



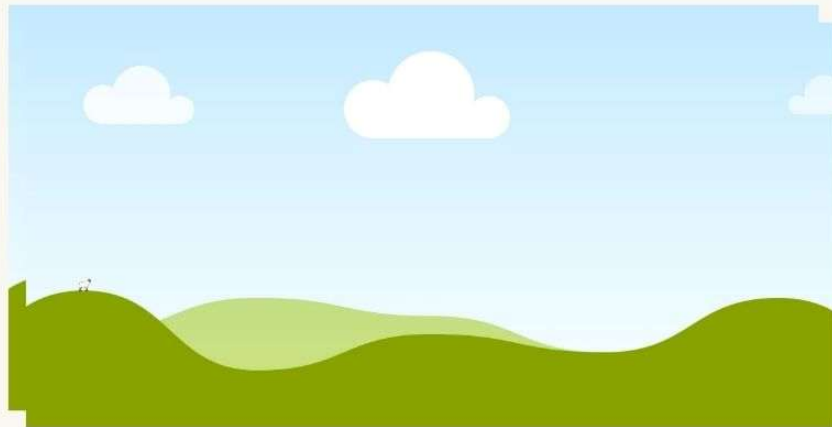
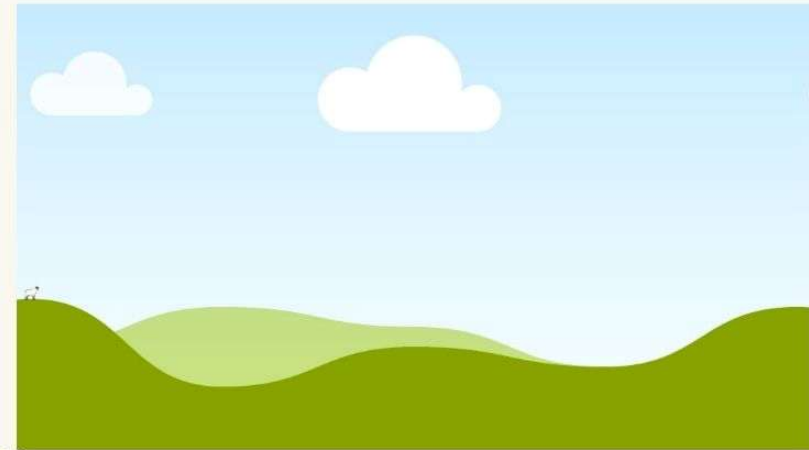
**AI-Driven Decarbonization**

# Core AI & ML Models Used in 270 Park Avenue

270 Park Avenue uses AI and Machine Learning to manage:

- Energy consumption
- Heating & cooling (HVAC)
- Indoor air quality
- Solar shading
- Lighting systems
- Occupancy patterns

Instead of using fixed schedules, the building learns, predicts, and adapts in real time.



What AI Does:

- Predicts energy demand before it increases
  - Adjusts temperature automatically
  - Controls shading based on sunlight
  - Optimizes lighting during the day
  - Maintains healthy indoor air
- AI connects all systems so they work together intelligently.

# Main AI & ML Models

- **Energy Prediction Model**

**What it does:**

Forecasts how much electricity the building will need.

**Why it matters:**

- Prevents energy spikes
- Reduces electricity costs
- Supports net-zero operation

- **Occupancy Prediction Model**

**What it does:**

Predicts which floors will be occupied.

**Why it matters:**

- Avoids cooling empty spaces
- Adjusts ventilation only where needed
- Saves energy without reducing comfort

