MMC Ireland National Conference

'Assessing the Holistic Value of MMC'

How MMC Can Reduce Costs & Carbon through Design Optimisation

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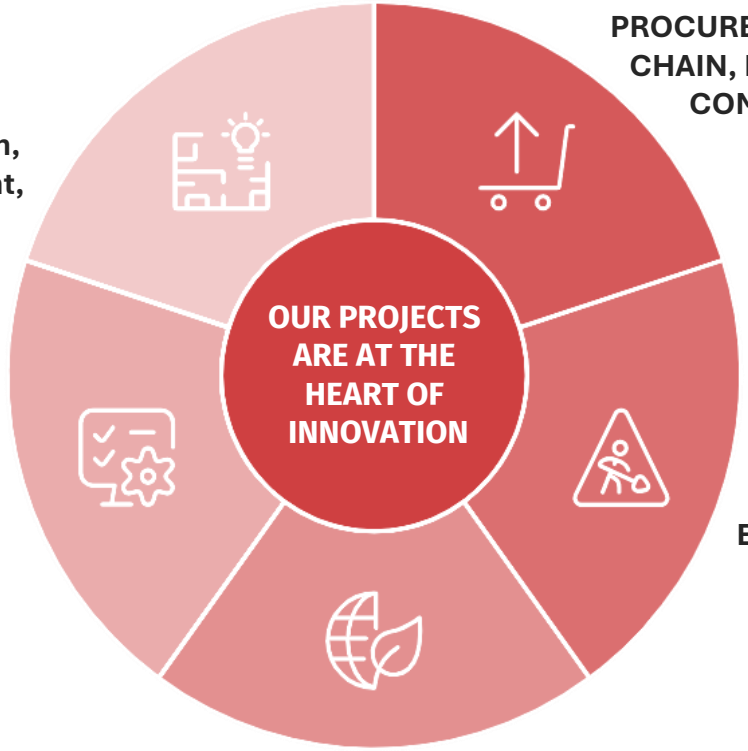
MMC, Digital Transformation and Net Zero at Sisk: A Collaborative, Integrated and Holistic Approach

Scaling up with a 'one team' approach and service offer for MMC Implementation

DESIGN & INNOVATION

(Sustainable Design, Carbon Management, & Design Management)

PROCUREMENT, SUPPLY CHAIN, ESTIMATING & COMMERCIAL



DIGITAL PROJECT DELIVERY

(3D/4D/5D, Geospatial & Information Management)

OPERATIONS, ENGINEERING & BUILDING SERVICES

(Logistics, Structures, Facades & MEP)

