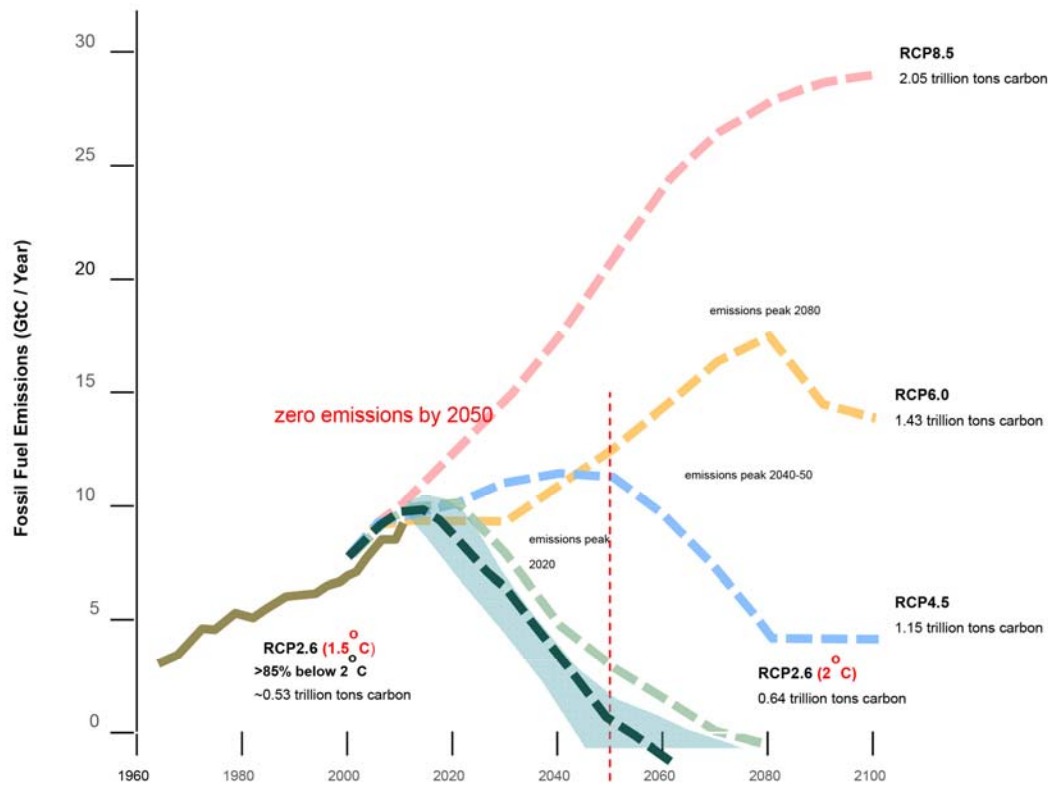


# CARBON LEADERSHIP FORUM

Advancing Low Carbon Construction through research, education and outreach



# Addressing Climate Change is a Time Critical Issue



Pathways for Fossil Fuel Carbon Emissions to 2100

Source: IPCC 2013, Representative Concentration Pathways (RCP); Stockholm Environment Institute (SEI), 2013; Climate Analytics and ECOFYS, 2014.  
Note: Emissions peak and cumulative carbon budgets are for fossil fuel CO<sub>2</sub>-only emissions.



**In order to meet global climate targets,  
Fossil fuel emissions must drive to zero by 2050**

# Over 50% of global energy use is attributed to buildings



## Embodied Carbon:

Greenhouse gas emissions from processes extracting and manufacturing materials to build buildings (trucks, equipment, factories, chemical reactions etc.)

## Operational Carbon:

Greenhouse Gas Emissions from energy used to operate a building (lights, heat etc.)

