Embodied Carbon Regulations in North America

Amy Leedham | Atelier Ten

A legacy of positive change

We are an international team of environmental design consultants focused on delivering sustainability to the planned and built environment.

Established
1990
in London

Experts
in a wide range of rating systems

LBC

Accredited
by a range of industry gold standards

PROVEN PROVIDER

UK GBC Gold Leaf Member

Just.

CYBER ESSENTIALS PLUS

clear

10 offices

A dedicated and innovative team of **350**

Shaping a more sustainable world

Over **5000** projects

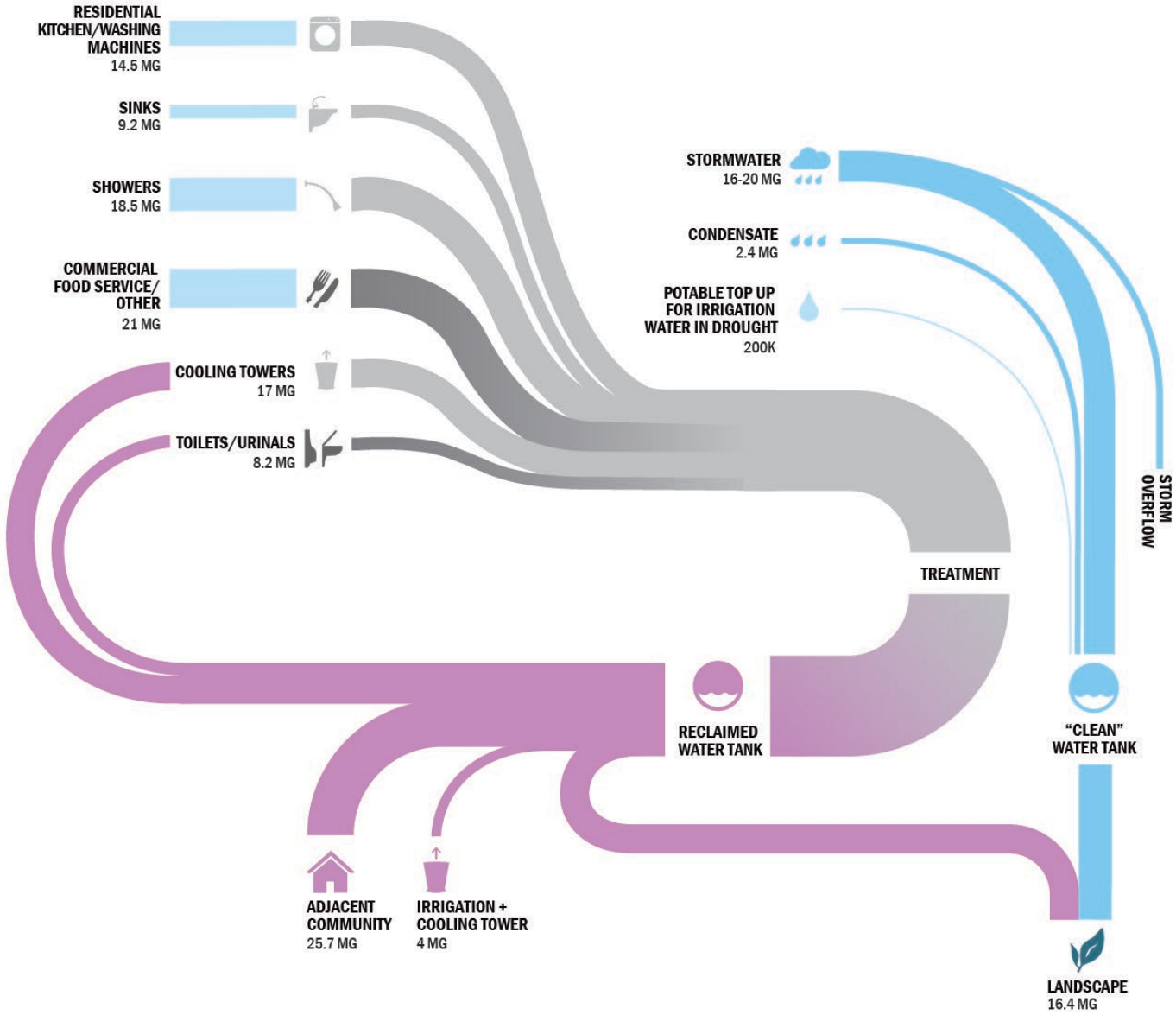
In more than **540** places and across **85** countries

Our approach

Is it sustainable?
Does it meet our clients' aspirations?
Is it cost-effective in the short and long terms?
Does it support the users' health and wellbeing?

What We Do

- Environmental Design
- Façade Optimization & Daylight Design
- Water System Optimization
- Resilience + Adaptation Planning
- Comfort + IEQ Consulting
- Lighting Design
- Benchmarking (LEED, LBC, etc.)
- Energy Analysis
- Net-Zero Consulting
- Verification
- Masterplanning
- Carbon Management
- Healthy Buildings
- MEP Engineering (international)