SUSTAINABILITY TEAM

20+

MMC Case Studies in 2024

25+

MMC Design Optimisations completed in 2024

35+

Material Optioneering Exercises Completed in 2024

15+

LCAs Completed in 2024

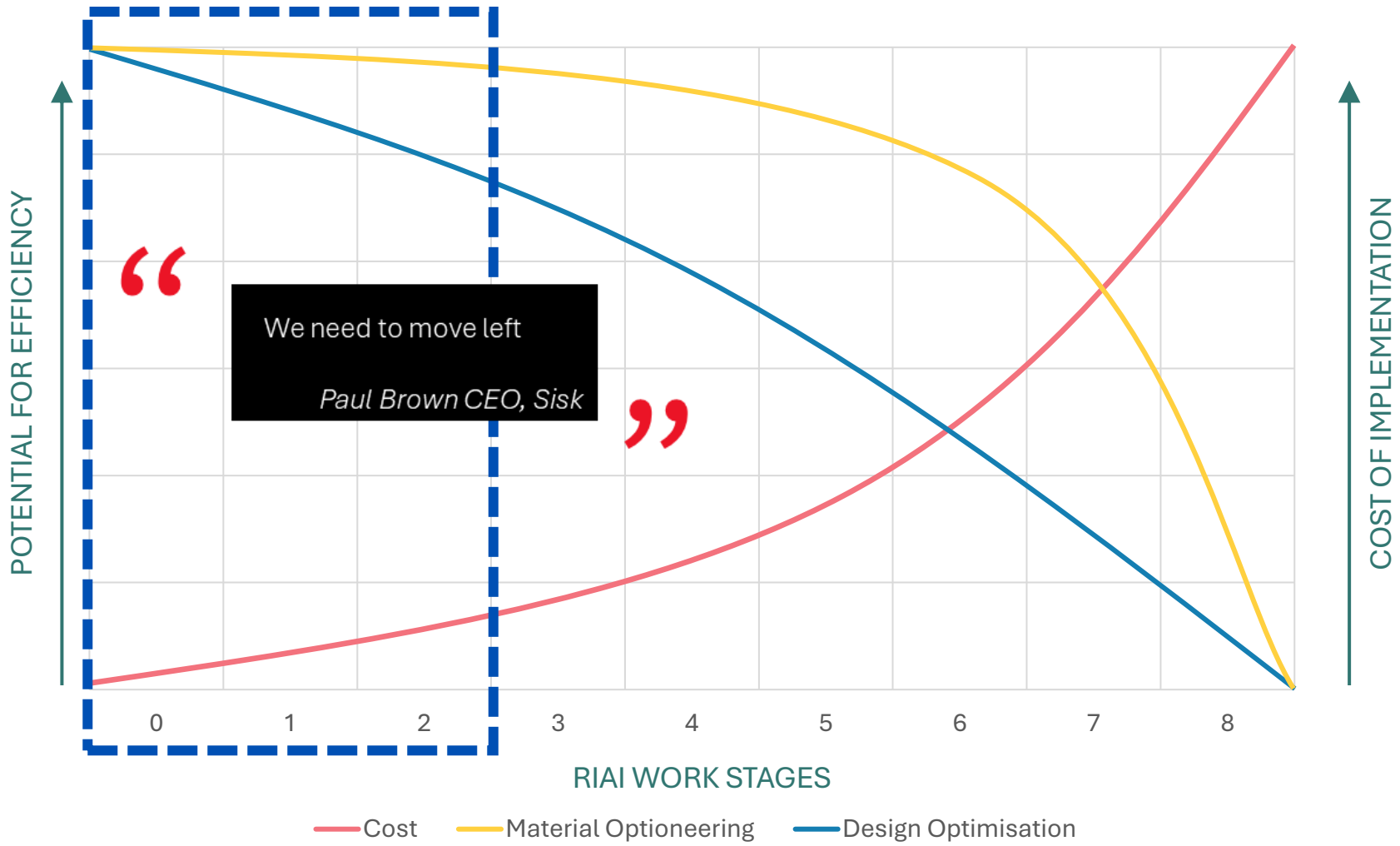
10+

MEP Optimisations Completed in 2024

10+

Ongoing Research Projects in 2025

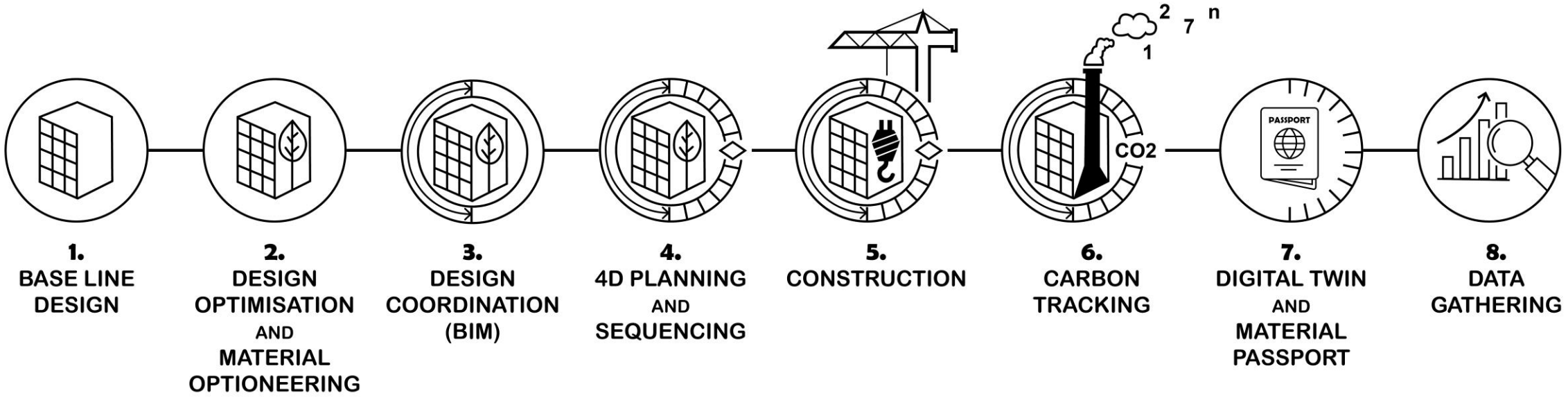
Early Engagement as the Route to Success



RIAI Work Stages:

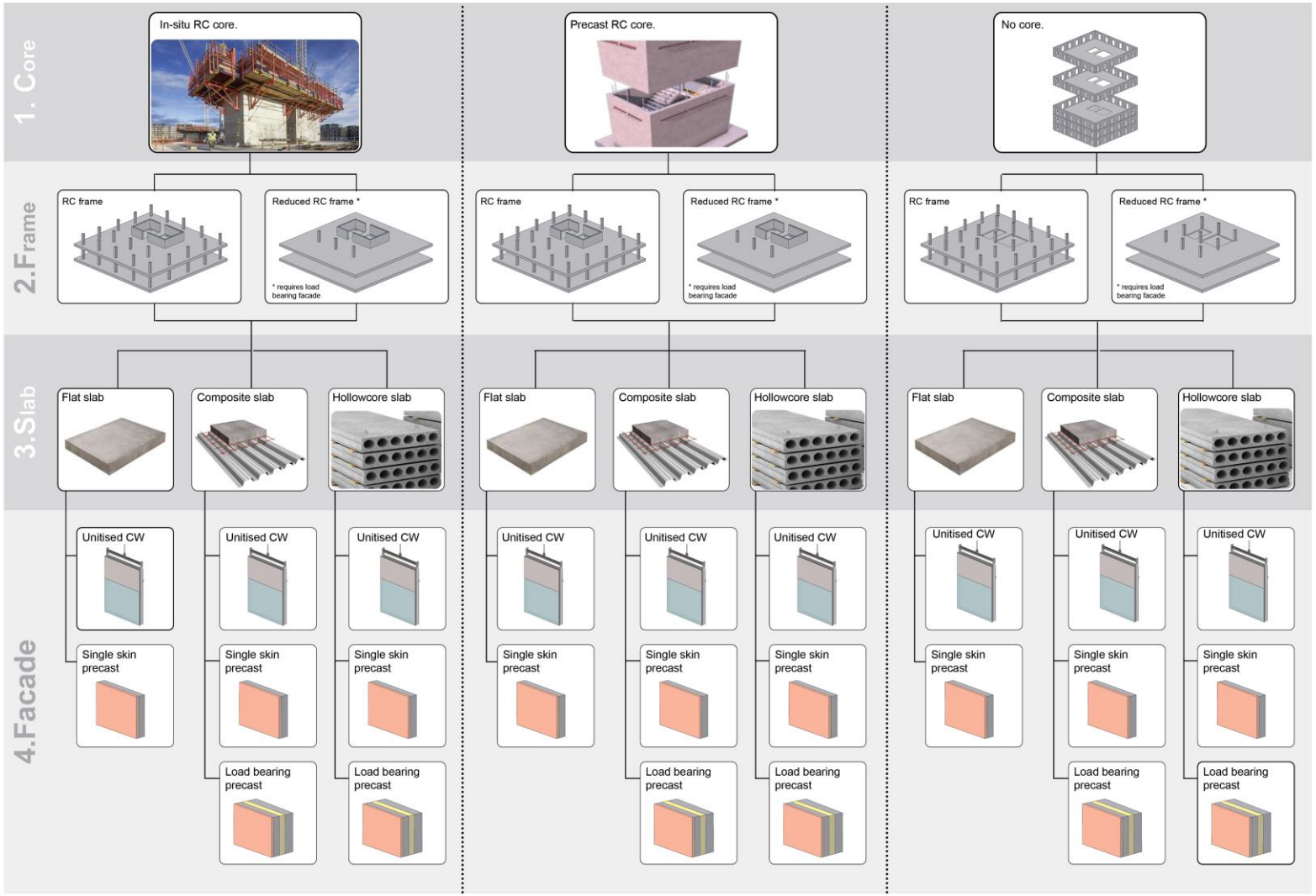
1. Inception & General Services
2. Outline Proposals
3. Scheme Design
4. Detail Design I Building Regulations
5. Production Information
6. Tender Action
7. Project Planning
8. Operations on Site and Completion

