MASSACHUSETTS
DEPARTMENT OF
ENERGY RESOURCES

Tackling Decarbonization from the Ground Up

Embodied Carbon in Massachusetts State Buildings

Leading By Example Council Meeting

February 10th, 2026

Presented by
Department of Energy Resources, Leading By Example Division

Agenda

Time	Agenda Item
10:00AM – 10:10AM	**Introduction & Agenda**
10:10AM – 10:25AM	**Embodied Carbon 101** *Speaker:* Rose Skylstad, Climate Planning and Research Associate, OCIR
10:25AM – 10:40AM	**Embodied Carbon in MA: Embodied Carbon Intergovernmental Coordinating Council (ECICC) Recommendations** *Speaker:* Rose Skylstad, Climate Planning and Research Associate, OCIR
10:40AM – 10:50AM	**State Projects and Embodied Carbon** *Speakers:* • Megan Carriere, Finegold Alexander Architects, Project Manager, Framingham Regional Justice Center • Megan Brown, Finegold Alexander Architects, Energy Team Manager
10:50AM – 11:00AM	**Q&A**
11:00AM – 11:30PM	**LBE Updates & Reminders**
11:30AM – 11:50PM	**In the News**
12:00PM	**Closing**

Embodied Carbon 101

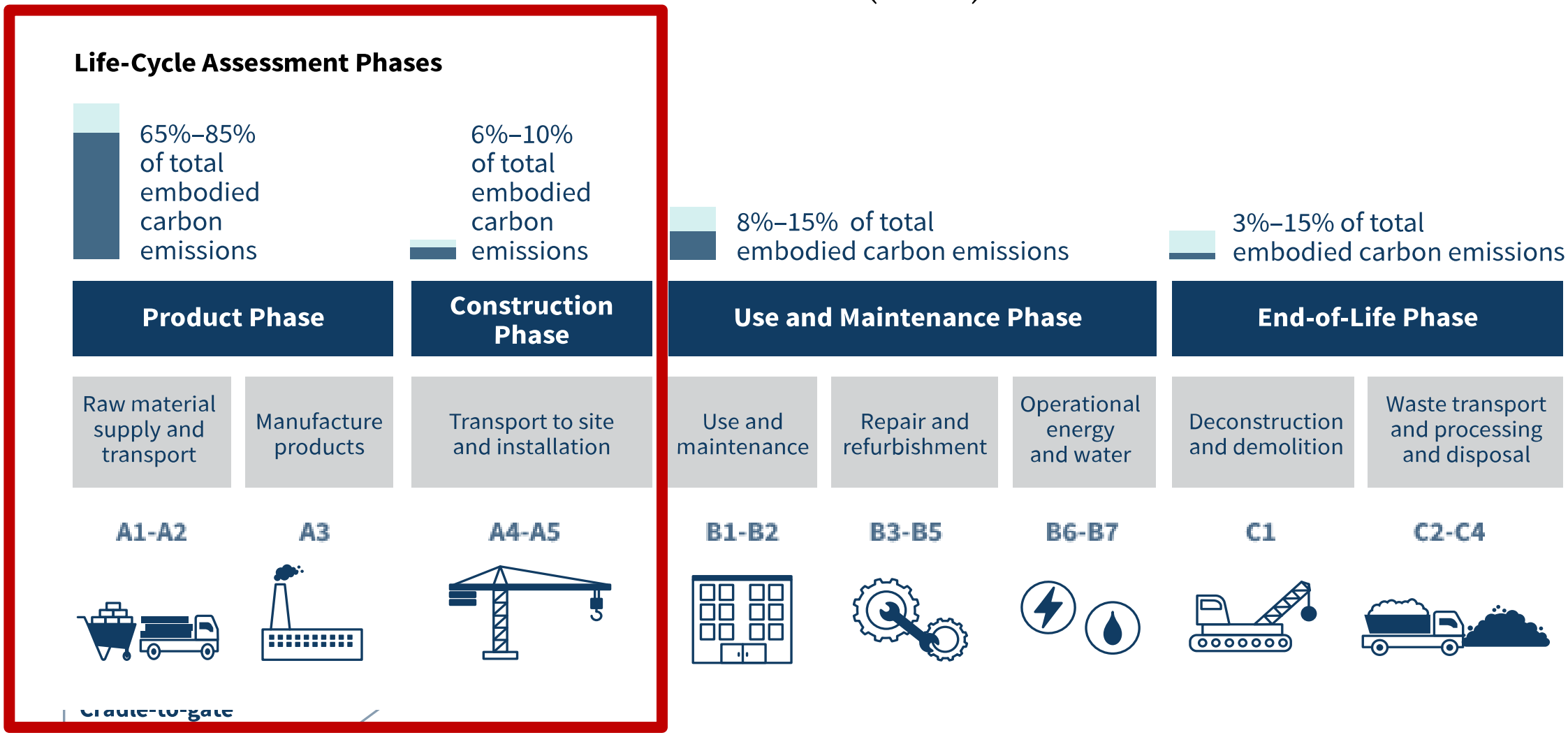
Massachusetts Office of Climate Innovation and Resilience

…and have missed what's going on here.

We have been focusing our attention here…

Source: Rebecca Esau, RMI "Embodied Carbon 101 Slides 2023"

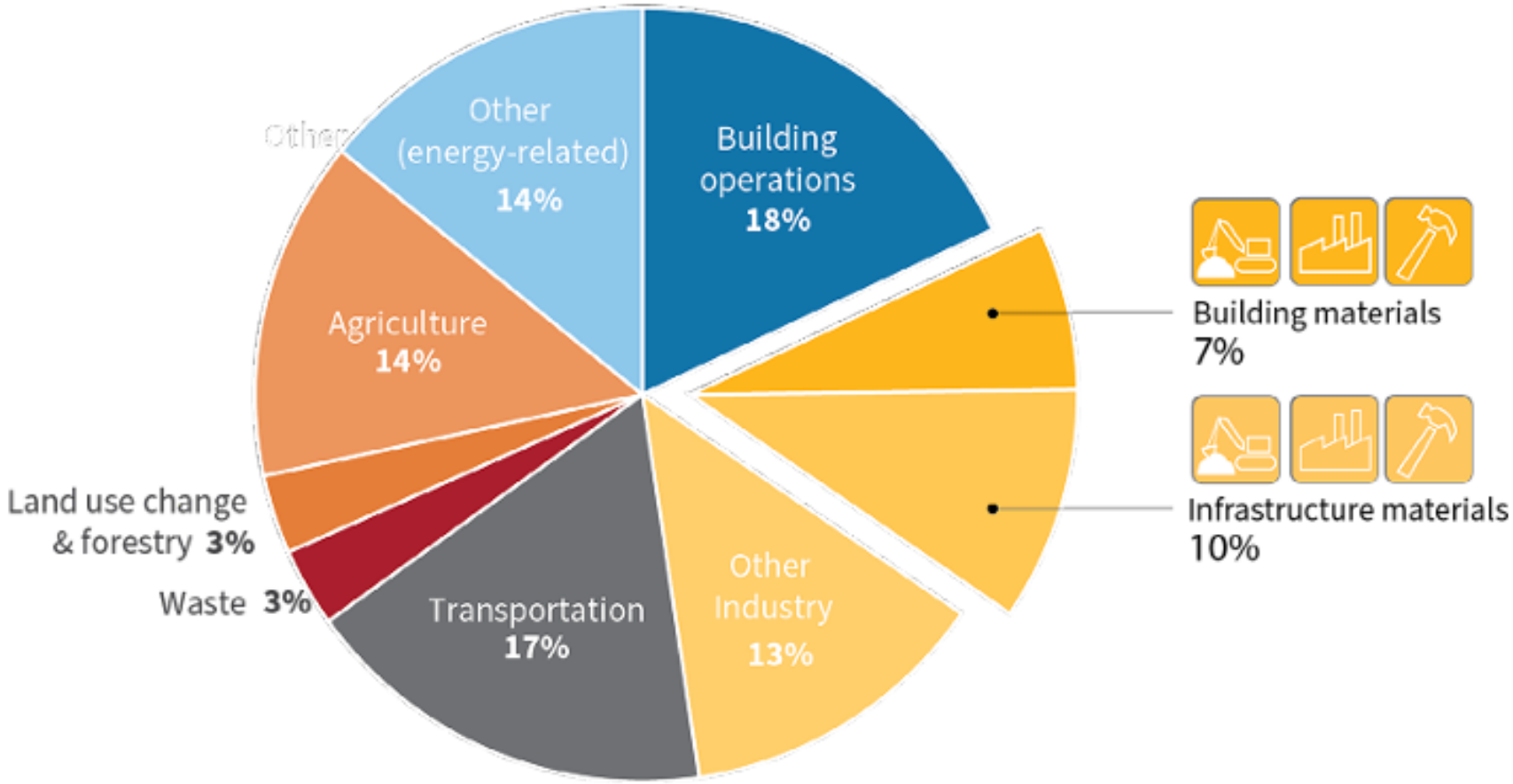
What is Embodied Carbon (EC)?



