

**Workplaces.  
A brand new world.  
Net Zero Carbon  
workplaces – how to  
make it happen.**

ASHLEY BATESON & CATH MACPHERSON

DESIGN, UNLEASHED



# Welcome.

## Net zero workplaces.

### How to make it happen.



Facilitator  
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Associate Director

# Drivers for net zero.

## Government.



Climate agenda  
Regulation and planning

## Funders and investors.



Investment resilience  
Shareholder assurance

## Developers and owners.



Performance expectations  
Long term value

## Tenants.



Efficient operation  
Alignment with staff values

# Net zero drivers. Government perspective.

- UN Agreement to limit global warming to no more than 1.5-2.0°C.
- UK commitment to be net zero carbon by 2050.
- Mandatory climate risk disclosure by 2025.
- Planning system review to include net zero objective and climate resilience.

A Green Future: Our 25 Year Plan to  
Improve the Environment



# Net zero drivers. Funders and investors.

Many investors are embracing climate mitigation strategies to align with their:

- Environmental, Social and Governance (ESG) policies.
- UN Sustainable Development Goals.

The Global Real Estate Sustainability Benchmarking (GRESB) system supports efforts to reduce carbon emissions.



G R E S B<sup>®</sup>

# Net zero drivers. Developer perspective.

- Setting low-carbon and net-zero carbon standards drives the supply chain to deliver better quality.
- Targeting net zero demonstrates focus on outcomes and long term performance.
- Sustainable buildings seen as a premium offer in the workplace market (with higher value).



# Net zero drivers. Developer climate commitments.

- Signatories of Better Buildings Partnership (BBP) Climate Change Commitment.
- Planning path to net zero for new and existing buildings.



# Net zero drivers. Tenant perspective.

- Efficient building operation seen as an indicator of a well managed building.
- Young employees more attracted to companies and workplaces that demonstrate social purpose and commitment to sustainability.





# Advancing Net Zero

A World Green Building Council global project



## WorldGBC definition:

A net zero carbon building is highly energy efficient with all remaining energy from on-site and/or off-site renewable sources

100% of buildings must operate at net zero carbon

2050

2030

All new buildings must operate at net zero carbon

GOVERNMENT ENGAGEMENT

TRAINING & EDUCATION

CORPORATE ENGAGEMENT

CERTIFICATION

## Key Principles

### 1. Measure and disclose carbon

Carbon is the ultimate metric to track, and buildings must achieve an annual operational net zero carbon emissions balance based on metered data



### 2. Reduce energy demand

Prioritise energy efficiency to ensure that buildings are performing as efficiently as possible, and not wasting energy



### 3. Generate balance from renewables

Supply remaining demand from renewable energy sources, preferably on-site followed by off-site, or from offsets



### 4. Improve verification and rigour

Over time, progress to include embodied carbon and other impact areas such as zero water and zero waste



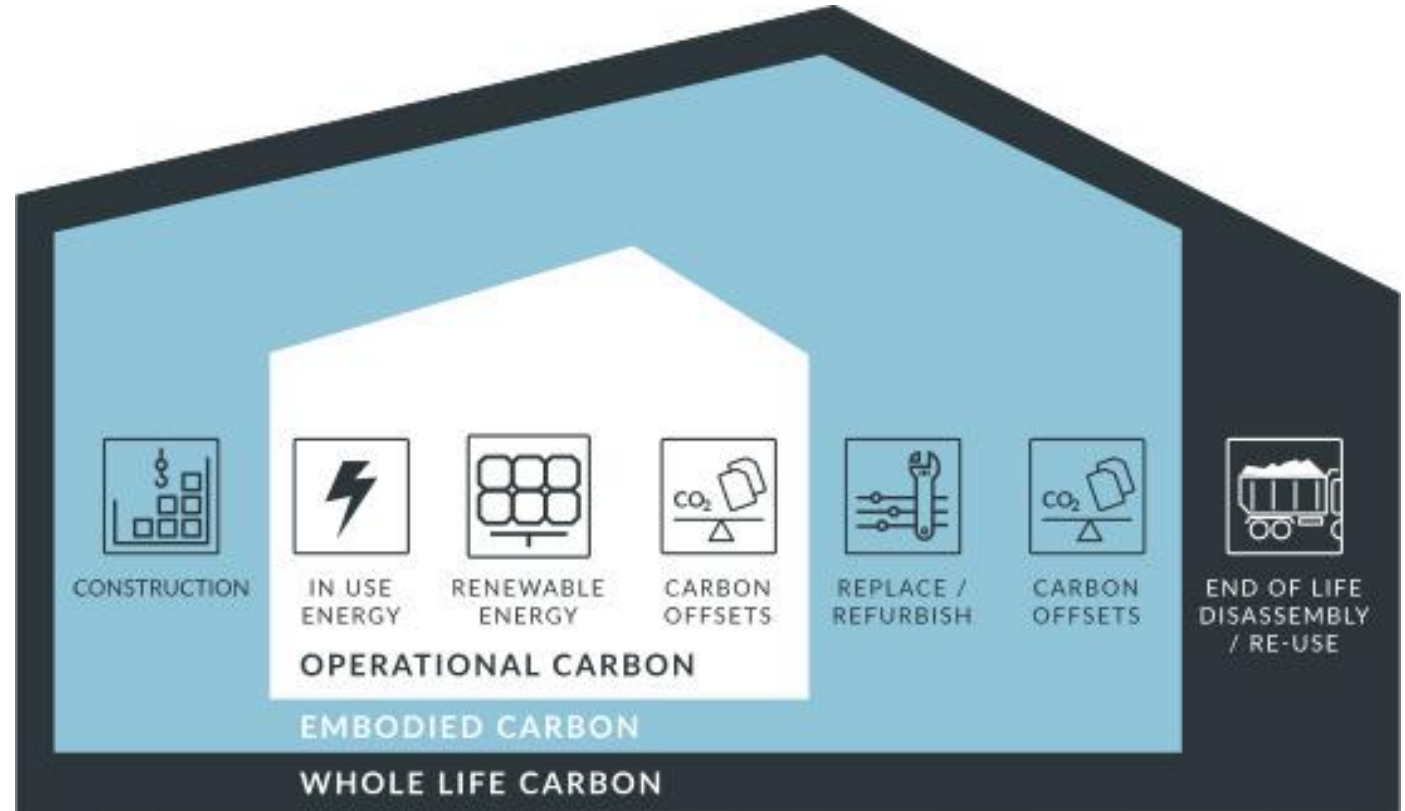
## What is zero carbon development? Defining the scope.

UK-GBC framework defines two potential targets for net zero carbon:

- Net zero carbon in construction (embodied)
- Net zero carbon in operation

Whole Life Carbon includes embodied and operational carbon emissions.

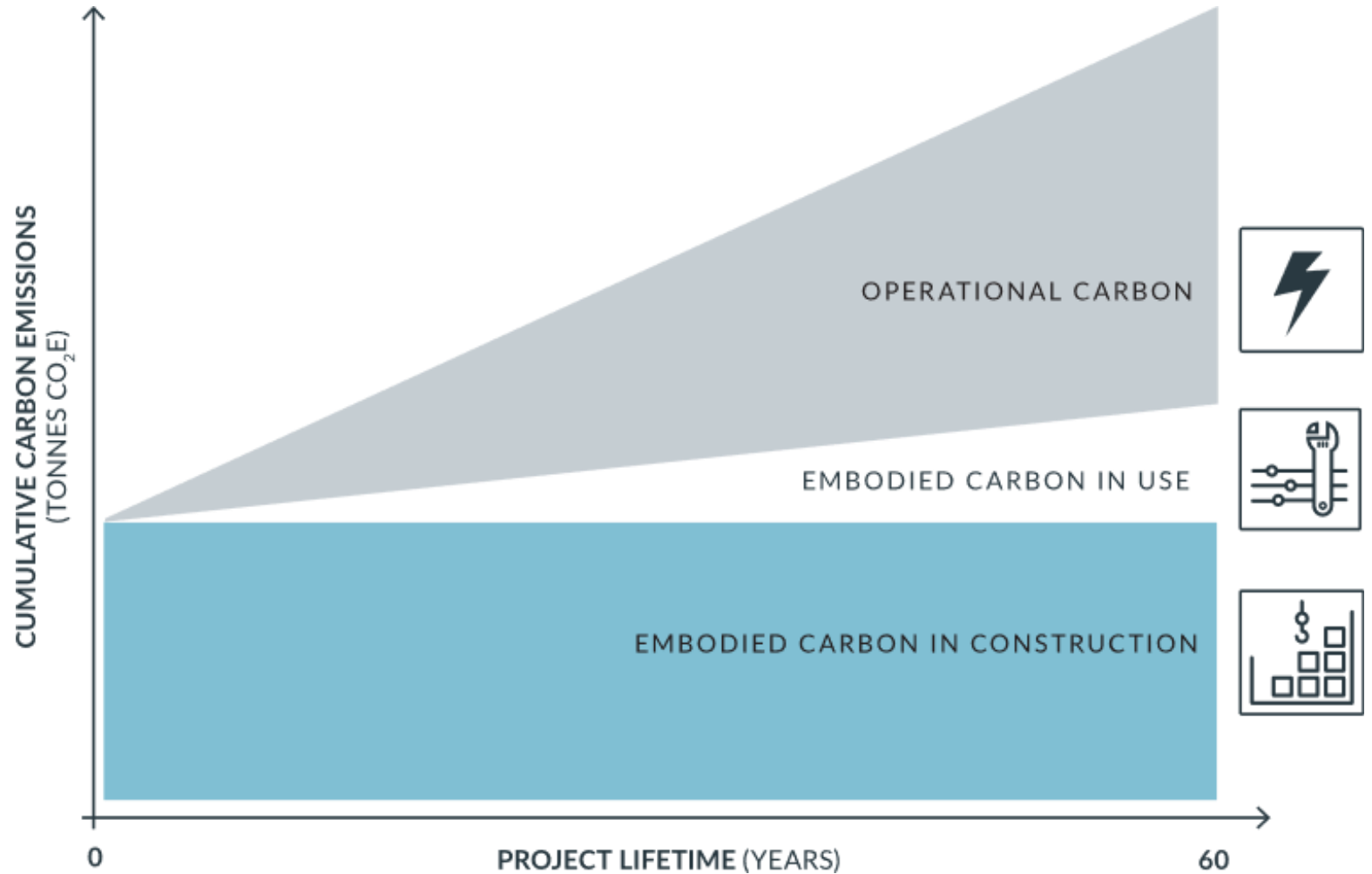
- Remaining carbon emissions to be offset.



