

LCA & EPDs in practice



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LCA & EPD Expert

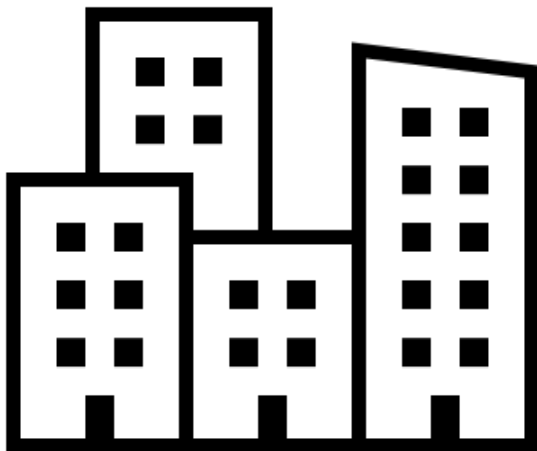




Tools to **decarbonize** construction & manufacturing

Target:
All construction to create at least **40% less**
embodied carbon by 2030

World Green Building Council



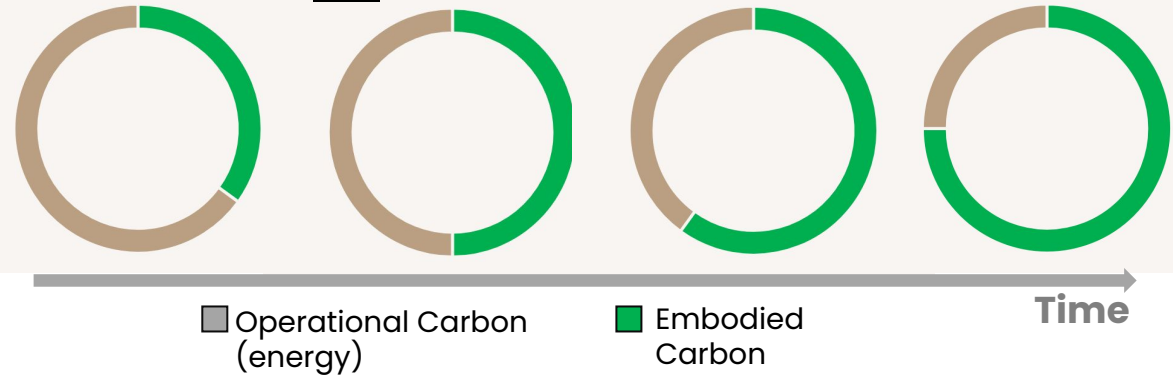
Cities are expected to **double** by 2060, adding an extra **230 gigatons of embodied carbon**

