
# AIA Conference on Architecture 2021

# The State of Climate Action in the Building Sector

How Architects Can Make a Difference

AIA Conference on Architecture 2021

# Leila Pourzahedi

Life Cycle Assessment Lead

Owens Corning

# AIA/CES PROVIDER

AIA Continuing Education Provider

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# COURSE DESCRIPTION/LEARNING OBJECTIVES

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As a significant contributor to global greenhouse gas emissions, the building sector has an immense opportunity to play a role in the efforts to mitigate climate change. This course will give an overview of the global move towards a more sustainable future. We will explore the latest state of knowledge on climate change, the targets, goals and regulations set to mitigate its worst effects, and what you, as an architect, can do to help. You will also learn about the science behind embodied carbon and why it is important, as well as other tools and resources available to advance the overall sustainability of the built environment. Connect acoustics and architectural vision

1. Explain the current sustainability landscape, the state of knowledge on climate change, and the contribution of the building sector
2. Understand the principles of Life Cycle Assessment and how it is used to calculate embodied carbon
3. Understand how to best use an Environmental Product Declaration (EPD)
4. Utilize available resources on material and environmental transparency to make informed product selection

OWENS CORNING

# AGENDA

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Current Climate State – Data and Facts

Global Efforts on Climate Action

External Push – Targets and Regulations

What can You do to Help?

Available Tools and Resources

Sustainability in Every Project

# SPEAKER: LEILA POURZAHEDI

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Life Cycle Assessment Analyst

## Academic Experience

- Researched environmental impacts of new technologies
- Published Journal articles around LCA

## Industry Experience

- Publish EPDs
- Managed external product transparency websites
- Help product developers to Design for Environment
- Help architects with sustainable material selection

# CURRENT CLIMATE STATE
## DATA AND FACTS

# WHAT IS CLIMATE CHANGE?

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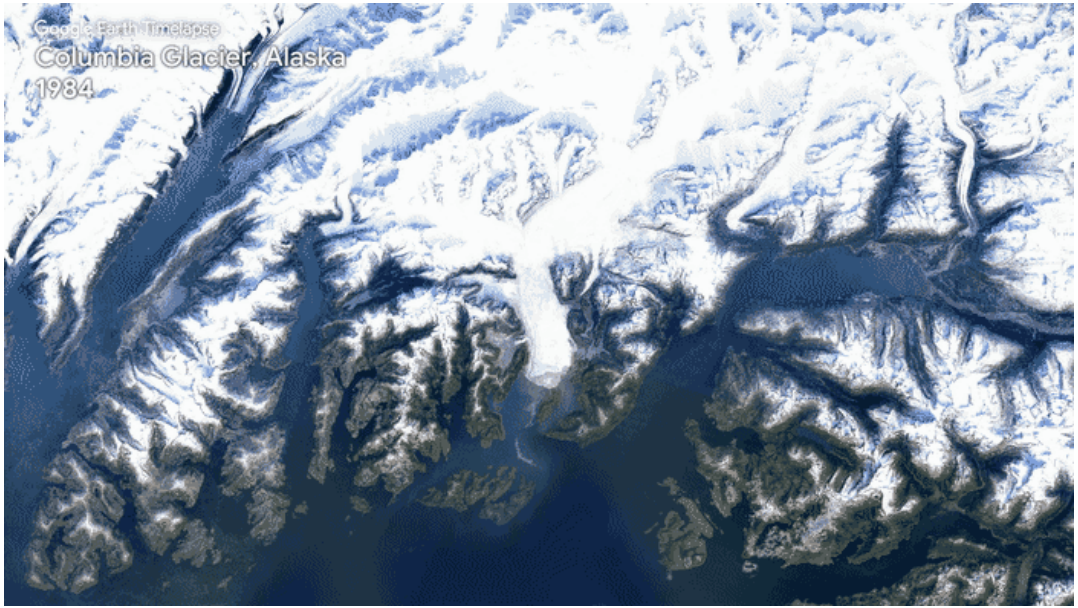
"A long-term change in the average weather patterns that have come to define Earth's local, regional and global climates."




Google Earth Timelapse (Google, Landsat, Copernicus)

https://climate.nasa.gov/resources/global-warming-vs-climate-change/

# WHAT CAUSES CLIMATE CHANGE?

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## The Greenhouse Effect

- Natural warming of the earth caused when atmospheric gases trap heat from the sun.
- Human activity has increased the concentration of greenhouse gases.
- Higher concentrations of greenhouse gases = extra heat trapped = global temperatures rise.


A simplified animation of the greenhouse effect. Credit: NASA/JPL-Caltech

https://www.nrdc.org/stories/greenhouse-effect-101#solution

# EVIDENCE OF CLIMATE CHANGE

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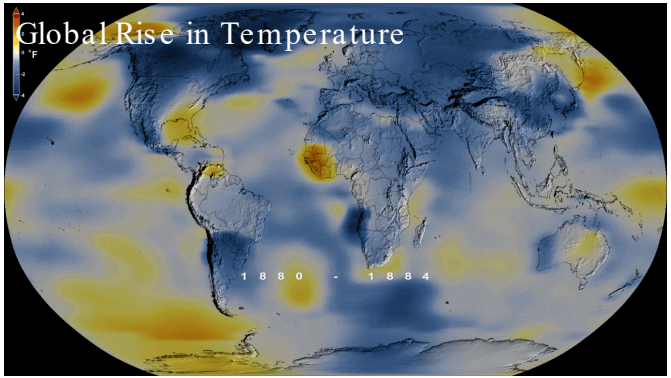
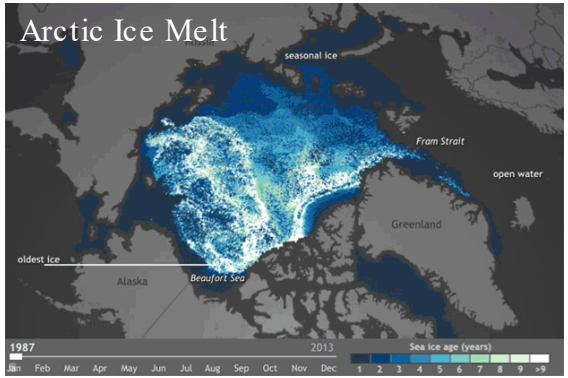
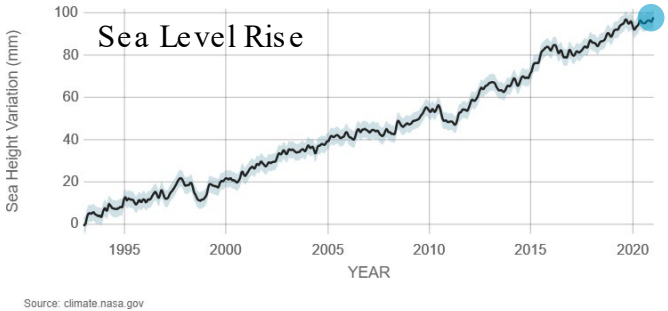
- Global temperature rise
- Warming of oceans
- Shrinking of ice sheets
- Glacial retreat
- Decreased snow cover
- Sea level rise
- Declining arctic sea ice
- Extreme events
- Ocean acidification




NASA Goddard Media Studios, visualization by Lori Perkins




NOAA/CLIMATE.GOV


NASA's Goddard Space Flight Center

https://climate.nasa.gov/evidence/

# EVIDENCE OF GLOBAL WARMING

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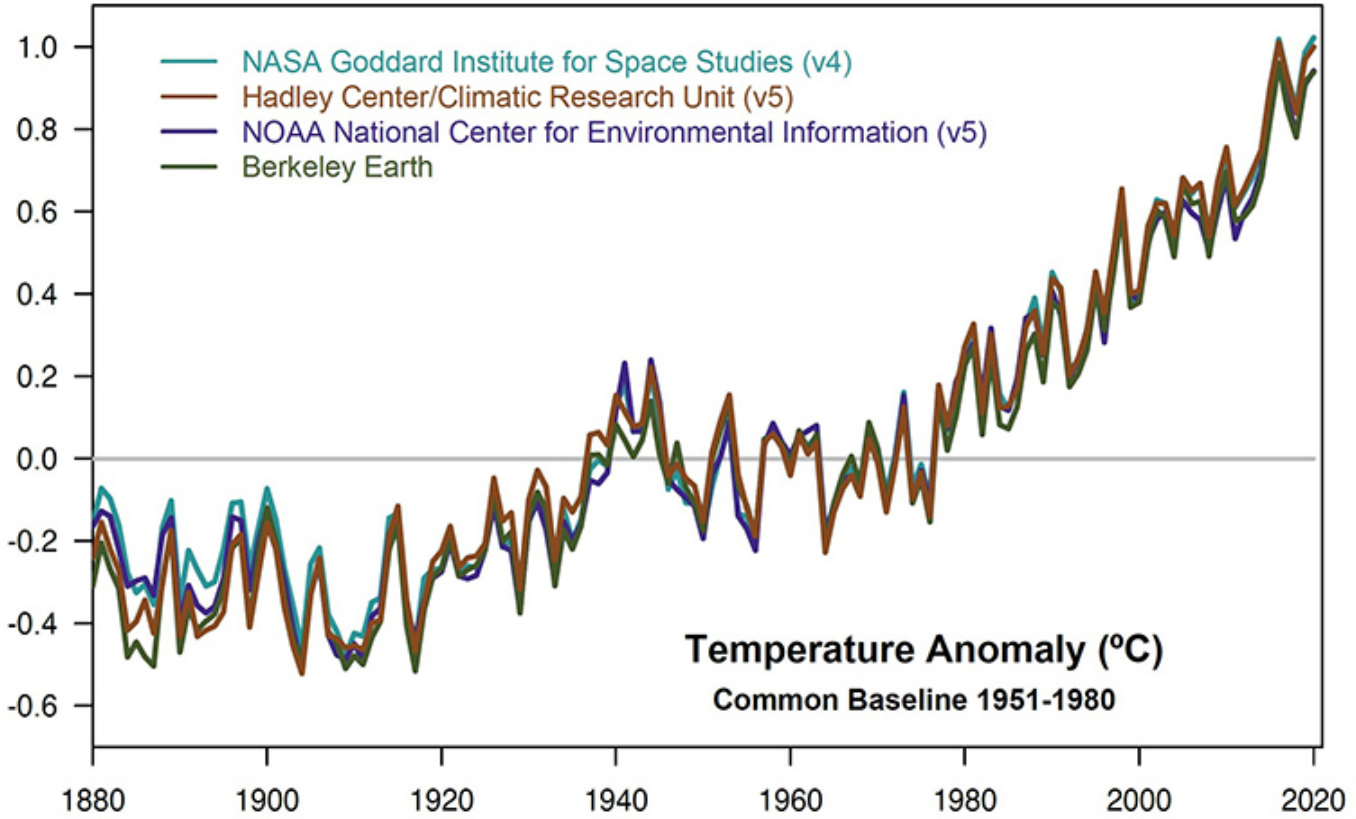


NASA's Goddard Institute for Space Studies

https://climate.nasa.gov/scientific-consensus/

# EFFECTS OF EXTREME COLD AND FLOODING IN TEXAS

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## February 2021 Snowstorm

Houston Chronicle/AP

## August 2017 Hurricane Harvey

Adrees Latif / Reuters

# EFFECTS OF EXTREME HEAT AND DROUGHT IN CALIFORNIA

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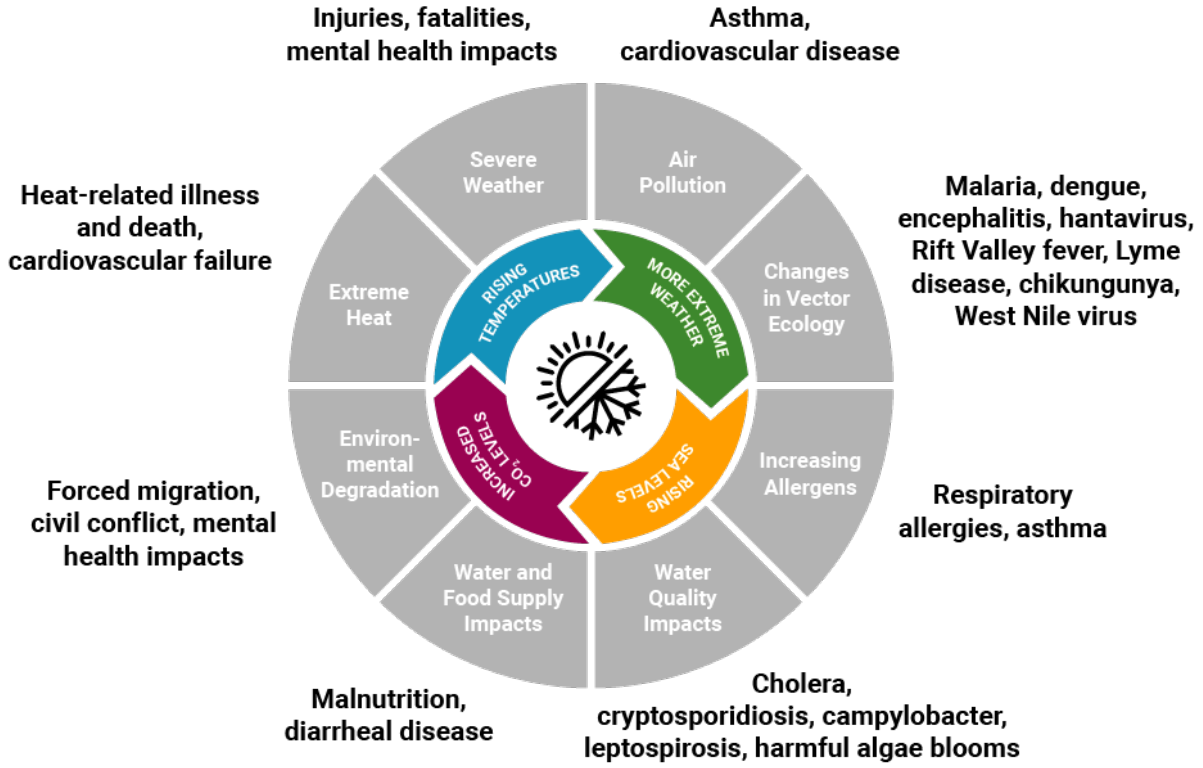
## 2020 Wildfires

Smoke plume by David McNew/Getty

AP Photo/Noah Berger

# EFFECTS HUMAN HEALTH

## CLIMATE CHANGE WIDELY AFFECTS HUMAN HEALTH




https://www.cdc.gov/climateandhealth/effects/default.htm

# EFFECTS: SOCIAL AND ENVIRONMENTAL JUSTICE

## CLIMATE CHANGE DOES NOT AFFECT EVERYONE EQUALLY


Photo credit: Fibonacci Blue / Flickr

# GLOBAL EFFORTS ON CLIMATE ACTION

# GHG- GREENHOUSE GASES

## WE NEED TO LIMIT GREENHOUSE GAS EMISSIONS

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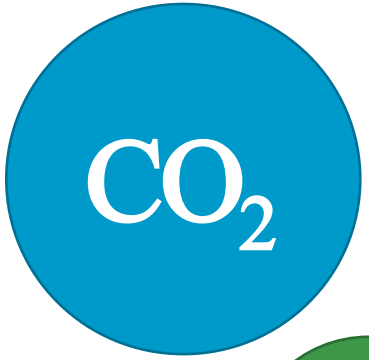