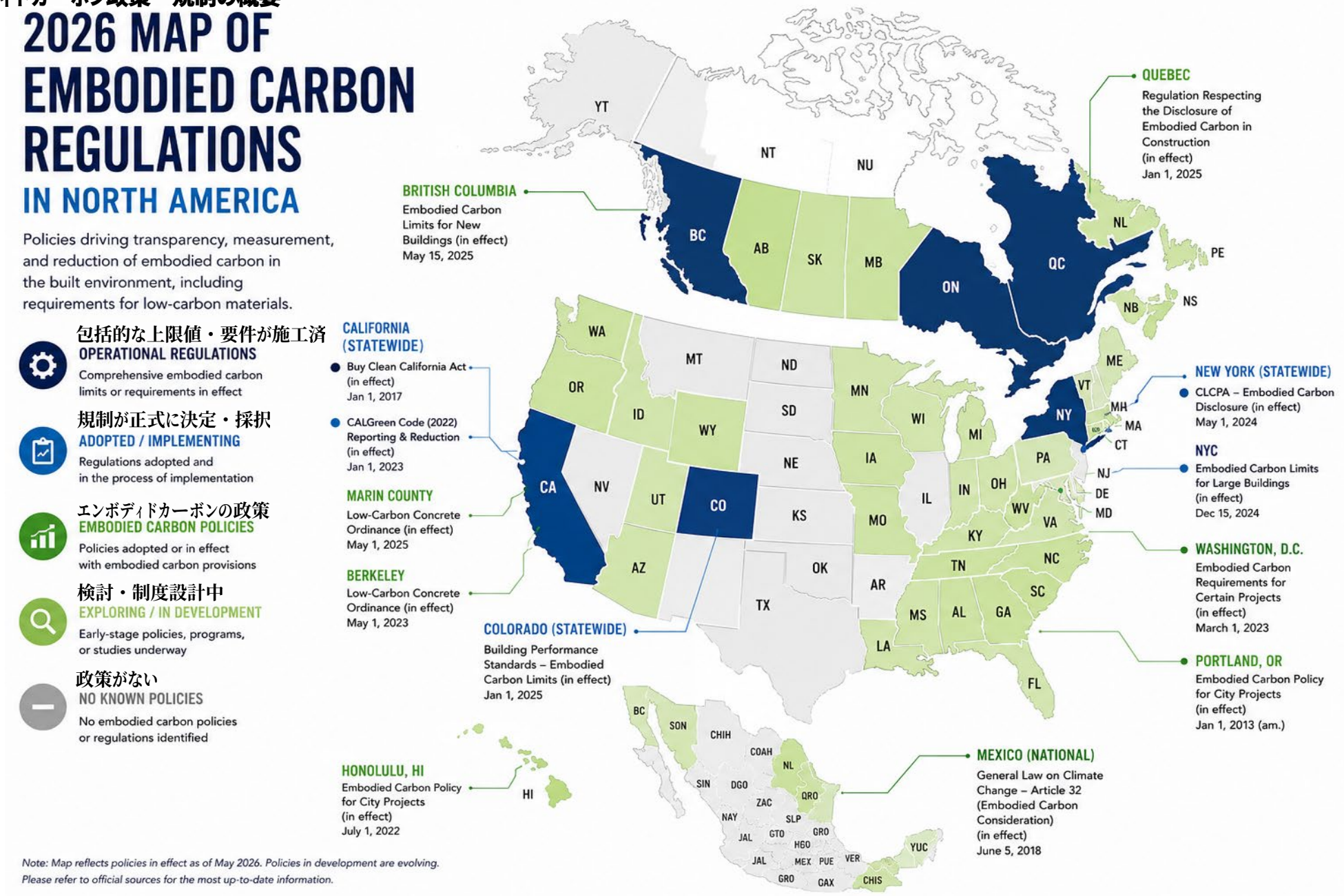


Embodied Carbon Regulations

エンボディドカーボン政策

Embodied Carbon Policy Overview

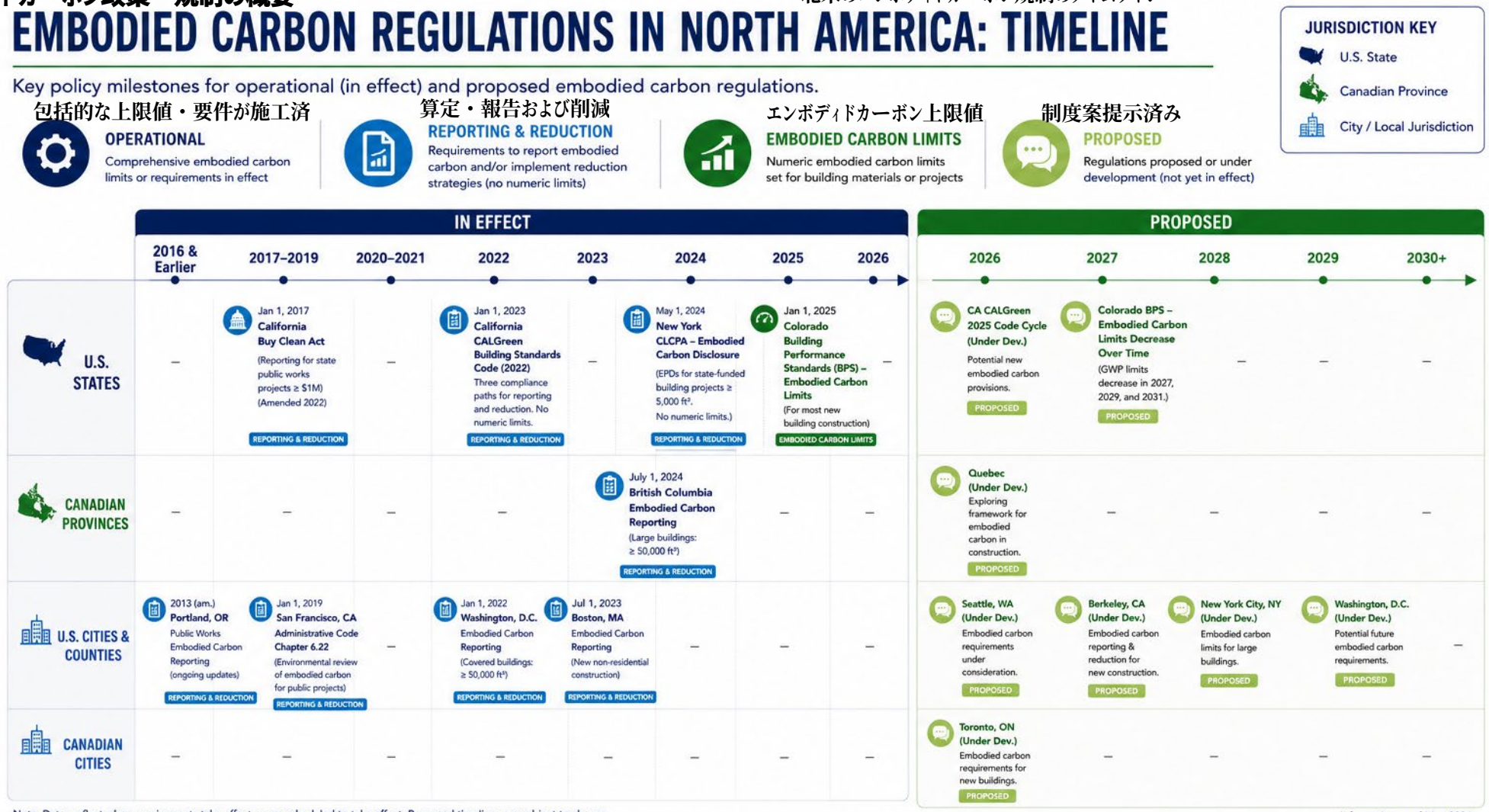
北米のエンボディドカーボン政策・規制の概要



Embodied Carbon Policy Overview

北米のエンボディドカーボン政策・規制の概要

北米のエンボディドカーボン規制のタイムライン



Note: Dates reflect when requirements take effect or are scheduled to take effect. Proposed timelines are subject to change.

Information as of May 2026.

SOURCES – U.S. STATES

California Building Standards Commission. "2022 CALGreen Code, Section 4.408 Embodied Carbon." https://www.dgs.ca.gov/BSC/Codes (See CALGreen 4.008.1)

California Department of General Services. "Buy Clean California Act." https://www.dgs.ca.gov/PD/Resources/Page-Content/Procurement-Division-Resources-List-Folder/Buy-Clean-California-Act

Colorado Energy Office. "Building Performance Standards – Embodied Carbon." https://energyoffice.colorado.gov/building-performance-standards

SOURCES – CANADIAN PROVINCES

Province of British Columbia. "Embodied Carbon Reporting." https://www2.gov.bc.ca/gov/content/environment/climate-change/buildings-standards-reporting/embodied-carbon-reporting

Gouvernement du Québec. "Plan pour une économie verte 2030 – Bâtiment et construction." https://www.environnement.gouv.qc.ca/changements/plan-verte-2030/batiment-construction.htm

SOURCES – U.S. CITIES & COUNTIES

City of Portland, OR. "Embodied Carbon Policy for City Projects." https://www.portland.gov/bps/embodied-carbon

San Francisco Administrative Code, Chapter 6.22. https://codelibrary.amlegal.com/codes/san_francisco/latest/sf_admin/0-0-0-379

District of Columbia. "Building Energy Performance Standards (BEPS) – Embodied Carbon." https://doee.dc.gov/service/beps

City of Boston. "Embodied Carbon Policy." https://www.boston.gov/departments/environment/embodied-carbon-policy

SOURCES – CANADIAN CITIES

City of Toronto. "TransformTO Net Zero Existing Buildings Strategy." https://www.toronto.ca/services-payments/water-environment/sustainability-climate-action/transformto/

Note: Additional policies are under development and will be added as details become available.

Embodied Carbon Policy Overview

北米のエンボディドカーボン政策・規制の概要

COLORADO (CO)

CO

BUILDING PERFORMANCE STANDARDS (BPS) – EMBODIED CARBON REQUIREMENT

First-in-the-nation requirement setting maximum global warming potential (GWP) limits for most new building construction.

全米初：州有建築物の多くの新築工事を対象に、建材のGWP上限値を設定

IN EFFECT SINCE	January 1, 2025
APPLIES TO	State-funded public buildings and state-owned facilities only. (Exemptions apply).
REQUIREMENT	Sets maximum embodied carbon (GWP) limits for building materials based on building use type and size.
ENFORCEMENT	Demonstrate compliance at permitting. Enforced by the Colorado Energy Office.
AUTHORITY	Colorado Energy Office pursuant to Executive Order D 2022 140 (Building Performance Standards Policy).

KEY DETAILS

- GWP limits decrease over time (2025, 2027, 2029, 2031).
- Requires whole-building life cycle assessment (LCA) using specified methodology.
- Report GWP results at permit application.

Source: Colorado Energy Office. "Building Performance Standards – Embodied Carbon." Updated Dec. 2024. https://energyoffice.colorado.gov/building-performance-standards

CALIFORNIA (CA)

CA

カリフォルニア州グリーン建築基準

CALGreen BUILDING STANDARDS CODE (2022)

Includes embodied carbon provisions with three compliance paths for reporting and reduction. Does not set mandatory embodied carbon limits.

報告・削減について3つの適合方法を規定。義務的な上限値は設けていない。

IN EFFECT SINCE	January 1, 2023 (2022 Code Cycle)
APPLIES TO	New building permit applications
REQUIREMENT	Choose one of three compliance paths: • Path 1: Whole-Building Life Cycle Assessment • Path 2: Material Carbon Emissions Reporting • Path 3: Prescriptive Compliance
ENFORCEMENT	Enforced through building permit review
AUTHORITY	California Building Standards Commission (Title 24, Part 11) (CALGreen 4.408.1)

カリフォルニア州クリーン調達法

BUY CLEAN CALIFORNIA ACT (2017)

Requires reporting of embodied carbon and environmental product declarations (EPDs) for state public works projects.

州の公共工事にエンボディドカーボンの報告・EPD提出を義務付け

IN EFFECT SINCE	January 1, 2017 (amended 2022)
APPLIES TO	State-funded public works projects ≥ $1 million
REQUIREMENT	Report global warming potential (GWP) for construction materials and provide EPDs