= Adding 1 New York
City every **29 days** till
2060



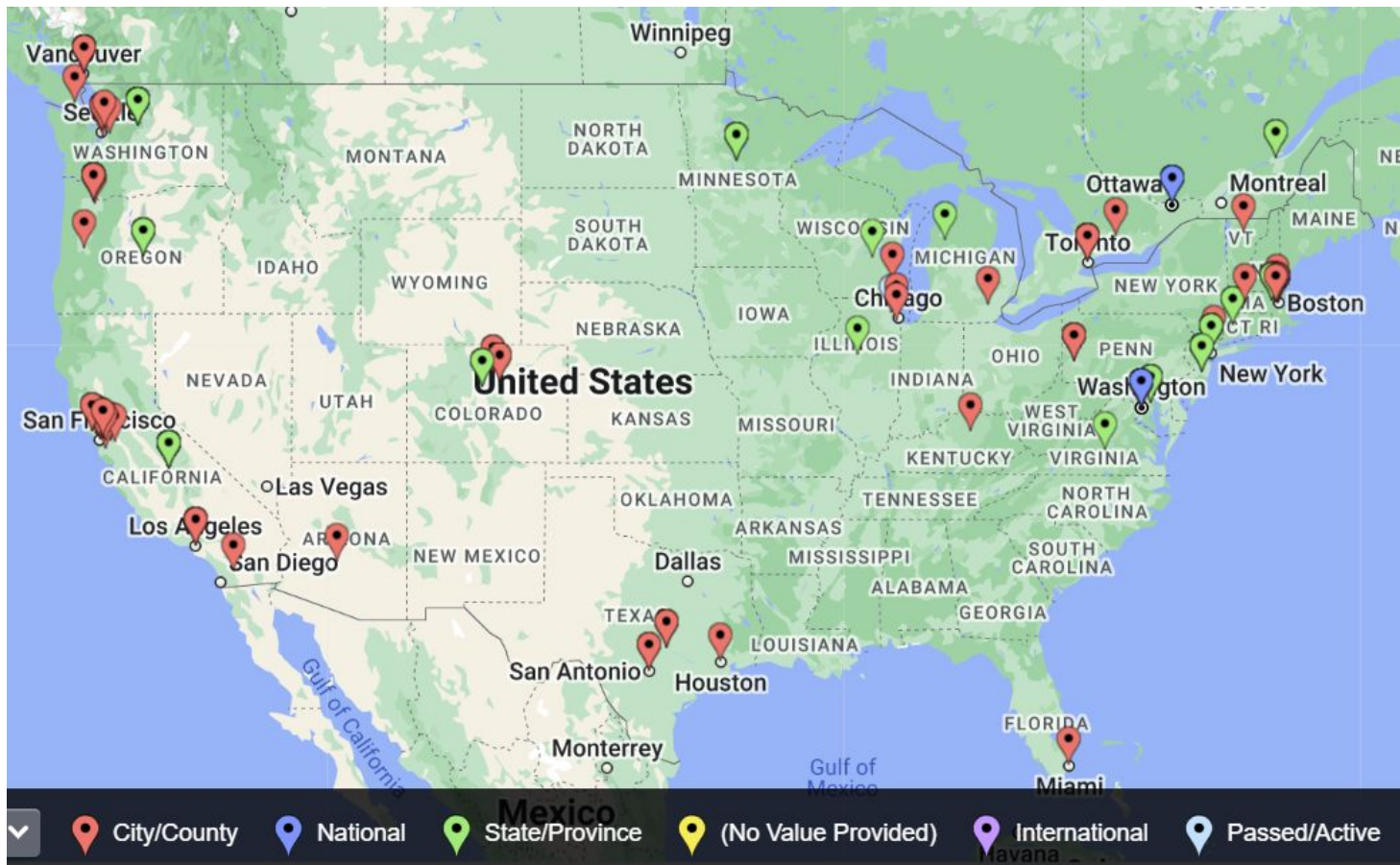
Materials will be the dominant source of CO2 emissions

Embodied Carbon Importance over time



Embodied carbon policies

US Embodied Carbon Policies/Certifications



Examples

Buy Clean California

State agencies, the University of CA, and CA State University systems construction projects must meet specific GWP limits for structural steel, concrete reinforcing steel, and light and medium density mineral wool board insulation.

Denver Green Code

Requires projects using the voluntary code to meet specific GWP limits for concrete and steel products.

Portland Low Carbon Concrete Initiative

Concrete in city construction projects must meet specific GWP limits.

CalGreen

All California projects over 100,000 sf can comply through building reuse, whole building LCA, or specific GWP limits for select products.

New Jersey Buy Clean

Concrete GWP limits for state-funded projects, 5% bid discount for exceeding limits, and 3% discount for bids with carbon capture, utilization, and storage
Up to 8% tax credit for concrete producers who overperform.

ASHRAE 189.1

EPDs for 30 products + Product GWP limit at 125% of IW-EPD for a minimum of 10 building products and enough products to equal 15% or 20% (JO) of product costs, and products that cost 5%+ of the material costs.

Austin Green Building Program

The City rating system includes credits/points for WB LCA and embodied carbon reduction

Other Codes

Marin County
International Building Code
Denver Green Code
Denver Building Code
Washington Building Code
Oregon Residential Code
Seattle Building Code