Source: Rocky Mountain Institute, "Embodied Carbon 101: Building Materials" 2023

Embodied Carbon is Significant

Construction materials make up **~10-17% of global greenhouse gas emissions**



Source: Carbon Leadership Forum, "Embodied Carbon 101 Fact Sheet 2025 ”

Embodied Carbon is Urgent

Embodied carbon is locked in as soon as a project is built

25-30 years of building operating emissions equivalent to upfront carbon

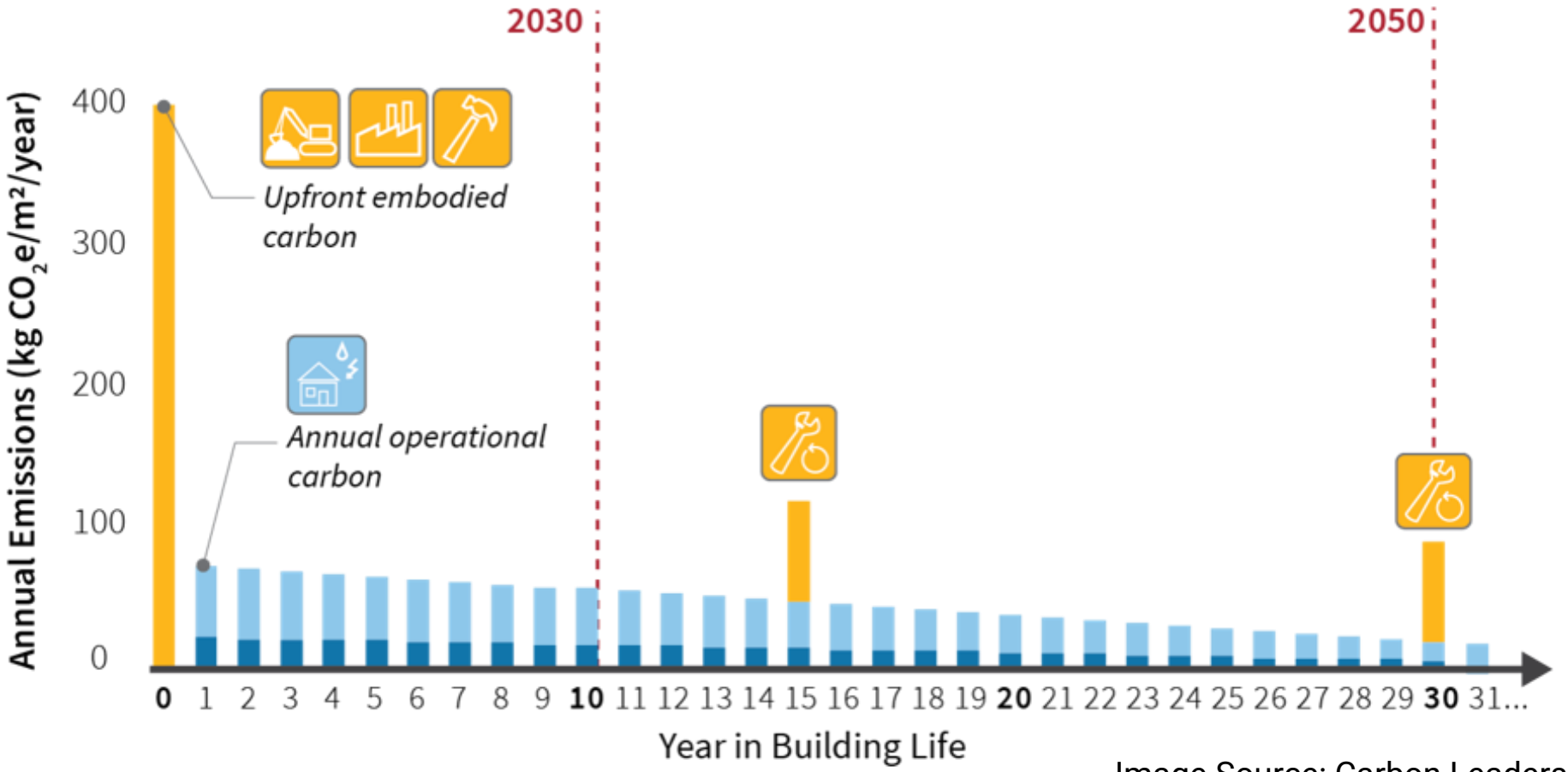
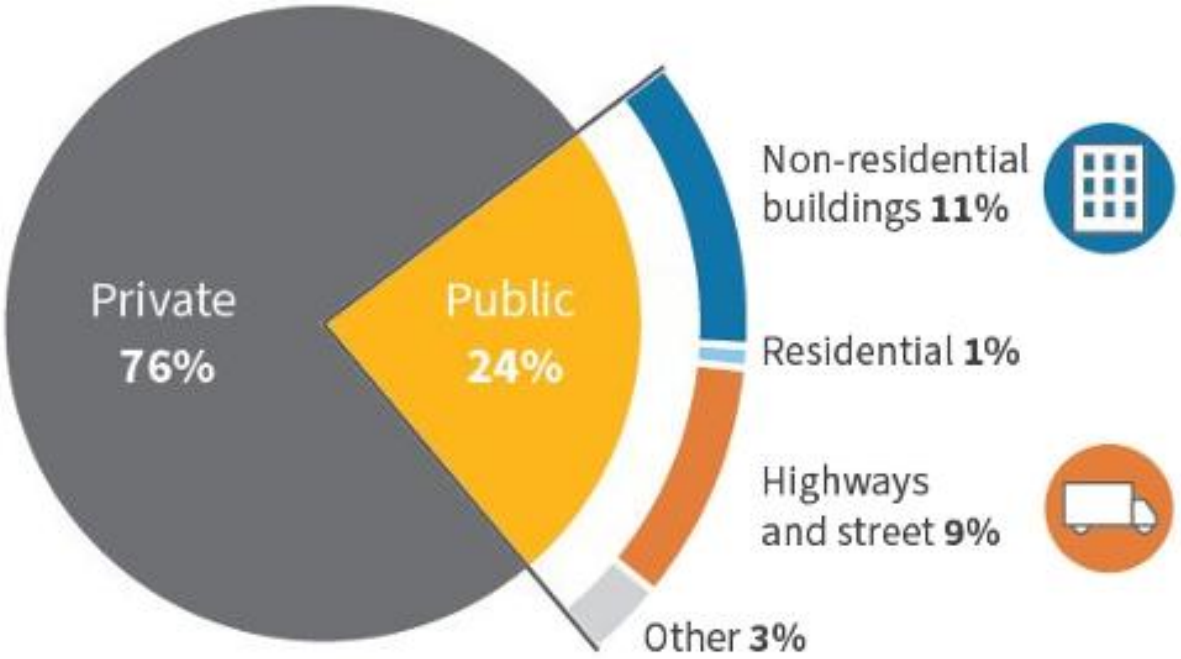


Image Source: Carbon Leadership Forum website 2021

Public Sector Materials Matter

Public Sector Material Use made up 24% of GWP from US construction (2013-2023)



Source: Carbon Leadership Forum, "Embodied Carbon 101 Fact Sheet 2025 ”

Embodied Carbon Intergovernmental Coordinating Council

Summary of the Massachusetts Embodied Carbon Reduction Plan

Key terms

Environmental Product Declarations (EPDs): “nutrition labels” for environmental impacts.

Global Warming Potential (GWP): Measures how much energy the emission of 1 ton of a gas will absorb over a given period of time (usually 100 years). *The larger the GWP, the greater climate warming effect.*

Council Mandate & Buy Clean Policy

Buy Clean Policy = procurement policy incorporating low-carbon requirements into government construction material purchasing

- Buy Clean Policies have been adopted by eight states—**California, New York, New Jersey, Colorado, Oregon, Maryland, Minnesota, and Washington**
- The ECICC was formed by the 2024 Climate Law to assess **Buy Clean Policy** for Massachusetts
- Council started meeting in March 2025, with first report published in January

Recommendations of the Council

(part 1 of 6)

Foundational Organizational Practices & Education

Recommendation 1
Agency Procedures & Decision-Making

Relevant agencies undertake an analysis of construction processes and identify key decision points that influence EC.

Recommendation 2
Education & Capacity Building

Develop educational resources to stakeholders throughout the supply chain

Recommendations of the Council

(part 2 of 6)

Core Reporting & Material-Level Requirements

Recommendation 3
EPD & MQ Reporting

Major projects collect Material Quantity (MQ) data and Environmental Product Declarations (EPDs) for listed materials.

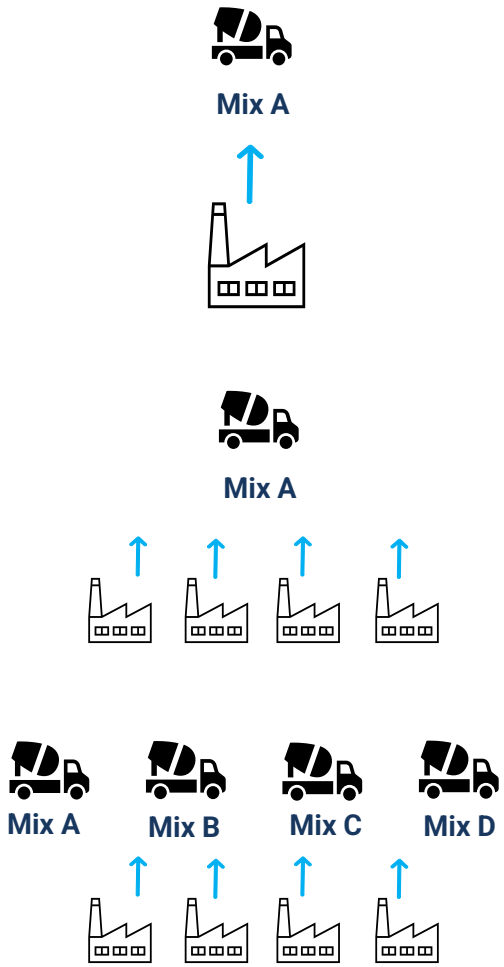
Recommendation 4
GWP Thresholds

Establish project-average Global Warming Potential (GWP) limits on major projects for key materials

Most Specific Data

Most General Data

EPD Tier	Description
Tier 1: Facility-specific EPD	Reflects the environmental impacts of a product from a **specific manufacturing facility** or plant.
Tier 2: Product-specific EPD	Represents a **specific product** line but may aggregate data from multiple facilities.
Tier 3: Industry-average EPD	Published by a trade association or consortium, representing **typical performance** for multiple products across producers.



