

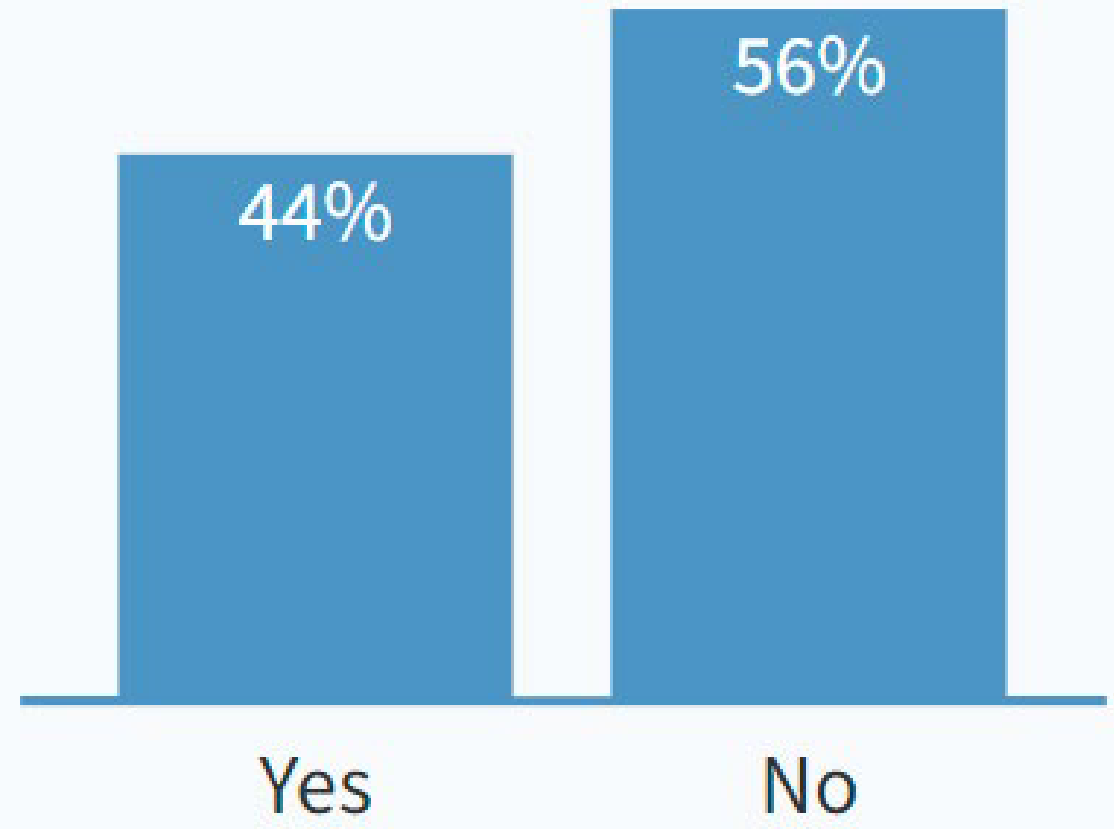


# DLC SUMMIT '22

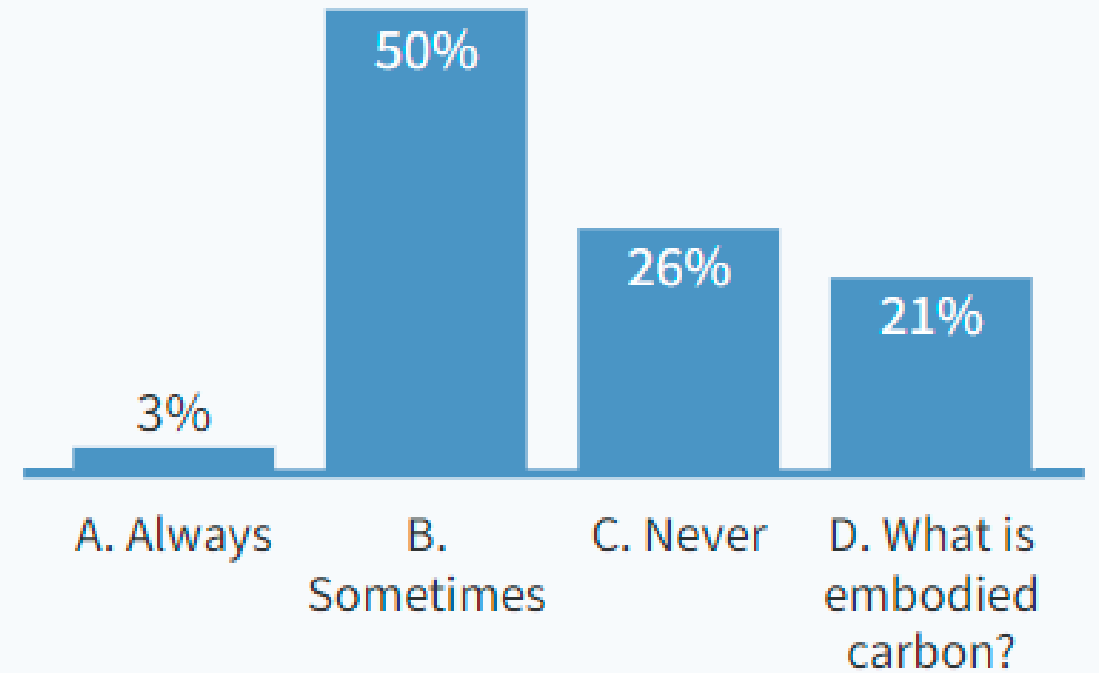
May 24, 2022 • Boston, MA

## **Whose Footprint is that? Embodied Carbon and Sustainable Lighting Design**

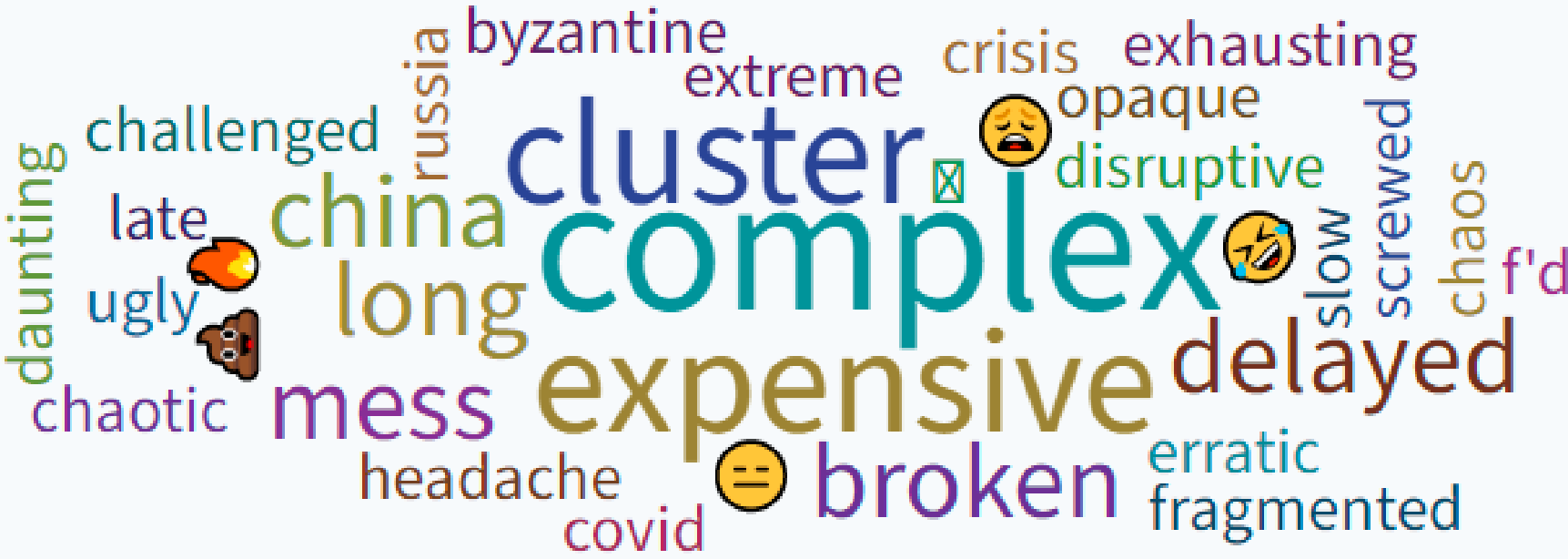
# Have you had experience doing a LCA?