ENFORCEMENT	Contractual requirement; noncompliance may affect eligibility and payments
AUTHORITY	Department of General Services (DGS) (Public Contract Code § 3500 et seq.)

Sources: California Building Standards Commission. "2022 CALGreen Code, Section 4.408 Embodied Carbon." https://www.dgs.ca.gov/BSC/Codes (See CALGreen 4.408.1)
California Department of General Services. "Buy Clean California Act." https://www.dgs.ca.gov/PD/Resources/Page-Content/Procurement-Division-Resources-List-Folder/Buy-Clean-California-Act

NEW YORK (NY)

NY

CLIMATE LEADERSHIP & COMMUNITY PROTECTION ACT (CLCPA) – EMBODIED CARBON DISCLOSURE

Requires disclosure of embodied carbon for state-funded building projects.

州の資金による建築プロジェクトにはエンボディドカーボンの開示を義務付け。

IN EFFECT SINCE	May 1, 2024
APPLIES TO	State-funded building projects ≥ 5,000 ft²
REQUIREMENT	Embodied carbon disclosure using Environmental Product Declarations (EPDs). No embodied carbon limits are required.
ENFORCEMENT	Disclosure required for funding approval; compliance tracked by agencies.
AUTHORITY	New York State Department of Environmental Conservation (DEC) (6 NYCRR Part 492)

KEY DETAILS

- Applies to new construction, major renovations, and additions.
- Supports tracking and reduction of embodied carbon over time.

Source: New York State Department of Environmental Conservation. "Embodied Carbon Disclosure Requirements." https://dec.ny.gov/environmental-protection/climate-change/buildings/embodied-carbon-disclosure-requirements

Note: Information reflects requirements in effect as of May 2026. Requirements vary by building type, size, use, and exemptions may apply.

Embodied Carbon Policy Overview

北米のエンボディドカーボン政策・規制の概要

カリフォルニア州クリーン調達法vs カリフォルニア州グリーン建築基準

BUY CLEAN CALIFORNIA ACT vs. 2024 CALGREEN REQUIREMENTS

Two complementary California policies advancing lower embodied carbon in construction—but they differ in scope, requirements, and implementation.

	BUY CLEAN CALIFORNIA ACT (in effect Jan 1, 2017)	2024 CALGREEN REQUIREMENTS (in effect Jan 1, 2023)
APPLICABILITY Which projects are covered?	**State-funded public works projects only** Applies to projects where the State is the awarding body or using state bond funds. Examples: State buildings, universities, hospitals, state parks, infrastructure.	**Virtually all new building construction in California** Applies to all newly constructed residential and nonresidential buildings, additions, and alterations permitted on or after Jan 1, 2023. Examples: Private and public projects of all sizes (1- and 2-family homes, commercial buildings, schools, etc.)
TYPE OF REQUIREMENT What is required?	**Mandatory material standards (embodied carbon limits)** Requires specified construction materials to meet maximum global warming potential (GWP) thresholds per unit. Steel · Rebar · Cement · Glass · Mineral Wool Insulation Must use compliant materials to be eligible for state funding.	**Reporting and reduction pathways (no numeric limits)** Provides three compliance paths focused on measurement, transparency, and reduction over time. 1 Reporting Only: Meet minimum reporting requirements 2 Prescriptive: Use prescriptive measures to reduce embodied carbon 3 Performance: Achieve whole-building embodied carbon reduction targets No specific embodied carbon limits are imposed.
EASE OF IMPLEMENTATION How easy is it to comply?	**Moderate** Requires procurement of compliant low-carbon materials and documentation at bid and during construction.	**Relatively Easy** Allows flexibility to choose the path that best fits the project. Relies on modeling and documentation, not material compliance certification.
PRIMARY PURPOSE	**Drive immediate market demand for low-carbon materials** Uses procurement power to reduce embodied carbon in key high-impact materials on state projects.	**Support industry-wide carbon reduction over time** Builds capacity for measurement and encourages reduction strategies across the entire building sector.
HOW IT WORKS IN PRACTICE	**Procurement requirement** Projects must specify compliant materials that meet or exceed GWP limits. Compliance is verified through product certificates and producer certifications.	**Design & permitting requirement** Projects submit embodied carbon calculations (EPDs) and follow one of the three compliance paths during design and permitting.

