

Where others tear down, we restore

# CARBON REPORT

KINRISE

**OUR BELIEF**

The path to *net zero* and the decarbonisation of the UK lies in the upgrading of existing buildings over new development and running buildings on renewable energy, rather than fossil fuels.



The full *story*

# CARBON

THE CONTEXT

# Net zero and the *decarbonisation* of the United Kingdom relies on the property industry



The landmark report from the UN IPCC, 'Global Warming of 1.5°C', presents a picture of the dramatically different world we will inhabit if global average temperatures rise by 2°C compared to 1.5°C. The scenario includes entire ecosystems being destroyed and huge negative economic impact globally from additional heating and cooling demand.

The built environment generates 39% of annual global CO<sub>2</sub> emissions, 11% of which is from construction (embodied carbon) and 28% of which is from buildings which are powered by fossil fuels (operating carbon). Decarbonising the property sector is one of the most cost-effective ways to mitigate the worst effects of climate breakdown.

It's our responsibility as developers and tenants to understand our impact through the buildings we develop and occupy.

Global CO<sub>2</sub> emissions by sector

39% of carbon emissions are from property

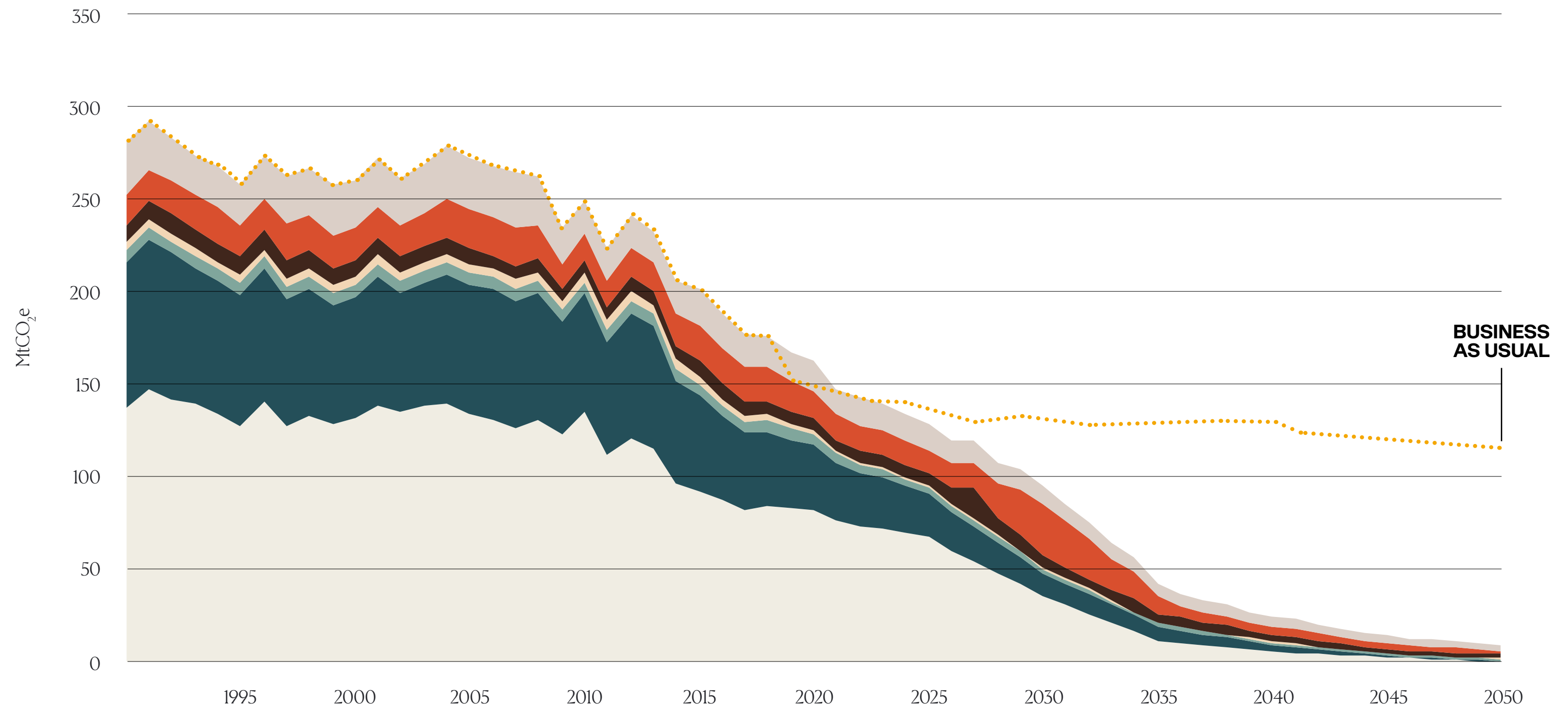


- 28% Building operations
- 11% Building materials & construction
- 32% Industry
- 23% Transportation
- 6% Other

**NET ZERO BY 2050**

# If business stays 'as usual', we'll miss the Government's Net Zero By 2050 target by 40%

- Buildings (Non-domestic) - Embodied Carbon
- Buildings (Domestic) - Embodied Carbon
- Infrastructure - Embodied Carbon
- Infrastructure - Operational Carbon
- Buildings - F-gas
- Buildings (Non-domestic) - Operational Carbon
- Buildings (Domestic) - Operational Carbon



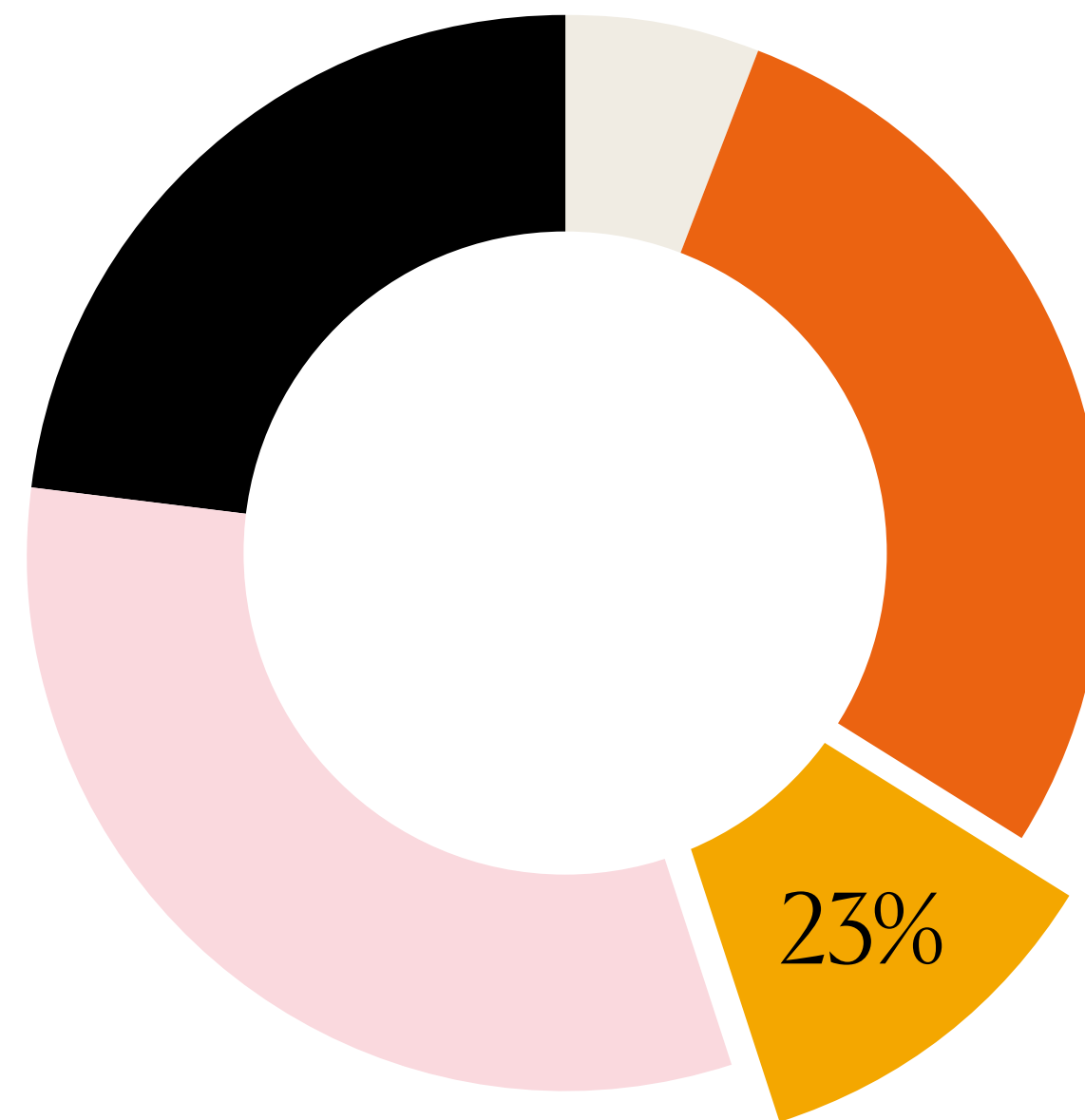
Source: UKGBC, Net Zero Whole Life Carbon Roadmap for the Built Environment



