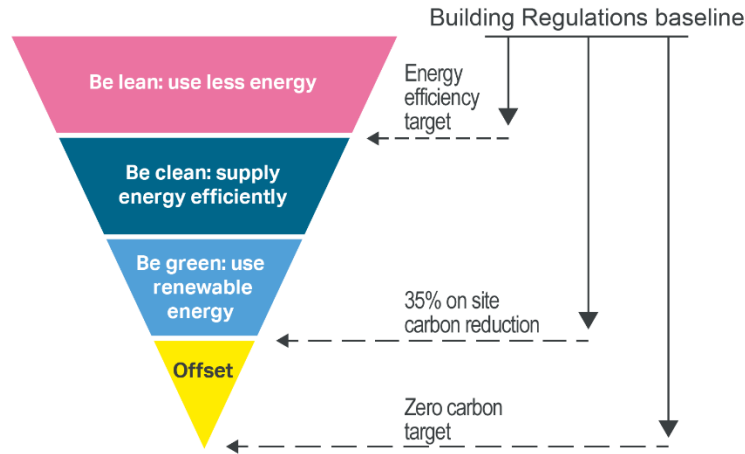


# **Draft SPD Consultation: Passive energy, daylight and overheating**

Dan Epstein – Principal Sustainability Officer

# Zero carbon development

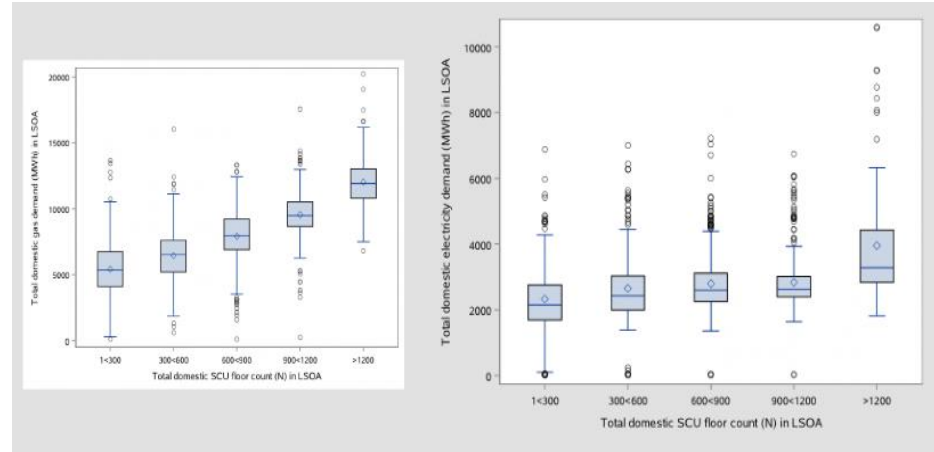
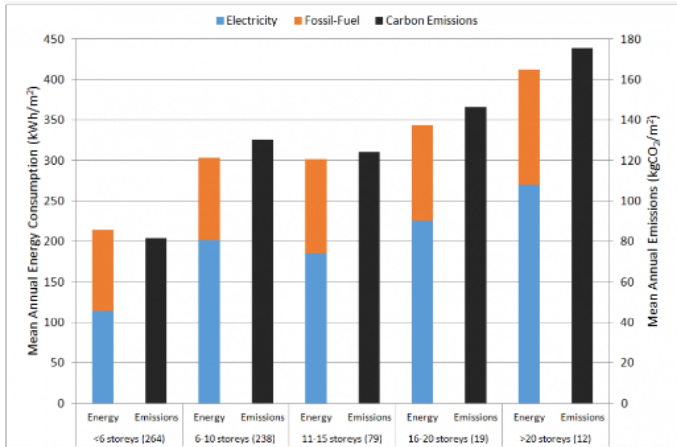
- The Mayor of London has published the Draft New London Plan which requires all development in London to be zero carbon and adopt the energy hierarchy



