



Reducing the Carbon Footprint of Every Building.

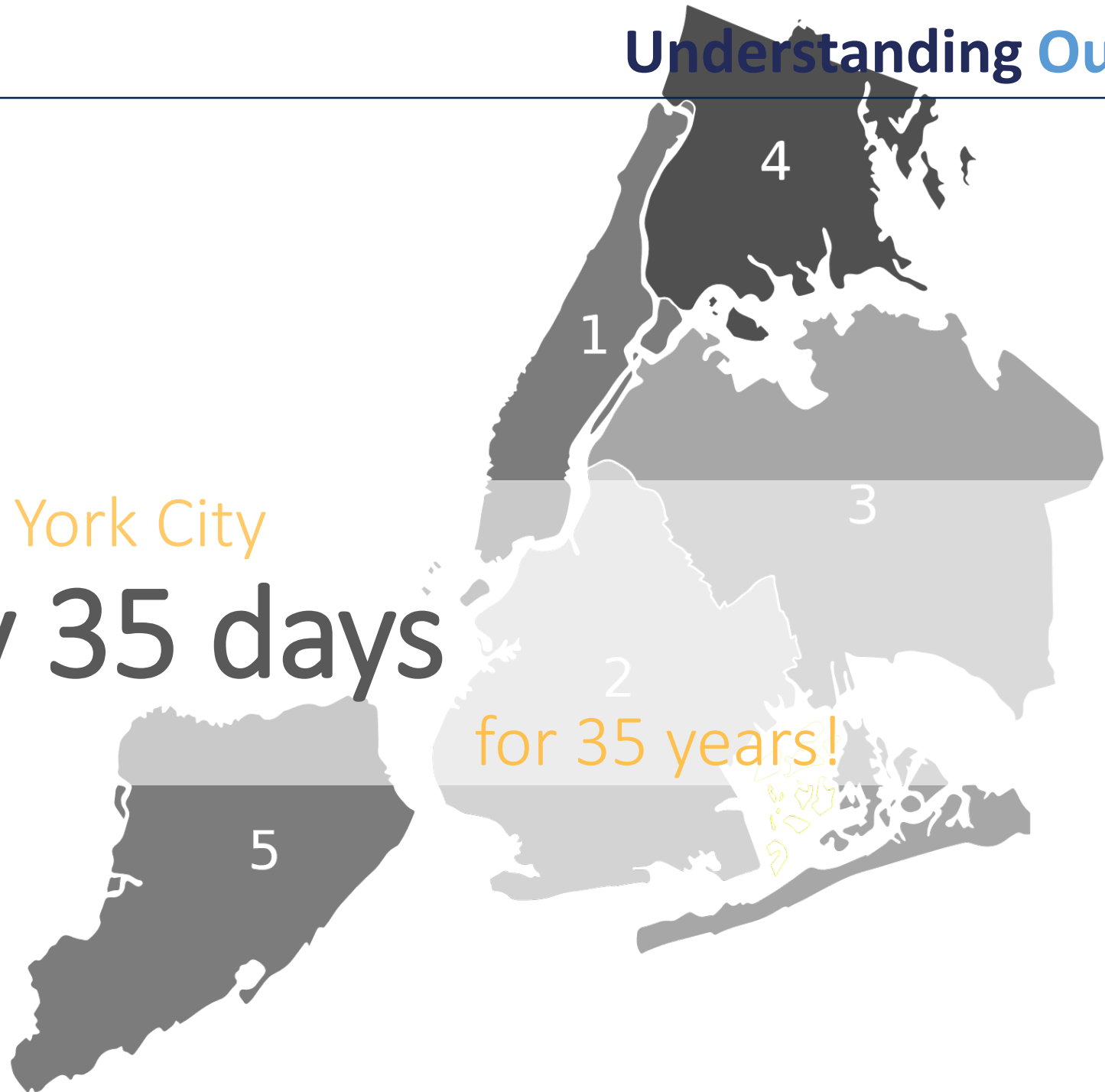
Over the next 35 years,

**two trillion ft<sup>2</sup>**

of new and rebuilt buildings  
will be constructed in cities worldwide.

An entire New York City  
every 35 days

for 35 years!





## Understanding Carbon



### Embodied Carbon

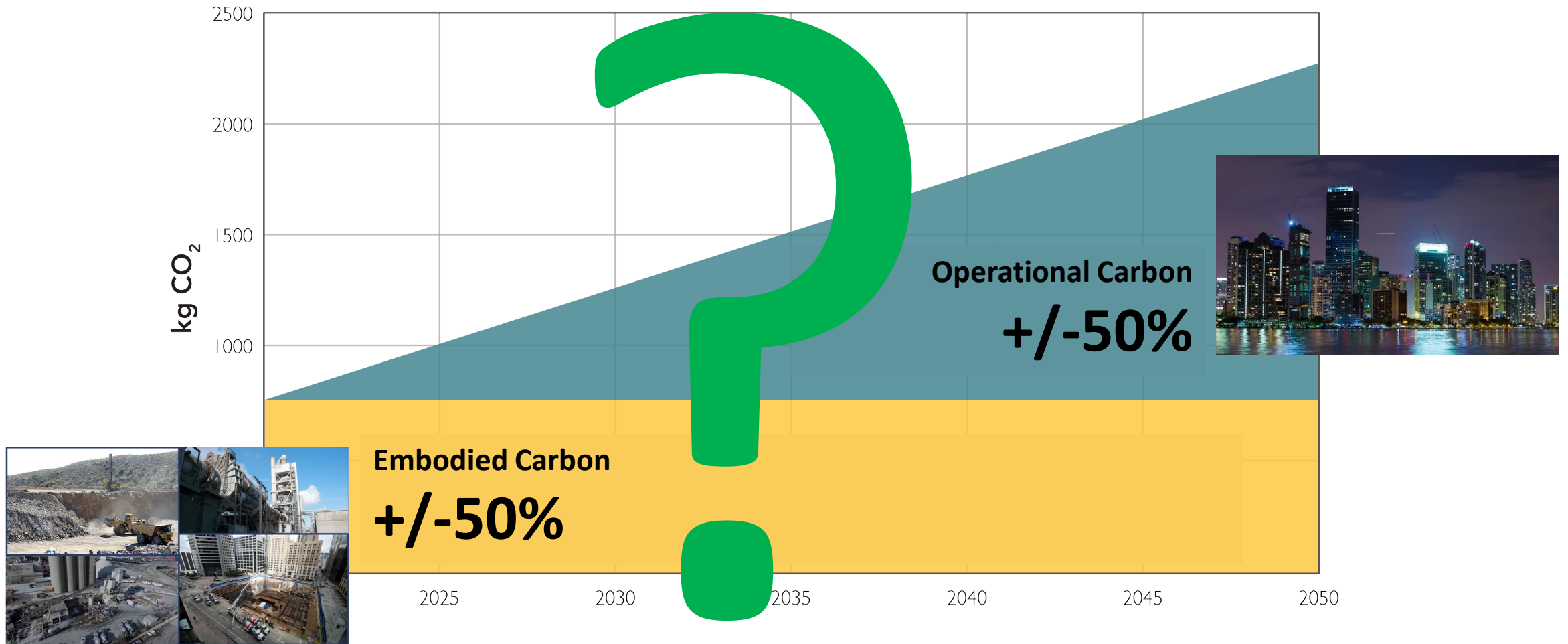
Manufacture, transport and installation of construction materials