Source: UK Gov Waste Report, Architecture 2030

## WASTE & EXTRACTION

# New-build construction is wasteful and resource intensive with concrete & steel making up 21% of global emissions



### Waste

The UK loses more than 50,000 buildings a year through demolition and 62% of the UK's waste is from construction (138 million tonnes).

### Raw material extraction

Just three materials - concrete, steel, and aluminium — are responsible for 23% of total global carbon emissions.

Concrete	11%
Steel	10%
Aluminium	2%

**EXPLAINER**

# Understanding carbon stages

**Carbon Emissions**

The emission of greenhouse gases. The global warming potential (GWP) from greenhouse gases is quantified in units of carbon dioxide equivalence. A kilogram of carbon dioxide therefore has a GWP of 1 kg CO<sub>2</sub>e.

**Embodied Carbon**

Carbon emissions associated with materials and construction processes throughout the whole lifecycle of a building. This includes Upfront Carbon and Use Stage Carbon.

**Operational Carbon**

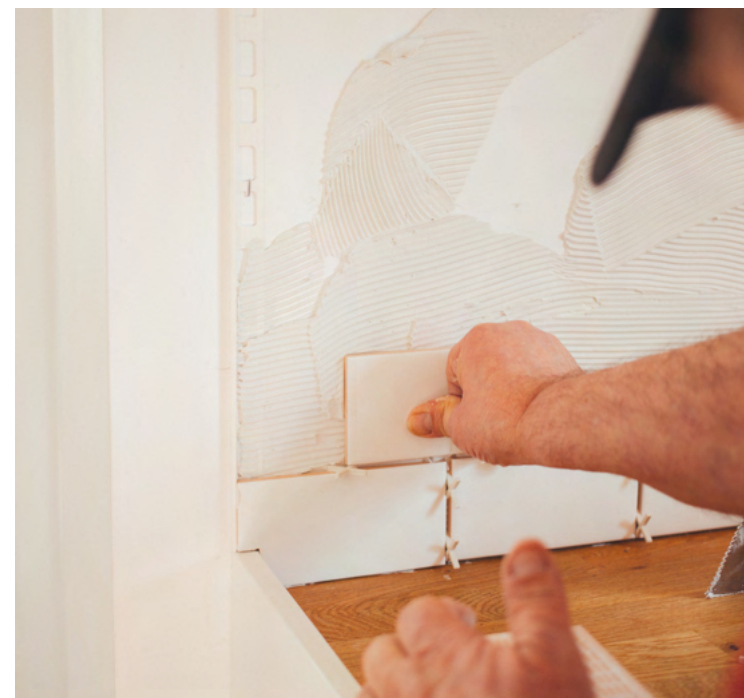
The emissions associated with energy used to operate the building.

**Whole Life Carbon**

Encompassing both embodied and operational carbon together.