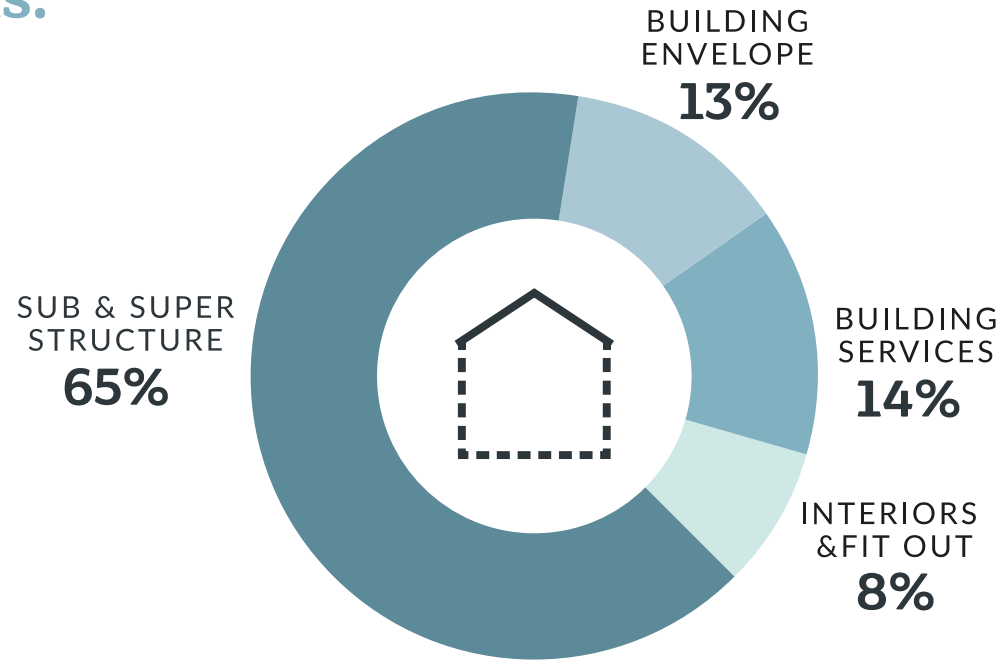
## Net Zero Carbon. Whole life assessment.

Cumulative carbon emissions.

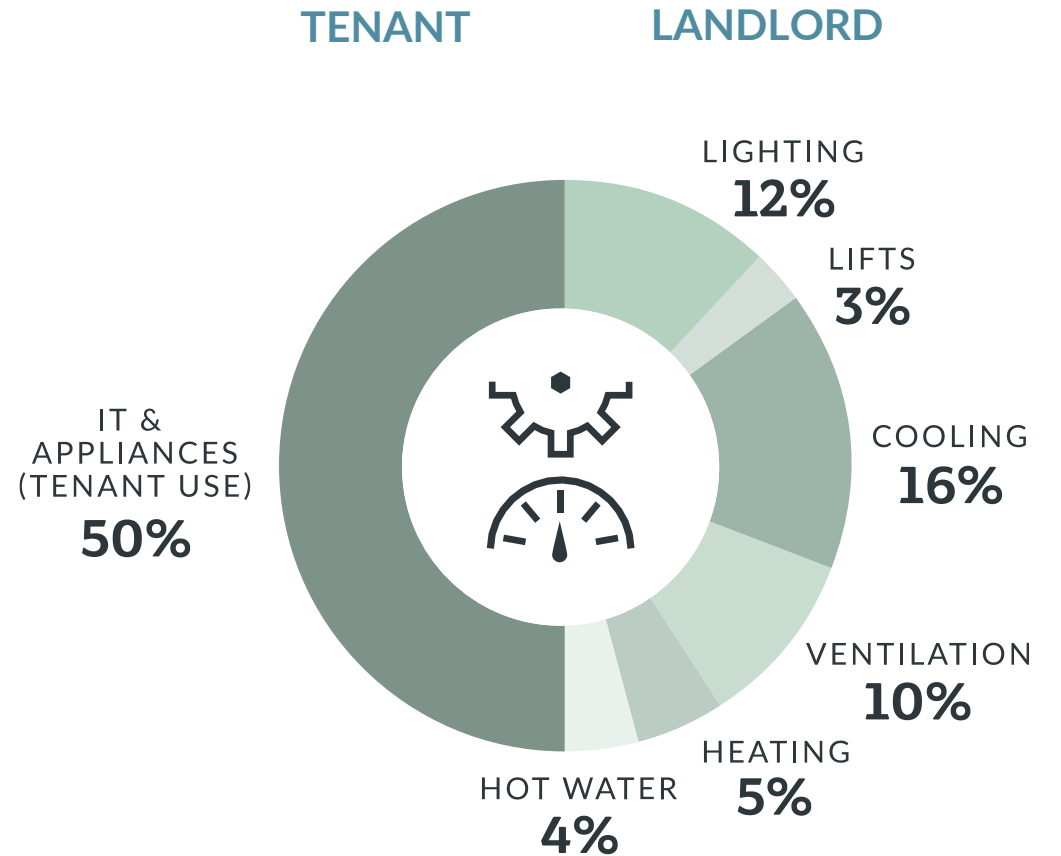
Typical 60-year whole life assessment.



# Net Zero Carbon. Embodied and operational analysis.

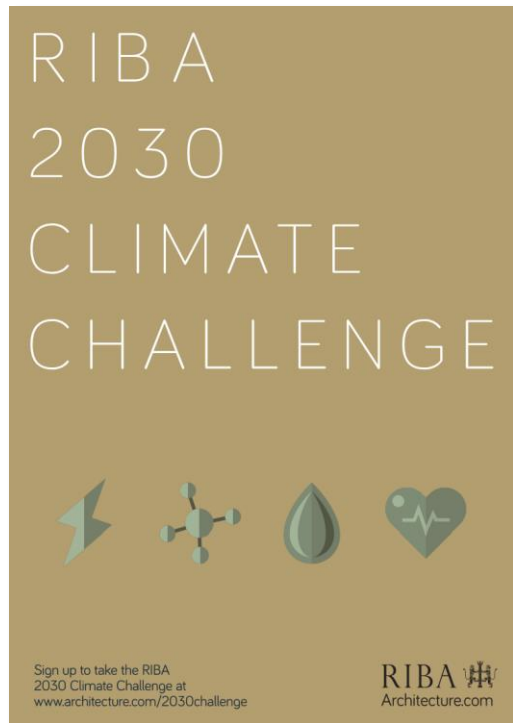


Embodied carbon



Operational carbon

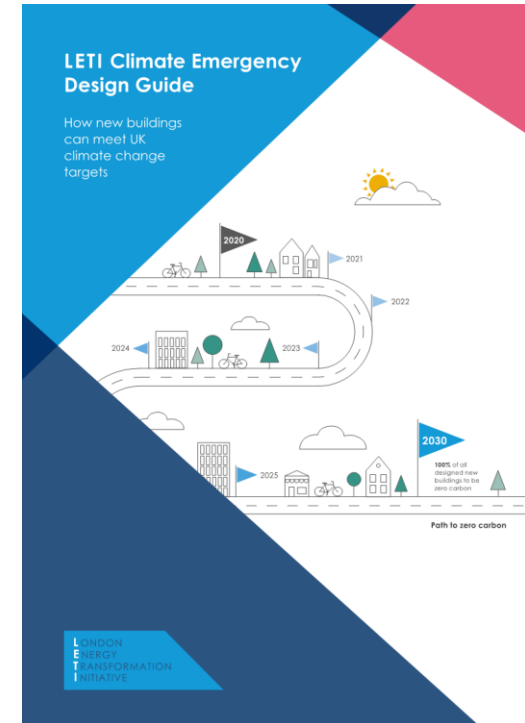
# Energy intensity targets. Performance standards for 2025 and 2030.



