Euston Tower

Facade Embodied Carbon Studies

Summary provided for information

18.02.2025

RevB

As part of the design development for the December 2023 submission, studies were undertaken to assess the embodied carbon performance of different facade system types. The analysis indicated that embodied carbon impacts were largely comparable across systems, contingent on material specifications.

The unitised curtain wall system was selected as it is lightweight and best balances performance and buildability. While pre-cast and UHPC systems were considered, they would have required external face sealing, increasing the need for work at height. The unitised system can be installed directly from the floorplate and therefore mitigates these risks.

Further studies were carried out to refine the materiality of the unitised system, to optimise embodied carbon. The principles and considerations from these studies remain applicable to the revised submission.

As the design develops, additional efforts will be made to further optimise material use, including reducing aluminium quantities and incorporating high-recycled-content aluminium, among other strategies, to improve the embodied carbon performance of the facade.

Sketches and calculations shown herein are work in progress and indicative only, and not representative of final application facade proposal. The final embodied carbon performance of the facade is as per the WLCA submitted with the revisions to the planning application.

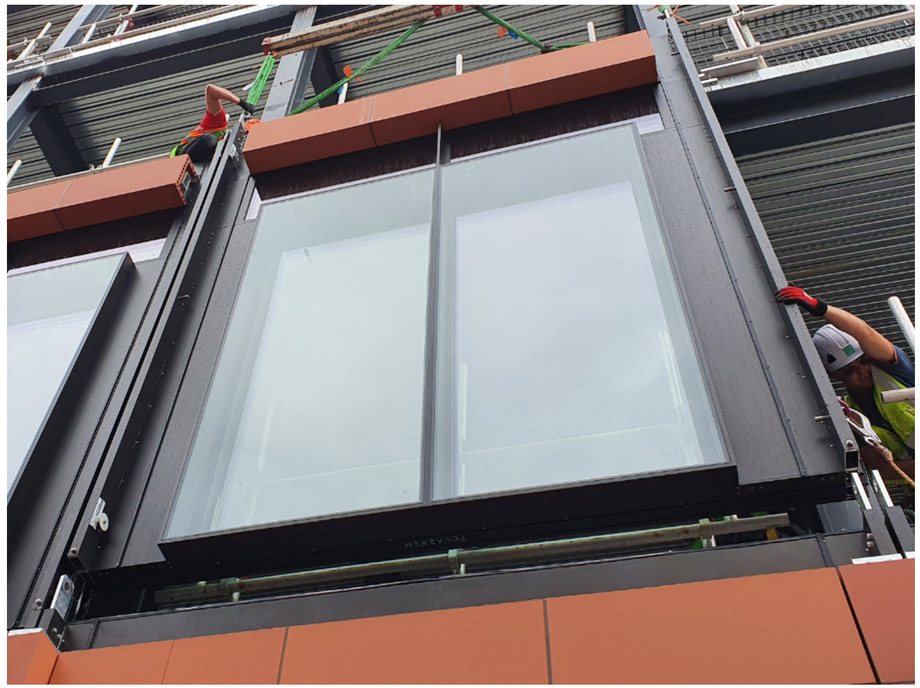
British Land 3XN GXN

Contents

Facade System and Materiality Studies

Facade Buildability and Materiality

Buildability Options Considered



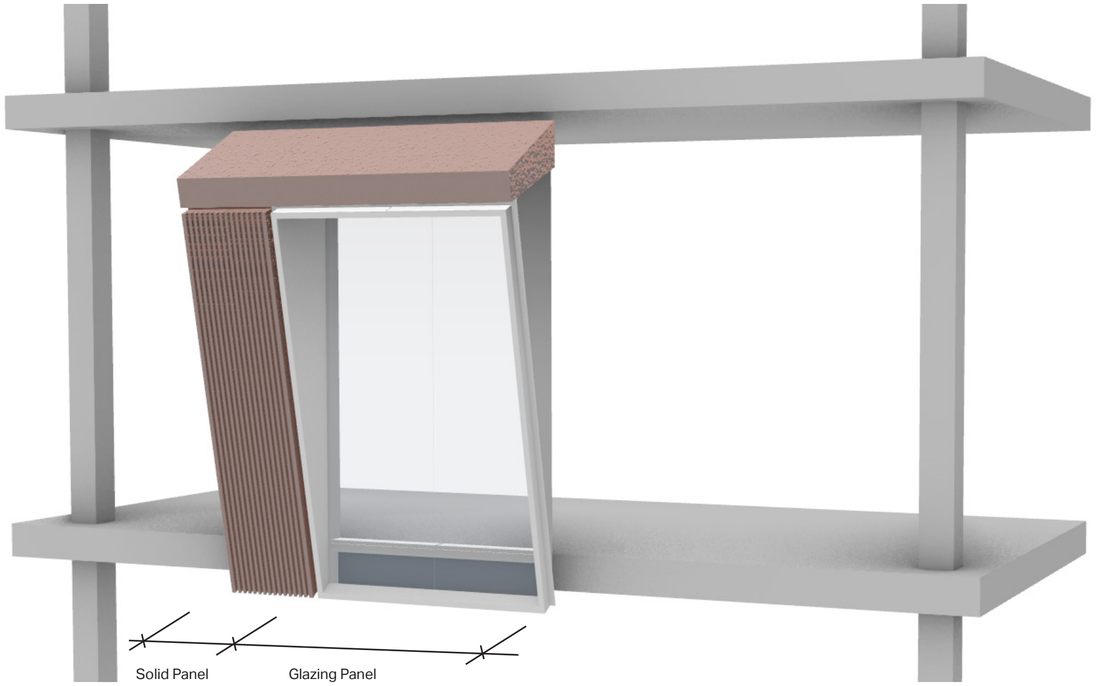
Unitised Curtain Wall

Precast Concrete Panel

Ultra High Performance Concrete (UHPC) Panel

Facade Buildability and Materiality

Panel Options



Unitised Curtain Wall

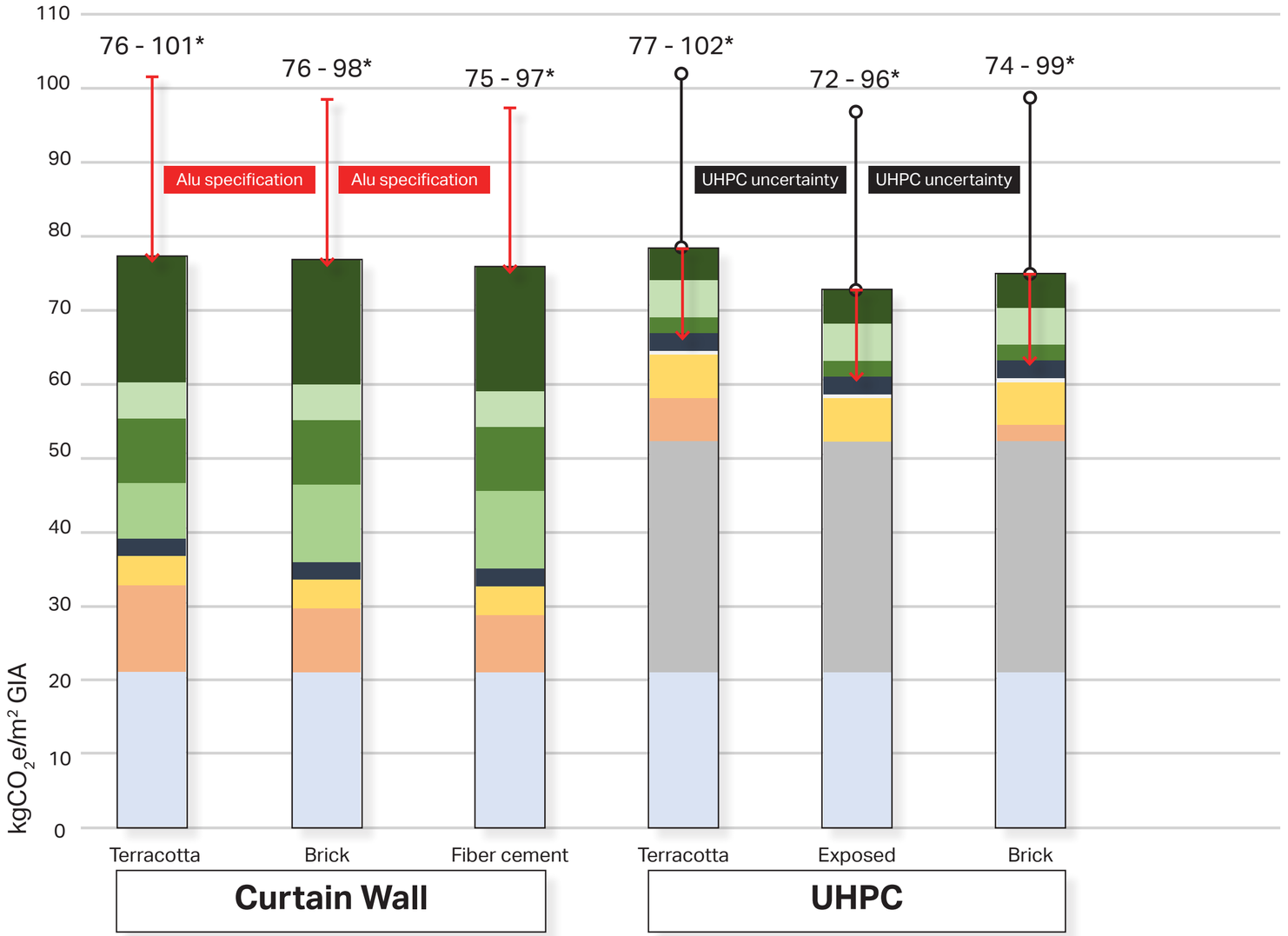
Ultra High Performance Concrete (UHPC) Panel
and Precast Concrete Panel