Materials subject to recommended requirements*

Material	EPD Reporting	MQ Reporting	GWP Limits
Asphalt Mixture	✅	✅	✅
Precast Concrete	✅	✅	❌
Ready-Mix Concrete	✅	✅	✅
Steel Reinforcement (Rebar)	✅	✅	✅
Structural Steel	✅	✅	✅
Structural Wood	❌	✅	❌
Window Assemblies	✅	✅	❌

**Additional materials will be reviewed for inclusion periodically*

Recommendations of the Council

(part 3 of 6)

Project-Level Requirements

Recommendation 5
Whole Building Life Cycle Assessment

To understand how design can be optimized to reduce EC, require cradle-to-grave whole building life cycle assessment (WBLCA) by July 1st, 2027 for vertical construction projects subject to LBE EO594

Recommendations of the Council

(part 4 of 6)

Governance, Review, and Continuous Improvement

Recommendation 6
Technical Advisory Committee

In order to review industry preparedness, market acceptance, and technology readiness for increased stringency in regulations, convene a technical advisory committee that will provide updated guidance to the Council every two years.

Recommendations of the Council

(part 5 of 6)

Emerging Initiatives & Market Enablement

Recommendation 6
Deconstruction & Reuse

Develop protocols and implement exploratory pilot state-managed projects to better understand opportunities and challenges presented by reusing structures and building materials

Recommendation 7
Market Development

Build awareness of existing state programs that support innovative low-embodied carbon (low -EC) technologies and identify opportunities to further catalyze business growth and market development.

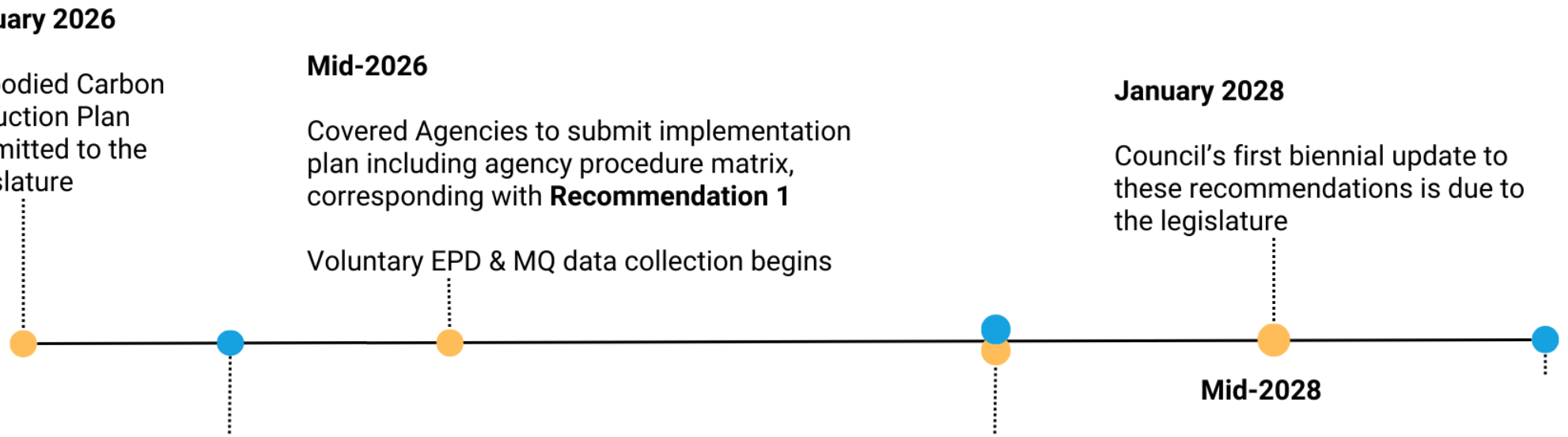
Recommendations of the Council

(part 6 of 6)

External Regulatory Alignment / Broader Market Impact

Recommendation 9
Building Code

BBRS + Council determine an appropriate timeline for adoption of EC provisions in base building code, first through incentive-based measures, then through a multiple-compliance path approach


January 2026
Embodied Carbon Reduction Plan submitted to the legislature
April 2026
DCAMM and MassDOT plans for intra-agency education due to OCIR, corresponding with **Recommendation 2**
Mid-2026
Covered Agencies to submit implementation plan including agency procedure matrix, corresponding with **Recommendation 1**
Voluntary EPD & MQ data collection begins
Mid-2027
Mandatory EPD & MQ collection begins for covered materials on Covered Projects, corresponding with **Recommendation 3**
TAC's first guidance due to Council, corresponding with **Recommendation 6**
January 2028
Council's first biennial update to these recommendations is due to the legislature
Mid-2028
Initial materials-level GWP limits for asphalt mixtures, concrete, steel reinforcement, and structural steel go into effect, corresponding with **Recommendation 4**
Legislative report, implementation plan, or policy guidance
Procurement requirement

How this applies to all agencies

"Frugality" mindset in capital planning

- Efficient use of space and resources
- Reuse of assets and materials

Framingham Regional Justice Center

DOER Leading by Example Council Meeting

February 10, 2026

DIVISION OF CAPITAL ASSET MANAGEMENT & MAINTENANCE

FINEGOLD ALEXANDER ARCHITECTS

FA ENERGY

FRJC Project Introduction

FINEGOLD ALEXANDER ARCHITECTS

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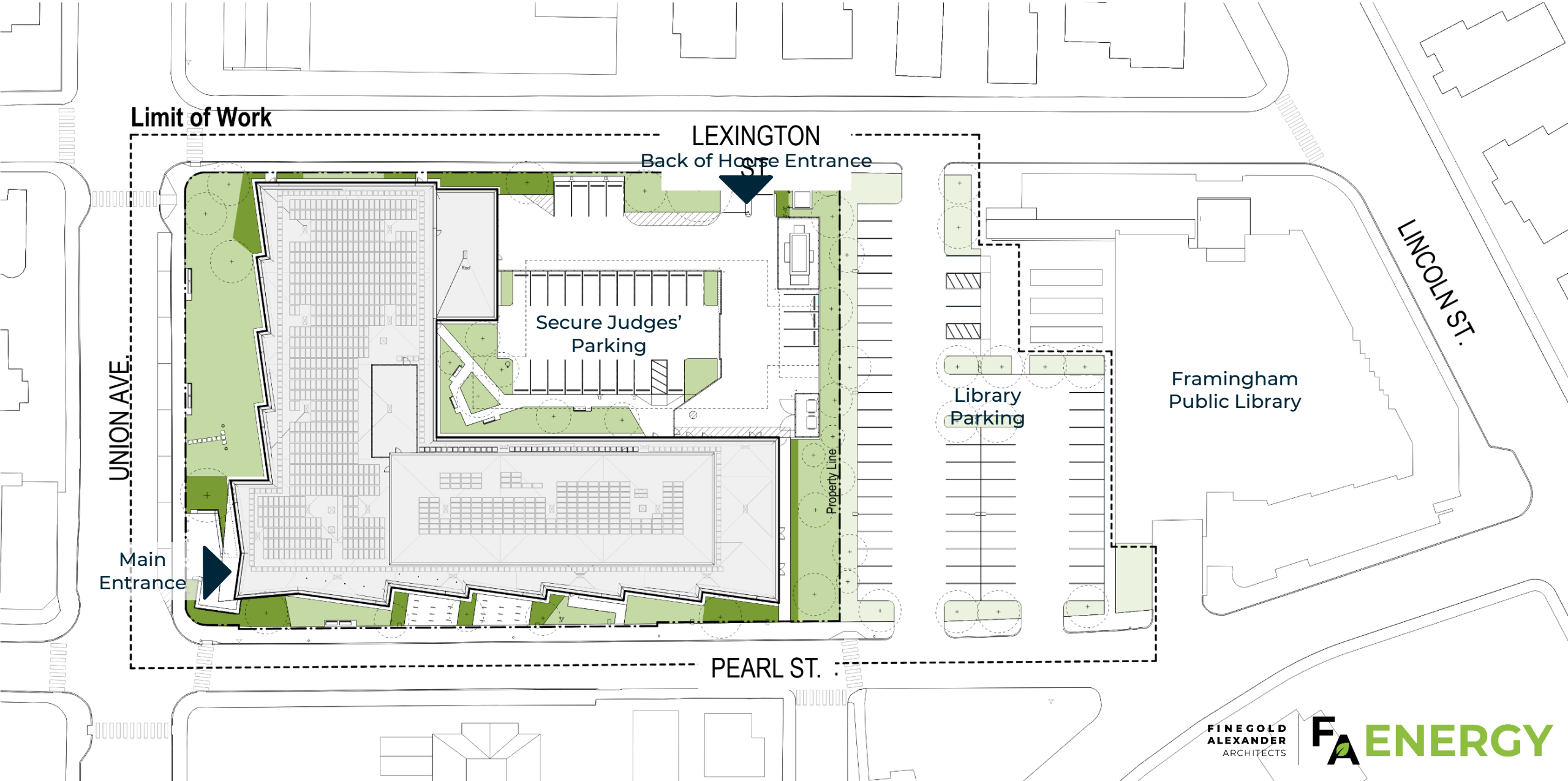
FRJC Site Plan