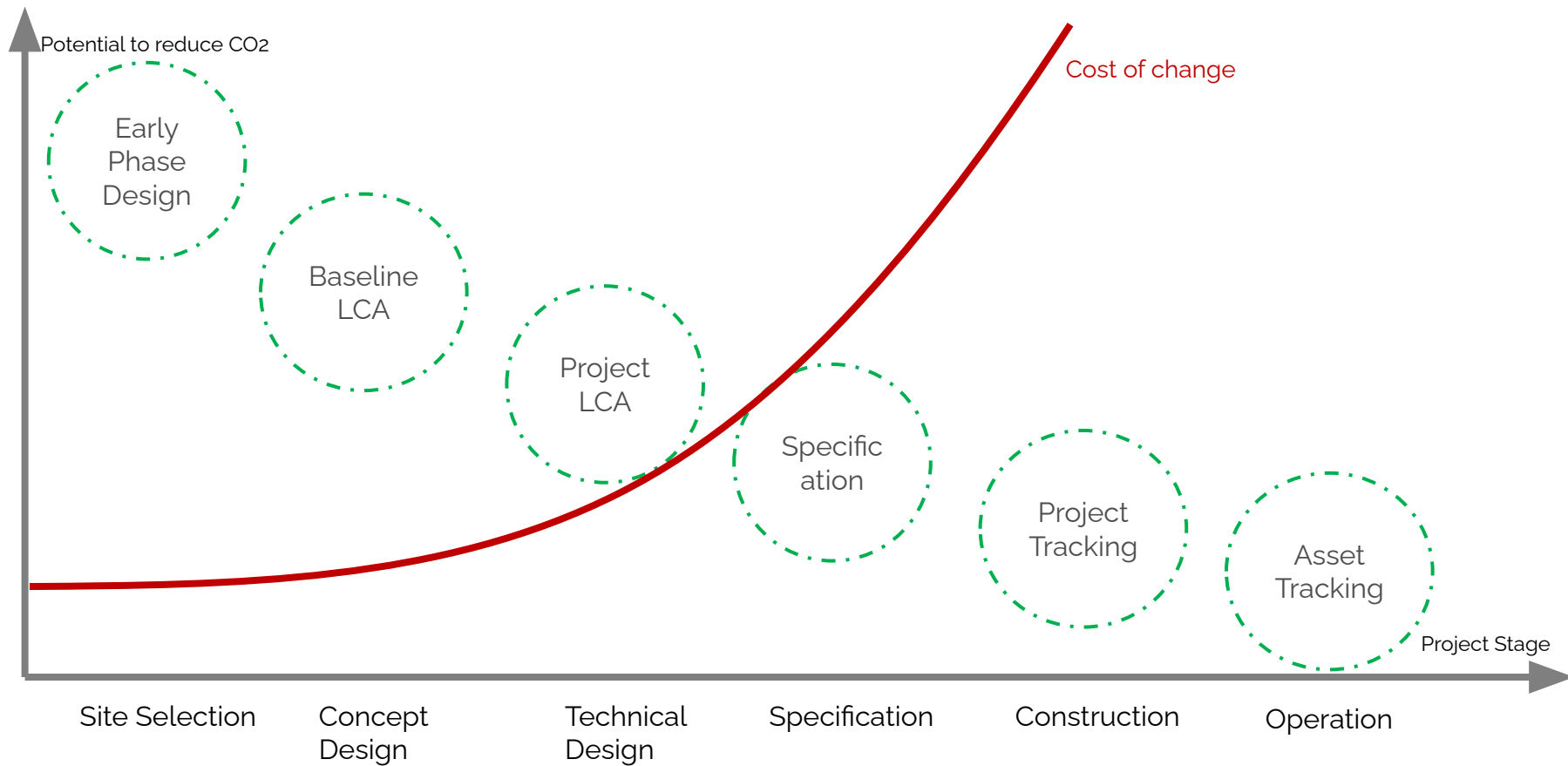
**Climate Reporting
Senate Bill
(SB253 & SB261)**



