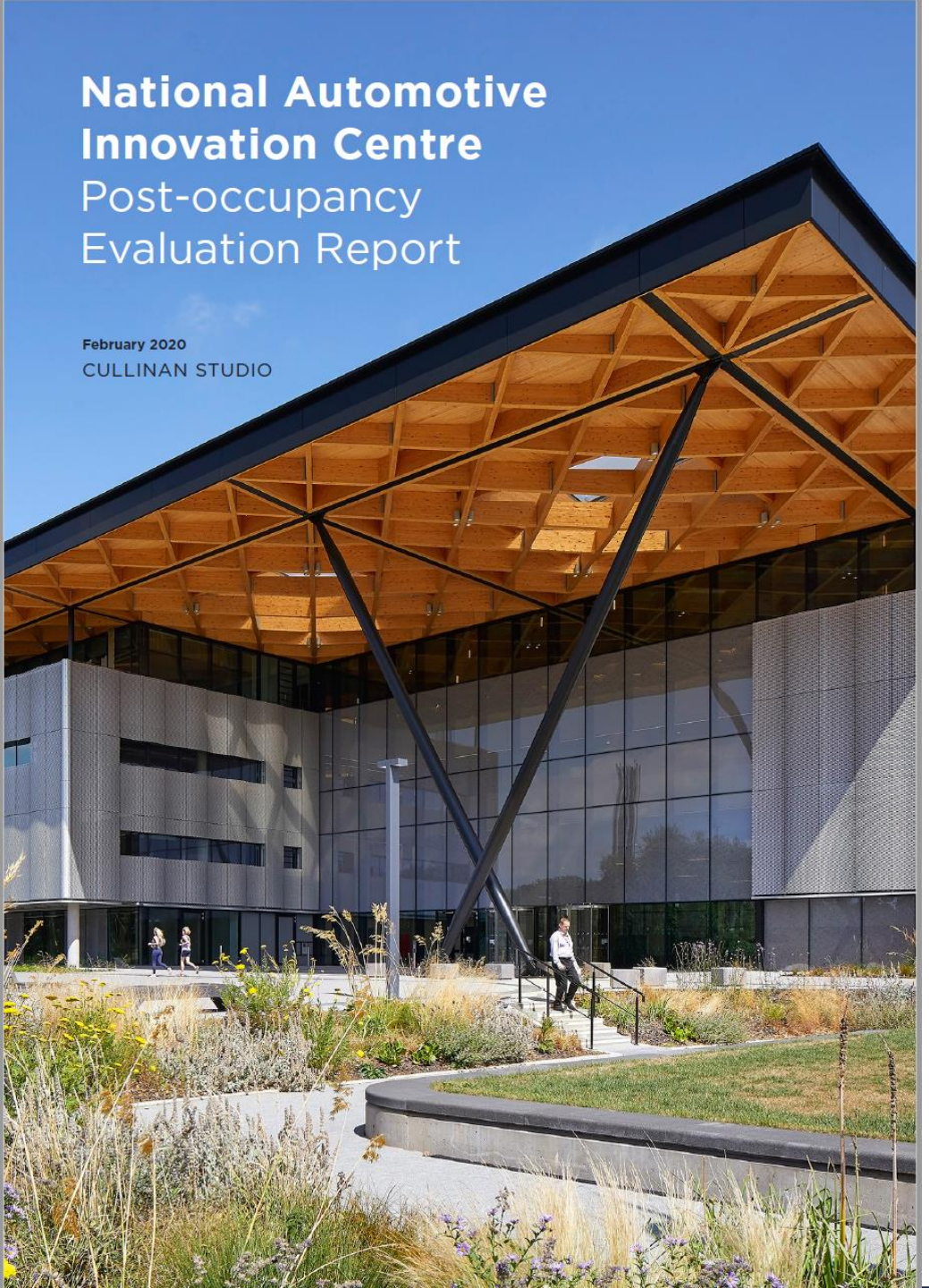
Gross Value Added (GVA) which measures how project employment contributes to economic productivity and uplift of an area including the indirect and induced effects of direct employment.