# How many people consider embodied carbon in your purchasing decisions



# Describe supply chain for Lighting Products



# How many projects do you "touch" per year



# Moderator



**Tina Halfpenny**

Executive  
Director/CEO  
DLC

# PANELISTS



**Alexandra Gadawski**  
HMFH Architects



**Sara Schonour**  
Lytei



**Dr. Nathaniel Jones**  
ARUP



# Exploring carbon reductions beyond the kwh





# Goal-setting Framework

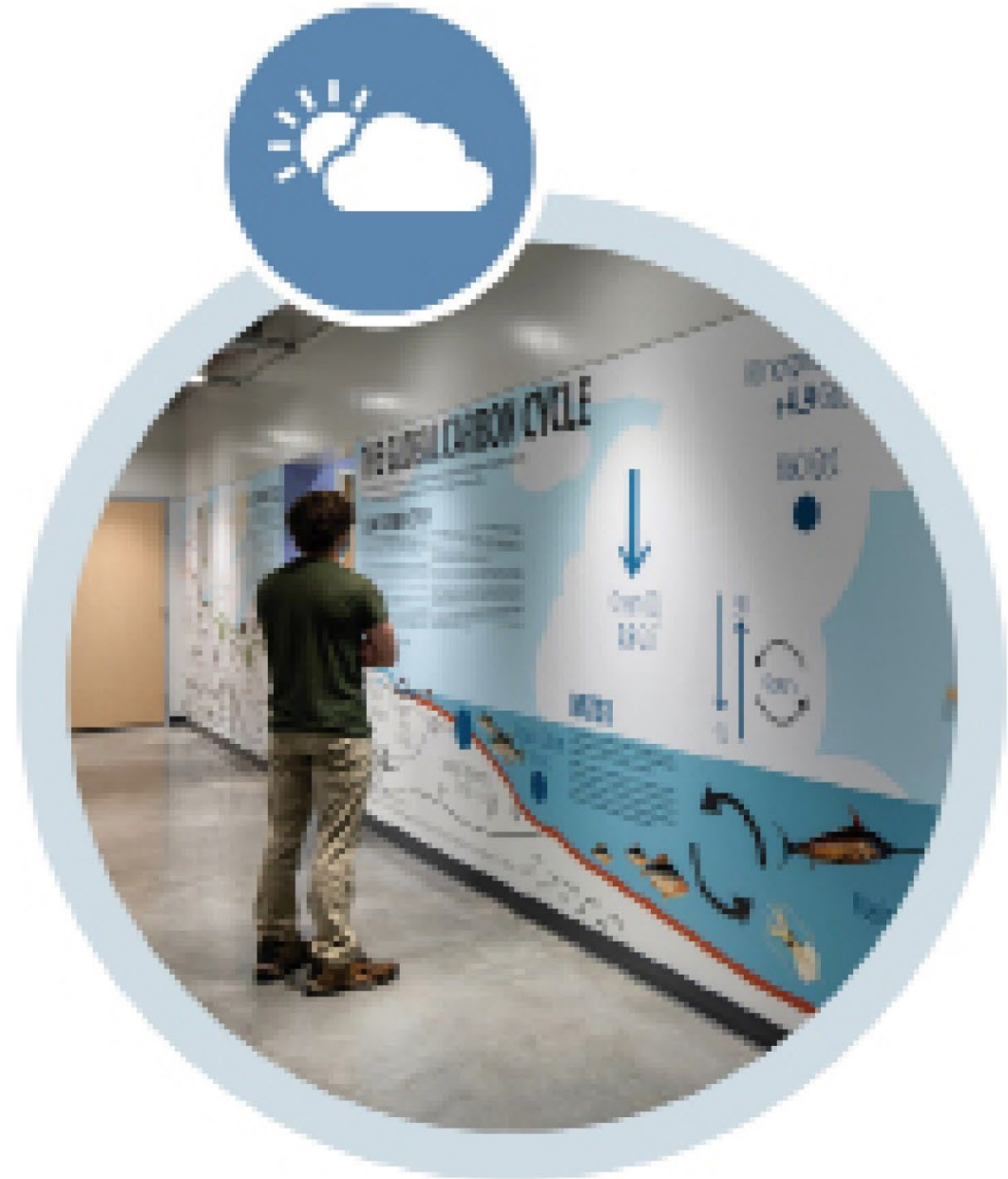






# Climate Health

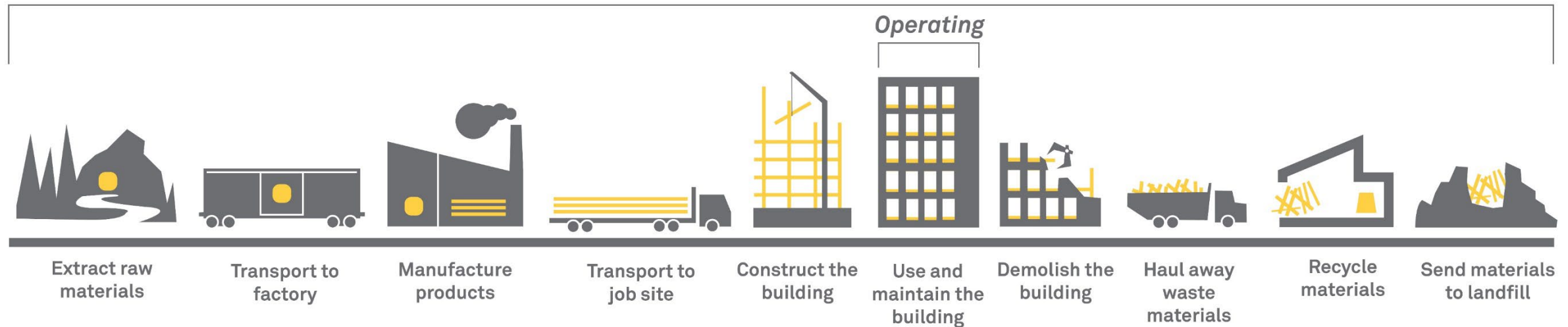
Support **climate health** by preferring products that reduce carbon emissions and ultimately sequester more carbon than emitted.





# Life Cycle Impacts

## Embodied



## Embodied vs Operational Carbon

According to the international panel on climate change (IPCC), global society will have to reduce carbon dioxide (CO<sub>2</sub>) emissions by 45% from 2010 levels by 2030, achieving net-zero carbon emission by 2050. Globally cities occupy about two percent of the planet's land mass but account for up to seventy percent of the greenhouse gas (GHG) emissions.

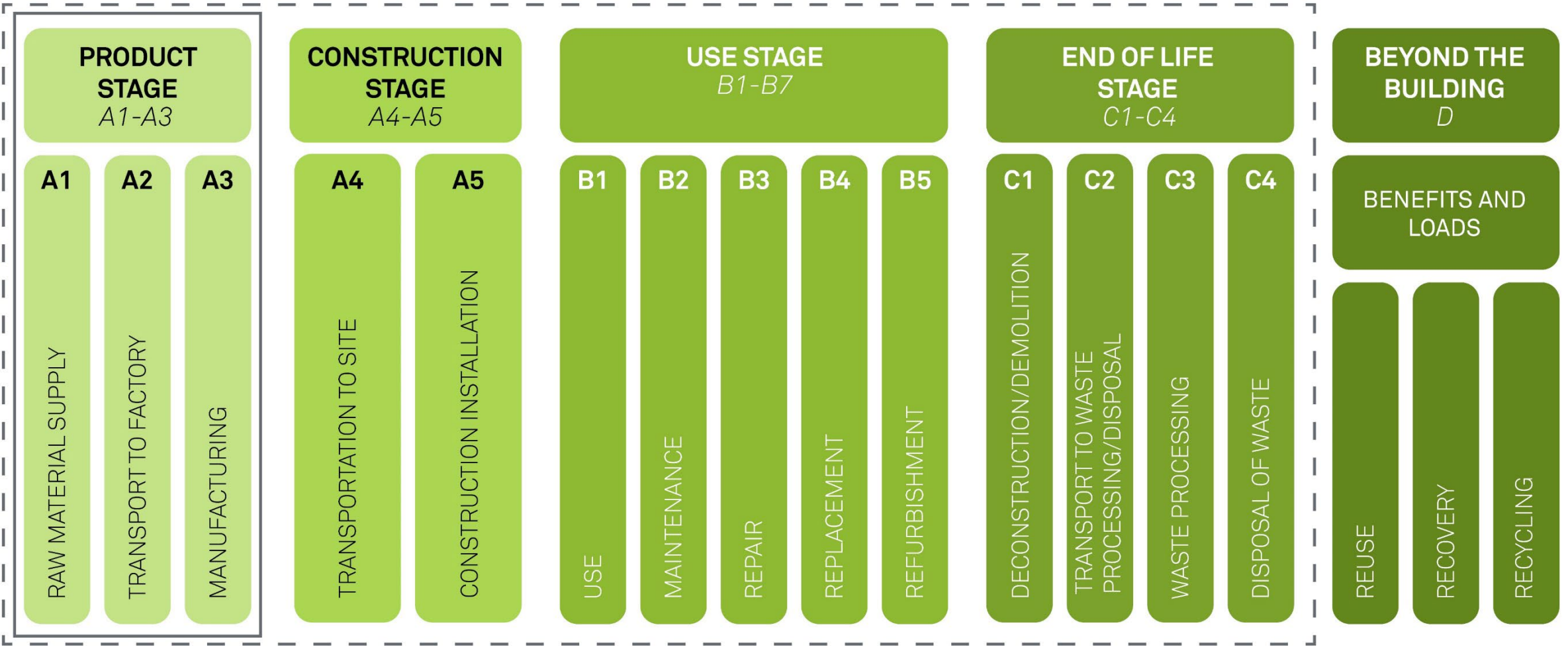


# Life Cycle Impacts

CO<sub>2</sub> (Carbon - all greenhouse gases normalized to carbon equivalent)



EMBEDDED CARBON



OPERATIONAL CARBON

CRADLE-TO-GATE

CRADLE-TO-GRAVE



# Material Transparency- Products Labels

	Human Health	Climate Health	Ecosystem Health	Social Health and Equity	Circular Economy
DECLARE LABEL					
LIVING PRODUCT CHALLENGE					
CRADLE TO CRADLE					
ROHS					
LIGHTING FOR GOOD					
GREEN SCREEN					
HPD					
EPD					



# What is an EPD?



**ABIOTIC  
DEPLETION**



**ACIDIFICATION  
POTENTIAL**



**EUTROPHICATION  
POTENTIAL**



**GLOBAL WARMING  
POTENTIAL**



**OZONE LAYER  
DEPLETION**



**PHOTOCHEMICAL  
OZONE CREATION**



# Why ask for EPDs?



Informed Decision Making



Whole Building Life Cycle Assessment



Benchmarking for Products and Buildings



Metric Based Goals

# WHOLE BUILDING LCA BENCHMARKS

## Benchmarking for Schools

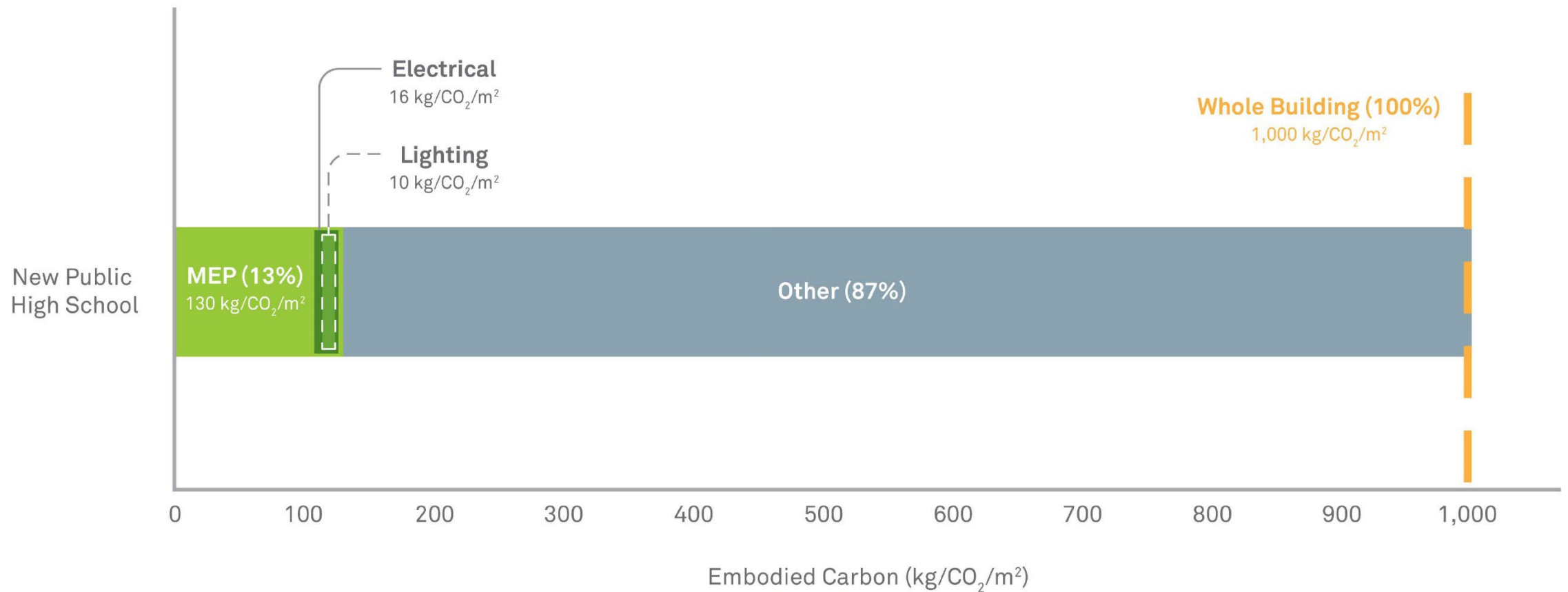
Source	Geographic Region	Life Cycle Scope	Physical Scope	Schools
CLF	North America	A only	Foundation, Structure, Enclosure, Interiors	230-460 kg CO <sub>2</sub> e /m <sup>2</sup>
LETI	UK	A1-A5	Substructure, Superstructure, Facade, Internal finishes, MEP	1000 kg CO <sub>2</sub> e /m <sup>2</sup>
RIBA	UK	A1-A5 B1-B5 C1-C4	Substructure, Superstructure, Finishes/fixed FF&E, Building services (and associated refrigerant leakage)	1400 kg CO <sub>2</sub> e /m <sup>2</sup>
One Click LCA	EUROPE	A1-A3, A4 B1-B5 C1-C4	Varies	380-490 kg CO <sub>2</sub> e /m <sup>2</sup>

<https://carbonleadershipforum.org/toolkit-2-measuring/>





# Life Cycle Assessment



Information from:

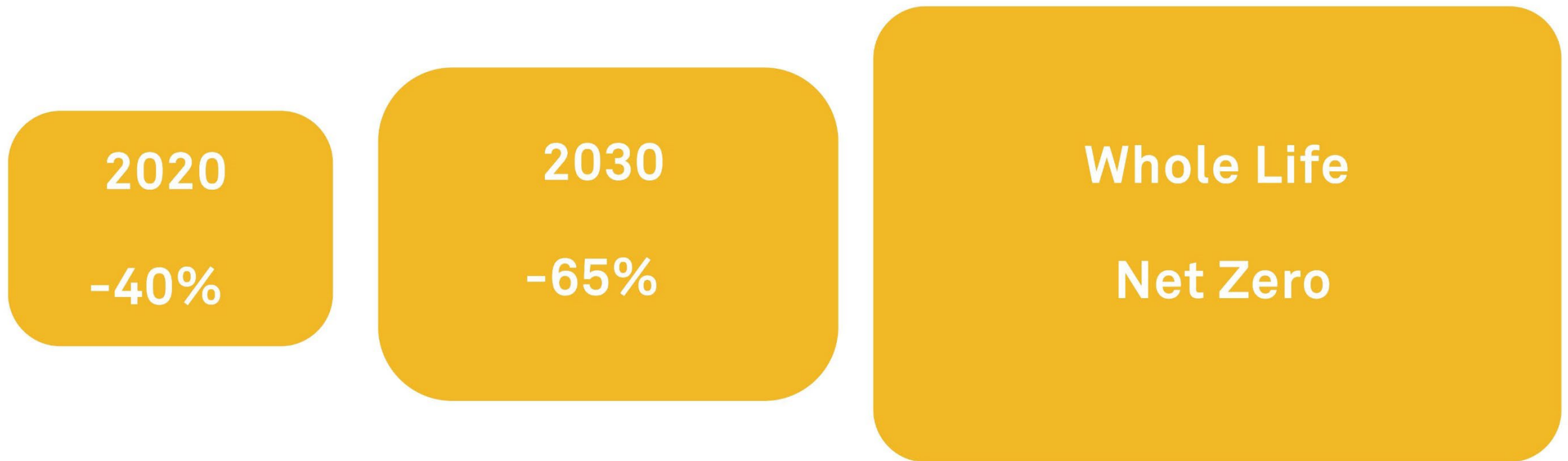
Hamot, L. (2021, November 20). Getting to grips with whole-life carbon. Retrieved from CIBSE Journal : <https://www.cibsejournal.com/general/getting-to-grips-with-whole-life-carbon/>

(2019). Life Cycle Assessment of Mechanical, Electrical and Plumbing in Commercial Office Buildings. The Carbon Leadership Forum.

London Energy Transformation Initiative . (2020). LETI Embodied Carbon Primer Supplementary Guidance to the Climate Emergency Guide. London: London Energy



# Long Term Embodied Carbon Goals



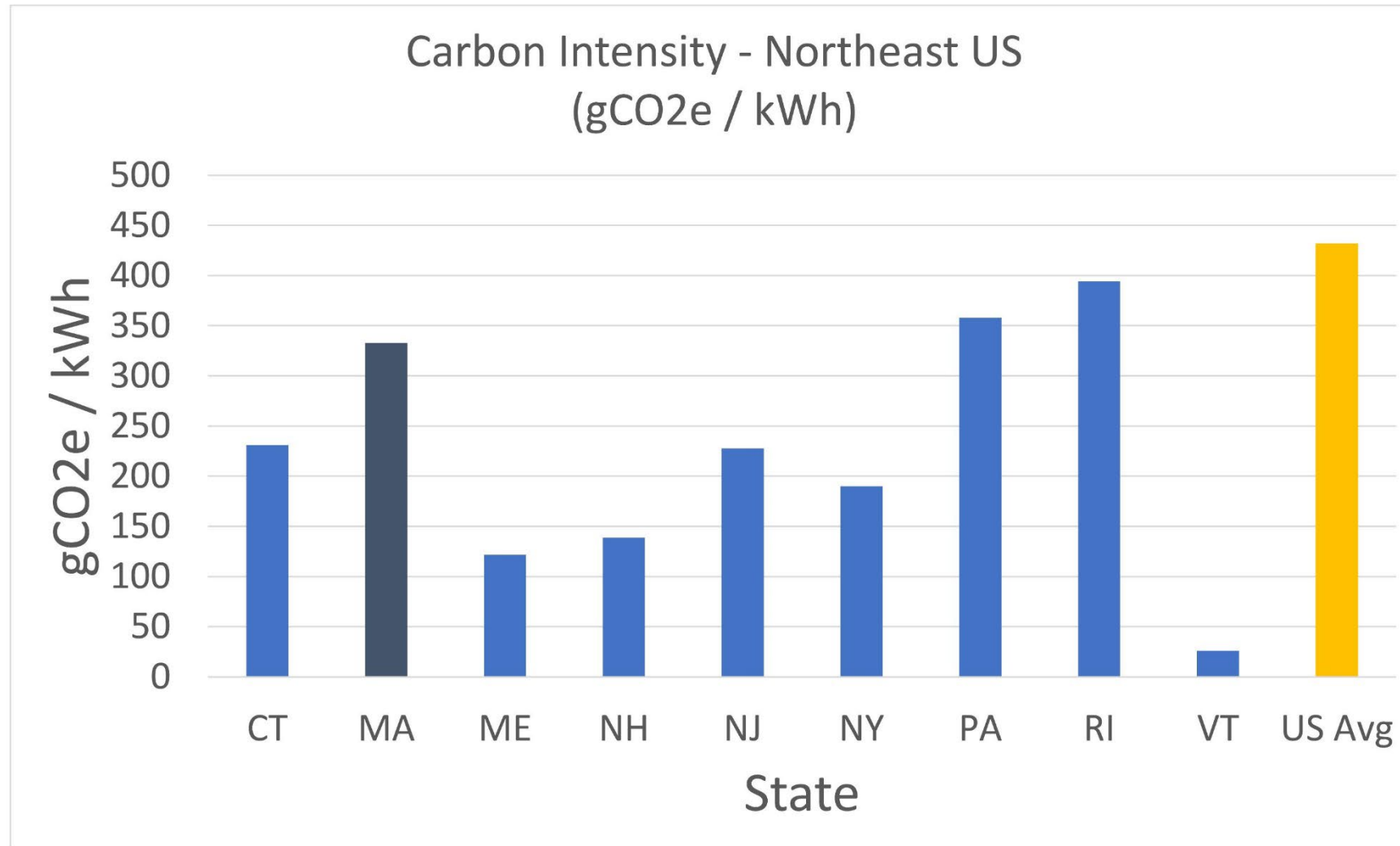
Information from:

London Energy Transformation Initiative . (2020). LETI Embodied Carbon Primer Supplementary Guidance to the Climate Emergency Guide. London: London Energy Transformation Initiative .

Pak, A. (2022, 1 1). Embodied Carbon: Key Considerations for Key Materials. Retrieved from Canadian Architect : <https://www.canadianarchitect.com/embodied-carbon-key->



# Embodied and Operational Carbon



Information from EPA EGrid 2018, via Pak, A. (2022, 1 1). Embodied Carbon: Key Considerations for Key Materials. Retrieved from Canadian Architect : <https://www.canadianarchitect.com/embodied-carbon-key-considerations-for-key-materials/>



# Material Transparency - Standards

	Human Health	Climate Health	Ecosystem Health	Social Health and Equity	Circular Economy
LEED					
WELL					
CHPS					
Living Building Challenge					
Passive House					