Source: Greater London Authority

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# High density buildings use a lot of energy



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# Daylight

- 90% of our time spent indoors
- Poor daylight can result in SAD
- Single aspect homes
- Impact depends on position in building

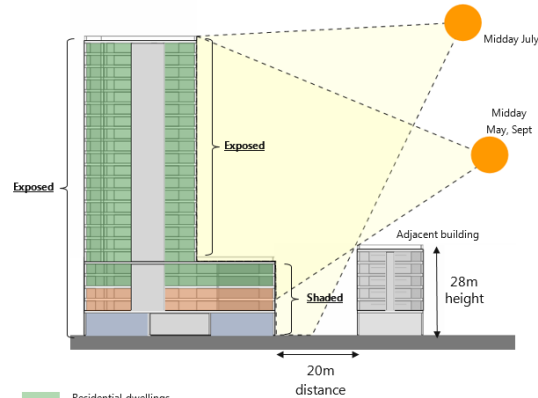
## Cloudy day for Average Daylight Factor Modelling (ADF) modelling

ADF only considers an overcast sky, with the sun directly above. All building orientations receive the same daylight. View of sky is the contributing factor not orientation.



## Summer sun for overheating modelling

In peak summer, due to high sun angles 'shaded' dwellings still receive solar gain which can cause overheating. In shoulder months they do not.

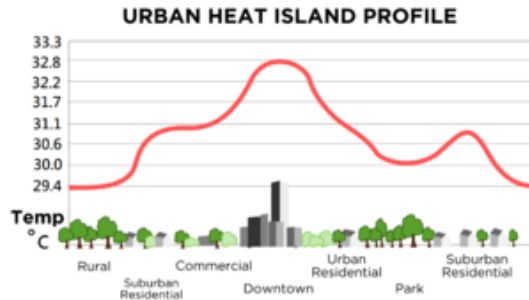
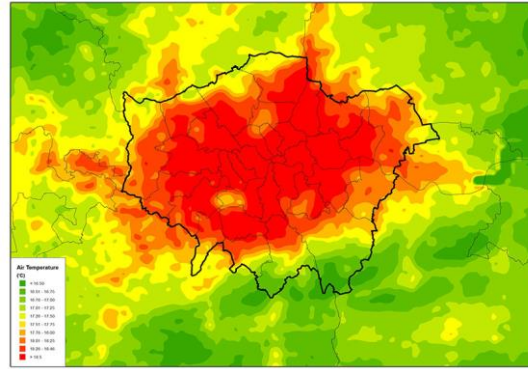


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# Overheating

## Overheating poses severe and growing risk

- Higher building standards
- Glazing
- Orientation and exposure
- Urban Heat Island effect
- High energy loads
- Proximity to rail, road, industry



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Figure 1. Floor layout of the base model.

Table 1. Solar Radiation (S.R) at 0%, 25%, 50%, and 75% Adjacent Shading Height (A.S.H).

Orientation	S.R at 0% Shaded (kWh/m <sup>2</sup> -a) Flat Position: Top Floor	S.R at 25% Shaded (kWh/m <sup>2</sup> -a) Flat Position: Middle Top Floor	S.R at 50% Shaded (kWh/m <sup>2</sup> -a) Flat Position: Middle Bottom Floor	S.R at 75% Shaded (kWh/m <sup>2</sup> -a) Flat Position: Bottom Floor
North	360	320	190	130
East	590	455	260	160
South	750	560	360	185
West	560	440	220	150
A.S.H (m)	0	12	17	33

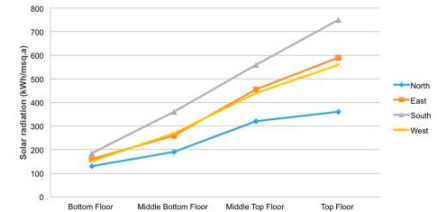


Figure 2. Solar radiation in each orientation (North, East, South, and West) and at each flat position (Bottom, Middle Bottom, Middle Top, and Top).