Precast Concrete Panel discounted due to weight on foundations.

Facade panel design work in progress and indicative only. Not representative of final application facade proposal.

Facade Buildability and Materiality

Embodied Carbon Assessment



*A4-A5 to be included, design calc not to CWCT methodology

- IGU (glazing)
- UHPC
- Cladding
- Insulation
- Drylining
- Galvanised steel sheet
- Aluminium sheet
- Aluminium second. support
- Brackets
- Aluminium profile

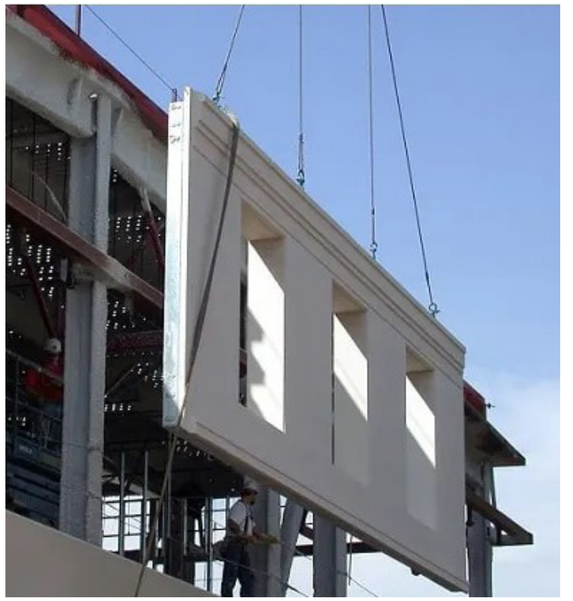
Facade Form Factor assumption:

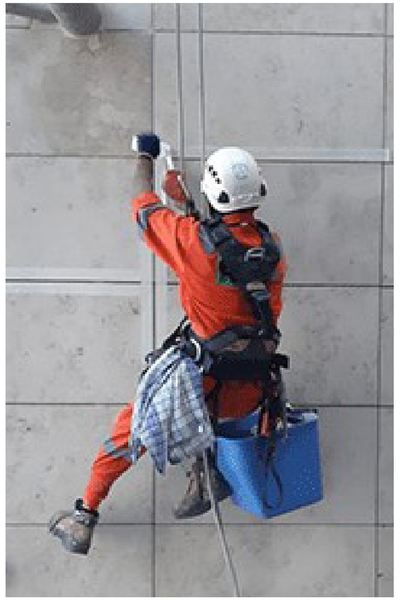
0.35

Facade panel design work in progress and indicative only. Not representative of final application facade proposal.