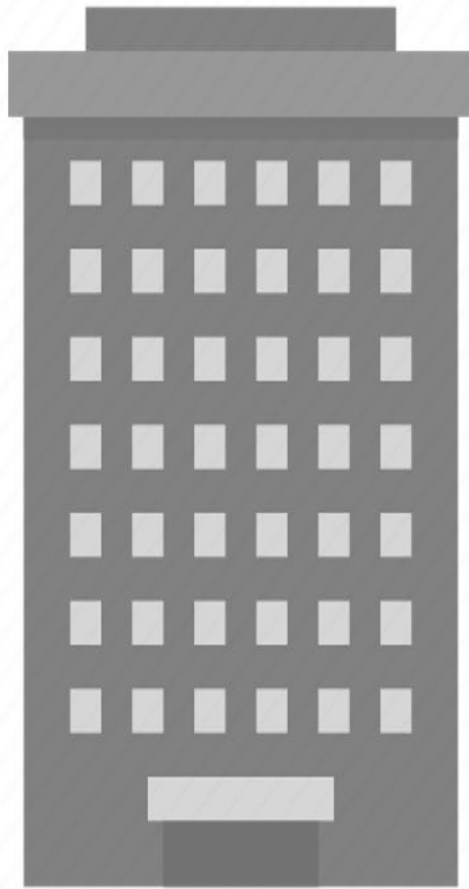
### Operational Carbon

Building Energy Consumption



## Total Carbon Emissions of **Single Building** *Global Average Building Carbon Footprint: Business as Usual*





**Your Project  
Project Location**



**16% operational**

**84% embodied**

(over 30 year lifecycle)