National Automotive Innovation Centre

Post-occupancy Evaluation Report

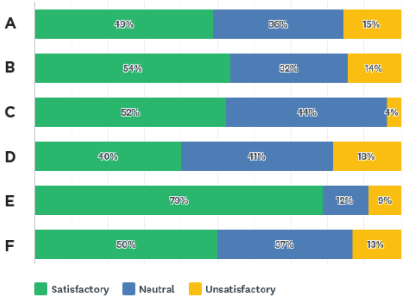
February 2020

CULLINAN STUDIO

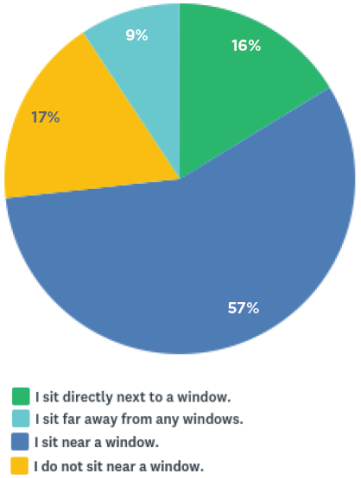


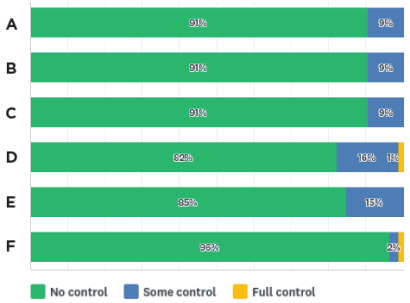
24. How would you describe noise in your normal work area?

A: Noise overall
B: Noise from colleagues
C: Noise from other people
D: Other noise internally
E: Noise from outside
F: Level to which you are affected by unwanted interruptions

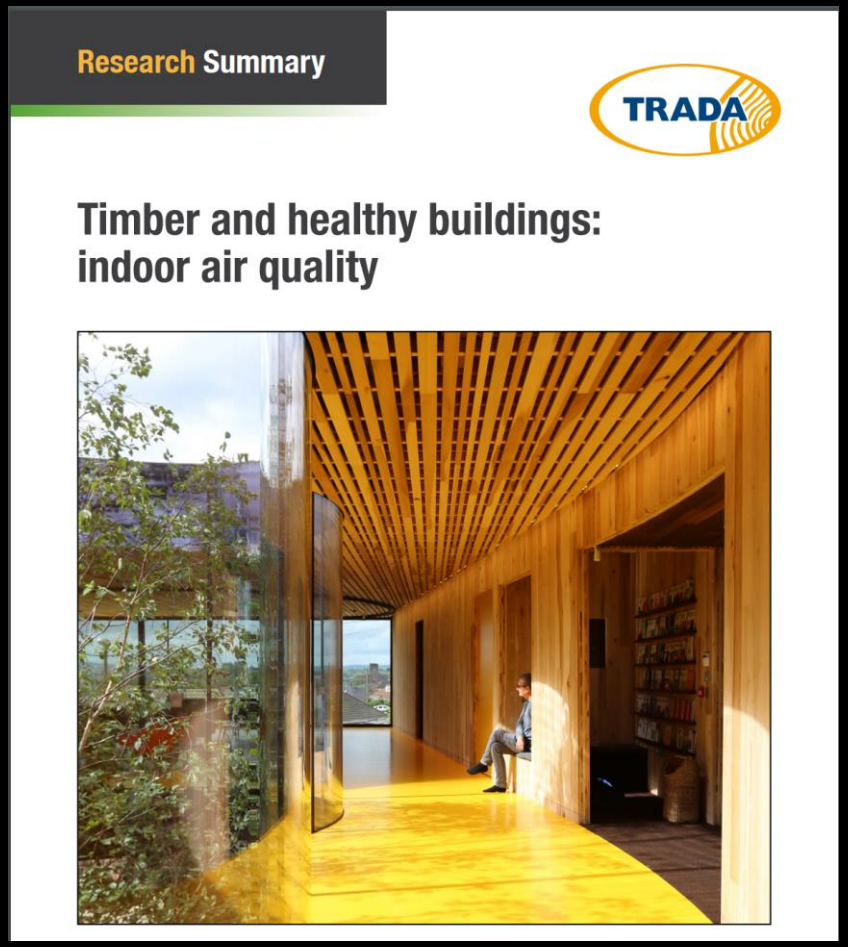


26. Do you sit near a window at your normal workplace?





‘accelerate shift to low embodied carbon materials’