Embodied Carbon Policy Impact

エンボディドカーボン政策の影響

1 EARLY COORDINATION ON COMPLIANCE APPROACH

適合方法について早期段階から関係者間で調整

Regulations require projects to plan early for embodied carbon compliance. This has led to earlier involvement of the full design and construction team to select the most appropriate compliance path and set reduction goals.

IMPACT:
Better outcomes through informed decisions

- ✓ Compliance strategy is aligned with project goals, budget, and schedule
- ✓ Reduces risk of costly redesigns or last-minute changes
- ✓ Embodied carbon becomes a shared priority from day one

2 COORDINATED UPDATES TO CONTRACT DOCUMENTS (SPECIFICATIONS)

契約図書・仕様書の変更を関係者間で連携して反映

Project teams are working together to update specifications to require EPDs, define low-carbon material options, and support reporting and compliance—creating clarity and consistency across the project.

IMPACT:
Stronger, clearer requirements in every project

- ✓ Specifications evolve to reflect regulatory needs and market solutions
- ✓ Improved clarity for bidders, suppliers, and subcontractors
- ✓ Fewer RFIs and smoother permit reviews

3 LOWER CARBON OPTIONS WERE ALREADY AVAILABLE— NO ONE HAD EVER ASKED

低炭素製品はすでに存在していたが、採用されず需要は限定的。規制が継続的な市場需要を創出。

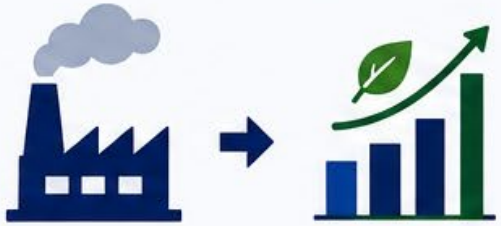
Many manufacturers already had lower carbon products in their portfolios, but demand was limited because they were never specified. Regulations created consistent market demand and visibility.

IMPACT:
Unlocking existing solutions at scale

- ✓ Low-carbon products gain traction when asked for
- ✓ More choices for projects without sacrificing performance
- ✓ Market transparency improves as options and EPDs become standard

4 MANUFACTURERS NOT ADDRESSING CARBON ARE BEING FORCED TO DO SO

カーボン削減に取り組んでこなかったメーカーにも対応を促す



Regulations are a catalyst for manufacturers who have not prioritized carbon reduction. To remain competitive and specified on projects, they are investing in EPDs, product innovation, and lower carbon materials.

IMPACT:
Accelerating industry-wide transformation

- ✓ Increased investment in R&D and decarbonization
- ✓ More low-carbon products entering the market
- ✓ Raising the bar for the entire construction industry

Embodied Carbon Policy Challenges

エンボディドカーボン政策の課題

1 DIFFERENCES IN SCOPE ACROSS PROGRAMS

制度ごとに対象範囲が異なる

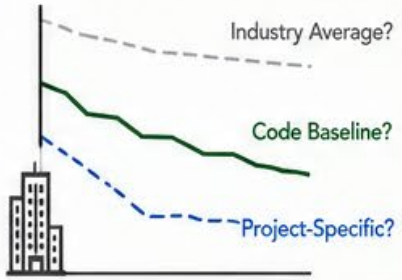
LEED vs. ILFI

LEED ILFI

Programs like LEED and ILFI take different approaches to scope, system boundaries, building types, and life cycle stages.

2 CHALLENGES AROUND DEFINING A BASELINE

ベースライン設定の難しさ



Establishing a fair and meaningful baseline is difficult due to limited data, evolving methods, and varying regulatory approaches.

3 DIFFERENCES IN MATERIALS INCLUDED & EXCLUDED IN PRESCRIPTIVE REQUIREMENTS

仕様規定で対象・対象外となる材料が制度ごとに異なる

Structural Steel Concrete MEP Systems

Prescriptive requirements vary widely in which materials are covered—creating gaps and inconsistencies across regulations.

4 REGIONAL AVAILABILITY OF LOWER CARBON OPTIONS

低炭素材料の地域ごとの入手可能性の差

Lower carbon materials are not equally available or cost-competitive in all regions, creating inequity and practical barriers to compliance.

5 CHALLENGES AROUND REPORTING METRICS ACROSS REGULATIONS

規制ごとに報告指標が異なり、比較・整合が難しい

kg CO_2e Global Warming Potential (GWP) Whole Building LCA

Different regulations and guidelines use different metrics, units, timeframes, and reporting formats—making comparison and aggregation difficult.

Atelier Ten US Process

Atelier Ten US のプロセス

Embodied Carbon as a Design Tool

設計ツールとしてのエンボディドカーボン

GOALS & CONTEXT

- Identify regulations, determine reduction targets / certification goals
- Identify opportunities

CARBON DRIVERS

- First pass on major drivers, including:
  - Massing
  - Structure
  - Envelope

DETAILED OPTIMIZATION

- Optimization of major packages
- Constructability discussions
- Specifications
- Procurement

FOLLOW THROUGH

- Final Calculations
- LEED Submission
- Offsets
- Submittals / CA Support

Embodied Carbon Goals

エンボディドカーボンの目標

BASELINE

LOW-CARBON SPECIFICATIONS
Set GWP targets for cast-in-place concrete products with higher-than-average recycled content thresholds

LIFE CYCLE ASSESSMENT
Perform Whole Building Life Cycle Assessment (WBLCA)

LEED v4.1

LEED v4.1 BUILDING LIFE CYCLE IMPACT REDUCTION
Perform a WBLCA and achieve a 5-10% reduction in GWP for structure and enclosure

INTERIOR ASSESSMENT
Assess GWP of the top ten interior product types (by volume) to inform specification of lower-carbon alternatives

ILFI ZERO CARBON

>10% REDUCTION
Achieve at least 10% reduction in GWP for structure, enclosure, and interiors

EMBODIED CARBON CAP
The total embodied carbon may not exceed 500 kg CO2e/m2 for building structure, enclosure, and interiors

CARBON OFFSETS
Carbon offsets to cover embodied carbon emissions of new materials

MOST ASPIRATIONAL

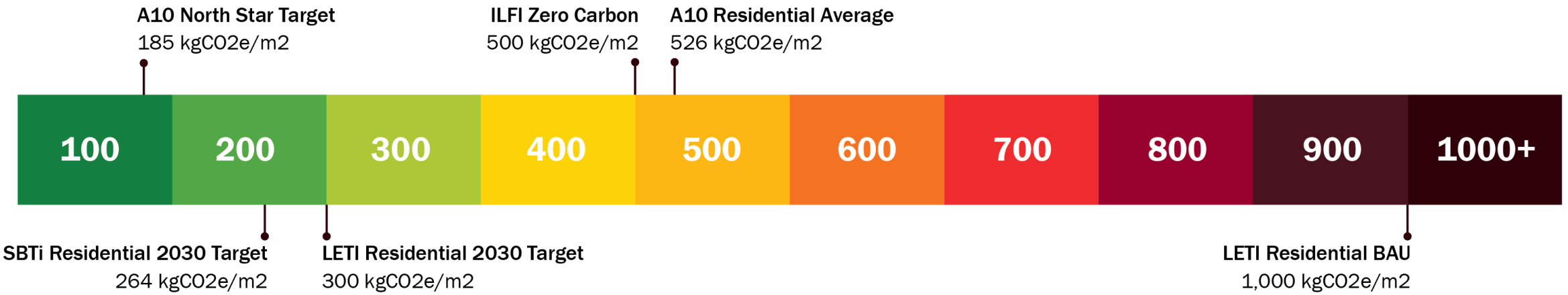
ZERO EMBODIED CARBON
Reduce embodied carbon to the greatest possible extent through design and offset remainder for structure, enclosure, interiors, and non-active systems

