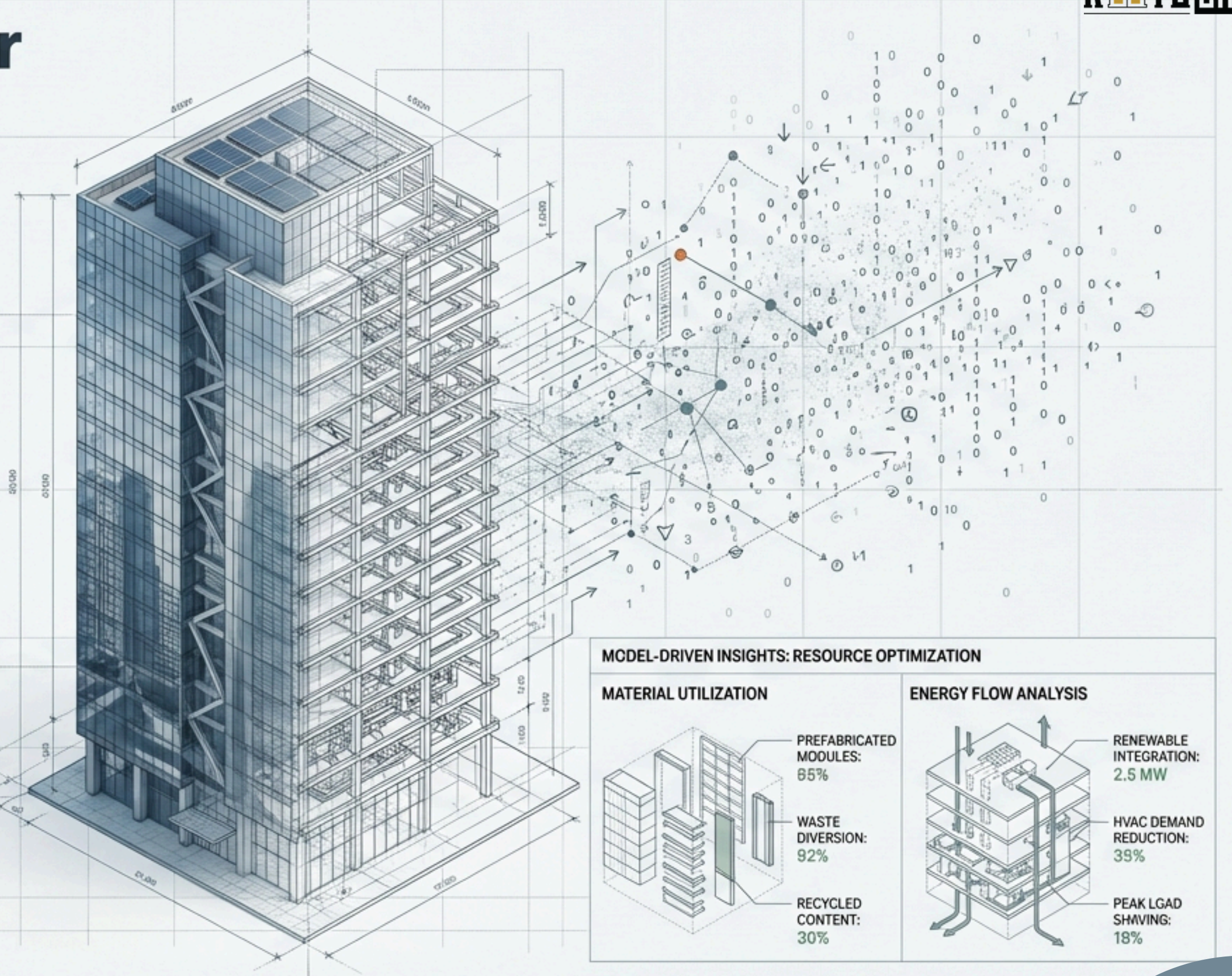


BIM Intelligence for Net-Zero & ESG Compliance

Case Study: Turning Model Intelligence into Measurable Sustainability

SUSTAINABILITY AUDIT: Q4 2023

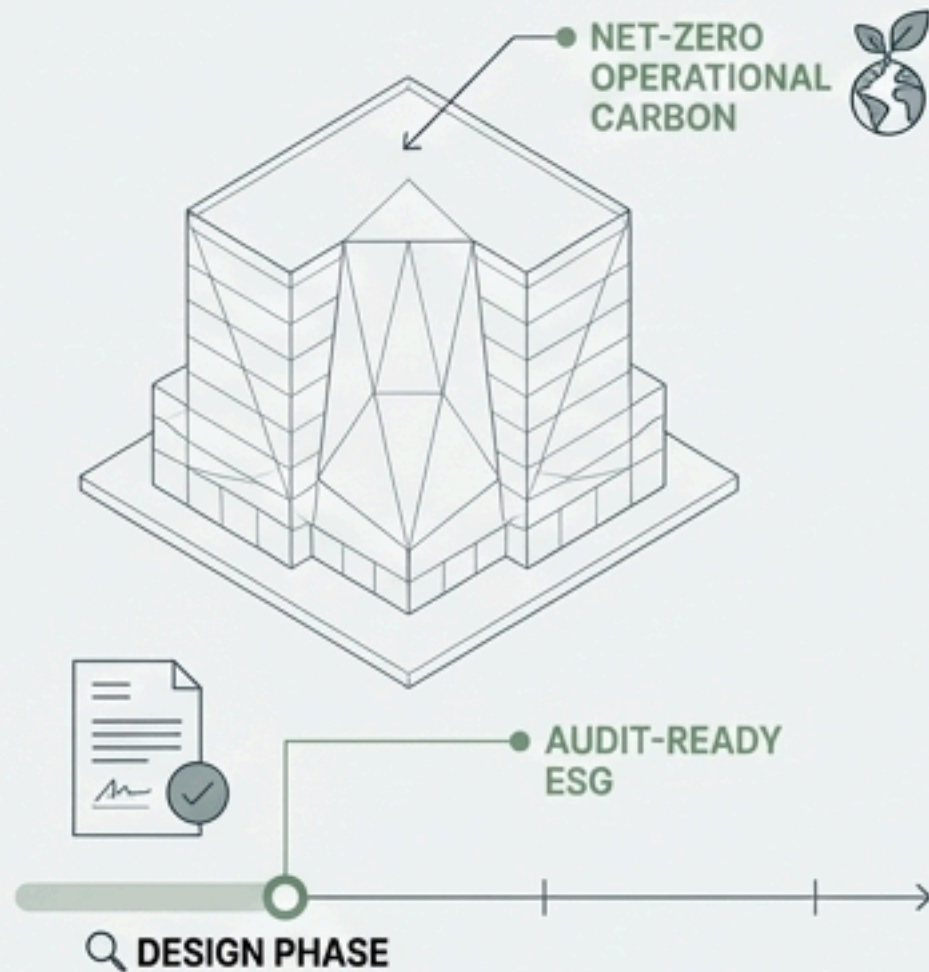
NEUE HAAS GROTESK		INTER	
NET-ZERO PERFORMANCE	100% (Verified)	↑	
ESG COMPLIANCE SCORE	94/100 (AA Rating)	✓	
EMBODIED CARBON REDUCTION	42% (vs. Baseline)	↗	
OPERATIONAL ENERGY EFFICIENCY	55% (Optimal System Integration)	↗	
RISK ASSESSMENT: SUPPLY CHAIN VOLATILITY	⚠ HIGH	IMPACT COST: +15% (\$3.2M EST.)	⚠