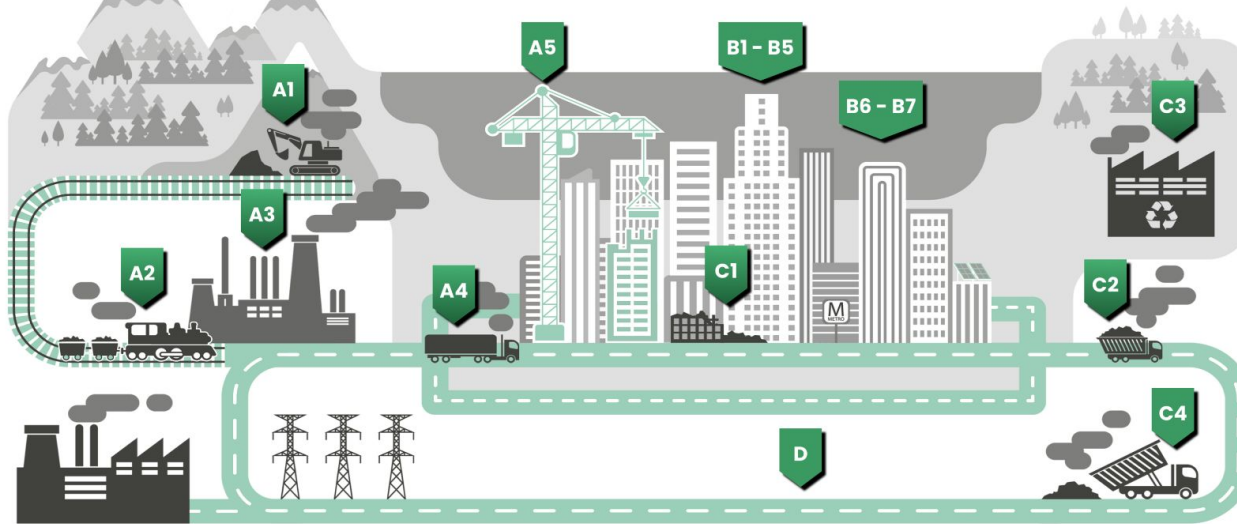
**LIVING
BUILDING
CHALLENGE** SM



LEED



Life Cycle Stages



A1 – A3 Product stage

- A1** Raw material extraction
- A2** Transport to manufacturing site
- A3** Manufacturing

A4 – A5 Construction stage

- A4** Transport to construction site
- A5** Installation / Assembly

B1 – B5 Use stage

- B1** Use
- B2** Maintenance
- B3** Repair
- B4** Replacement
- B5** Refurbishment
- B6** Operational energy use
- B7** Operational water use

C1 – C4 End of life stage

- C1** Deconstruction & demolition
- C2** Transport
- C3** Waste processing
- C4** Disposal

D – Benefits and loads beyond system boundary

Reuse, recovery and/or recycling potentials, expressed as net impacts and benefits

What is an EPD?

ENVIRONMENTAL IMPACTS

Declared Product:

Mix 3EFZ75Q1 • South San Francisco (wet) Plant
3IN LN 0.45 W/C 1" EF45 3-5SL CO2
Compressive strength: 5000 PSI at 28 days

Declared Unit: 1 m³ of concrete

Global Warming Potential (kg CO ₂ -eq)	287
Ozone Depletion Potential (kg CFC-11-eq)	1.0E-5
Acidification Potential (kg SO ₂ -eq)	1.86
Eutrophication Potential (kg N-eq)	0.36
Photochemical Ozone Creation Potential (kg O ₃ -eq)	40.7
Abiotic Depletion, non-fossil (kg Sb-eq)	4.0E-6
Abiotic Depletion, fossil (MJ)	817
Total Waste Disposed (kg)	1.90
Consumption of Freshwater (m ³)	1.86

Product Components: natural aggregate (ASTM C33), crushed aggregate (ASTM C33), Portland cement (ASTM C150), slag cement (ASTM C989), fly ash (ASTM C618), batch water (ASTM C1602), admixture (ASTM C494)

- ***Based on product LCAs***
- ***Think ‘food labels’***
- ***Transparency***
- ***Provides data on environmental performance***
- ***Third party verified and standards compliant (ISO, EN)***
- ***Can have different levels of resolution – plant specific, manufacturer specific or industry average***
- ***Avoids greenwashing***

The environmental data in an EPD comes from a product level Life-Cycle Assessment



What constitutes an Environmental Product Declaration?