Upfront embodied carbon

Material use / Replacement



## A1-A3

**Product**

Includes: Raw material, sourcing, transport & manufacture

## A4-A5

**Construction**

Includes: Transport to site, installation

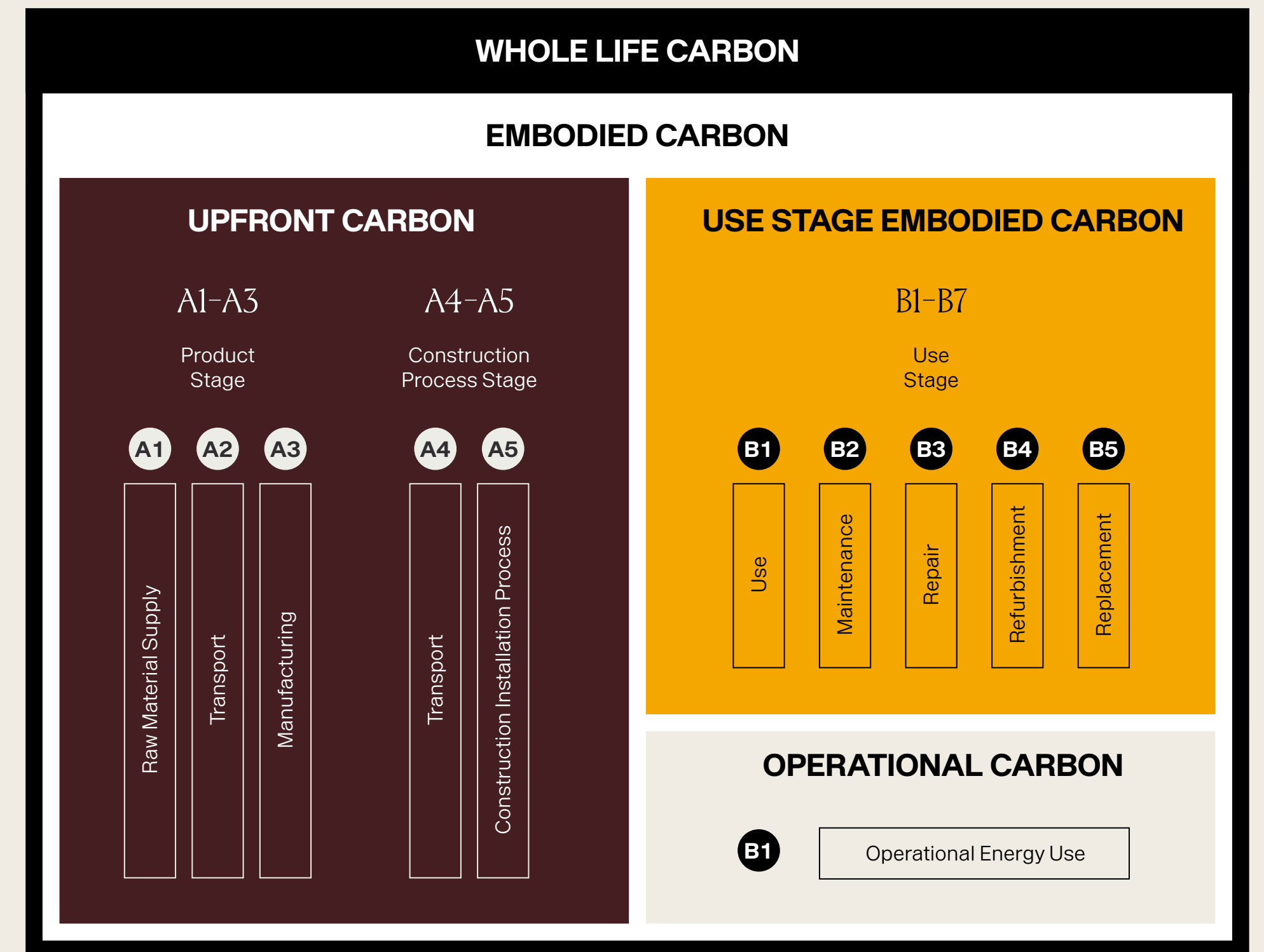
## B1-B7

**Use**

Includes: Maintenance, repairs, replacement, refurbishment

European standard EN 15978

# Carbon: upfront, operational, embodied, whole life



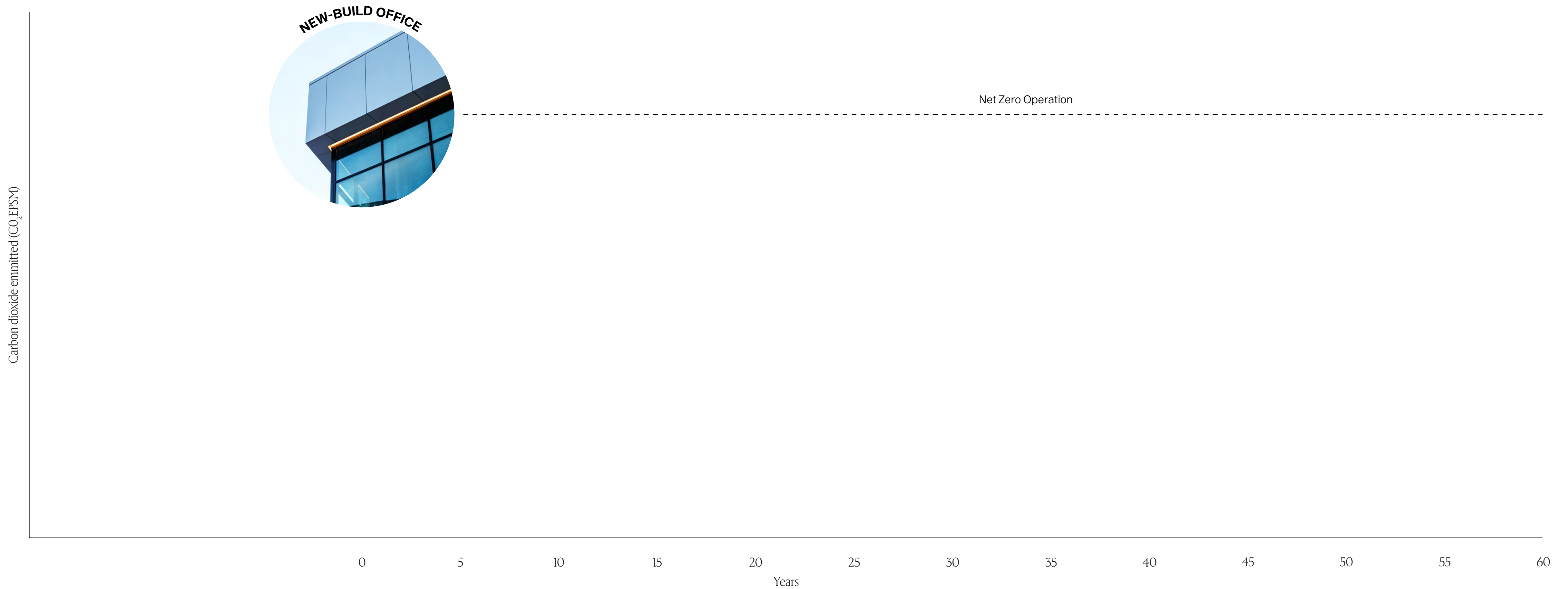
Are new-builds ever *'net zero'*?

# THE DATA



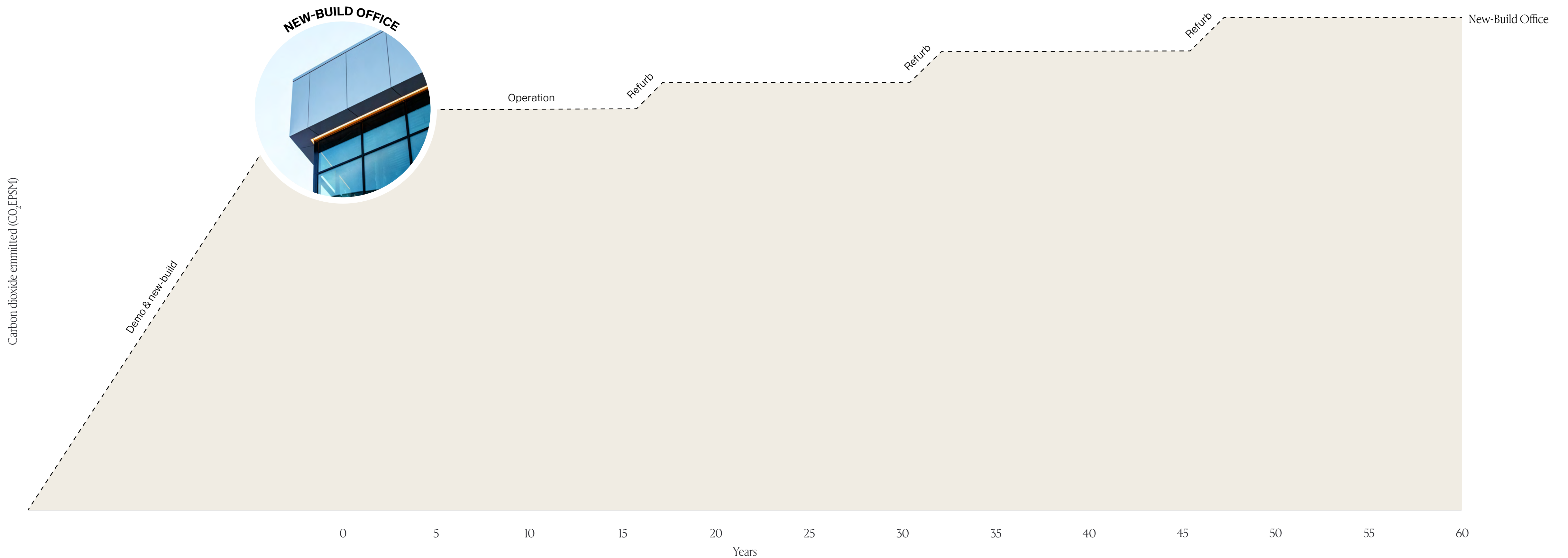
### THE CONCEPT

# Many new-builds claim to be 'net zero'



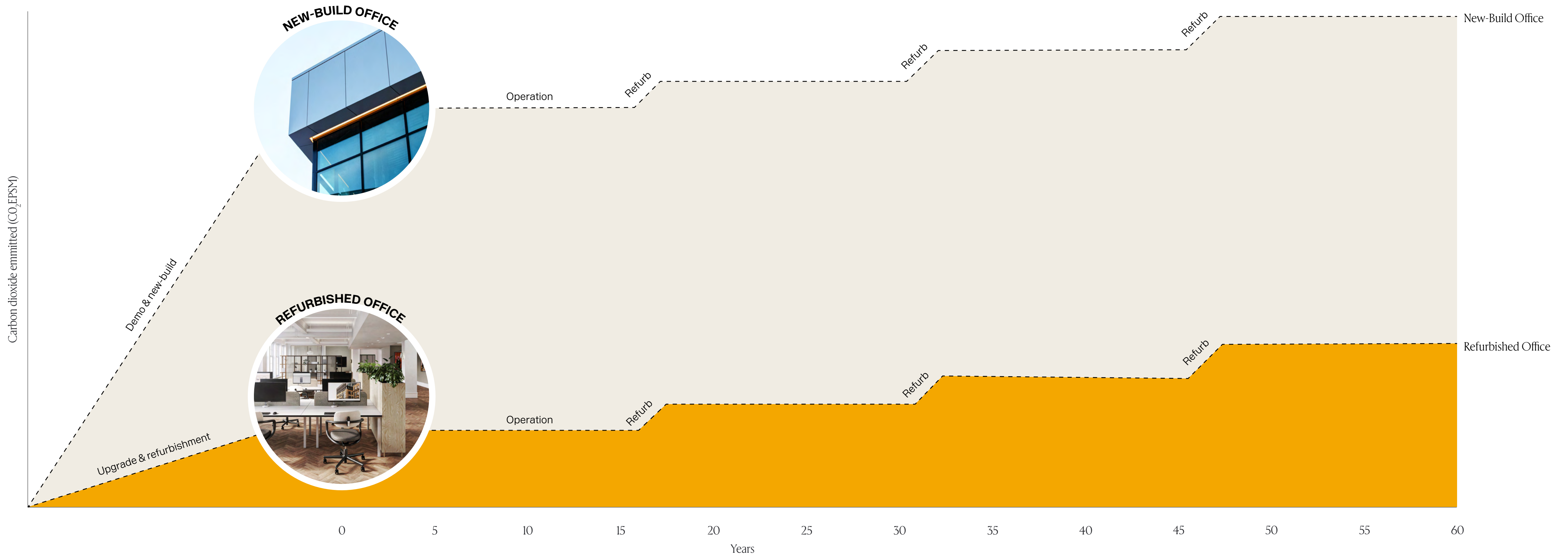
### THE CONCEPT

# What's swept under the rug is the carbon emitted during the demolition and construction of a new-build and refurbishments