Embodied Carbon Budget

エンボディドカーボン予算

CORE & SHELL + INTERIORS

躯体・外皮+内装

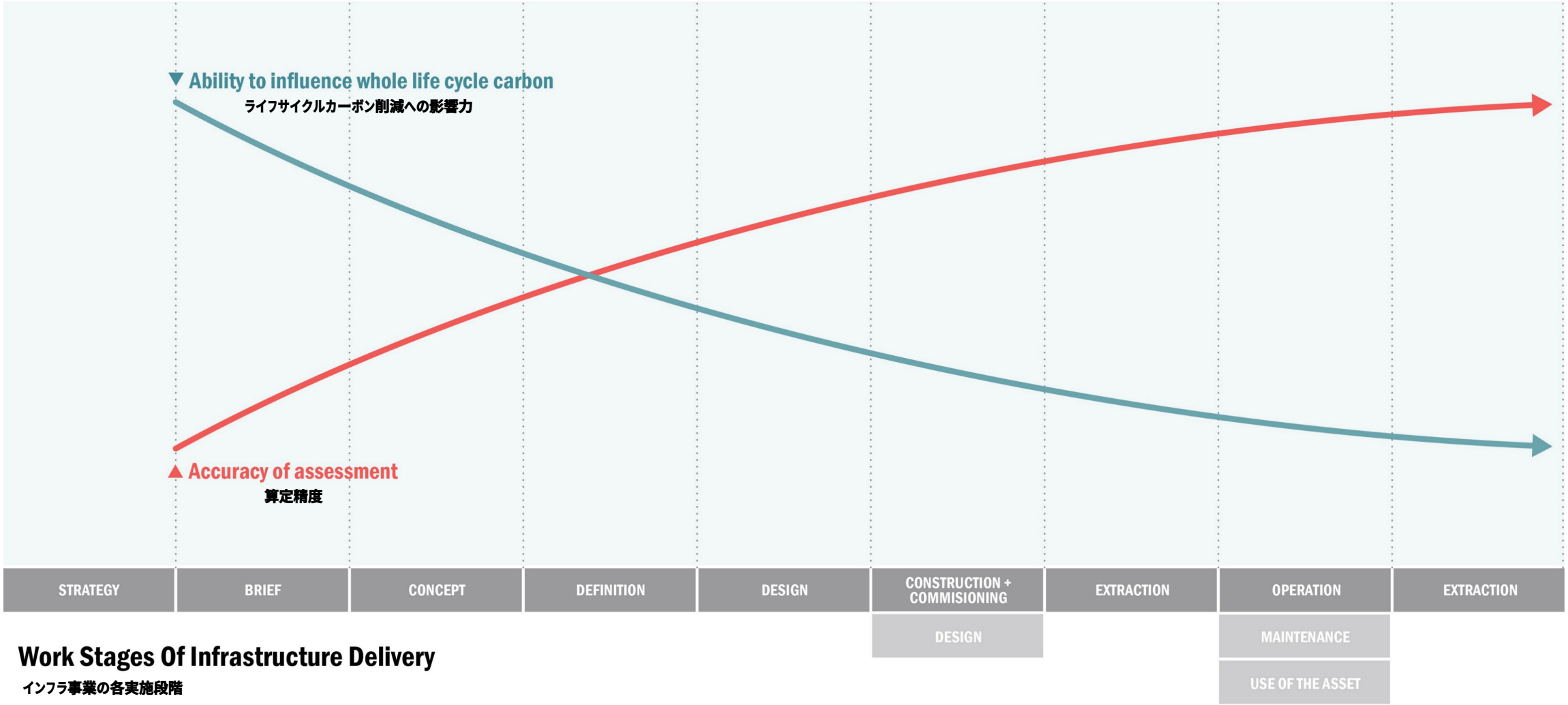


CORE & SHELL + INTERIORS + MEP + REFRIGERANTS

躯体・外皮+内装+設備（機械・電気・給排水設備）+冷媒

Embodied Carbon Influence & Accuracy

エンボディドカーボンへの影響度と算定精度



Work Stages Of Infrastructure Delivery

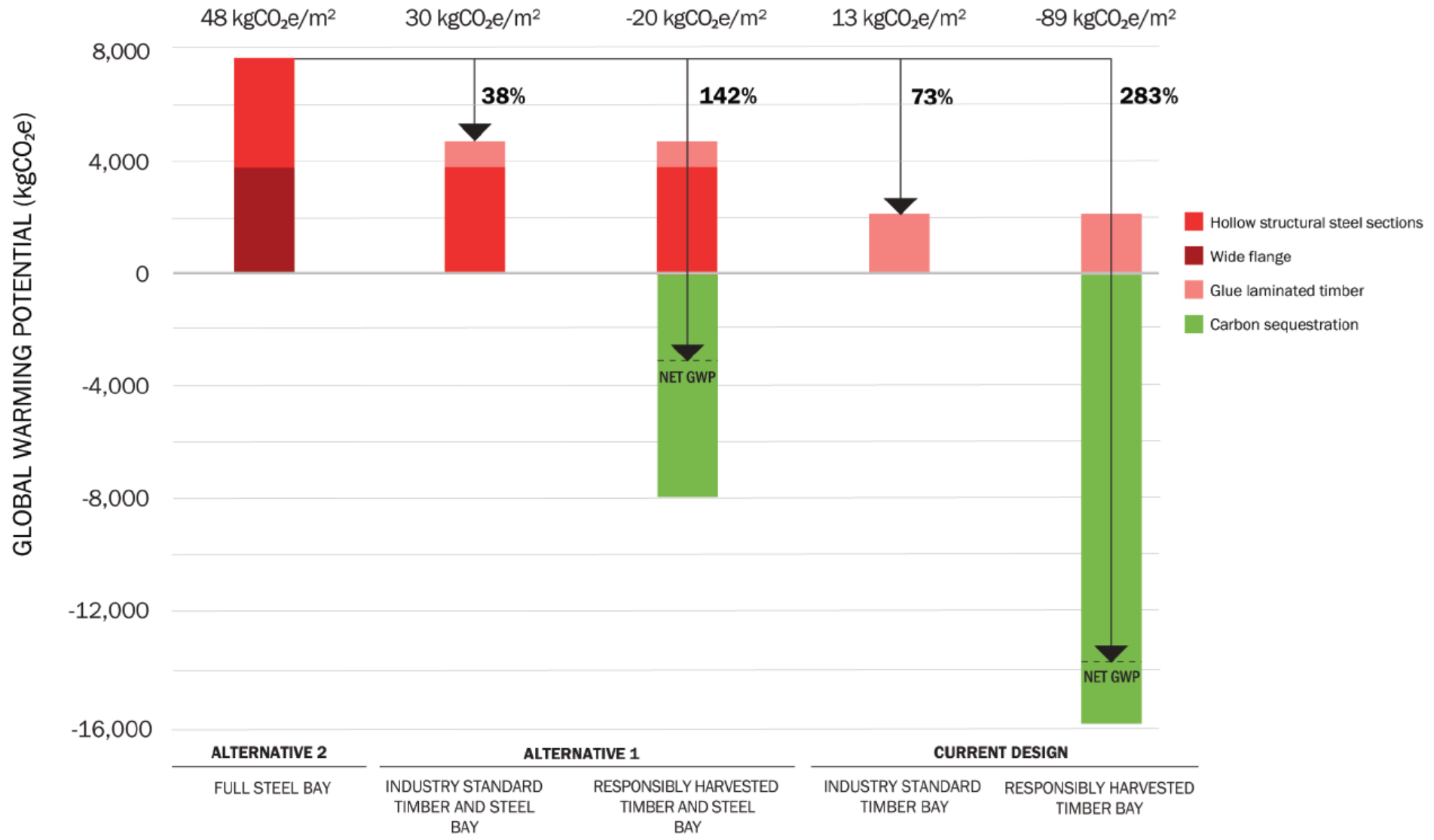
インフラ事業の各実施段階

Adapted from BSI, 2016. PAS 2080:2016, Carbon Management in Infrastructure

Early Design – Structural System Selection

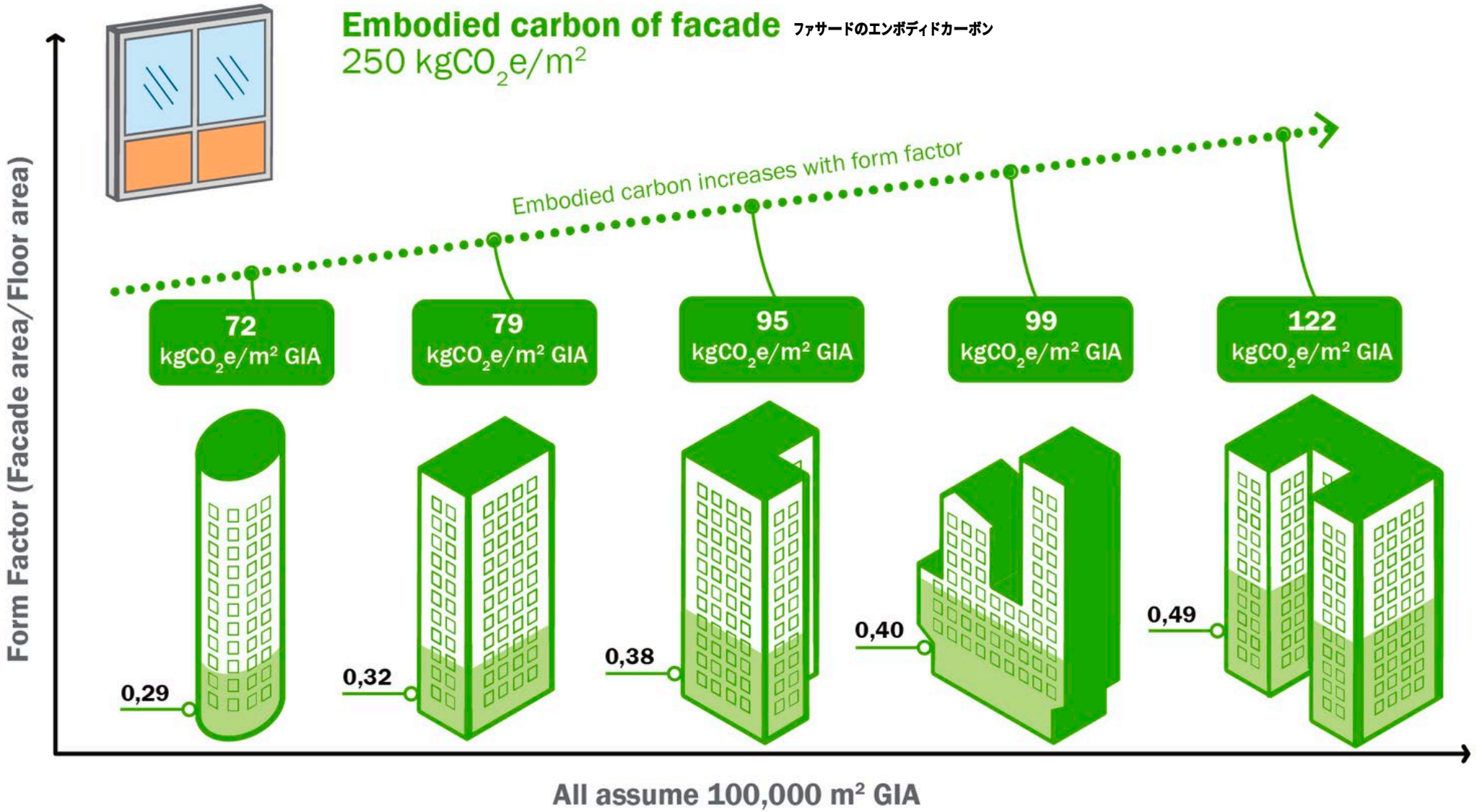
設計初期 — 構造システムの選定

GLOBAL WARMING POTENTIAL COMPARISON FOR STRUCTURAL BAY OPTIONS 構造スパン案別のGWP比較



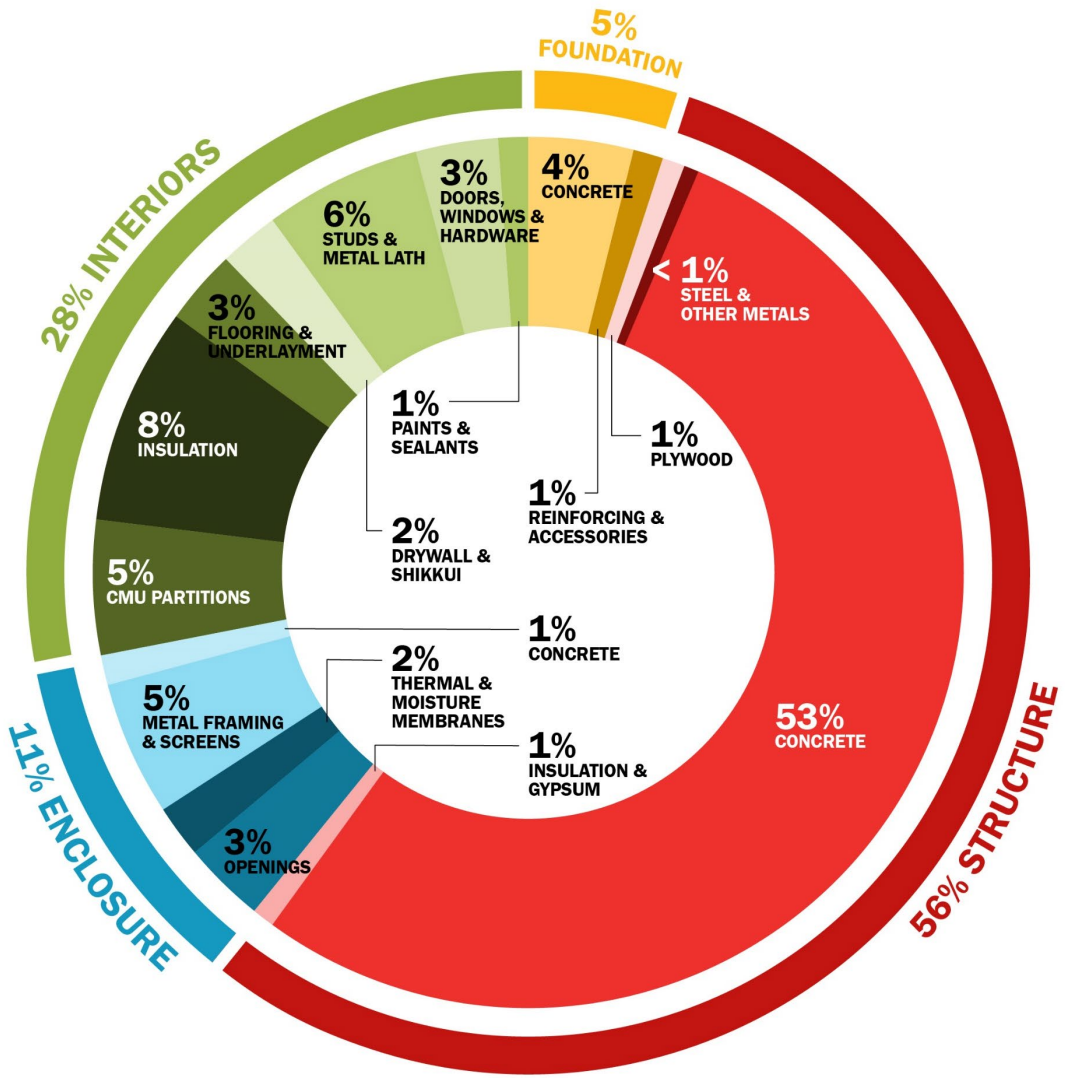
Early Design – Massing Options Assessment