Facade Buildability and Materiality

Health and Safety



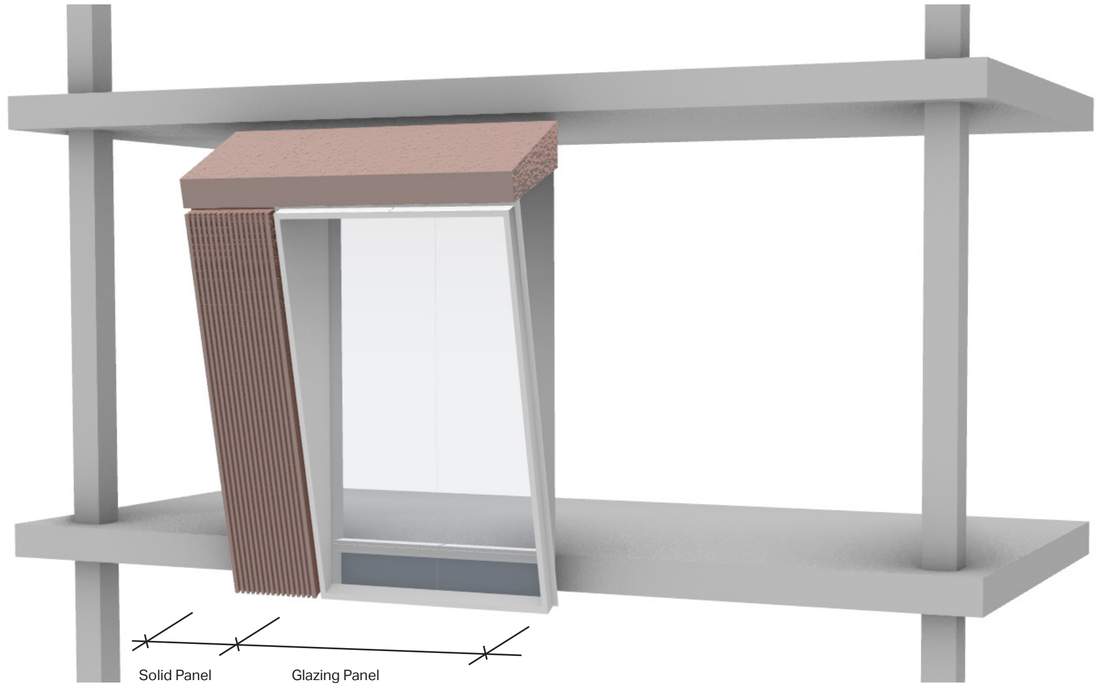


Ultra High Performance Concrete (UHPC) Panels

- The location of externally facing joints that require wet mastic sealing presents a large risk in terms of working externally at height.
- Advice would be to avoid a solution whereby an individual would be required to work their way up and down the building once the facade is installed to apply wet mastic joints to close the UHPC panels.
- Any UHPC solution must allow the panel to be installed with no further interaction afterwards.

Facade Buildability and Materiality

Conclusions



Buildability - Unitised Curtain Wall

- Mitigates health and safety risk from working at height
- Wider facade manufacturer options and market competition
- Textured materials can be chosen from different cladding products
- Standard and quick on-site installation process
- Possibility to lower carbon impact through specification