**55,000 tons of CO<sub>2</sub>**



Or... a



flying for 70 days

Or... 10,762



driving for 1 year

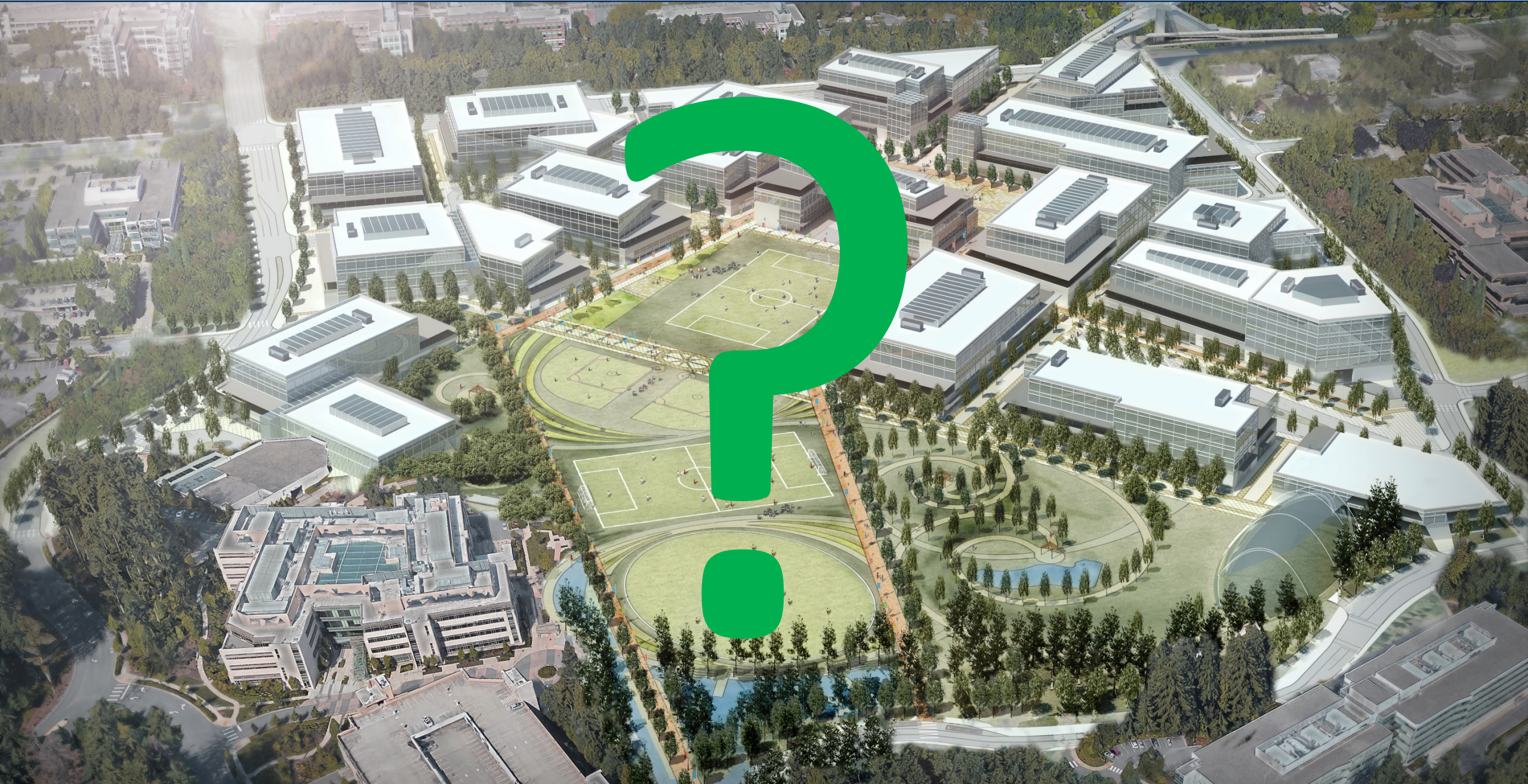
Or... 172,897



of crude oil

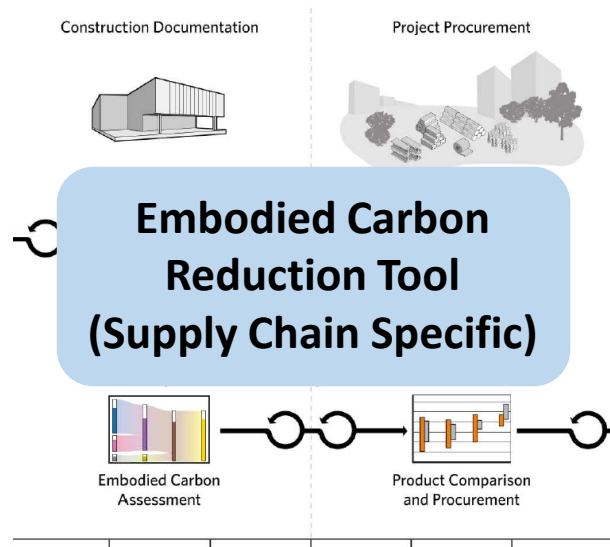


# Understanding Carbon





## Supply chain emissions reduction.



### Wish List

Available to Everyone

Easy to Use

Free to Use

Open & Transparent Data Source

Open API  
(willing/able to share data with other tools)

Focused on Supply Chain Accountability

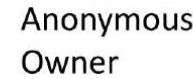




## Lead Sponsors



## Pilot Sponsors



## Association Sponsors



## Material Sponsors



## Early Adopters Sponsors



LOS ANGELES  
BOARD OF DIRECTORS



Coughlin Porter Lundeen  
LeMessurier  
PCS Structural  
Nucor  
Salesforce  
SCS Global Services  
TK1SC  
Thornton Tomasetti  
WRNS Architects

## Methodology Partners

Arup  
Brightworks Sustainability  
Central Concrete Supply  
Kattera  
Kieran Timberlake  
LMN Architects  
National Ready Mixed Concrete Co  
Urban Fabrick  
WAP Sustainability

## Technology Partners

Autodesk  
Climate Earth  
mindfulMaterials  
Sustainable Minds  
Tally

## Project Leadership



CHARLES PANKOW  
FOUNDATION

Building Innovation through Research



Carbon  
Leadership  
Forum

UNIVERSITY of WASHINGTON



## Kg CO2e from Environmental Product Declarations

Nutrition Facts	
Serving Size 2/3 cup (55g)	
Servings Per Container About 8	
Amount Per Serving	
<b>Calories</b> 230	Calories from Fat 40
% Daily Value*	
<b>Total Fat</b> 8g	<b>12%</b>
Saturated Fat 1g	<b>5%</b>
Trans Fat 0g	
<b>Cholesterol</b> 0mg	<b>0%</b>
<b>Sodium</b> 160mg	<b>7%</b>
<b>Total Carbohydrate</b> 37g	<b>12%</b>
Dietary Fiber 4g	<b>16%</b>
Sugars 1g	
<b>Protein</b> 3g	



### Life Cycle Impact Results (per m<sup>3</sup>)

Declared Unit: 1 m<sup>3</sup> of 10,000 psi concrete at 28 days

#### OPERATIONAL IMPACTS

*PerformX™  
PECC10K*

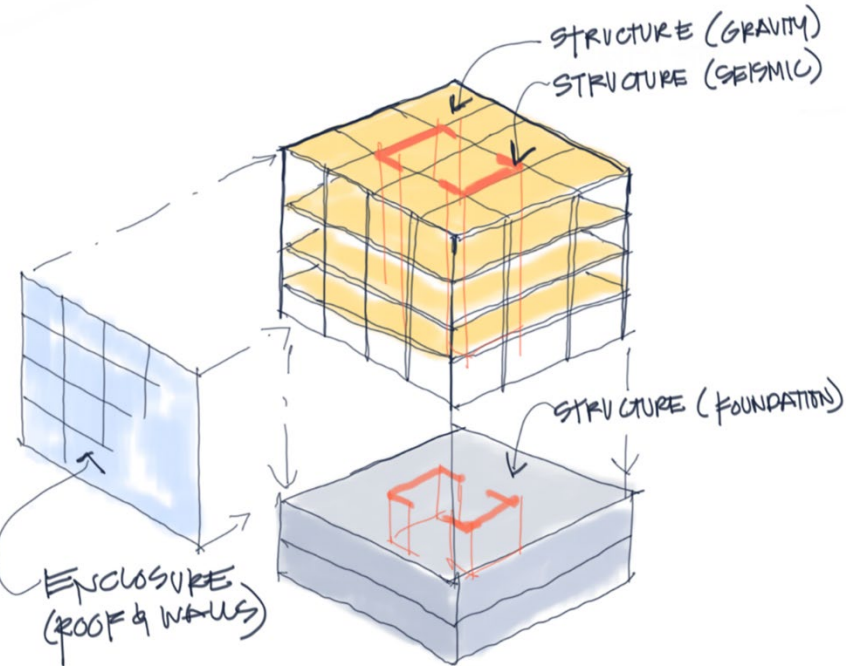
Plant Operating Energy (MJ)	38.6
On-Site Plant Fuel Consumption (MJ)	11.1
Concrete Batch Water (m <sup>3</sup> )	1.68E-01
Concrete Wash Water (m <sup>3</sup> )	1.91E-02
On-Site Waste Disposal (kg)	0.0

#### ENVIRONMENTAL IMPACTS

Total Primary Energy (MJ)	3,017
Climate Change (kg CO <sub>2</sub> eq)	445
Ozone Depletion (kg CFC 11 eq)	1.31E-08
Acidification Air (kg SO <sub>2</sub> eq)	2.96
Eutrophication (kg N eq)	0.09
Photochemical Ozone Creation (kg O <sub>3</sub> eq)	0.61