Executive Summary: The 1.4 Million Sq. Ft. Net-Zero Challenge

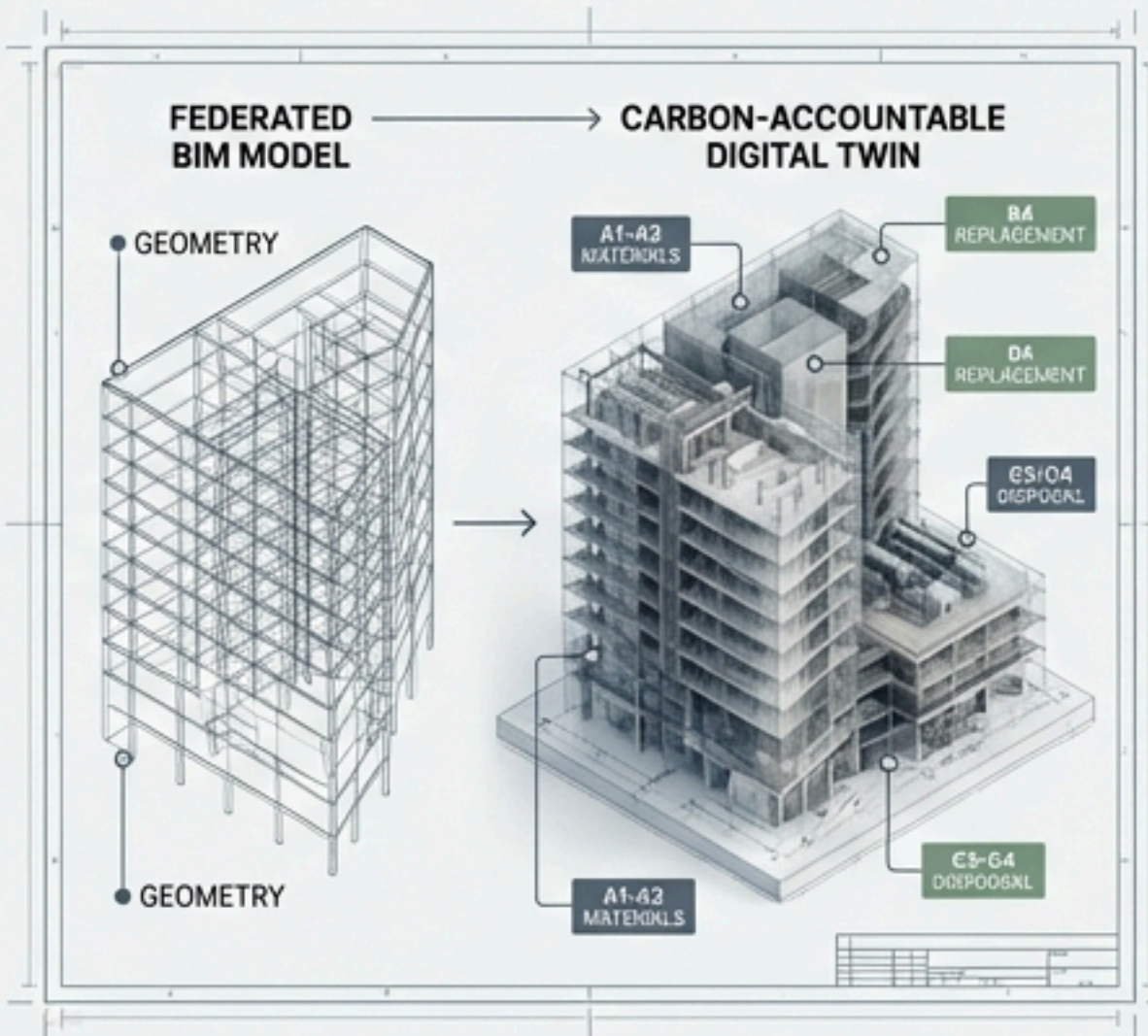
The Mandate

A mixed-use commercial development targeting Net-Zero Operational Carbon. The requirement was absolute accountability: audit-ready ESG reporting and quantifiable embodied carbon during the design phase, not after.

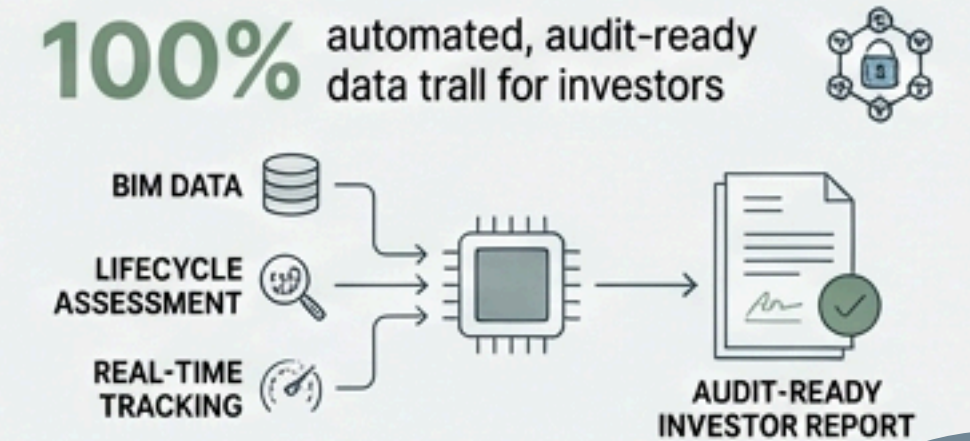
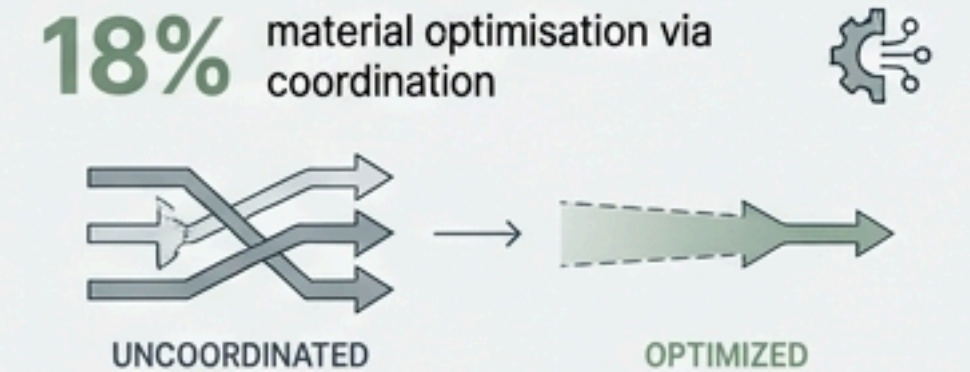