FINEGOLD ALEXANDER ARCHITECTS

FA ENERGY

FRJC Executive Order 594

LEED certification: Silver minimum

PV Array

Carbon Reduction

EUI Reduction

Geothermal Heating & Cooling

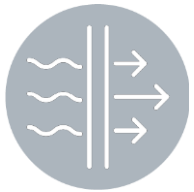
Ventilation

Efficient Glazing

All-Electric Building

Building Energy Metering

Thermal Insulation



Reduced Solar Heat Gain

Airtightness

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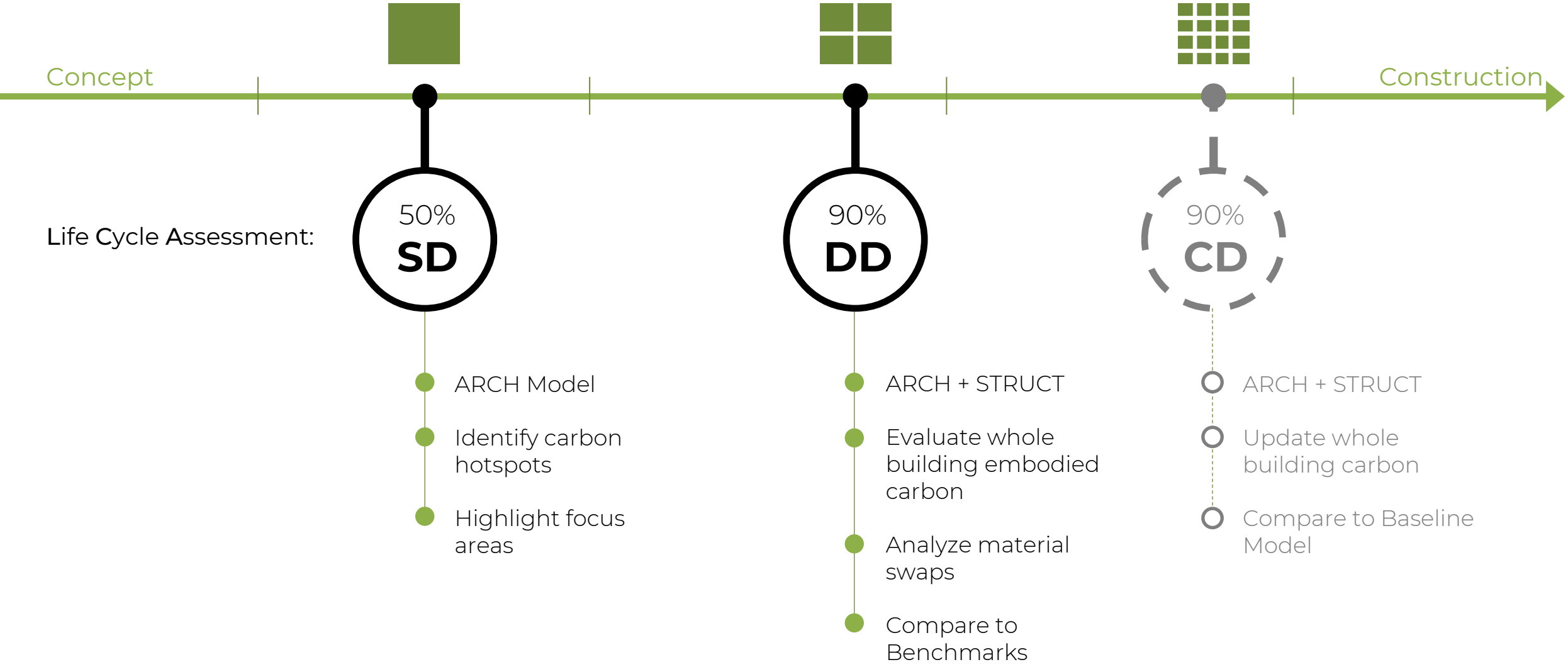
LCA Project Timeline



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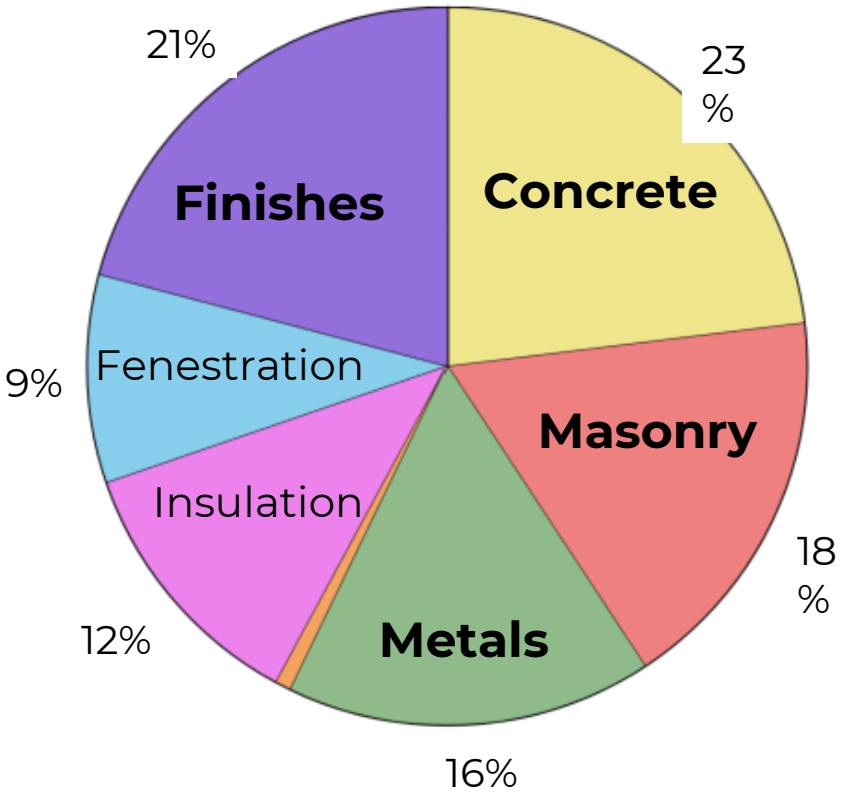
HOT SPOT Analysis

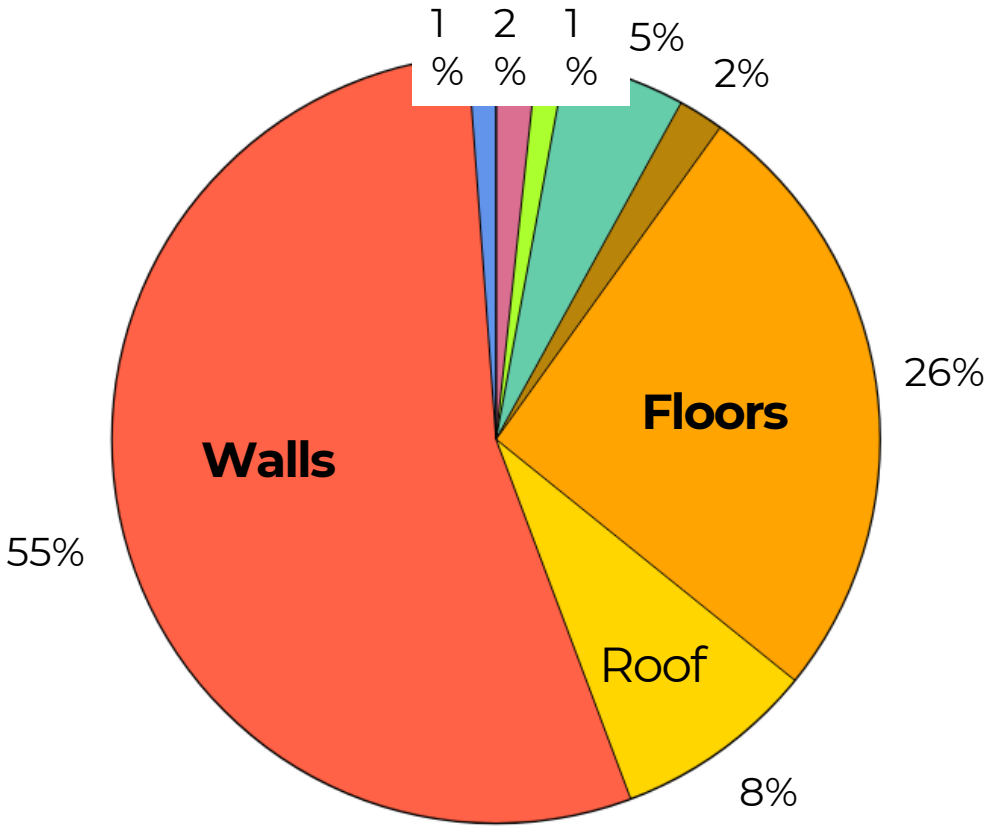
Embodied Carbon Hot Spots

50% SD Model

% Global Warming Potential
By Material Division



% Global Warming Potential
By Model Category



SD

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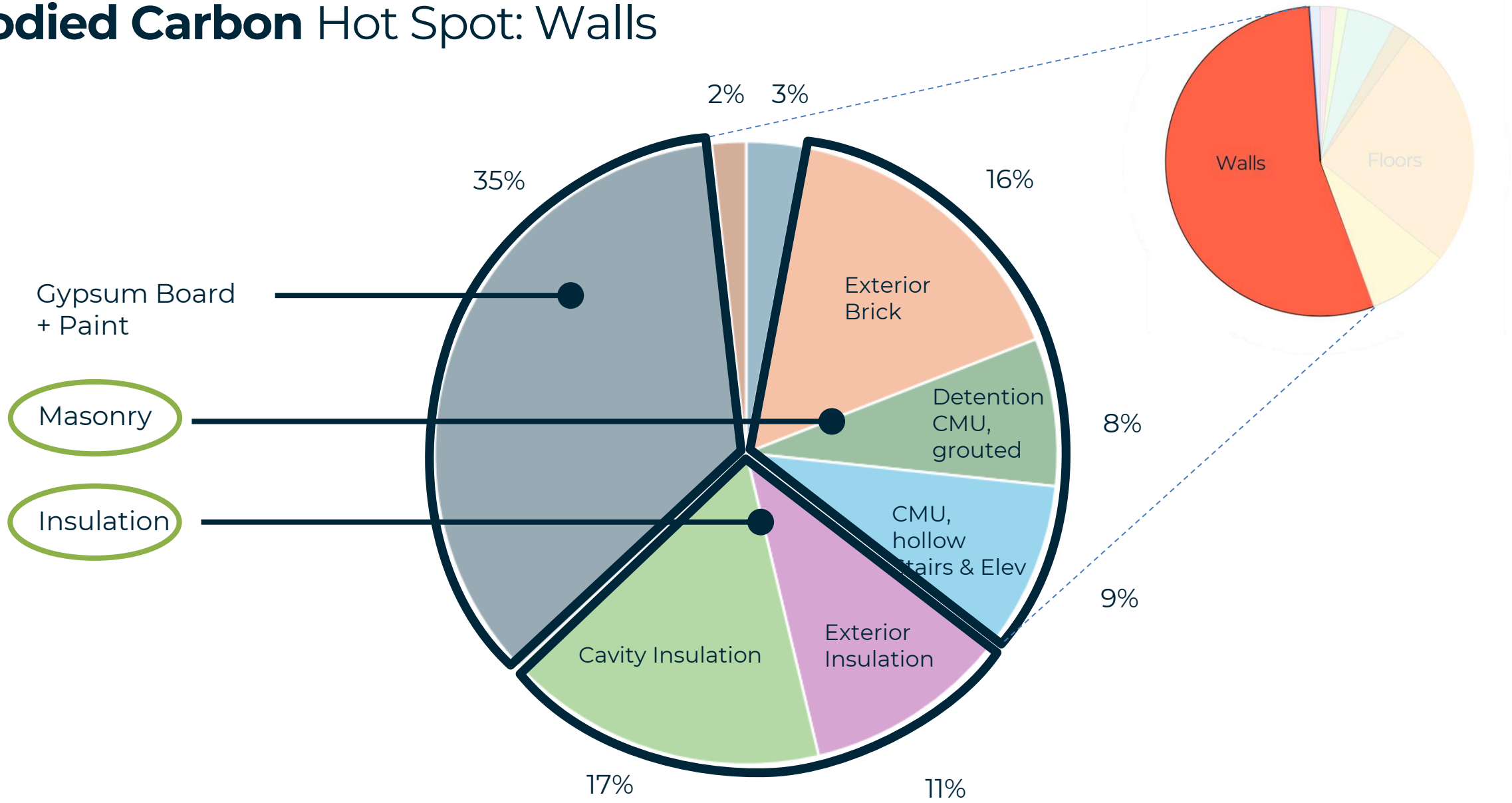
Embodied Carbon Hot Spot: Walls