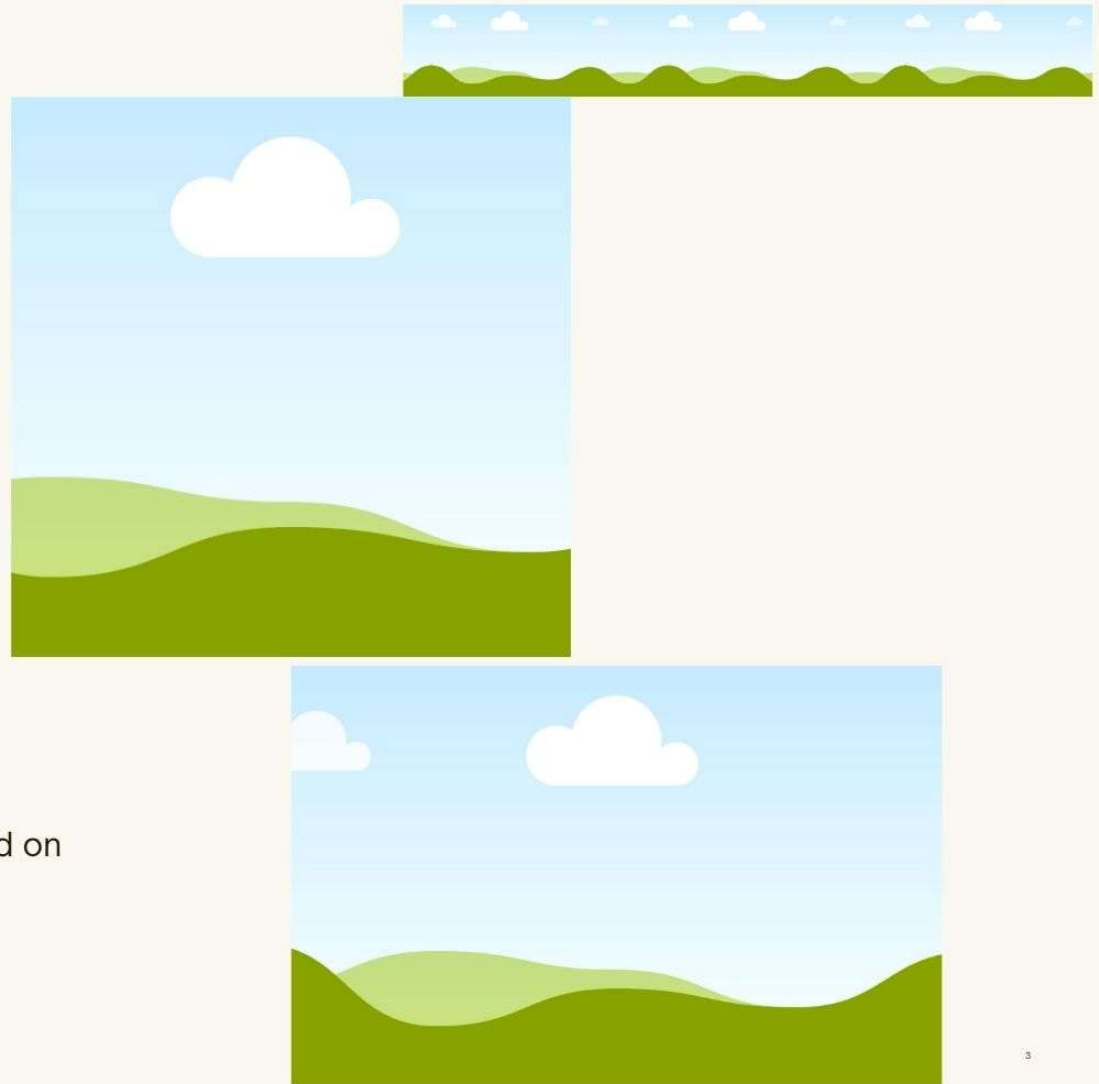
- **Smart Control Model**

**What it does:**

Automatically adjusts HVAC, shading, and lighting based on predictions.

