PA Climate Action Committee: Decarbonizing the Built Environment

Vincent Martinez
President & COO, Architecture 2030

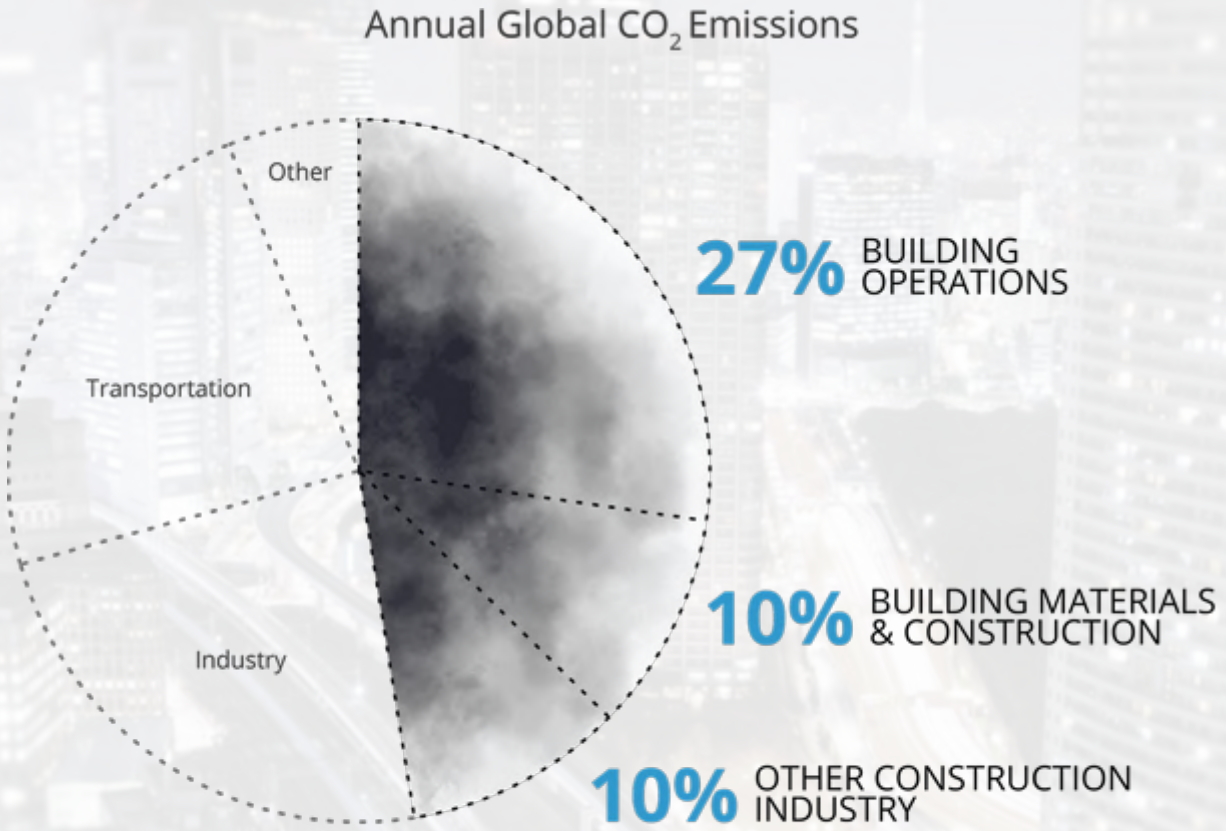
DECARBONIZING
the Building Sector

NEW BUILDINGS

EXISTING BUILDINGS

EMBODIED CARBON

Total **Annual** Global Fossil Fuel Emissions by Sector



Data Sources: Global ABC Global Status Report 2021, EIA

DECARBONIZING
the Building Sector

Existing Building Decarbonization Polices

In 2040, **2/3 of the global building stock** will be buildings that exist today.
Without upgrades, they will still be emitting GHGs.