Using evidence to persuade our clients and win the argument

Alder Hay Community Cluster
Glulam and CLT structure devised with Buro Happold

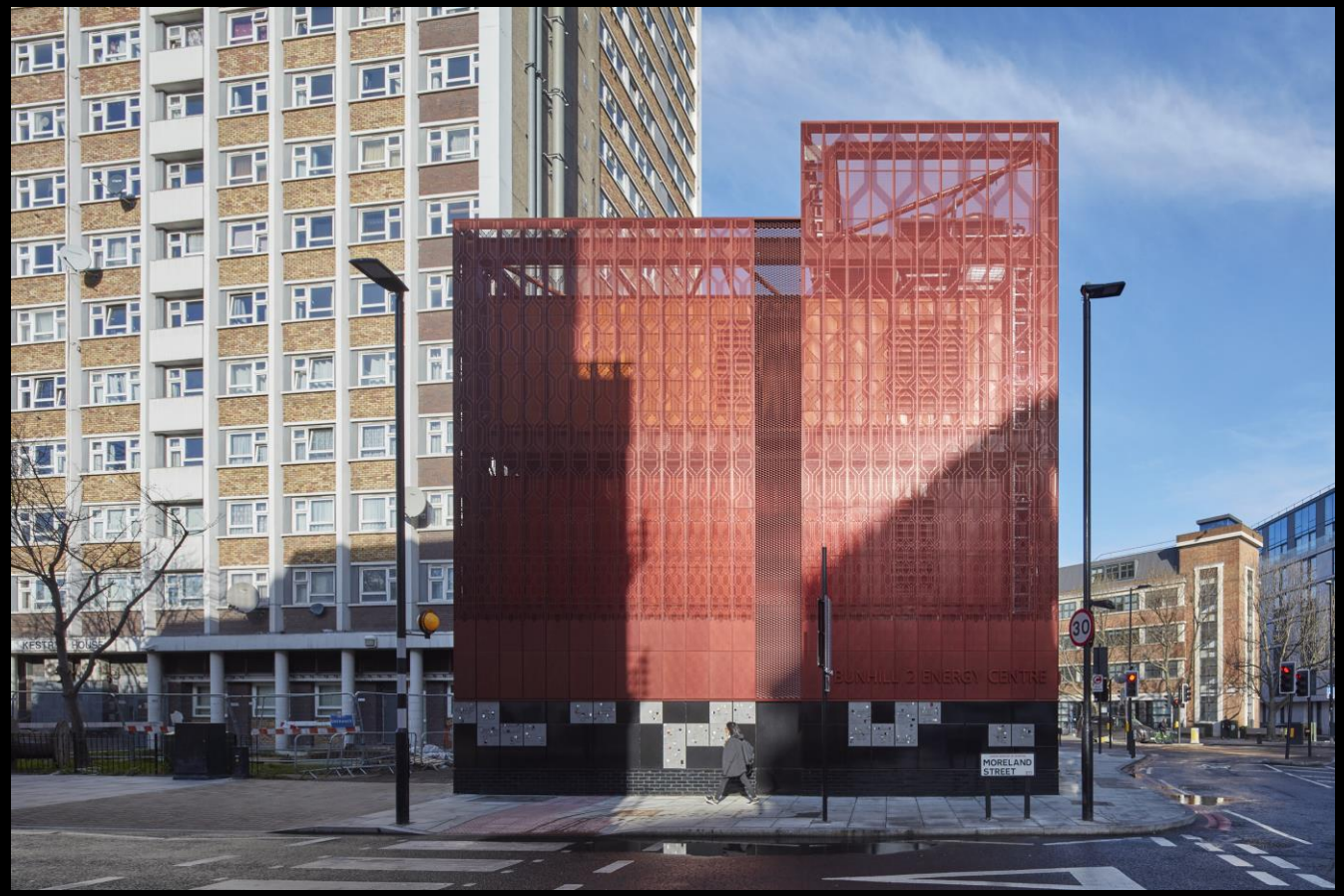
‘collaborate with engineers, contractors and clients to reduce construction waste’