\*current database holds over 22,000 epds

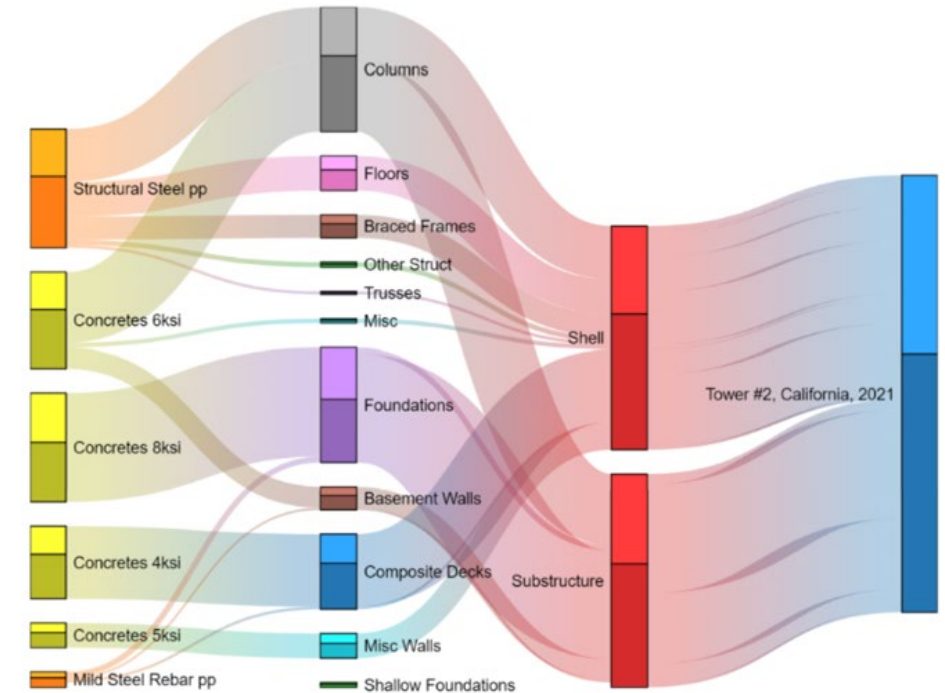




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**MATERIAL  
QUANTITY  
ESTIMATE**



**EMBODIED  
CARBON  
PER MATERIAL  
EPDs**



**BUILDING  
EMBODIED  
CARBON (EC)  
ESTIMATE**

## Estimate Quantities

Skanska USA Building Inc

### 02 GARAGE

#### A SUBSTRUCTURE

##### A10 FOUNDATIONS

##### A1010 Standard Foundations

##### BP03010 Cast-In-Place Concrete

Spread Footings

Continuous Footings

Mat Foundations

Rat slab under mat foundation, 3" (fiberglass)

BP03010 Cast-In-Place Concrete

##### BP03030 Reinforcing Steel

BP03030 - Reinforcing Steel - Buyout @ 75% CD

BP03030 Reinforcing Steel

##### A1010 Standard Foundations

##### A1020 Special Foundations

##### BP02035 Excavation Support System

BP02035 - Excavation Support Systems - Buyout @ 50% CD

BP02035 - Excavation Support Systems - Revisions @ 75% CD

BP02035 Excavation Support System

##### A1020 Special Foundations

##### A1030 Slab on Grade

##### BP03010 Cast-In-Place Concrete

Elevator Sump Pits (Garage)

Slab on grade, 8" thick

Misc. Concrete Work at Loading Dock

BP03010 Cast-In-Place Concrete

##### A1030 Slab on Grade

## Into EC3

### MODEL VIEWER

Selected Viewable

360\_Standard

## Building Material Quantities

from Construction Estimates, BIM models and Tally

Tally® Environmental Impact Tool - rac\_advanced\_sample\_project\_2019.rvt

Help Define Scope Refresh Save Report Manage Definitions

© 2019 KT Innovations  
LCA Data by thinkstep

### Report Details

#### Report Information

Title: Full building summary

Date: 11/5/2019

Author: ryanxwelch

Company: KieranTimberlake

Project: Sample Project

Location: Enter address here

Cover: - set image -

Gross Building Area: 5010 m<sup>2</sup>

Expected Building Life: 60 years

Goal and Scope of Assessment

Test

#### Transporation Impacts

Heating

Water

#### Output Summaries

☒ Bill of Materials (Excel)

☐ Location Assessments (PDF)

☐ Cycle Stage

☐ Revision

☐ Unit Cat

Map

Export to EC3 (BETA) Save Cancel

Export to EC3

Logged in as Ryan Welch

Upload complete

100% complete. 6 of 6 Revit families processed.