## Life Cycle Assessment (LCA)

The primary method used to track environmental impacts, such as carbon/CO<sub>2</sub>e throughout the life of a building

Over the next 35 years,

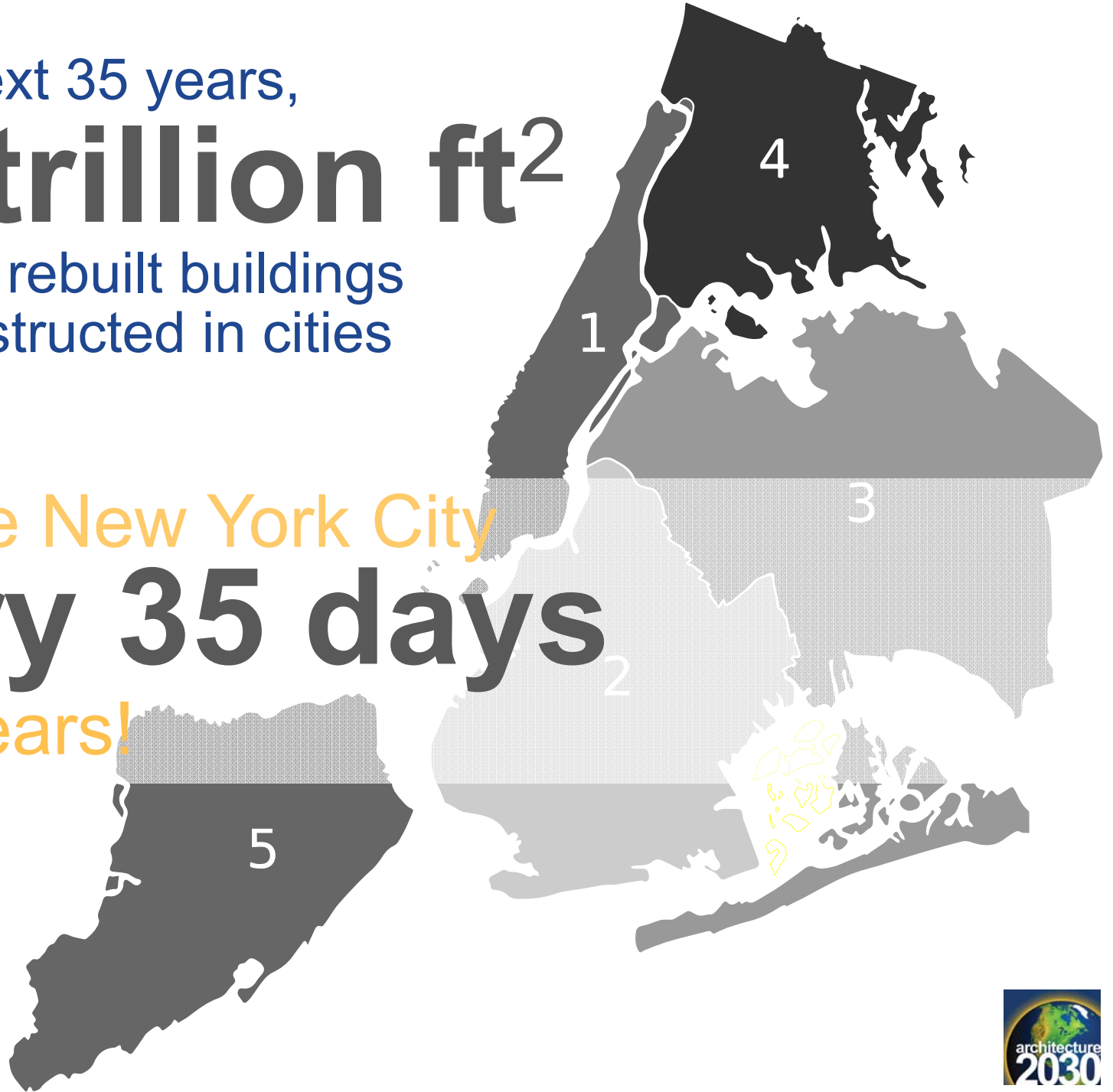