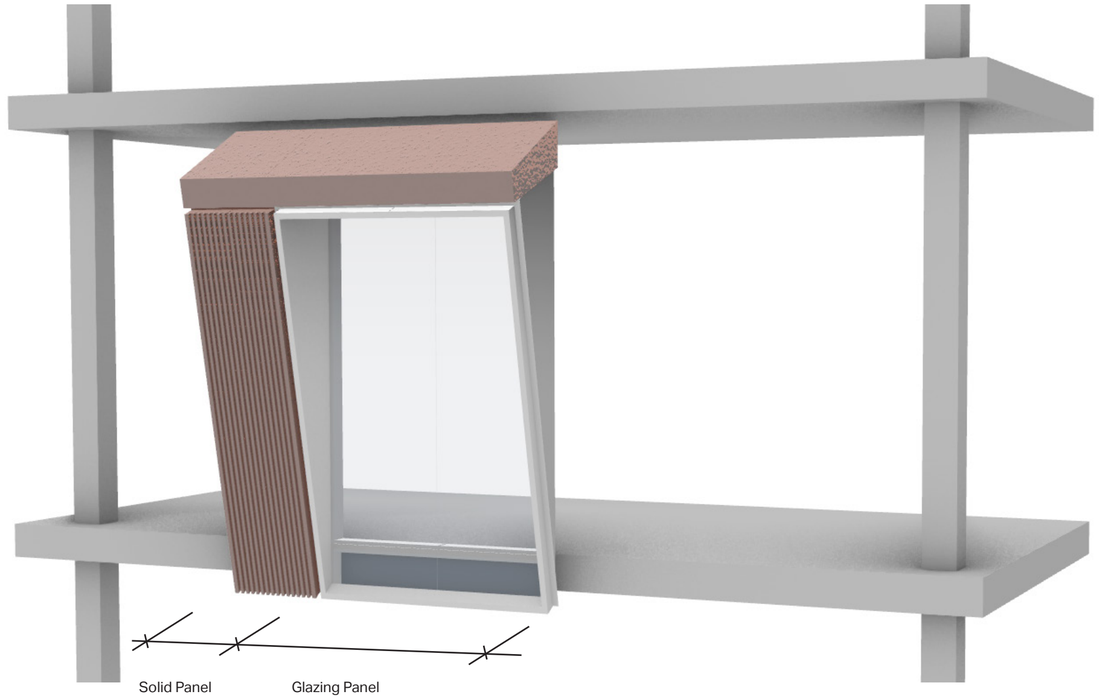
Materiality

- Solid and textured material
- Lowest embodied carbon - Terracotta, bricks, fiber cement

Facade panel design work in progress and indicative only. Not representative of final application facade proposal.

Facade Buildability and Materiality

Summary



Unitised Curtain Wall

- Installation
- Cost
- Weight
- Thermal performance
- Facade zone
- Jointing
- Programme
- Contractors involved
- Storage
- Embodied Carbon

Ultra High Performance Concrete (UHPC) Panel

- Installation
- Cost
- Weight
- Thermal performance
- Facade zone
- Jointing
- Programme
- Contractors involved
- Storage
- Embodied Carbon

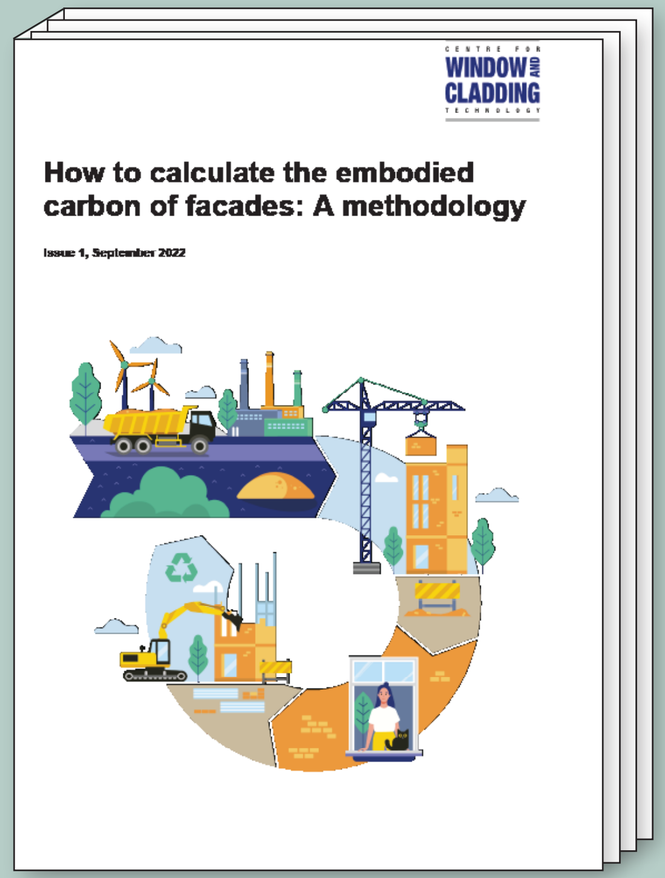
Facade panel design work in progress and indicative only. Not representative of final application facade proposal.

CWCT Facade Methodology

Impacts on Embodied Carbon Assessment

New methodology for calculating facade carbon - accounting for intermediate manufacturing steps

[A2] Transportation to off-site factory	6 $kgCO_2e/m^2$ GIA
[A3] Off-site fabrication emissions	14 $kgCO_2e/m^2$ GIA
[A3] Off-site assembly emissions	3 $kgCO_2e/m^2$ GIA
[A3] Off-site wastage rates	14 $kgCO_2e/m^2$ GIA
Subtotal	*36 $kgCO_2e/m^2$ GIA*