Our MMC Process



1. Baseline Design

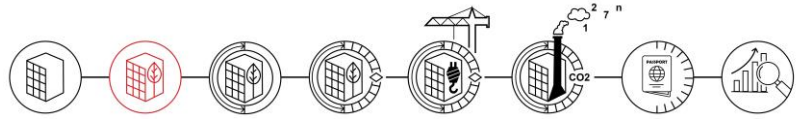
2. Design Optimisation and Material Optioneering

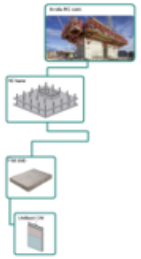
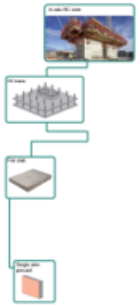
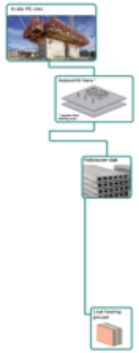
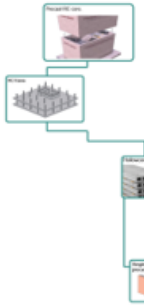
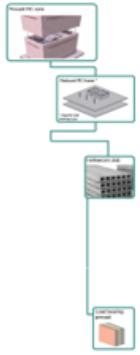


Design Optimisation Matrix

- **Focus** on main elements of the building, **structure and facade**. Higher cost and higher embodied carbon.
- The options with a **higher offsite component** usually have a **lower embodied carbon, are quicker to install** and potentially **more cost effective**.
- Focus on **Buildability** and **Construction Efficiency.**
- We have considered CLT, 3D Volumetric, Steel Frame and different facade types on other projects.

2. Design Optimisation and Material Optioneering

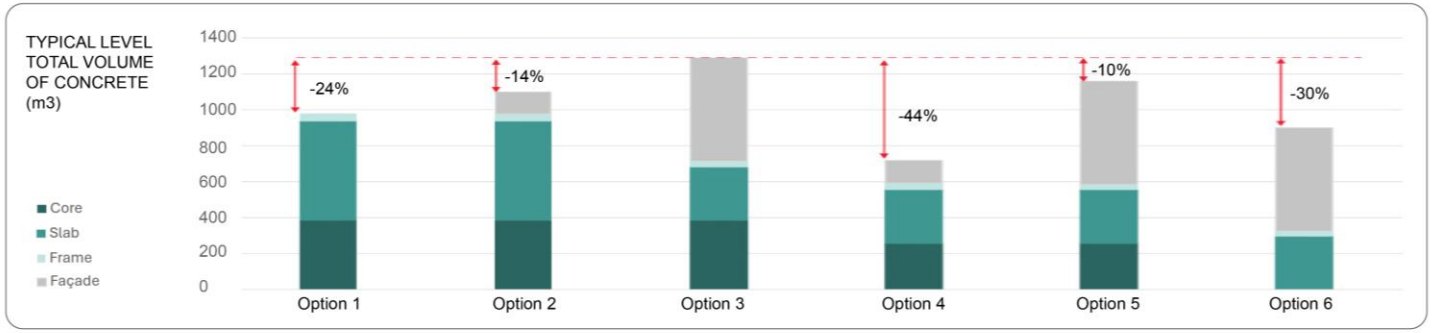


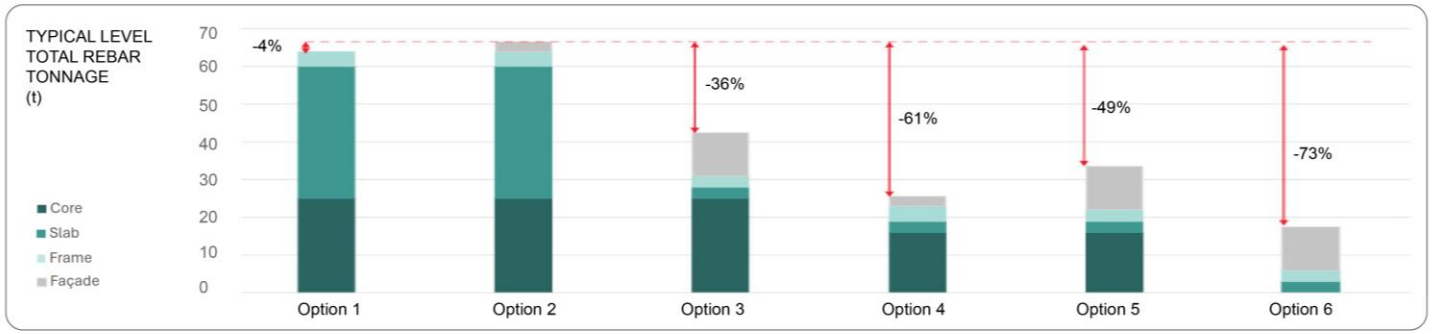
	OPTION 1	OPTION 2	OPTION 3	OPTION 4	OPTION 5	OPTION 6
						
TYPICAL LEVEL TOTAL VOLUME OF CONCRETE	977 kg/m2	1102 kg/m2	1289 kg/m2	719 kg/m2	1160 kg/m2	902 kg/m2
TYPICAL LEVEL TOTAL REBAR TONNAGE	64 kg/m2	66.5 kg/m2	42.5 kg/m2	25.5 kg/m2	33.5 kg/m2	17.5 kg/m2
TYPICAL LEVEL TOTAL EMBODIED CARBON	142 tCO2e or 267kgCO2e/m2	141 tCO2e or 265kgCO2e/m2	111tCO2e or 211kgCO2e/m2	91 tCO2e or 170kgCO2e/m2	92 tCO2e or 173kgCO2e/m2	85 tCO2e or 158kgCO2e/m2
BUILDABILITY	Tried and tested.	Tried and tested.	Emerging system.	Tried and tested.	Emerging system.	Emerging system.