**Carbon Dioxide**
- Transportation
- Burning Fossil Fuels
- Coal and Crude oil


**Methane**
- Agriculture
- Natural gas
- landfills


**Nitrous Oxide**
- Cars
- Manufacturing
- Soil management

### Fluorinated Gases


**Hydrofluorocarbons**
- Semiconductors
- CFC substitutes


**Perfluorocarbons**
- Aluminum production


**Sulfur Hexafluoride**
- Electrical transmission
- Magnesium products

# GHG- GREENHOUSE GASES

## DIFFERENT GREENHOUSE GASES HAVE DIFFERENT EFFECTS ON EARTH'S WARMING

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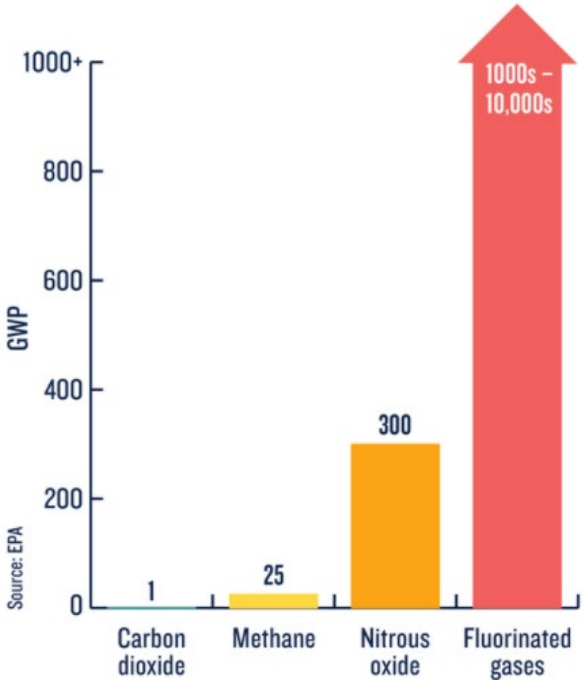
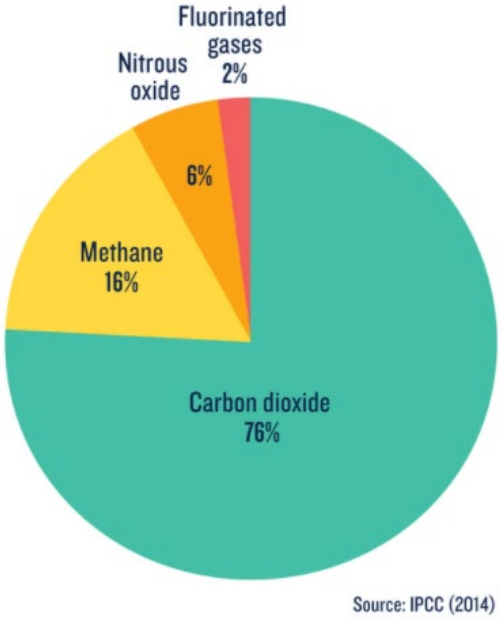
The global warming potential (GWP) of human-generated greenhouse gases is a measure of how much heat each gas traps in the atmosphere, relative to carbon dioxide.




How much each human-caused greenhouse gas contributes to emissions around the globe.

https://www.nrdc.org/stories/greenhouse-effect-101

# TIMELINE OF NOTABLE EVENTS FOR CLIMATE ACTION

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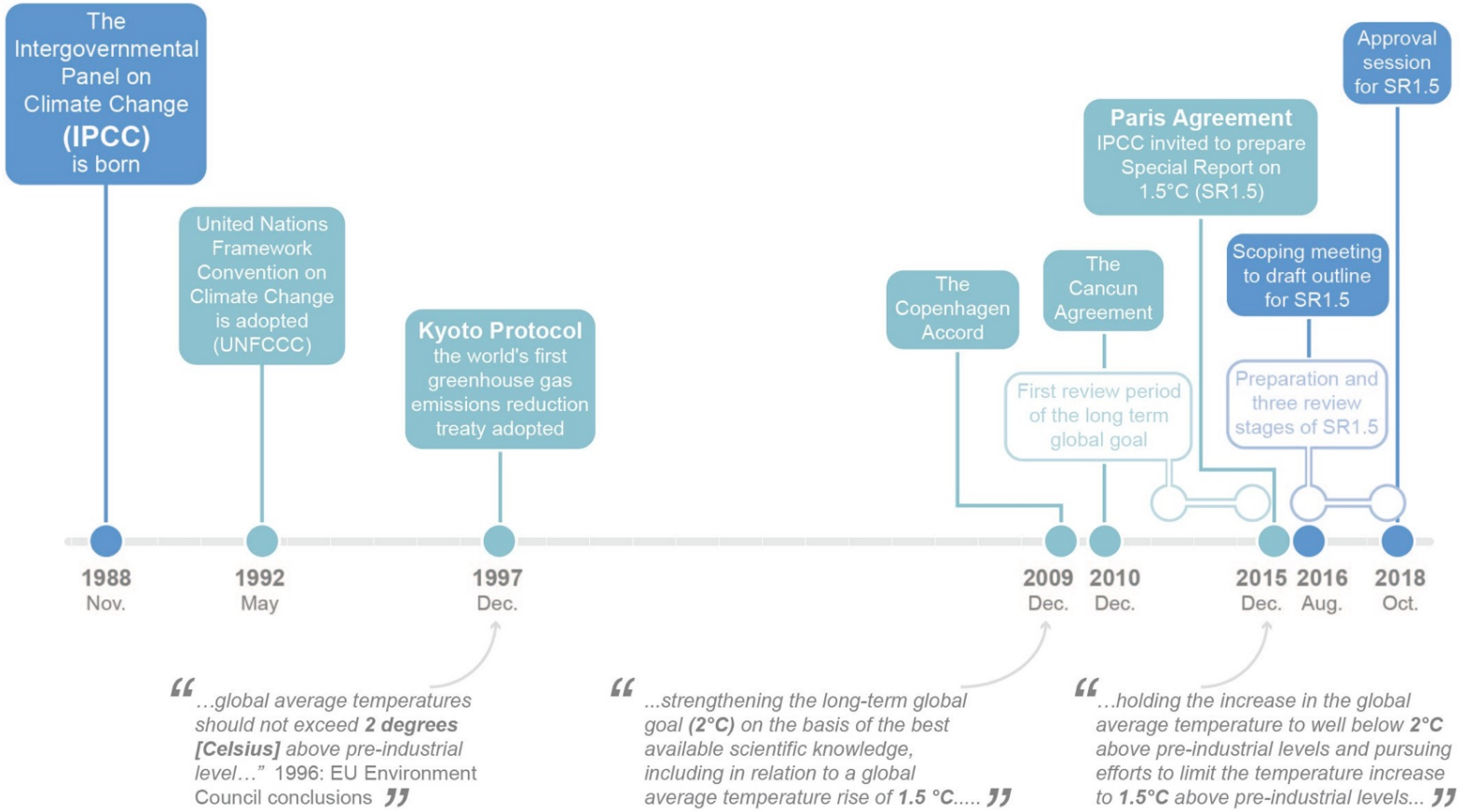


https://www.ipcc.ch/sr15/chapter/chapter-1/

# IPCC SPECIAL REPORT (SR15)

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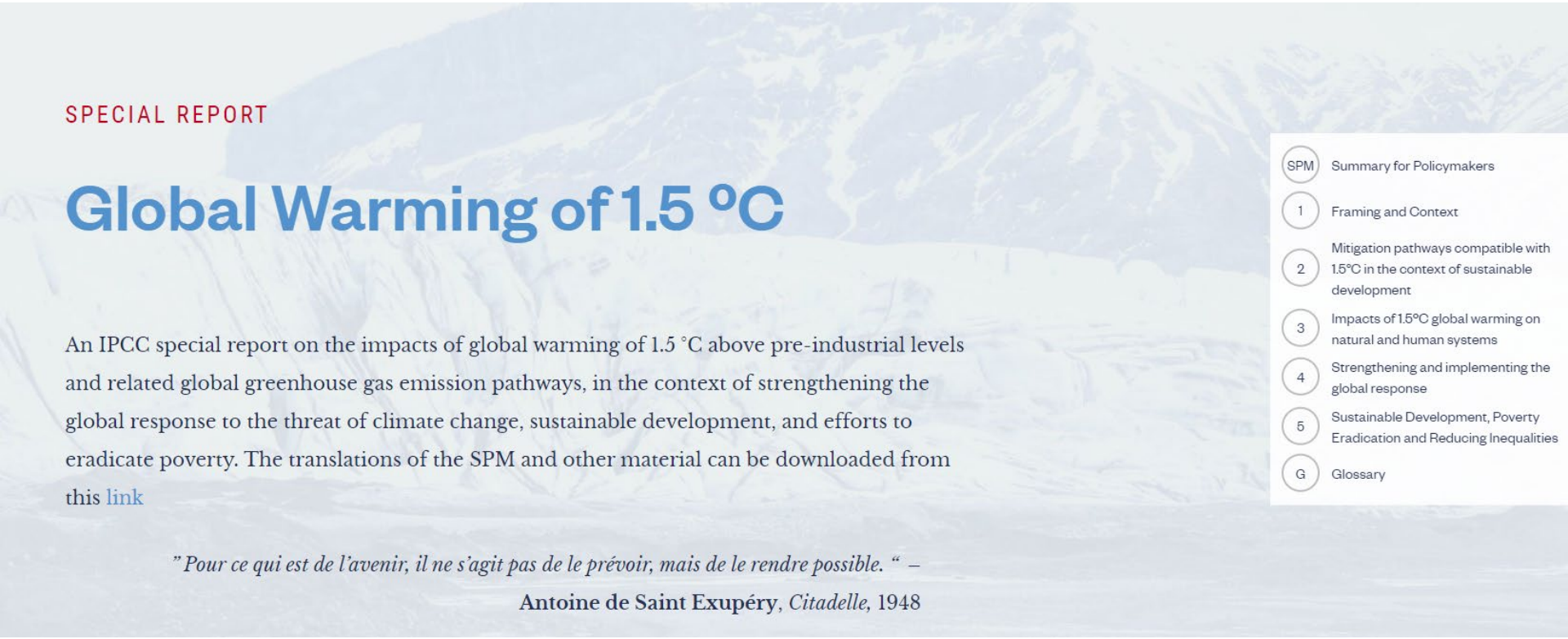


https://www.ipcc.ch/sr15/

# IPCC TARGETS

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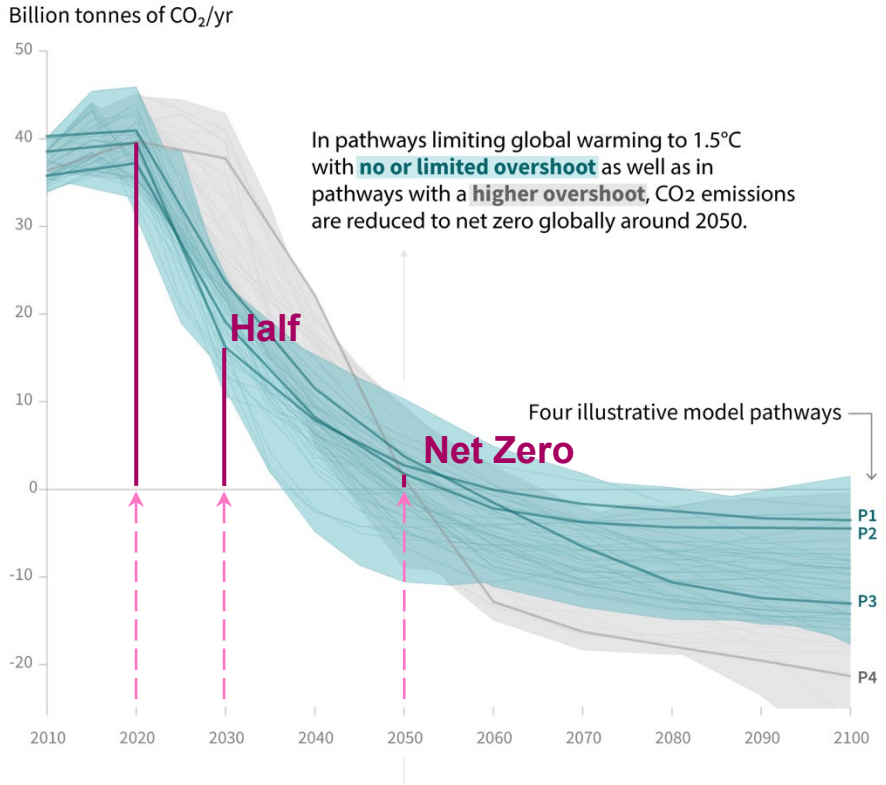
## GLOBAL TOTAL NET $CO_2$ EMISSION TARGETS SET FOR 2030 & 2050

UNEP Emissions Gap Report 2019:

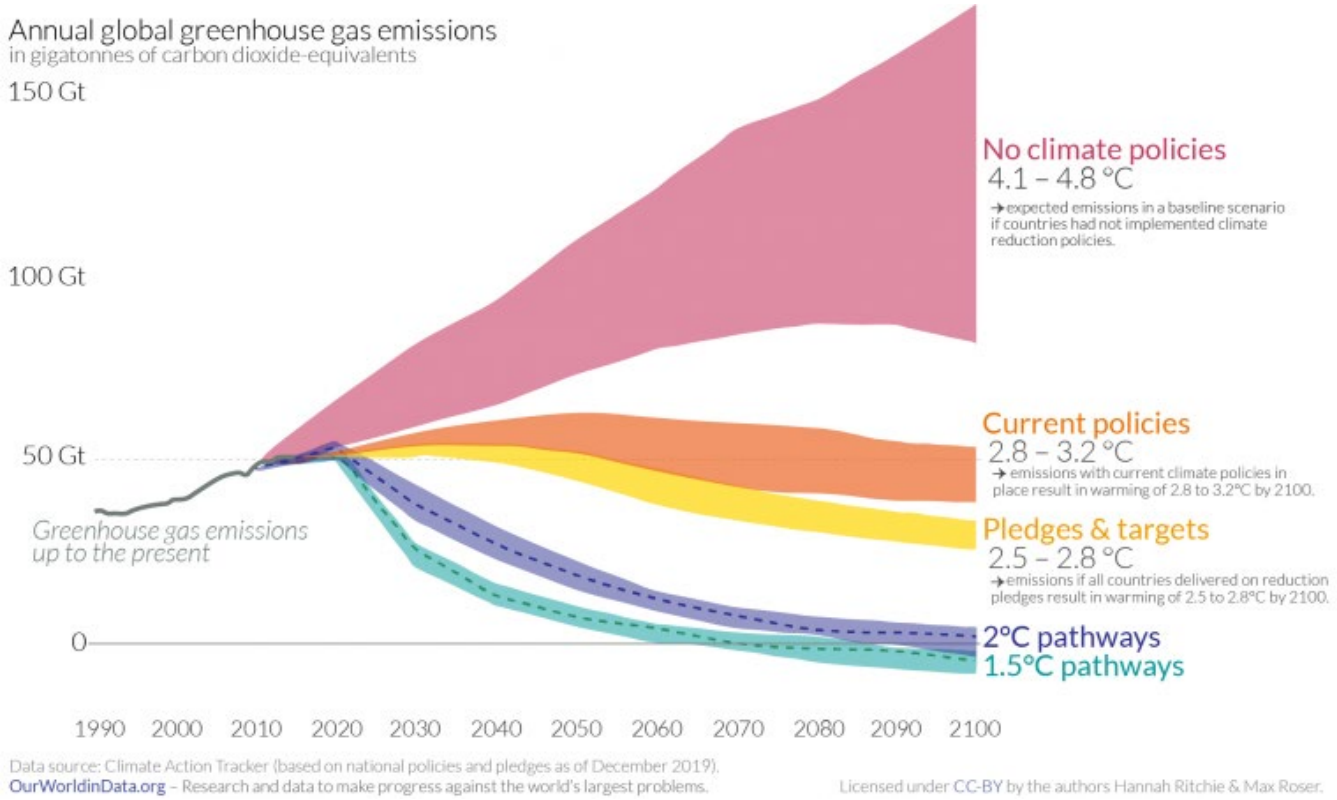
- To meet 2°C goal emissions must drop 2.7% per year from 2020 to 2030.
- To meet 1.5°C goal emissions must drop 7.6% per year from 2020 to 2030.