## Why are we producing an SPD?

- OPDC Energy, Daylight and Overheating in Tall Buildings Study contains information too detailed for a Local Plan
- SPD will enable this detail to be embedded within supplementary guidance to shape development and support successful planning applications
- Enables OPDC to meet the Mayor's aspirations for functional bodies to lead in delivering guidance in the London Environment Strategy

# Partner Engagement

**OPDC**  
OLD OAK AND  
PARK ROYAL  
DEVELOPMENT  
CORPORATION

**GREATER  
LONDON  
AUTHORITY**

## SPD developed with key partners

- GLA
- Local authorities
- UKGBC and industry partners



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# Residential

**OPDC**  
OLD OAK AND  
PARK ROYAL  
DEVELOPMENT  
CORPORATION

## Principles

- Achieve minimum standards
  - 10% improvement over Part L from passive measures
  - Average Daylight Factor 2% for kitchen (1% bedroom and 1.5 living room)
  - 15% Vertical sky component
  - Avoid single aspect units where possible and achieve good ventilation
  - Modelling for overheating using 2020 weather files
  - Adopt GLA cooling hierarchy
- Optimise for all three goals

## Ambitions

- Exceed 10% improvement and work towards passive house standards
- In use energy performance modelling
- Avoid single aspect in all north facing dwellings
- 2-5% daylight (Well Building Institute) and adopt daylight simulation modelling
- 2050 weather files



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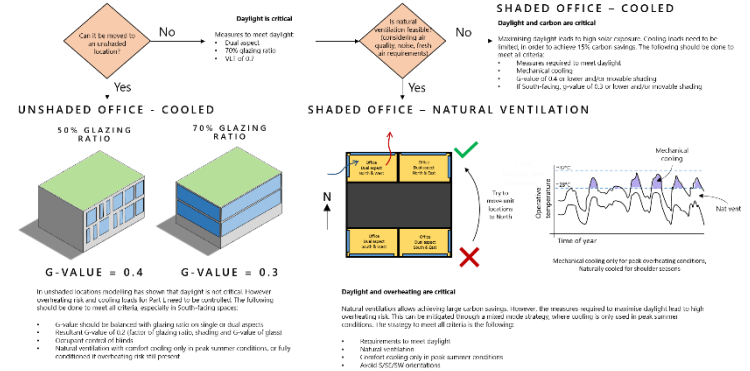
# Non-residential

## Principles

- 15% for non-residential from passive measures
- Operational performance modelling at design stage to identify performance gap
- Optimise daylight in offices: ADF of 2%
- Modelling with 2020 weather files
- Adopt GLA cooling hierarchy
- Optimise for all three goals

## Ambitions

- Exceed 15% target for passive energy
- Apply green leases to ensure fit out achieves targets
- Exceed ADF of 2%
- Use modelling to maximise Useful Daylight Illuminance
- 2050 weather files



### EXAMPLE BUILDINGS



Lower glazing ratios and window recess or shading elements can be considered in unshaded locations to reduce overheating risk