Open Project in EC3

☐ Include Operational Energy Impacts

Annual Site Energy Use

Electricity

Heating

Source

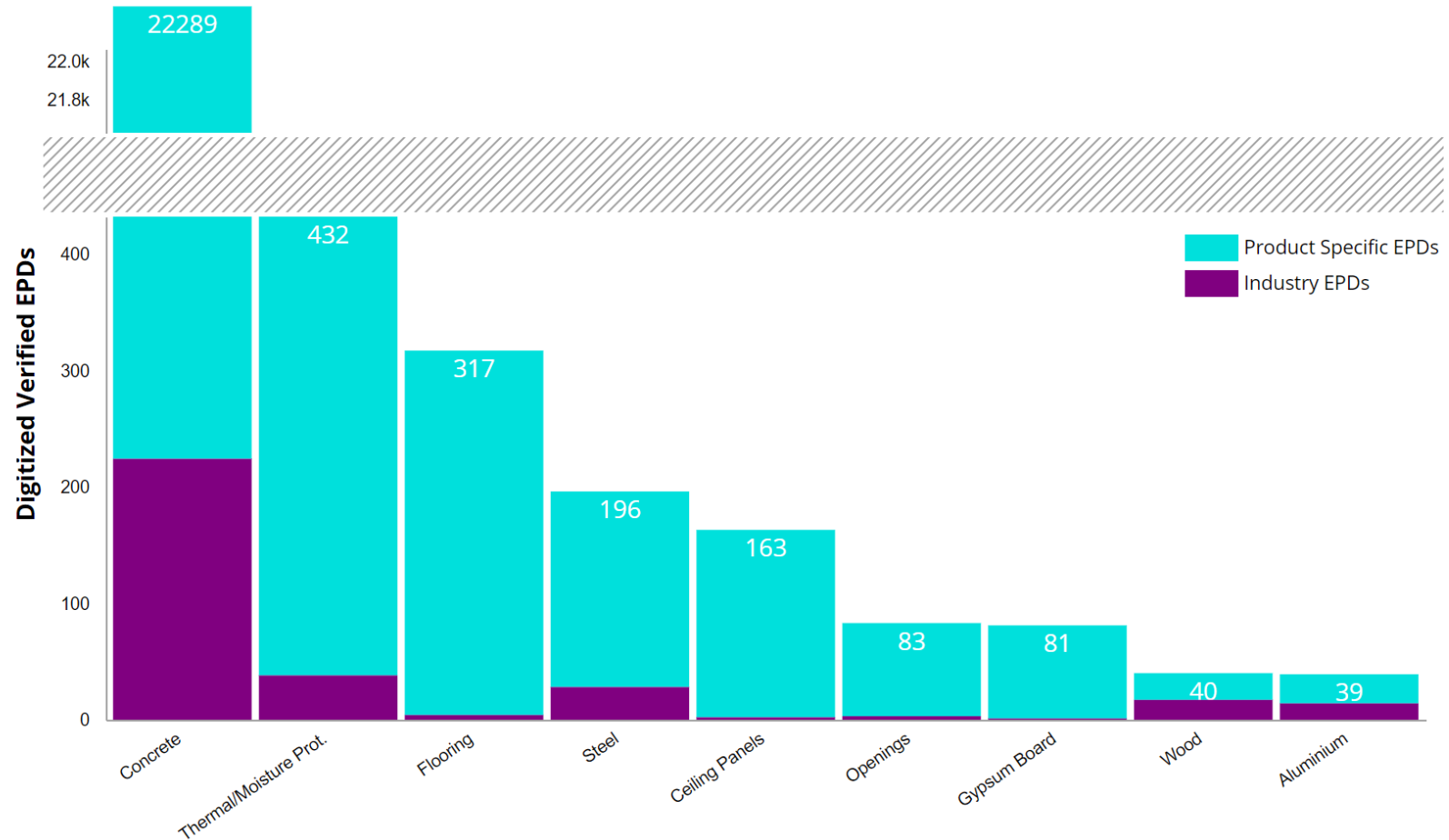
Map



## Kg CO2e from Environmental Product Declarations

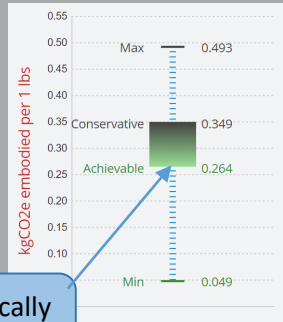
The EC3 tool version v-17.1.2\_b-1161 is in Public Beta, and continues to be developed with a broad range of stakeholders. To learn about, discuss, help define, and improve the EC3 tool, visit our [EC3 Community Forum](#)

The Carbon Query Database is **Online** and contains:



## Sankey Diagram for Building Project, Structural System

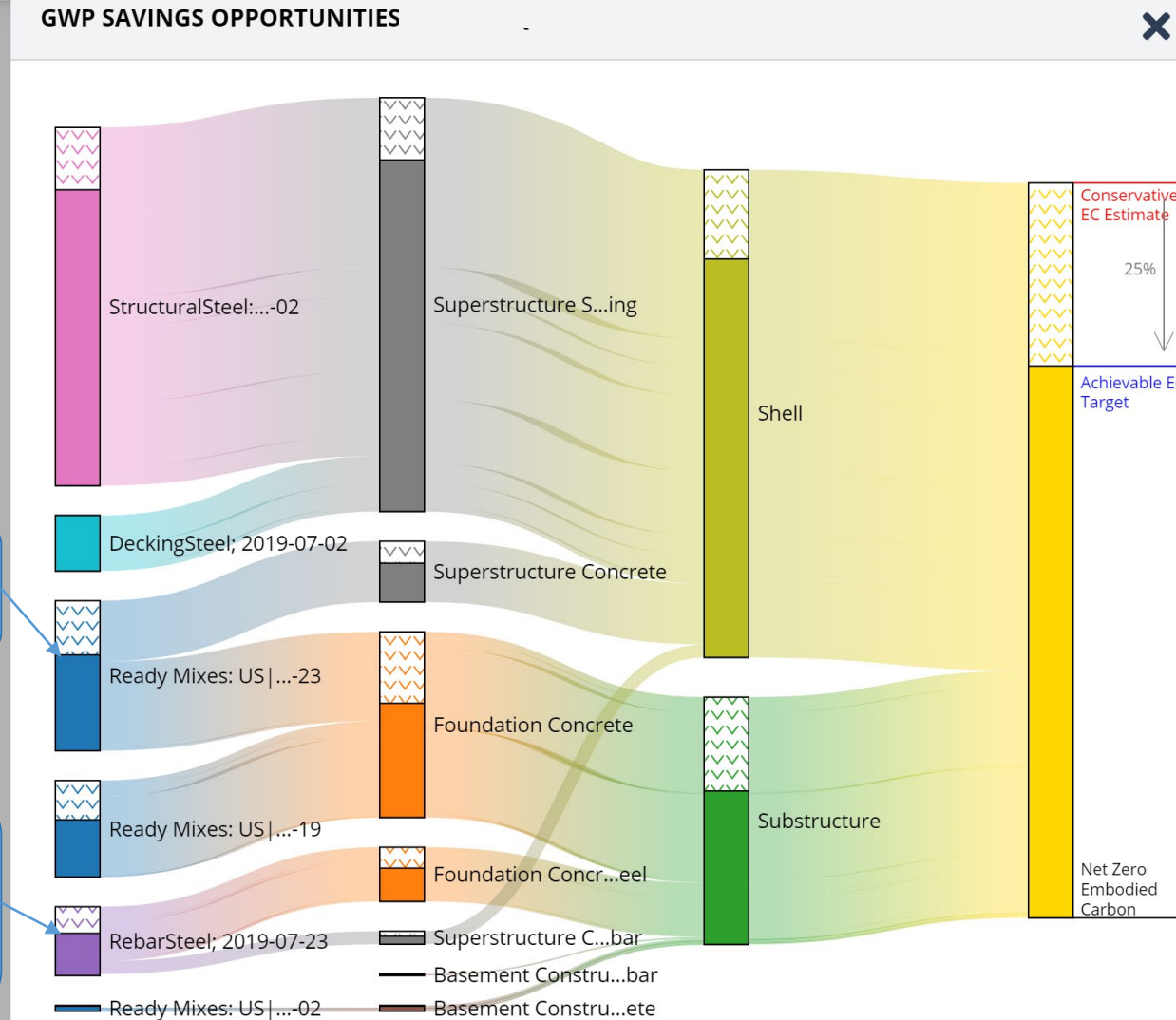
Simple visualization of available reductions based on current supply chain



Locally produced rebar

30% reduction possible in concretes

Large variance in emissions of rebar based on manufacturing location



2019 CLF Baseline

Achievable Embodied Carbon Target

Zero Embodied Carbon

EC Intensity

18.6 kgCO<sub>2</sub>e / ft<sup>2</sup>

EC (Conservative)