The Approach

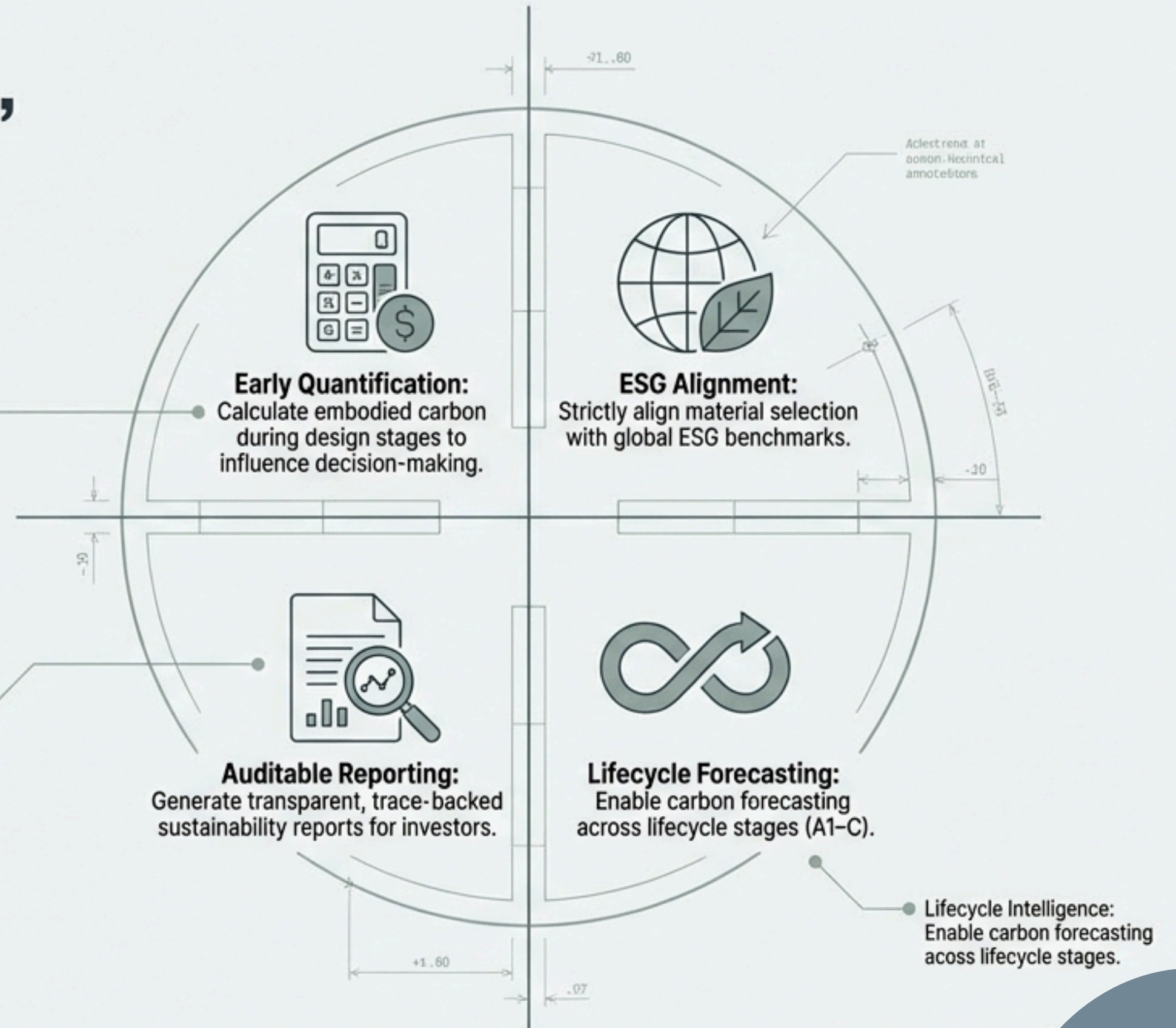
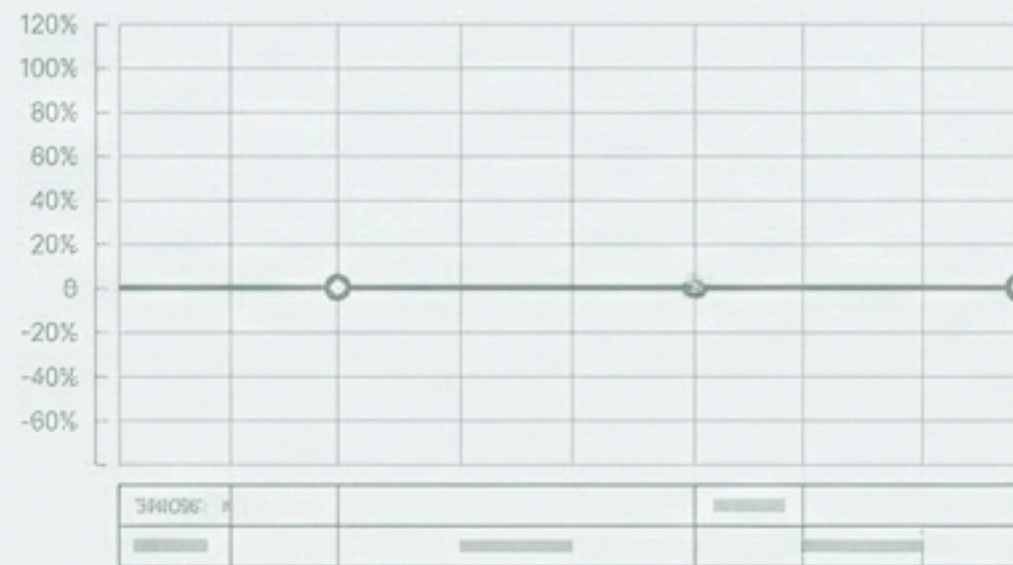
Roots BIM LLC transformed the federated BIM model into a carbon-accountable digital twin. We moved beyond geometry to embed lifecycle intelligence (A1-C modules) directly into the model elements.



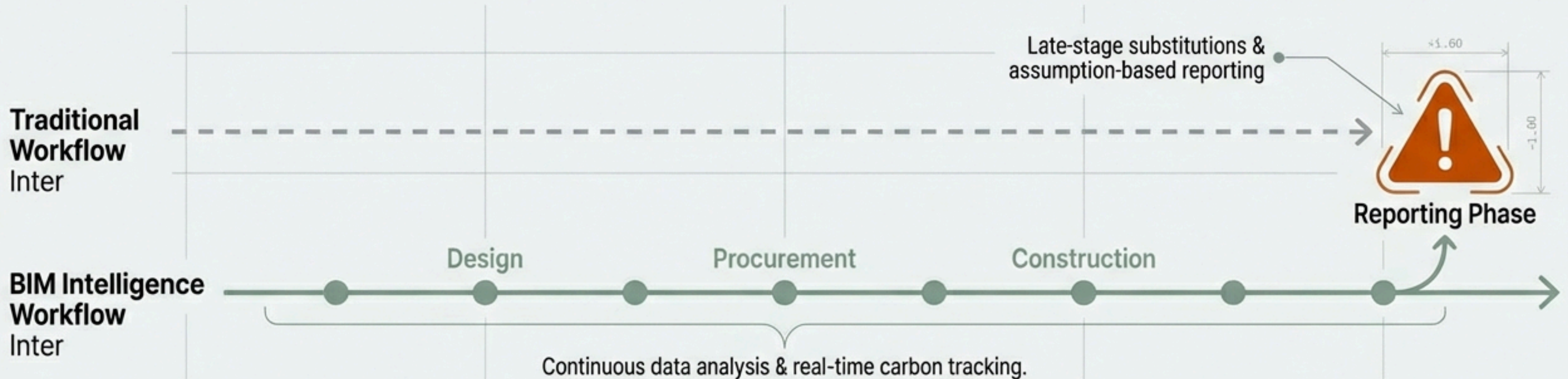
The Outcome



Early Quantification:
Calculate decarbon embodied carbon during design stages to influence decision-making.



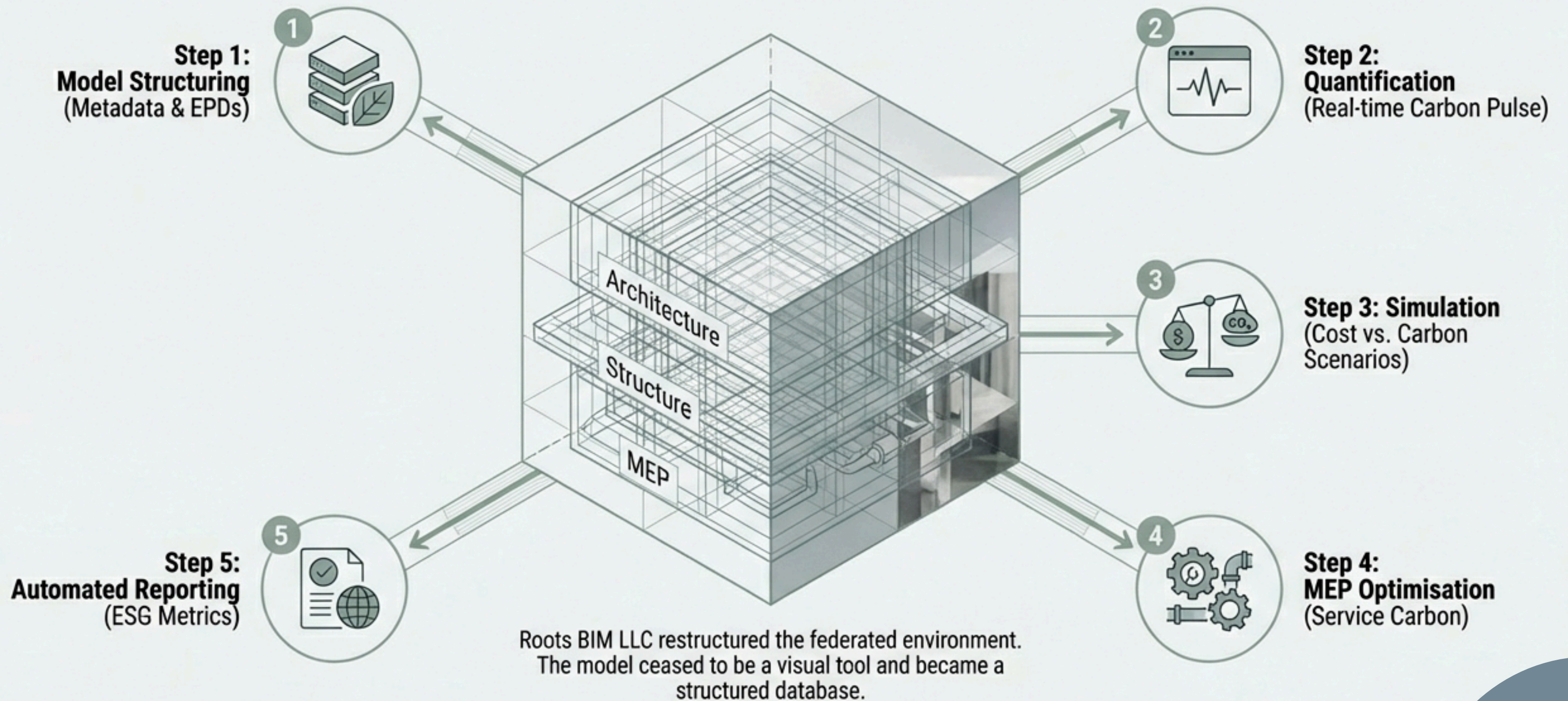
The Failure of Traditional Sustainability Reporting