**Why it matters:**

- Reduces manual work
- Keeps comfort stable
- Improves efficiency continuously



# How AI Makes Work Easier

**Before AI:**

**Manual monitoring**

**Fixed temperature schedules**

**Reactive maintenance**

**Higher energy waste**

**With AI:**

✓ **Automatic adjustments**

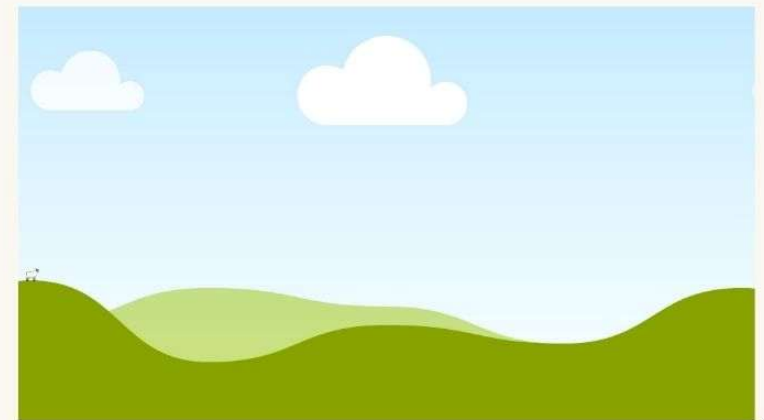
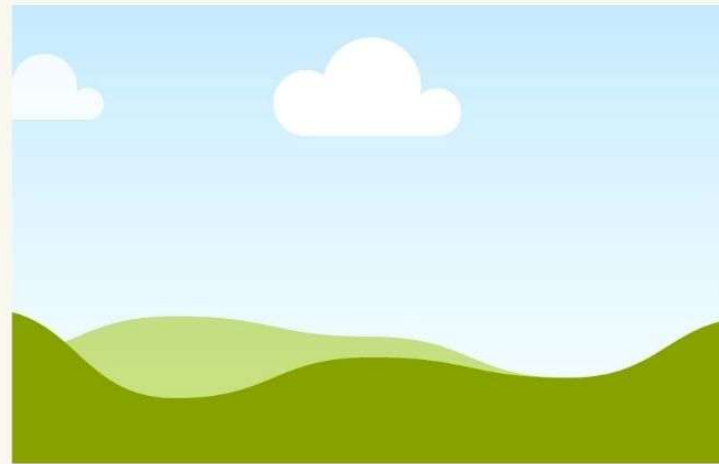
✓ **Real-time monitoring**

✓ **Predicts problems early**

✓ **Reduces manual decision-making**

✓ **Continuous energy optimization**

**AI works like a smart assistant for facility managers.**



## Hines: Operating a 2.5M Sq Ft Intelligent Tower



### **Role of Hines at 270 Park Avenue**

- **Appointed property & facility manager for JPMorgan's global HQ**
- **Responsible for day-to-day operations of a 60-story, 2.5M sq ft tower**
- **Oversees advanced infrastructure & intelligent systems**
- **Ensures seamless performance for ~10,000 employees**
- **Focus on long-term operational excellence**

### **Impact:**

**Mission-critical building managed with structured operations and 24/7 oversight.**

# Managing Advanced & Intelligent Systems



## Core Systems Under Management

- Building Management System (BMS)
- HVAC + mechanical systems
- Interior & exterior lighting
- Automated solar shading connected to HVAC
- Fire, life safety, elevators & AV systems

## How They Manage Them

- Preventive maintenance programs
- Real-time system monitoring
- Vendor performance control
- Rapid troubleshooting & escalation

## Impact:

Reduced downtime, stable comfort, optimized system performance.



## People, Vendors & Accountability Structure

### **Operational Governance Model**

- **On-site engineering & facilities leadership team**
- **Structured service request & escalation system**
- **Vendor selection & performance tracking**
- **Contract oversight with KPI-based standards**
- **Monthly performance reviews & reporting**

### **Impact:**

**Accountable operations with measurable service quality.**



## Comfort, Wellness & Workplace Experience

### **Experience-Driven Operations**

- **High indoor air quality & ventilation performance**
- **Smart lighting & circadian systems**
- **Automated shading to reduce glare & heat gain**
- **Continuous monitoring of comfort systems**
- **Hospitality-focused facility service model**

### **Impact:**

**Fewer comfort complaints. Healthier, more productive workplace.**

## Actual Intelligent Technology at 270 Park



### Confirmed Smart Technology Features

- **Sensors integrated throughout the building**
- **AI & Machine Learning to predict energy needs**
- **Intelligent Building Management System**
- **Automated solar shades coordinated with HVAC**
- **Triple-pane façade for thermal efficiency**

### What This Means

**The building does not operate on fixed schedules — it predicts, responds, and adapts in real time.**

## How AI Makes Facility Management Smarter



### AI-Driven Operational Advantages

- Predicts energy demand before peaks occur
- Adjusts HVAC & shading automatically
- Learns occupancy patterns over time
- Detects inefficiencies early (preventive maintenance)
- Supports net-zero operational performance