3.04M kgCO<sub>2</sub>e

2019 CLF Baseline

EC (Achievable)

3.04M kgCO<sub>2</sub>e

Achievable Embodied Carbon Target

Summary View GWP Summary

(Conservative)

1.36M kgCO<sub>2</sub>e

(Conservative)

1.02M kgCO<sub>2</sub>e

EC	%	Notes
k kgCO <sub>2</sub> e	4 %	
k kgCO <sub>2</sub> e	5 %	
k kgCO <sub>2</sub> e	43 %	
k kgCO <sub>2</sub> e	40 %	
k kgCO <sub>2</sub> e	1 %	

Zero Embodied Carbon




## Search for 5000 psi ready mix concretes in a region

Apply Policy or Certification Compliance

Filter by location

Number of EPDs that meet search parameters



Find & Compare Materials

- Concretes
  - Ready Mixes
  - Precast Concretes
  - Cast-in-Place Concrete
- Masonry
- Slurry
- Roof Decks and Underlayment
- Insulating
- Steel
- Aluminium
- Wood
- Thermal/Moisture Prot.
- Cladding
- Openings
- Finishes
- Gypsum Board
- Ceiling Panels
- Flooring
- Materials
- Other Materials
- Plan & Compare Buildings

SEARCH BY PROPERTIES: 03 30 00 CAST-IN-PLACE CONCRETE

DESIGN INTENT

Compressive Strength  
 @ Curing Time  @ Curing Time

Slump (min)  ≤ W/C Ratio

Compliance  
 ≤ EC3 / 1 yd3

GEOGRAPHIC

Filter by Country/Region

ADVANCED

☒ Filter by Product Name
 ☒ Filter by Plant
 ☒ Filter by Manufacturer

☒ Filter by Product Description

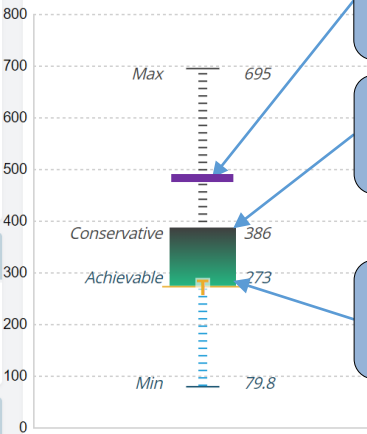
Valid after

SEARCH RESULTS AND STATISTICS

Samples: 4744   
 Achievable: 273 kgCO<sub>2</sub>e   
 Average: 325 kgCO<sub>2</sub>e ± 0.0533   
 Conservative: 386 kgCO<sub>2</sub>e   
 Declared Unit: 1 yd3

[Report Bugs & Feedback](#)