RISKS

-  **Late-Stage Substitutions:** Costly changes required when materials fail compliance.
-  **The 'Greenwashing' Trap:** Reliance on assumption-based reporting.
-  **Disconnected Documentation:** Manual spreadsheets lack audit trails.
-  **Inaccurate Estimates:** Inability to track carbon impact of design changes.

Strategic Pivot: From Geometry to Carbon Database



Step 1: Structuring the Model for Intelligence



Lifecycle Stage:
A1-A5 (EN 15978)



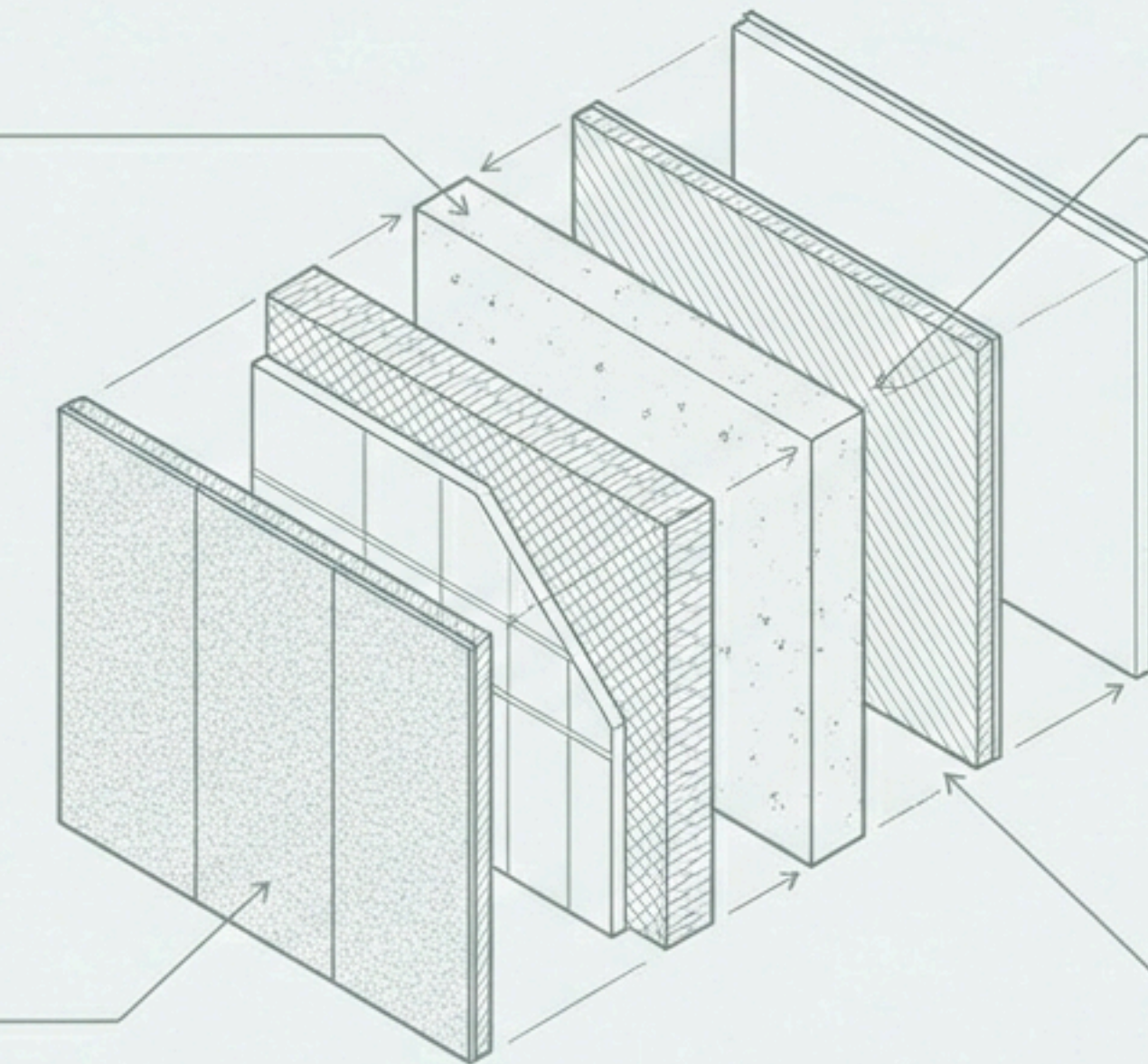
EPD Link:
Manufacturer Specific #8842-X



Parameter:
Recyclability Index: 0.85



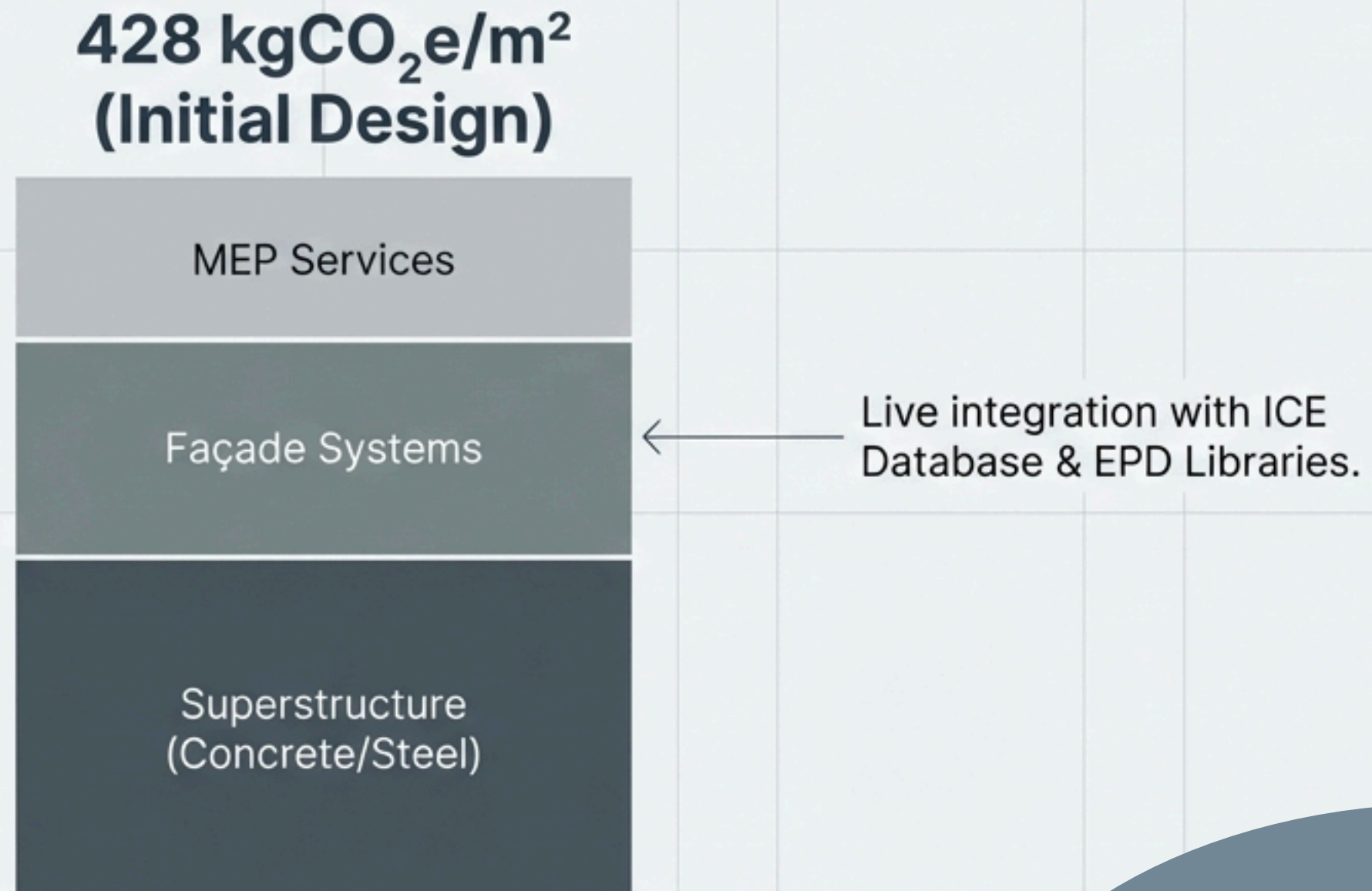
Parameter:
Supply Chain Dist: 45km



Data is only valuable if it is structured. We tagged elements at the material level, validating volume and density to ensure accurate mass calculations. This creates a digital supply chain within the model.

Step 2: Real-Time Embodied Carbon Quantification

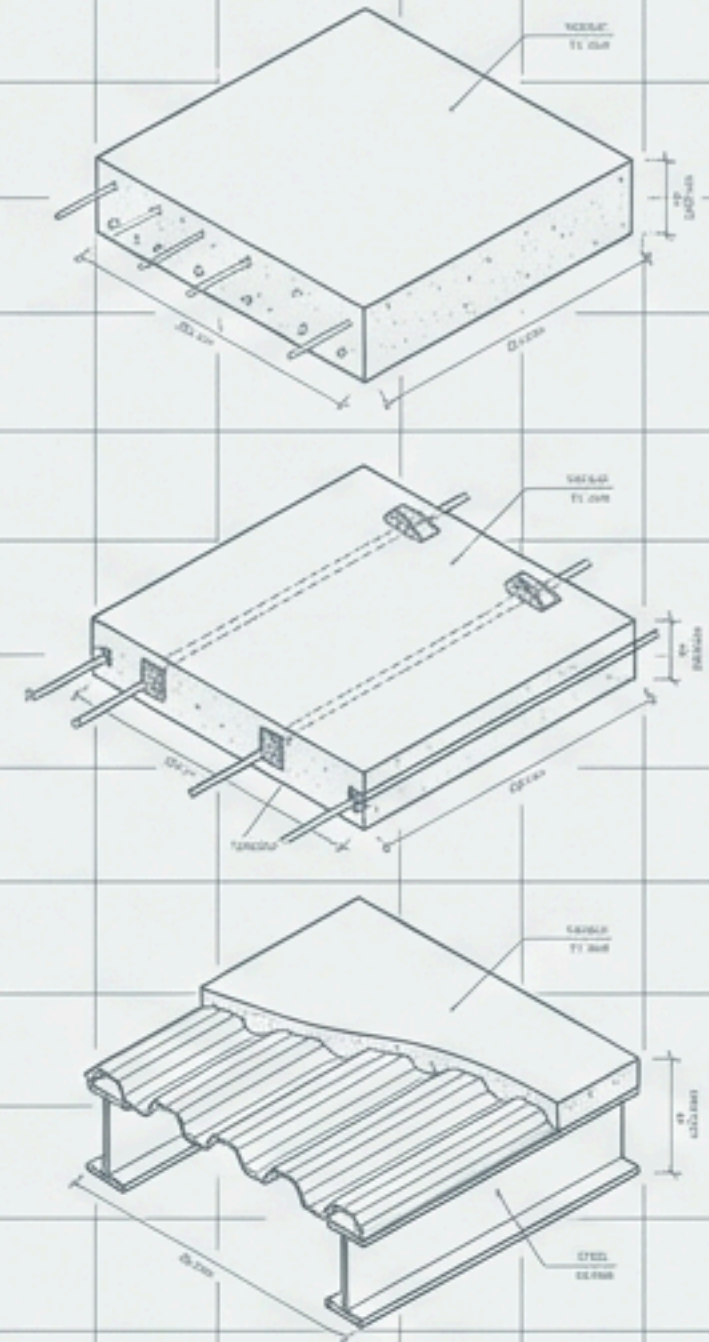
By integrating Revit schedules with the ICE database, we established a live “carbon pulse” for the project. This baseline allowed us to benchmark the initial design before optimization.



Step 3: Simulation & Scenario Optimisation

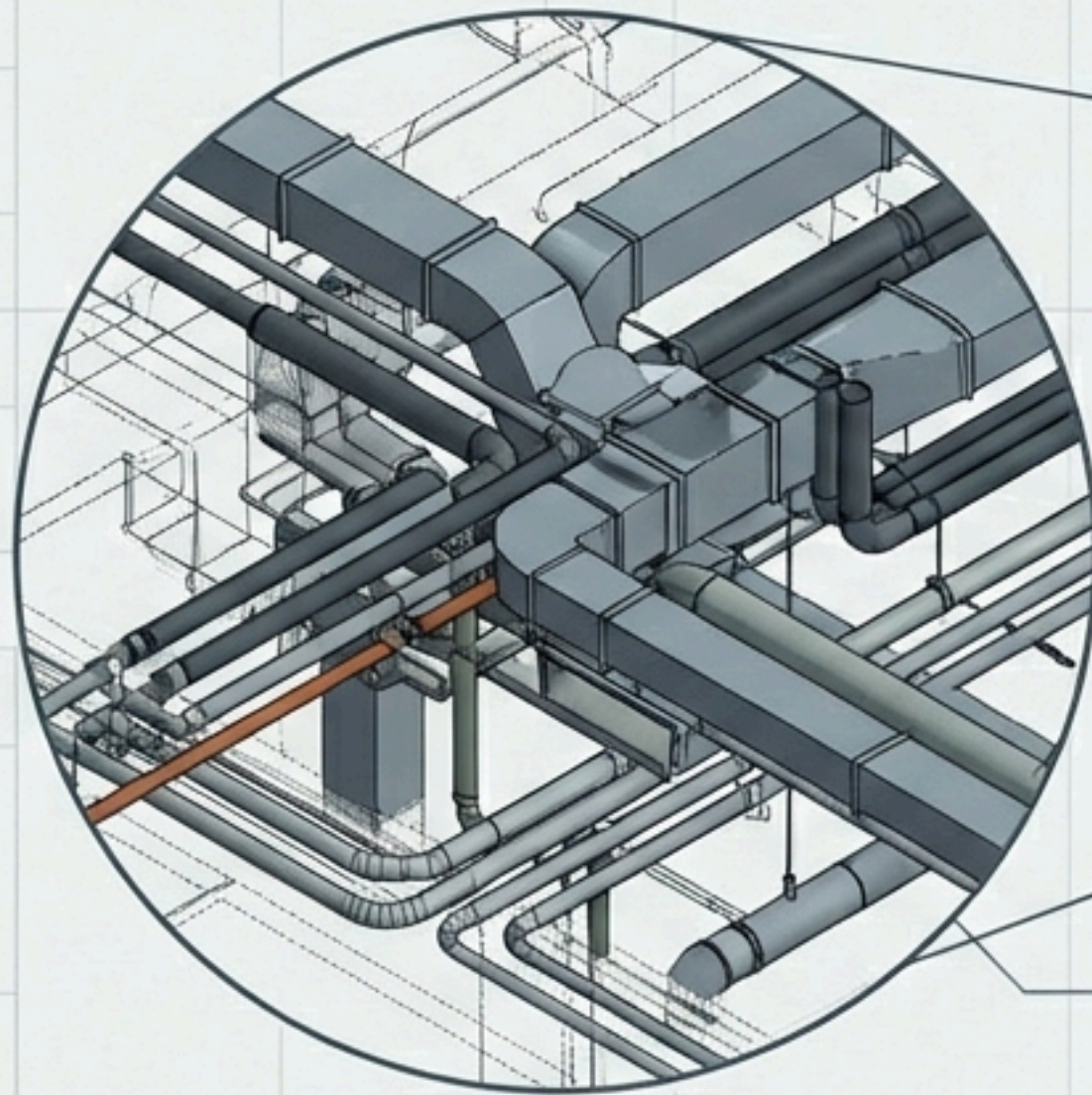
Performance-based decision making: Trading cost for carbon.

