

CWCT - Pushing the envelope - meeting future challenges



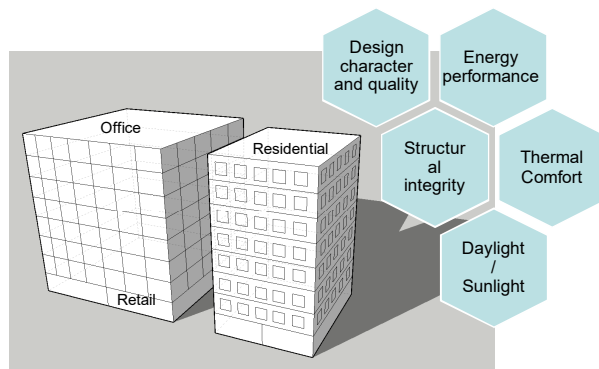
Presentation outline

- Site context
- Factors influencing occupant satisfaction
- Thermal comfort
- Daylight
- Refurbishment case study

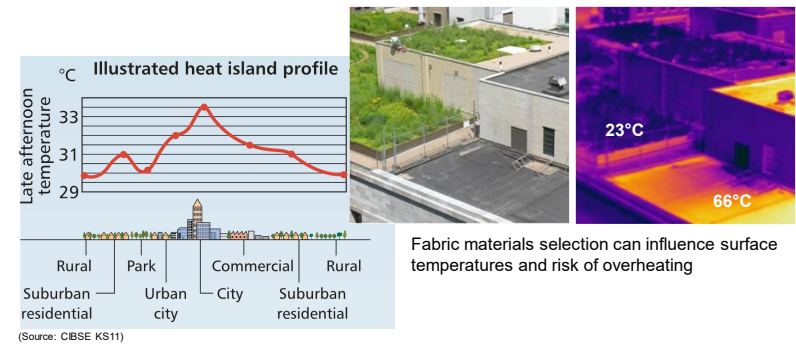


Business School, University of West of England

Façade design drivers



Site context – external temperature conditions



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Site context – acoustics and air quality



An interdepartmental group of **economists** estimated the annual **cost** of urban road **noise** alone in England was **£7-10 billion**.



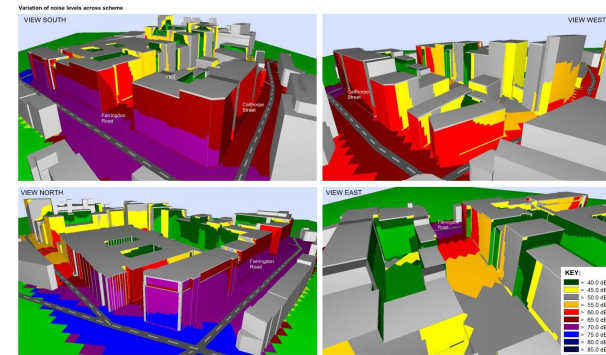
Poor air quality is estimated to result in 40,000 premature deaths each year in the UK.

In addition a report published by the WHO in 2011 identified environmental noise as the second largest environmental risk in the developed world.

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Site context – noise prediction modelling



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Resilient planning



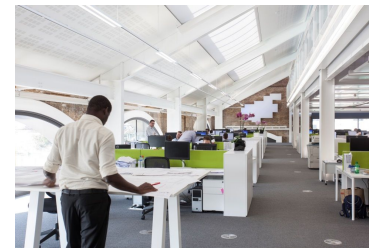
Green landscaping can mitigate the urban heat island effect and improve wellbeing



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Factors influencing occupant satisfaction



- Level of light
 - Views out
 - Air quality and ventilation
 - Thermal comfort
 - Noise
- Factors influenced by façade design

- Interior layout
- Range of amenities and facilities
- Ergonomics and furniture design

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Occupant health and wellbeing

We typically spend about **90% of our time indoors**, with 65% of this spent at home.



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Occupant health and wellbeing

The World Health Organisation has recognised that **housing conditions** are one of the major environmental and social **determinants of population health**.



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Shading options – impact on solar control and views out

3-D View	Section Plan	Ideal orientation	View restriction
Horizontal single blade		South	★★★★
Outrigger system		South	★★★★
Horizontal multiple blades		South	★★★★
Vertical fin		East/West	★★★☆☆
Slanted Vertical fin		East/West	★★★☆☆
Eggcrate		East/West	★★★☆☆

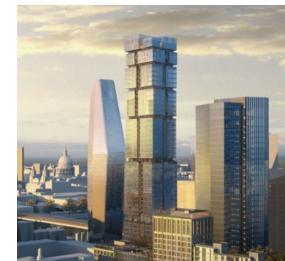


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What facades do people want?