PLASTICS IN CONSTRUCTION

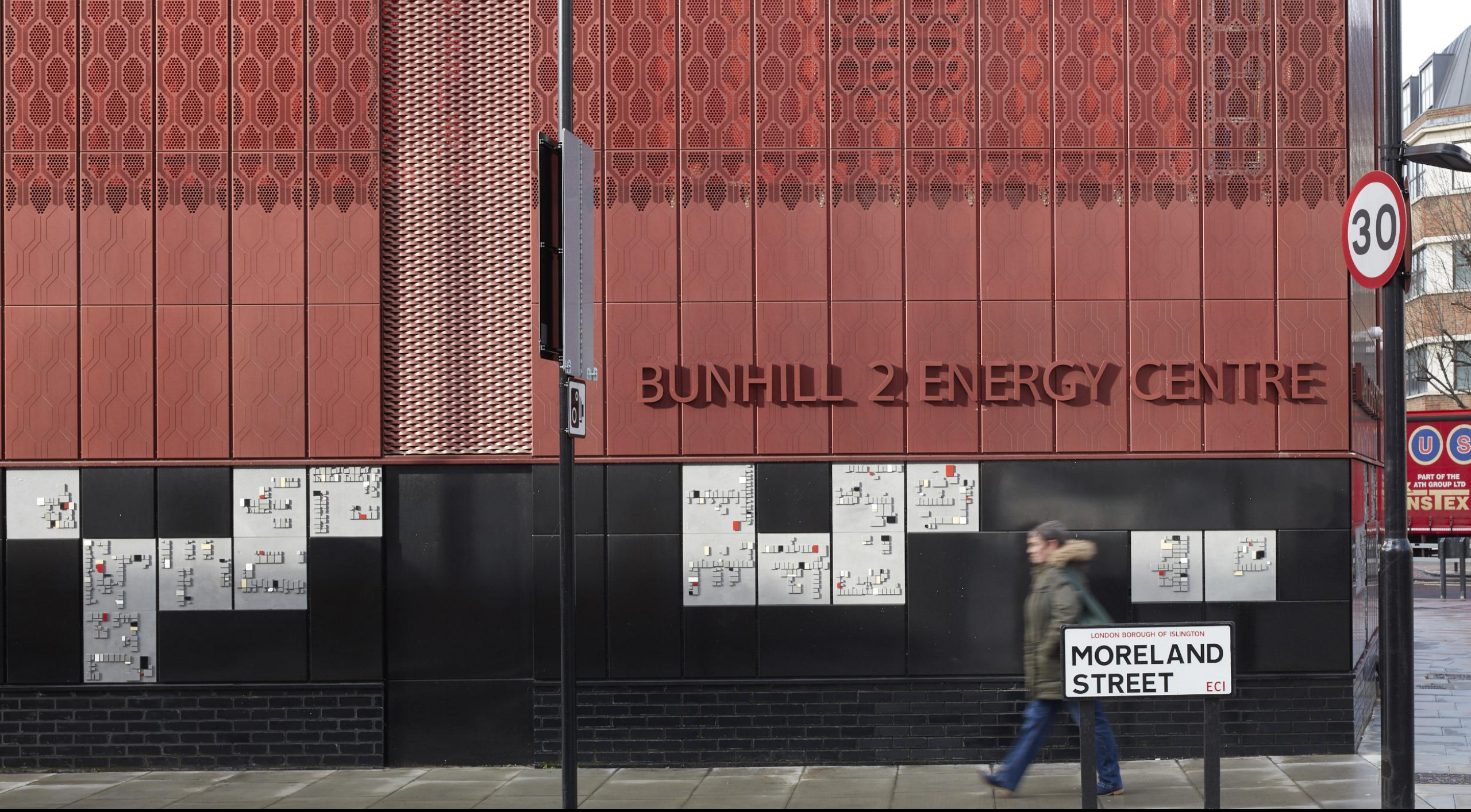
A collaborative stakeholder group seeking to identify solutions and alternatives that can help to reduce the over-use of plastic building products and packaging in the construction industry

Pursuing research with ASBP for measuring/ mitigating plastic packaging on site at Dudley College

‘adopt more regenerative design…minimize waste’