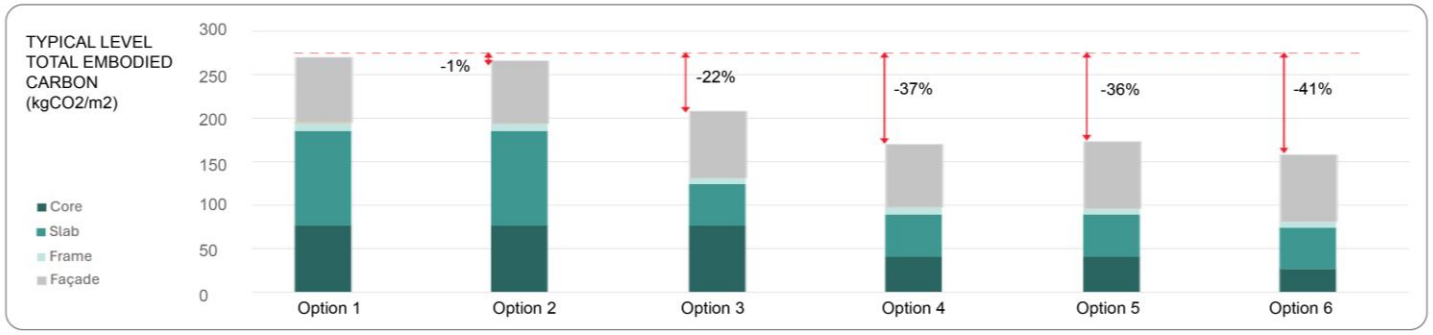
Optioneering analysis

- Different **options** are **analysed in detail** to quantify material usage for each option. In this case, volume of concrete and steel tonnage.
- The **options** are discussed with our operations teams to **assess buildability, cost and programme.**
- Offsite alternatives are more integrated in some geographies than in others. **Some options** are **feasible in one region might but not be feasible in another**.

2. Design Optimisation and Material Optioneering



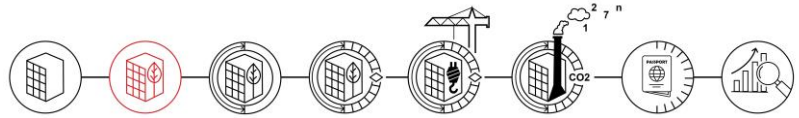




Data Analysis

- **MMC alternatives** are usually linked to **less material usage** and therefore **lower carbon**. Those reductions are usually linked to cost and programme savings.
- **Data** is **communicated** in a **clear** and thoughtful **way**.

2. Design Optimisation and Material Optioneering



Impact Reduction Measure	Baseline	Impact Reduction Measure	% Reduction over Baseline design (A1-A5)	Cost Impact (€)	Schedule Reduction (Days)
M1: Addition of GGBS concrete	C30/37, 0% GGBS	C30/37, 30% GGBS	1.21%	Potential Increase	Potential Increase
M2: Increased recycled content in rebar	70% recycled content	100% recycled content	3.08%	Potential Increase	Neutral
M3: Increased recycled content in structural steel*	70% recycled content	90% recycled content	9.03%	Potential Increase	Neutral
M4: Alternative façade envelope cladding	Traditional system	Unitised facade	3.21%	Neutral	Potential saving
M5: Rebar Offsite Manufacturing	Cut & bend rebar	Faster Fix	1.26%	Potential Increase	Potential saving
M6: Alternative roof structure*	Steel frame. I-sections	Optimised truss	8.08%	Potential Saving	Potential Saving
M7: Alternative roof buildup	Traditional roof system	Composite panel system	5.05%	Neutral	Potential Saving
Total			**30.92%**		

Summary of Potential Impact Reduction A1-A5

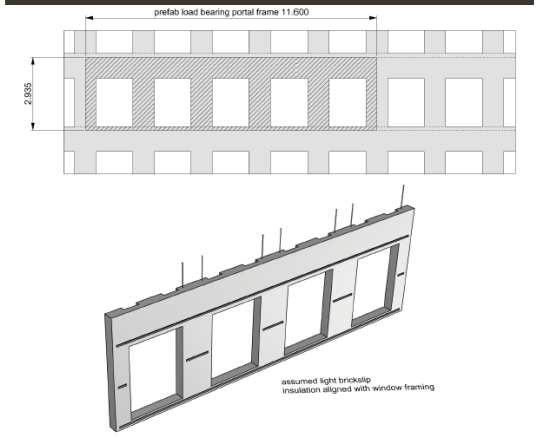
Informed Decision Making

- This **holistic approach** allows our **clients** to make **informed decisions** based on data.
- The **optioneering** process is **summarised** in a table that captures carbon reductions, cost impact and programme reductions.
- **Early engagement** with our teams and our supply chain is critical to be able to make a positive **impact in the carbon, cost and programme.**

2. Design Optimisation and Material Optioneering

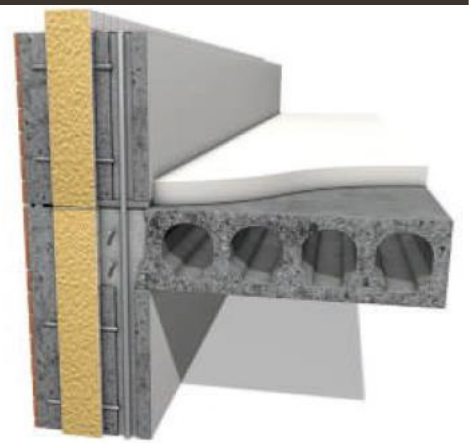
Precast Frame

- Faster construction
- Floor by floor construction including the core
- Single subcontractor Efficiency
- Lower embodied carbon



Hollowcore Slabs

- Supported on façade and core walls
- Lighter slab
- Faster construction
- Up to 40% reduction volume of concrete and up to 70% reduction steel rebar



Post-Tensioned Slabs (PT)

- 60-70% less rebar than flat slab
- Up to 30% thickness reduction compared
- Potential for extra floor to ceiling height

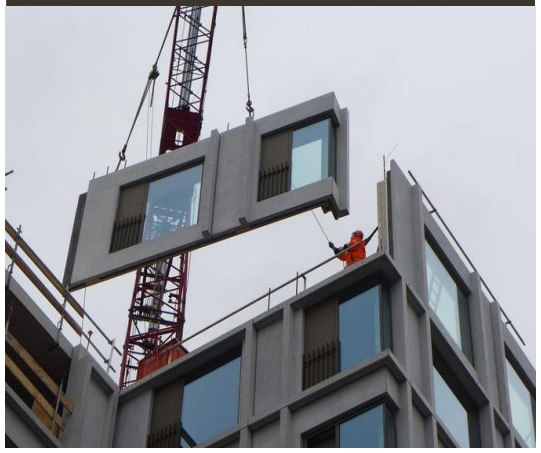
Off-Site Rebar

- Higher Quality
- H&S improvement
- Faster construction time
- Steel Rebar reduction up to 10% in foundations.
- No rebar waste & lower embodied carbon