https://www.ipcc.ch/sr15/chapter/spm/
https://www.unep.org/resources/emissions-gap-report-2019

# ARE WE ON THE RIGHT PATH?

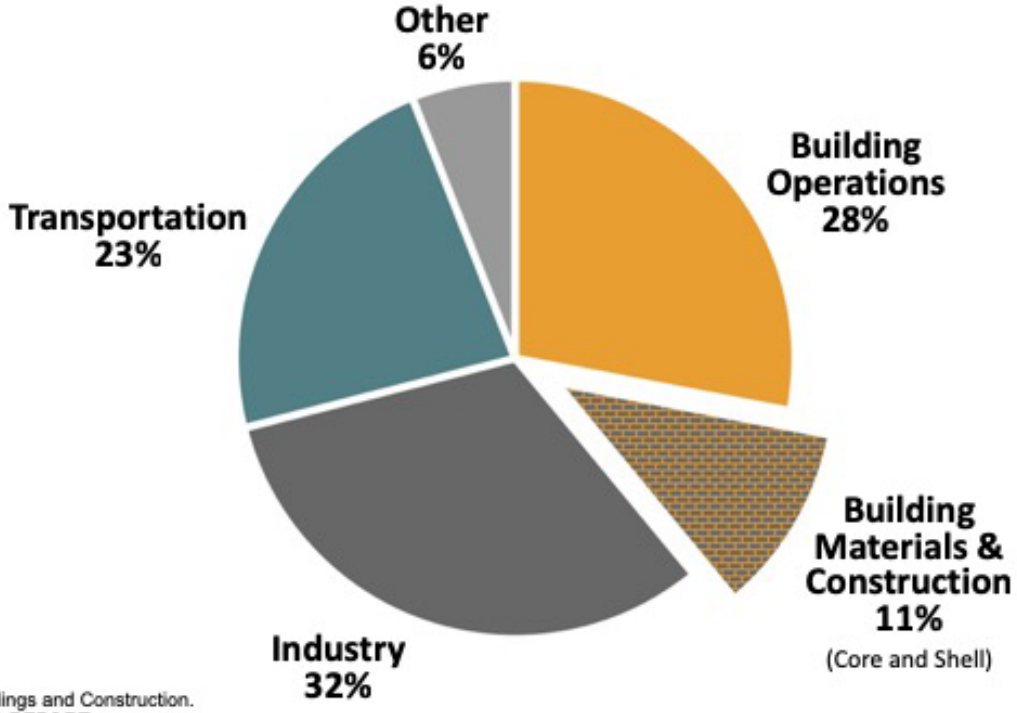
## ALMOST, BUT NOT QUITE…




https://ourworldindata.org/co2-and-other-greenhouse-gas-emissions

# IMPACT OF THE BUILDING SECTOR

## OVERALL 39% OF THE GLOBAL $CO_2$ EMISSIONS BY SECTOR




Source:
Global Alliance for Buildings and Construction.
*2018 GLOBAL STATUS REPORT.*

https://architecture2030.org/buildings_problem_why/

# PROGRESS IN ENERGY EFFICIENCY

## MORE STRINGENT BUILDING CODES HELP REDUCE OPERATIONAL CARBON

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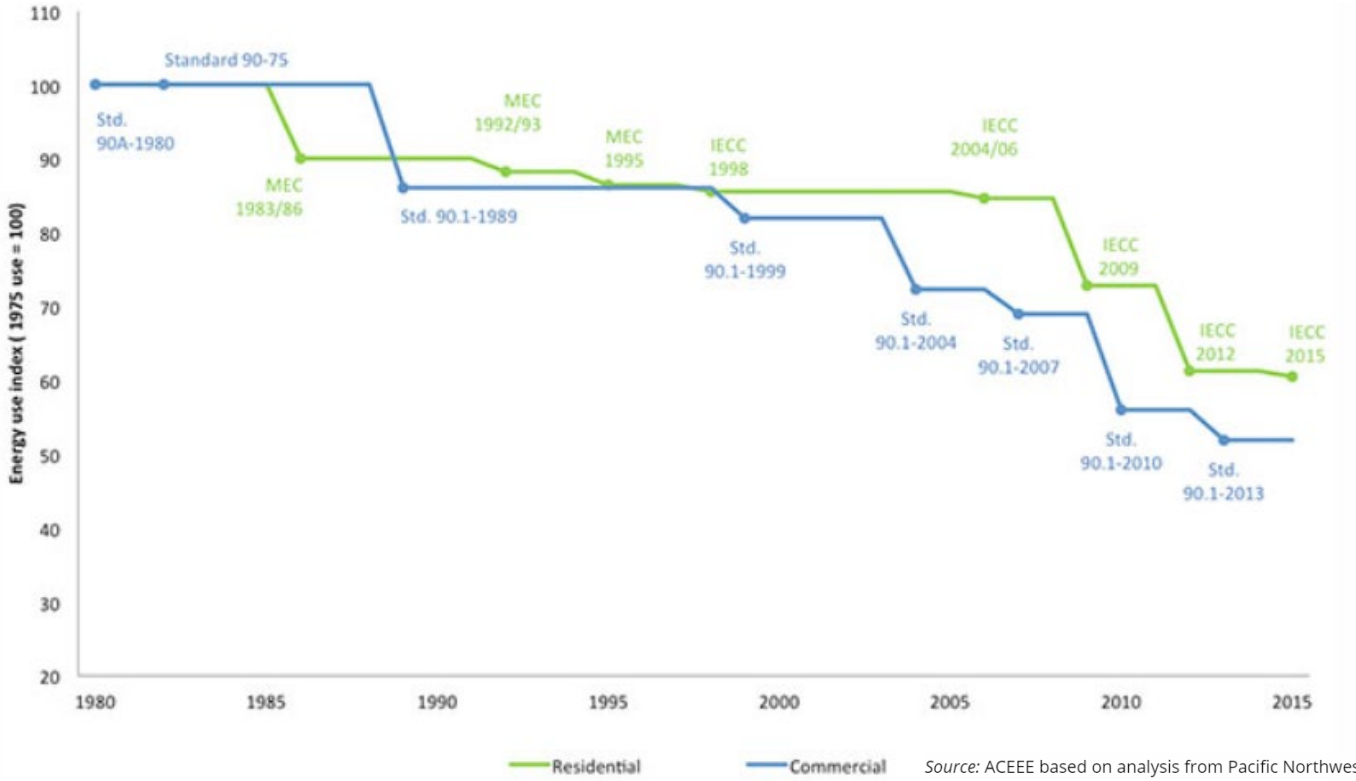


*Source:* ACEEE based on analysis from Pacific Northwest National Laboratory

https://www.aceee.org/blog/2016/02/take-ride-energy-slide-building-codes

# WHY DOES EMBODIED CARBON MATTER?

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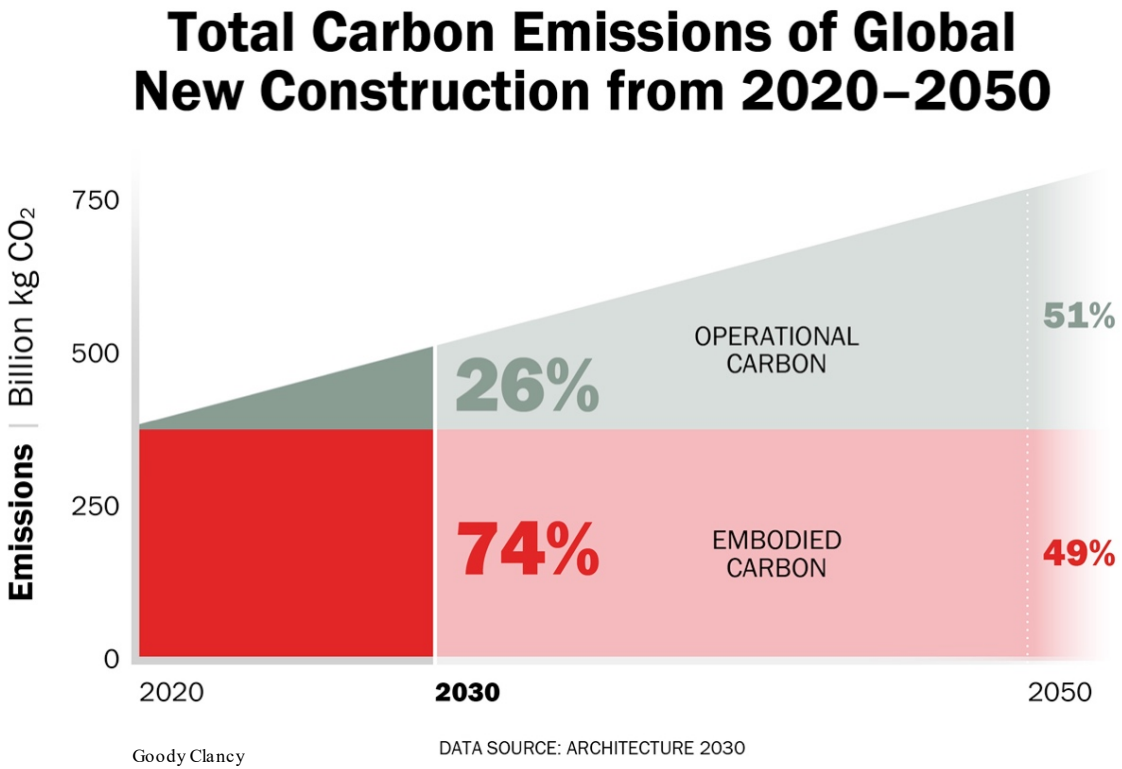
## EMBODIED CARBON IS AN UPFRONT COST, TAKEN FROM OUR CARBON BUDGET




Goody Clancy

https://architecture2030.org/new-buildings-embodied/

# WHAT IS EMBODIED CARBON OF BUILDING MATERIALS?

- Embodied Carbon (EC) or carbon footprint of a material is the total greenhouse gas emissions (GHGs) from:
  - Production of raw materials (including energy needed)
  - Transport of raw materials
  - Energy needed for manufacturing
  - Emissions throughout the process


http://www.carbonleadershipforum.org/

# EXTERNAL PUSH
# TARGETS AND REGULATIONS

# US– ARCHITECTURE 2030 TARGETS

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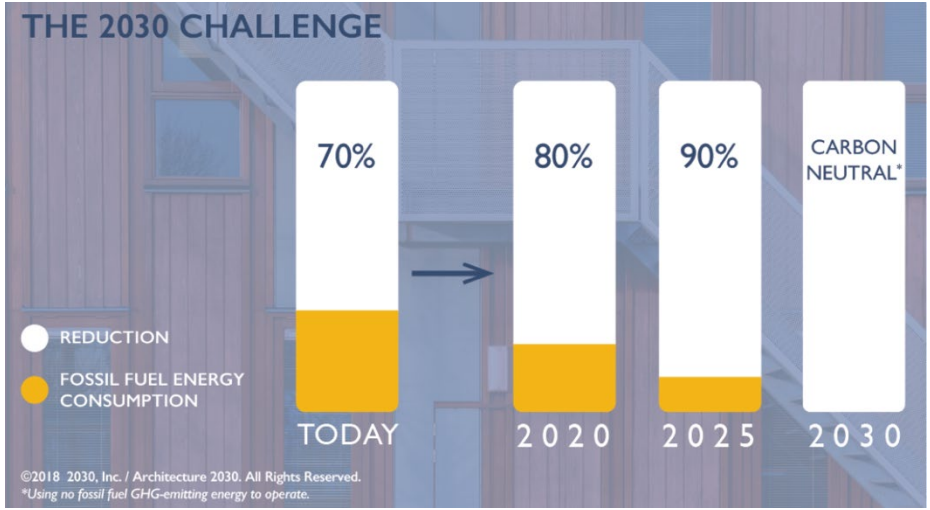
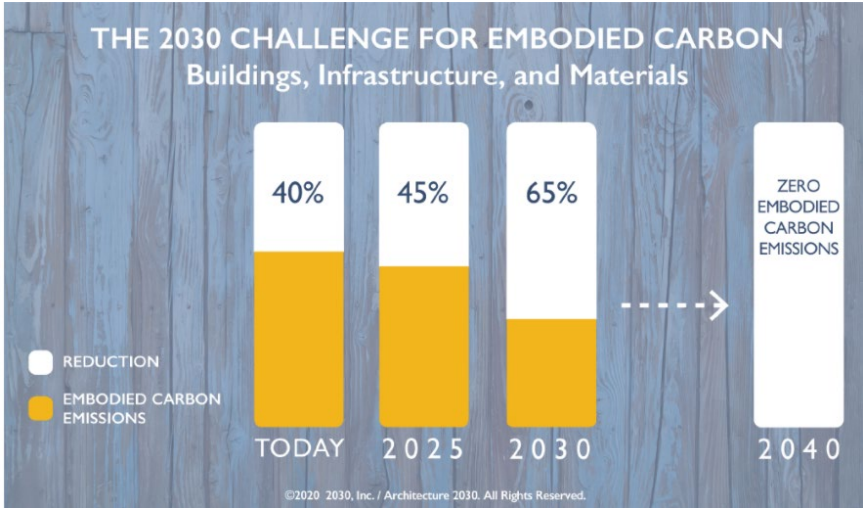



**Operational Emissions**




**Embodied Emissions**

https://architecture2030.org/2030_challenges/2030-challenge/
https://architecture2030.org/2030_challenges/embodied/

# US– AIA 2030 COMMITMENT

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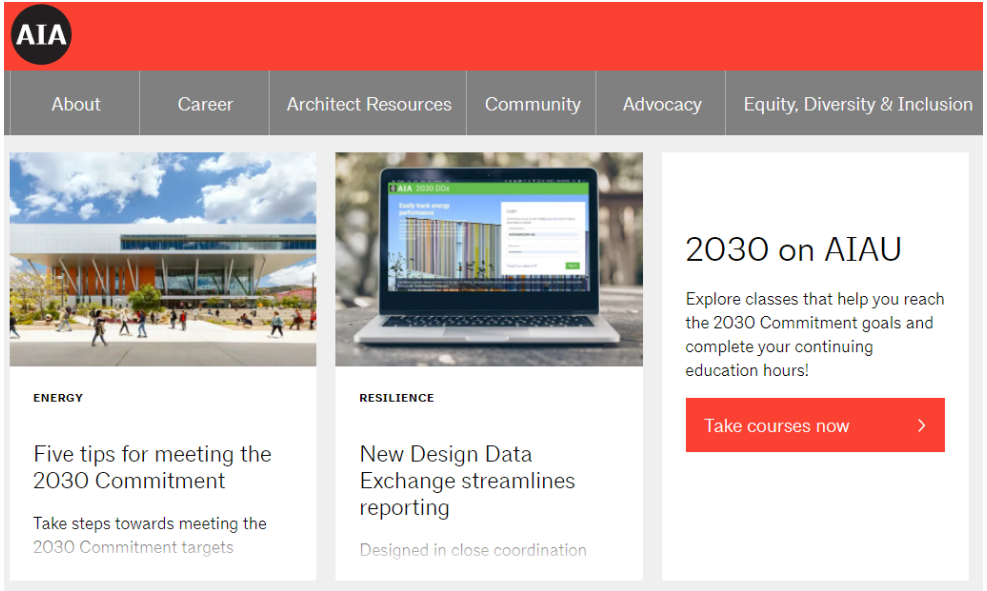
- 800+ firms committed to designing for energy efficiency and carbon neutrality by 2030.
- Enables managing the progress of your firm's entire design portfolio toward meeting the 2030 goals by tracking each project in the Design Data Exchange (DDx).