% Global Warming Potential
By Material

SD

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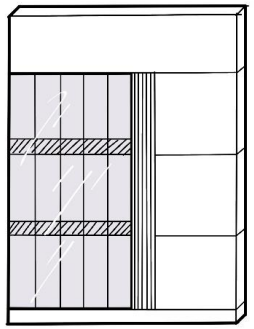
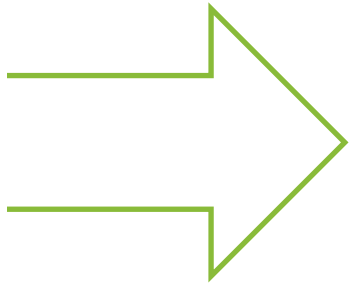
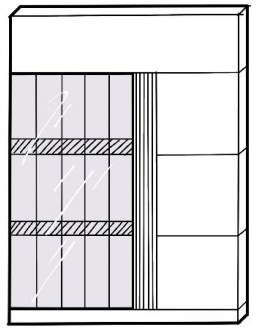
Embodied Carbon Design Development

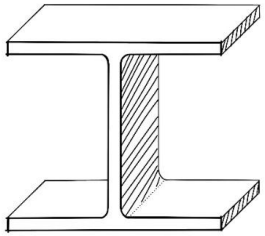
50% **SD** Model

90% **DD** Model









Architectural

Architectural + **Structural**

SD DD

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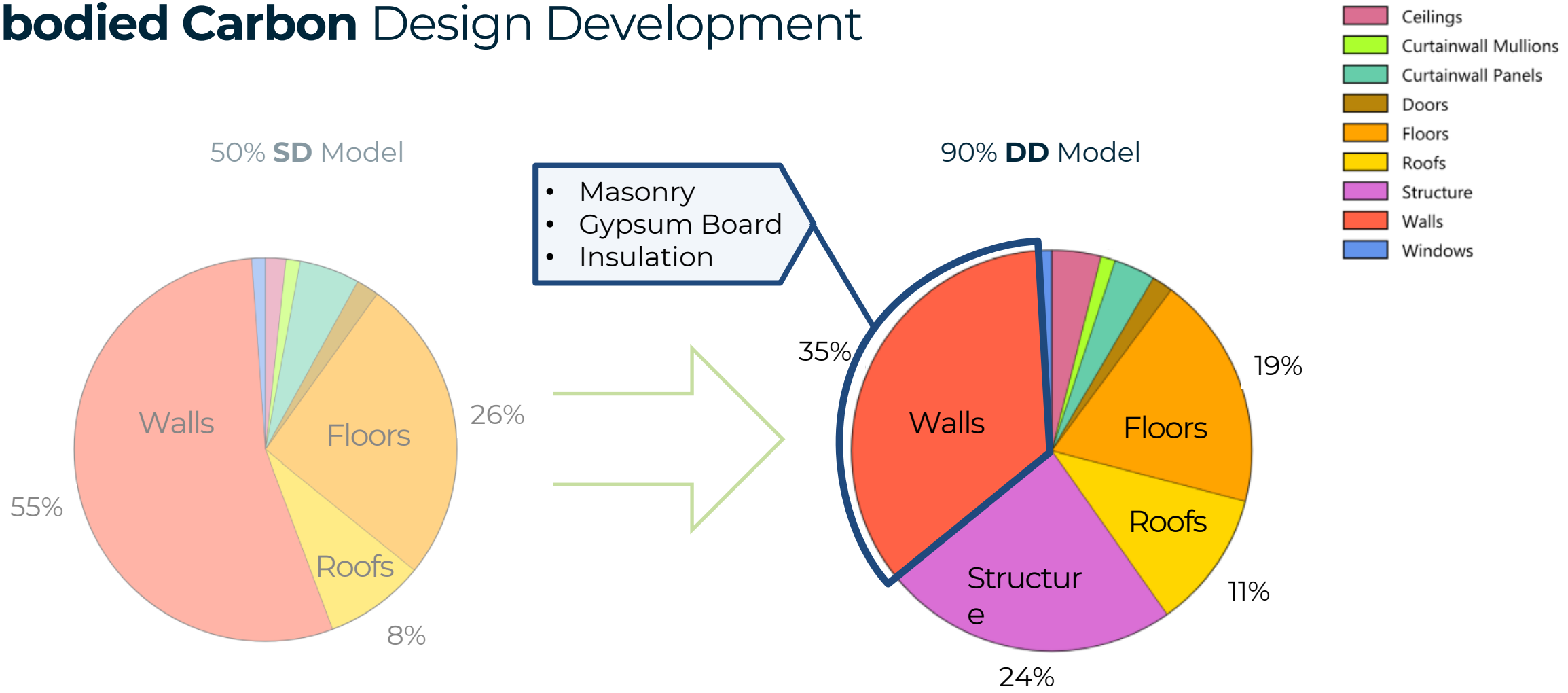
Embodied Carbon Design Development



% Global Warming Potential
By Model Category

SD DD

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Material Recommendations

Embodied Carbon Hot Spot Materials

Carbon Hot Spots	Reduction	Relative Reduction Potential
Concrete	Normal weight concrete at frostwall and footing Supplemental cement materials (slag, fly ash)	High
CMU	Specify Low-Carbon CMU with Low-Carbon Grout	Moderate
Insulation, Exterior	Mineral Wool	Moderate
Insulation, Below-Grade	Structural Glass Insulating Board	Moderate
Insulation, Interior	Mineral Wool or Wood Fiber	Moderate
Curtain Wall	Fiberglass Mullions	Moderate

Embodied Carbon Concrete

Supplemental Cement Materials (SCM)

- Furnace Slag
- Fly Ash Pozzolan
- Up to 40% / 50% replacement of Portland Cement

Design Development

- Normal weight concrete at footings & foundation
- Cement substitutes of slag or fly ash
- Referencing Low-Carbon Concrete Mixes in MA (mass.gov)

Slag Concrete

Fly Ash Pozzolan

Concrete Reduction Strategy

SCMs vs. Eastern Regional Average

27,270

KG CO_2EQ

Upfront Carbon Avoided

=

CARBON EQUIVALENCIES:

3,069

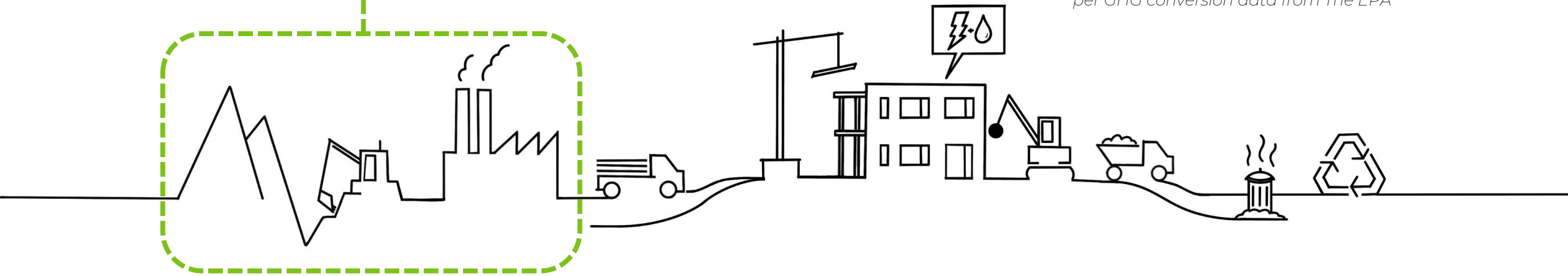
GALLONS GAS CONSUMED

OR

451

TREE SEEDLINGS: 10 YRS

per GHG conversion data from The EPA



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Embodied Carbon Low-Carbon CMU

Typical CMU (industry avg):

- 150-200 kgCO2e

Low-Carbon CMU:

- 100-150 kgCO2e

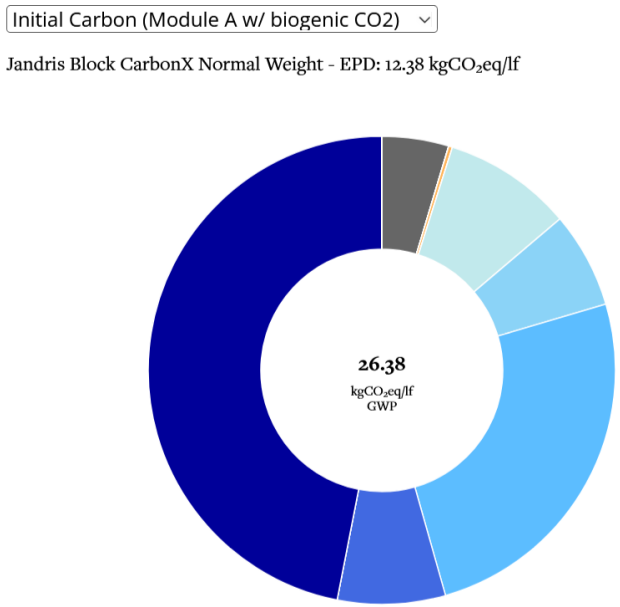
CarbiCrete CMU:

- 11 kgCO2e

Design Development

- Specifying low-carbon CMU (up to **50%** reduction)
- Specifying low-carbon grout

CMU - Painted Low Carbon Block



"Carbon dioxide from ambient air reacts with the constituents of the CMU and is *permanently sequestered as calcium carbonate* within the block, creating **a carbon sink**."