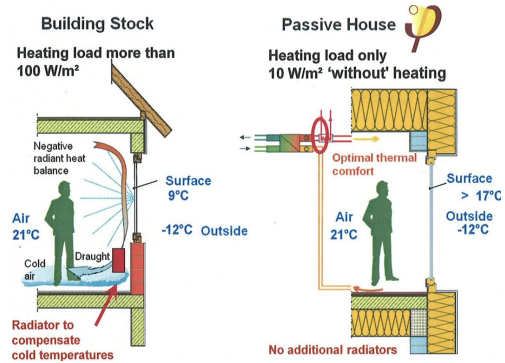
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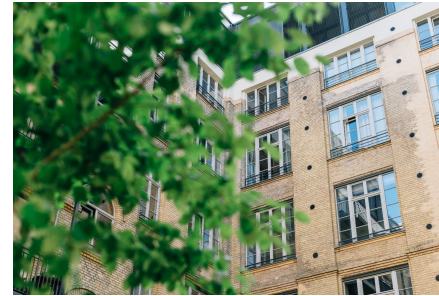
Thermal comfort



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Importance of views out



Research shows that hospital patients with views of green landscaping recover quicker, feel better and have shorter hospital stays than occupants that can't see nature

(Source: View through a window may influence recovery from surgery, Roger S. Ulrich, 1984)

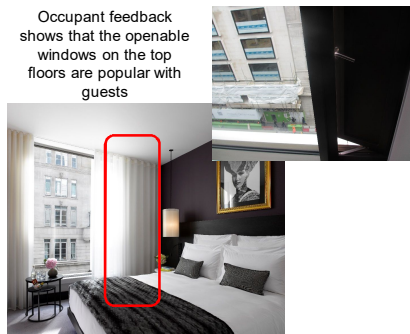
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People like openable windows



South Place Hotel, London (Photo: Guy Montagu Pollock)

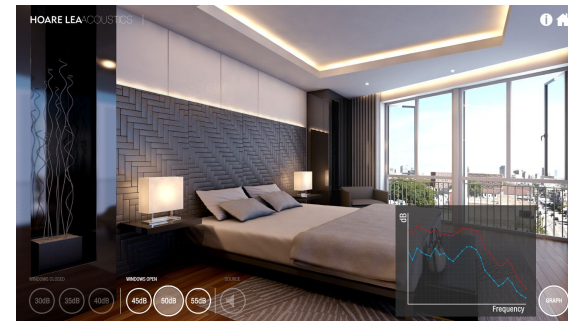


Occupant feedback shows that the openable windows on the top floors are popular with guests

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Optimising ventilation, noise control, daylight and views out

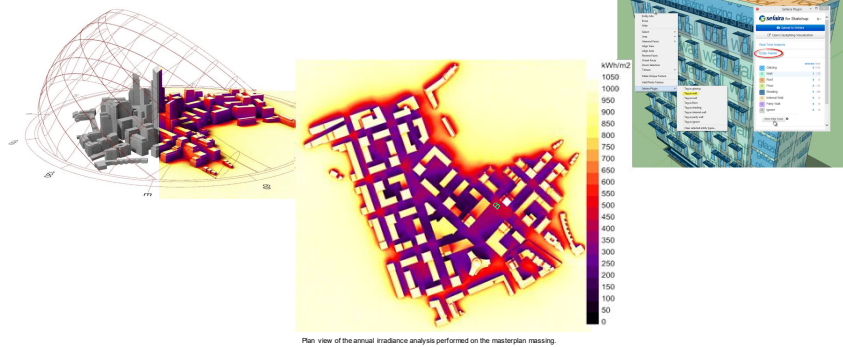


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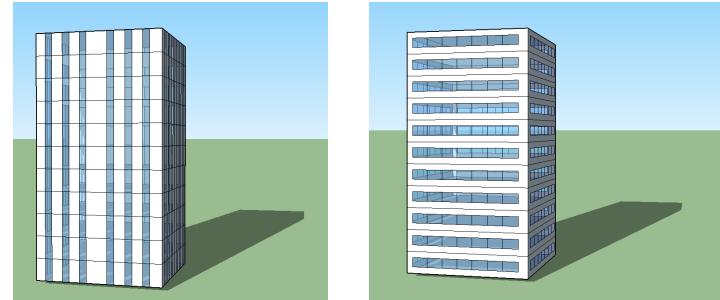
Early site and façade analysis can help optimise thermal and daylight performance



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Which façade design performs best?