AIA 2030 COMMITMENT



# US– SE2050

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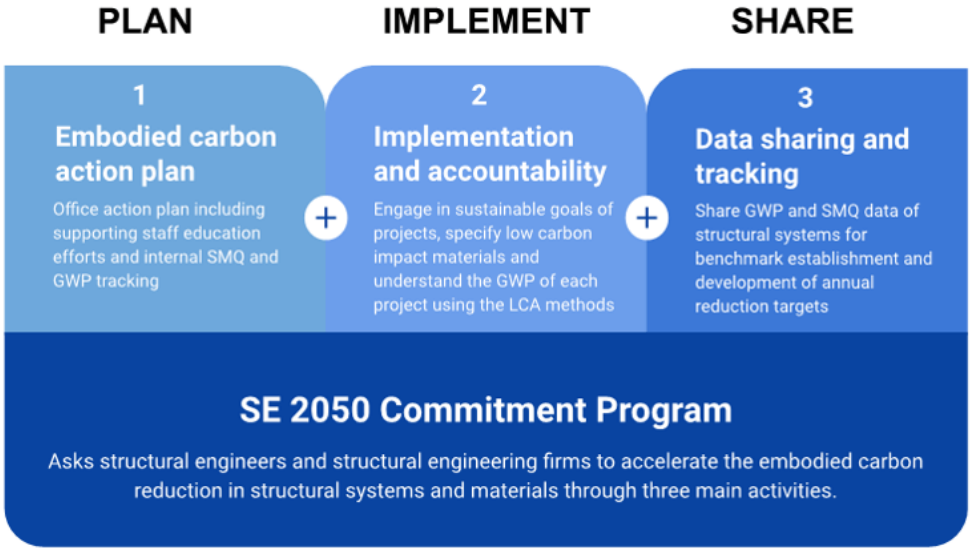
- “All structural engineers shall understand, reduce and ultimately eliminate embodied carbon in their projects by 2050.”

SEI STRUCTURAL ENGINEERING INSTITUTE ASCE | SE2050 COMMITTING TO NET ZERO




https://se2050.org/what-is-se-2050-overview/

# US– FEDERAL LEGISLATIVE PUSH

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BRIEFING ROOM

## Executive Order on Protecting Public Health and the Environment and Restoring Science to Tackle the Climate Crisis

JANUARY 20, 2021 • PRESIDENTIAL ACTIONS

BRIEFING ROOM

## Executive Order on Climate-Related Financial Risk

MAY 20, 2021 • PRESIDENTIAL ACTIONS

BRIEFING ROOM

## Executive Order on Tackling the Climate Crisis at Home and Abroad

JANUARY 27, 2021 • PRESIDENTIAL ACTIONS

March 2021

**Summary of Title V, Section 811, and Title X of the Climate Leadership and Environmental Action for our Nation's (CLEAN) Future Act**

COMMITTEE ON ENERGY & COMMERCE

BRIEFING ROOM

## FACT SHEET: The American Jobs Plan

MARCH 31, 2021 • STATEMENTS AND RELEASES

# US– REGULATORY LANDSCAPE

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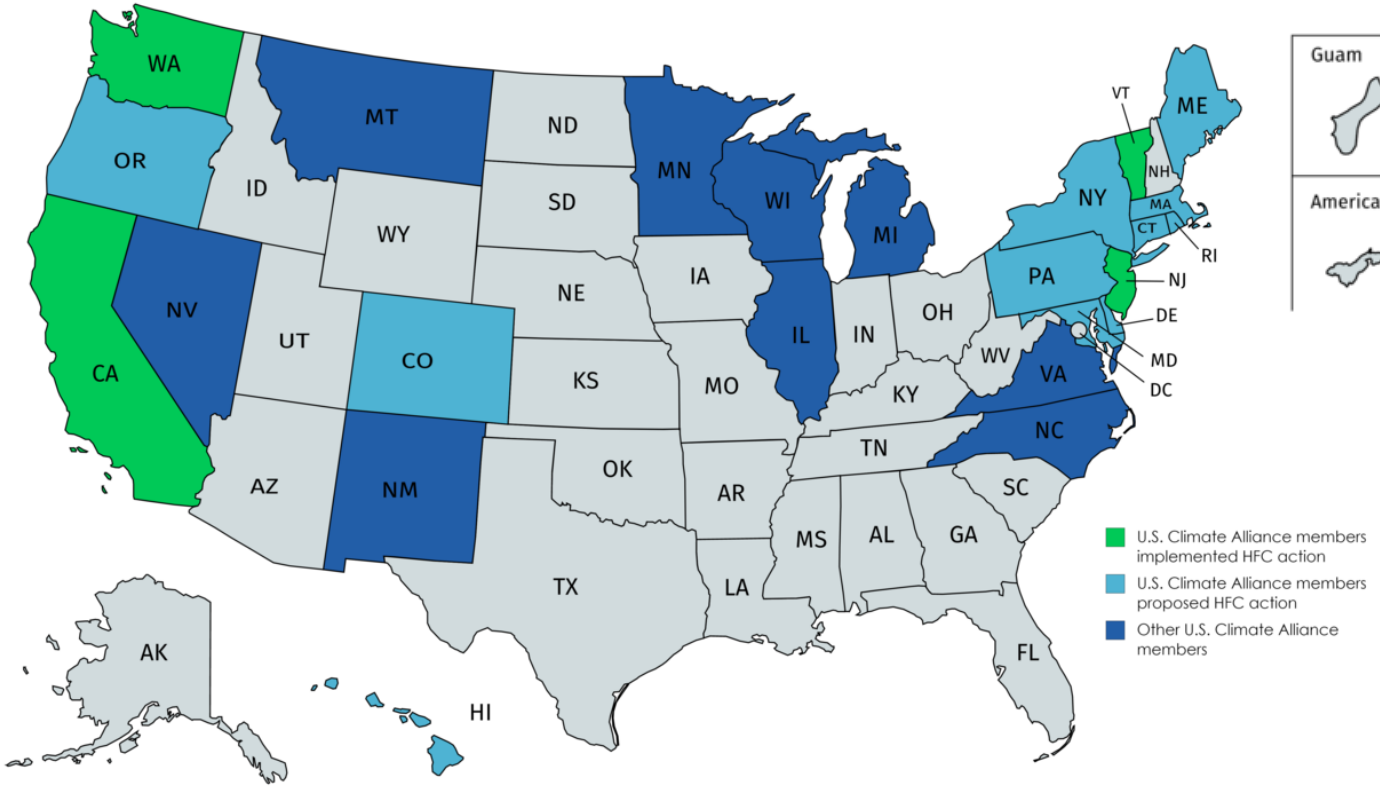


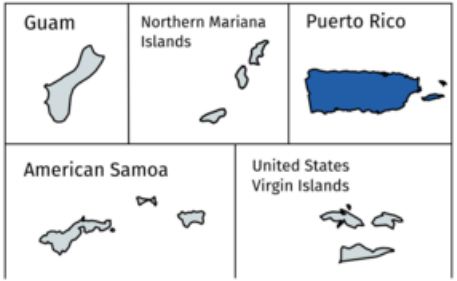


https://www.nrdc.org/experts/david-doniger/more-states-announce-hfc-action-raising-tally-fifteen

# US– REGULATORY LANDSCAPE EMBODIED CARBON

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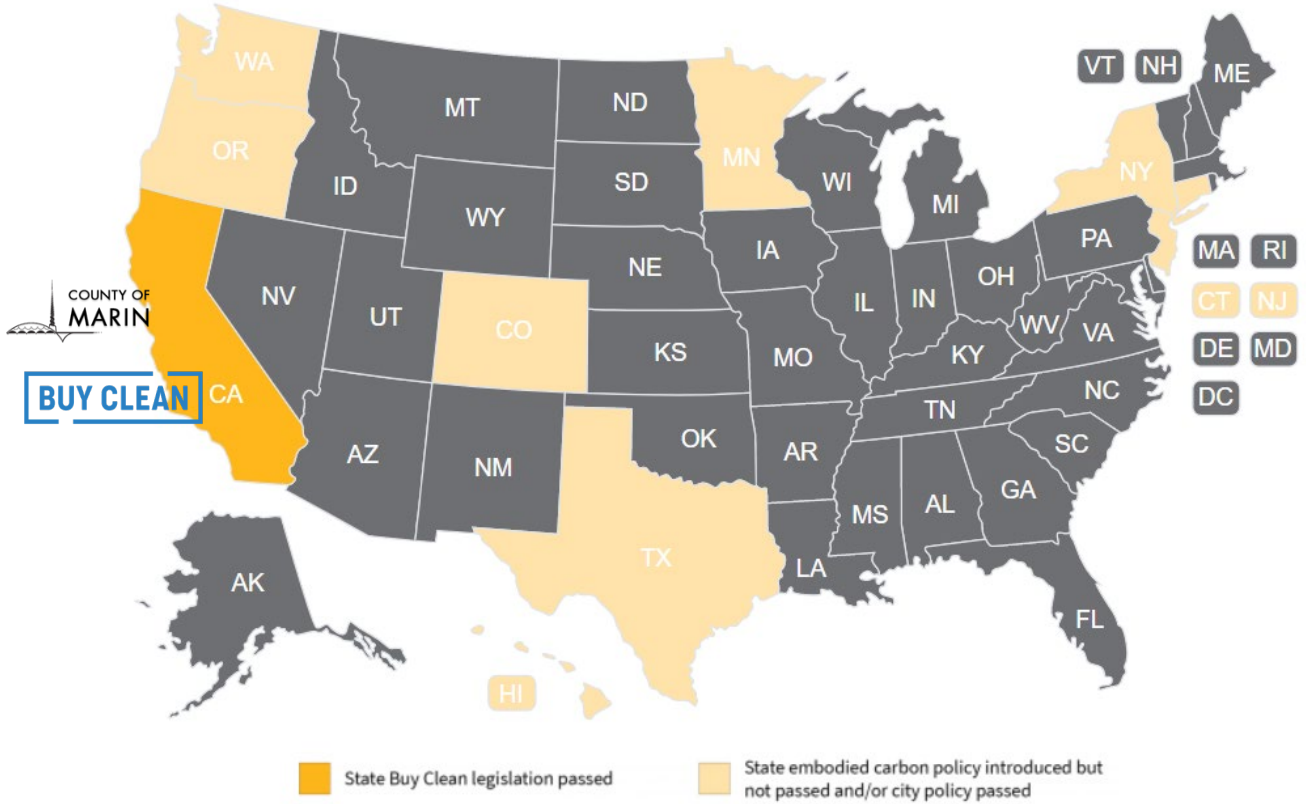


https://carbonleadershipforum.org/clf-policy-toolkit/

# EU – LEGISLATIVE PUSH – GREEN DEAL

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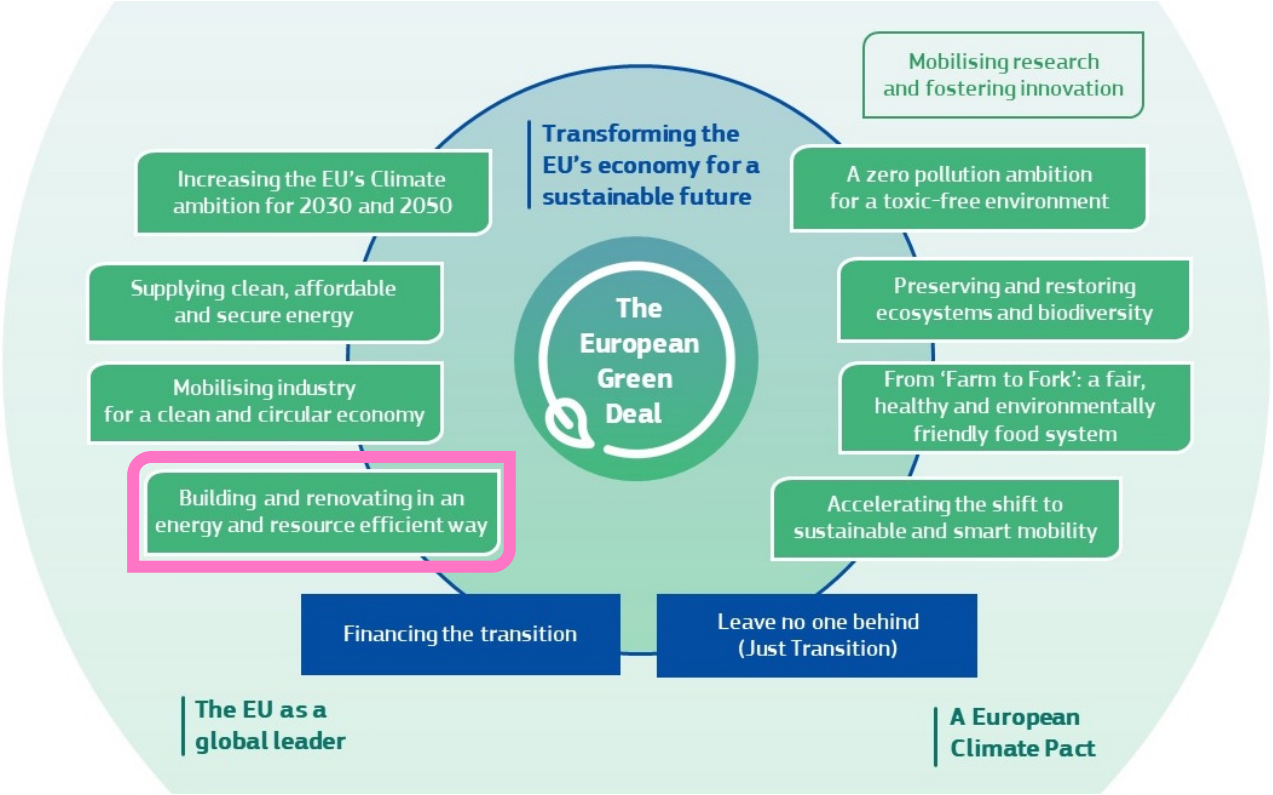


https://ec.europa.eu/info/strategy/priorities-2019-2024/european-green-deal_en

# GLOBAL INITIATIVES

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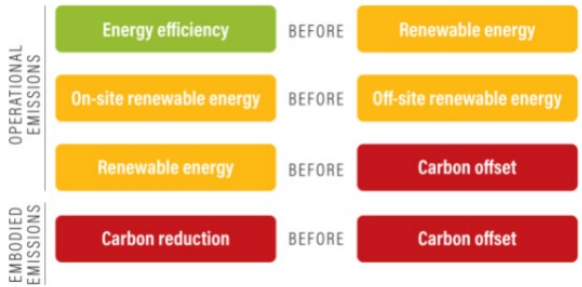
WORLD RESOURCES INSTITUTE

## WRI - Zero Carbon Buildings For All

- National and local leaders, to develop and implement policies to drive decarbonization of all new buildings by 2030 and all existing buildings by 2050
- Financial and industry partners, to provide expert input and commit $1 trillion of market action by 2030




WORLD GREEN BUILDING COUNCIL

## WGBC – Whole Life Carbon Vision

- By 2030, new buildings, infrastructure and renovations will have at least 40% less embodied carbon with significant upfront carbon reduction, and all new buildings must be net zero operational carbon
- By 2050, new buildings, infrastructure and renovations will have net zero embodied carbon, and all buildings, including existing buildings, must be net zero operational carbon


ADVANCING NET ZERO

https://wrirosscities.org/ZeroCarbonBuildings
https://www.worldgbc.org/advancing-net-zero-status-report-2020

# GLOBAL INITIATIVES

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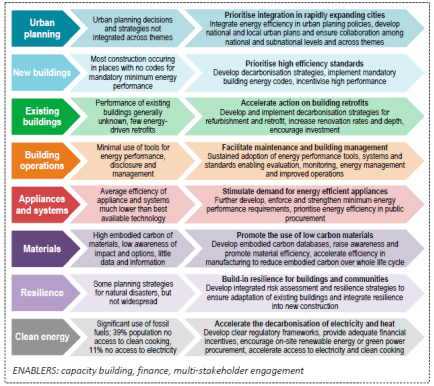
UN environment programme

Global Alliance for Buildings and Construction

## GlobalABC - Roadmap for Buildings and Construction 2020-2050

- Connect governments, private sector and organizations to drive the transformation towards a zero-emission, efficient, and resilient buildings and construction sector.