FINEGOLD ALEXANDER ARCHITECTS | FA ENERGY

Embodied Carbon Insulation

Cellular Glass Insulation

- Materials: Recycled Glass, Sand, Lime, Dolomite
- Replaces Foam Insulation + Gravel Below Slab
- High Compressive Strength
- Insulates & Mitigates Thermal Bridges

Cellular Glass Insulation Pellets

Design Development

Cellular Glass Insulation:

- Below-grade insulation
- Precast wall base to reduce thermal bridging

Structural Glass Insulating Unit Install

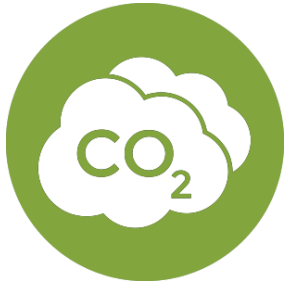
Embodied Carbon Additional Strategies

Environmental Product Declarations (EPDs)

Product Types To Require EPDs:

- Ready-Mix Concrete
- CMU Blocks
- Structural Steel
- Asphalt
- Gypsum Board
- Insulation

Embodied Carbon
+
LEED Goals



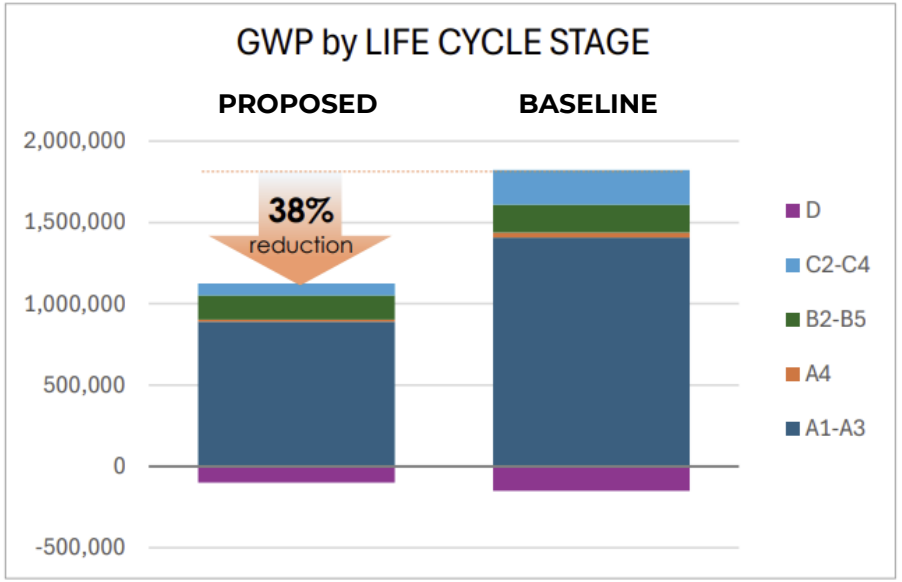
Next Steps

Embodied Carbon Construction Documentation

Example Project at CD

Life Cycle Stage	PROPOSED DESIGN	vs	BASELINE BUILDING	DIFFERENCE
Production [A1-A3]	889,647		1,406,566	-516,919
Transportation [A4]	13,646		30,462	-16,817
Maintenance + Replacement [B2-B5]	149,600		174,106	-24,507
End of Life [C2-C4]	70,723		212,006	-141,284
Recycling/ Reuse Potential [Module D]	-100,138		-151,510	51,372
***TOTAL Global Warming Potential (GWP)** **	**1,023,477** $kgCO_2eq$		**1,671,631** $kgCO_2eq$	**-648,154** $kgCO_2eq$

**includes biogenic carbon*



SD DD CD

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Thank You!

LBE Updates & Reminders

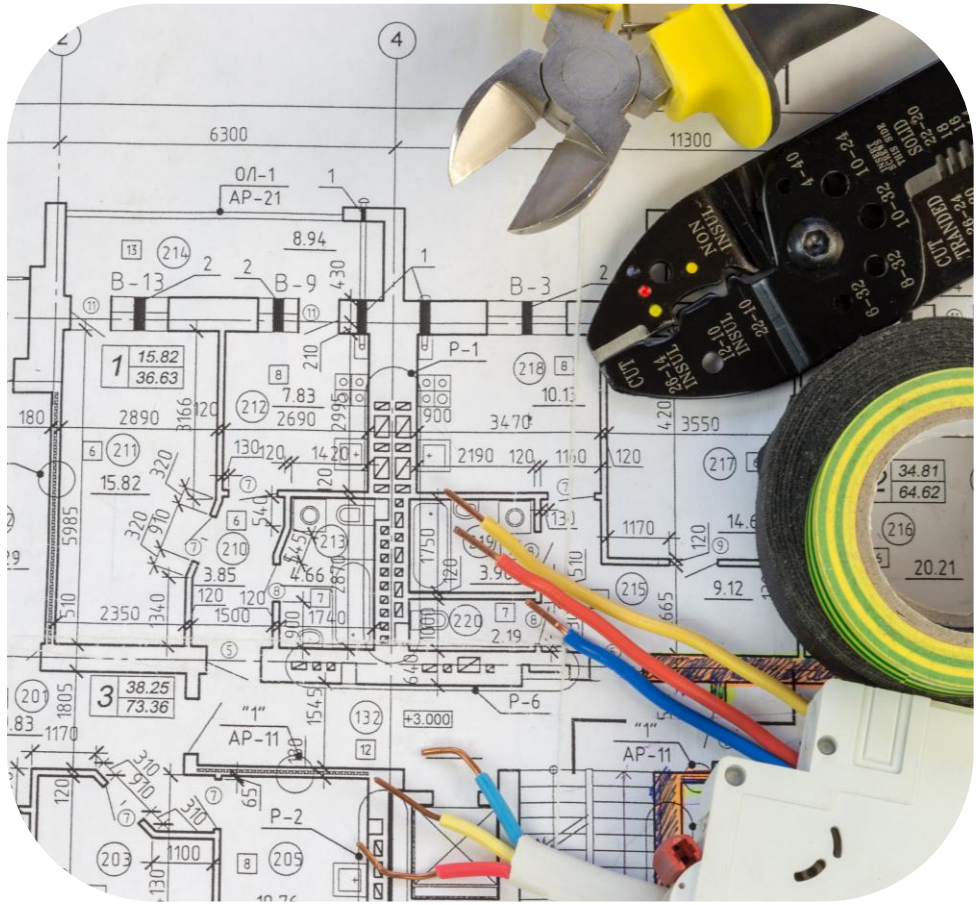
Lots of updates to start the year!

- Grant updates
- VEH122 contract updates
- Fleet planning results
- Renewable Diesel

LBE Grant Updates: DIG

Decarbonization Implementation Grant (DIG)

- Round 1 DIG applications under last stage of review
- DOER increased total grant funding available from $12.5M to $15M to accommodate Round 1 requests
- Given the number of applications in Round 1 and the total amount in funding available in the PON, **the DIG program will go on pause** for the foreseeable future until Round 1 awards are announced and funding availability is certain



LBE Grant Updates: EVSE

Fleet EV Charging Grant

- Funding remaining for state-owned sites: **$388,113***
- Funding available for domicile EVSE: **$127,390**
- For non-domicile projects, work must be complete by **June 30, 2026**. If interested, please email sophia.vitello@mass.gov.

**Based on awarded and submitted applications*

LBE Grant Updates: Solar

Solar-Decarbonization Grant

- PON amended on January 7, 2026
- Limits PPA savings to **50% below current basic service kWh rate**
- Updated to align with new SMART 3.0 regulations
- Allows funding for **independent battery storage** ($2 million total available for such projects)
    - ❑Limits funding to either LBE grant or Connected Solutions

VEH122: Advanced Vehicle Technology Equipment, Supplies and Services

Summary

- Contract term: October 1, 2025 – September 30, 2033
- Replaces VEH102
- Vendors can be added to VEH122 during contract life via an open enrollment period, if the Operational Services Division (OSD) or the Strategic Sourcing Team deem it necessary

Key Links

- VEH122 user guide (click on “VEH122”):
  - Summary table of all awardees
  - Description of the four types of services offered in the contract
  - Instructions for how to use the contract
- VEH122 on COMMBUYS:
  - Links to key bid documents (e.g. Request for Response (RFR), bidder response form, price sheet)
  - List of awardees

VEH122 Overview (cont.)

Contract Categories

- **Category 1:** Electric Vehicle Supply Equipment (EVSE), Hardware, Software, and Ancillary Services
- **Category 2:** Idle Reduction Technology – All Vehicle Categories; and Heavy-Duty Equipment
- **Category 3:** Alternative Fuel & Technology Conversions
- **NEW! Category 4:** Electric Vehicle Supply Equipment (EVSE) Operation and Maintenance

What's new on VEH122?