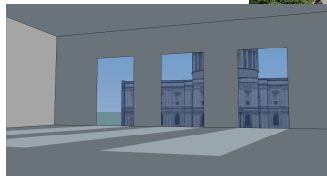
Vertical window configuration

Horizontal window configuration

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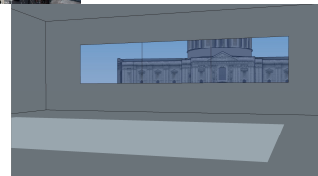
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Optimising glazing configuration



Vertical window configuration

Comparing view out

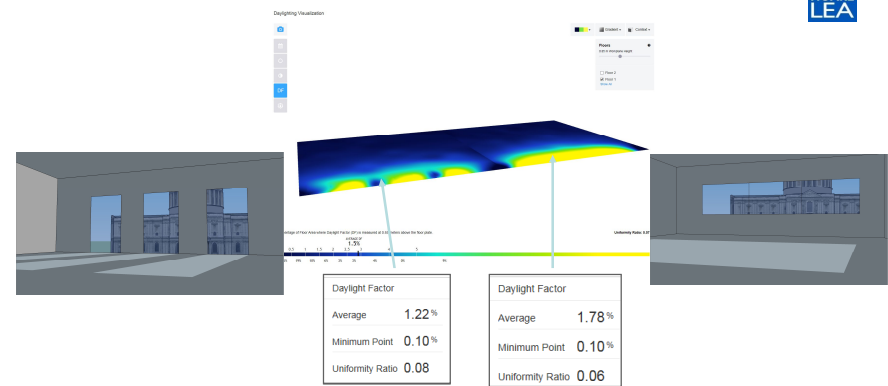


Horizontal window configuration

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Horizontal glazing has better daylight factor



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Retrofit case study – improving façade performance



North Wales Police HQ, Colwyn Bay



1970s concrete frame office with poor performance

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Retrofit case study – occupant perspectives prior to refurb



- “Too hot in summer – unbearable, can get hotter than 30 degrees, but also too cold in winter - had to leave my coat on to concentrate on my work.”
- “It is nice for each office to have lovely big windows, but it creates a lot of problems re: heating and cooling.”
- “The blinds at the window have to be shut as the sunshine is so bright. The lights then have to be put on in order to see.”



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Retrofit case study – additional shading and upgraded fabric thermal performance



North Wales Police HQ, Colwyn Bay, after refurbishment



External shading (brise soleil) to mitigate summertime peak solar gains

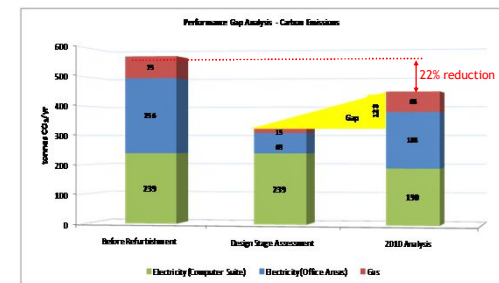
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Retrofit case study – post occupancy evaluation



- Improved summer comfort
- Improved winter comfort
- Lower energy bills
- 22% reduction in carbon dioxide emissions



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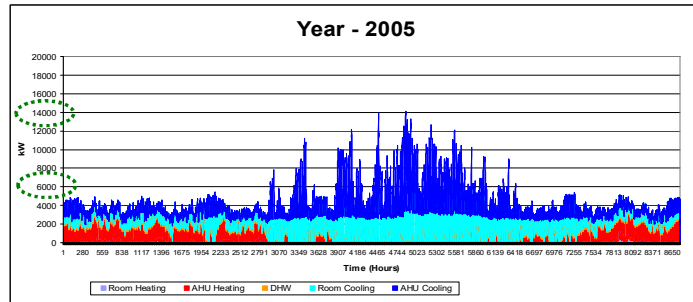
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Climate change



Cooling loads – airport terminal – 2005 vs 2050



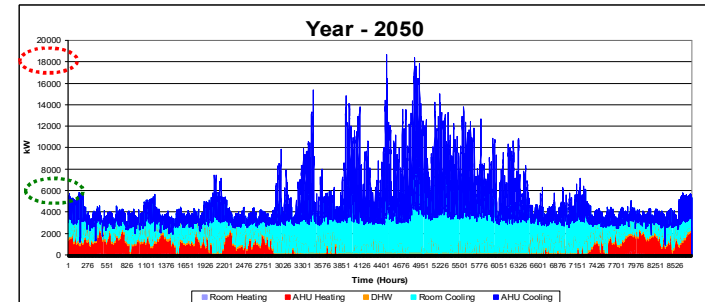
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Climate change



Cooling loads – airport terminal – 2005 vs 2050



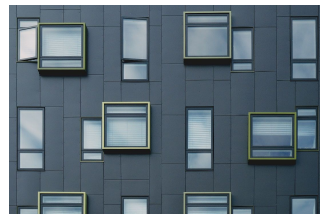
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Conclusions



- The façade design has a significant on occupant comfort and satisfaction
- Early analysis can help optimise the façade from both a performance and wellbeing perspective
- Climate change impacts will require additional planning



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Thank you.

Any questions?

ashleybateson@hoarelea.com



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