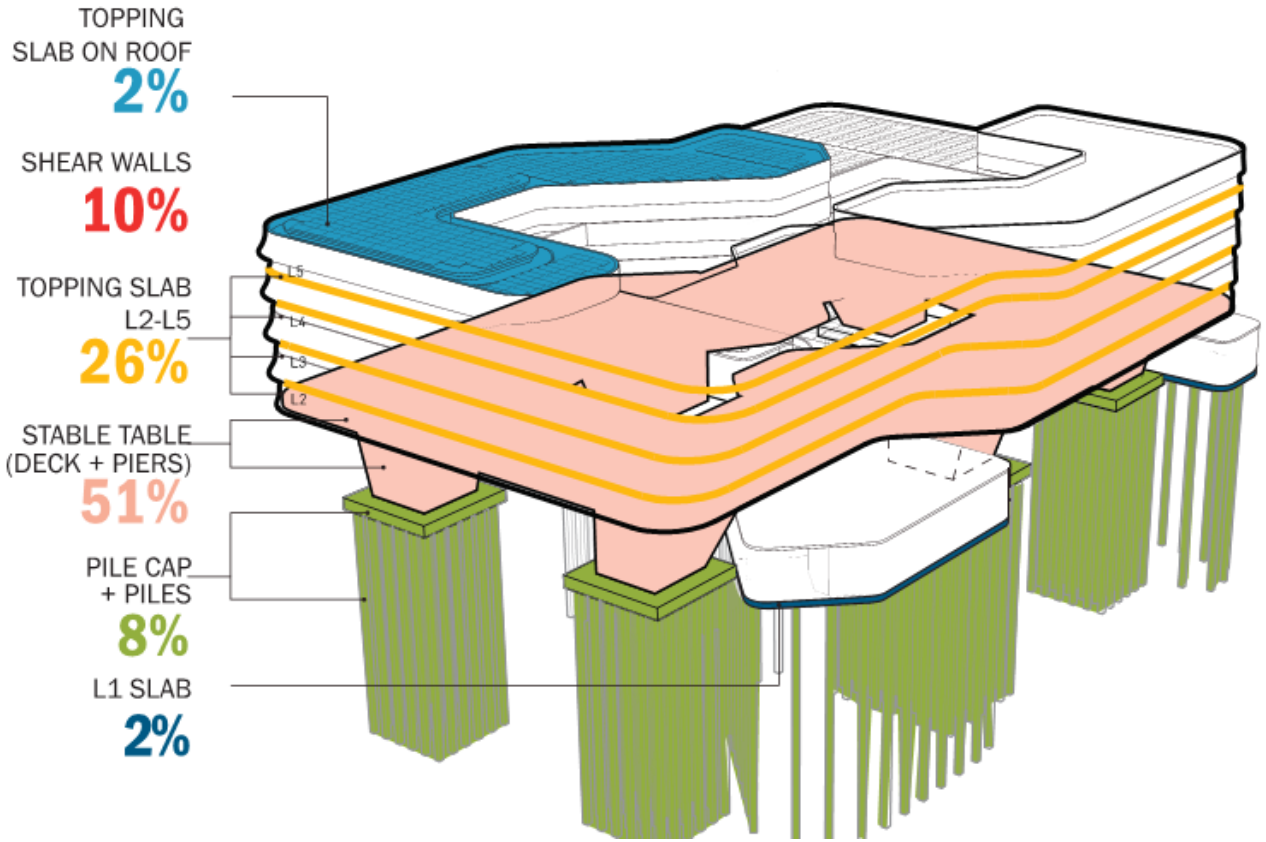
設計初期 — 建物ボリューム案の比較評価



Early Design – Embodied Carbon Characterization

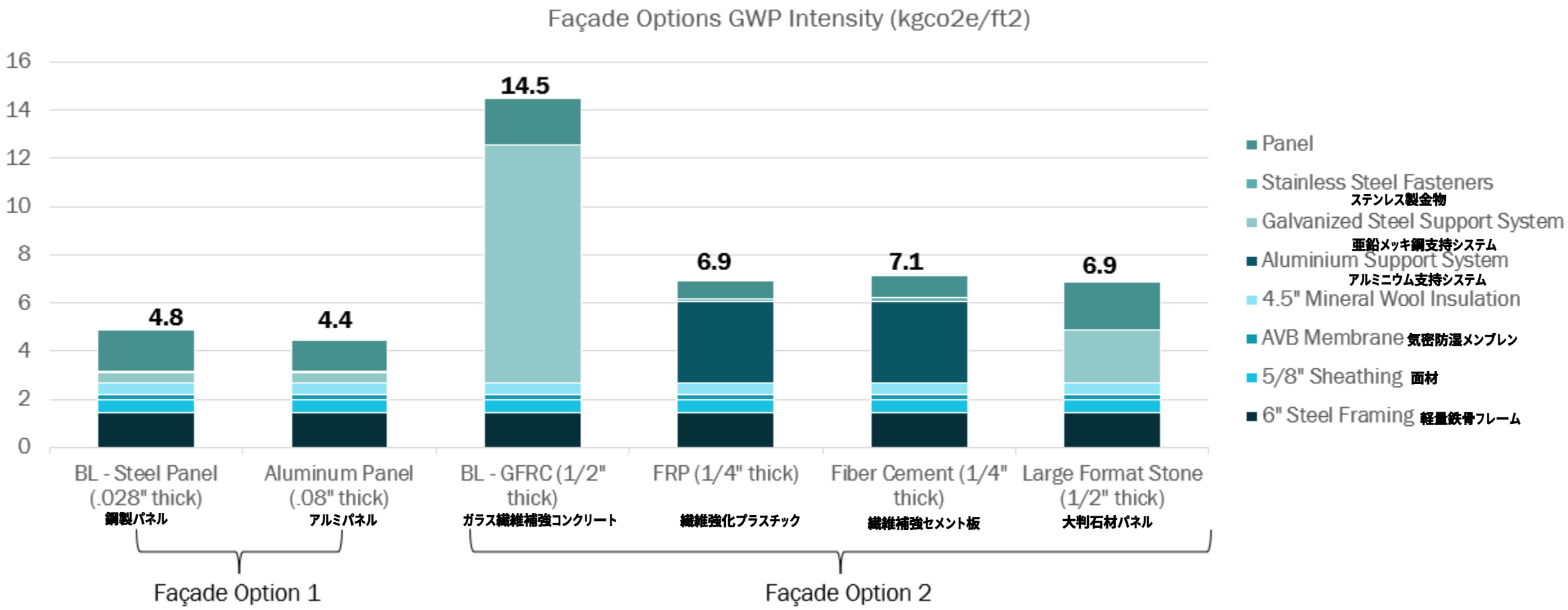
設計初期 — エンボディドカーボンの特性評価





Early–Mid Design – Façade Options

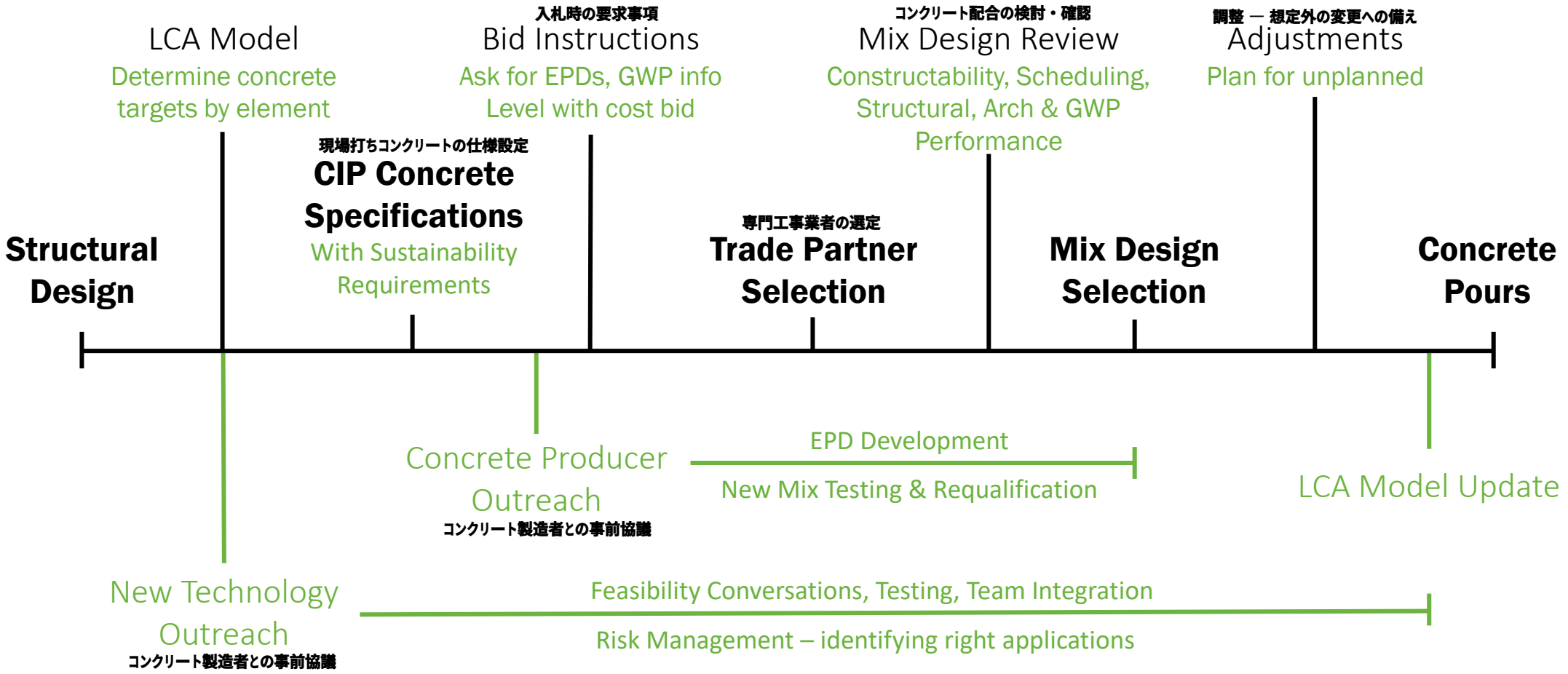
設計初期〜中期 — ファサード案



Early – Mid Design – Contractor and Supplier Coordination

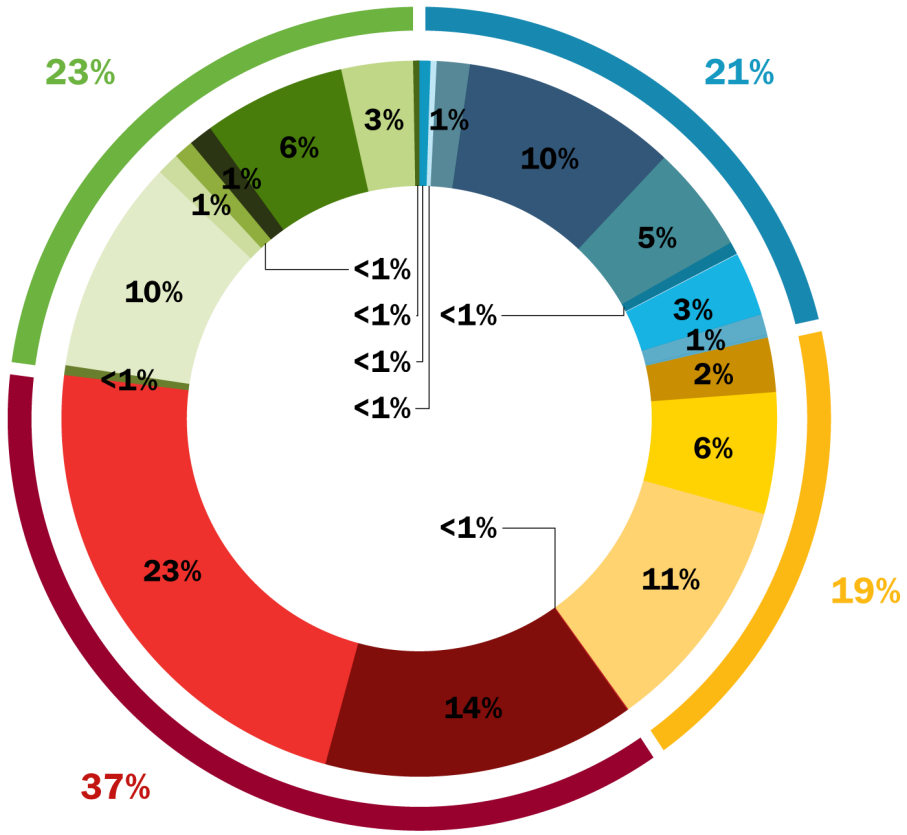
Timeline

設計初期～中期 — 施工者・サプライヤーとの連携　タイムライン



Mid Design - Interiors

設計中期 — 内装

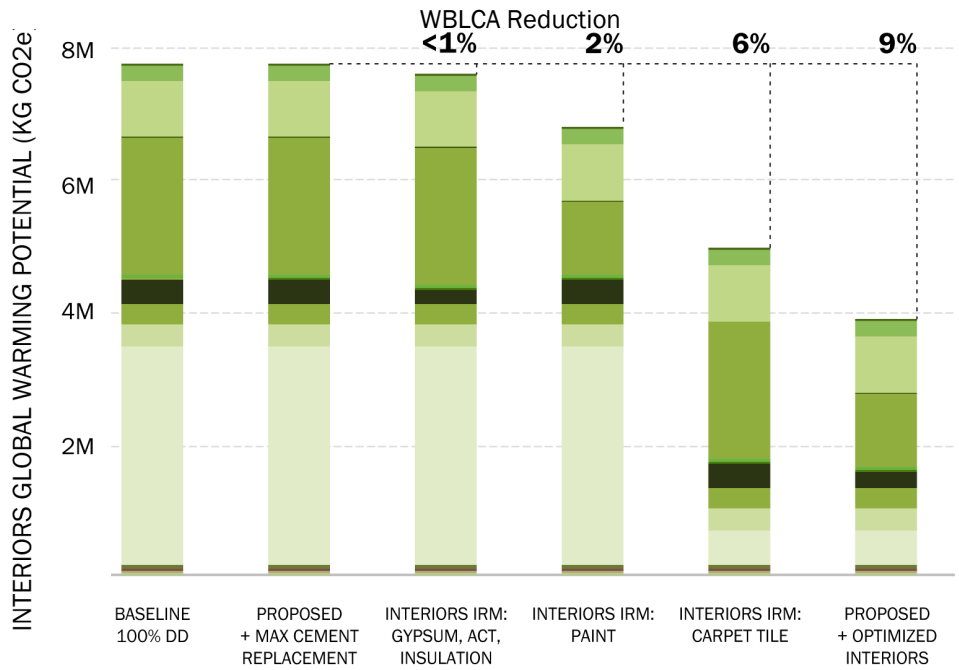


ENCLOSURE
- Glass
- Gypsum, Plaster, and Cement
- Insulation
- Steel and Metals
- Insulated Metal Panel
- Doors, Windows, and Parts
- Wood
- Plastics, Membranes, and Roofing
- Concrete

SUBSTRUCTURE
- Concrete Rebar
- Geotechnical Pile Concrete
- Concrete

SUPERSTRUCTURE
- Insulation
- Structural Steel
- Concrete

INTERIOR
- Flooring and Wall Base
- Carpet Tile
- Glass
- Gypsum
- Insulation and Acoustic Finishes
- Paints and Coatings
- Steel and Metals
- Doors, Windows, and Paneling