### Operational Result

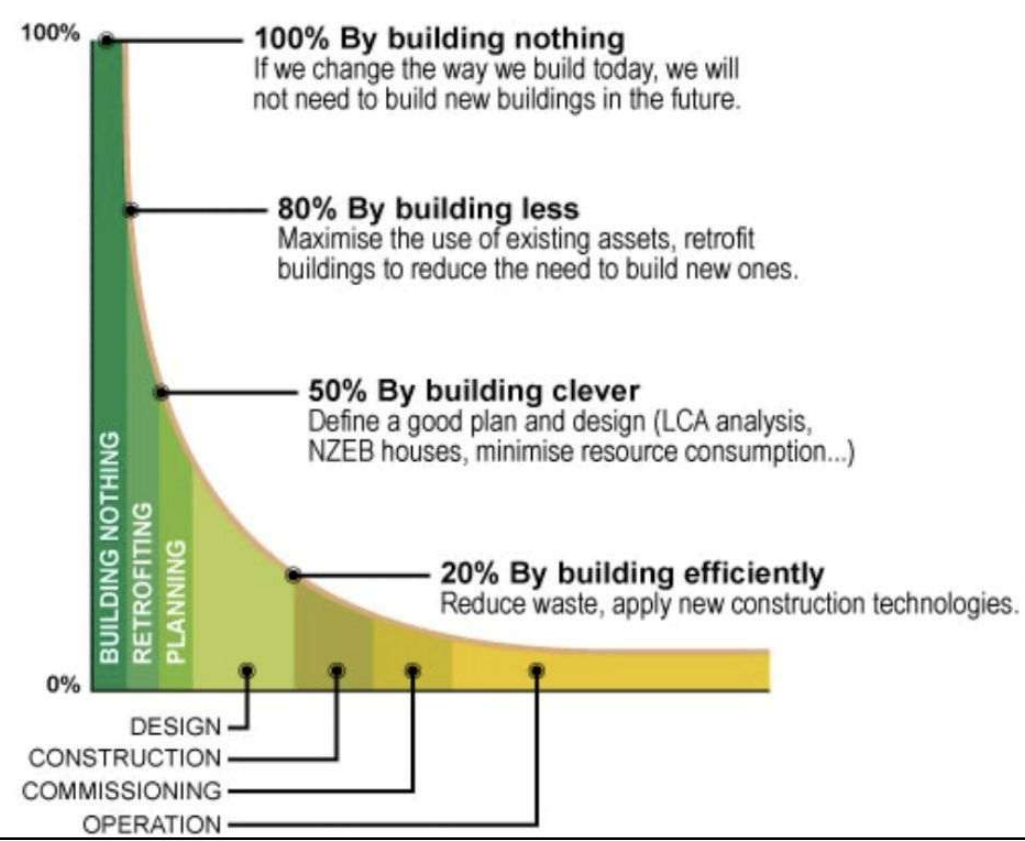
From reactive maintenance → to predictive optimization.

From manual control → to intelligent coordination.

# Where AI Can Reduce Carbon in Construction

- AI can reduce carbon at four stages
- Design Stage
    - AI optimizes building geometry
    - Reduces material quantities
    - Simulates energy performance
  - Construction Stage
    - AI optimizes logistics and equipment use
    - Reduces idle machinery emissions
    - Improves scheduling efficiency
  - Operations Stage
    - AI optimizes HVAC and energy use
    - Predicts maintenance needs
    - Reduces operational carbon
  - End-of-Life Stage
    - AI tracks materials for recycling
    - Supports circular construction

## How to reduce the carbon emitted at each stage



## AI in Design: Reducing Embodied Carbon

### Key AI Applications

#### Generative Design

- AI generates thousands of design options
- Selects lowest-carbon material combinations