# Resources



CERTIFIED  
40 - 49 POINTS



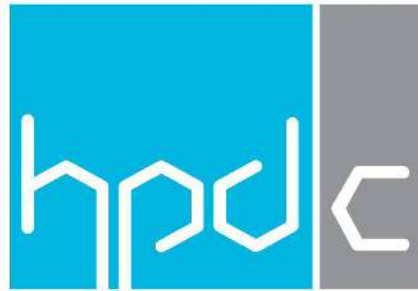
SILVER  
50 - 59 POINTS



GOLD  
60 - 79 POINTS



PLATINUM  
80+ POINTS



PLATINUM



GOLD



SILVER



LIVING BUILDING CHALLENGE™





# Why Lighting?



# Whose Footprint is that?

## Embodied Carbon and Sustainable Lighting Design

**Nathaniel Jones**

24 May 2022

# Who saves the most carbon?

**Teleconference instead of flying New York to London**

**Adopt a vegan diet**

**Stop driving for one year**

**Reduce embodied carbon in one architect's work for one year by 1%**



# Who saves the most carbon?

**Teleconference instead of  
flying New York to London**

**1,500 kg CO<sub>2</sub>e**

**Adopt a vegan diet**

**2,000 kg CO<sub>2</sub>e**

**Stop driving for one year**

**3,000 kg CO<sub>2</sub>e**

**Reduce embodied carbon in  
one architect's work for one  
year by 1%**

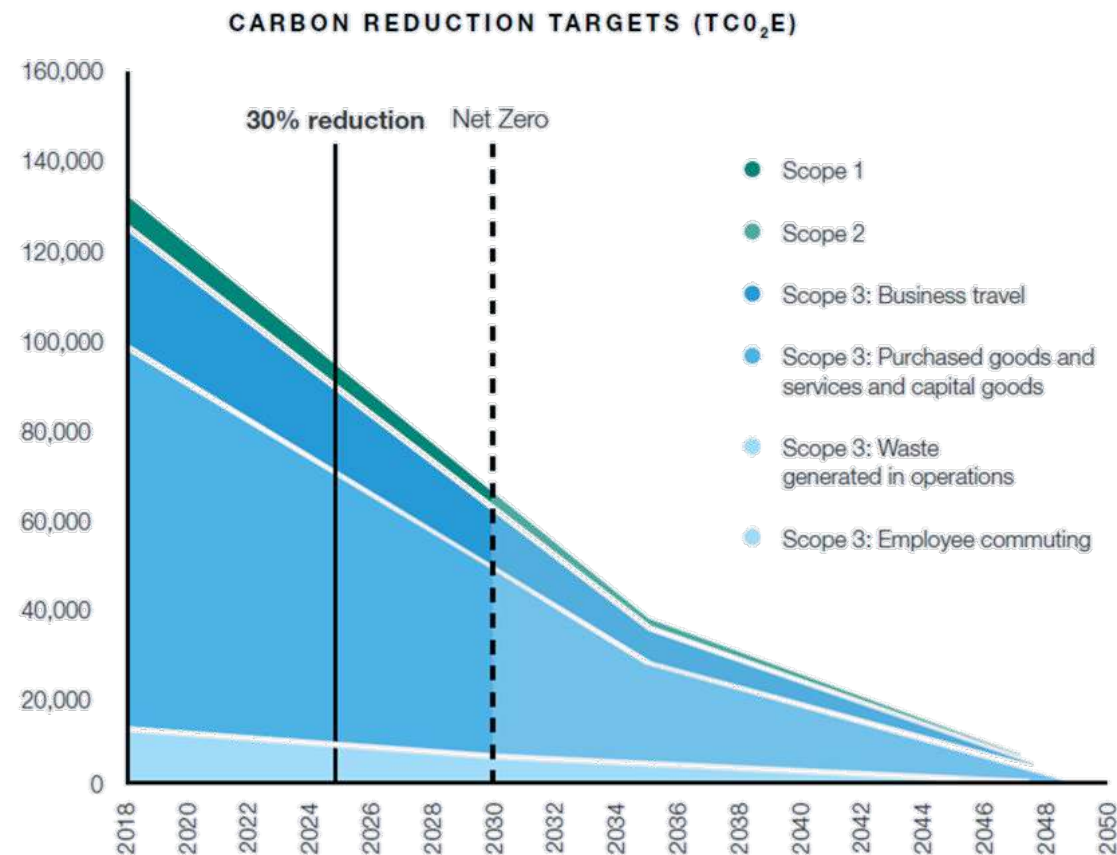
**12,000 kg CO<sub>2</sub>e**

# Our net zero carbon strategy

A better way

At Arup, we aim to reduce our carbon footprint by **30%**

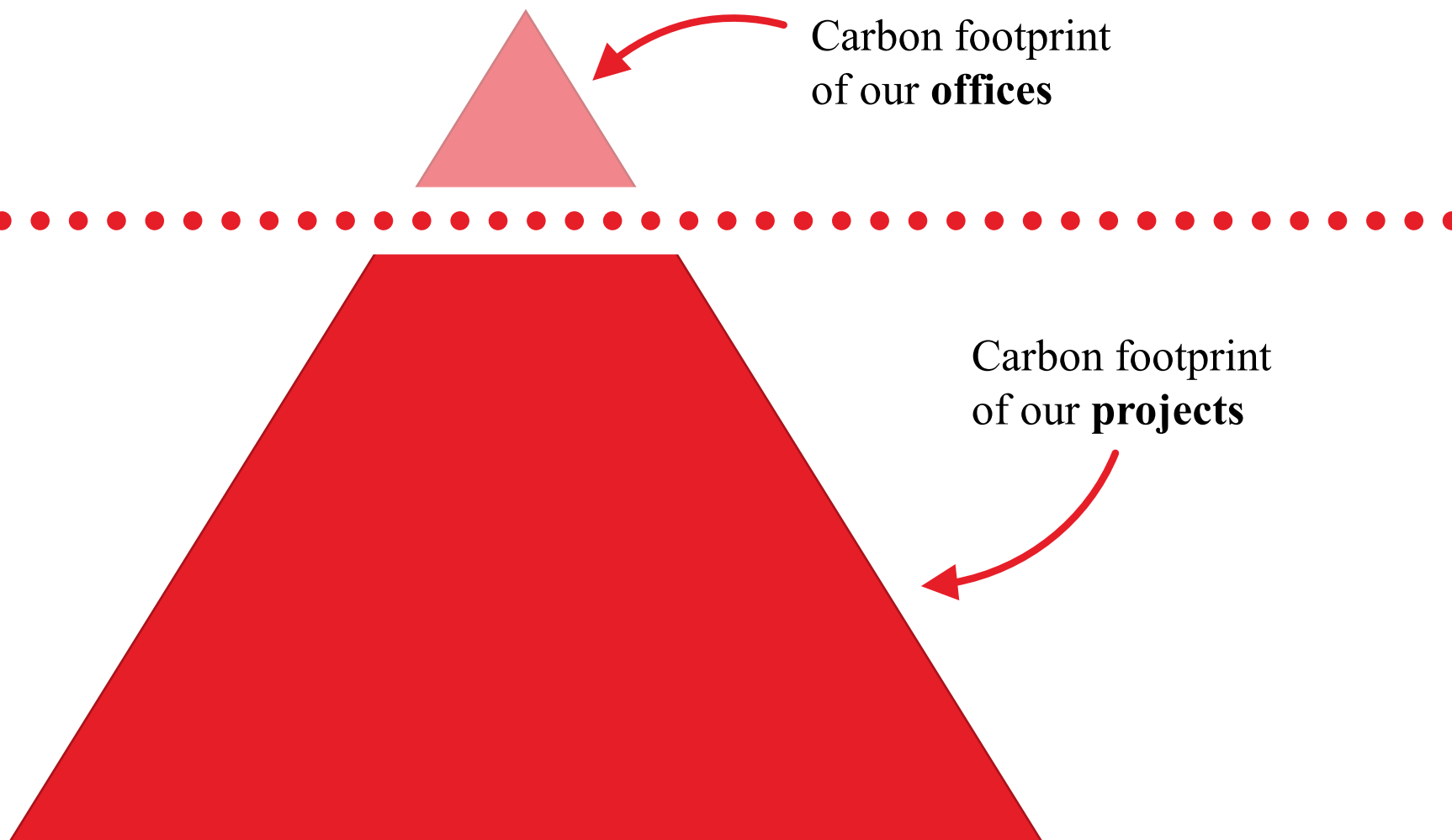
- Reducing purchasing and catering
- Flexible working
- Reduced business travel
- Electric car reliance
- Renewable energy sourcing



# Our reach

Control

Influence



# Arup Zero

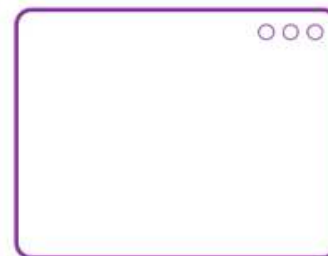
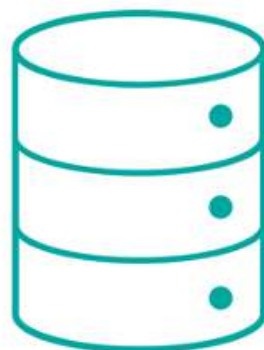
## Veracity

Stores non-project information used within the Zero platform

- Benchmarks
- High-level assessment assemblies
- Material factors
- Utility factors
- etc.

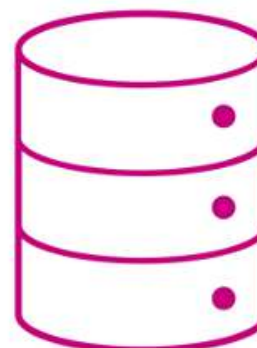
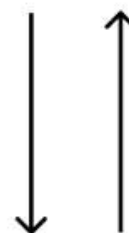
## Veracity CMS UI

For data owners to manage recommended non-project data



## Zero

UI for carbon data for buildings projects

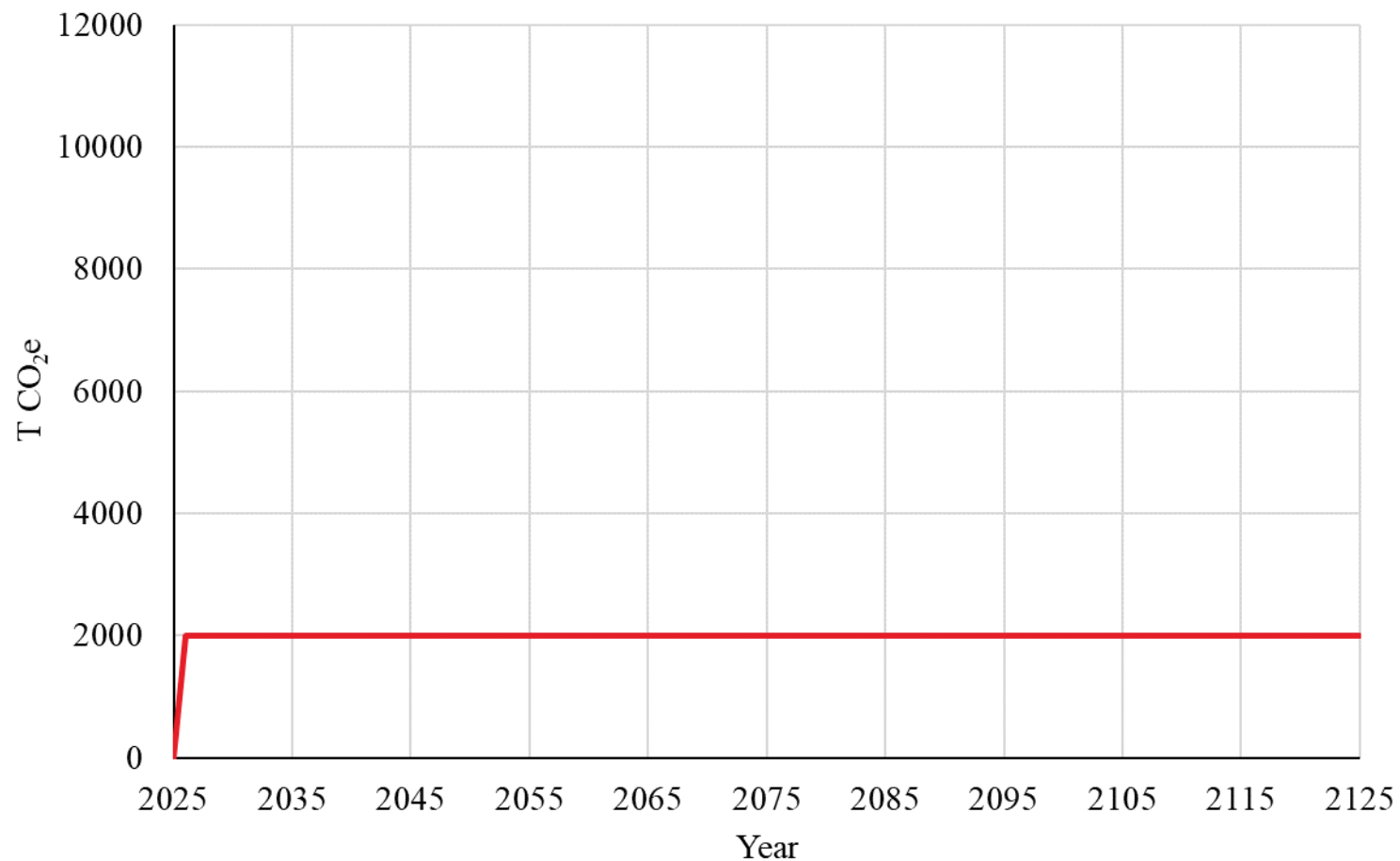


## DDB:

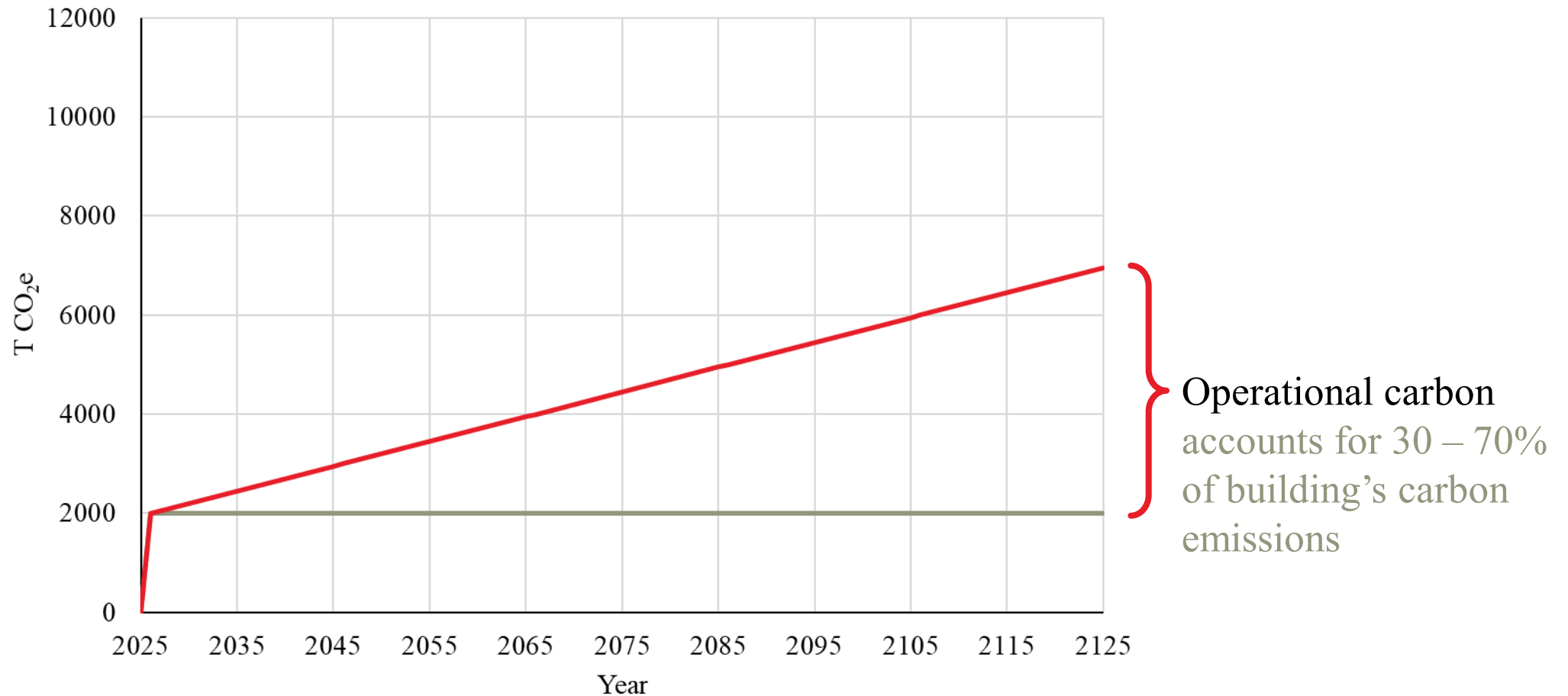
Stores project data created by or submitted through Zero

- Asset structure
- Detailed Assessment output
- High-level assessment output
- Benchmark output
- System meta-data
- etc.