- **29 total vendors** on new contract
- **Addition of Category 4**: EVSE Operation & Maintenance
- Option for **open enrollment period** to increase contract flexibility
  - OSD may determine that additional vendors are necessary to meet buyer's needs and/or to obtain additional products or services
  - Open enrollment periods are every two (2) years after the contract start date (from October 1-15)

VEH122 Category Details

	Category Description	Examples of Products & Services	# of vendors on VEH122
Category 1	EV charging equipment and installation services	EV charging equipment, mobile charging, charging-as-a-service, solar-powered EVSE	**23**
Category 2	Equipment and services designed to reduce unnecessary vehicle idling	Battery Power Units, cab heaters, air heaters, waste heat recovery systems	**2**
Category 3	Modify vehicles and engines so that they can run on – or be supplemented by – fuels or technologies other than the ones for which they were originally designed	EV upfits/retrofits	**1**
Category 4	Provide comprehensive maintenance and operational services for EV charging stations	Charging station operations & maintenance	**18**

VEH122 New Offerings: Mobile Charging

Mobile Charging

- Provides **temporary EV charging** while a charging site waits for utility upgrades or interconnection
- Brings EV charging to **off-grid locations** or places with electric grid capacity constraints
- Provides **additional charging capacity** in emergencies (e.g., evacuations) or events with temporary large parking/charging needs

VEH122 New Offerings: CaaS and O&M

Charging-as-a-Service (CaaS)

- **Vendors** install (usually), own (usually), operate, and maintain charging projects for a pre-determined fee; guarantee some level of charger uptime
- **Avoids large upfront installation costs** and reduces complexity to operate and maintain chargers

Operations & Maintenance Contracts

- Ensures chargers continue to be maintained and serviced post-warranty
- New Category 4 on VEH122 contract

VEH122 Webinar

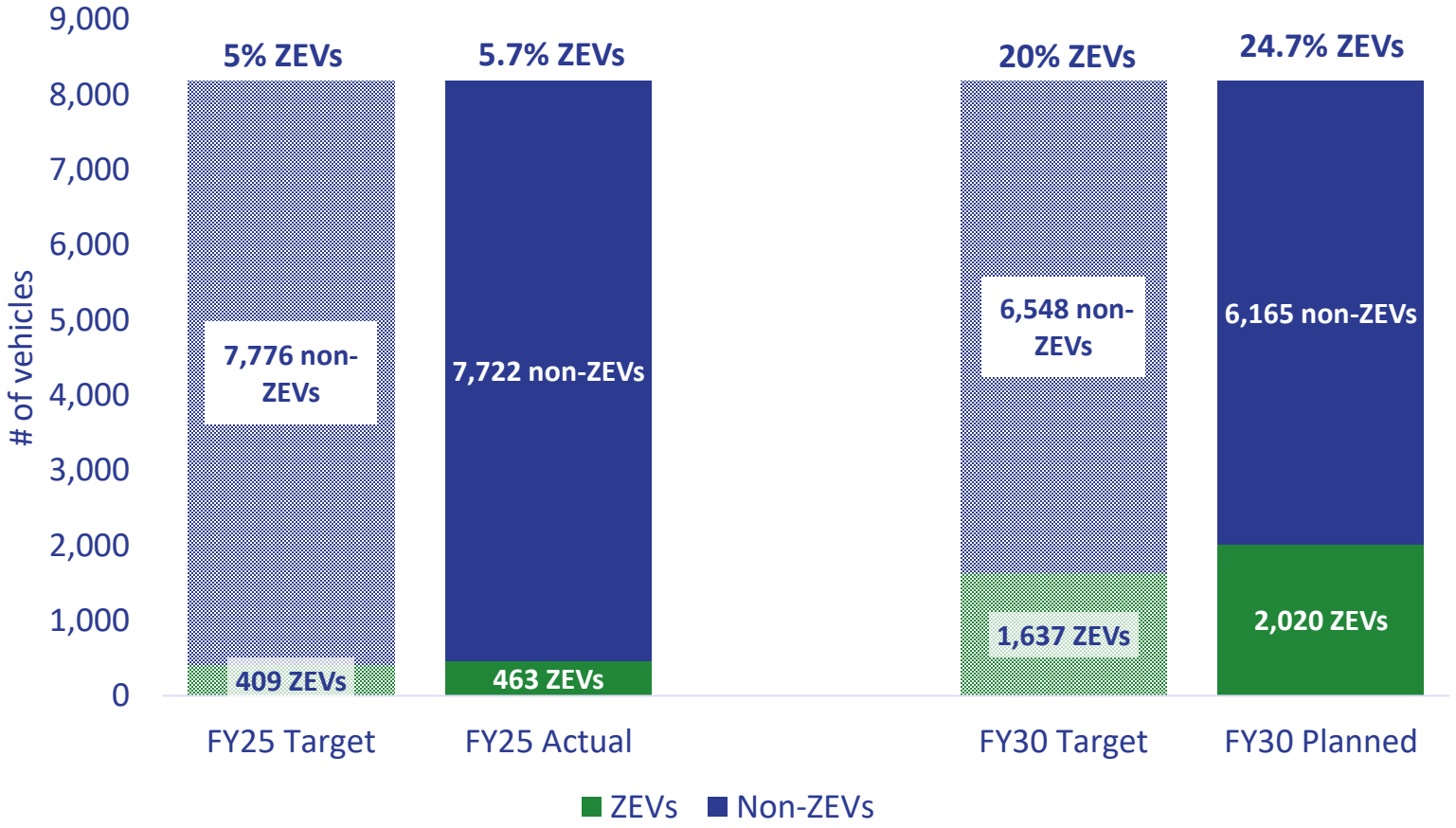
Join us February 24, 11AM to noon

- Learn from LBE and OSD staff about these changes to the contract
- LBE will send out a link to register for the webinar following the Council Meeting
- Contact Sophia Vitello (Sophia.Vitello@mass.gov) for more details on VEH122 contract and for questions on the webinar

Fleet Planning Results

State fleet has exceeded FY25 electrification target and is on track to exceed the FY30 target

(if fleets follow plans)



- State fleet:
  - 78 fleets
  - 8,185 non-emergency vehicles
- OVM worked with all 40 of its fleets to complete electrification plans
- 30 of the 38 non-OVM fleets completed plans
- Completed plans account for 82% of all fleet vehicles

MASSACHUSETTS DEPARTMENT OF ENERGY RESOURCES

FY2025 Fleet Electrification Status by Fleet Type

Fleet Type	Number of Fleets	Number of Vehicles	Number of BEVs	Number of PHEVs	Number of ZEVs	Percent ZEVs
Executive Branch (OVM-Managed)	40	2,921	213	54	267	9.1%
Non-OVM-Managed	38	5,264	133	63	196	3.7%
Total	**78**	**8,185**	**346**	**117**	**463**	**5.7%**

Note: Vehicle counts include non-emergency vehicles only.

- Electrification levels varied for fleet types, but the state fleet collectively exceeded the 5% target
- Non-OVM-managed fleets include:
  - MassDOT Highway Division
  - MWRA
  - MBTA non-revenue
  - Mass. Port Authority
  - 29 public institutions of higher education
  - Mass. Lottery Commission
  - Department of State Police
  - Environmental Police
  - Office of the Inspector General
  - Secretary of State

New Renewable Diesel (RD) Policy and Guidance!

Executive Order 594

"On an annual basis, LBE shall be responsible for tracking and collecting building and vehicle energy consumption, clean energy development, GHG emissions, and other relevant information associated with state government operations."

RD Policy Goals

- ❑ **Provide guidance** to state entities on how RD can be used as an emissions reduction strategy:
  - Eligible use cases
  - Eligible feedstocks
  - Process to receive approval for RD use
  - Emissions calculations
- ❑ **Ensure consistency** across state portfolio and with other statewide goals and reporting mechanisms
- ❑ Ensure prioritization of **long-term electrification**

Renewable Diesel (RD) Policy Overview

Eligible Use Cases

Medium- and **heavy-duty vehicles**
(with no currently available or cost-feasible electric alternatives)

Certain **off-road equipment**
(with no currently available or cost-feasible electric alternatives)

Central campus heating plants using diesel

Emergency generators

Sourcing Requirements

To claim any emissions benefits from RD use, state entities must use "eligible RD" from **waste oil feedstocks**, which includes**:**

- Used cooking oil (UCO)
- Tallow, and/or animal fats

RD must be **sourced domestically** (with occasional exemptions)

Sites must ID challenges with electrification and acknowledge commitment to long-term electrification

Calculating Renewable Diesel (RD) Emissions

Align with state emissions accounting and reporting

Main points:

- LBE will collect and track RD data separately
- For current reporting purposes, eligible RD will **not count** towards onsite fossil fuel emissions (Scope 1)
- At the time of Net Zero emissions calculations, **RD will be included in total GHG emissions**

LBE will host a webinar (April) that will detail the RD requirements, process, and emissions calculations.

Renewable Diesel (RD) – Next Steps

LBE will publish RD guidance and forms on our website

LBE will host an RD webinar in April

LBE will evaluate if any adjustments are needed to the process

In the News

Challenges & Moving Forward

- Offshore wind, Onshore wind, and Hydropower
- New Window Heat Pump technology
- State of EVs, and more!