1	Scenario A: Baseline (RCC)	Carbon Impact: Standard	Cost Impact: Standard
2	Scenario B: Post-Tensioned	Carbon Impact: -12%	Cost Impact: +3%
3	Scenario C: Hybrid Steel (SELECTED)	Carbon Impact: -18%	Cost Impact: +5%

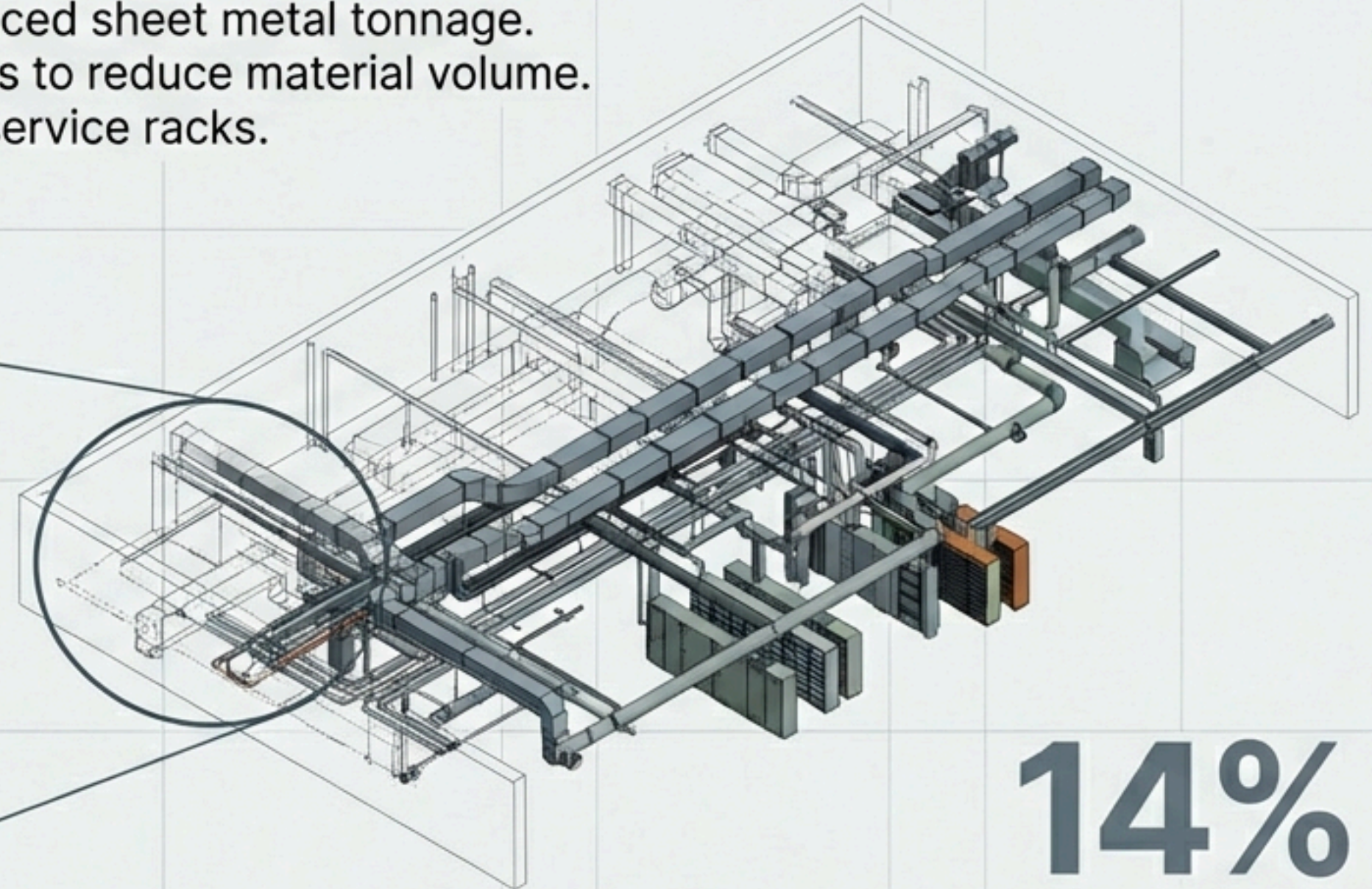


Step 4: The Hidden Impact of MEP Optimisation

- **Routing Efficiency:** Improved duct routing reduced sheet metal tonnage.
- **Hydraulic Simulation:** Optimised pipe diameters to reduce material volume.
- **Waste Reduction:** Implementation of modular service racks.



LOD 350-400
Modeling



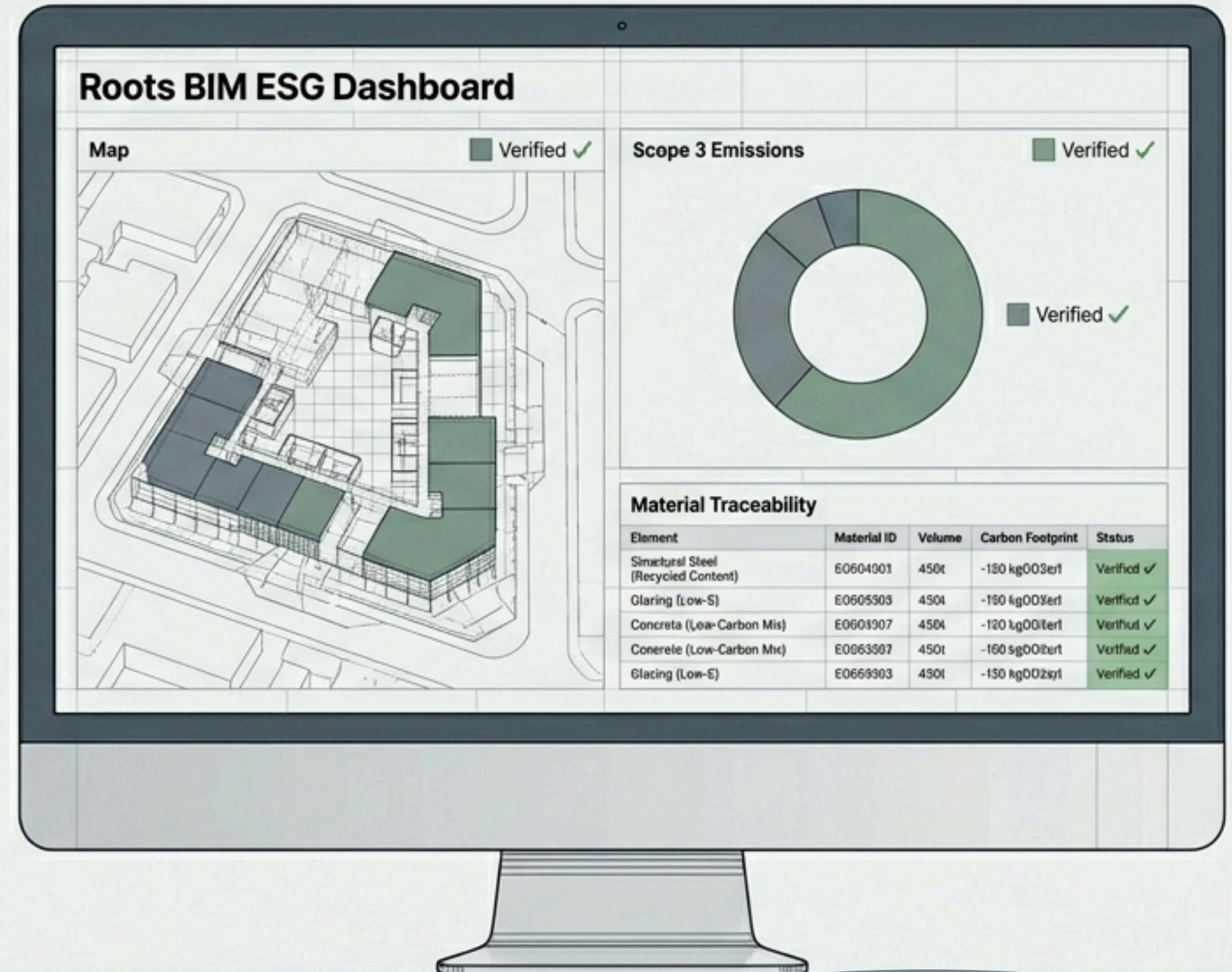
14%
**Reduction in MEP
Embodied Carbon**