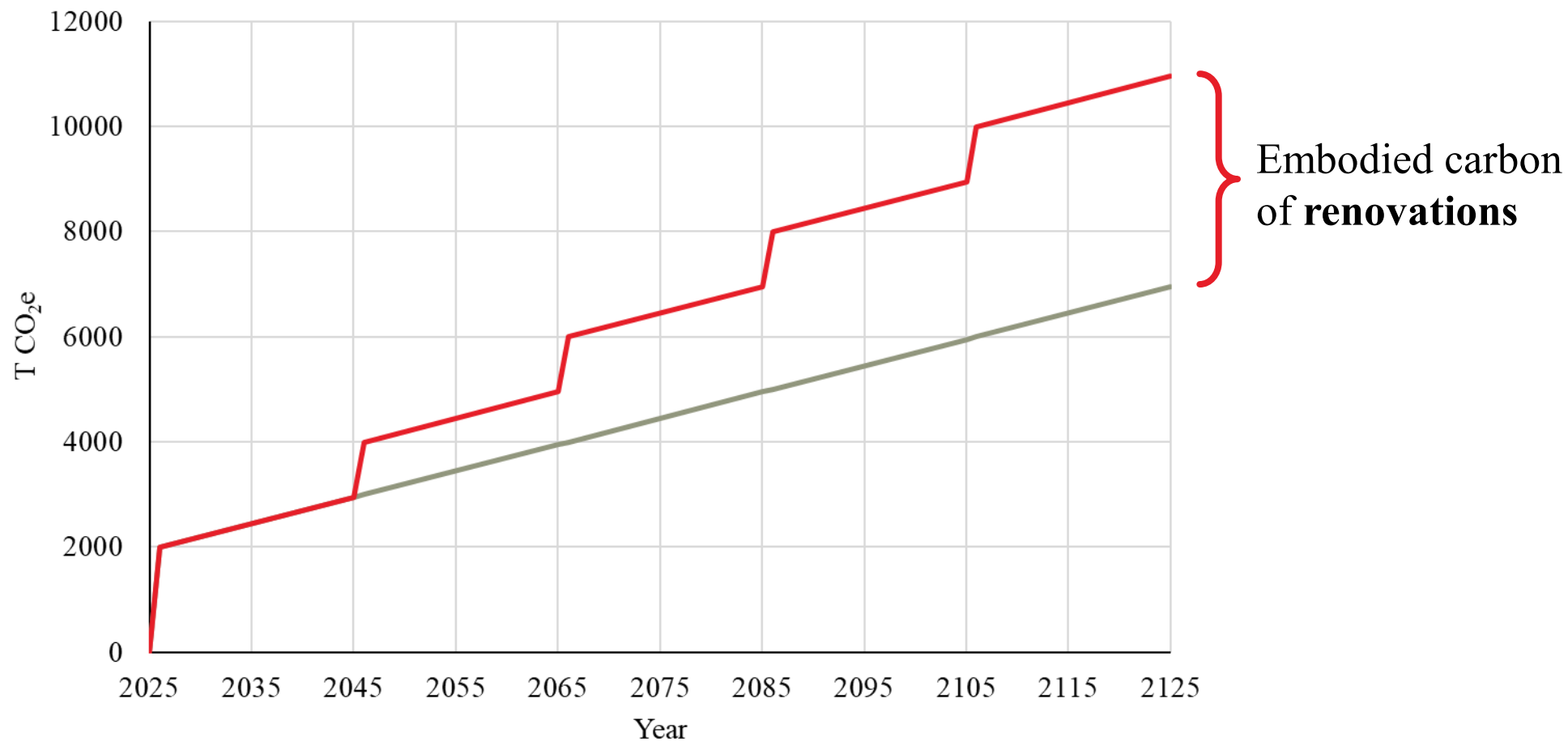
# Life of a building in carbon



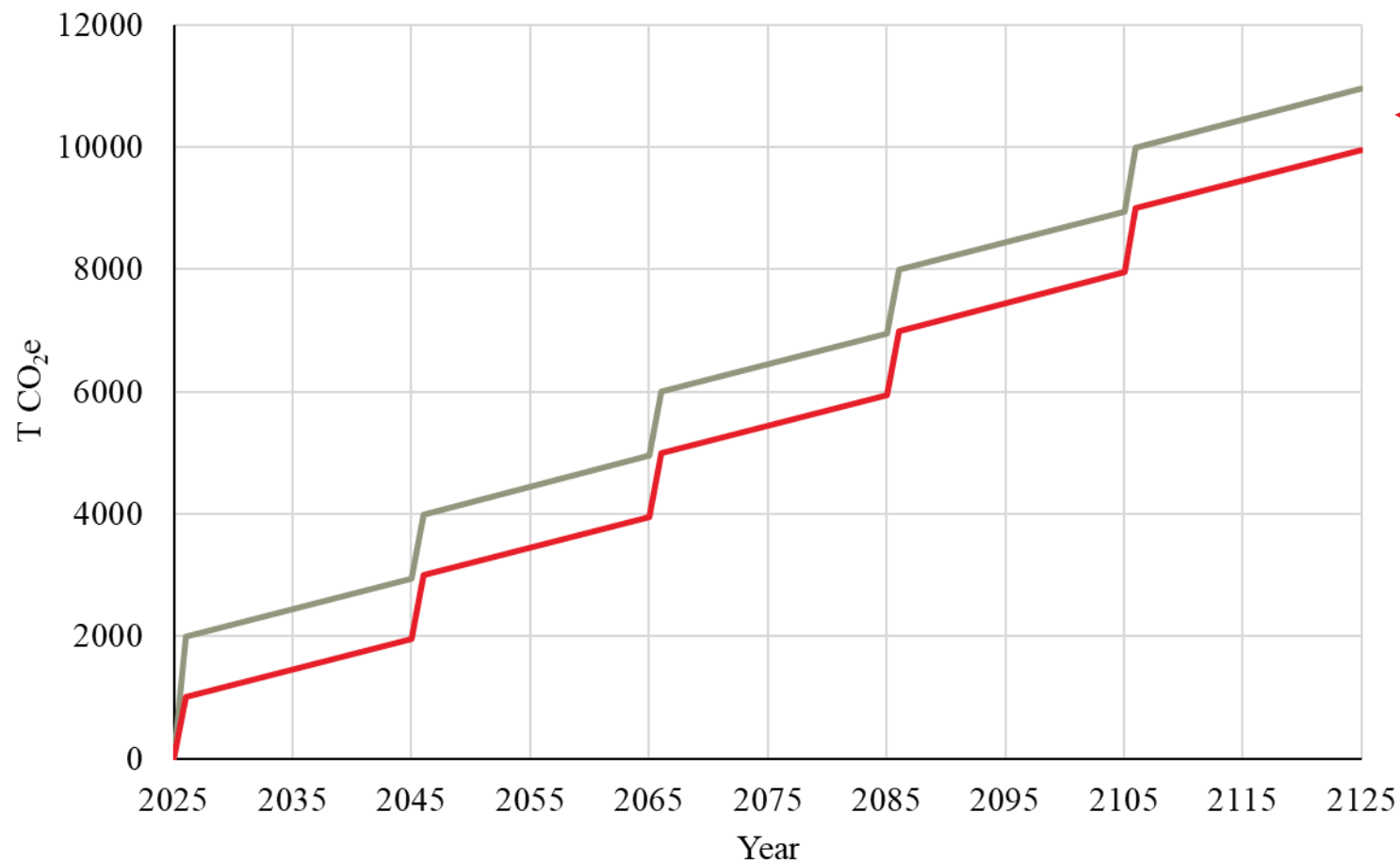
# Life of a building in carbon



# Life of a building in carbon



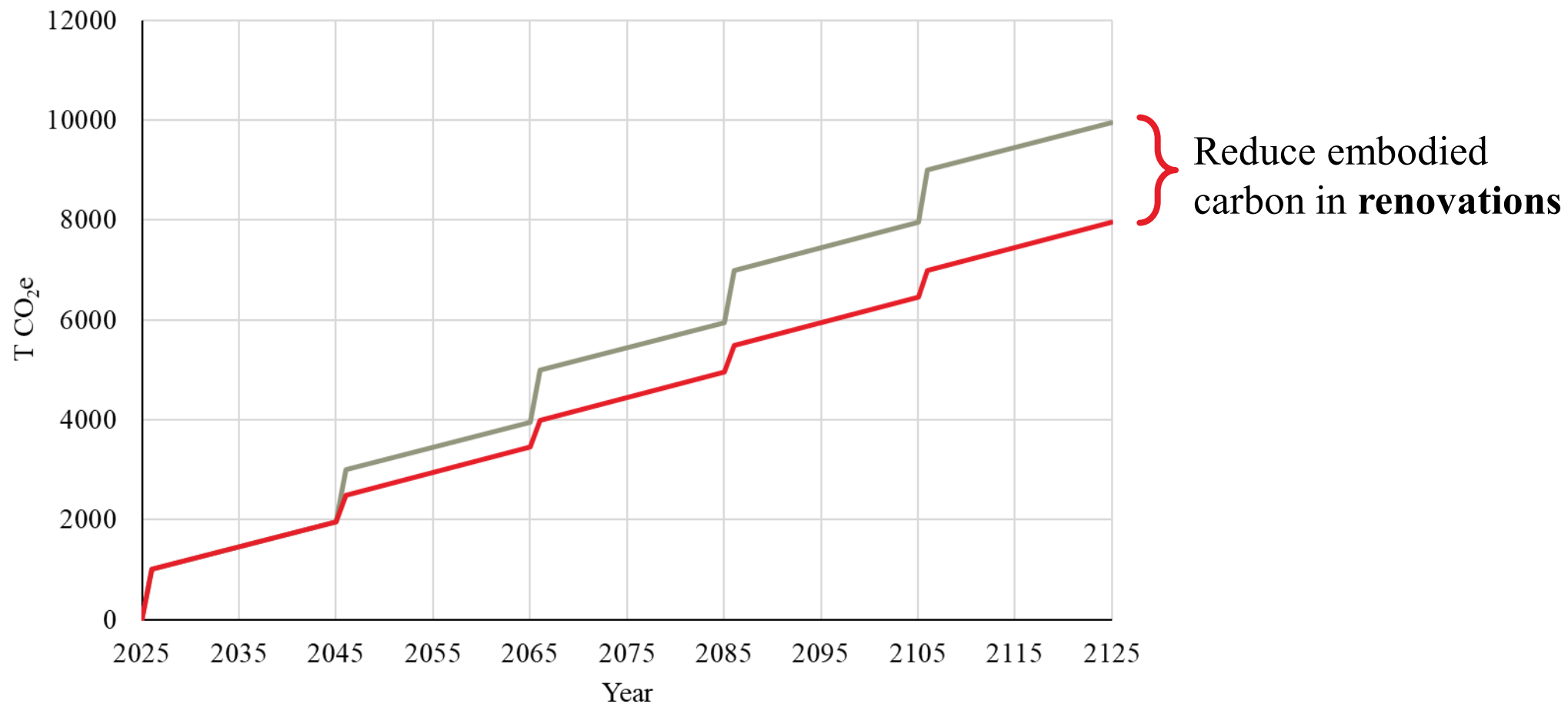
# Life of a building in carbon



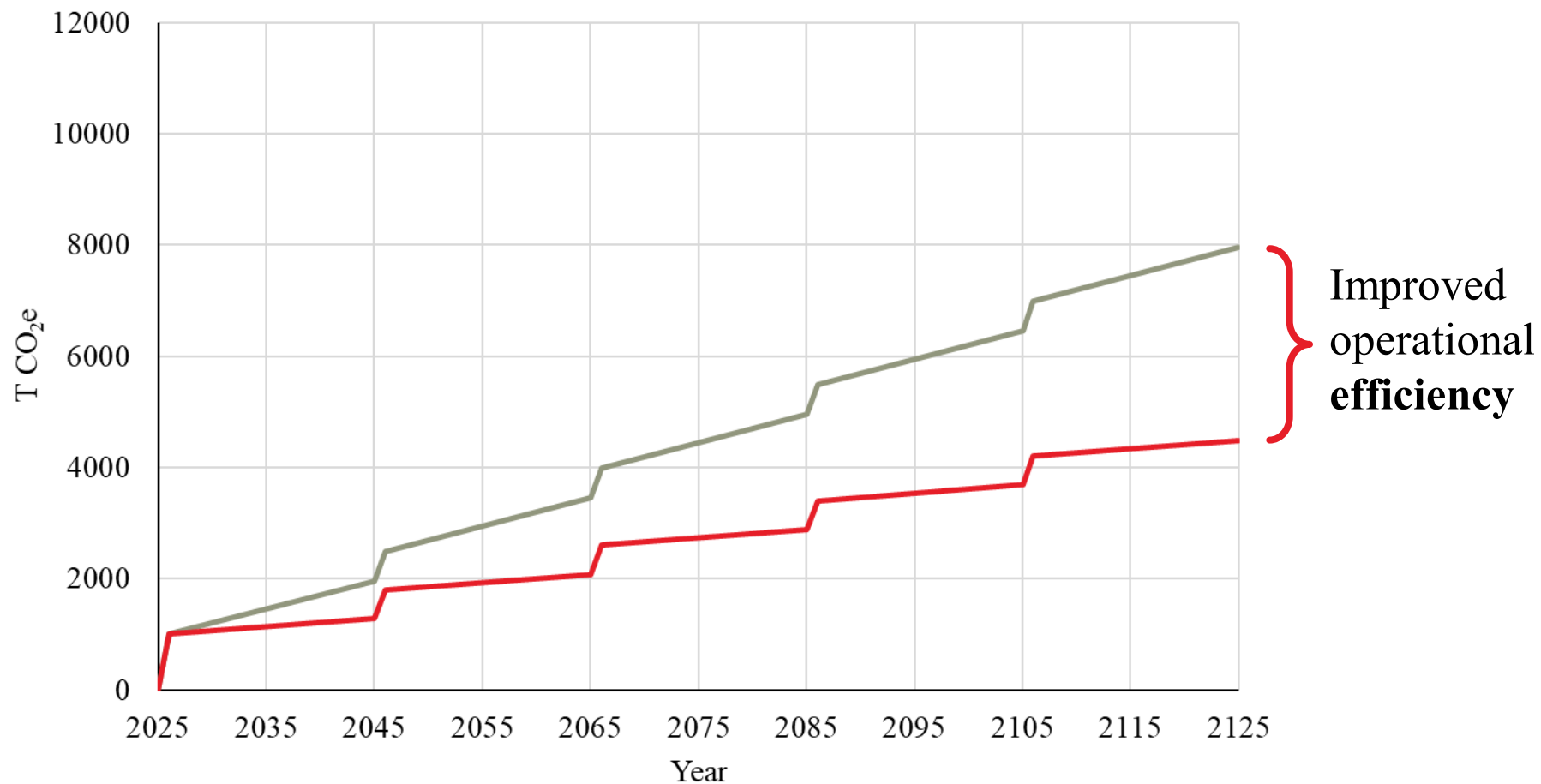
Reduce embodied  
carbon in **construction**



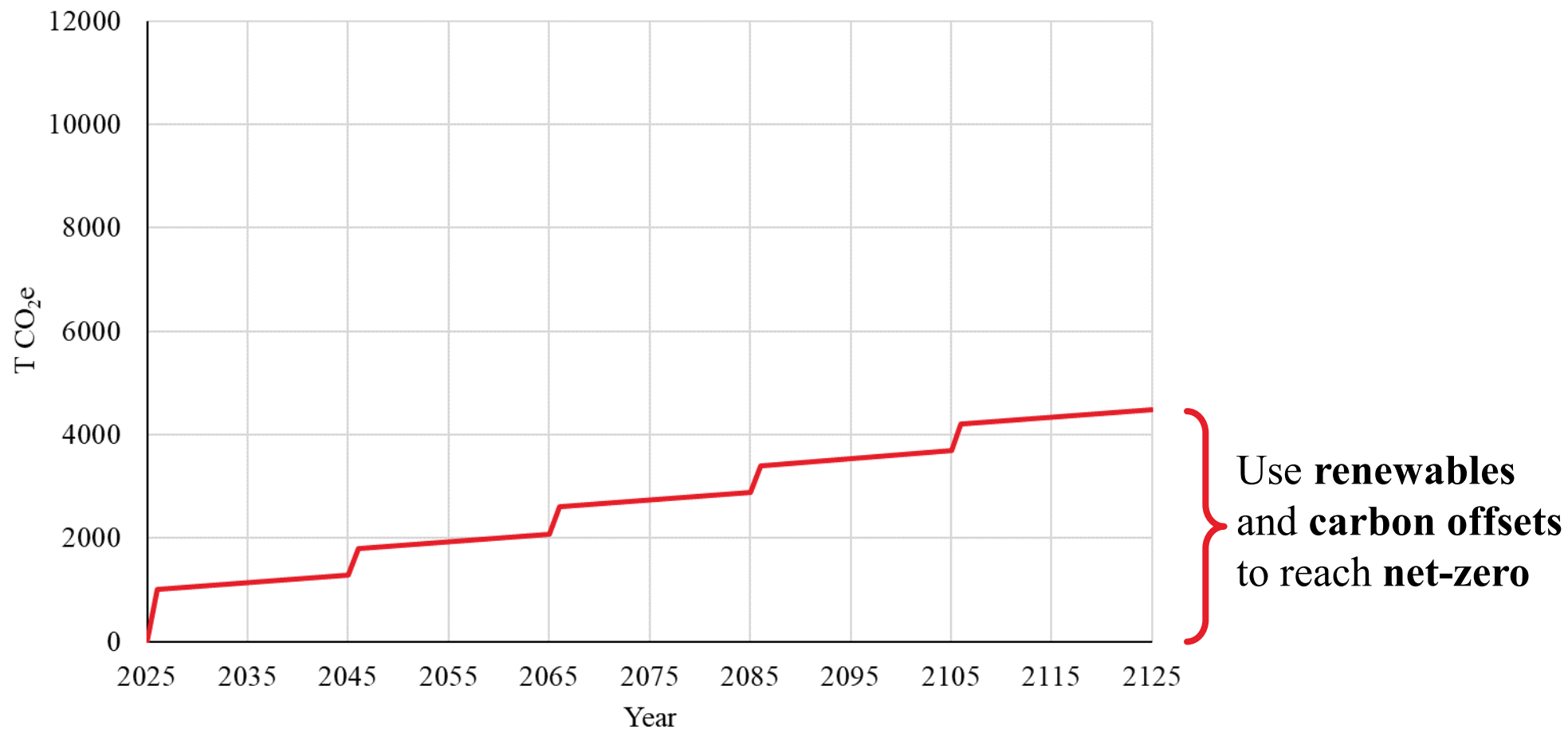
# Life of a building in carbon



# Life of a building in carbon



# Life of a building in carbon



# Circular lighting design principles

## 0. Daylight

Buildings and interiors should be designed for daylight first.