RIBA, 2019



UKGBC, 2020





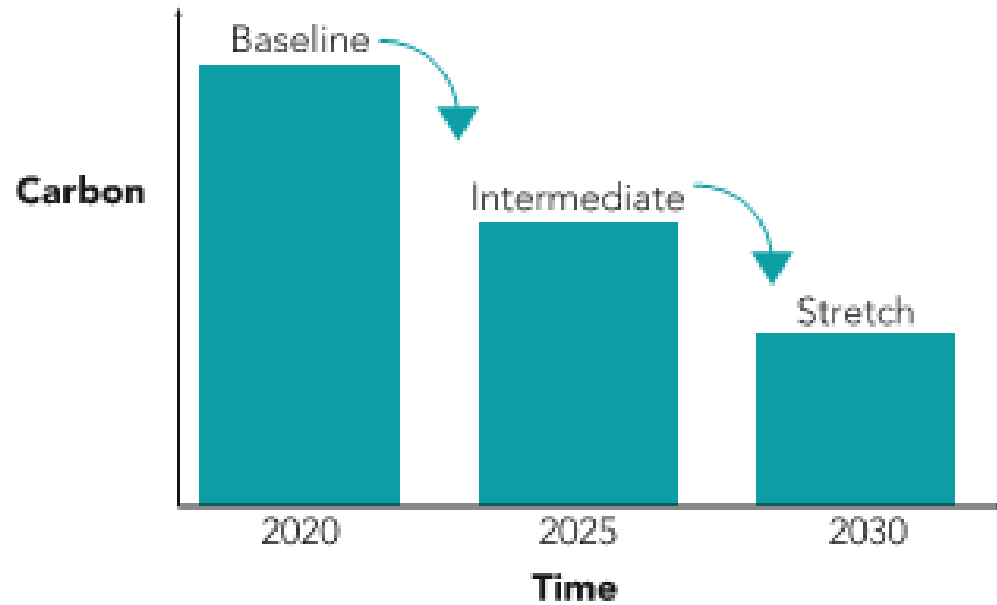
LETI, 2020

# Building the case for net zero. UKGBC study.



RIBA 2030 Climate Challenge target metrics for non-domestic buildings

RIBA Sustainable Outcome Metrics	Current Benchmarks	2020 Targets	2025 Targets	2030 Targets
Operational Energy kWh/m <sup>2</sup> /y 	225 kWh/m <sup>2</sup> /y DEC D rated (CIBSE TM46 benchmark)	< 170 kWh/m <sup>2</sup> /y DEC C rating	< 110 kWh/m <sup>2</sup> /y DEC B rating	< 0 to 55 kWh/m <sup>2</sup> /y DEC A rating
Embodied Carbon kgCO <sub>2</sub> e/m <sup>2</sup> 	1100 kgCO <sub>2</sub> e/m <sup>2</sup> (M4i benchmark)	< 800 kgCO <sub>2</sub> e/m <sup>2</sup>	< 650 kgCO <sub>2</sub> e/m <sup>2</sup>	< 500 kgCO <sub>2</sub> e/m <sup>2</sup>



## Baseline design.

- Fan coil units



- Steel frame and composite deck



**80%** glazing ratio,  
sealed façade.

- Floor to ceiling glazing



- Suspended aluminium ceiling
- Raised access floor



(Image: Bennetts Associates)

- Reinforced concrete substructure
- Steel frame and concrete composite floor structure
- Suspended ceiling and raised access floor system

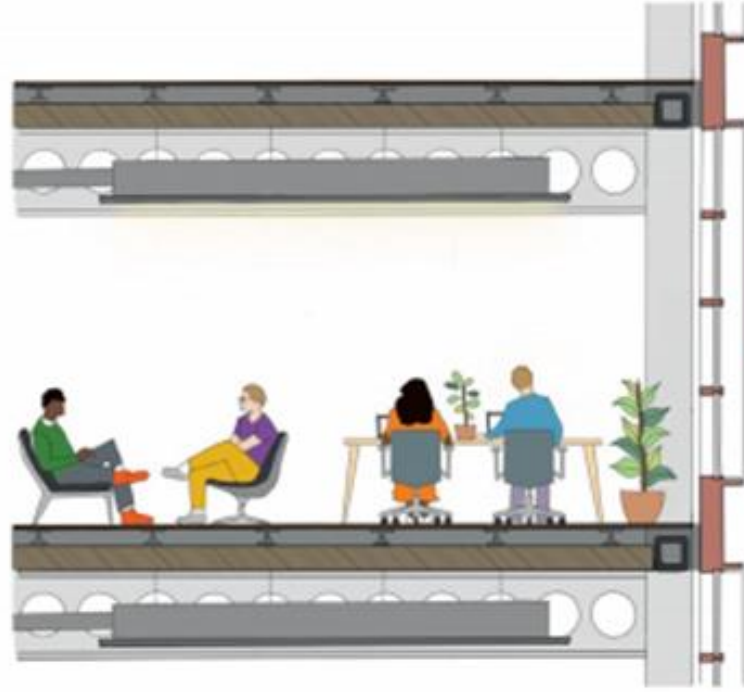
- Gas Boiler & Chillers – Fan Coil Units
- Comfort set point 22 +/- 2°C (BCO standard)
- Typical tenant lighting, power and server rooms

## Intermediate target.

- Chilled beams



- Hybrid steel frame and CLT deck



**50-60%** glazing ratio,  
sealed façade.

- Lower glazing ratios
- External solar shading

- No suspended aluminium ceiling
- Raised access floor made from reclaimed materials

- Steel frame / CLT slabs.
- Exposed ceilings
- Recycled raised access flooring

- Air Source Heat Pump with Fan Coil Units
- Demand Controlled Ventilation
- Tenant's small power loads reduced



## Stretch target.

- Mixed mode ventilation/ chilled beams
- Task lighting
- Wider range of indoor temperatures (due to reduced comfort cooling)

- Timber frame and CLT deck



**40%** glazing ratio,  
openable windows and  
solar shading

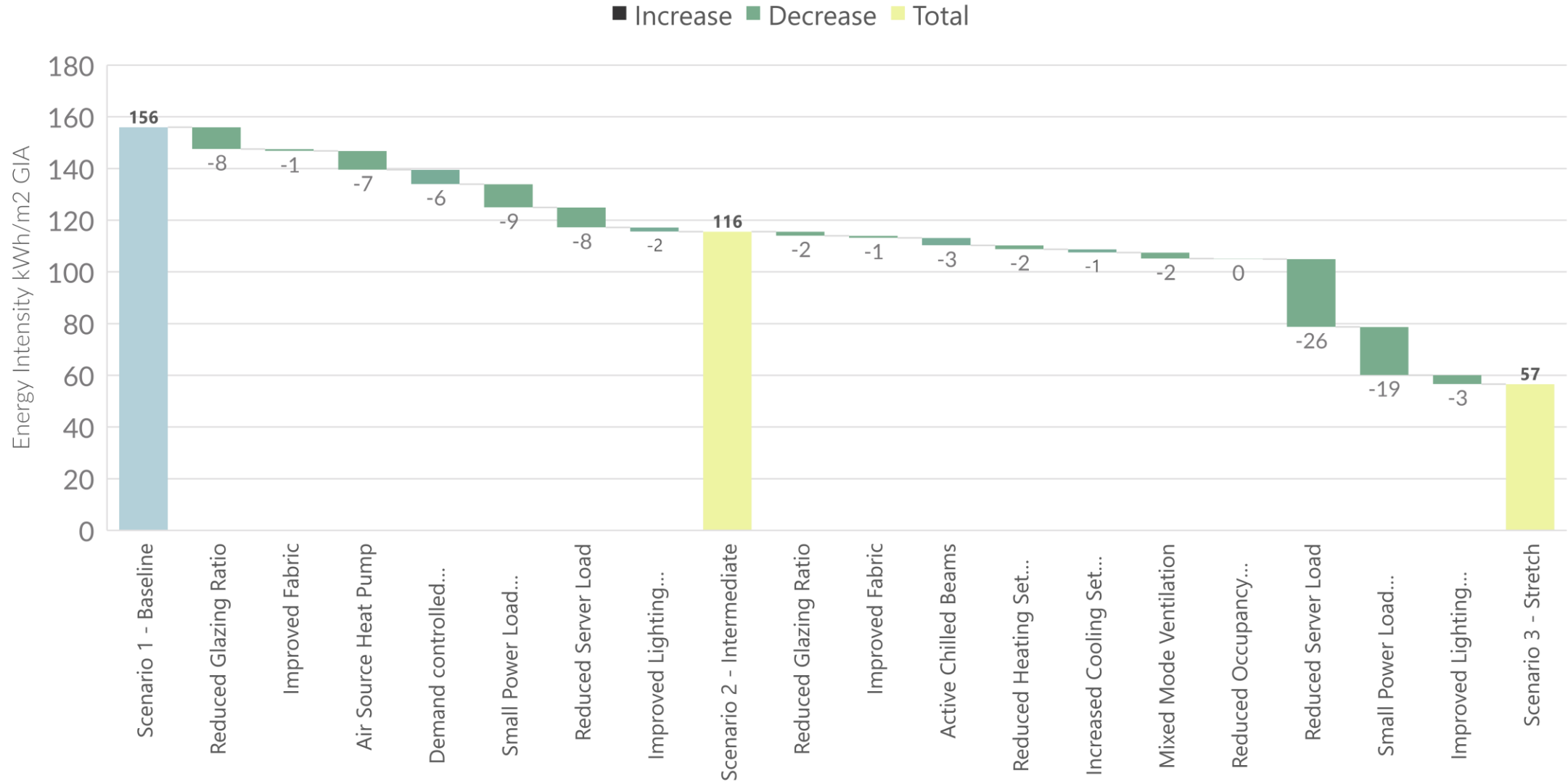
- Lower glazing ratios
- External solar shading
- Opening windows