SCIENCE BASED TARGETS
DRIVING AMBITIOUS CORPORATE CLIMATE ACTION

## SBTI - Science Based Targets Initiative

- Provides companies with a clearly-defined path to reduce GHG emissions in line with the Paris agreement goals.
- The SBTI does not currently assess targets for cities, local governments, public sector institutions, educational institutions or non-profit organizations.


https://globalabc.org/our-work/forging-regional-pathways-global-and-regional-roadmap
https://sciencebasedtargets.org

# C40 CITIES + CNCA

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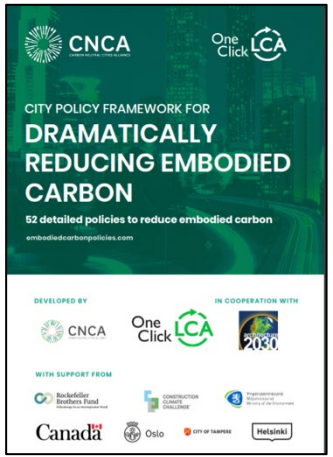
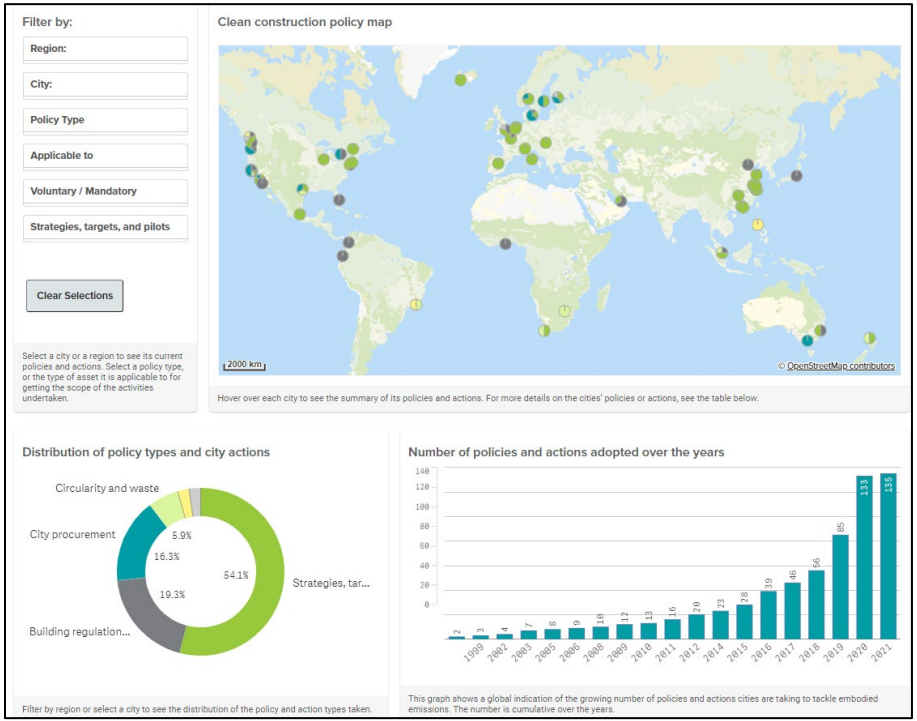
- “The C40 Clean Construction Policy Explorer, combined with the Carbon Neutral Cities Alliance's framework, will help cities deliver on their commitment to climate action and a sustainable future for all.”




CNCA
CARBON NEUTRAL CITIES ALLIANCE

C40 CITIES




https://www.c40knowledgehub.org/s/article/Clean-Construction-Policy-Explorer?language=en_US
https://www.embodiedcarbonpolicies.com/

# WHAT CAN YOU DO TO HELP?

# UTILIZING GREEN BUILDING RATING SYSTEMS

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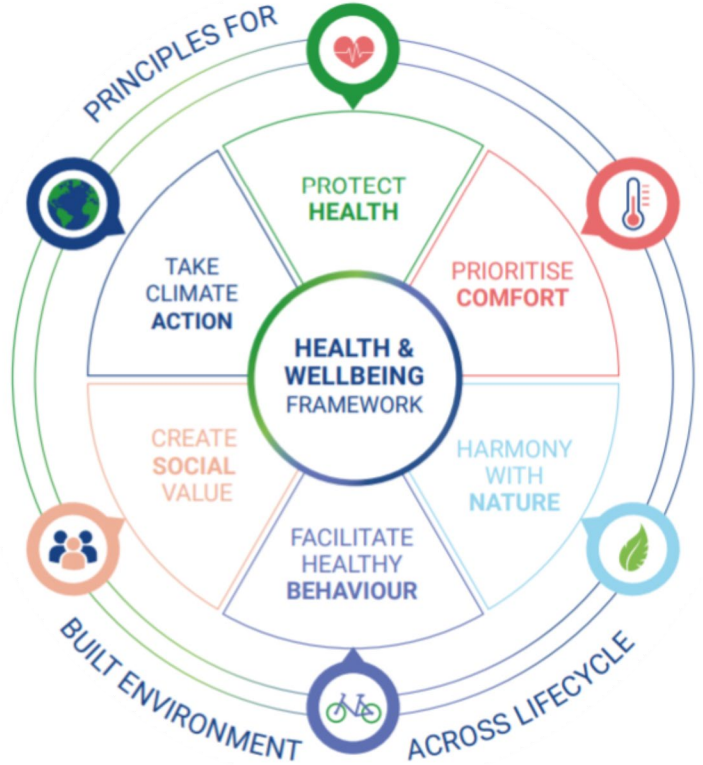
## FOCUS ON PEOPLE + PLANET

"There are a number of features which can make a building 'green'. These include:

- Efficient use of energy, water and other resources
- Use of renewable energy, such as solar energy
- Pollution and waste reduction measures, and the enabling of re-use and recycling
- Good indoor environmental air quality
- Use of materials that are non-toxic, ethical and sustainable
- Consideration of the environment in design, construction and operation
- Consideration of the quality of life of occupants in design, construction and operation
- A design that enables adaptation to a changing environment"




The Six Principles of the Health & Wellbeing Framework WorldGBC Annual Report 2020

https://www.worldgbc.org/what-green-building

# INFORMED MATERIAL SELECTION & DESIGN

## PRODUCT DECISIONS AFFECT THE EMBODIED CARBON OF YOUR BUILDING

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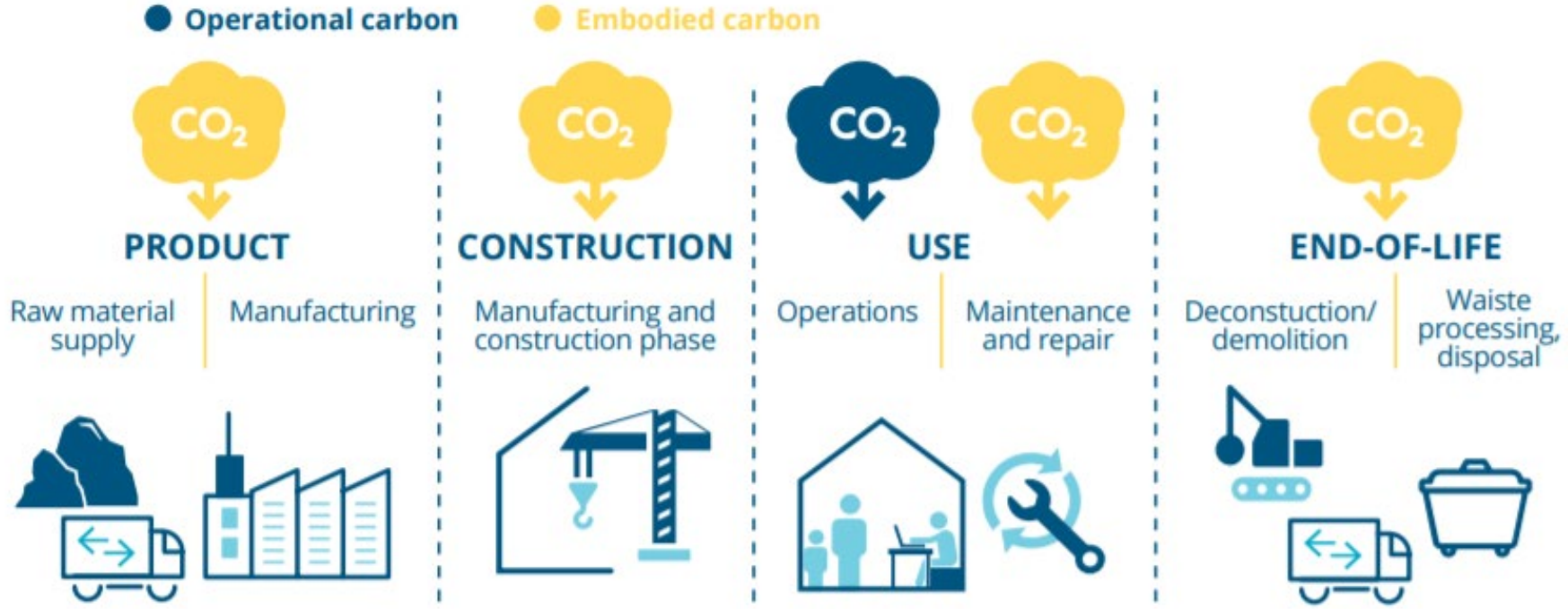


BPIE Whole Life Carbon: Challenges and Solutions for Highly Efficient and Climate Neutral Buildings

# WHAT ARE MANUFACTURERS DOING?

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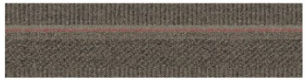
## New Product Development

https://www.carboncure.com/

Sashiko Stitch



Simple Sash

https://www.interface.com/US/en-US/collections/embodied-beauty#copy

## Operations


- Improving conversion efficiencies
- Lower impact technologies
- Using renewable energy
- Waste reduction
- Emission reduction strategies

## Existing Product Improvement


- Overall reduction in materials
  (reduced density, lighter weight, etc.)
- Lower impact materials
  (blowing agent, renewable, etc.)
- More recycled content

## Transportation

- Using local materials
- Efficient shipping methods
  (rail vs. truck, alternative fuels, EVs)

# HOW IS EMBODIED CARBON CALCULATED?

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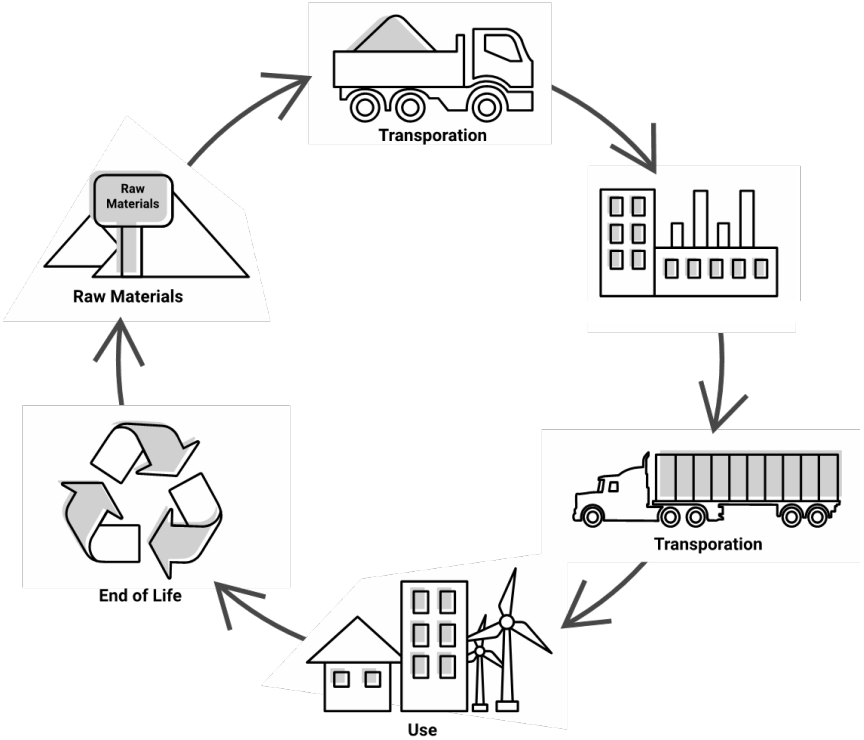
**Life Cycle Assessment**, or **LCA**, measure the environmental impacts, including embodied carbon, of a product, process or service.

- Inventory of the energy and materials through the value chain and corresponding emissions to the environment.
- Identify hotspots within a process to allow for improvements



# WHAT TYPE OF INFORMATION IS NEEDED FOR LCA?

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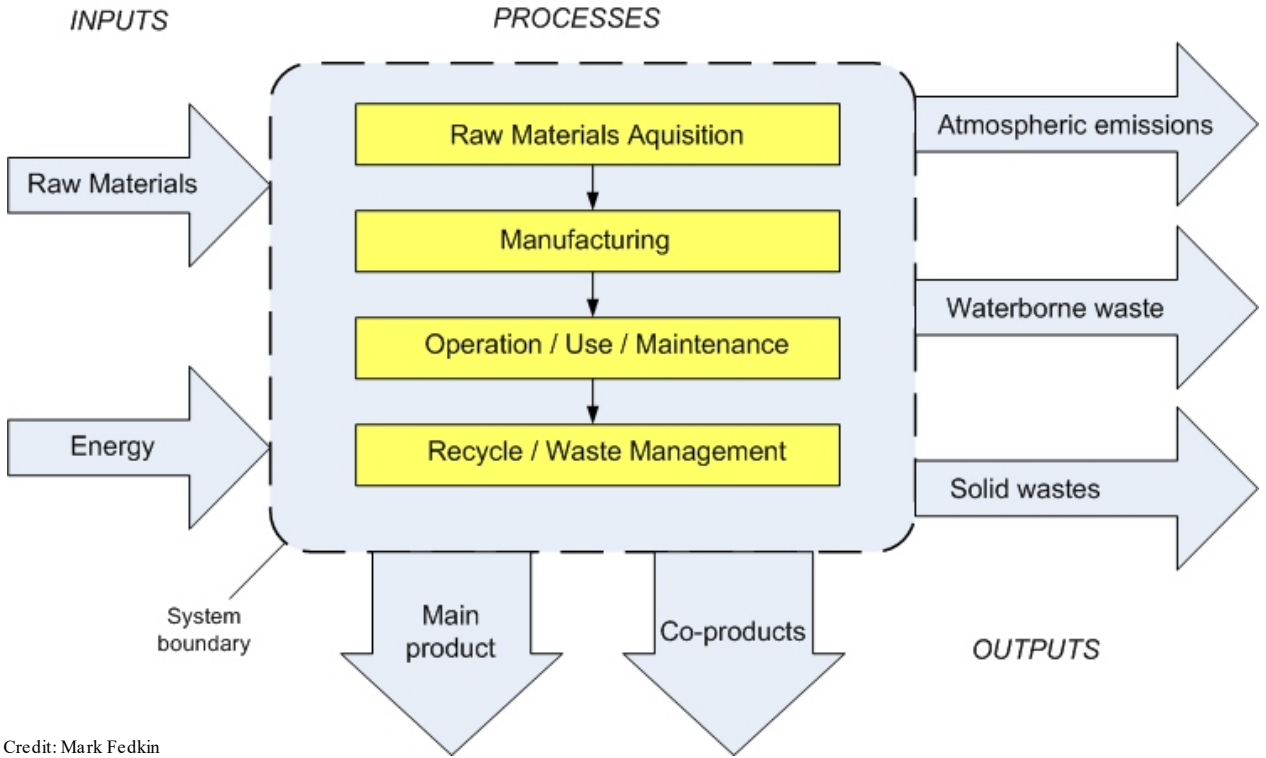