## 1. Circle of lighting materials

Lighting products can be up or down cycled, or, as a last resort, re-cycled.



## 2. An adaptable system

Lighting systems must adapt to changes in layouts, functions and programs.



## 3. Higher flexibility, higher resilience

Lighting must accommodate variable functions and uses throughout the day.

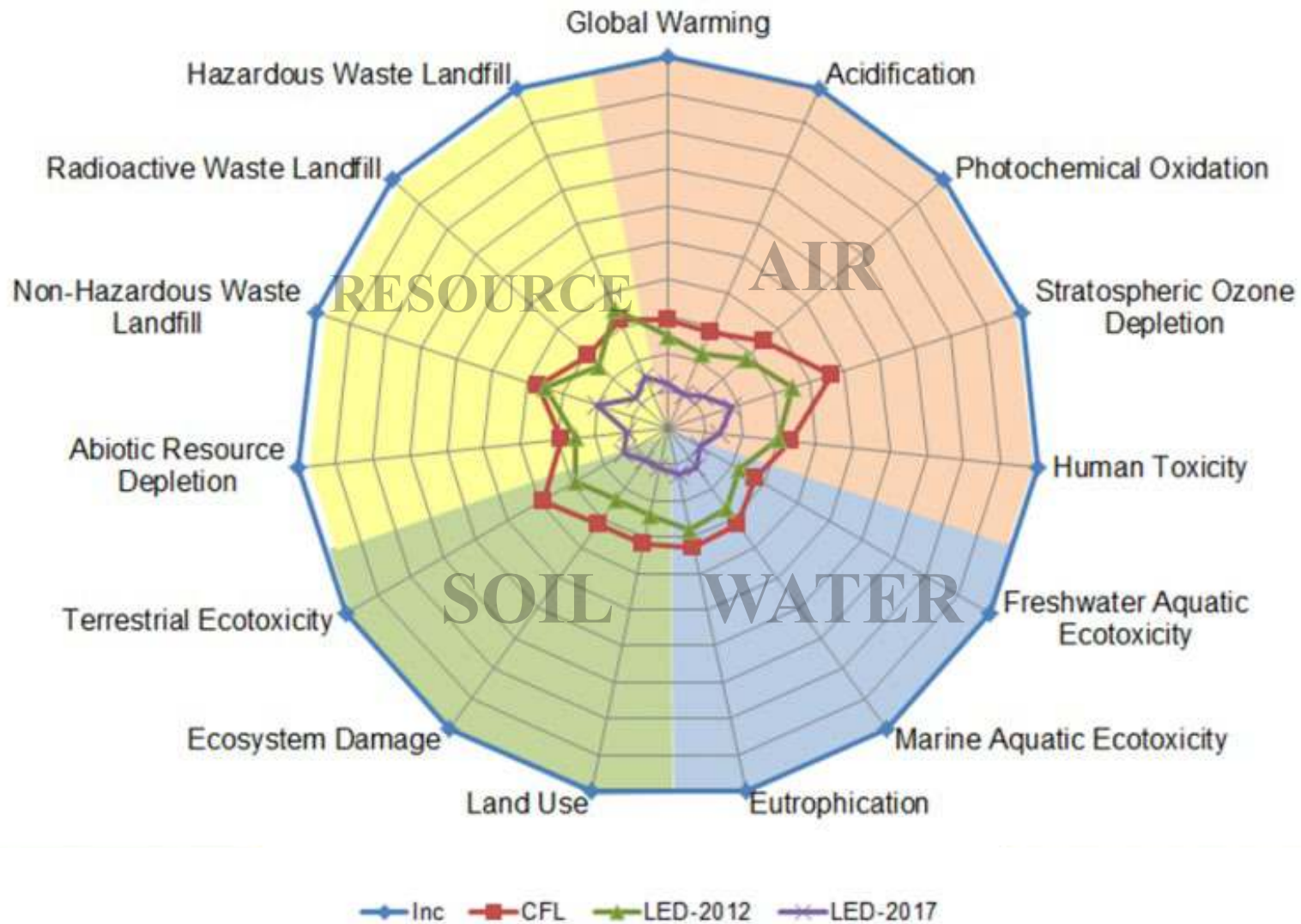


## 4. High quality design

The quality of the lighting design has a significant impact on the longevity of its use.