### THE CONCEPT

# By comparison, an upgraded existing building emits a fraction of the carbon over its lifetime

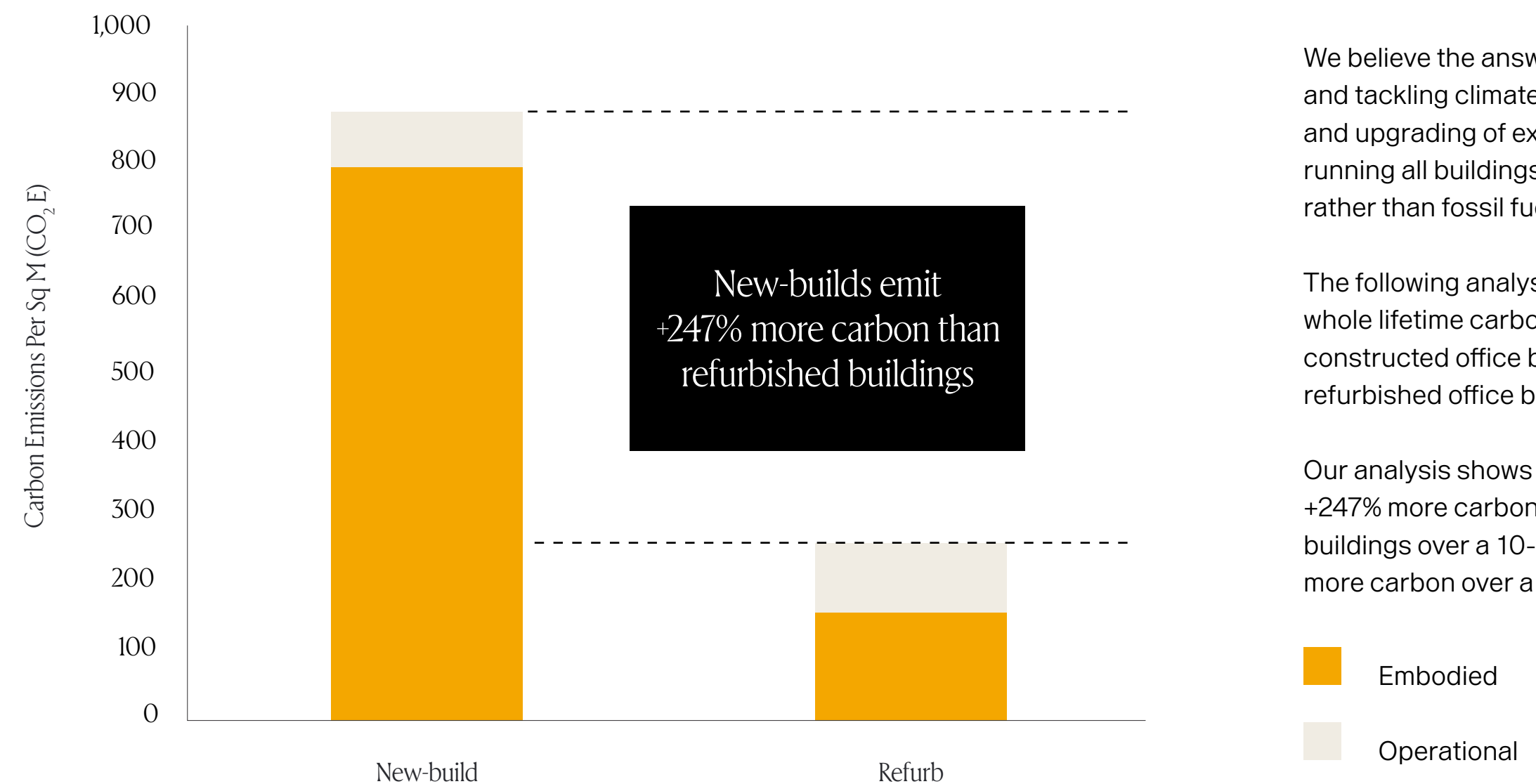




## SUSTAINABILITY

# The *greenest* buildings are the ones we upgrade, not rebuild

### CARBON FOOTPRINT OVER A 10-YEAR LEASE



There is a misconception that new buildings are more green than existing buildings. The carbon emissions and waste caused by a new-build construction is rightly coming under increasing scrutiny from policy makers.

We believe the answer to decarbonisation and tackling climate change is the retention and upgrading of existing buildings and running all buildings on renewable energy, rather than fossil fuels.

The following analysis compares the whole lifetime carbon footprint of a newly constructed office building to a fully refurbished office building.

Our analysis shows that new-builds emit +247% more carbon than refurbished buildings over a 10-year lease and 40% more carbon over a 60-year lifecycle.

■ Embodied  
■ Operational





Refurbished office

# ANALYSIS

**ANALYSIS**

# Carbon inputs for new-builds and refurbishment

	Demolition	Build	Fit out	Operate
 <p><b>New-build office</b></p>	<p>Removal of previous building</p> <p>50 kg CO<sub>2</sub>e psm</p>	<p>Construction of new office building</p> <p>600 kgCO<sub>2</sub>e psm</p>	<p>High quality office fit-out including new air conditioning, lighting, lifts and WCs</p> <p>Building in meeting rooms, kitchens, data infrastructure, basic office furniture</p> <p>150 kgCO<sub>2</sub>e psm upfront, and a further refurbishment of 150 kgCO<sub>2</sub>e psm every 15 years</p>	<p>All-electric building systems run by renewable supply</p> <p>55kWh/m2/GIA/year at SAP 10.2 emission factor equating to 7.48 kgCO<sub>2</sub>e psm per annum</p>
 <p><b>Refurbished office</b></p>	<p>N/A</p>	<p>N/A</p>	<p>As above</p>	<p>75kWh/m2/GIA/year at SAP 10.2 emission factor equating to 10.20 kgCO<sub>2</sub>e psm per annum to account for increased operational energy use</p>