PRODUCT LCA RESULTS

An LCA/EPD is always in line with ISO 14025 (standard defining an EPD) and practically also always in line with EN 15804 (European EPD standard) or then ISO 21930



INDEPENDENT VERIFICATION

Verification by an independent third party, approved to verify by the EPD Program Operator

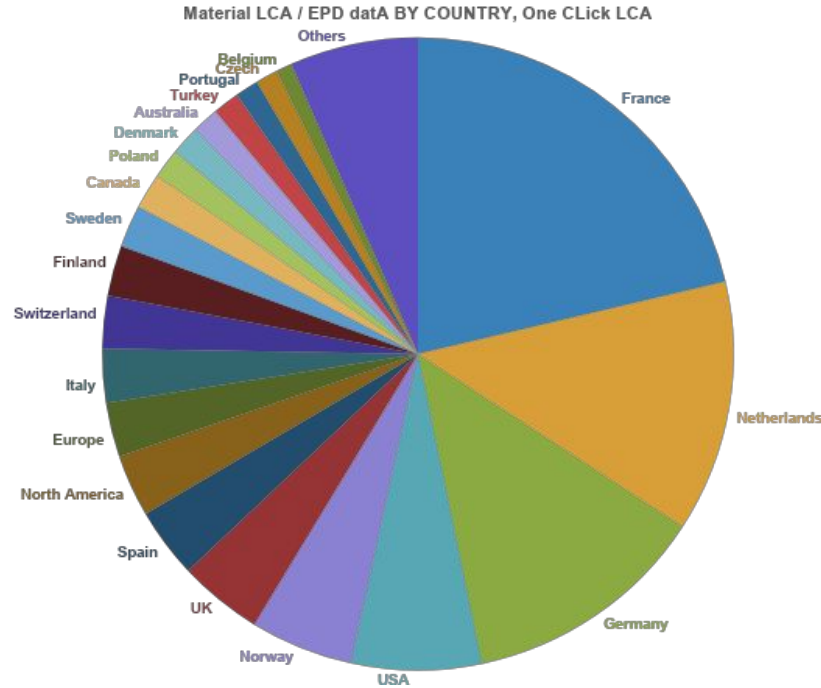


PUBLISHED IN AN EPD PROGRAM

EPD must be created in line with Program Operator's requirements and Product Category Rules

- | PROJECT LIFE CYCLE INFORMATION | | | | | | | | | | SUPPLEMENTARY INFORMATION BEYOND THE PROJECT LIFE CYCLE | | | | |
|----------------------------------|----------------------------------|-----------------------------|----------------------------|-------------------------------------|-----------------------------|-------------|--------|-------------|---------------|---|--------------------------------|---|----------|---|
| [A1 – A3] | | | [A4 – A5] | | [B1 – B7] | | | | | [C1 – C4] | | | | [D] |
| PRODUCT stage | | | CONSTRUCTION PROCESS stage | | USE stage | | | | | END OF LIFE stage | | | | Benefits and loads beyond the system boundary |
| [A1] | [A2] | [A3] | [A4] | [A5] | [B1] | [B2] | [B3] | [B4] | [B5] | [C-1] | [C-2] | [C-3] | [C-4] | |
| Raw material extraction & supply | Transport to manufacturing plant | Manufacturing & fabrication | Transport to project site | Construction & installation process | Use | Maintenance | Repair | Replacement | Refurbishment | Deconstruction Demolition | Transport to disposal facility | Waste processing for reuse, recovery or recycling | Disposal | Reuse
Recovery
Recycling
potential |
| | | | | | | | | | | | | | | |
| | | | | | [B6] Operational energy use | | | | | | | | | |
| | | | | | [B7] Operational water use | | | | | | | | | |
| | | | | | | | | | | | | | | |

There is no central repository for EPDs, they are published by different program operators



Why publish EPDs?

BUYERS, SPECIFIERS & THE MARKET REQUIRE EPDS

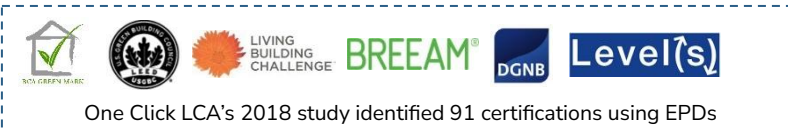
Buyers and specifiers want



EPDs are required by regulations mandating LCA



EPDs are required for commercial certifications



EPD = ENVIRONMENTAL PRODUCT DECLARATION

- ISO 14025/40/44 & EN 15804/ISO 21930 compliant
- Life-cycle assessment based, comprehensive impact data
- Third-party verified and program operator approved
- Used to make environmental claims & choose products