- No suspended aluminium ceiling
- Timber floor build-up without floor access for services (power and IT distribution to be surface mounted)

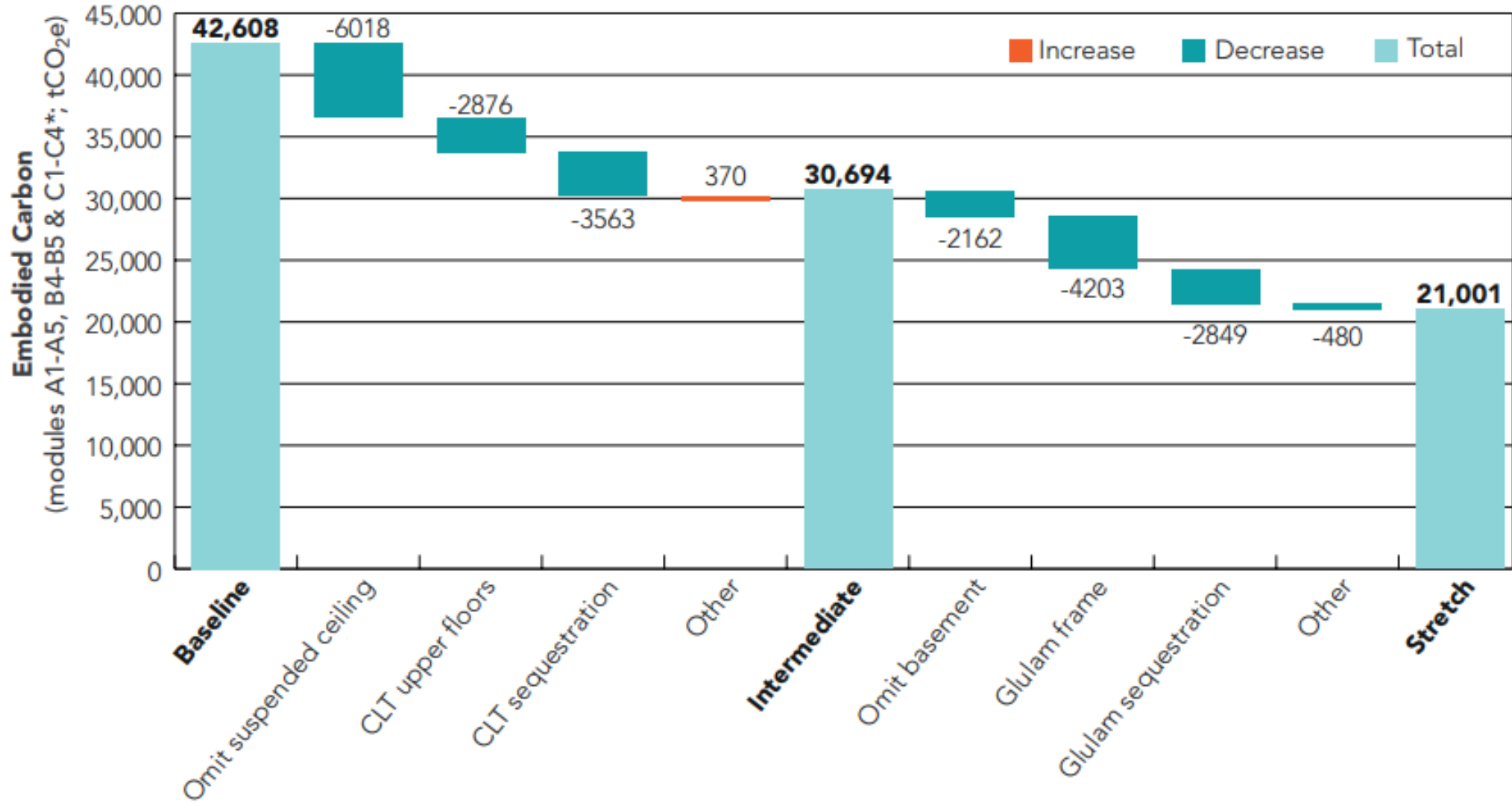
- Omit concrete basement
- Glulam frame and cross laminated timber floor
- Exposed ceiling and timber floor build-up

- Mixed Mode Ventilation , Chilled Beams
- Relaxed comfort set points : (Summer peak: 27°C)
- Off site cloud computing; reduced lighting levels .

## Operational energy analysis.



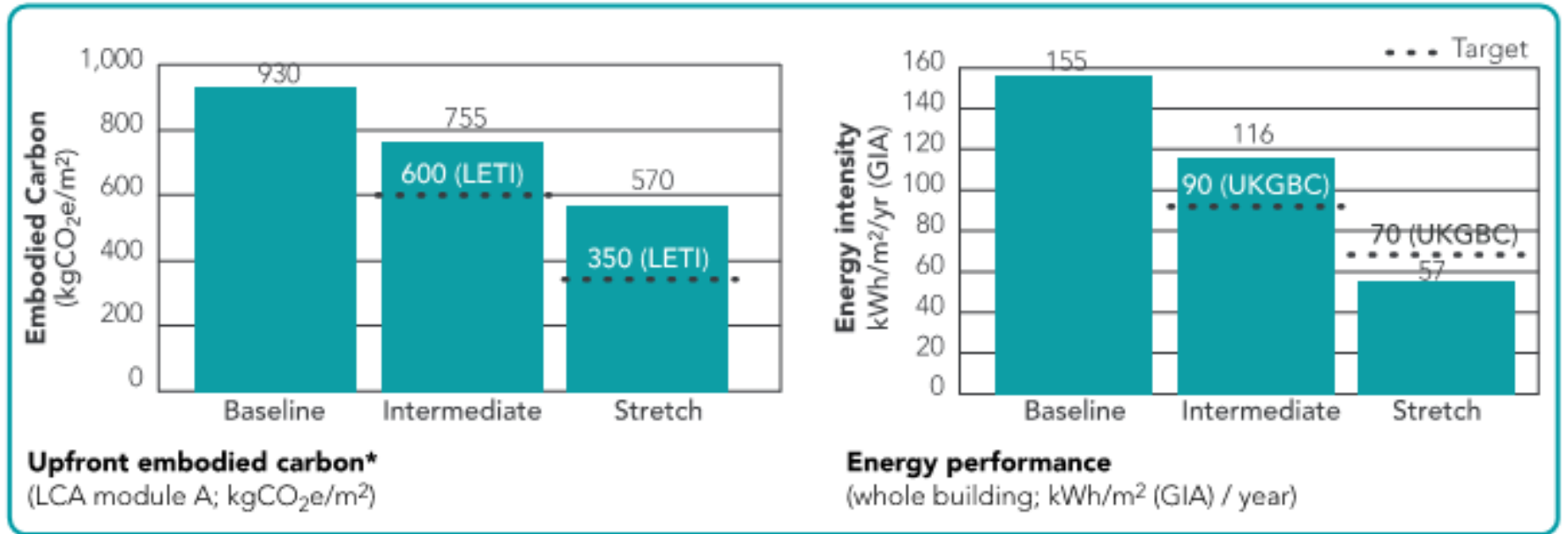
## Embodied carbon analysis.



## Summary overview.

Case study analysis.

Net zero commercial building (multi-storey city office).



**Cost change** (shell and core; £/m<sup>2</sup> GIA) See pages 40-46



\*Not including sequestration (capture of carbon in timber building materials)

# Net zero new build. Key impacts.

- Need to establish targets and collaborative team working towards common goal.
- Supply chain and procurement to be carefully managed.
- Outcomes to be verified.
- Need post occupancy evaluation and on-going tenant engagement.