kgCO<sub>2</sub>e embodied per 1 yd<sup>3</sup>



2019 CLF Baseline

Conservative 80% Benchmark

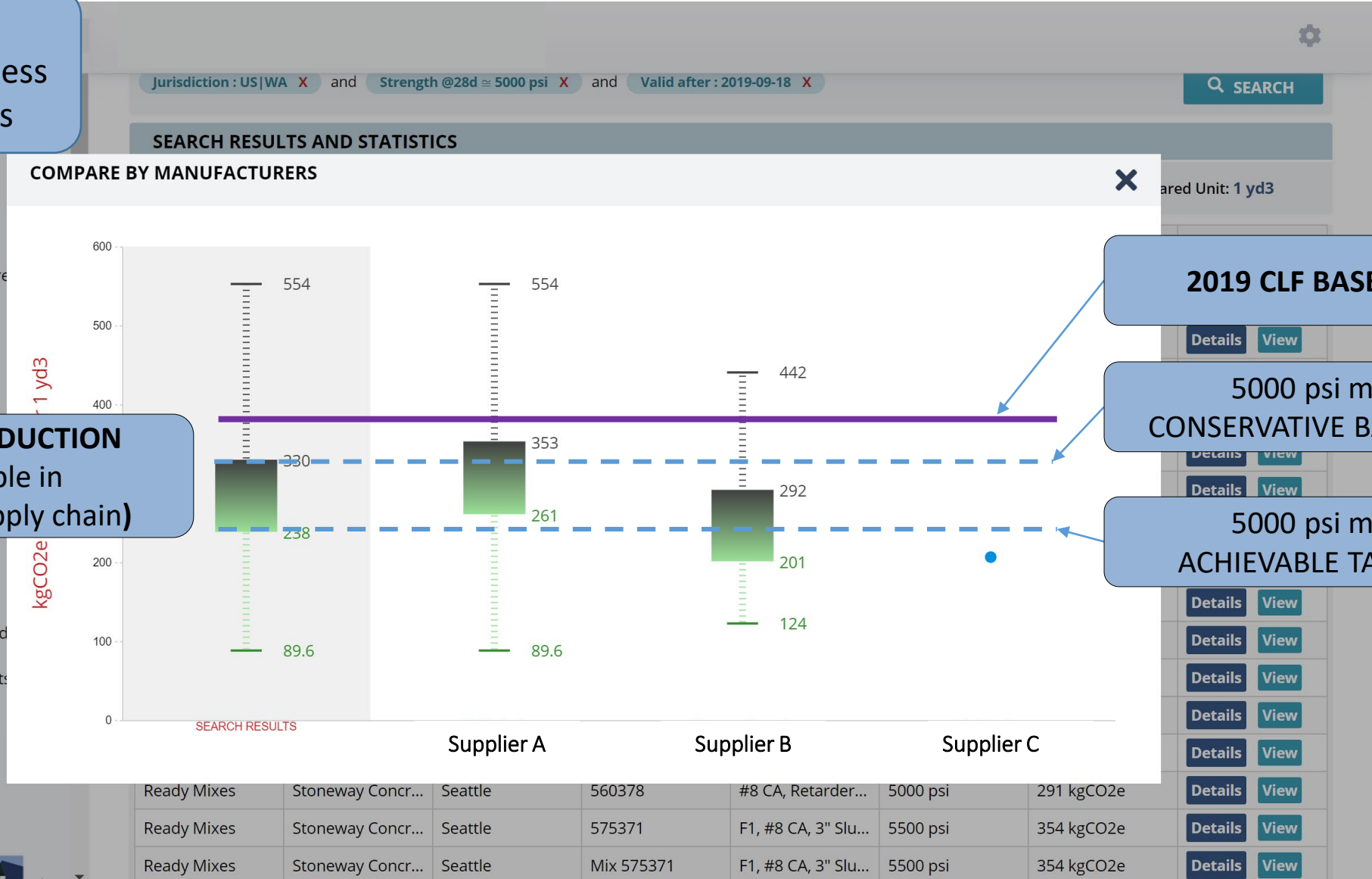
Achievable 20% Target

--T-- Target Settings

## Comparison of 5000 psi ready mix concretes in a region

Ability to compare manufacturers and assess baselines and targets

**30-50% REDUCTION**  
(possible in regional supply chain)



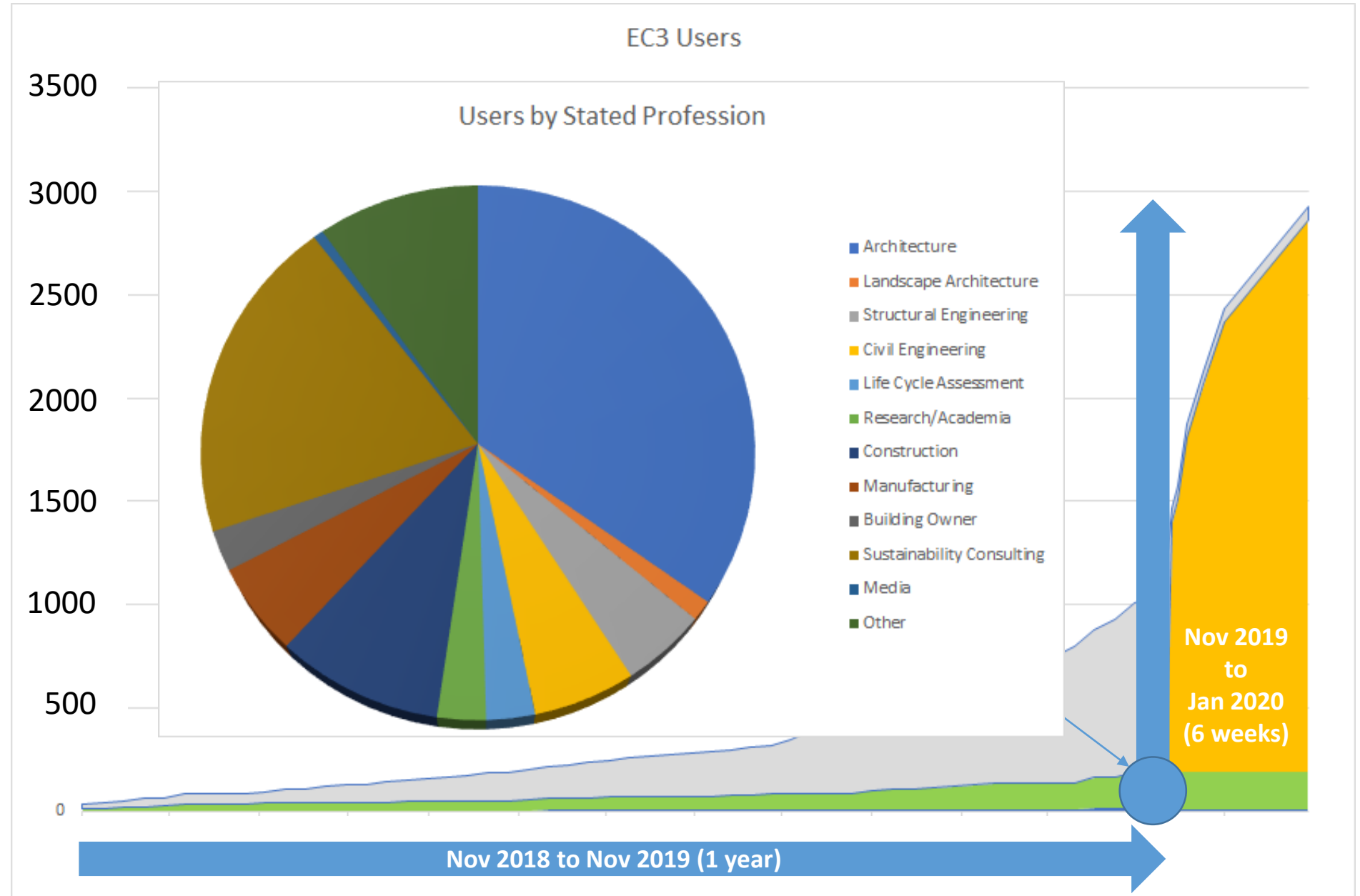
**2019 CLF BASELINE**

**5000 psi mix  
CONSERVATIVE BASELINE**