Sustainable Design: Pain Points

1 Lack of quality data

2 Cost of EPD creation

3 Data mapping from
BIM and Excel



4 Manual / labour
intensive process

5 Early stage design
optioneering

6 Not fully embedded

Generative AI-driven feasibility & optioneering

Select building shape

Generate shapes with AI

Building size constraints (AI)

Max height of building: 15 m

Façade (blind) max length: 15 m

Façade (window) max length: 15 m

Building site constraints (AI)

Depth on the plot: 15 m

Min distance to front limits: 15 m

Min distance to side limits: 15 m

Min distance to back limits: 15 m

Site coverage: 15 %

Based on high level inputs, Gen AI rapidly creates multiple design options.

1 Create a design 2 Scope 3 Calculate the geometry

3 - Edit and calculate the geometry

Choose AI shape
Verify and edit the building dimensions

Scenario	Floors	Parking spaces	GFA	Action
Scenario 1 <i>Recommended</i>	8	2	5500 m2	<i>Selected</i>
Scenario 2	8	2	5500 m2	Select
Scenario 3	8	2	5500 m2	Select
Scenario 4	8	2	5500 m2	Select

3D model

Hospital CHU Angers Design 1

The 3D model is based on the building dimensions and aims to provide a better understanding of the proportions.

Any edits in the building structure areas are not taken into account. The demonstrated model excludes: stairs, balconies, foundations except piling, cleanliness layer, few other building elements which are not relevant for all regions or building frames, such as frost insulation and shear walls.

Quickly compare whole-life carbon impact of AI-generated options.

Cost/ complexity of creating EPDs is Manufacturers' #1 pain point!

DIY with EPD software



- Steep learning curve
- Data gathering
- Verification & Publishing

Or..

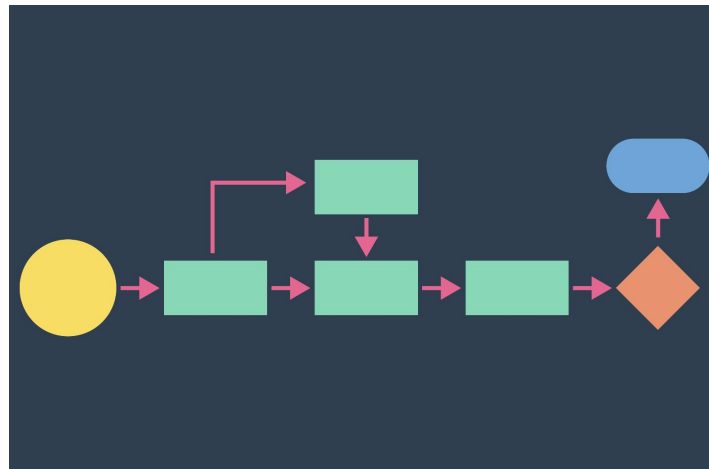
Consultants



- Cost

Luckily, AI and Automation can help

- EPD creation and verification is a repeatable workflow performed 1000s of times each year
- So it's perfect for:
 - (1) Training algorithms
 - (2) Automating
- AI models help us with:
 - Instantaneous, intelligent checking of fields
 - Flagging where a mistake is predicted



While EPDs are still manually verified, AI reduces friction and helps EPD creators get it right first time

Pain: Identifying, classifying and mapping materials is tedious

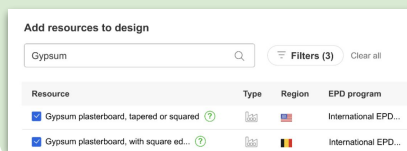


**Whole Life Carbon reduction
needs quality data**

Import



Manual data selection



**But getting data into
LCA software is:**

- Time consuming
- Tedious
- Error prone

AI powered import mapping can add speed and simplicity

- Import data from BIM or Excel

Less unidentified data thanks to AI

- Automatic Excel formatting & mapping

1. File upload ✓

2. Import settings ✓

3. Column mapping ✓

4. Review & filter ✓

5. Combine data ✓

6. Data mapping

Previous

Import

Data mapping

Map imported data to materials and resources from the database and review and correct errors and change mappings. [Read more](#)