Credit: Mark Fedkin

# HOW DOES LCA WORK?

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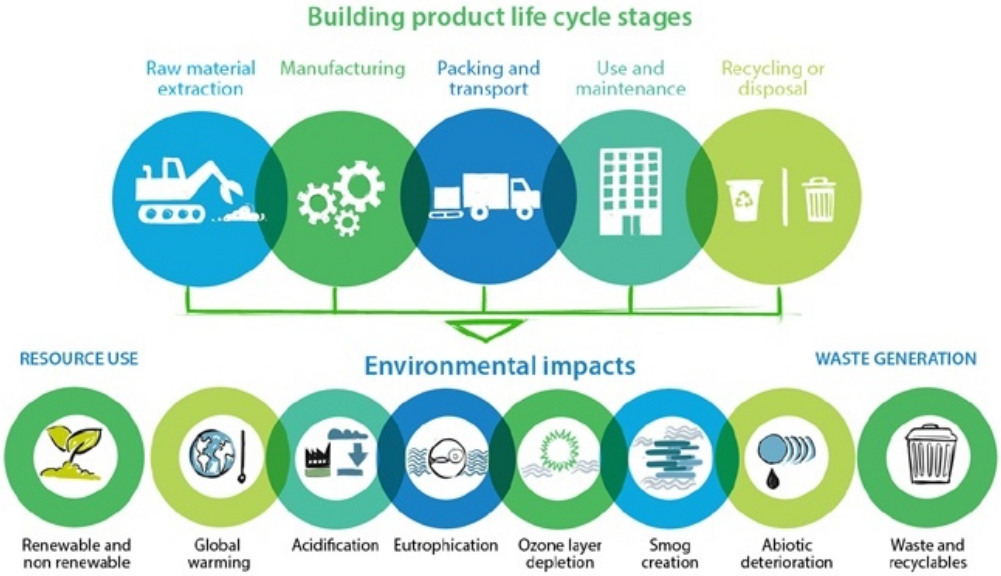
- The process closely follows predefined standards
  - ISO Standards
  - Product Category Rules
- Need to define the scope, functional unit, and system clearly
- Collected data is used to map relevant emissions and translate to impact categories
- There is software available to speed up calculations




http://amanac.eu/amanac-lca-workshop/

# LCA STAGES AND BOUNDARIES IN BUILDING INDUSTRY

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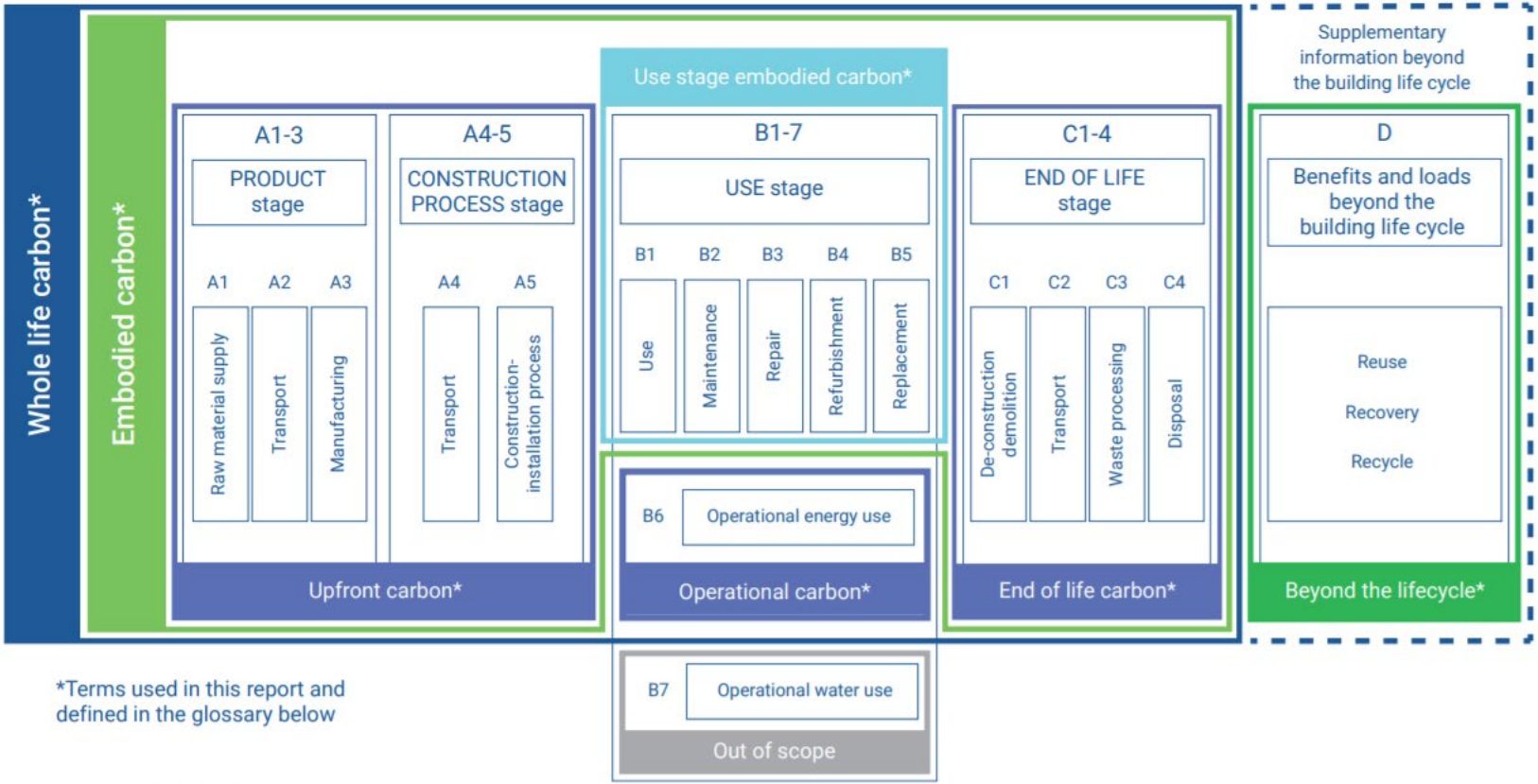

# WHERE CAN I FIND PRODUCT EMBODIED CARBON NUMBERS?

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**Environmental Product Declarations** or **EPDs** are the primary third-party verified publicly available source for embodied carbon values.

| Global Warming Potential (GWP) | = | Embodied Carbon (EC) | = | Product Carbon Footprint (PCF) |
|---|---|---|---|---|

**Same value with many names**

## ENVIRONMENTAL PRODUCT DECLARATION

CERTIFIED ENVIRONMENTAL PRODUCT DECLARATION

EcoTouch® PINK® Fiberglas™ Batt & Roll Insulation – Unfaced and Faced

According to ISO 14025, EN 15804 and ISO 21930:2017

### 4. Life Cycle Assessment Results

Table 6. Description of the system boundary modules

| | PRODUCT STAGE | | | CONSTRUCT-ION 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 | B6 | B7 | C1 | C2 | C3 | C4 | D |
| | Raw material supply | Transport | Manufacturing | Transport from gate to site | Assembly/Install | Use | Maintenance | Repair | Replacement | Refurbishment | Building Operational Energy Use During Product Use | Building Operational Water Use During Product Use | Deconstruction | Transport | Waste processing | Disposal | Reuse, Recovery, Recycling Potential |
| EPD Type | x | x | x | x | x | MND | MND | MND | MND | MND | MND | MND | MND | x | MND | x | MND |

MND – Module Not Declared

### 4.1. Life Cycle Impact Assessment Results

Table 7. North American Impact Assessment Results for 1 m² unfaced insulation at RSI=1

| TRACI v2.1 | A1-A3 | A4 | A5 | B1-B7 | C1 | C2 | C3 | C4 |
|---|---|---|---|---|---|---|---|---|
| GWP 100 [kg $CO_2$ eq] | 4.64E-01 | 2.95E-02 | 2.06E-03 | MND | MND | 8.63E-03 | MND | 0.00E+00 |
| ODP [kg CFC-11 eq] | 6.30E-08 | 7.66E-09 | 3.67E-11 | MND | MND | 2.24E-09 | MND | 0.00E+00 |
| AP [kg $SO_2$ eq] | 2.02E-03 | 1.86E-04 | 1.08E-06 | MND | MND | 5.42E-05 | MND | 0.00E+00 |
| EP [kg N eq] | 2.20E-03 | 2.53E-05 | 4.73E-07 | MND | MND | 7.40E-06 | MND | 0.00E+00 |
| POCP [kg $O_3$ eq] | 2.06E-02 | 5.25E-03 | 3.14E-05 | MND | MND | 1.53E-03 | MND | 0.00E+00 |
| $ADP_{fossil}$ [MJ, LHV] | 7.01E-01 | 6.77E-02 | 3.28E-04 | MND | MND | 1.98E-02 | MND | 0.00E+00 |

[GWP – Global Warming Potential, ODP – Ozone Depletion Potential, AP – Acifdification Potential, EP – Eutrophication Potential, POCP – Smog Formation Potential, $ADP_{fossil}$ – Abiotic Depletion Potential of Non-renewable (fossil) energy resources]

# THERE ARE MULTIPLE TYPES OF EPDS

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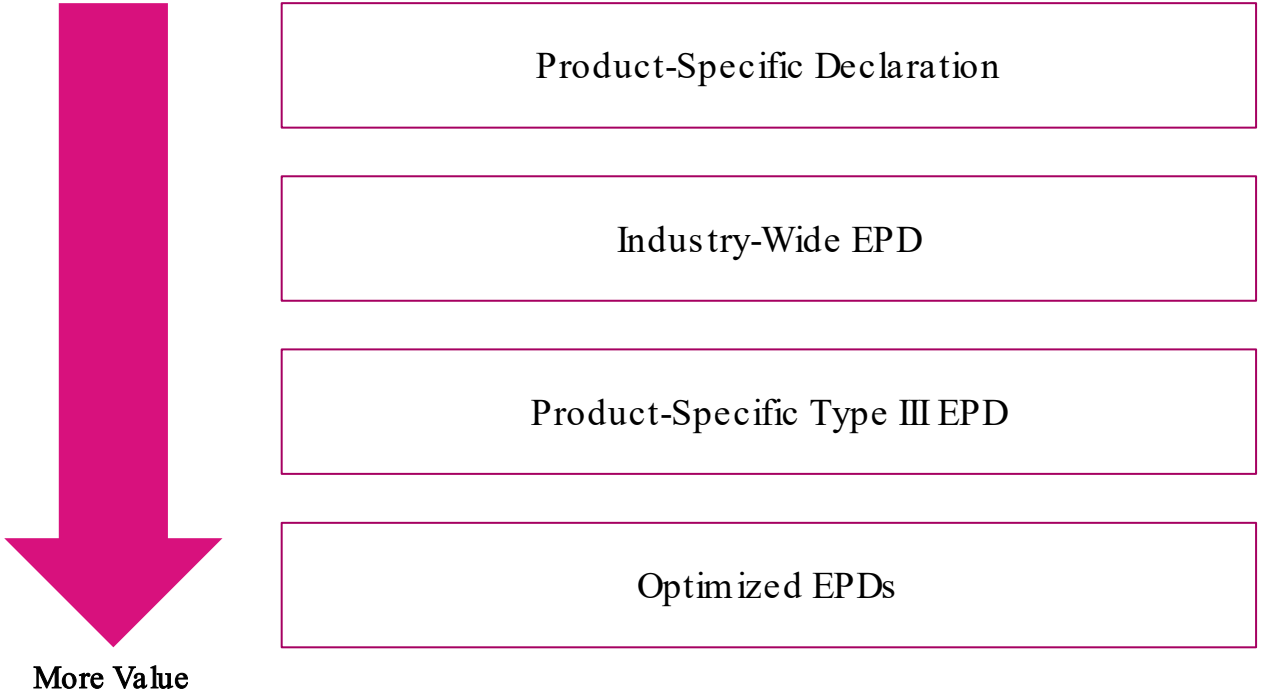

# HOW ARE EPDS MADE?

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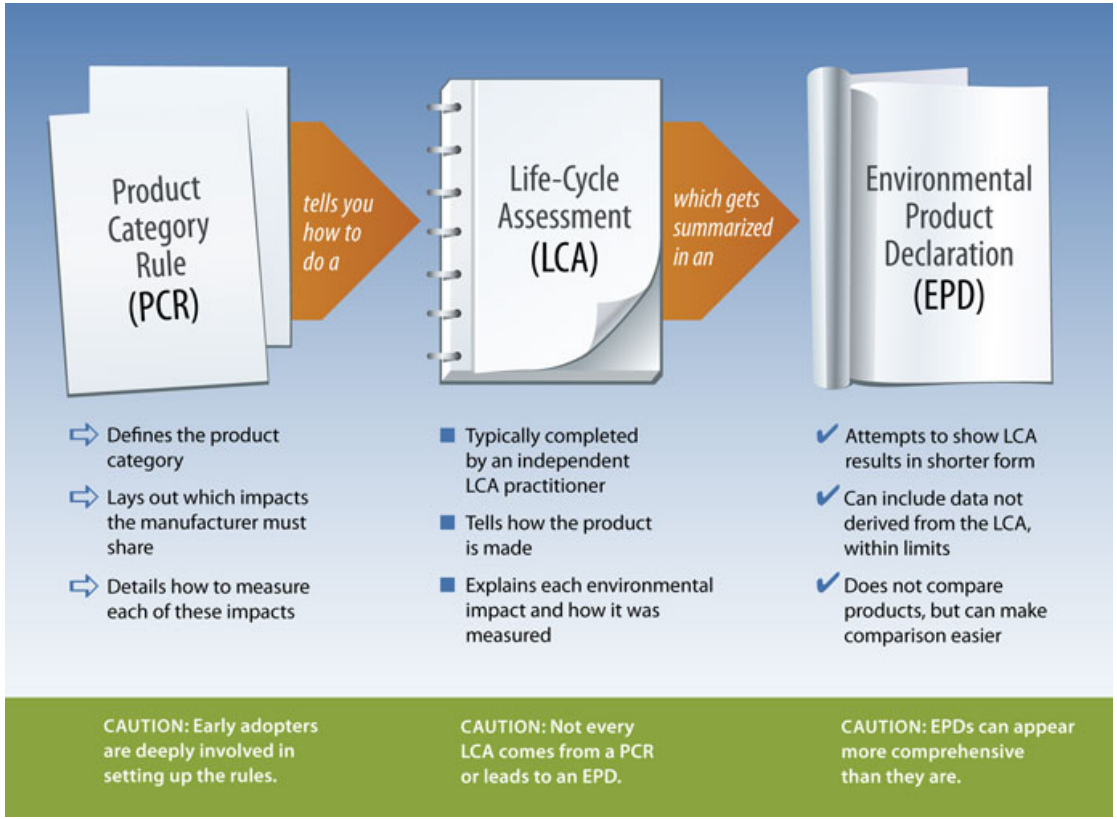


Graphic: BuildingGreen, Inc.