New local energy centre using waste heat from the London Underground


BUNHILL 2 ENERGY CENTRE
30
LONDON BOROUGH OF ISLINGTON
MORELAND
STREET
EC1
PART OF THE
ATH GROUP LTD

smart
power
mobility
thermal

greenSCIES

Green Smart Community Integrated Energy Systems

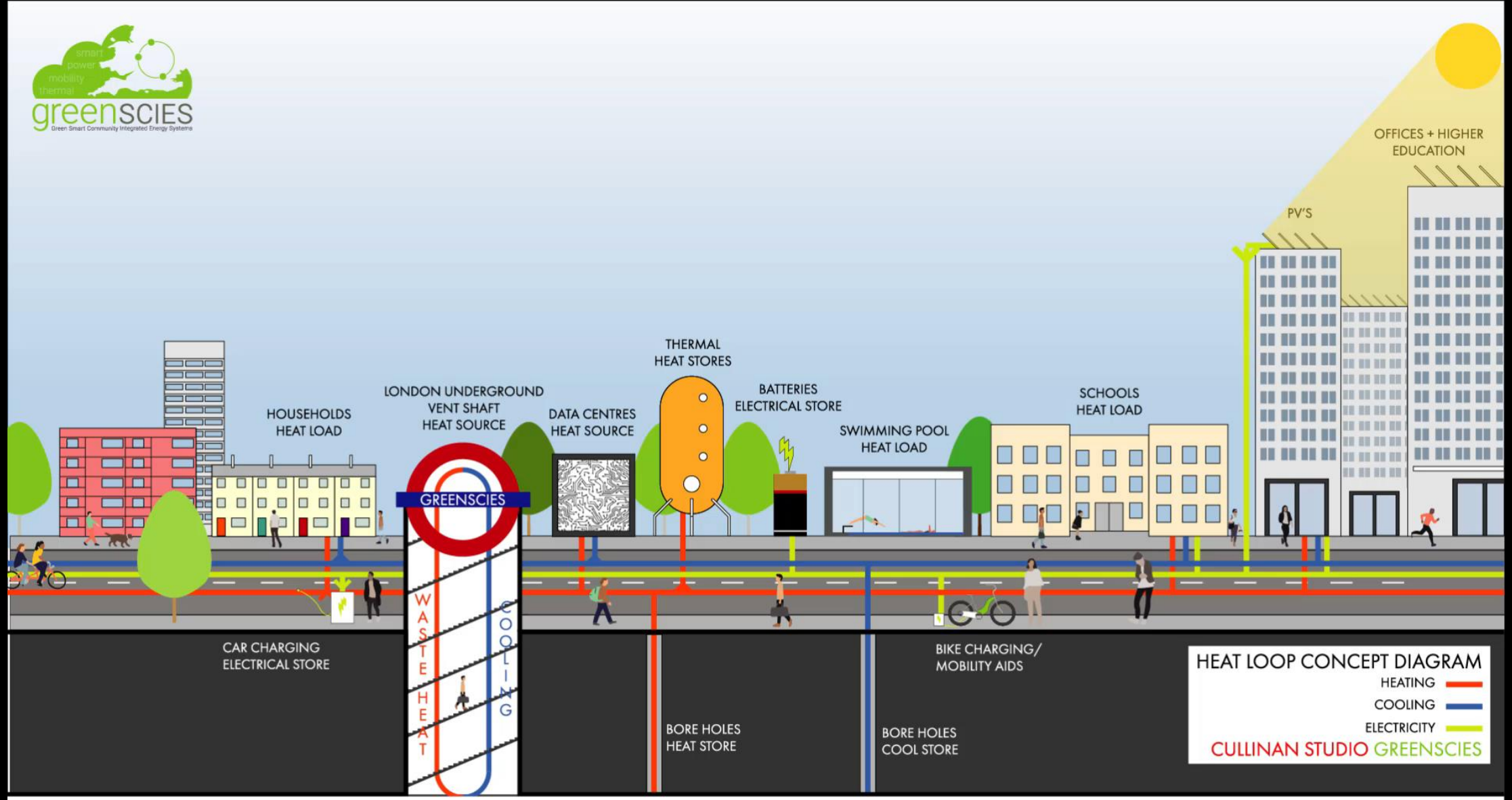
We work with

Innovate UK

The Guardian
@guardian

West Midlands canals to help heat hospitals and homes under plans

We are collaborating with partners to decarbonize local energy supply and reduce fuel poverty


greenSCIES
Green Smart Community Integrated Energy Systems
OFFICES + HIGHER EDUCATION
PV'S
THERMAL HEAT STORES
BATTERIES ELECTRICAL STORE
SCHOOLS HEAT LOAD
SWIMMING POOL HEAT LOAD
DATA CENTRES HEAT SOURCE
LONDON UNDERGROUND VENT SHAFT HEAT SOURCE
HOUSEHOLDS HEAT LOAD
GREENSCIES
WASTE HEAT
COOLING
CAR CHARGING ELECTRICAL STORE
BORE HOLES HEAT STORE
BORE HOLES COOL STORE
BIKE CHARGING/ MOBILITY AIDS
HEAT LOOP CONCEPT DIAGRAM
HEATING
COOLING
ELECTRICITY
CULLINAN STUDIO GREENSCIES

TO THE SUBURBS
LONDON UNDERGROUND
TO THE CITY