Valle Wood office building, Oslo, Norway.  
Completed 2018, 7-storeys, floor area 6,700 m<sup>2</sup>.



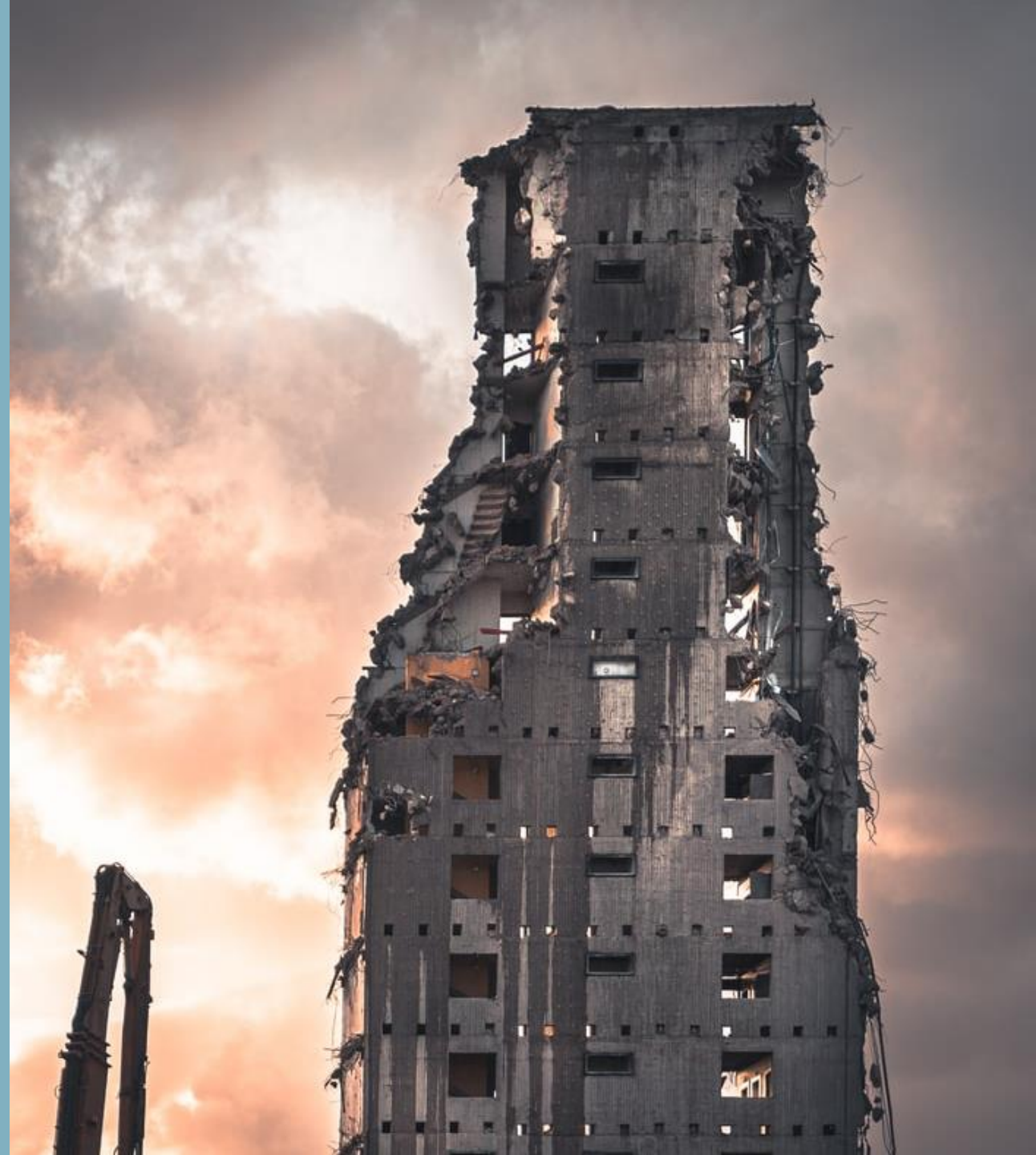
**‘80% of buildings  
that will exist in  
2050 have already  
been built’.**