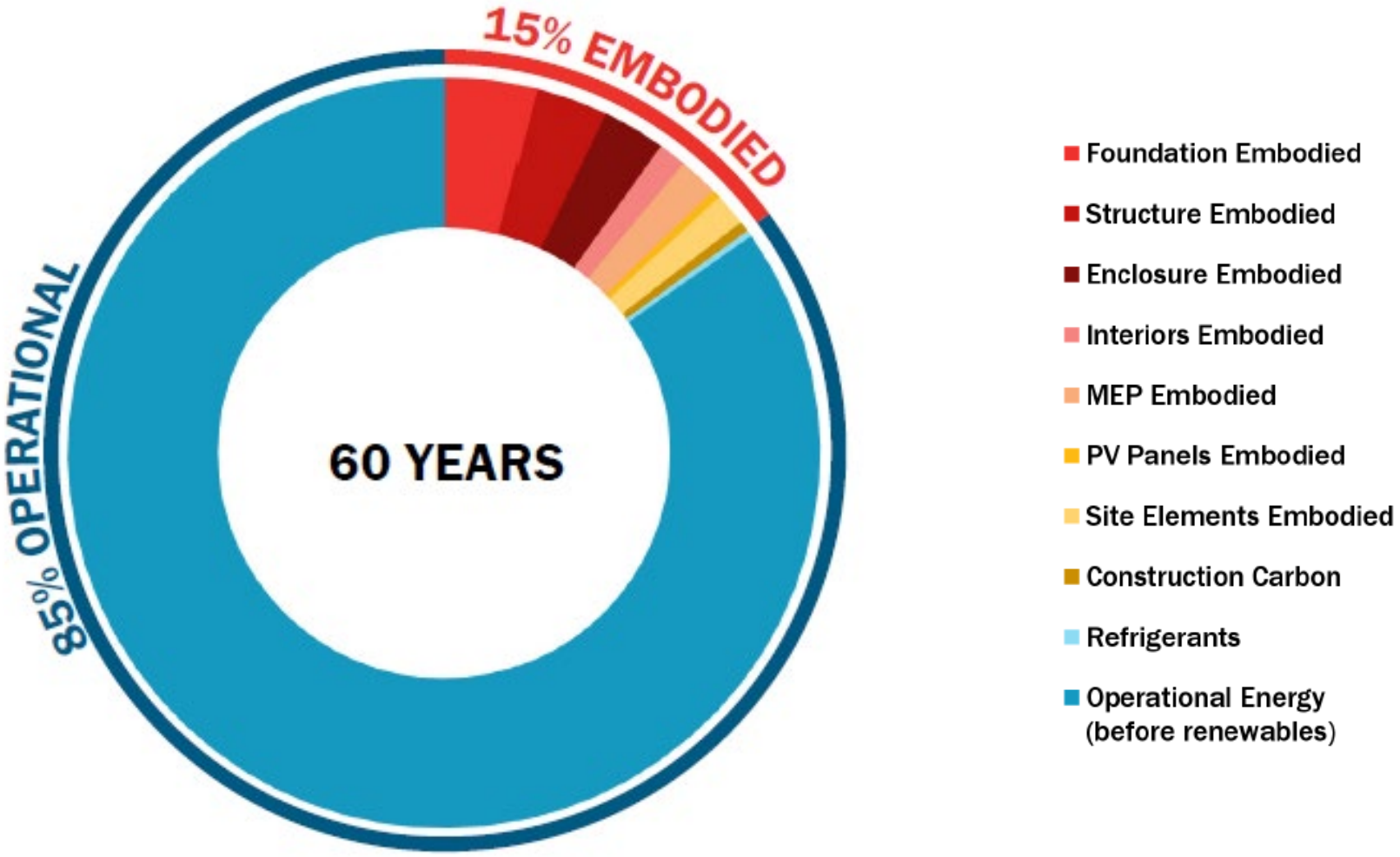


INTERIOR
- Plywood and Timber Paneling
- Stainless Steel Paneling
- Studs and Framing
- FRP Paneling
- Interior Paints
- Traffic Coatings and Floor Paints
- Flooring Adhesives and Sealants
- Batt Insulation and Ceiling Tile
- Gypsum, Plaster, and Cement
- Glass
- Carpet Tile
- Tile Flooring
- Epoxy Flooring
- Rubber Wall Base
- Vinyl Floor Tile
- Doors, Windows, and Parts

Procurement Impact Analysis

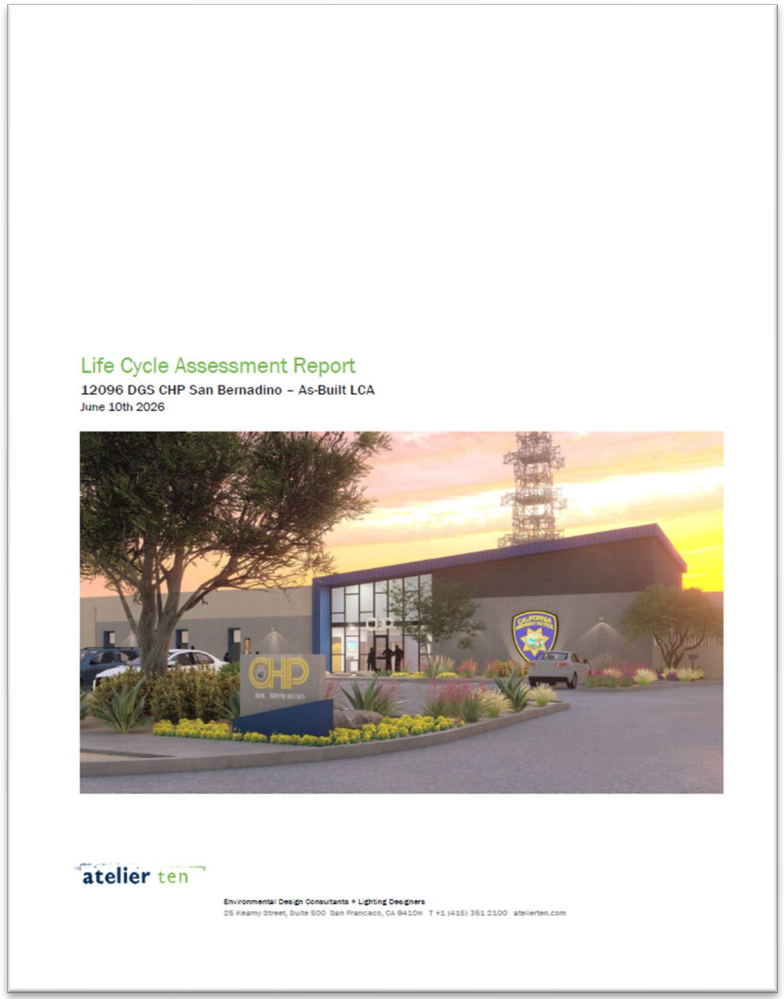
Mid-Design: Holistic Carbon Assessment

設計中期 — 建物全体の包括的なカーボン評価



End of Design / Early Construction

設計終盤～施工初期


Life Cycle Assessment Report

12096 DGS CHP San Bernadino – As-Built LCA

June 10th 2026

atelier ten

Environmental Design Consultants + Lighting Designers

RESULTS SUMMARY	Results Summary			
	Reporting Metric	LEED Baseline	LEED Proposed	% Change
	Total GWP (A1-A4, B1-B5, C1-C4, without sequestration)	849,537	763,072	-10.2%
	Upfront Total GWP (A1-A4, without sequestration)	670,092	588,581	-12.2%
	Total GWP Intensity (A1-A4, B1-B5, C1-C4, without sequestration)	293	263	kgCO2e/m2
	Upfront Total GWP Intensity (A1-A4, B1-B5, C1-C4, without sequestration)	231	203	kgCO2e/m2