#### Material Optimization

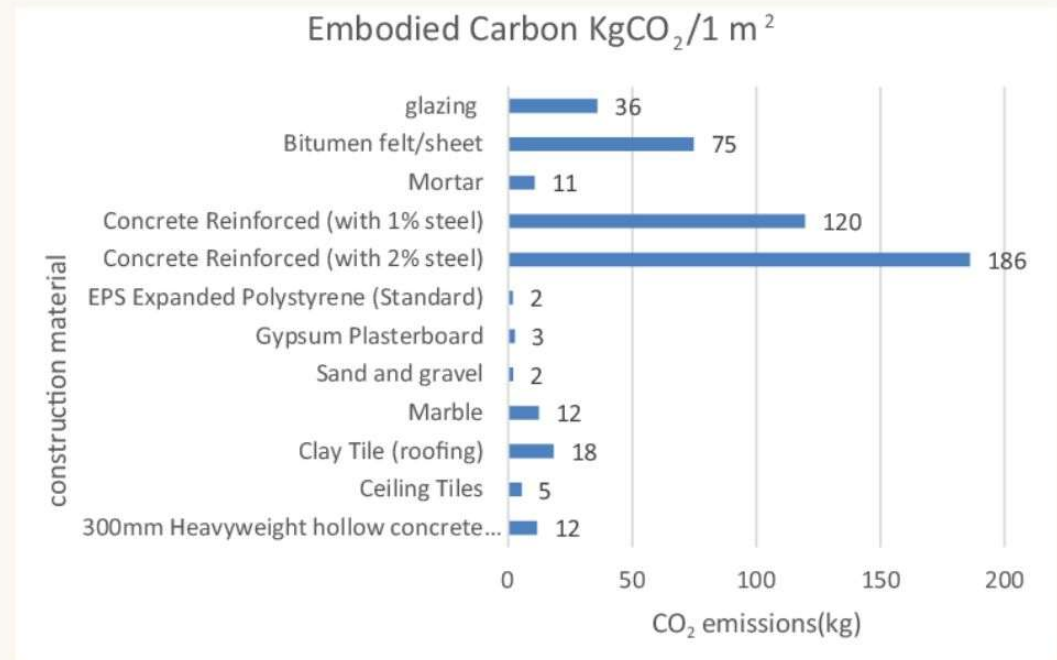
- Predicts carbon footprint of materials
- Suggests lower-carbon alternatives

#### Energy Simulation

- AI simulates building energy use before construction

#### Real Tools Used in Industry

- Autodesk Generative Design
- Spacemaker AI
- Cove.Tool
- One Click LCA



## AI in Construction Site Operations

### Key AI Applications

- Equipment Optimization
- AI monitors fuel use and idle time

### Logistics Optimization

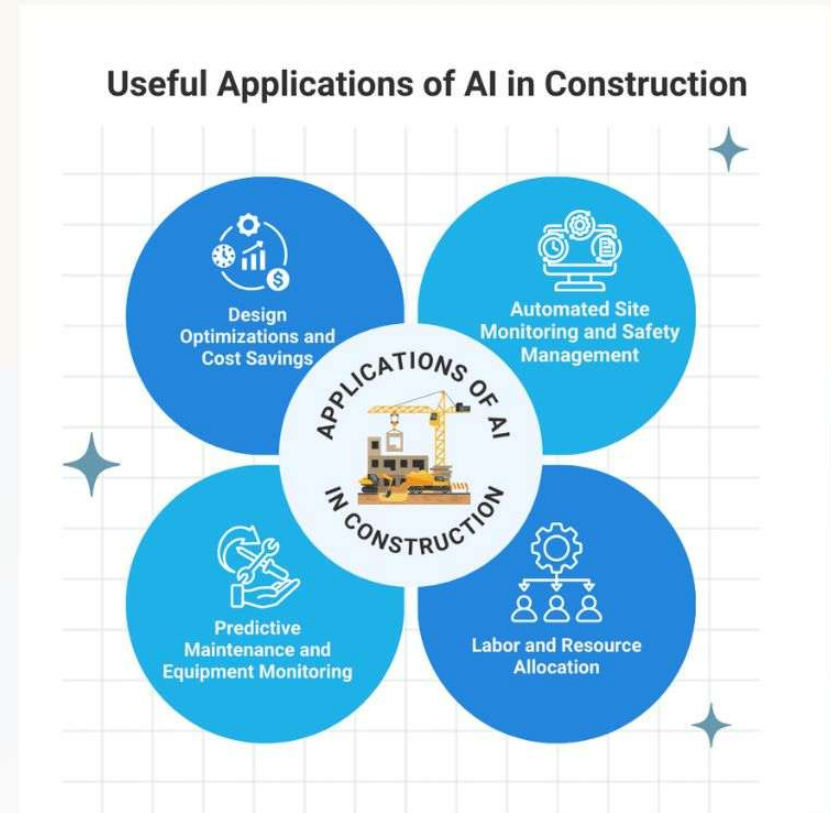
- Predicts delivery schedules
- Reduces transportation emissions