**UK GREEN BUILDING COUNCIL**

<https://www.ukgbc.org/climate-change/>

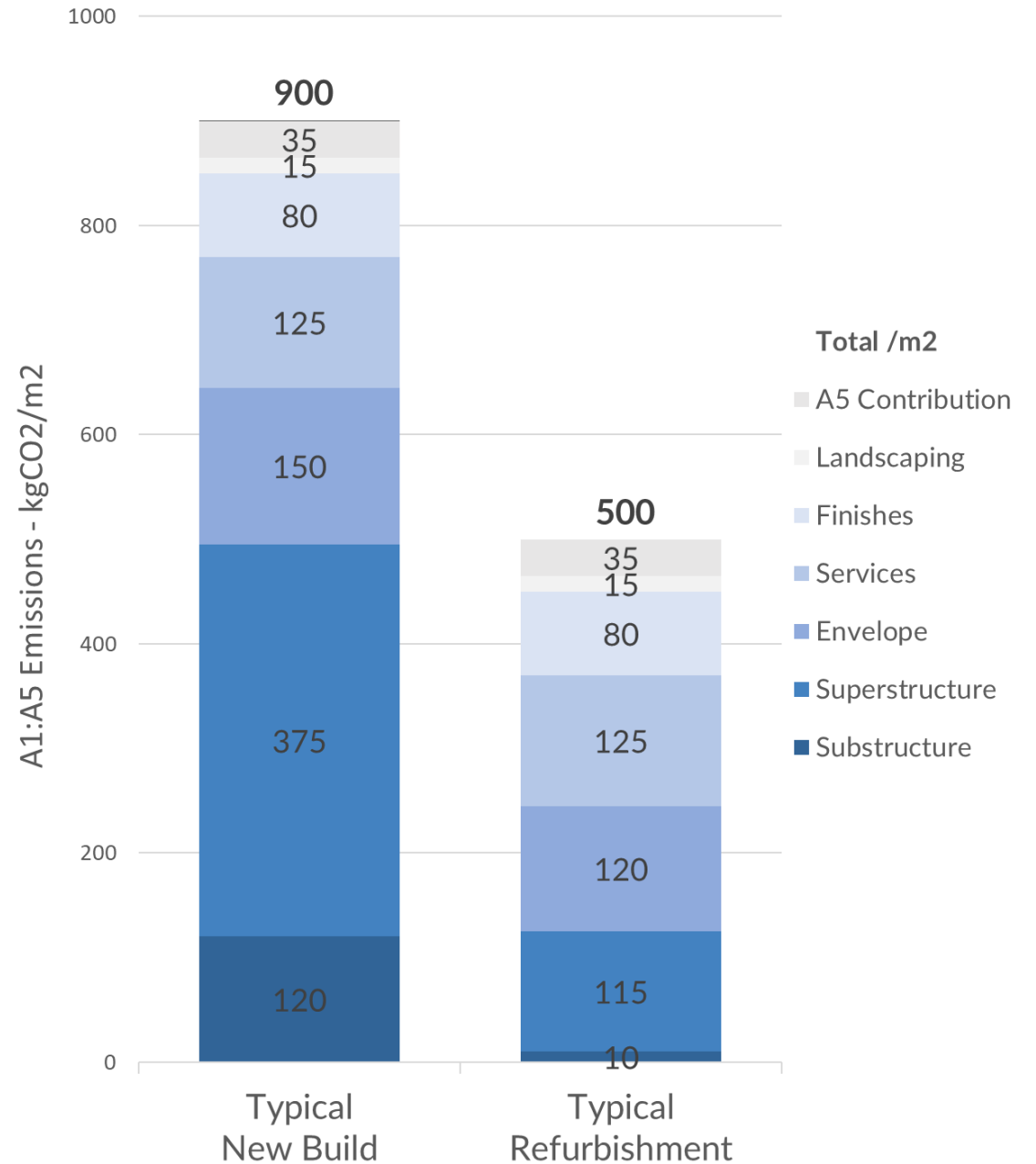


# To rebuild or refurbish?



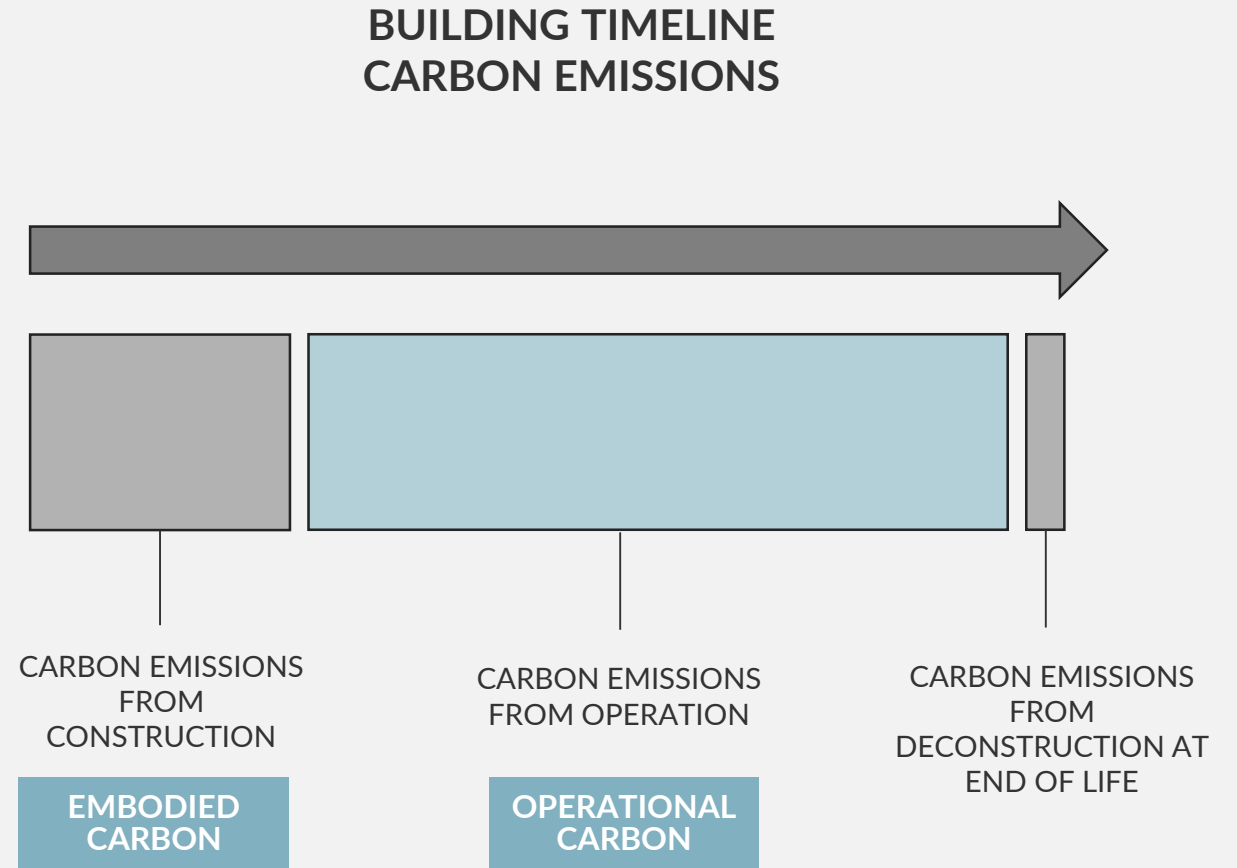
# Embodied Carbon. Typical office.

- Superstructure and substructure are the predominant elements
- Typically with high masses of concrete & steel.