Figure 1: WBLCA Assessment Summary

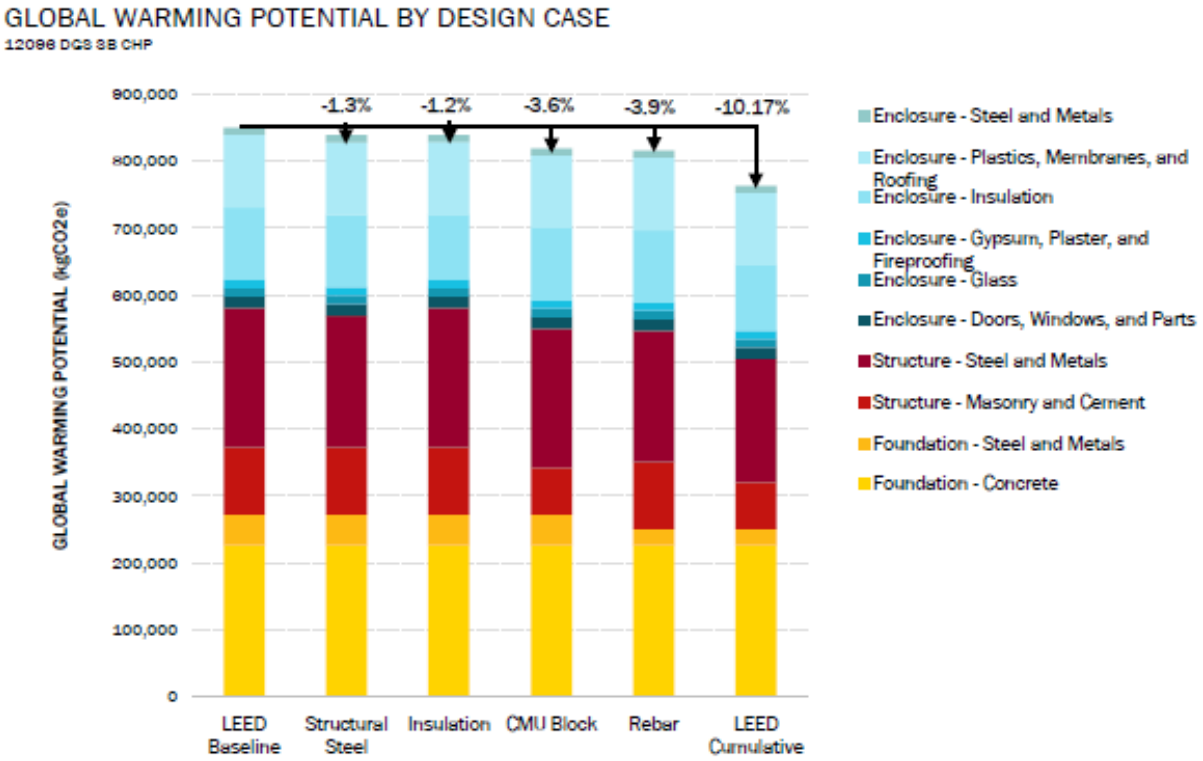


Figure 2: WBLCA Assessment Summary

Construction Activities – Measuring Emissions

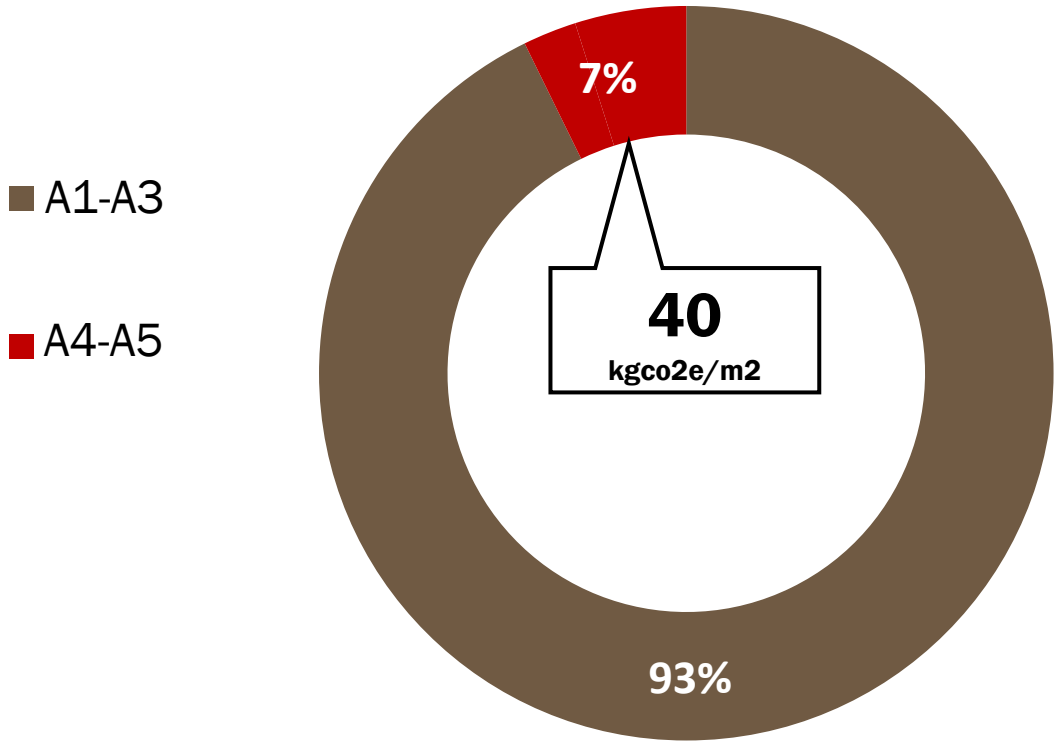
施工段階 ― 建設活動に伴う排出量の計測

Product Emissions vs. Construction Emissions

製品段階の排出量 vs. 施工段階の排出量

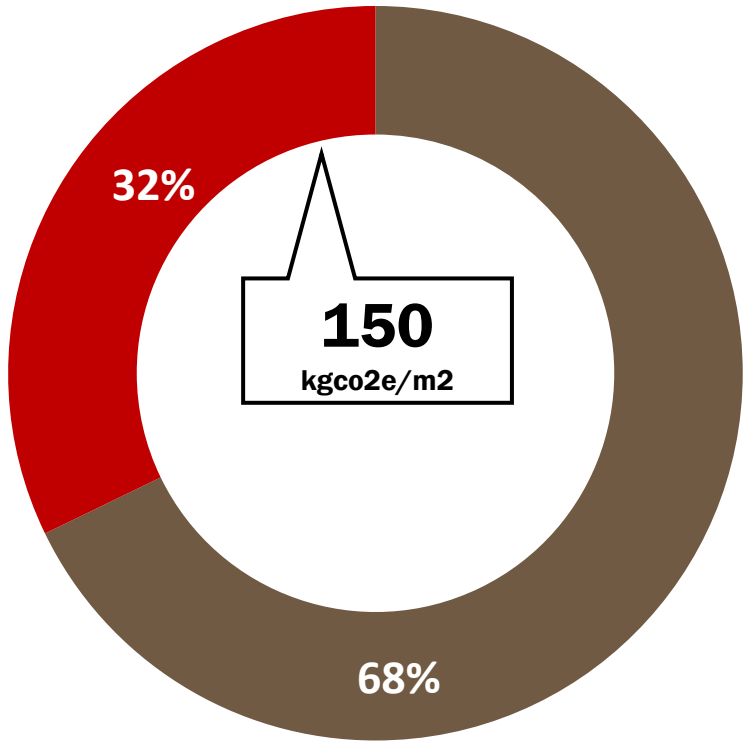
業界平均データを用いたOne Click LCAによる推計

Office Building - Estimated by OneClick LCA Based on Industry Data



A1～A3：EC3による算定、A4～A5：現場での実測

Office Building – A1-A3 calculated with EC3, A4-A5 measured on-site



EC3：EPDデータをもとに建材のGWPを比較し、低炭素建材の選定・調達を支援する無料オンラインツール

Atelier Ten US Impact

TOTAL NUMBER OF WBLCA MODELS

207

NUMBER OF LEED WBLCAS

59

% OF LEED LCAS THAT EARN 3+ POINTS

93%

NUMBER OF ILFI WBLCAS

8

KGCO2E SAVED

503,714,763

Atelier Ten US Process

Summary

1 EARLY COORDINATION IS ESSENTIAL

Plan together. Align early.
Own the outcome.

ENGAGE EARLY → ESTABLISH A PLAN → ALIGN & OWN

KEY TAKEAWAY

- Identify key stakeholders and bring them to the table early.
- Define goals, strategies, responsibilities, and decision points.
- Ensure the plan is achievable and everyone understands their role.

2 TRACK EVOLVING REGULATIONS, GUIDELINES & TOOLS CLOSELY

Stay informed. Stay agile. Stay ahead.

MONITOR → UNDERSTAND & ADAPT → APPLY & ADJUST

KEY TAKEAWAY

- Track policy changes across jurisdictions and project types.
- Interpret updates, new guidelines, and emerging tools and metrics.
- Incorporate changes into project strategy and decisions.

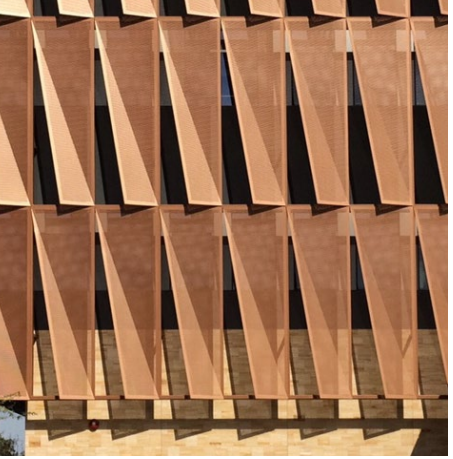
3 USE WBLCA AS A DESIGN TOOL, NOT JUST AN ACCOUNTING TOOL

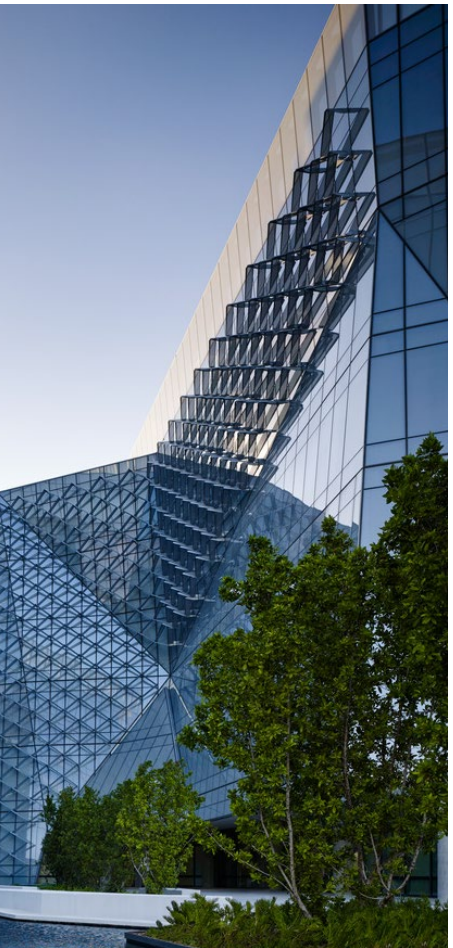
Design better. Decide smarter.
Deliver more value.

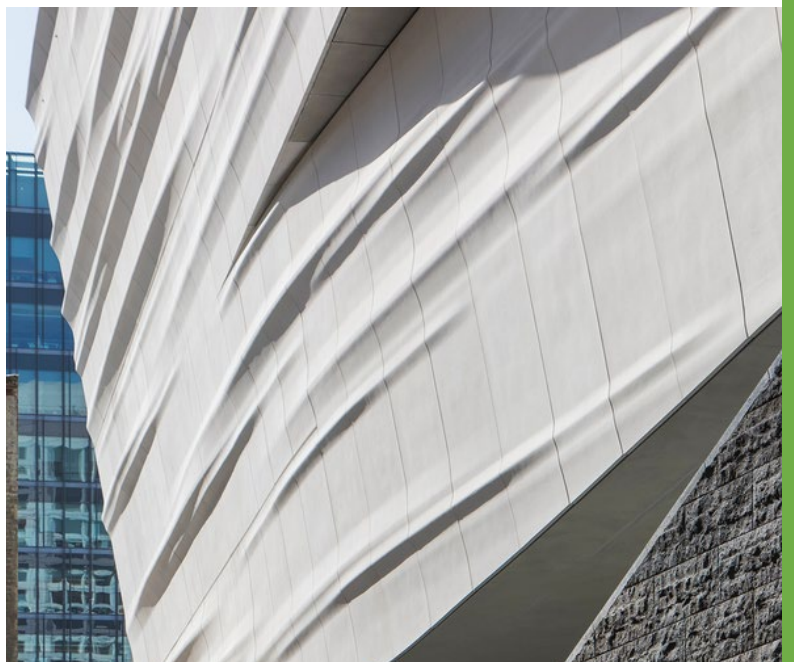
INTEGRATE EARLY → COMPARE & OPTIMIZE → INFORM DECISIONS

KEY TAKEAWAY

- Use WBLCA in concept design to explore options and trade-offs.
- Evaluate materials, assemblies, and systems to reduce carbon impact.
- Make data-driven choices that balance carbon, cost, and performance.







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