### Site Monitoring

- Drones + computer vision track progress
- Detect inefficiencies early

### Impact

- Reduced fuel consumption
- Lower equipment emissions
- Improved productivity



## Challenges of Using AI in Construction

- **Limited data standardization**
- **High implementation cost**
- **Integration with legacy systems**
- **Need for skilled workforce**



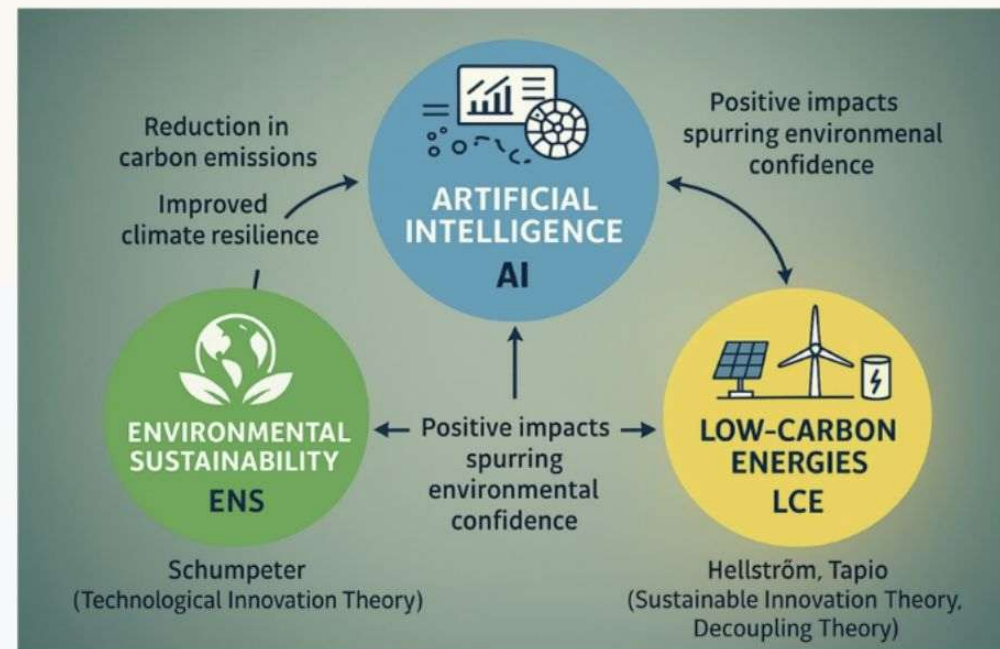
“While AI offers many benefits, adoption in construction is still evolving. Companies must overcome data challenges, system integration issues, and workforce training barriers.”

## Conclusion: The Role of AI in a Low-Carbon Future

### Key Takeaways

- AI enables data-driven decision-making
- Reduces carbon across the construction lifecycle
- Improves building performance and efficiency
- Supports sustainable urban development

“AI will play a critical role in transforming construction into a more sustainable industry. By combining smart design, efficient construction processes, and intelligent building operations, AI can significantly reduce carbon emissions.”



## Project Overview: Open Lab 3 (Japan)

### Key Highlights

Project: Open Lab 3 (OL3)

Location: Obayashi Technology Research Institute, Japan

First-of-its-kind structural reuse project in Japan

Focus: Direct reuse of demolition materials

### Why This Case Study Matters

- Moves beyond recycling → actual structural reuse
- Demonstrates circular construction in practice
- Aligns with net-zero and circular economy goals



## What Happens During Demolition

### Traditional vs This Project

- Traditional demolition
- Steel melted
- Concrete crushed
- High carbon emissions

### Obayashi approach

- Steel carefully unbolted
- Concrete cut into reusable sections
- Components preserved for reuse