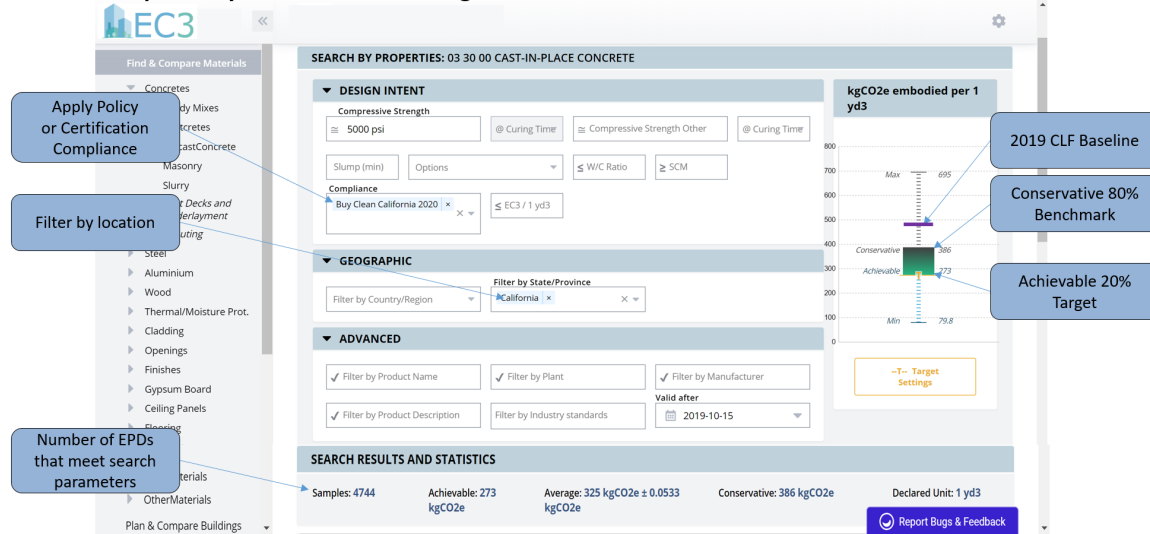
**5000 psi mix  
ACHIEVABLE TARGET**



■ Active Users  
■ Waitlist  
■ Pilot Users

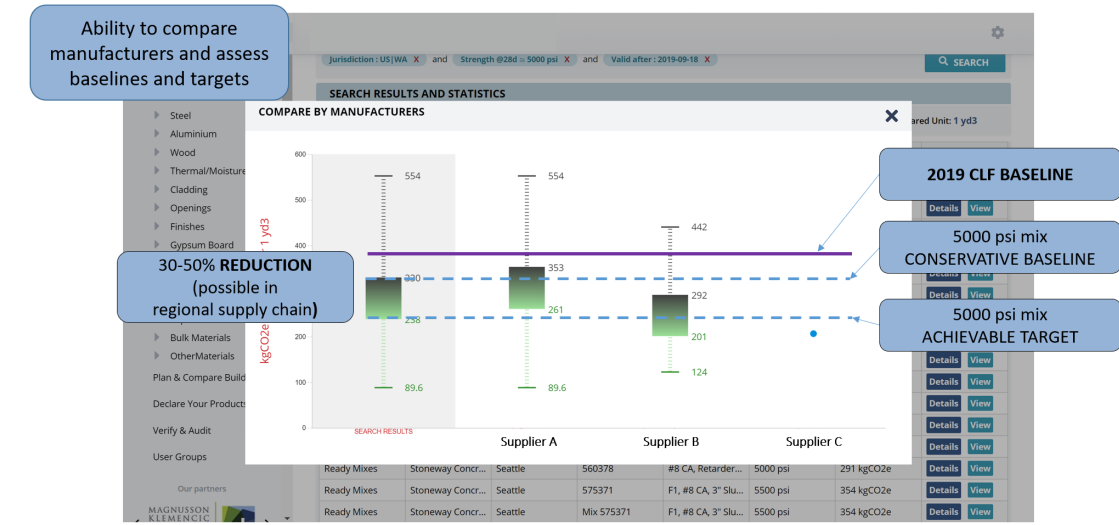


## Search for 5000 psi ready mix concretes in a region



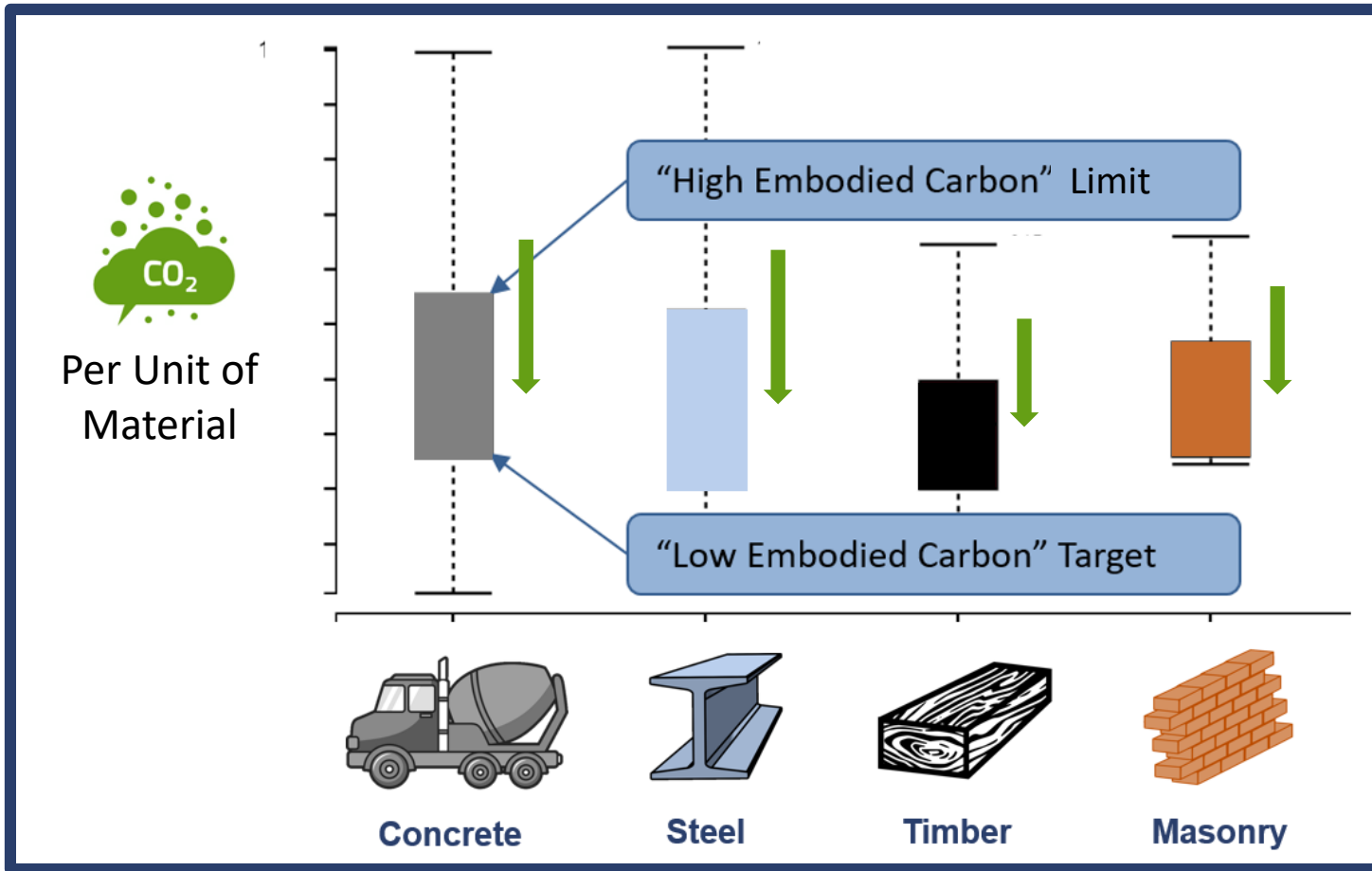
Assess market for EPD adoption.

## Comparison of 5000 psi ready mix concretes in a region



Use EC3 data to inform procurement and selection.





30% reduction in CO<sub>2</sub> emissions  
JUST BY having data and ASKING.

