25 April, 10:00–12:30

Design challenge launch, briefing & technical talks

London South Bank University
Clarence Centre for Enterprise & Innovation

The London South Bank University Clarence Centre for Enterprise & Innovation together with CIBSE and the ARCC network is challenging industry and academia to collaborate to develop ideas for making their offices healthier, more sustainable and climatically resilient by using green infrastructure.

There are three main areas to consider:

- the building curtilage (the surroundings: street scene, plazas, courtyards, other open spaces)
- the external building surfaces
- the building’s interior

Remember: Vegetation in the surroundings and on the exterior of the building can impact on the building interior.

Main considerations

### Curtilage and building surfaces

Primary issues here are:

- Aesthetics
- Temperature, humidity, shade
- Rainfall/Drainage
- Wind tunnel effects
- Energy efficiency
- Air pollution (e.g. particulates/NO2)
- Noise
- Biodiversity
- CSR

### Building interiors

Primary issues here are:

- Aesthetics
- Climate/Air conditioning
- Air pollution (mainly VOCs)
- Mental health
- Energy efficiency
- Noise

### The curtilage

Use strategically placed vegetation such as street trees, hedges, flower borders, planters, and grass to: soften hard landscaping and brutalist building styles; intercept rainfall; moderate temperature, humidity & windspeed, and cast shade; capture diesel particulates and exhaust gases; reduce noise; provide wildlife habitat and resources.

Use permeable pavements and rain gardens to provide rainwater infiltration, attenuation storage, and pollution treatment (e.g. oil leaks broken down by microbial communities on the geotextile under permeable pavements).

Create shaded walkways, seating and patios using trees and climbing plants to reduce impact of ultra violet radiation (skin cancer) and heatwaves.

www.arcc-network.org.uk/greensky/
Building surfaces

• Use green roofs and walls to improve: insulation/energy efficiency (reduced winter heating, reduced summer air conditioning), to capture rainfall and slow its descent to main drainage or rain gardens, reduce noise transmission, provide wildlife habitat

• Consider capturing water from green roofs and walls for non-potable use (storage in ponds or underground cisterns)

• Use deciduous climbing plants growing in planters on external frameworks to cool the building and shade windows (and thus room interiors) in the summer and allow solar heating in the winter.

• Consider using a green wall to pre-treat air sucked-in to the building's HVAC system

• Consider shading air conditioning heat exchangers (whilst maintaining air flow)

• Use green walls to hide ugly structures and enhance the appearance of others

• Use green walls to reproduce corporate logos or other creative design elements relevant to the organisation

Indoors

• The visual appeal of internal spaces can be improved with free-standing vegetation in planters (from small shrubs up to full size trees), green walls, houseplants on window-ledges, and even ‘green wall’ room dividers

• Incorporation of plants in water features may maximise humidity improvements and create a pleasant soundscape.

• Green walls use less space than conventional plantings

• Internal green walls can be incorporated into the HVAC system to freshen air/ remove pollutants

• Plants help reduce noise and pollution: VOCs (such as formaldehyde), odours, and dust; they also contribute to climate control (humidity, temperature)

• Indoor plantings reduce symptoms of sick-building syndrome, reduce stress levels, improve attention & productivity, contribute to microbial load reduction, and reduce days off from sickness.

• Leafy food plants and herbs can be grown in restaurant areas for staff to harvest/ use

Climbers growing up a framework will shade this walkway when fully developed. Photo: John Dover

Installation of a LivePicture green wall. Photo: John Dover
## Adaptation and Resilience in the Context of Change (ARCC)

A knowledge exchange network focusing on improving resilience in the built environment and infrastructure sectors and connecting research outputs with users.

## Transforming Energy Demand through Digital Innovation (TEDDINET)

A suite of 25 major research projects addressing the challenges of transforming energy demand in our domestic and non-domestic buildings, as a key component of the transition to an affordable, low carbon energy system.

## The creation of localised current and future weather for the built environment

Creating local weather files from 2015 to 2080 covering the whole UK at a resolution of 5km, including representations of various excursions from the mean (heat waves and cold snaps) and guidance on how these might be used in building design.

## Managing Air for Green Inner Cities

How to develop cities with no air pollution and no heat-island effect by 2050. Looking to develop decision support systems that allow the city design and its operation to manage the air so that it becomes its own HVAC system, with clean, cool air providing low-energy solutions for health and comfort.

## Blue-Green Cities – delivering and evaluating multiple flood risk benefits in Blue-Green Cities

Blue-Green City aims to recreate a naturally-oriented water cycle while contributing to the amenity of the city by bringing water management and green infrastructure together.

## Improving city life with green infrastructure

A suite of research projects looking to improve urban life and create sustainable cities by making use of green infrastructure.

## Complex Built Environment Systems: The Unintended Consequences of Decarbonising the Built Environment

Looking to gain a deeper understanding of the physical performance of built environment choices and their implications for energy use, health, conservation, productivity and climate change. The research is primarily interested in developing solutions to the practical problems of designing, constructing, and managing appropriate environments within and around buildings.

## How better design can facilitate mobility, connectivity & wellbeing for older people

Looking at how the design and management of housing and neighbourhoods can be improved to better support the mobility of older people and their participation in community life. The research will focus on both the design of newly built housing and the surrounding environment and the re-fitting of existing housing and neighbourhoods.

## Mobility, Mood and Place: design of built environments to make mobility easy, enjoyable and meaningful for older people

Delivering new ideas about the design of places that support positive emotions, reduce anxiety, and encourage people to be more active and mobile.

## High-Rise Buildings: Energy and Density

There are concerns about the sustainability and energy use in high-rise buildings. Are high-rise buildings more energy-intensive – all other things being equal – than equivalent low-rise buildings? Is it possible to provide the same floor area on the same sites as high-rise buildings, but using a much-reduced numbers of storeys?

## Remodelling Building Design Sustainability from a Human Centered Approach

Looking to quantify the impact of indoor air on human performance and determine what is optimal for quality performance.

## Implementing Whole Life Carbon in Buildings

Aiming to bridge the gap between whole life carbon theory and its practical implementation in assessing life cycle carbon emissions of buildings by developing a common calculation framework to be used across the building industry.
Research display

Can water sounds improve work spaces?
Dr Laurent Galbrun & Zanyar Abdalrahman, Heriot-Watt University

Particulate pollution capture by plants on living walls: the impact of rainfall
Udeshika Weerakkody Staffordshire University

Metagenomic analyses of rhizosphere bacteria from Peace lily exposed to atmospheric Benzene
Dilhani De Silva, Staffordshire University

Design research – living envelopes. Changing the way we live
Maricruz Solera, Oxford Brookes University

Biodiversity surveys of urban hedges
Eleanor Atkins, Staffordshire University

Aquaponics: A closed-loop food production method
Jalal Ahmed, Oxford Brookes University

Please contact ARCC@ukcip.org.uk if you would like to get in contact with these researchers.