**two trillion ft<sup>2</sup>**

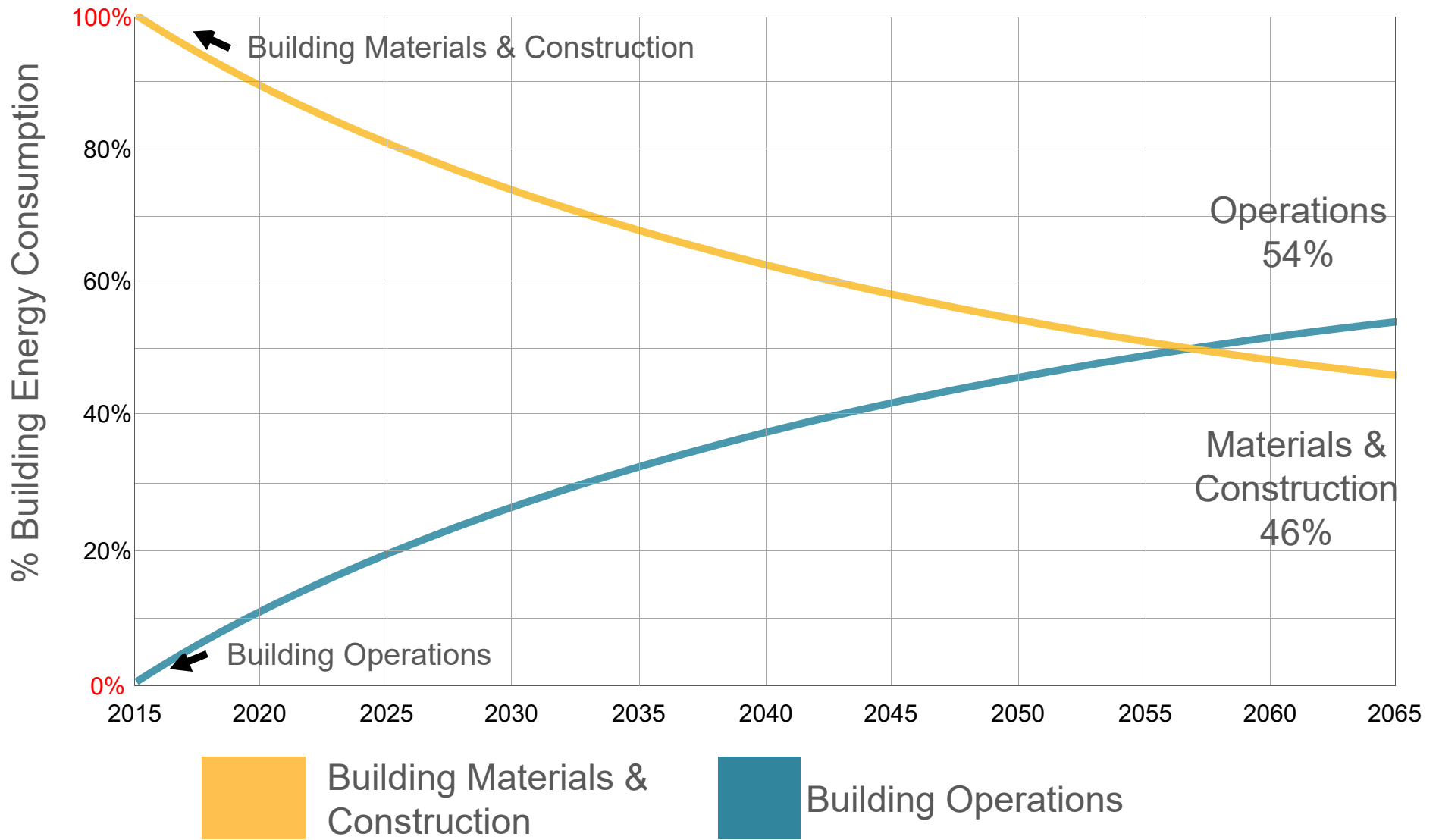
of new and rebuilt buildings  
will be constructed in cities  
worldwide.

An entire New York City

**every 35 days**

for 35 years!