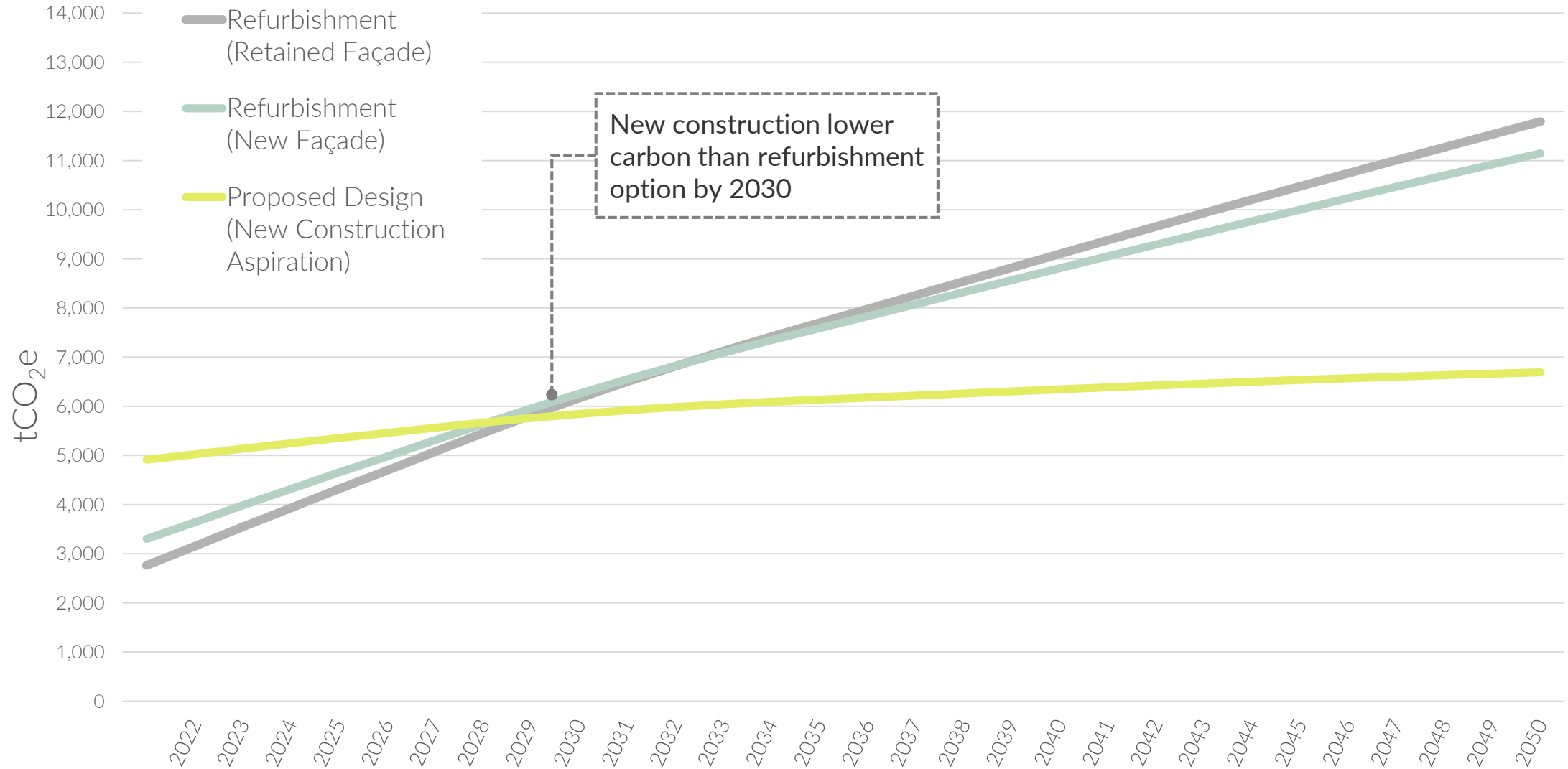




# Whole Life Carbon. Rebuild or refurb?

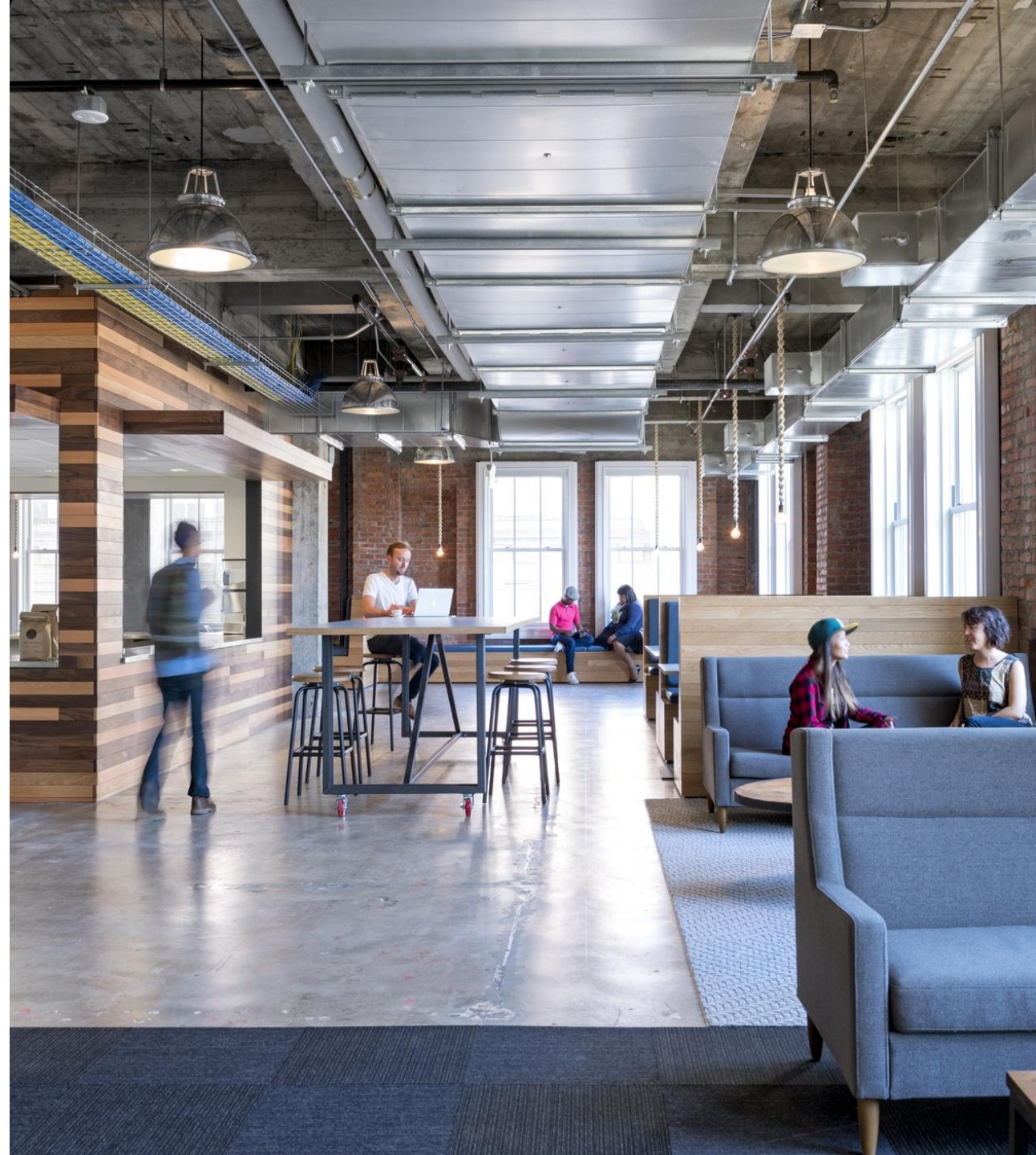


Whole Life Carbon scenarios (period 2022-2050).



# Using less. Lean design.

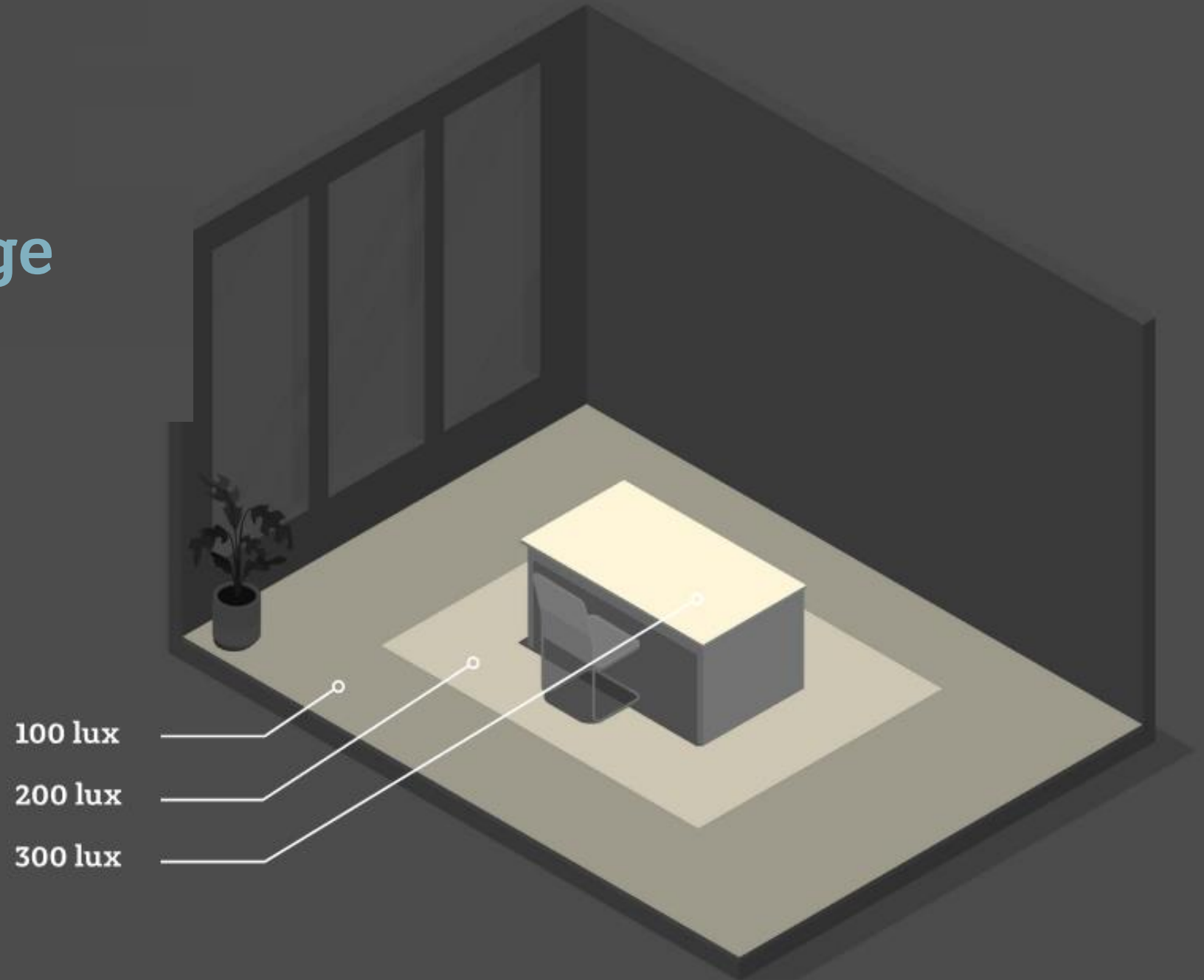
- Fewer internal finishes
- Fewer ceilings & floors
- Robust materials