Carbon *emitted* over a 10-year lease

# TENANT PERSPECTIVE

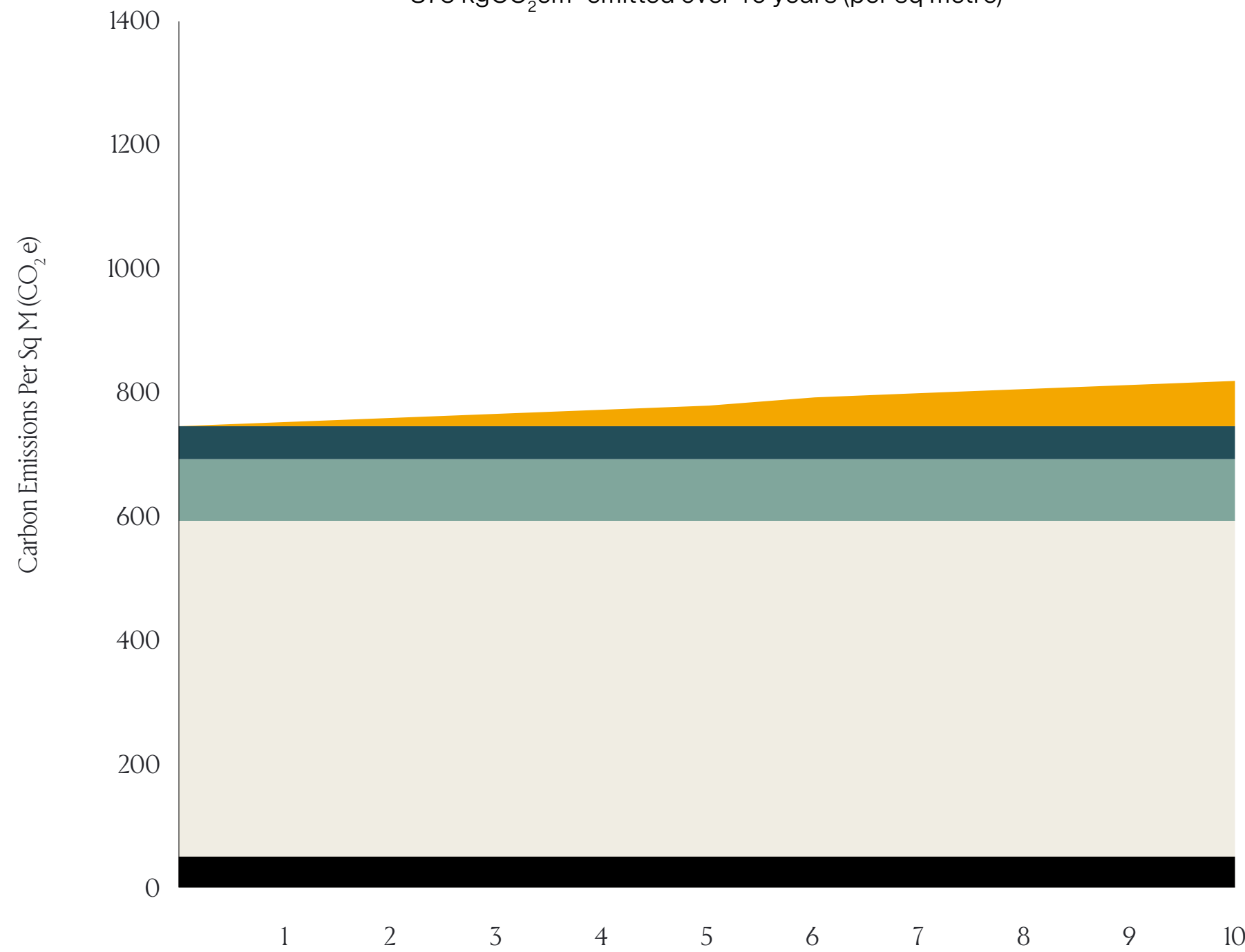
**ANALYSIS**

# New-build emits 247% more carbon over a 10-year lease

- Operational
- CAT B
- CAT A
- Base Build
- Demo

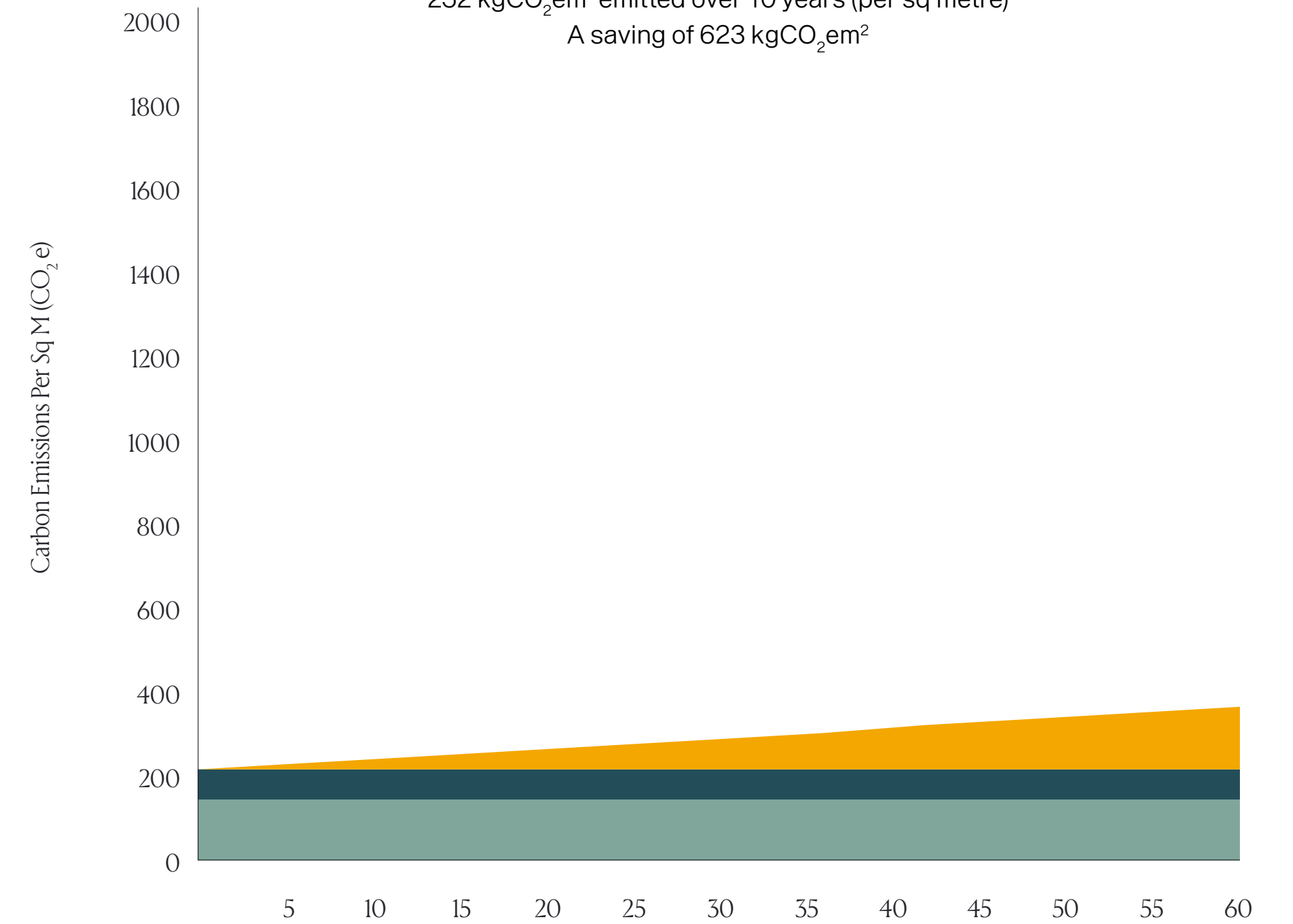
## NEW-BUILD

875 kgCO<sub>2</sub>em<sup>2</sup> emitted over 10 years (per sq metre)