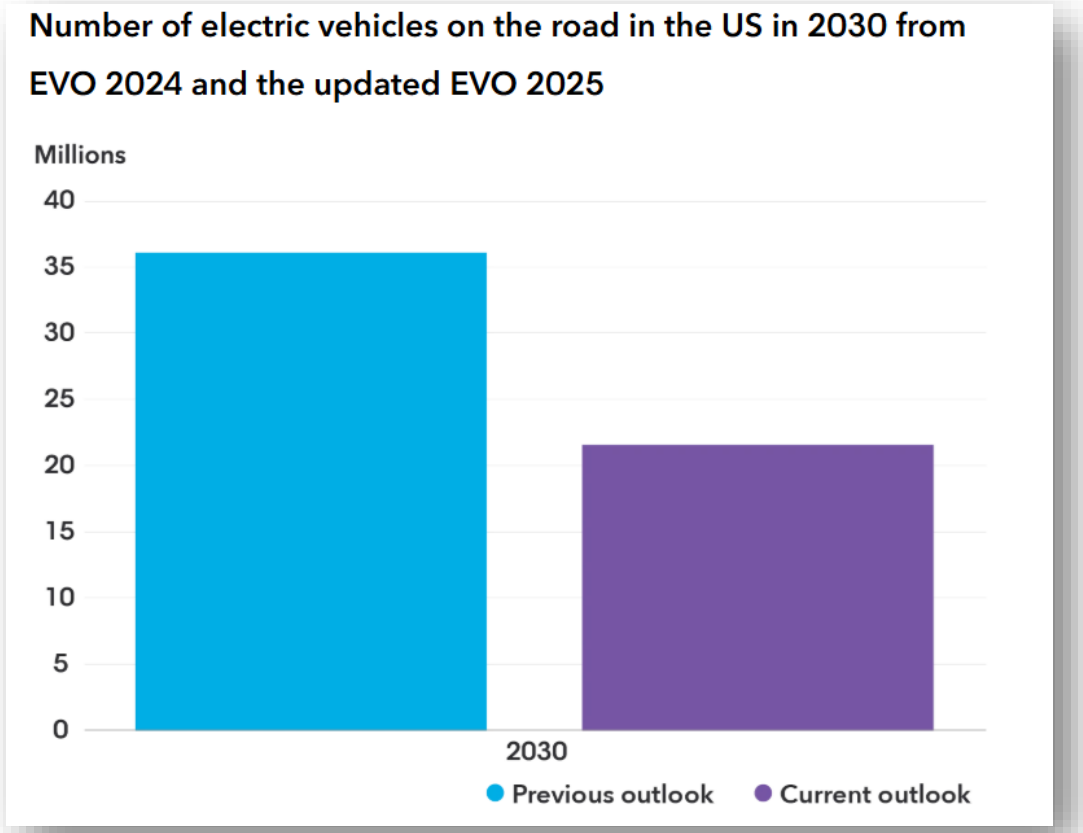
Updates on Offshore Wind

Court rulings allow offshore wind projects to resume

- On December 22, 2025, the Trump Administration halted work on five (5) offshore wind projects already in construction for at least 90 days
- However, wind developers (e.g., Vineyard Wind, Revolution Wind, Empire Wind) challenged this order in court
- Recent court rulings mean that many are set to resume project activities – including Vineyard 1

Source: Electrek

EV Setbacks



Source: Electric Vehicle Outlook | BloombergNEF

EVs have seen declining sales

- November 2025 MA registrations down 60% YOY (59% for October)
- Cancellation of F150 Lightning
- Automakers drop goals for 100% EVs (GM, Volvo, Porsche, Volkswagen, Mercedes)
- Federal changes
  - End of federal EV tax credits
  - Congress revokes California Clean Air Act waiver (EV-only new vehicle sales targets)

The Road Ahead

Progress elsewhere!

- Over **20 new EV models** expected in 2026
- MA exceeding benchmarks for DCFC installations
    - More than 112 DCFC ports ahead of 2025 EVICC benchmark
- NEVI plan approved – $64M for DCFCs along corridors
- Nationally, EV fast-charging network grew 30% in 2025
- Fully electric EV adoption expands globally (1 in 4 car sales were electric in 2025)

Battery Storage Boost

MA to procure almost 1,300 MW of battery storage

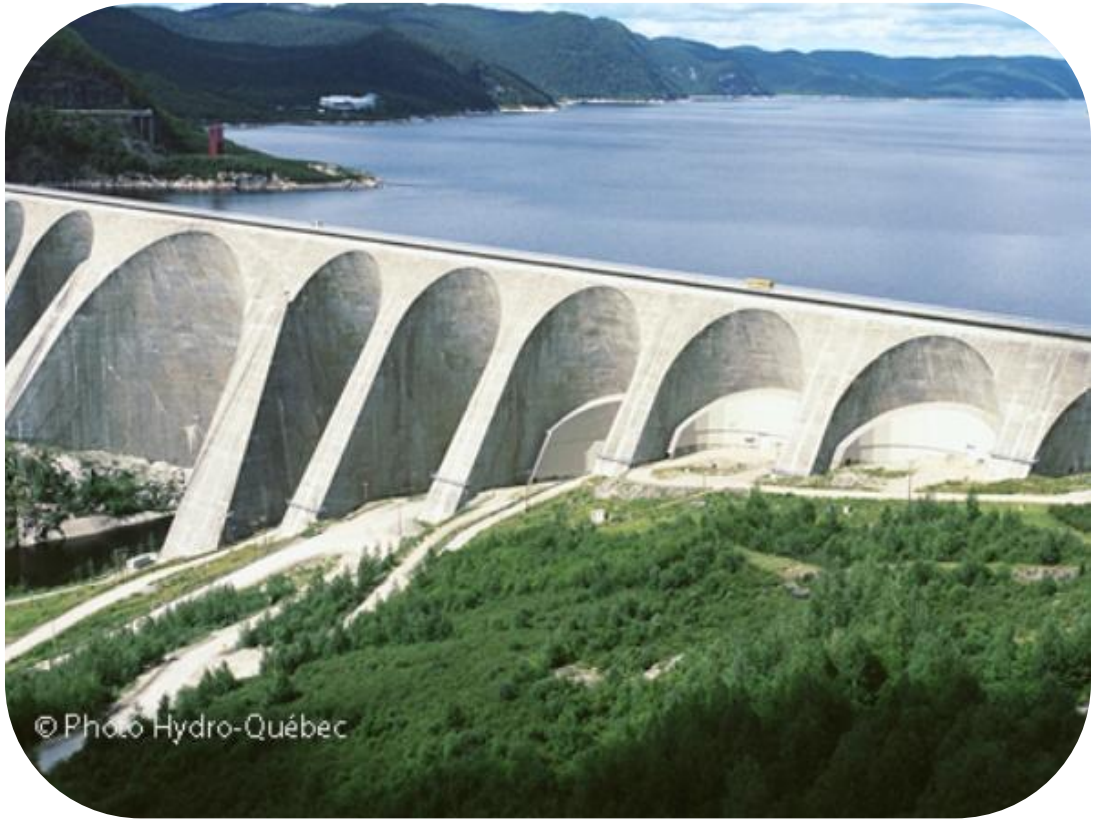
Site for the Trimount energy storage project

- Battery storage will help **store renewable energy** and release it during times of high demand
- Reduces need for peaker plants and avoids $2.2B in transmission upgrades
- **4 projects** located in Everett, Somerset, Chelsea, and Tyngsborough
- Trimount project (in Everett) will be one of the largest in New England, **replacing a former Exxon oil storage facility**
- State goal to gain **5,000 MW** of storage by 2030

Canadian Hydropower

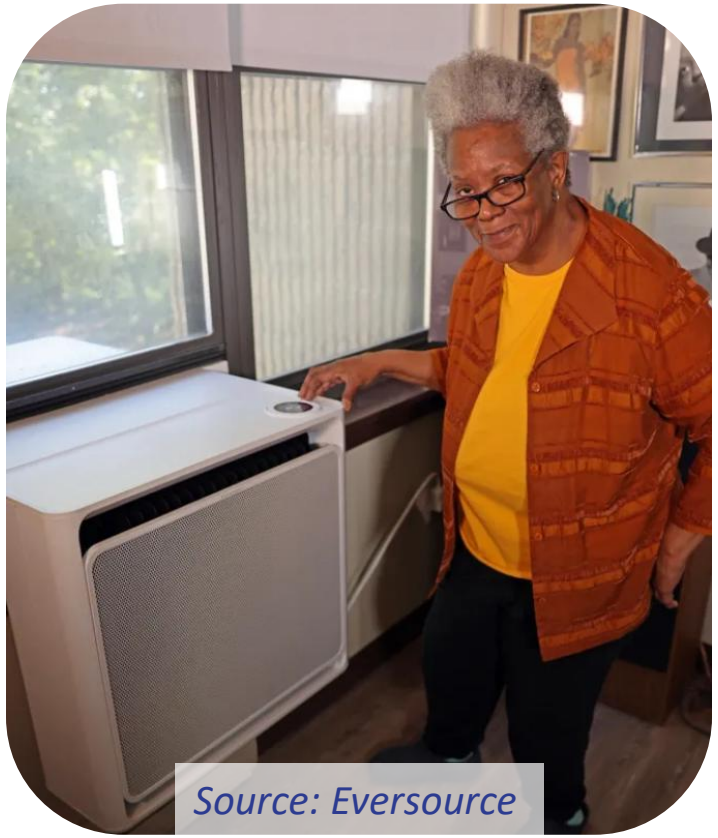
Massachusetts will receive 1,200 MW from Hydro-Québec

- Made possible through New England Clean Energy Connect (NECEC) transmission line
- Provides significant baseload power year-round
- Expected to lower electricity costs in New England, and possibly reduce need for gas power plants in colder months
    - **$3 billion** in net benefits
- Electricity generated can power **1 million homes**, the bulk of which are in MA



Window Heat Pump (WHP) Technology

Boston Housing Authority (BHA) piloting 100 WHPs


Source: Eversource

- WHPs from startup Gradient
- Can be installed **without electrical upgrades**, **more efficient** than electric-resistance systems
- **Faster and cheaper to install** than traditional heat pumps
- BHA expects to save **up to $60,000** in energy costs per year
- Chelsea Housing Authority and Lynn Housing Authority & Neighborhood Development also piloting Gradient appliances

Future Collaboration

MOU signed between Massachusetts and Nova Scotia on offshore wind

- Gov. Maura Healey and Nova Scotia Premier Tim Houston signed agreement to strengthen collaboration in the North Atlantic
- Amidst discussions of power during colder winter months
- MOU identifies several areas of coordination, including:
  - workforce development and job creation,
  - transmission planning and grid integration,
  - stakeholder engagement and public education, and
  - investments in ports and supply chain development

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Thank You