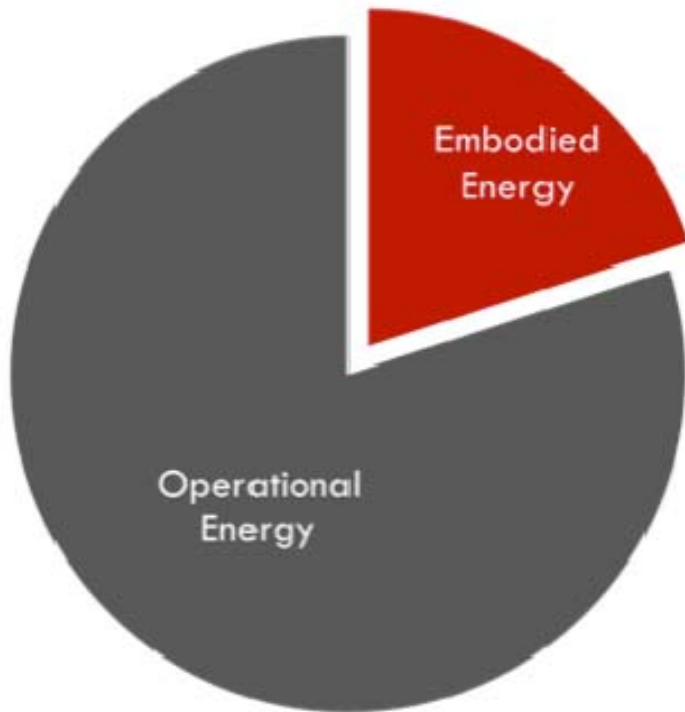


## Energy Profile (Building Built to Current Code Standards)

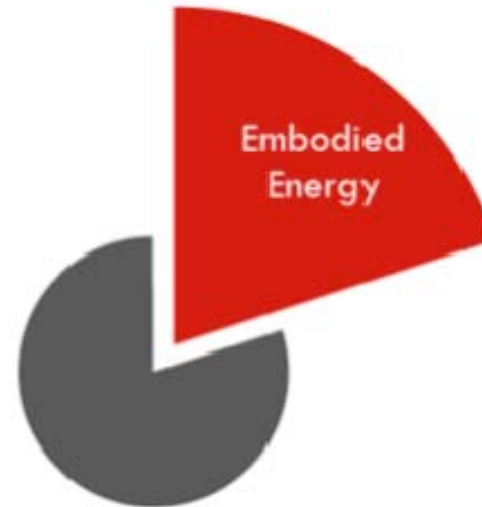
Source: ©2016 2030, Inc. / Architecture 2030. All Rights Reserved.  
Data Source: Richard Stein, CBECS (2003).