2. Design Optimisation and Material Optioneering

Precast Load-bearing

- Self-finished but can receive architectural finishes if required
- Quick to install
- Simple interfaces
- High quality
- Lower carbon footprint

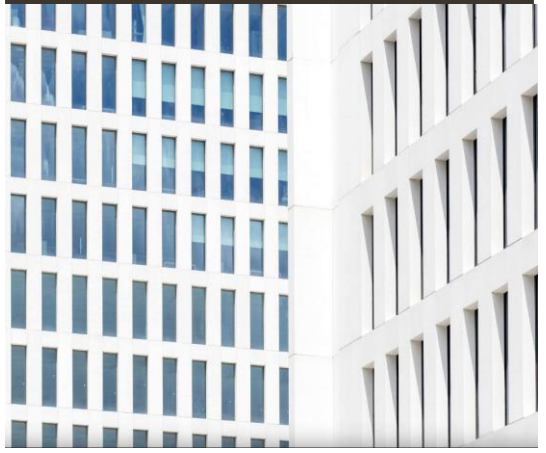


Unitised

- Faster construction
- Higher quality
- Safer to build
- Less wastage
- Less storage on site

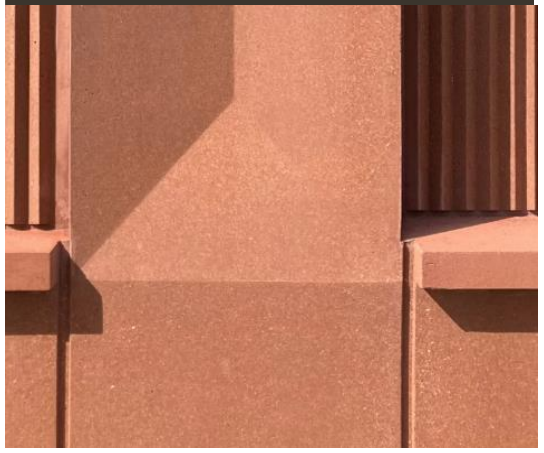
Precast UHPC

- Ultra high-performance concrete (UHPC)
- Extremely light weight, resistant, and durable.
- Thin buildup. Less material = Lower environmental impact.
- Flexible. Can be unitized, mounted on stick frames or backing walls.



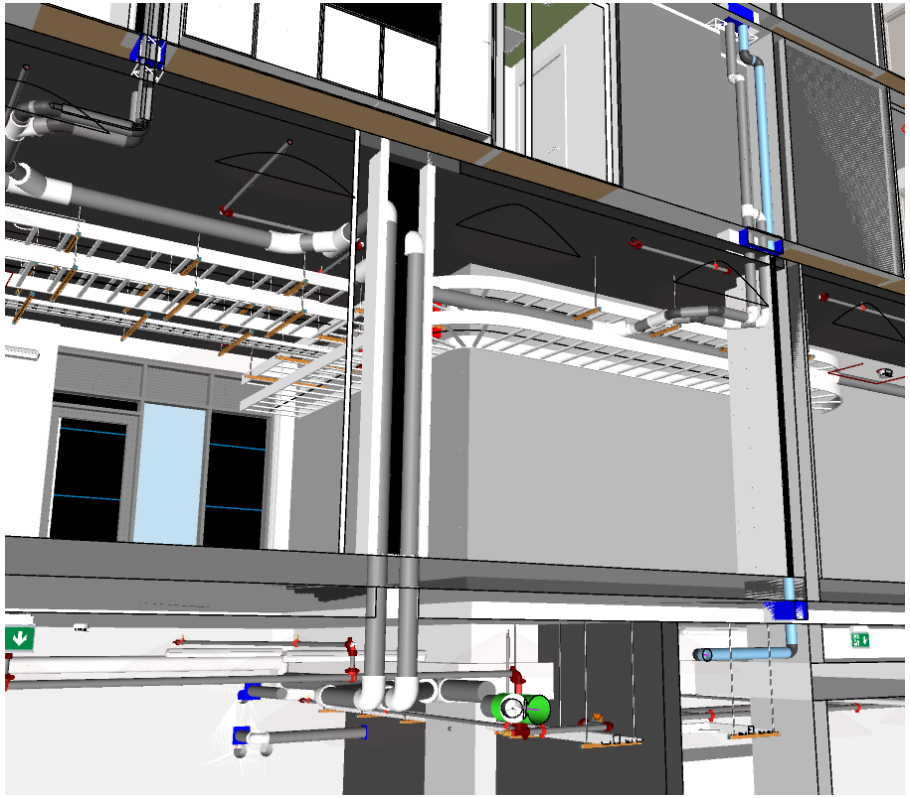
Precast Cladding

- Less carbon than SFS
- Faster
- High quality
- Robustness
- Fire rating
- Low maintenance



3. DfMA, Design Coordination and BIM

Early engagement with the supply chain and design consultants is focussed on design standardisation, manufacture and assembly requirements, compliance, systems integration and certification. Everything is fully coordinated in a 3D federated model.