Identified ✓ 1000

Unidentified ✓

Name in imported data	Map resource	Mapping basis
Expanded polystyrene insulating	Expanded polystyrene insulating panel ?	AI mapping ✚
Cellular PVC trim	Cellular PVC trim ?	AI mapping ✚
Coated Steelpipes	Coated Steel pipes ?	AI mapping ✚
Glasswool insulation	Glasswool insulation panels ?	AI mapping ✚
Readymix Concrete High Strength	Readymix Concrete High Strength ?	Colleague mapping

NE EXTENSION IN SINGAPORE

BREAKDOWN	STAGE	QMS	TYPE	EPD n°	Transportation	Waste
QTY	U					
1.00	pieces	ISO	Stone			
1.00	pieces	ISO	Stone			
1.00	m	ISO				
50.98	m2	ISO				
	U	ISO				
11.00	wingunit	APD	My comment	111	14295	
1.00	poortunit	APD		222	12359	28
109.24	poortunit	APD		333	17462	
946.70	KG	APD		444	11285	
10.70	M3	APD		555	1143	39
0.73	M2	APD		666	11211	
0.73	M2	APD		777	4920	18
11.00	M3	APD	My comment	111	14295	
109.24	M3	APD		222	12359	28
109.24	KG	APD		333	17462	

What the future looks like

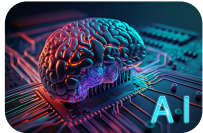
1. AI-enhancements will continue to gather pace



“Hyper Moore’s Law”



**More projects,
more data**

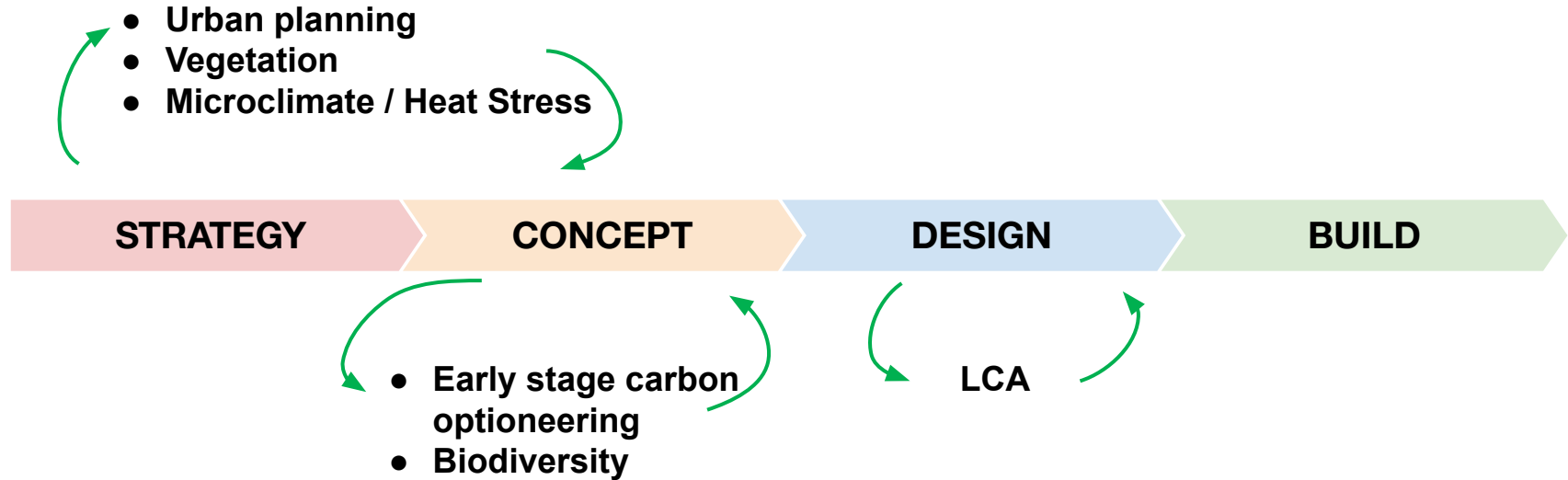


**More & better AI
models**

**“End to end AI-powered
sustainable design”**



2. Further integration of workflows, data, tooling..





Hands on demos available during
networking session

Keep in touch



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Thank you!