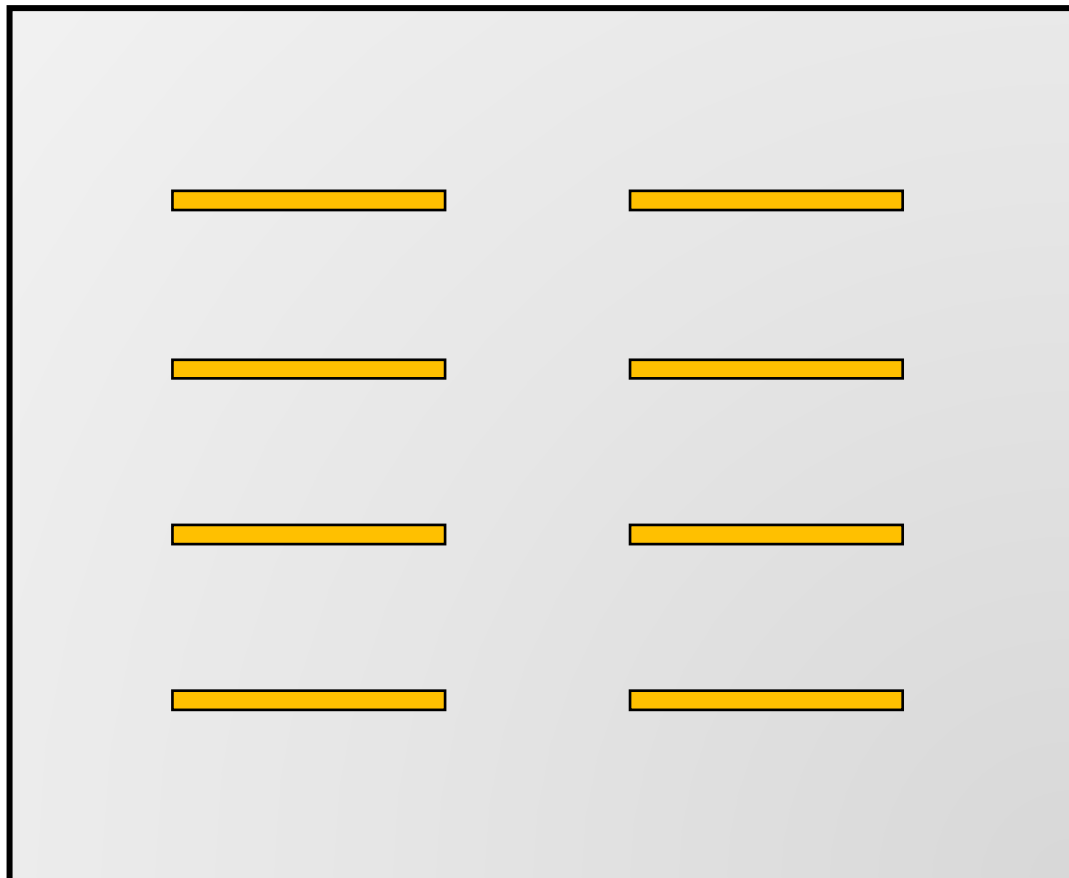


# Why LEDs?

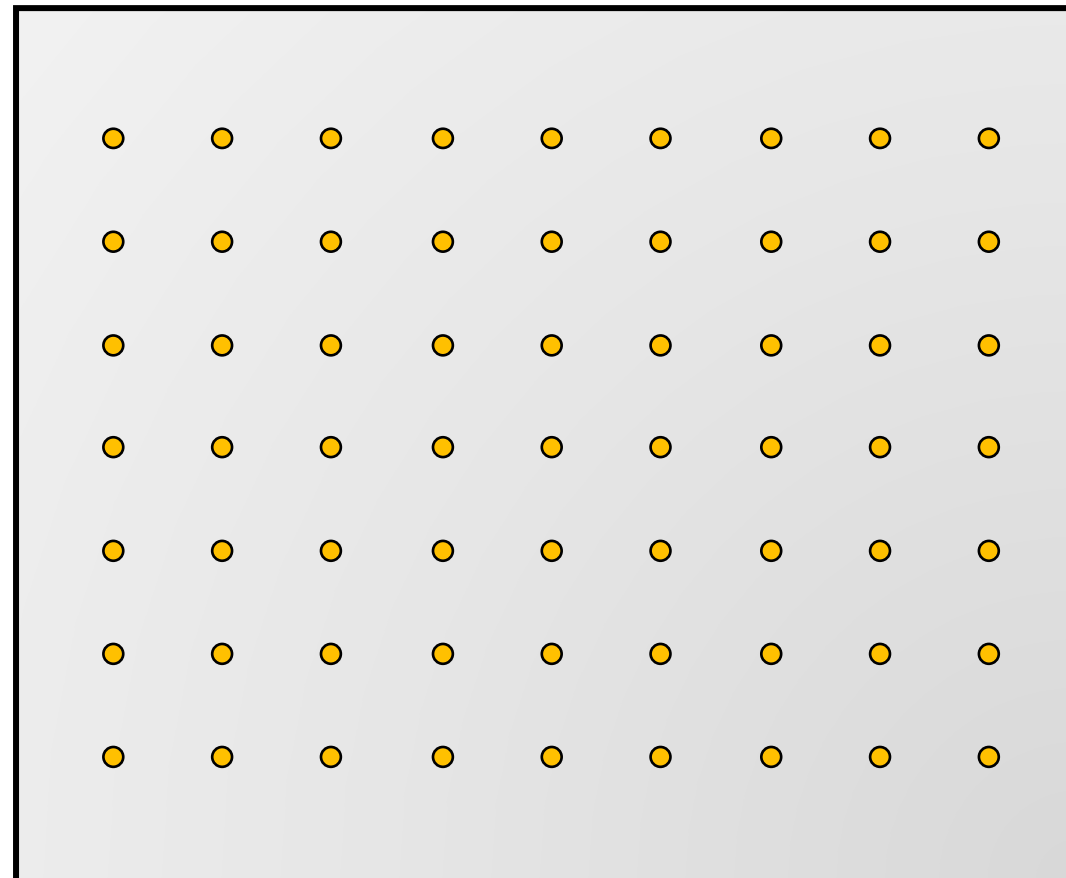


# Fixture selection

## Linear fixtures



## Spot fixtures



# Factory location



# Got an EPD?

Building assessment information (x = included in LCA MND = module not declared)																
Building life cycle information																Supplementary information beyond the building life cycle
Product Stage			Construction Process Stage		Use-stage							End-of-Life Stage			Benefits and loads beyond the system boundary	
Raw material supply	Transport	Manufacturing	Transport to building site	Construction installation process	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	Deconstruction / demolition	Transport	Waste processing	Disposal	Reuse, recovery or recycling potential
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
X			X	X	MND	MND	MND	X	MND	X	MND	MND	X	X	X	X





# Amorepacific Headquarters

# Development of a modular luminaire system

## Key collaborators

David Chipperfield Architects

## Manufacturer

Viabizzuno

## Key facts

12 different light distributions

30 possible combinations

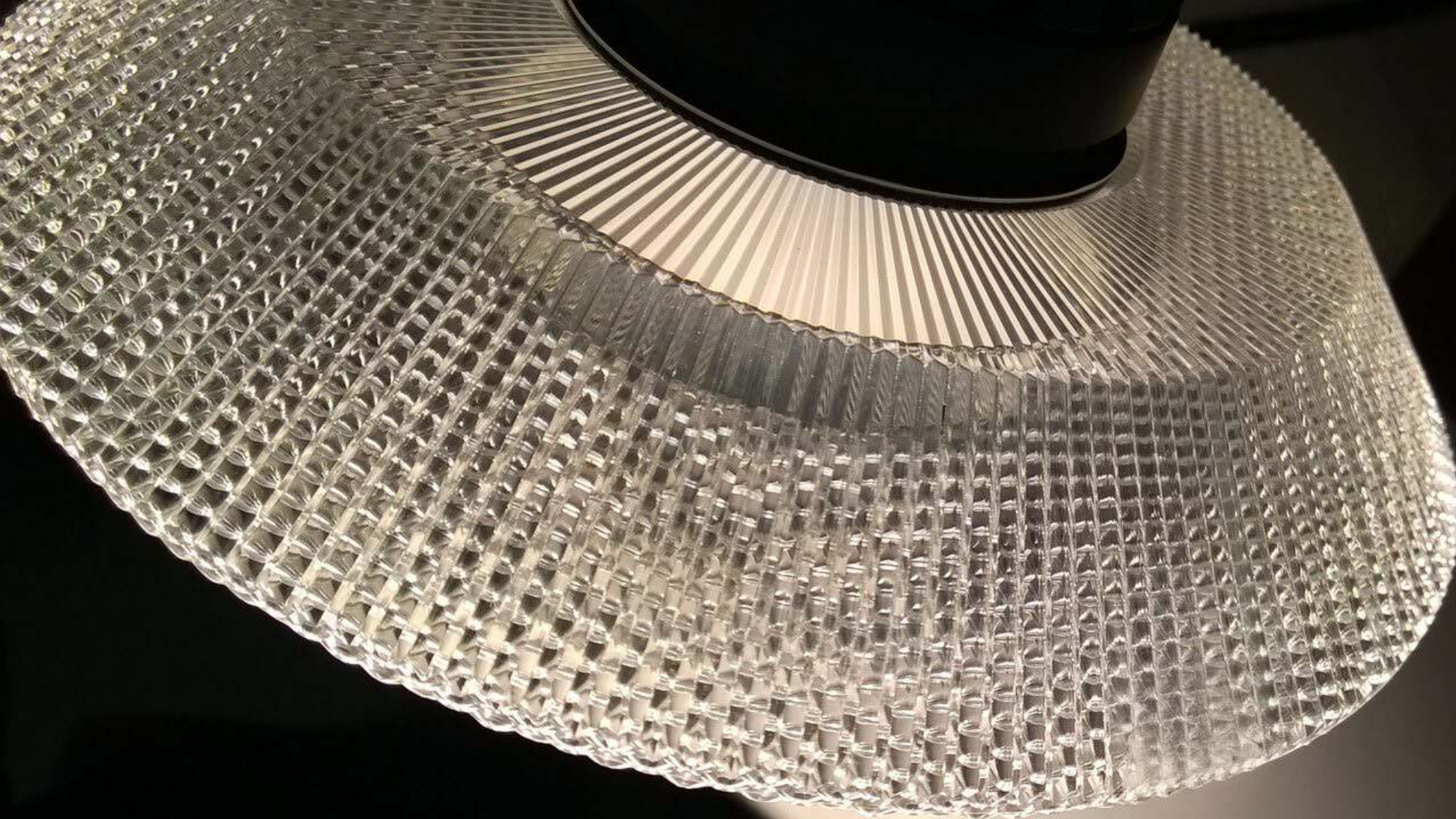
100% replaceable components



ARUP



ARUP



# Design principles in action



## Daylight

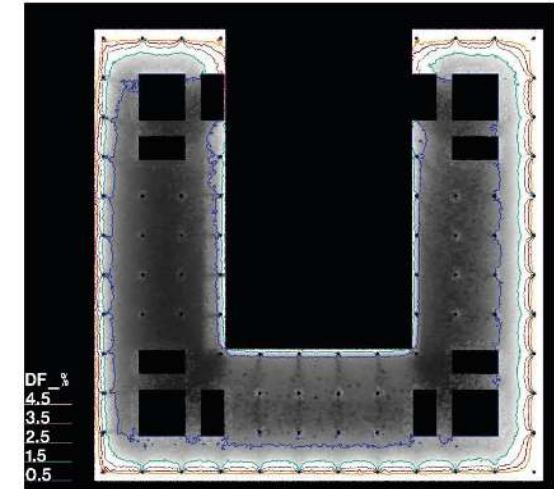
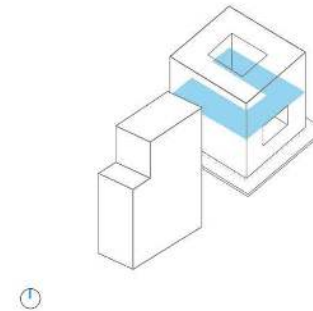
Windows and skylights maximize daylight availability