## REFURBISHMENT

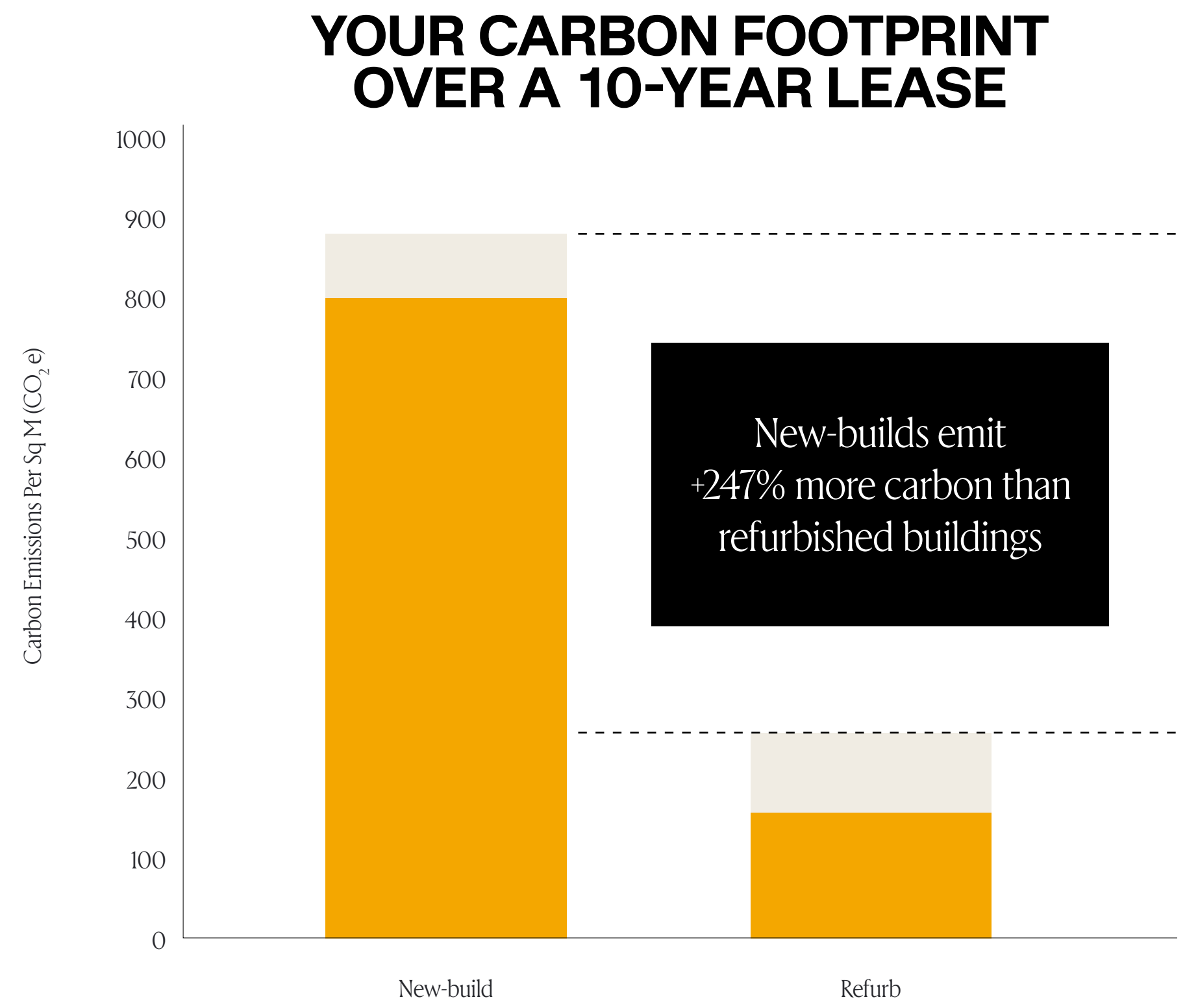
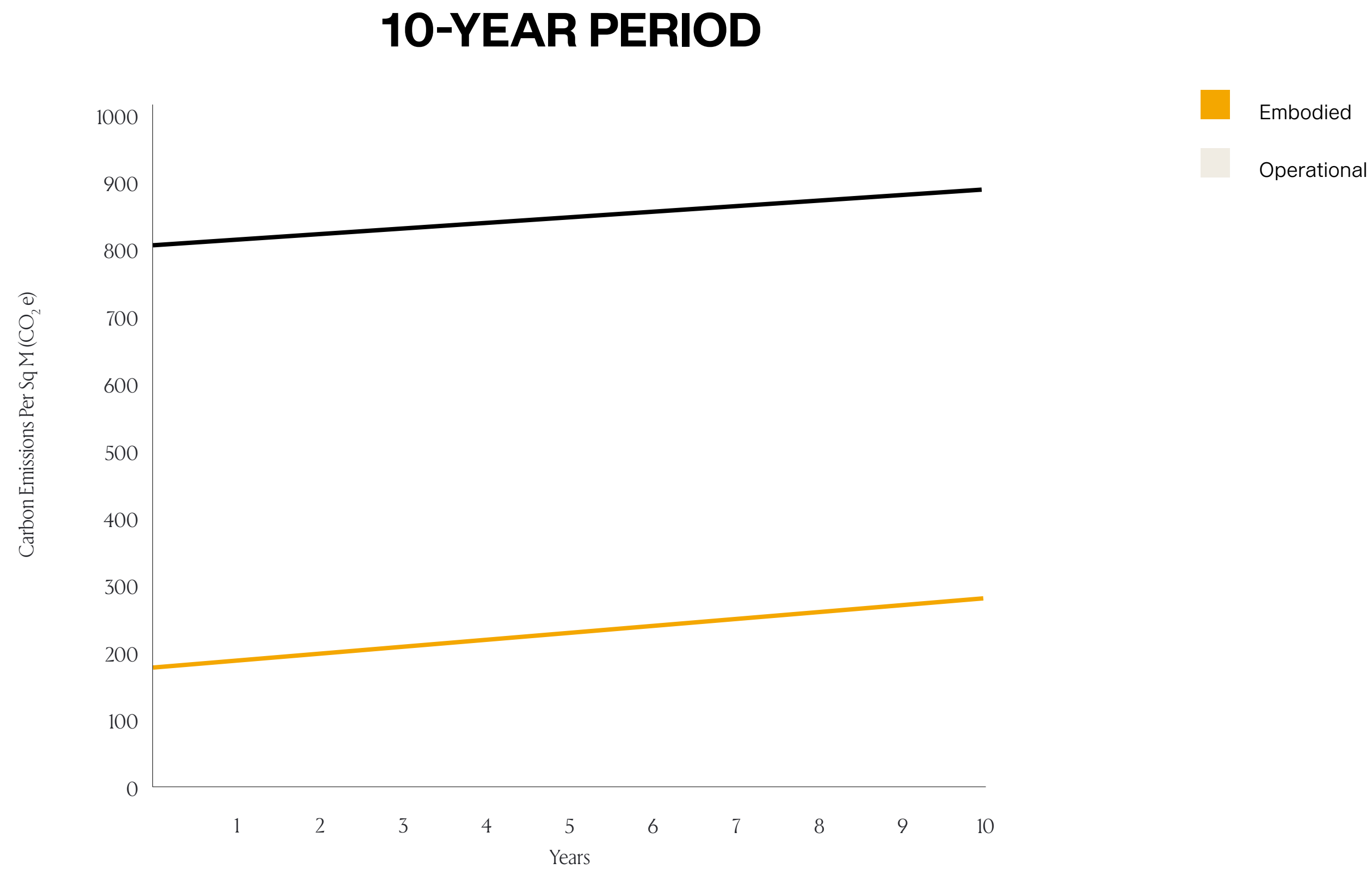
252 kgCO<sub>2</sub>em<sup>2</sup> emitted over 10 years (per sq metre)  
A saving of 623 kgCO<sub>2</sub>em<sup>2</sup>