**Recycled raised access floors.**  
**75% less embodied carbon compared to new.**

# Cat A lighting. Can we challenge the norm...

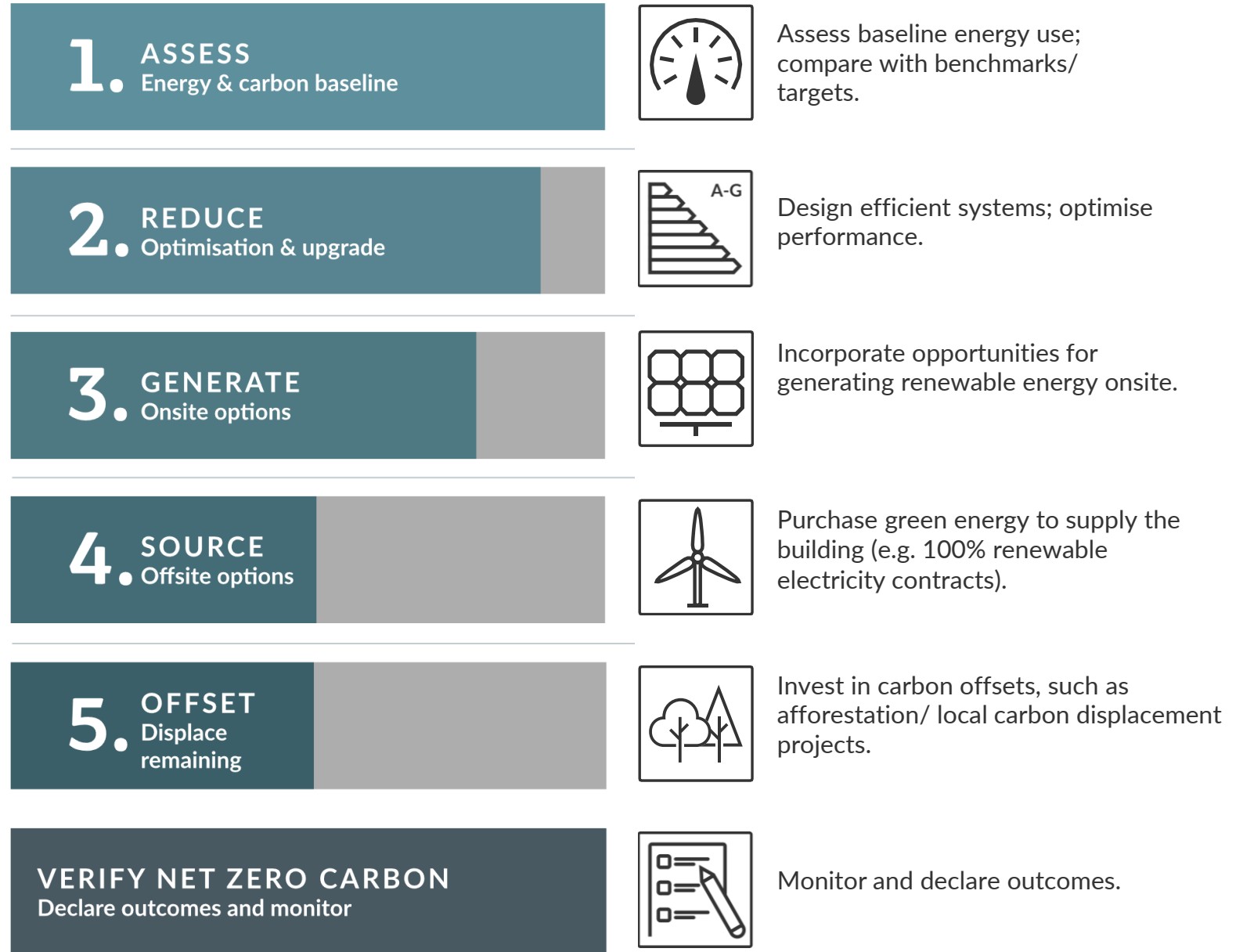


# Minimum Energy Efficiency Standards (MEES).

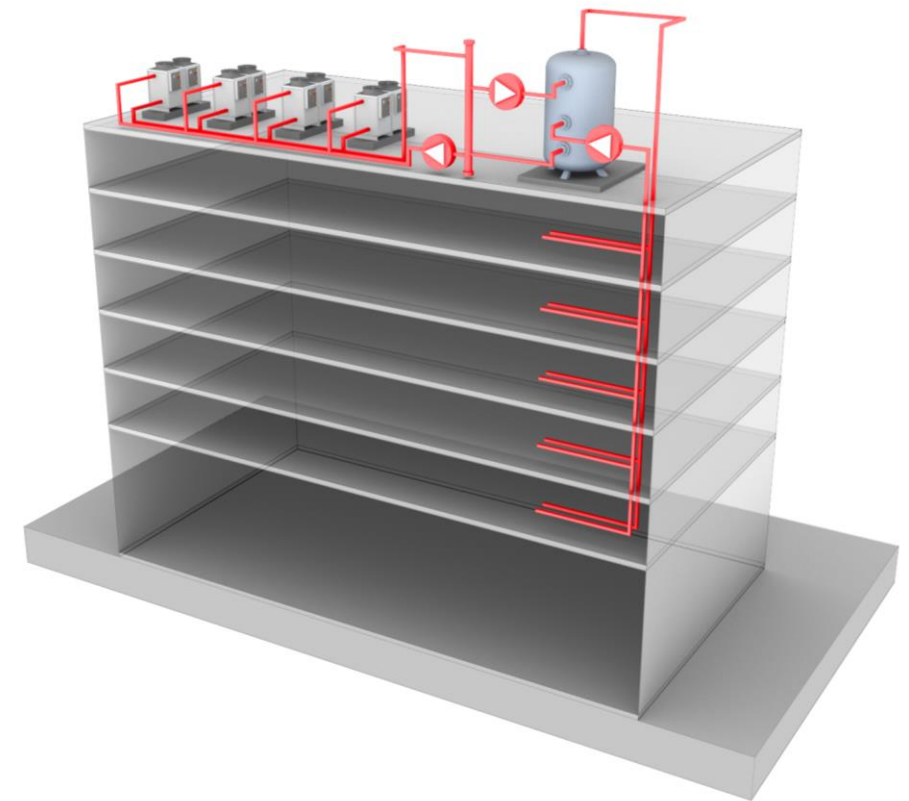
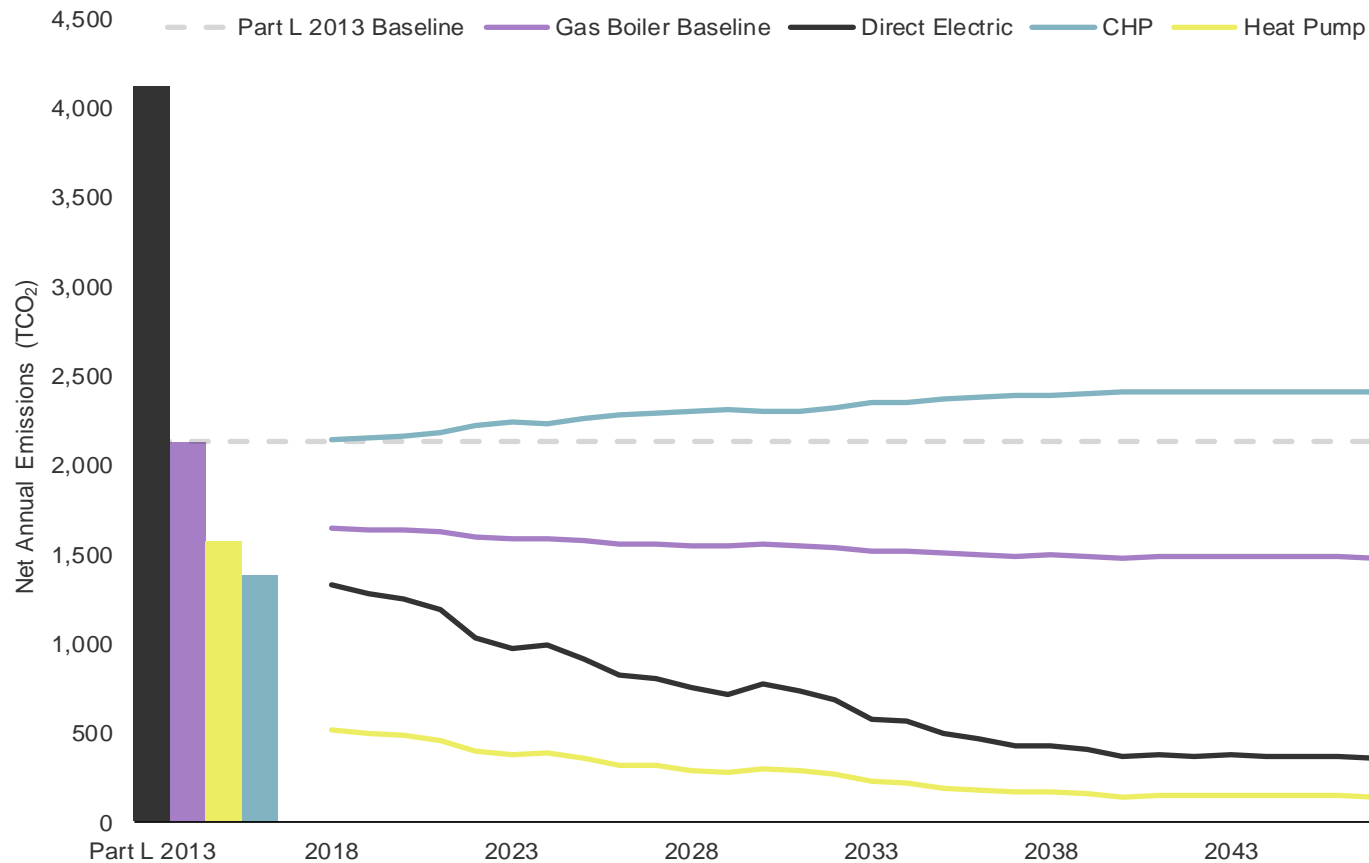
- Energy Performance Certificates (EPC) provide an energy rating for commercial spaces.
- The Government is proposing to raise the minimum standard, that a landlord can let, from an E-rating to a B-rating by 2030.
- Landlords should consider upgrading building systems to reduce carbon emissions when undertaking refurbishments and/or at the end of lease periods.



# The journey to zero carbon in operation.



# Decarbonise heating. Retrofit heat pumps.





# Net zero. Summary.

Existing buildings will play a bigger part than new.

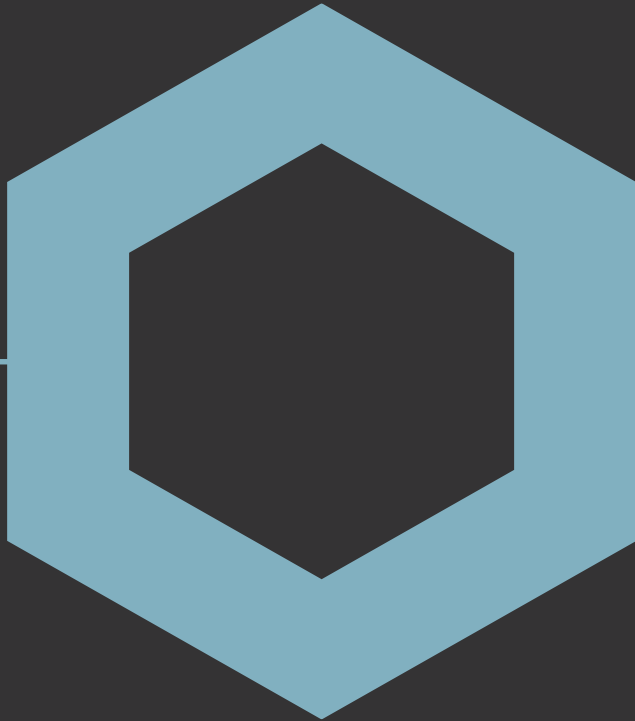
Think about whole life carbon when considering retaining or replacing.

Use less – challenge the norms.

Improve energy efficiency.

Decarbonise your heating.





# Thank you.

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# Any questions?

## Net zero workplaces.

### How to make it happen.



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