4. 4D Planning and Sequencing

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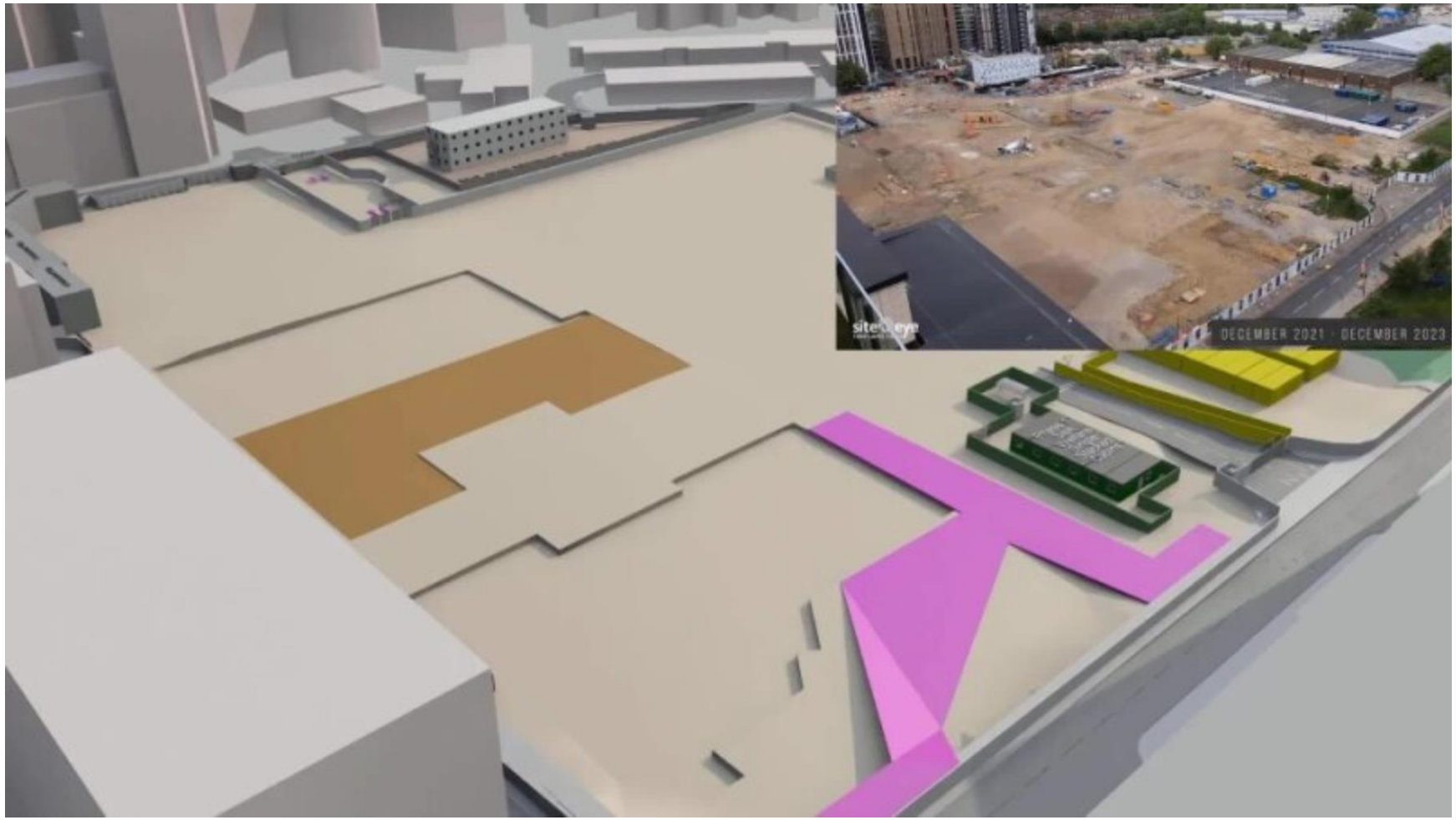
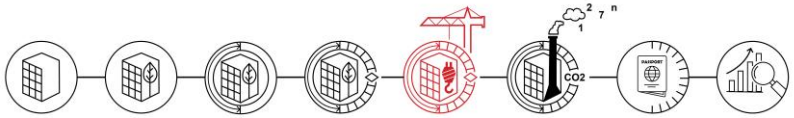


5. Construction – Streamlined Delivery

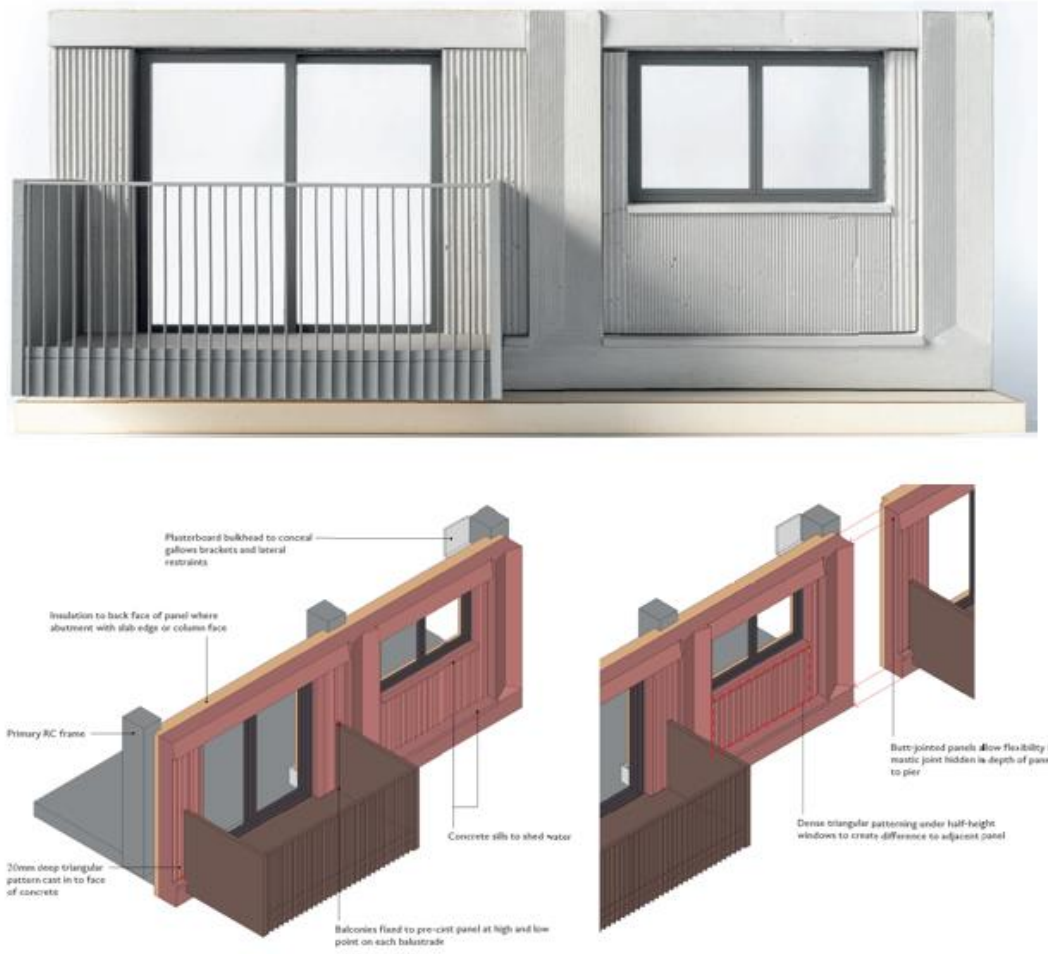


5. Construction – Streamlined Delivery

Wembley Residential Building – A Year in Numbers

- Prefabricated **752** Balconies (Sapphire Balconies)
- Cast **1802** façade panels (Techrete)
- Prefabricated **972** Bathroom Pods
- **93** Prefabricated Riser Modules
- Completed **16km** of Dry Lining (including Off-site Eekowall)