ANALYSIS

# Carbon footprint over a 10-year lease



**ANALYSIS**

# Comparison to a new-build equivalent



## UPGRADE TO EXISTING BUILDING

252 kg CO<sub>2</sub>e psm

19,243 sq m

4,849,236 kg CO<sub>2</sub>e psm

4,849 ton CO<sub>2</sub>e

4,849 hot air balloons of emitted CO<sub>2</sub>



## NEW-BUILD OF SAME SIZE

875 kg CO<sub>2</sub>e psm

19,243 sq m

16,838,100 kg CO<sub>2</sub>e psm

16,838 ton CO<sub>2</sub>e

16,838 hot air balloons of emitted CO<sub>2</sub>



*Carbon emitted over 60-year lifecycle*

# OWNER PERSPECTIVE

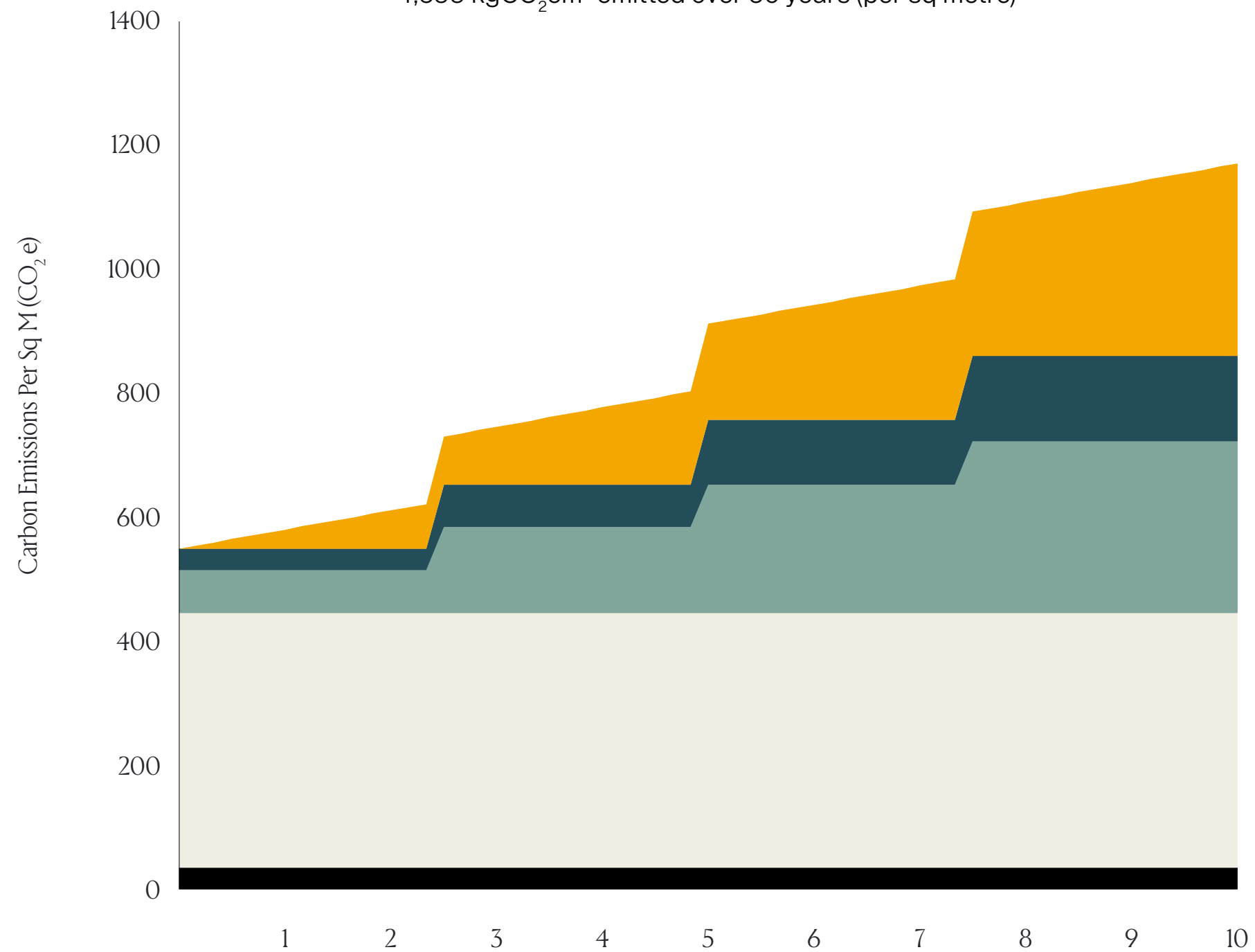
ANALYSIS

# A new building emits 40% more carbon over a 60-year lifecycle

- Operational
- CAT B
- CAT A
- Base Build
- Demo

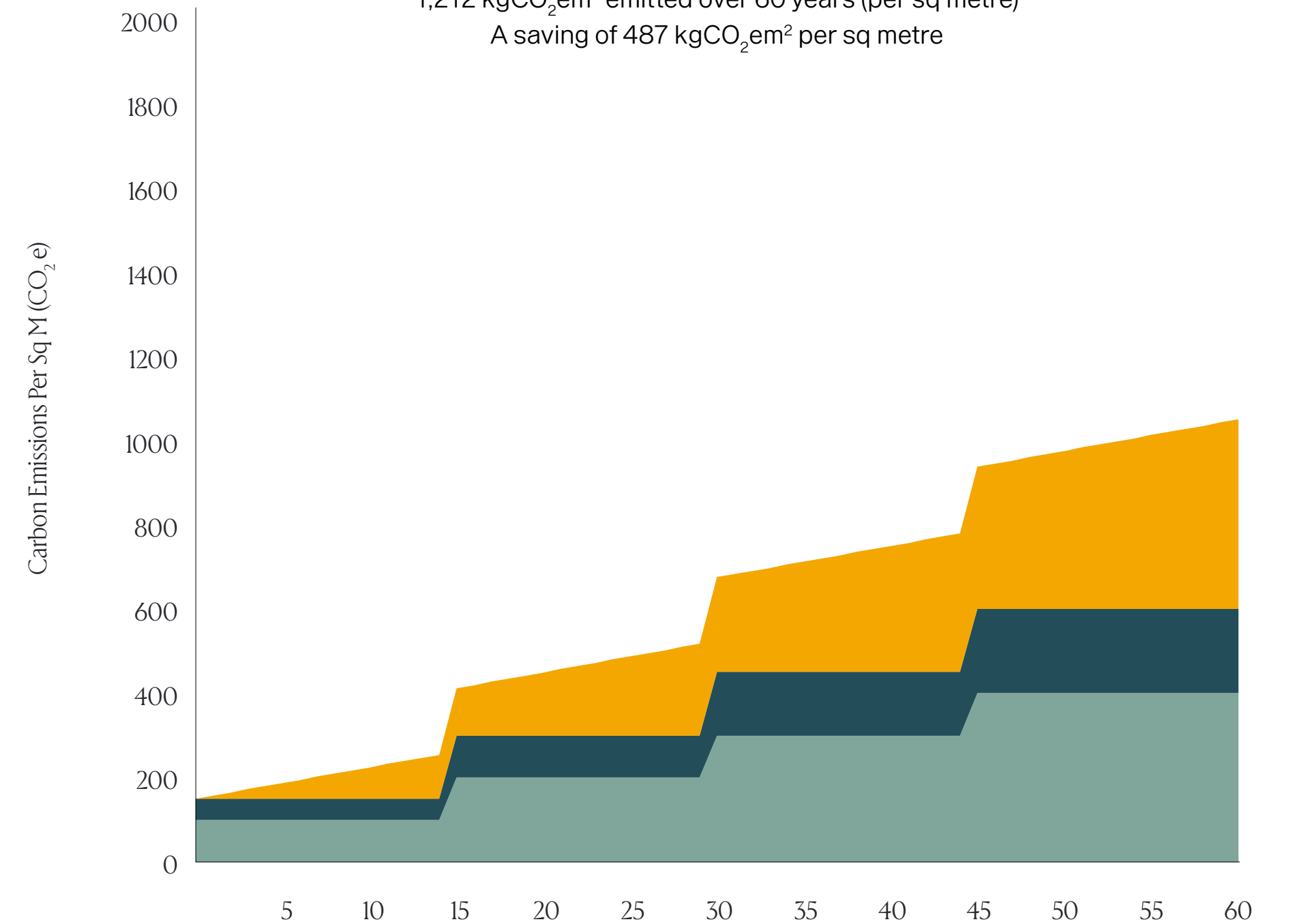
## NEW-BUILD

1,699 kgCO<sub>2</sub>e/m<sup>2</sup> emitted over 60 years (per sq metre)



## REFURBISHMENT

1,212 kgCO<sub>2</sub>e/m<sup>2</sup> emitted over 60 years (per sq metre)  
A saving of 487 kgCO<sub>2</sub>e/m<sup>2</sup> per sq metre