# WHAT SHOULD I WATCH OUT FOR WHEN USING EPDS?

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Impact values published in EPDs can vary depending on a number variables:

- Functional Unit (how much product)
- PCR (product category rules on how to create an EPD)
- Scope (cradle-to-gate vs. cradle-to-grave)
- Software used to model
- Underlying data sets used to model
- Impact assessment methods

Trying to compare EPDs which vary in these areas can introduce error

ENVIRONMENTAL PRODUCT DECLARATION

CERTIFIED

EcoTouch® PINK® Fiberglas™ Batt & Roll Insulation – Unfaced and Faced

According to ISO 14025, EN 15804, and ISO 21930:2017

| | | |
|---|---|---|
| EPD PROGRAM AND PROGRAM OPERATOR NAME, ADDRESS, LOGO, AND WEBSITE | UL Environment 333 Pfingsten Road Northbrook, IL 60611 | https://www.ul.com/ https://spot.ul.com/ |
| GENERAL PROGRAM INSTRUCTIONS AND VERSION NUMBER | General Program Instructions v.2.4 July 2018 | |
| MANUFACTURER NAME AND ADDRESS | Owens Corning, One Owens Corning Parkway, Toledo, OH, USA | |
| DECLARATION NUMBER | 4788548937.101.1 | |
| DECLARED PRODUCT & FUNCTIONAL UNIT OR DECLARED UNIT | 1 m² insulation at RSI=1 | |
| REFERENCE PCR AND VERSION NUMBER | UL Part B: Building Envelope Thermal Insulation EPD Requirements, UL 10010-1 | |
| DESCRIPTION OF PRODUCT APPLICATION/USE | EcoTouch® Unfaced and Faced Insulation for use in wall, floor, roofing and ceiling applications for residential and commercial installations. | |
| PRODUCT RSL DESCRIPTION (IF APPL.) | 75 years | |
| MARKETS OF APPLICABILITY | North America | |
| DATE OF ISSUE | September 19, 2018 | |
| PERIOD OF VALIDITY | 5 Years | |
| EPD TYPE | Product-specific | |
| RANGE OF DATASET VARIABILITY | NA | |
| EPD SCOPE | Cradle to gate with options (A4, A5, C2, C4) | |
| YEAR(S) OF REPORTED PRIMARY DATA | 2016 | |
| LCA SOFTWARE & VERSION NUMBER | SimaPro 8.4.0.0 | |
| LCI DATABASE(S) & VERSION NUMBER | ecoinvent 3.3 | |
| LCIA METHODOLOGY & VERSION NUMBER | TRACI 2.1 v1.04; CML I-A baseline v4.2; Cumulative Energy Demand (CED) v1.09 | |

| | |
|---|---|
| The PCR review was conducted by: | PCR Review Panel |
| | Chair: Thomas Gloria, PhD |
| | t.gloria@industrial-ecology.com |
| This declaration was independently verified in accordance with ISO 14025:2006 by Underwriters Laboratories | Grant R. Martin |
| ☐ INTERNAL ☒ EXTERNAL | Grant R. Martin, UL Environment |
| This life cycle assessment was independently verified in accordance with ISO 14044 and the reference PCR by: | Thomas P. Gloria, Industrial Ecology Consultants |

# WBLCA WHOLE BUILDING LCA

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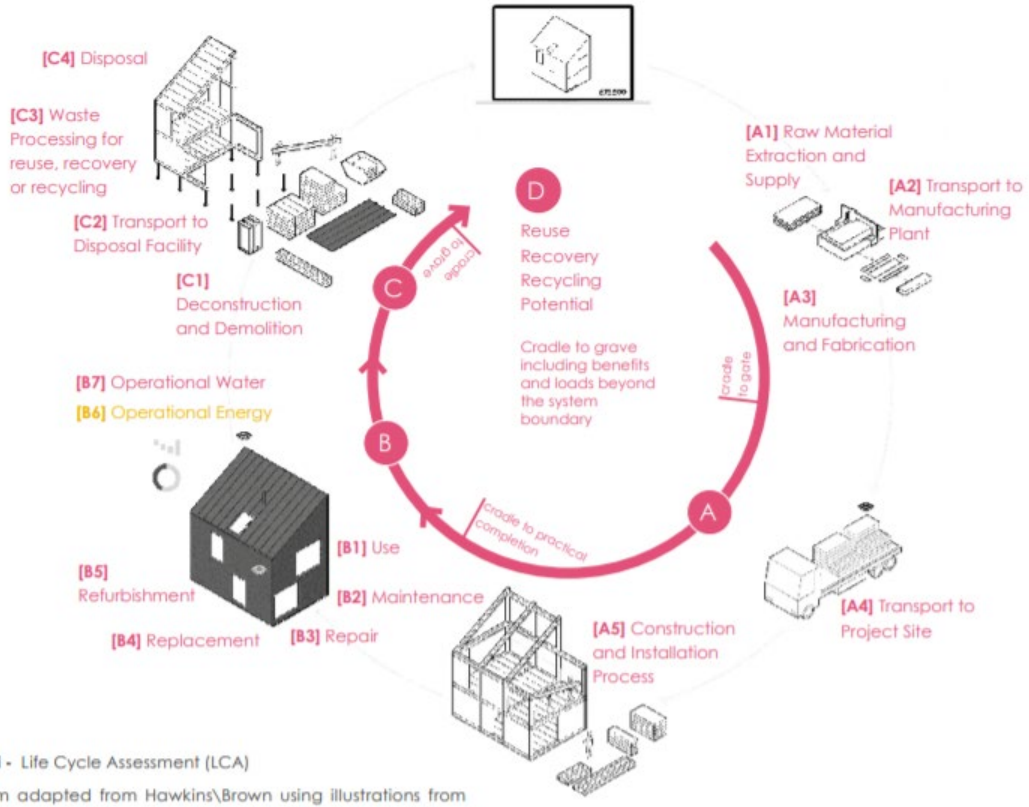


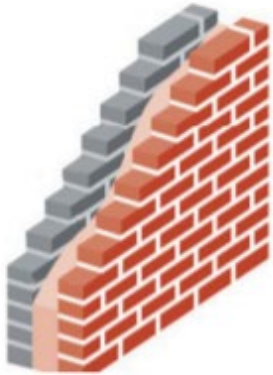

**Figure ii -** Life Cycle Assessment (LCA)

Diagram adapted from Hawkins\Brown using illustrations from Open Systems Lab 2018 licensed under Creative Commons CC-BY-ND

# CALCULATING EMBODIED CARBON OF COMPOSITE PARTS



$$\sum \text{Material Quantity} \times \text{Embodied Carbon (or GWP) per material Functional Unit} = \text{Total Building (or component) embodied carbon}$$



| | | | | |
|---|---|---|---|---|
| Quantity of concrete blocks | × | Embodied carbon conversion factor of concrete blocks | = | Embodied carbon of concrete blocks |
| Quantity of mineral wool insulation | × | Embodied carbon conversion factor of mineral wool insulation | = | Embodied carbon of mineral wool insulation |
| Quantity of bricks | × | Embodied carbon conversion factor of bricks | = | Embodied carbon of bricks |
| Quantity of mortar | × | Embodied carbon conversion factor of mortar | = | Embodied carbon of mortar |

→ Embodied carbon of cavity wall

Methodology to calculate embodied carbon of materials, RCIS Professional Information, UK

# CARBON IS NOT THE ONLY QUALIFIER

## THERE ARE OTHER ENVIRONMENTAL IMPACT CATEGORIES

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### 4.1. Life Cycle Impact Assessment Results

**Table 7. North American Impact Assessment Results for 1 m² unfaced insulation at RSI=1**

| TRACI v2.1 | A1-A3 | A4 | A5 | B1-B7 | C1 | C2 | C3 | C4 |
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| POCP [kg $O_3$ eq] | 2.06E-02 | 5.25E-03 | 3.14E-05 | MND | MND | 1.53E-03 | MND | 0.00E+00 |
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[GWP – Global Warming Potential, ODP – Ozone Depletion Potential, AP – Acifdification Potential, EP – Eutrophication Potential, POCP – Smog Formation Potential, $ADP_{fossil}$ – Abiotic Depletion Potential of Non-renewable (fossil) energy resources]

# CARBON IS NOT THE ONLY QUALIFIER

## THERE ARE OTHER TRANSPARENCY DOCUMENTS FOR PRODUCTS

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# AVAILABLE TOOLS AND RESOURCES

# EPD LISTINGS FOR PRODUCTS

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**UL Spot**
https://spot.ul.com/

**NSF**
http://info.nsf.org/Certified/Sustain/listings.asp?ProdCat=EPD

**Environdec**
https://www.environdec.com/EPD-Search/

**Institut Bauen und Umwelt e.V. (IBU, Germany)**
https://ibu-epd.com/en/published-epds/

**EPD Ireland**
https://www.igbc.ie/epd-search/

**GreenBookLive (UK)**
http://www.greenbooklive.com/search/scheme.jsp?id=260

**The EPD Registry (Global)**
https://www.theepdregistry.com/

**CSA Group**
https://www.csaregistries.ca/epd/epd_listing_e.cfm

# EC3- EMBODIED CARBON IN CONSTRUCTION CALCULATOR

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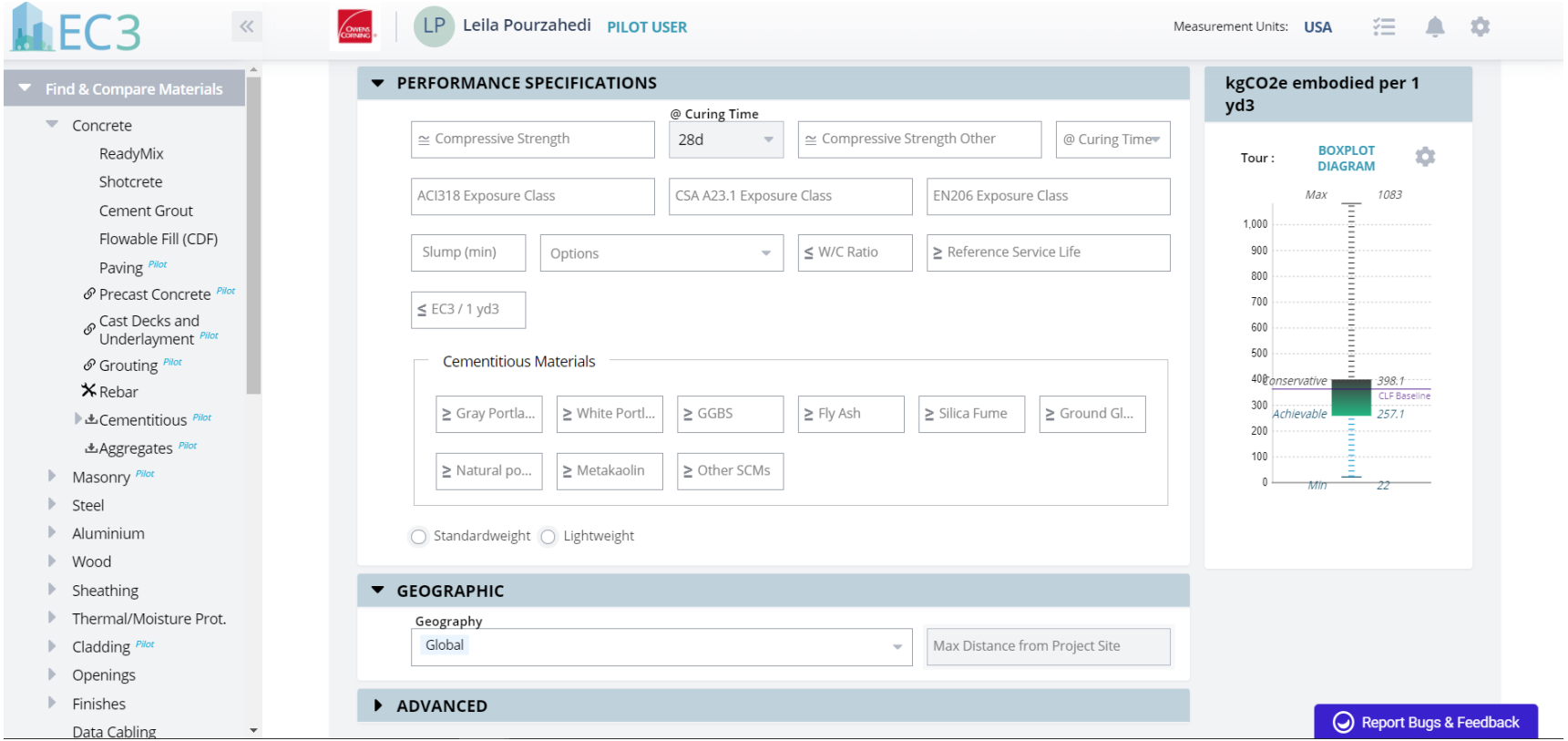


https://www.buildingtransparency.org/

# WBLCA TOOLS

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## IDENTIFY MAIN CONTRIBUTORS TO EMBODIED CARBON OF THE BUILDING

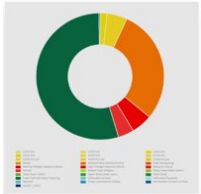
eTool

B

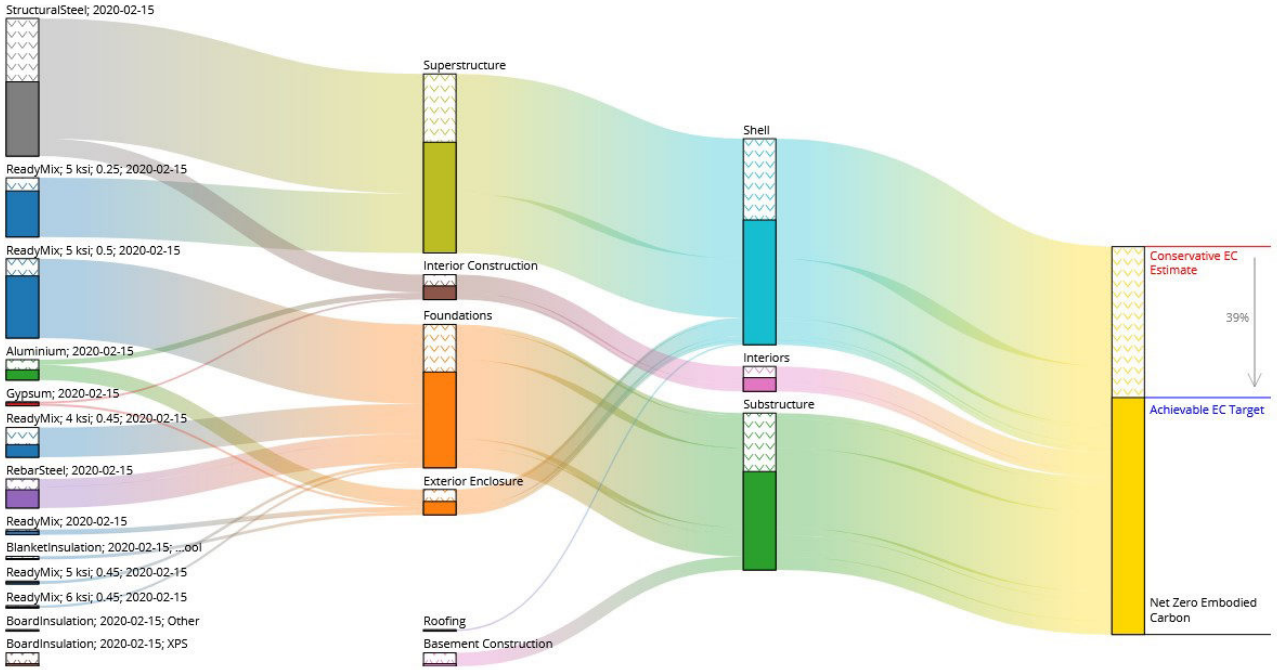
Excellence In Design For Greater Efficiencies
Edge