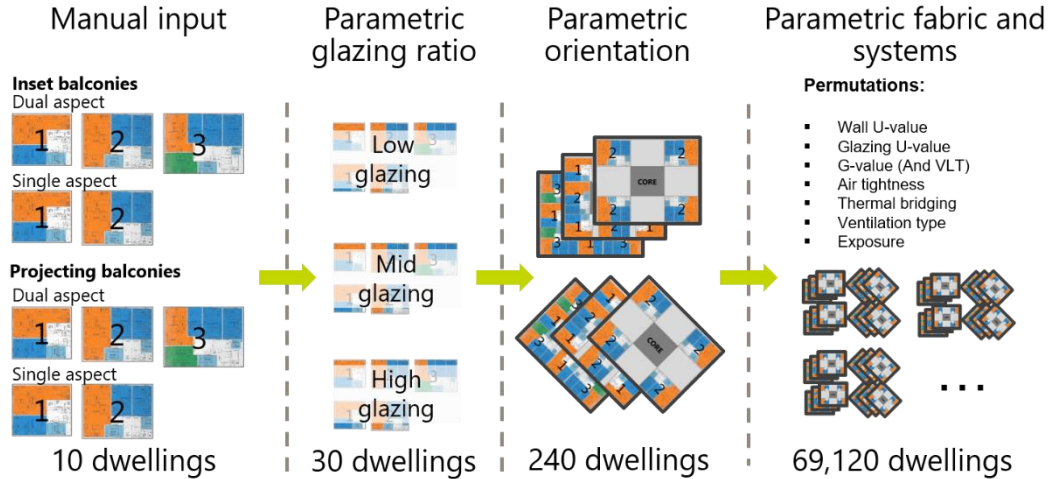


High glazing ratios used in shaded locations helps maximising daylight. In unshaded locations high glazing ratios can be avoided but should be compensated with deep eaves to reduce overheating risk



Different facade treatments can be applied. Lower floors are more shaded and benefit from higher glazing ratios to maximise daylight, while overheating risk in more exposed upper floors can be mitigated through reduced glazing ratios, lower eaves and shading elements

# Modelling



# Solutions

## Passive energy

- Triple glazing
- Mechanical Ventilation and Heat Recovery
- Air tightness 3m3/m2/hr
- LED and light sensors

## Overheating

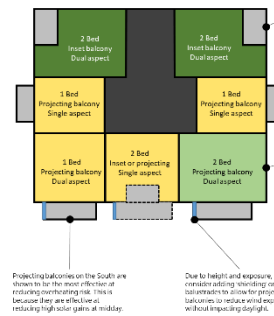
- Balcony placement
- Glazing ratio and G-value
- Top and bottom opening windows
- Window positions
- External shutters
- Exposed thermal mass

## Daylight

- Reflective surfaces
- Floor to ceiling heights

## OPDC OLD OAK AND PARK ROYAL DEVELOPMENT CORPORATION

### CARDINAL ORIENTATION



### DUAL ASPECT UNITS

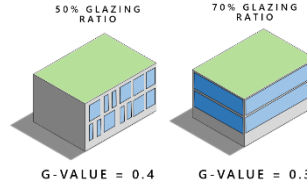
Dual aspect, particularly on southern aspects, mean that the facade area as a % to floor area is high, typically needing multiple equal glazing units with aspects, one of which is unshaded as no balcony is present.

Design should look to minimise glazing on one of the facade orientations and maximise it on the other along with a balcony.

### 45° ROTATED ORIENTATION



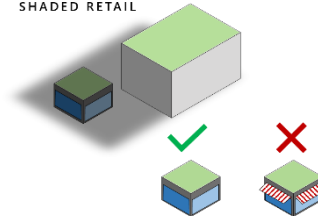
### UNSHADED OFFICE



In unshaded locations modelling has shown that daylight is not critical. However, overheating risk and cooling loads for Part L need to be controlled. The following should be done to meet all criteria, especially in South facing spaces:

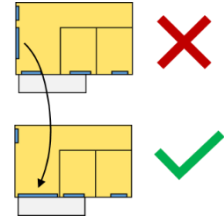
- G-value should be balanced with glazing ratio on single or dual aspects
- Resultant G-value or D.F. (ratio of glazing ratio, shading and G-value of glass)
- Occupant control of blinds
- Mixed mode strategy or provide comfort cooling if overheating risk still present

### SHADED RETAIL



To meet the minimum daylighting requirements in shaded retail locations:

- Position retail units in dual aspect locations (increasing active frontage)
- Minimise horizontal shading and fins
- If shading is used ensure it is retractable



## Next steps



- Public consultation from **10 January – 22<sup>nd</sup> February 2019**
- Final draft SPD **summer 2019**
- Adopt following adoption of Local Plan

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