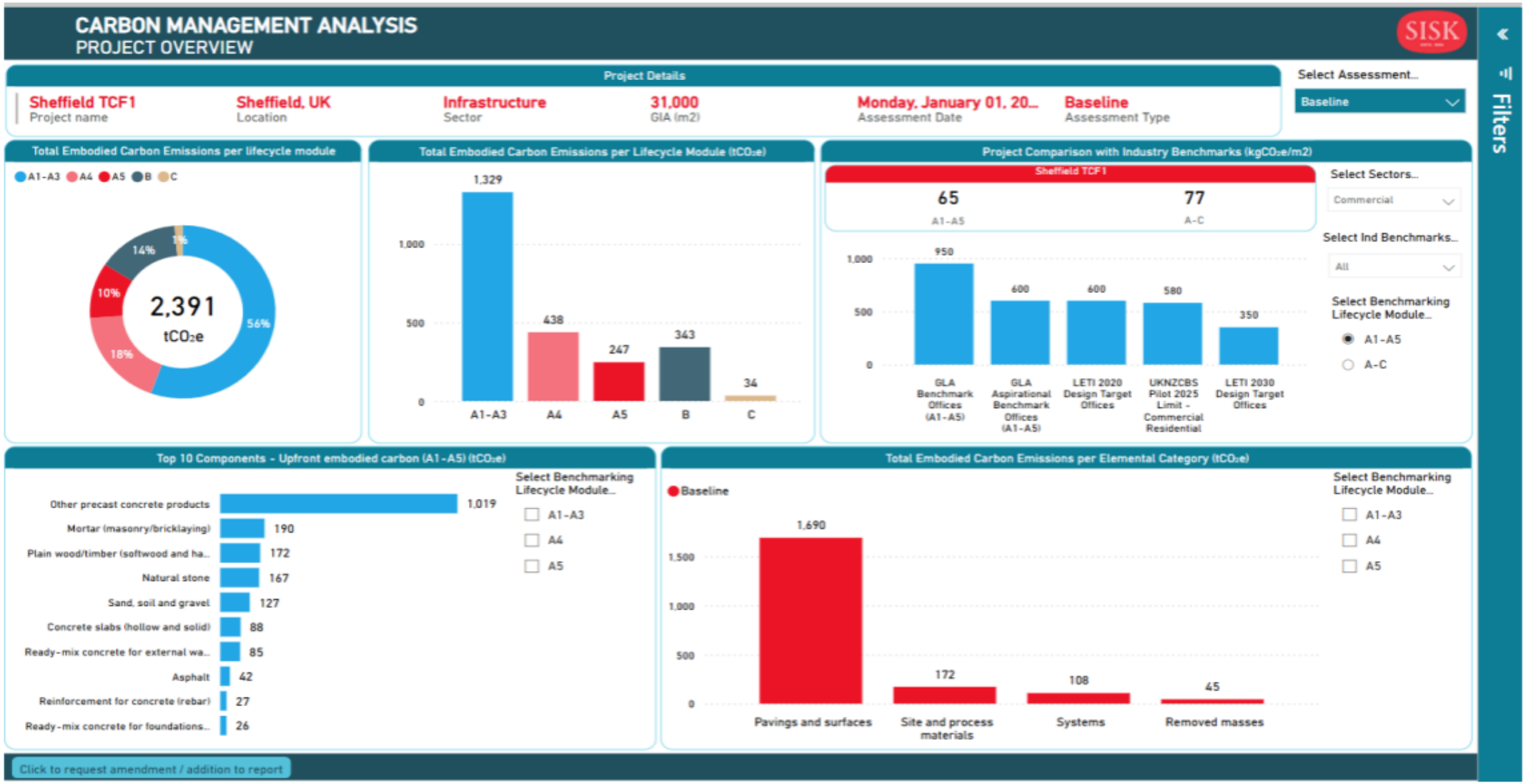
5. Construction – Quality, from Concept to Reality



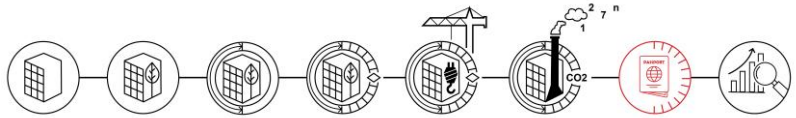
Mock up – Incremental innovation resulting in a refined solution