### Key Insight

- Demolition becomes material harvesting

### Impact

- Avoids energy-intensive material production





(a) Second-story frame lifting



(b) Demount second-story frame



(c) Connection bolts removed



(d) EDCPs disassembly



(e) Disassemble the steel beam



(f) Remove second-story column



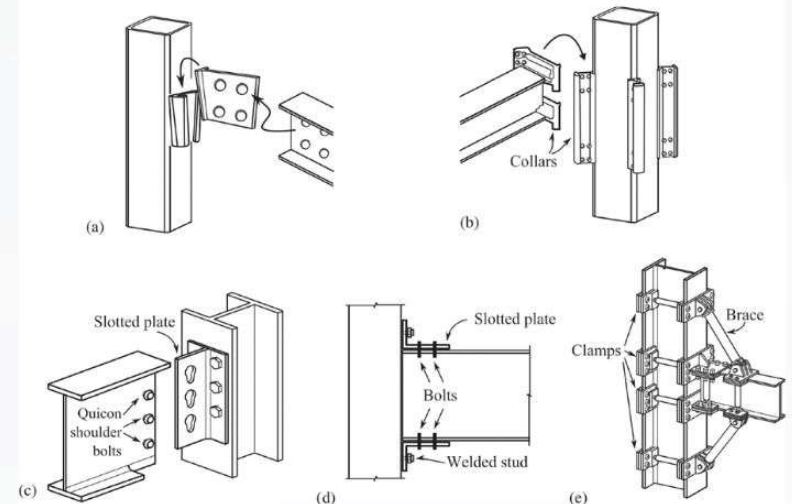
(g) First-story frame lifting



(h) Demount first-story frame



(i) Remove first-story column



## Process

### Inspection

- Check strength, damage, dimensions

### Reprocessing

- Steel reshaped in fabrication factory
- Concrete trimmed for new geometry

### Transportation

- Materials moved and stored for reuse

### Reinstallation

- Used components integrated with new materials



## Carbon Impact

### Measured Impact

- 57% of steel reused
- 33% of concrete reused
- ~49% reduction in CO<sub>2</sub> emissions

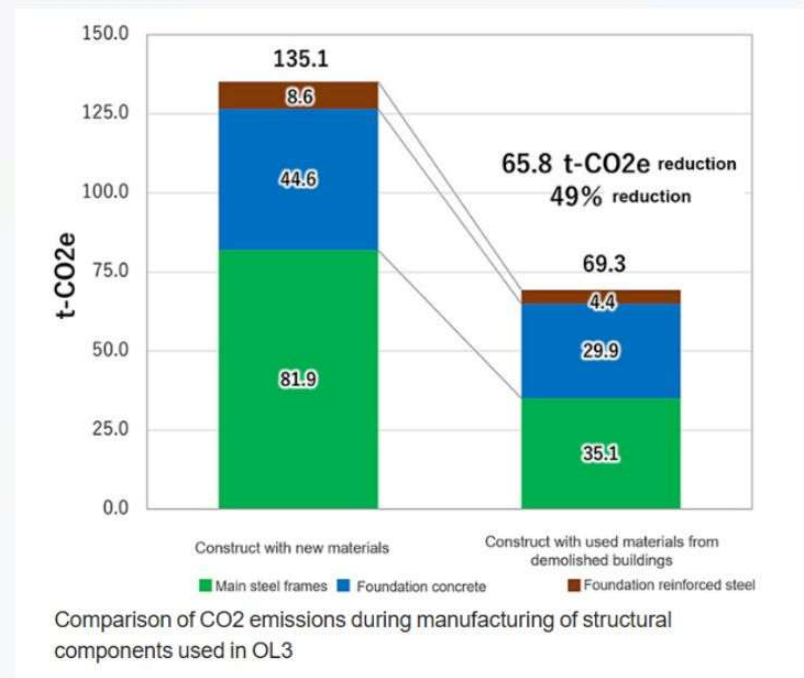
### Why This Happens

No need to:

- manufacture new steel
- produce new cement
- Avoids energy-intensive processes

### Key Insight

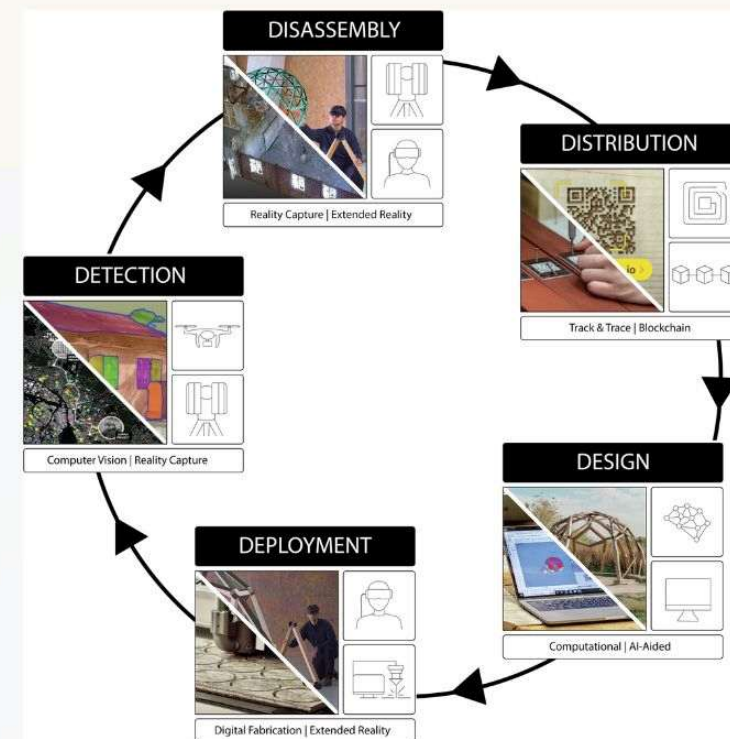
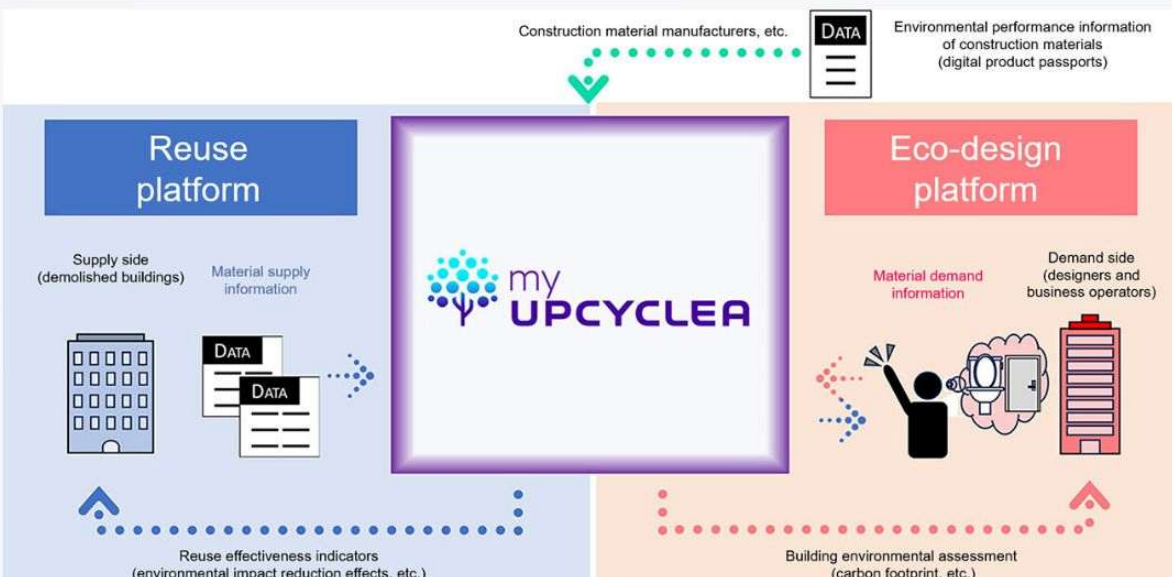
Reuse is more efficient than recycling



## AI + Future of Demolition-Based Construction

Tracks:

- material condition
- reuse potential
- carbon impact



## References

### Case Study – Open Lab 3

- Obayashi Open Lab 3 Project (Official Case Study)
- Structural Reuse Initiative – Open Lab 3 (CO<sub>2</sub> Reduction Details)
- Circular Construction & Material Reuse Obayashi Circular Economy & Material Reuse Strategy
- Upcyclea Platform – AI for Material Reuse in Construction
- Obayashi Vision Showcase – AI-Based Material Reuse Platform

### Corporate / Technical Validation

- **Obayashi Corporate Report – Structural Reuse & Circular Construction**