Three “garden” atria for daylight and natural ventilation

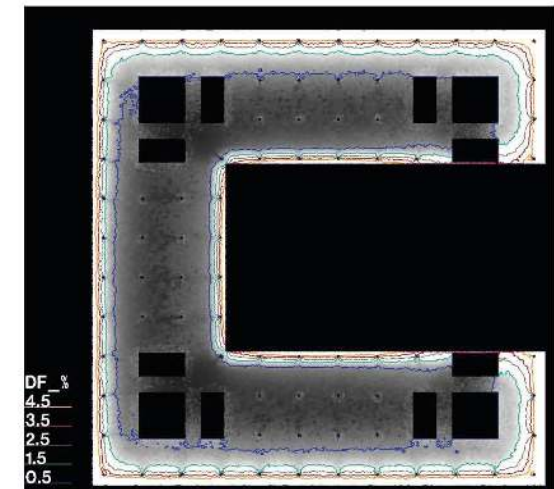
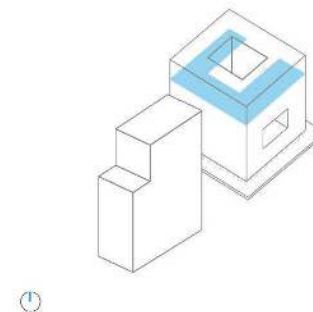
Integrated photovoltaics

LEED Gold rating achieved

11th Floor



17th Floor



# Design principles in action



## Circle of lighting materials

Reduced material quantity  
Replaceable components  
Single manufacturer

## Adaptable system

Swappable parts to achieve different looks  
28 different brands and 7,000 occupants under one roof



## Higher flexibility, higher resilience

Lens adaptable to multiple uses  
Long-lasting LEDs

## High quality design

Multiple “atmospheres” created  
Optics designed for controlled lighting distribution



# Luminaire Broker

Step 1 -  
Create searches



Step 2 -  
Shortlist favourites



Step 3 -  
Choose best match



Luminaire Broker



What are the

Strategies for  
change?





# STRATEGIES TO CREATE CHANGE



# OTHER EXAMPLES TO FOLLOW

ARCHITECTURE

INTERIOR DESIGN

CARPET

FURNITURE

CEILINGS

**2012**  
**A+D Letters**

To Manufacturers asking for material transparency



**2019**  
**AIA Materials Pledge**

Public launch



**2022**  
**Lrg Increase in Fixtures w/ transparency labels**  
Available in the lighting market

The Manufacturing Collaboration

**LP50 Formed 2018**



**LP 50**

Public launch  
Inspired by LP50 + Materials Pledge

**Lighting Advocacy Letter 2021**



Future Benchmark  
**Lighting Included on Whole Bldg LCA's 2024**



# WHAT'S POSSIBLE?

(ROHS + HPDs)

DECLARE + EPDs

**INCLUSION IN LCAs**

# WHAT LIGHTING SPECIFIERS WANT:

- TRANSPARENCY – LABELS + DOCUMENTATION
  - PROCESS, PRODUCT, END OF LIFE
- PRODUCTS THAT ARE:
  - DESIGNED TO HAVE LOW CARBON FOOTPRINTS
  - PRODUCED WITH SUSTAINABLE, HUMANE PROCESSES
  - READILY AVAILABLE AT AFFORDABLE PRICES

# LIGHTING ADVOCACY LETTER: WHAT LIGHTING SPECIFIERS WANT



Register for our upcoming webinar about the Lighting Advocacy Letter and supporting toolkits at 2p Pacific / 5p Eastern on March 3rd.

## ABOUT THE LIGHTING ADVOCACY LETTER

The Lighting Advocacy Letter is an initiative by lighting specifiers to accelerate the sustainability of lighting products. Inspired by the AIA Materials Pledge, the letter is intended to inspire a collective dialogue with the lighting manufacturing community about how to align intent and action around a common framework for sustainability. If you are a lighting designer or specifier, signing this letter is your opportunity to publicly commit to making more informed material choices and specification changes and supporting an ongoing dialogue with manufacturers to reduce the impacts of the built environment.

July 14, 2021

## LIGHTING ADVOCACY LETTER

Dear Lighting Manufacturer,

As members of the lighting specifier community, we are working to accelerate a transformation in the manufacturing industry. Inspired by the 2019 AIA Materials Pledge, we are united across disciplines in a common goal: ensuring that healthy, high performing luminaires become the industry standard. We all want our projects to positively impact human health, the climate, the environment, and society.

As designers and specifiers, we are committed to the five areas of concern in the 2019 AIA Materials Pledge:

- **Human Health** - Preferring products which support and foster life throughout their life cycles and seek to eliminate the use of substances that are hazardous to humans.
- **Climate Health** - Selecting/giving preference to products with lower embodied carbon.
- **Ecosystem Health** - Preferring products which sustain and regenerate the natural air, water, and biological cycles of life through thoughtful supply chain management and restorative company practices.
- **Social Health and Equity** - Preferring products from manufacturers who secure human rights in their operations and supply chains, and which provide positive impacts for their workers and the communities where they operate.
- **Circular Economy** - Preferring products that are designed for long life, with end-of-life solutions in mind and enabling a closed-loop manufacturing cycle.

To address these concerns and meet our goal of transforming the industry, we commit to continuously updating our specifications and sharing best practices, tools, and education to require transparency on material content and optimized luminaires. We further commit to giving priority in our specifications to these products and manufacturers that:

- Provide publicly available material ingredient disclosure information
- Provide publicly available environmental impact disclosure information
- Do not stop at material transparency, but strive for optimization

To achieve this goal, we must work together as designers, specifiers, building owners, developers, manufacturers, and contractors to build awareness, share knowledge, drive demand, and deliver solutions. We ask you as responsible manufacturers for your commitment to working towards luminaire industry transformation. To accelerate this mission and to leverage cross-industry insight and expertise, we seek your partnership in advancing this conversation at upcoming industry conferences and trade shows.

We value our relationship with each of you and understand that the change we seek will not be accomplished overnight. Please join us in continued dialogue and collaboration as we learn from each other and improve our lighting industry together.

Sincerely,

LIGHTING MATERIALS PLEDGE SIGNATORIES



## WHY ARE WE ASKING FOR EPDS, HPDS, DECLARE?

- **They are already accepted and prevalent in other trades**
- **There's an established process**
- **It creates a baseline, and an opportunity to look at process + practices in a structured way**

# THE IMPORTANCE OF THIRD-PARTY VERIFICATION

- Not all labels, declarations & certifications are 3rd party verified
- Allows “apples to apples” comparisons





# ACTION STEPS FOR MANUFACTURERS



JOIN US  
OCTOBER 18!



OCT  
18

## Lighting the Way: Sharing Experiences + Lessons Learned

by [mindful MATERIALS](#)

41 followers

[Follow](#)

Free



On Sale Mar 3 at 8:00 AM

[Remind Me](#)

[Details](#)

**Lighting Designers learning + advocating for holistic health in lighting re-convene to share successes, challenges + lessons learned**

### About this event

In March of this year, mindful MATERIALS held a webinar in partnership with the authors of the [Lighting Advocacy Letter](#) to talk about the power of demand, asking for transparency in lighting, and introduced a toolkit for action.

You can find the recording here.

6 months later, we're reconvening for a conversation - as a group and in breakouts - to talk about what has happened since then. What have designers learned, tested out, explored? Where have you seen success, had missteps, been frustrated? How can we all learn from each other's experiences? This will help inform iterations of the toolkit, plus your experience may inspire someone else to start.

### Date and time

Tue, October 18, 2022  
5:00 PM - 6:00 PM EDT

### Location

**Online event**

# WHERE CAN THIS INFO BE FOUND FOR LIGHTING?

## LIGHTAZ.com

Listings & Certificates ▲

### Certificates

<input type="checkbox"/> ADA	863
<input type="checkbox"/> Chicago Approved	70
<input checked="" type="checkbox"/> Declare	352
<input type="checkbox"/> DLC*	982
<input type="checkbox"/> Energy Star*	958
<input type="checkbox"/> IBEW	902
<input type="checkbox"/> Indigo-Clean	98
<input type="checkbox"/> Made in USA	4643
<input type="checkbox"/> Night Sky	129
<input type="checkbox"/> NSF	387
<input type="checkbox"/> NYC	186
<input checked="" type="checkbox"/> RoHS	794
<input type="checkbox"/> T24*	1477

## Declare.

PROGRAM    DECLARAT

LIVING PRODUCT CHALLENGE CERTIFIED

DECLARE

DECLARE + THIRD PARTY VERIFIED

DECLARE + EMBODIED CARBON (PILOT)

## mindful MATERIALS Library

<https://drive.google.com/drive/u/0/my-drive>

Selected Filter: General Material Category: Light Fixtures X

### Search Materials

Keyword

### BASIC INFORMATION

Material

Page 1

CSI Division

09 00 00 Finishes

26 00 00 Electrical

26 50 00 Lighting

26 51 00 Interior Lighting

Focal Point 9mm .

LightArt LA2 Lig...

IK10+ Efficacy 9-B.

IK10+ Efficacy 9-B.

IK10+ Efficacy 4-B.

TOOLKIT PDF

Lighting Advocacy Letter Toolkit V1, March 2022

# Lighting Advocacy Letter

# Toolkit V 1.1

March 2022



HMFH ARCHITECTS



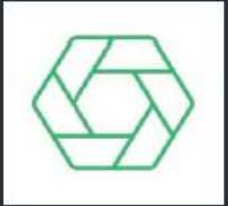
Interior Elements Design



Sladen Feinstatein  
Integrated Lighting



**IES Sustainability Committee**  
<https://ies.org>



**Green Light Alliance**  
<https://www.greenlight-alliance.com>



**Lytei** – Hub for Sharing Lighting Ideas  
<https://www.lytei.com/>



**Ecomedes** – Database for Sustainable Building Products  
<https://www.ecomedes.com/>

**Declare.**

**Declare Product Database**  
<https://living-future.org/declare-/>



**Design Lights Consortium**  
<https://www.designlights.org/>



**Materials Pledge Starter Guide**  
<https://www.aia.org/pages/6405423-materials-pledge-starter-guide>

**METROPOLIS**

**Climate Toolkit for Interior Design**  
<https://metropolismag.com/climate toolkit/>



**Mindful Materials**  
<https://www.mindfulmaterials.com>



**AIA Committee on the Environment**  
<https://network.aia.org/committeeontheenvironment/>



**Carbon Leadership Forum**  
<https://carbonleadershipforum.org>



**Built Environment Plus**  
[Home - Built Environment Plus](#)