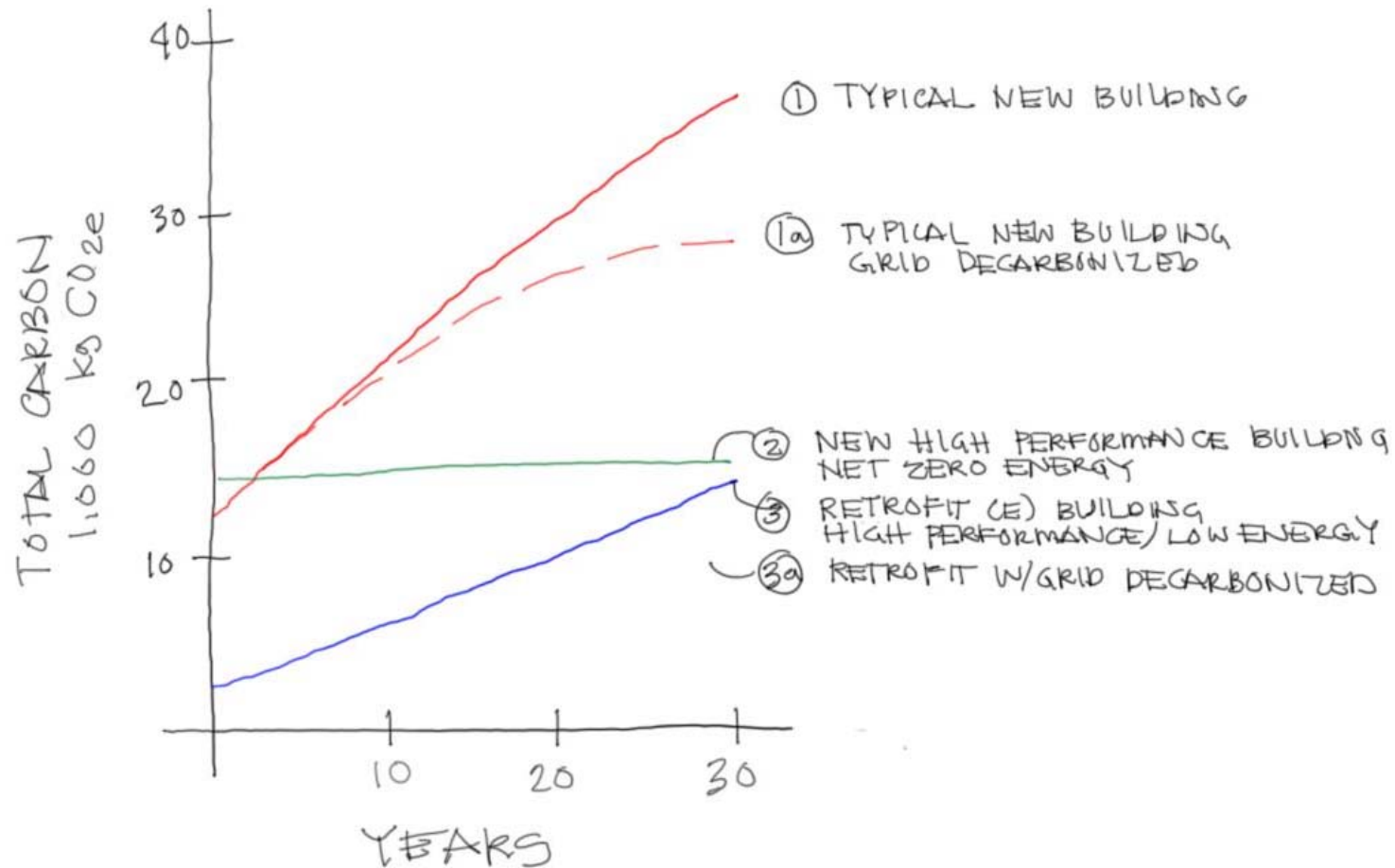
## Typical Building



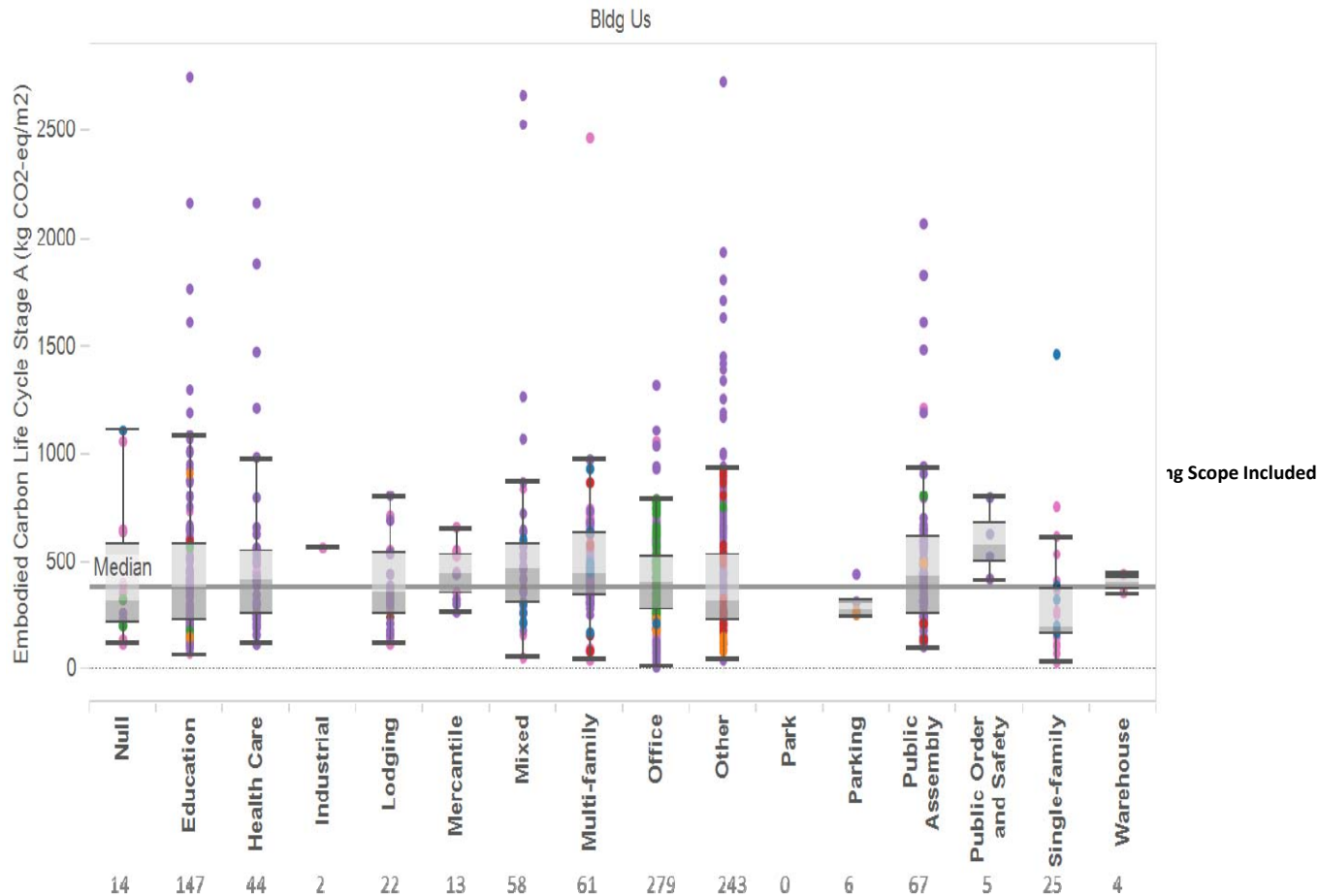
## High Performance



**As buildings become more energy efficient to operate,  
The relative importance of embodied energy increases.**



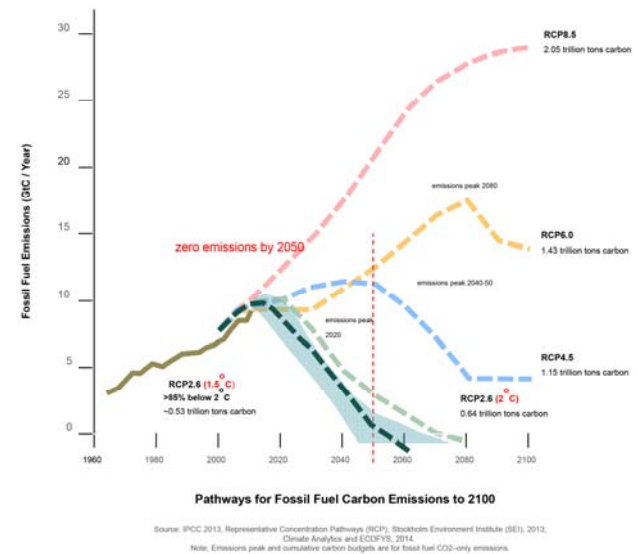
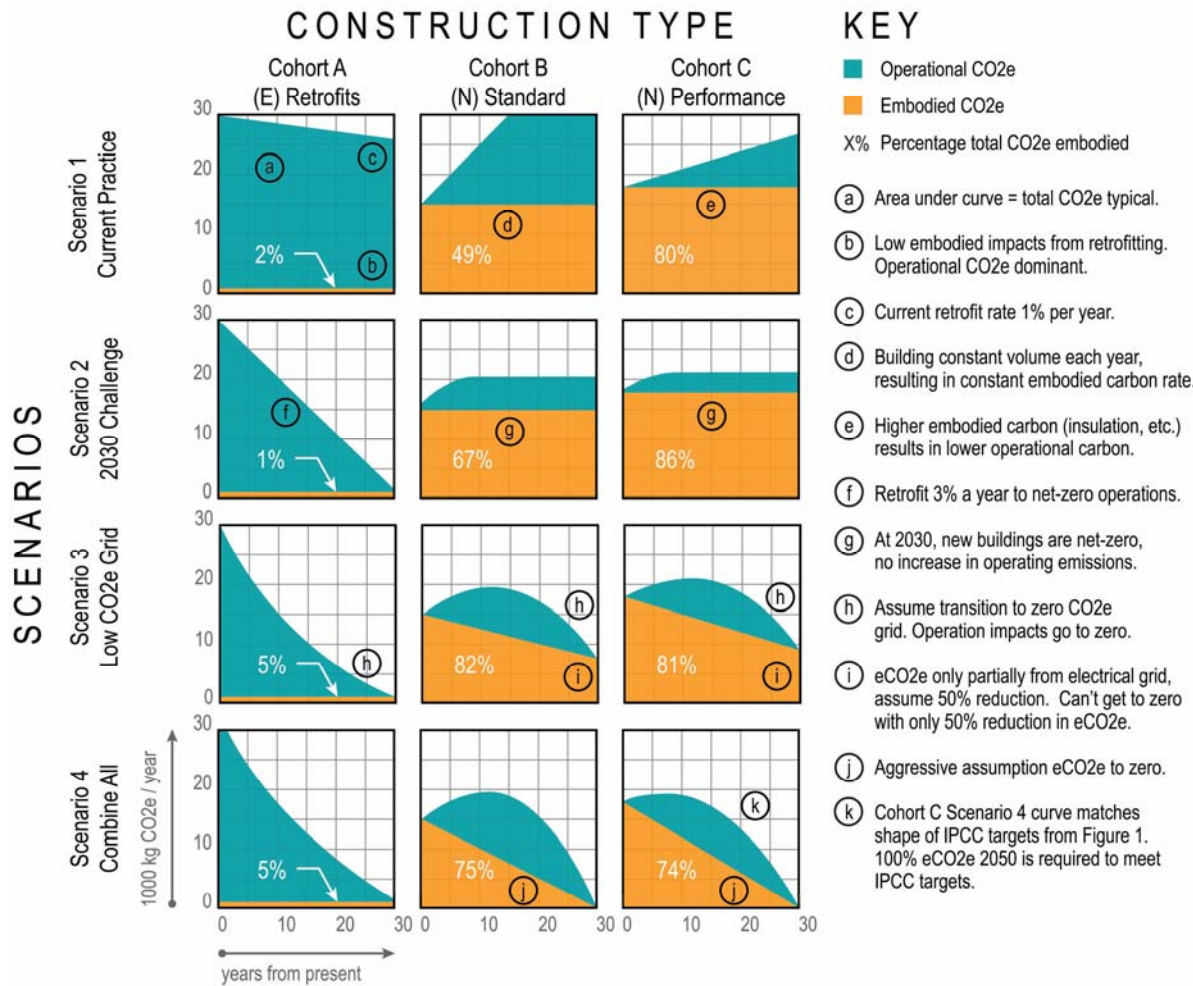
**The total carbon emitted from a building over time depends on both the initial (embodied) impacts as well as the longer term operational impacts**



**New data from the Embodied Carbon Benchmark Study**  
 (<http://www.carbonleadershipforum.org/data-visualization/>)  
 Enables better projections of future building impacts.



# Professionals and Policy Makers need better data and tools to assess scenarios and develop pathways to meet global carbon targets.



## Global Targets

## Preliminary Planning Scenarios: Rate of Carbon Emissions for a neighborhood of 30 buildings

## **There is a time value to carbon:**

- The built environment is a major carbon contributor
- For new buildings to 2050, Embodied impacts dominate
- Newly available embodied carbon data can be integrated with more established operational carbon data

## **The building industry needs pathways to meet global targets**

- Embodied and operational carbon are both critical
- Different building scenarios must be tested to make design and policy choices.
- Data and tools are needed to test policy and building options

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