One Click LCA

tally



ECOM – Embodied Carbon Estimator




https://www.architects.org/news/the-new-net-zero

# EC3 + TALLY SYNERGY

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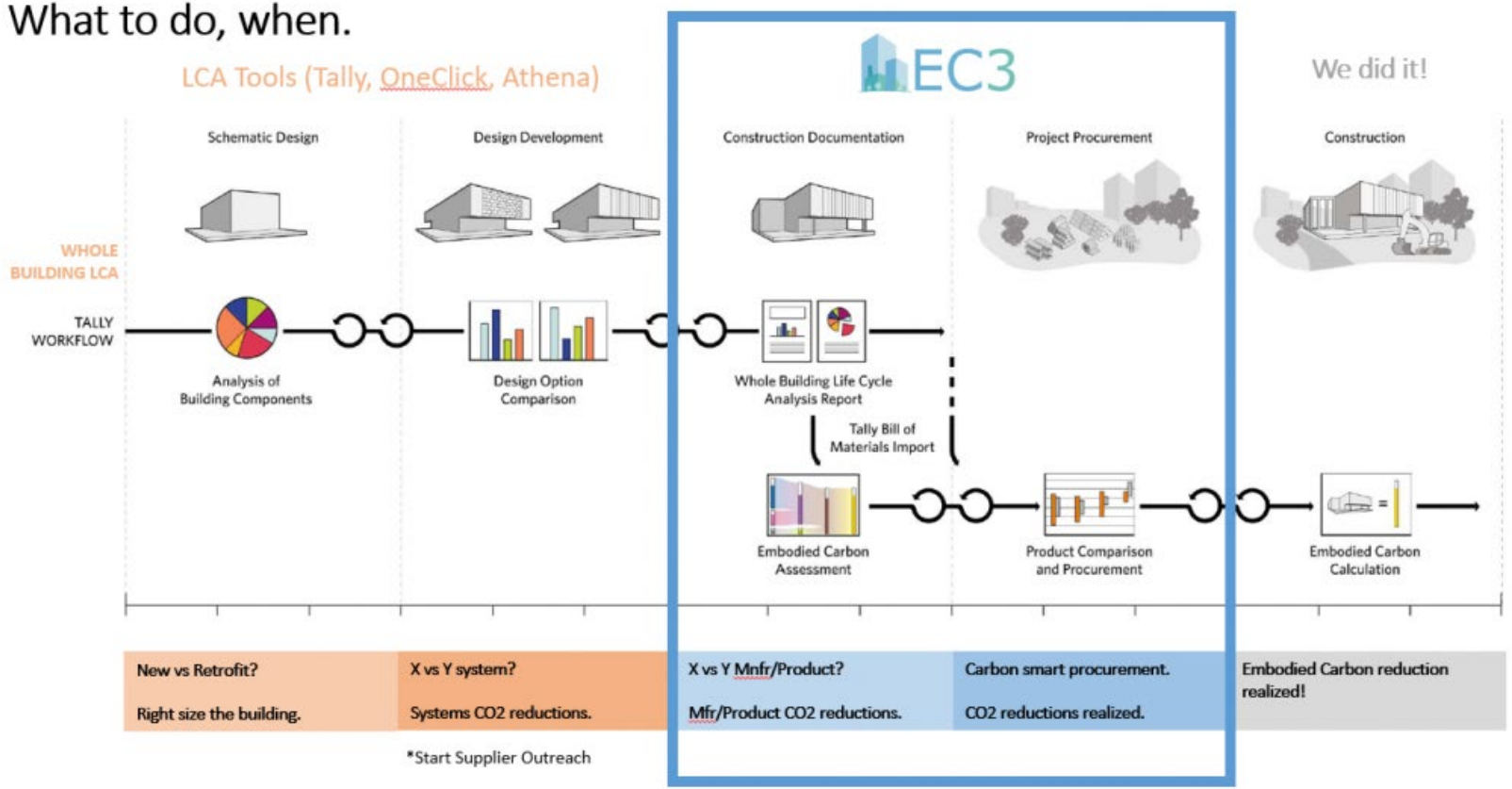


https://carbonleadershipforum.org/guide-to-the-ec3-tool/

# OTHER TRANSPARENCY RESOURCES

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**ILFI (International Living Future Institute)**
https://living-future.org/

**HPD**
https://www.hpd-collaborative.org/hpd-public-repository/

**UL Spot**
https://spot.ul.com/

**Cradle to cradle**
https://www.c2ccertified.org/

**SCS Global Services**
https://www.scsglobalservices.com/certified-green-products-guide

**ICC-ES**
https://icc-es.org/environmental-program/

**Greencircle certified**
https://www.greencirclecertified.com/

**NSF**
https://www.nsf.org/testing/sustainability/product-sustainability

# TRANSPARENCY CATALOGUES

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Mindful MATERIALS
https://www.mindfulmaterials.com/

Sustainable Minds
http://www.sustainableminds.com/

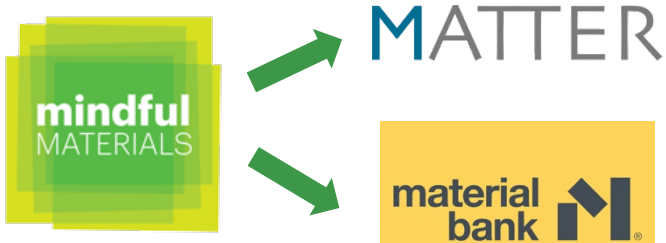
Ecomedes
https://www.ecomedes.com/

Healthy Materials Lab
https://healthymaterialslab.org/

Brightworks Sustainability
https://brightworks.net/

MATTER
https://matterbuild.com/

Material Bank
https://www.materialbank.com/







# SUSTAINABILITY
# IN EVERY PROJECT

# WHAT ARE THE DRIVERS?

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- "Regulations Are Coming
- Green Building Certifications and Reporting Structures Increasingly Look at Materials
- No Incremental Cost Is Necessary for Lower-Carbon Materials
- Action Gains Community Goodwill"

# TIME OF ACTION FOR EMBODIED CARBON

## THE EARLIER YOU ACT, THE HIGHER THE IMPACT

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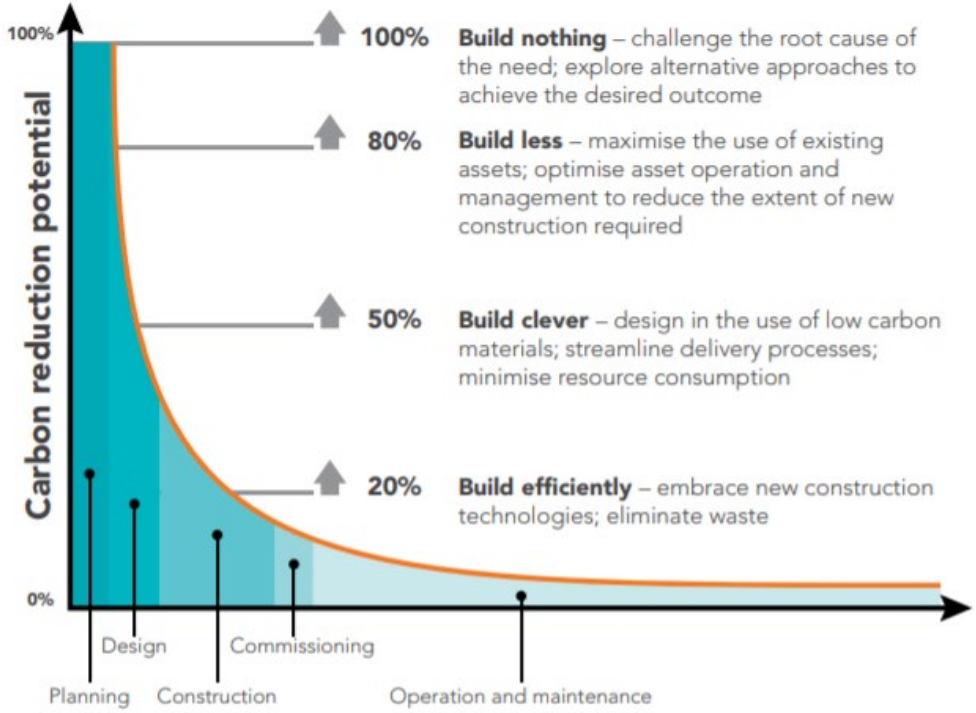
**Embodied carbon reduction potential at different stages of a building project**

© HM Treasury; Green Construction Board




UKGBC – Net Zero Carbon Buildings: A Framework Definition

# WHAT WE ALL NEED TO DO TO MAKE A CHANGE

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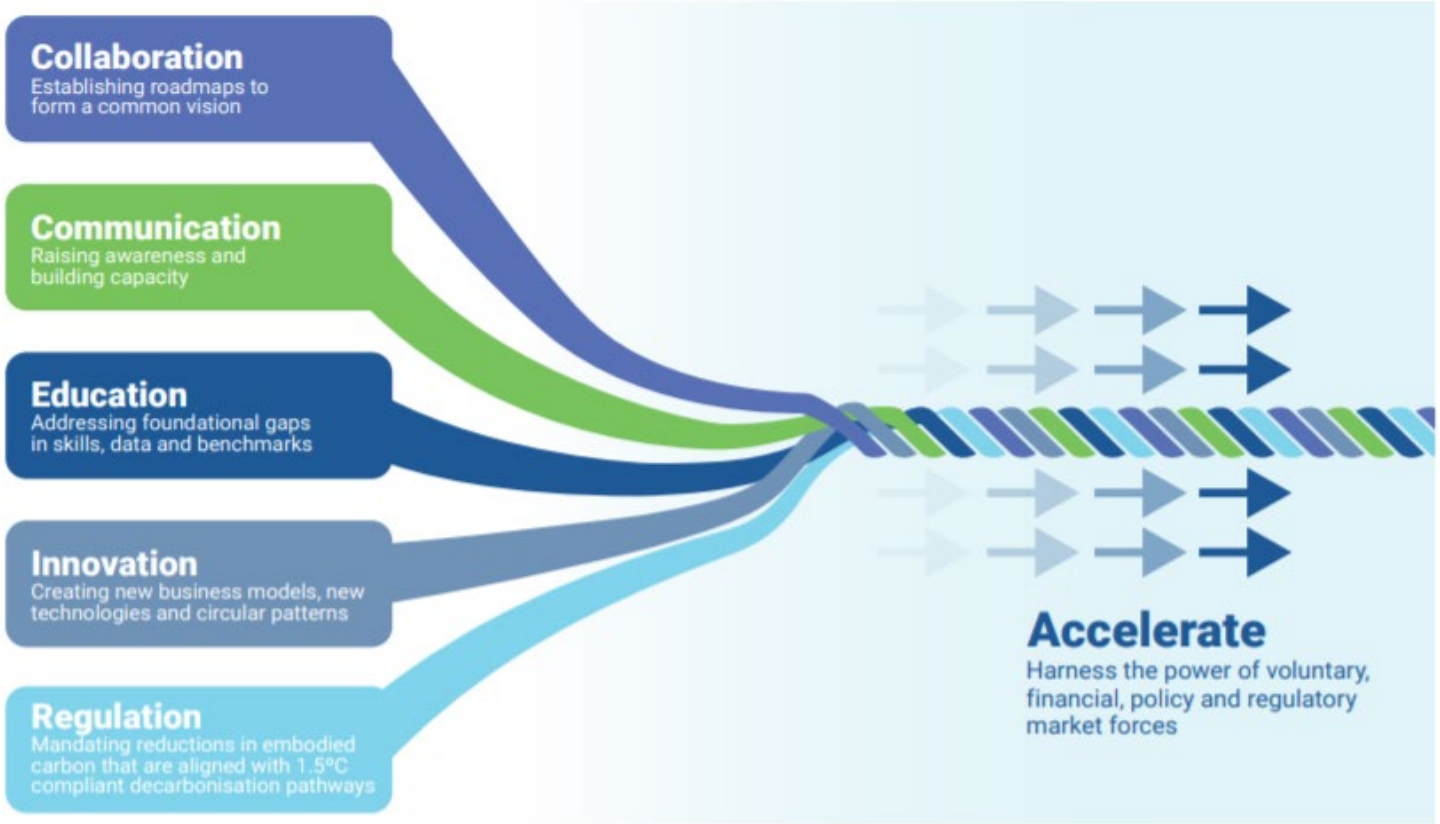


WGBC Bringing Embodied Carbon Upfront

# ADDITIONAL RESOURCES

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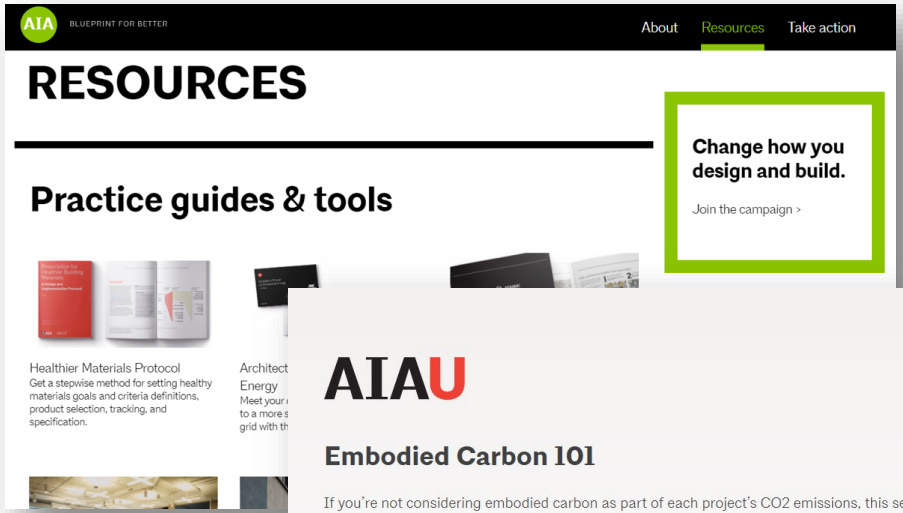


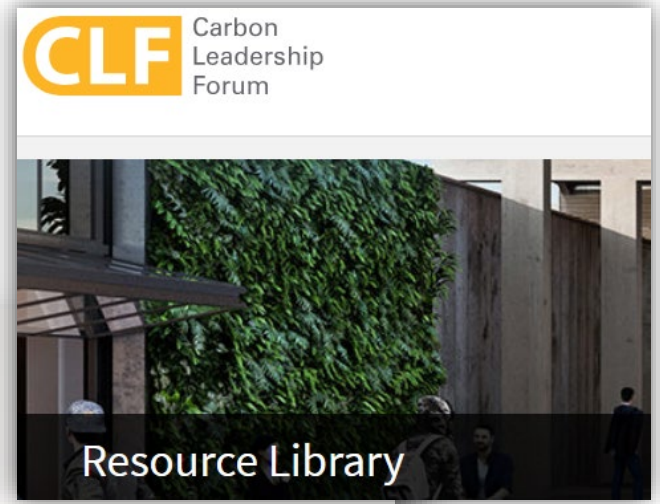


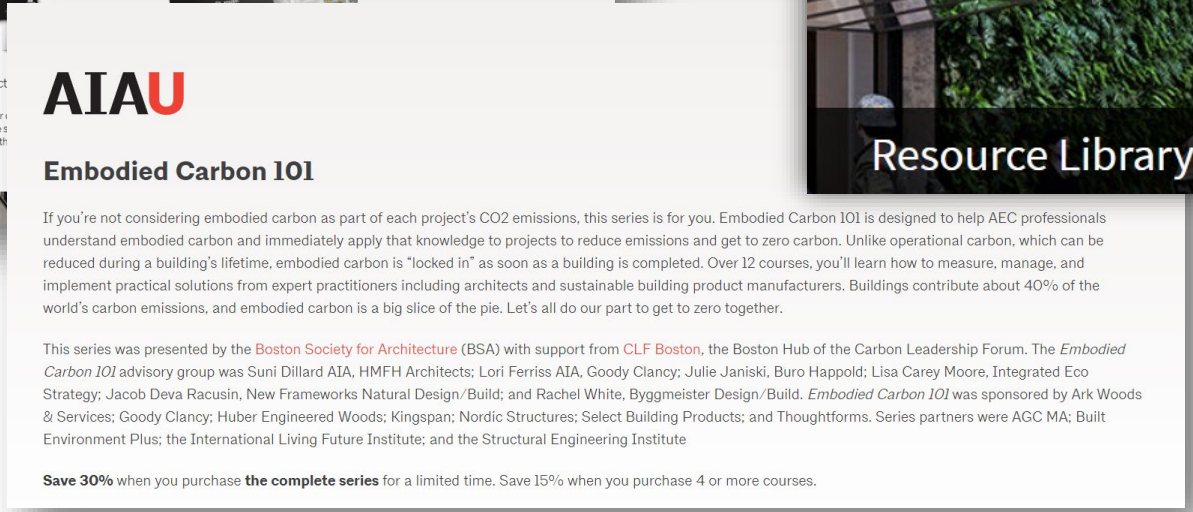


https://blueprintforbetter.org/resources/
https://aiau.aia.org/embodied-carbon-101
https://carbonleadershipforum.org/resource-library/