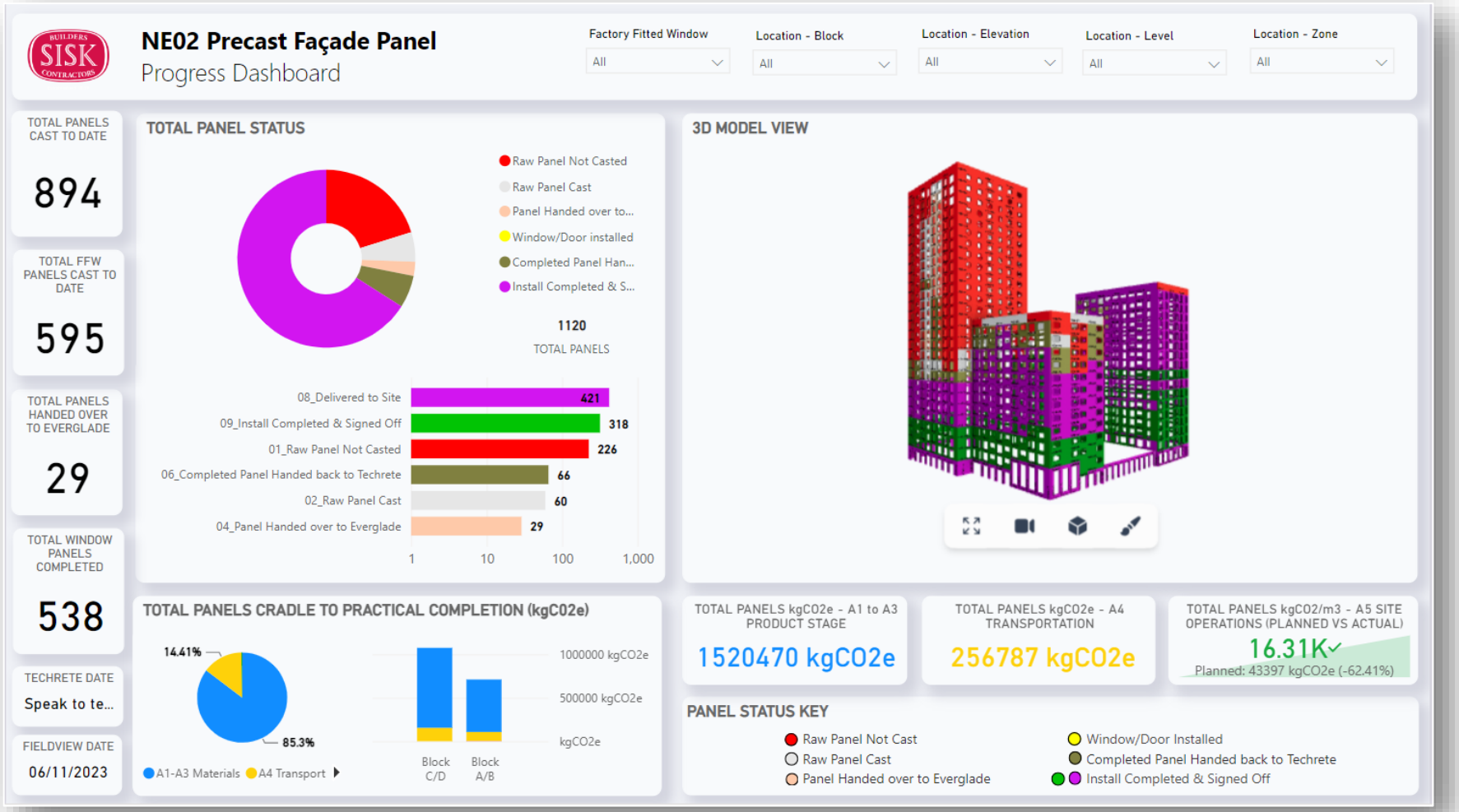
- 10-15% Carbon Reduction compared to other systems
- Speed of installation & Less deliveries to site
- Increased Quality and H&S
- Waste Reduction and material optimisation
- Addresses shortage of skilled labour

6. Carbon Tracking - During Construction



7. Digital Twin and Material Passports





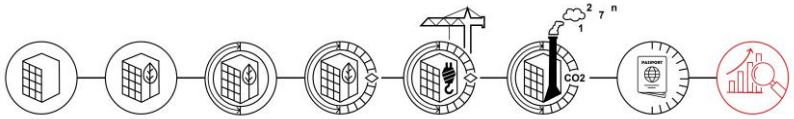
We implement a system for tracking and reporting on off-site manufacturing, using real time tracking of materials from factory to site. A Unique QR code during manufacture allows accurate tracking of each item.

A live digital twin is created with geo-spatial scanning completed during construction to verify as-built information.

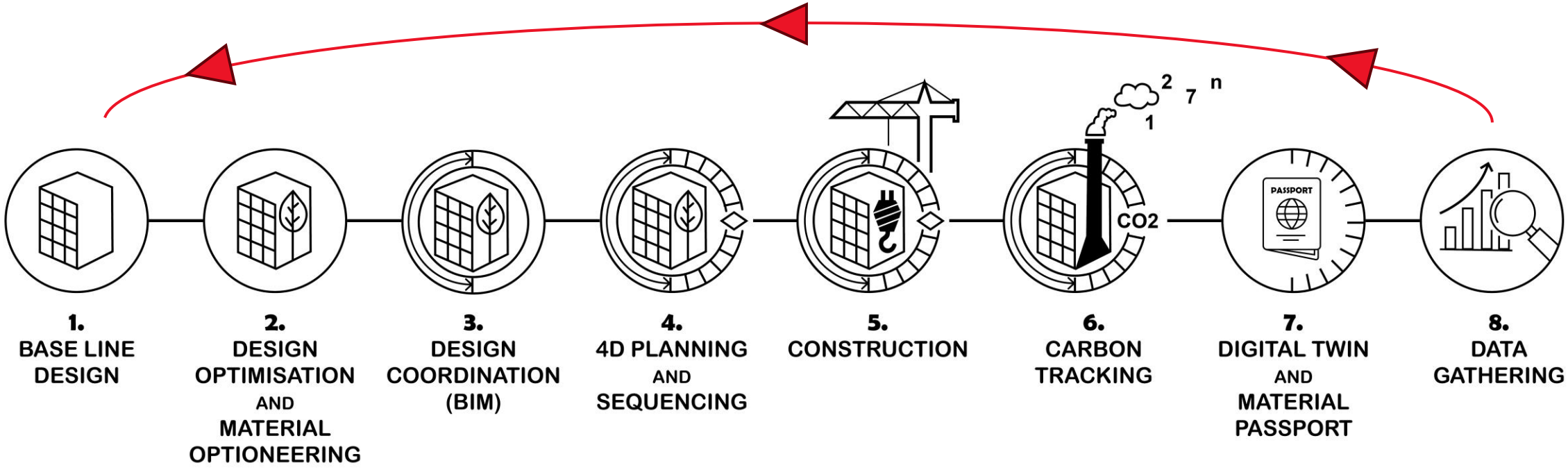
LCA
LONDON CONSTRUCTION AWARDS
WINNER
EXCELLENCE IN BIM / DIGITAL CONSTRUCTION

OFFSITE AWARDS
2023
HIGHLY COMMENDED
BIM/DIGITAL CONSTRUCTION AWARD

8. Data Gathering



By leveraging detailed project assessments and ongoing research, we enhance our datasets, fostering continuous refinement and delivering increasingly effective solutions.



Innovation & Demonstrators – A Pathway to MMC