A worked example calculation following the methodology was published in Feb 2023

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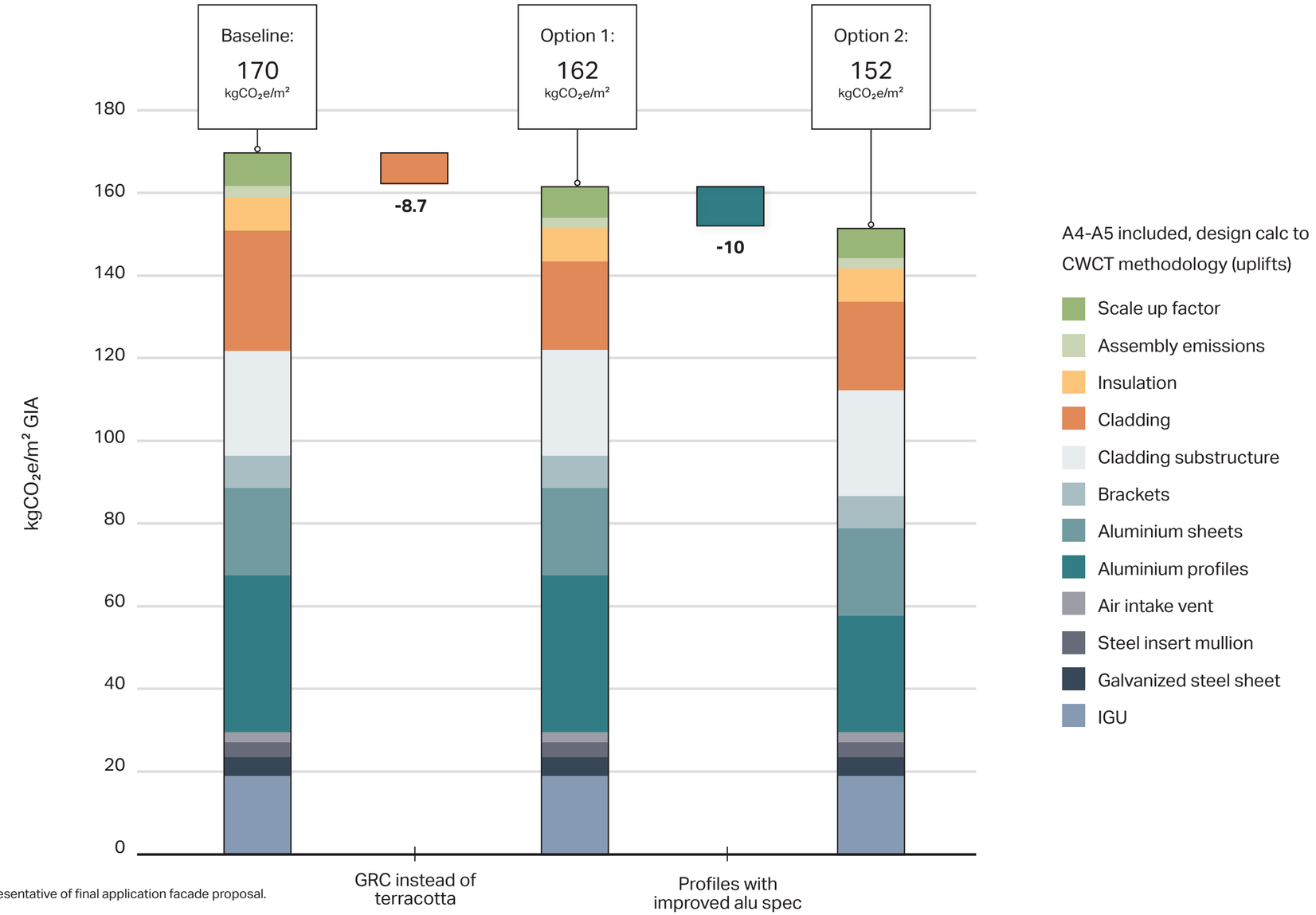
Facade Materiality

Further Materiality Embodied Carbon Assessment



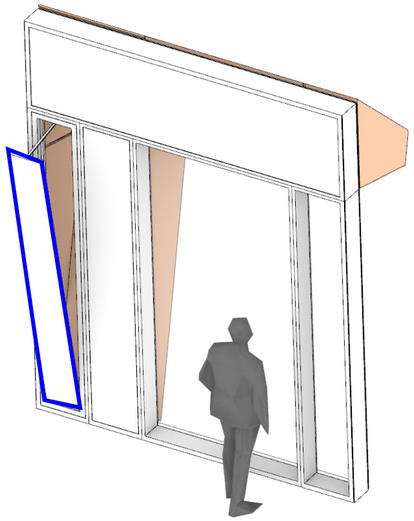
Facade panel design work in progress and indicative only. Not representative of final application facade proposal.