ANALYSIS

# Comparison to a new-build equivalent



## UPGRADE TO EXISTING BUILDING

1,212 kg CO<sub>2</sub>e psm

19,243 sq m

23,322,516 kg CO<sub>2</sub>e

23,323 ton CO<sub>2</sub>e

23,323 hot air balloons of emitted CO<sub>2</sub>



## NEW-BUILD OF SAME SIZE

1,699 kg CO<sub>2</sub>e psm

19,243 sq m

32,693,857 kg CO<sub>2</sub>e

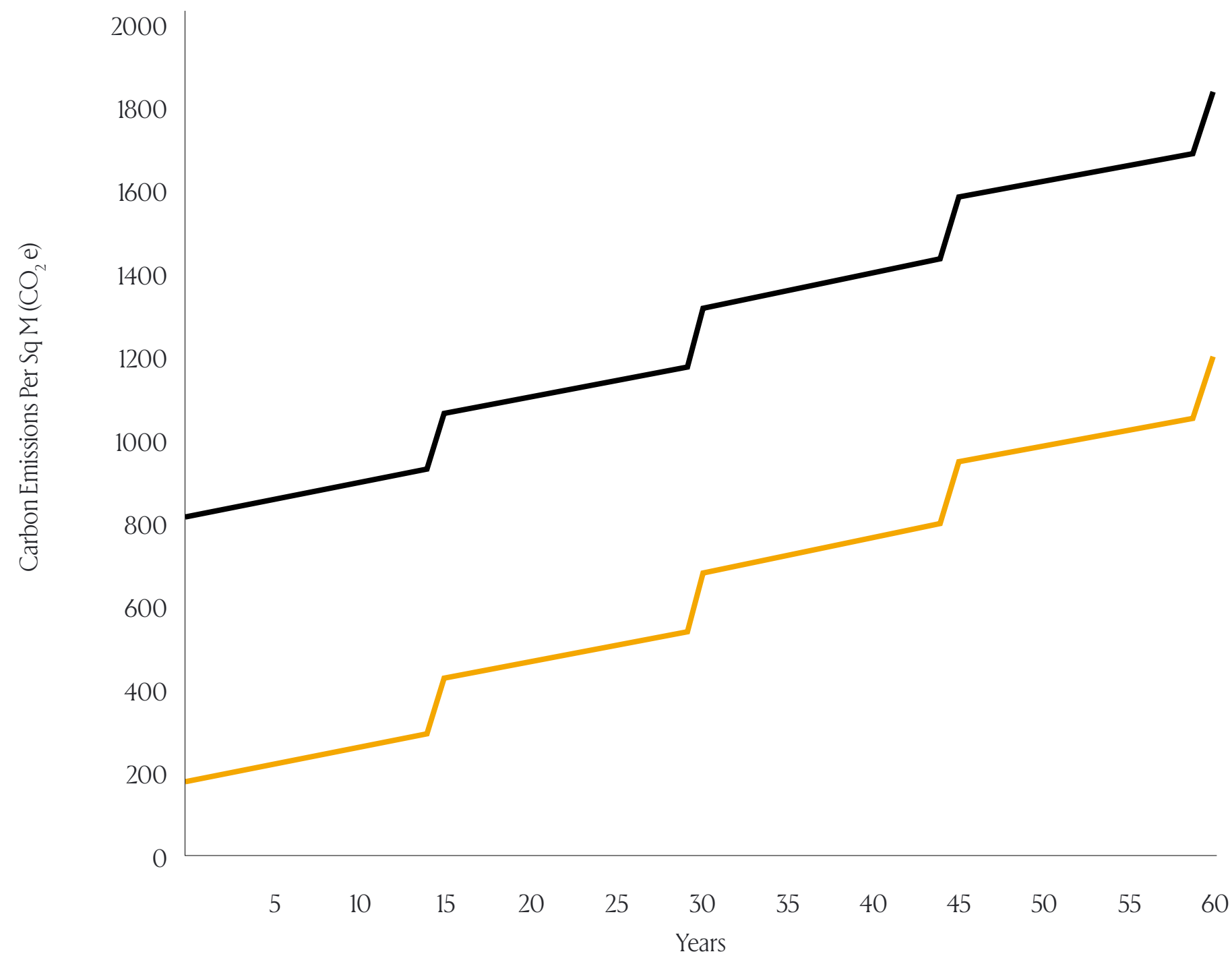
32,694 ton CO<sub>2</sub>e

32,694 hot air balloons of emitted CO<sub>2</sub>

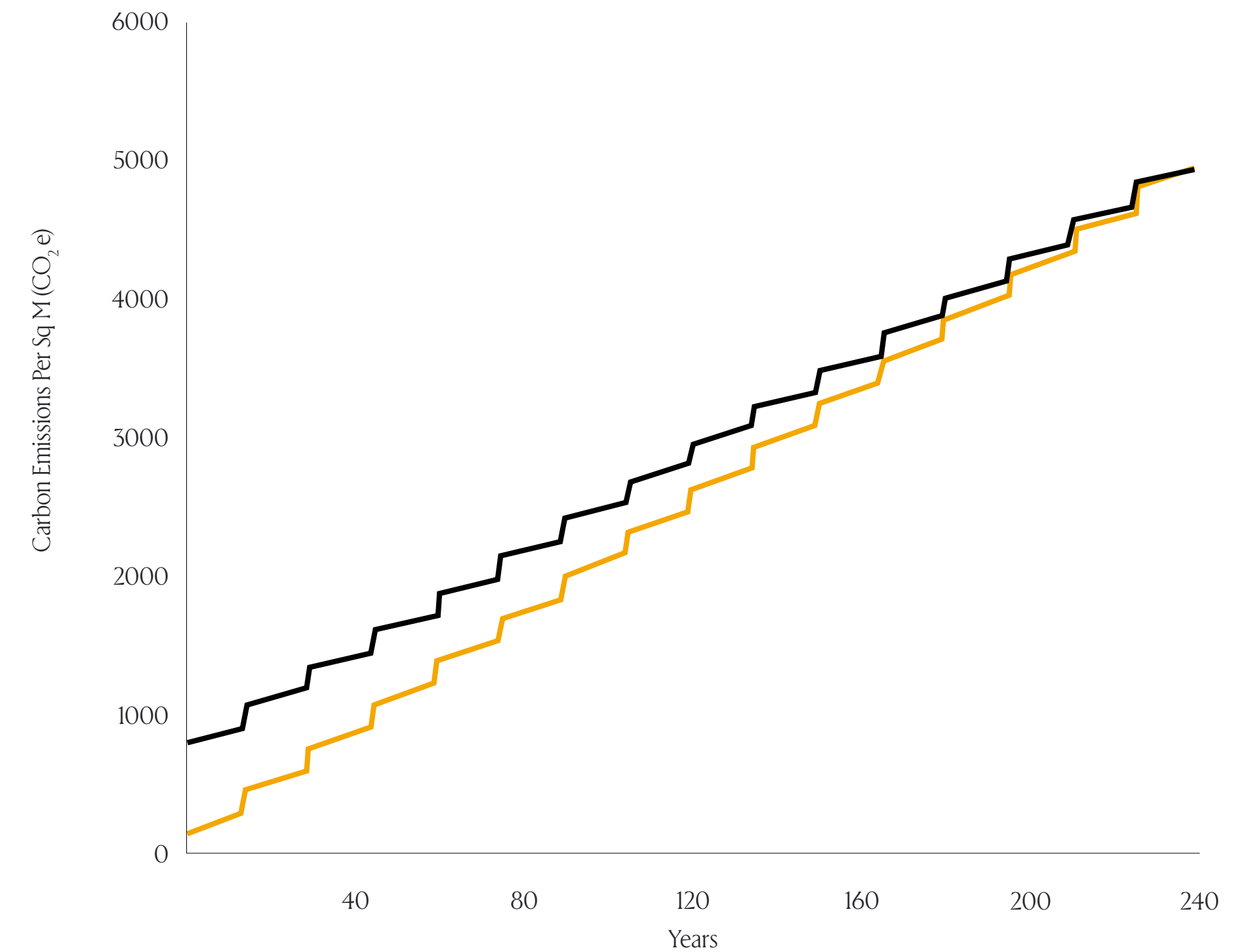
ANALYSIS

# It would take 239 years for a new-build to pay back its emissions during construction, via its improved energy efficiency

### 60-YEAR LIFECYCLE



### 239-YEAR LIFECYCLE



- New-build
- Refurb

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