Step 5: Automated ESG Reporting & Auditing

Manual spreadsheets were replaced with direct data extraction. Every number reported to investors is linked back to a **specific model element**, ensuring a 100% auditable data trail.

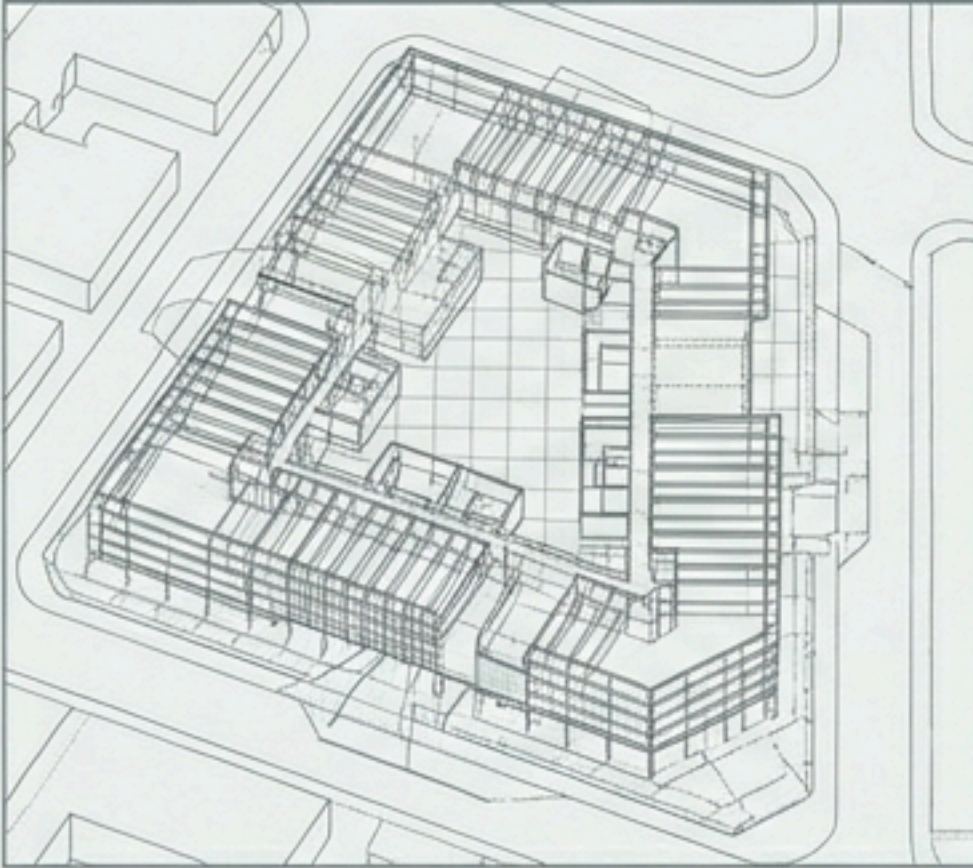
Automated Metrics

- Verified ✓ Scope 3 Emissions
- Verified ✓ Waste Diversion %
- Verified ✓ Recycled Content

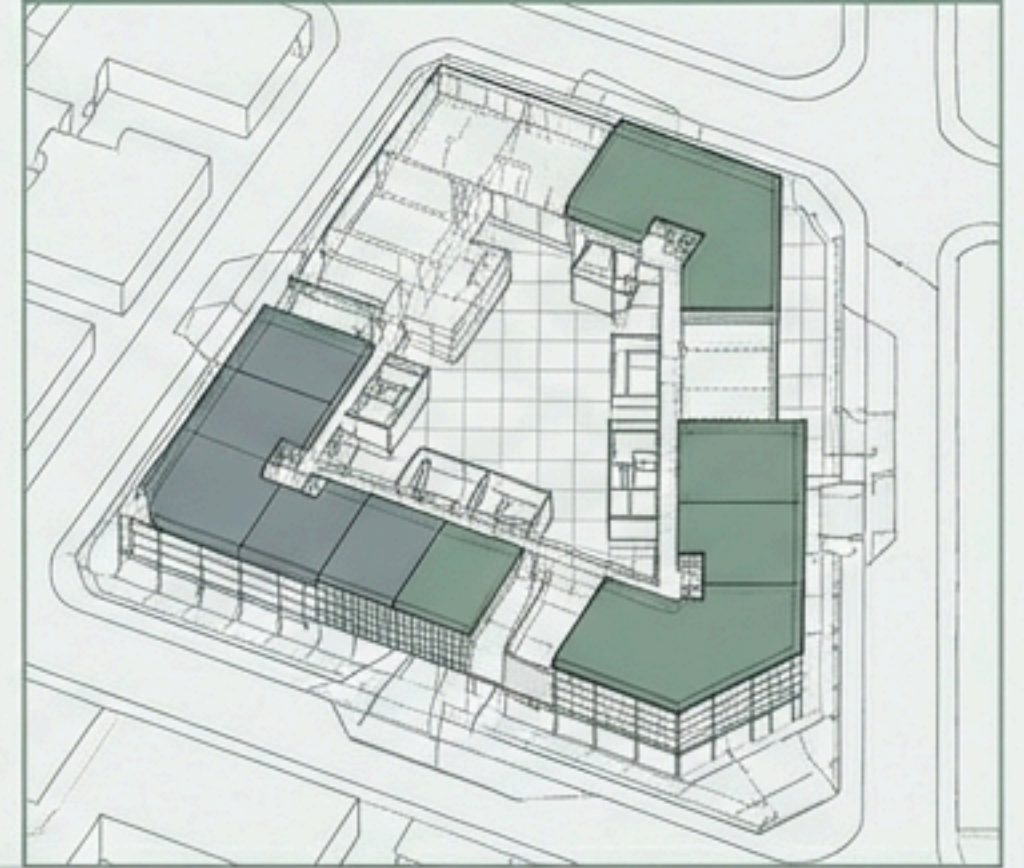


Quantifiable Success: The Impact of Data

Initial Design: 428 kgCO₂e/m²



Final Design: 342 kgCO₂e/m²



20%
**Total Embodied
Carbon Reduction**

18%

Material **Optimisation**
(Waste Reduction)

100%

Auditable
Data Trail

Contributing Factors:

High SCM concrete mix,
Recycled steel specification,
Low-carbon façade material.