Impact of Openalble Vent Studies

Openable Vent Options

Summary

Stage 02
500mm wide, full height

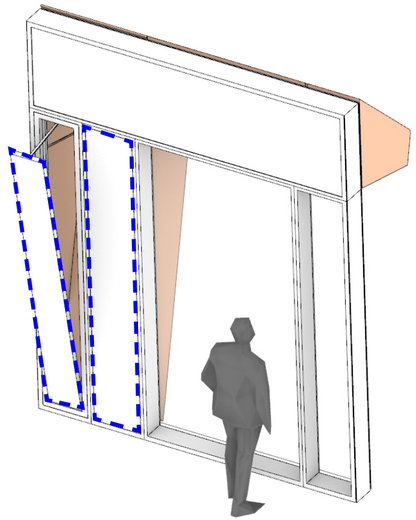


Free area - **0.55 sqm**

U-value - **1.22 W/m²k**

Carbon - **480 kgCO_2e/m²**
(95 kgCO_2e/m² GIA)*

Option A
500mm wide, full height, flip

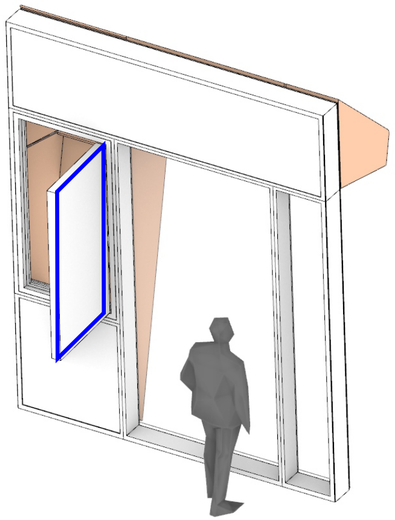


Free area - **0.80 sqm**

U-value - **1.22 W/m²k**

Carbon - **480 kgCO_2e/m²**
(95 kgCO_2e/m² GIA)*

Option B
1000mm wide, 1100mm upstand

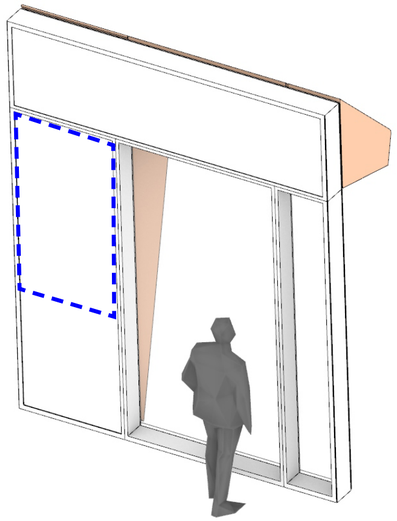


Free area - **0.80 sqm**

U-value - **1.16 W/m²k**

Carbon - **505 kgCO_2e/m²**
(98 kgCO_2e/m² GIA)*

Option C
No Operable + Future flexibility

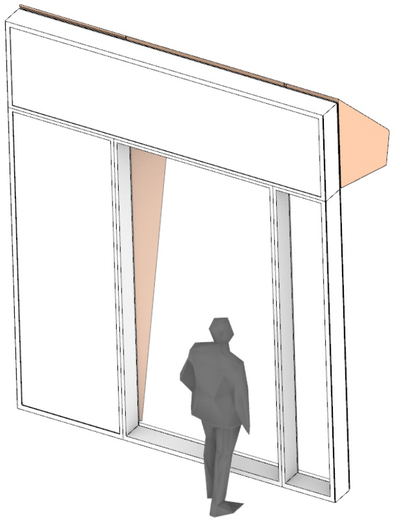


Free area - **0 sqm** *(0.80 sqm)*

U-value - **1.16 W/m²k**

Carbon - **423 kgCO_2e/m²**
+ 107 kgCO_2e/m²
(87 kgCO_2e/m² GIA
+ 13 kgCO_2e/m² GIA)*

Option D
No Operable



Free area - **0 sqm**

U-value - **1.10 W/m²k**

Carbon - **423 kgCO_2e/m²**
(87 kgCO_2e/m² GIA)*

Facade panel design work in progress and indicative only. Not representative of final application facade proposal.

** Upfront carbon (A1-A5) for typical facade only*