The Paradigm Shift



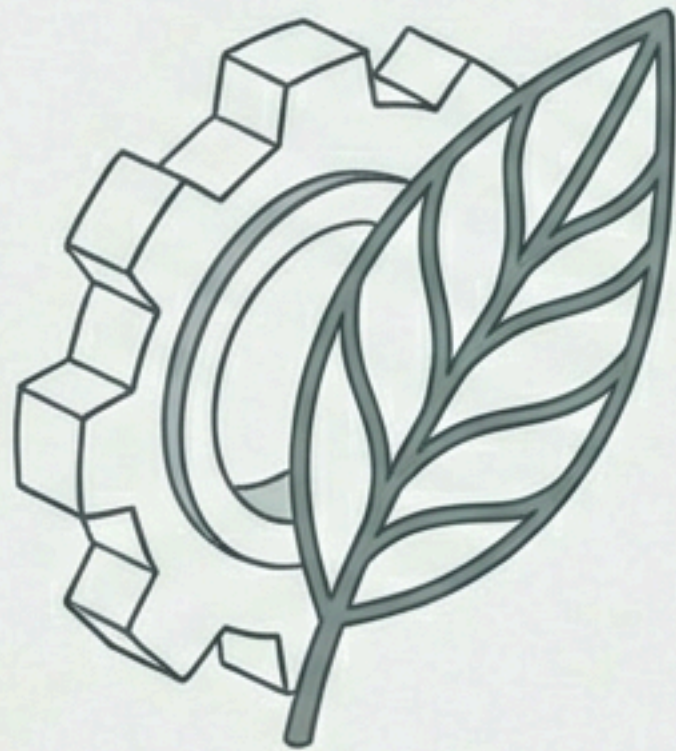
“BIM was *not* used to document sustainability—it was used to design design sustainability.”

- The federated model evolved into a:
 - ✓ Carbon Calculator
 - ✓ ESG Compliance Engine
 - ✓ Net-Zero Strategy Simulator

“By embedding carbon data directly into model intelligence, every design decision became measurable.”

Partnering for Climate Accountability

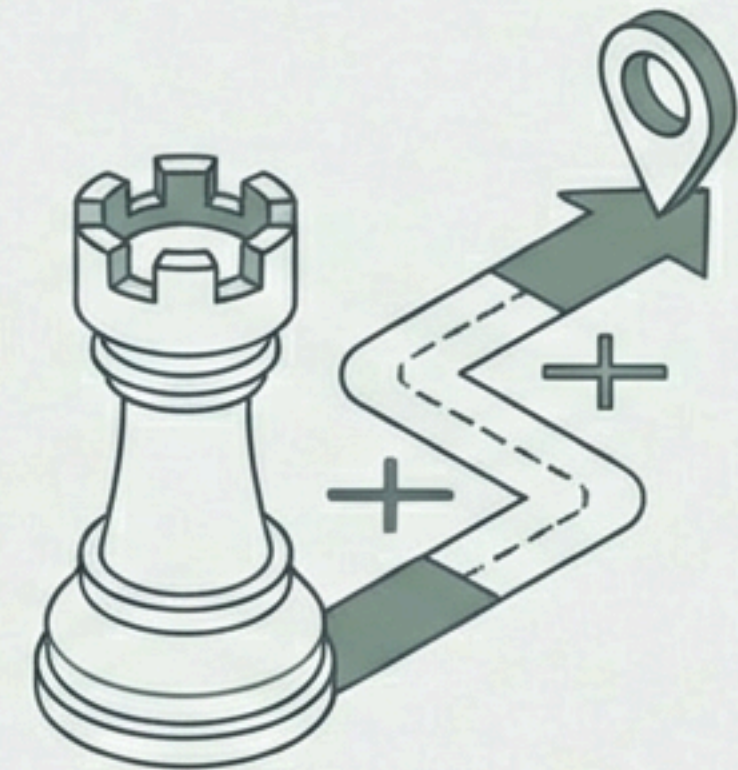
Roots BIM LLC: Data-Driven Sustainability Infrastructure



Embodied Carbon
Intelligence



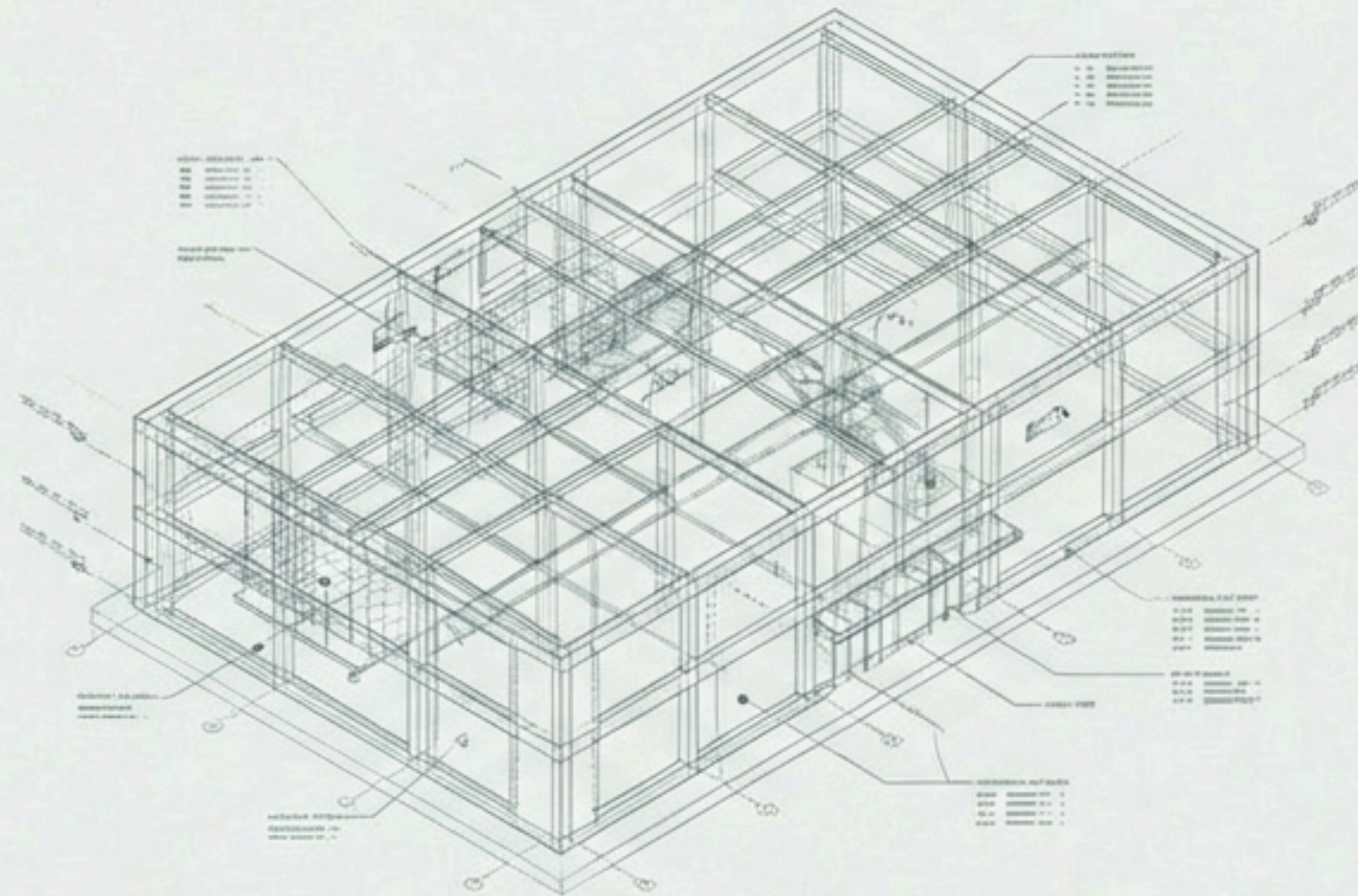
ESG Transparency
& Audit



Lifecycle-Informed
Decisions

Design Without Data is Just an Opinion.

Net-Zero targets cannot rely on post-design analysis.
They must be engineered into the model from Day One.



Transform your portfolio into a data-driven asset.