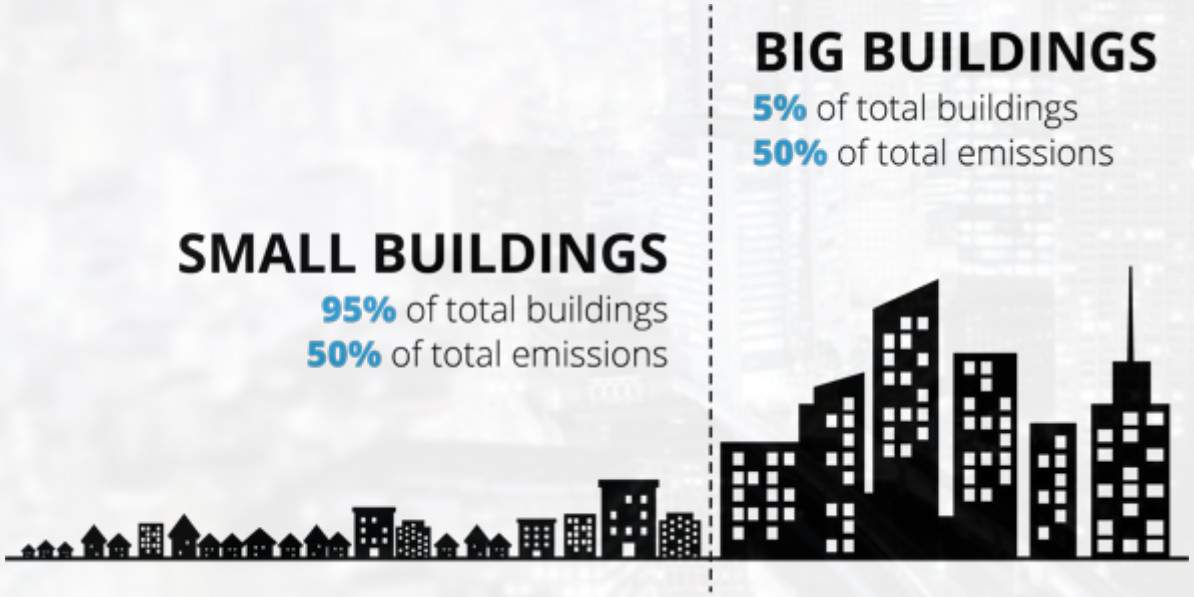
Data Source: IEA Energy Technology Perspectives 2020, February 2021 Revised Edition

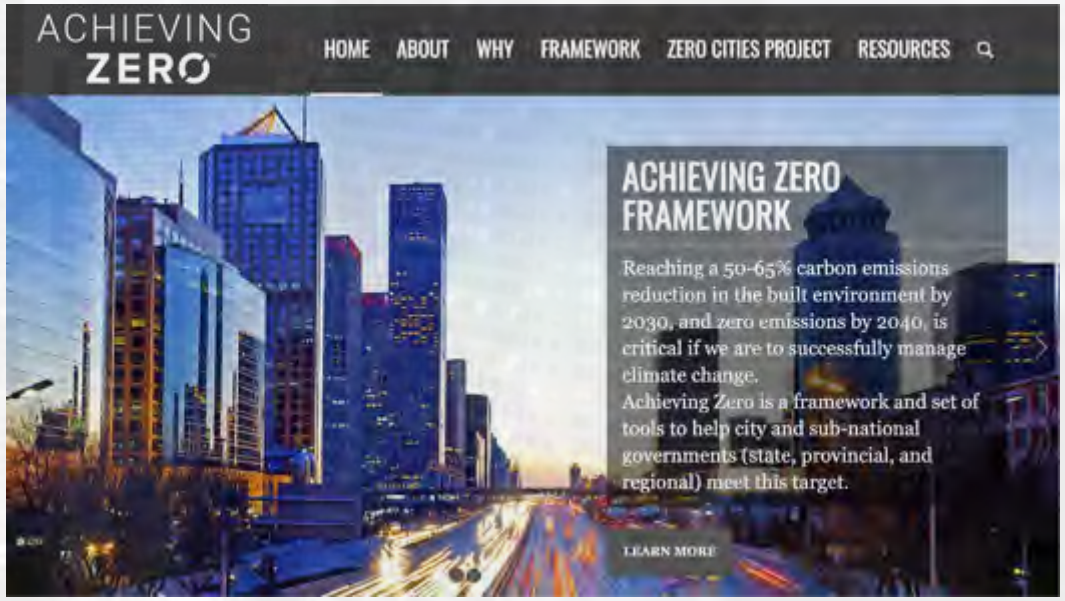
Decarbonizing Existing Buildings
Will Require

 EFFICIENCY +  ELECTRIFICATION +  RENEWABLE ENERGY

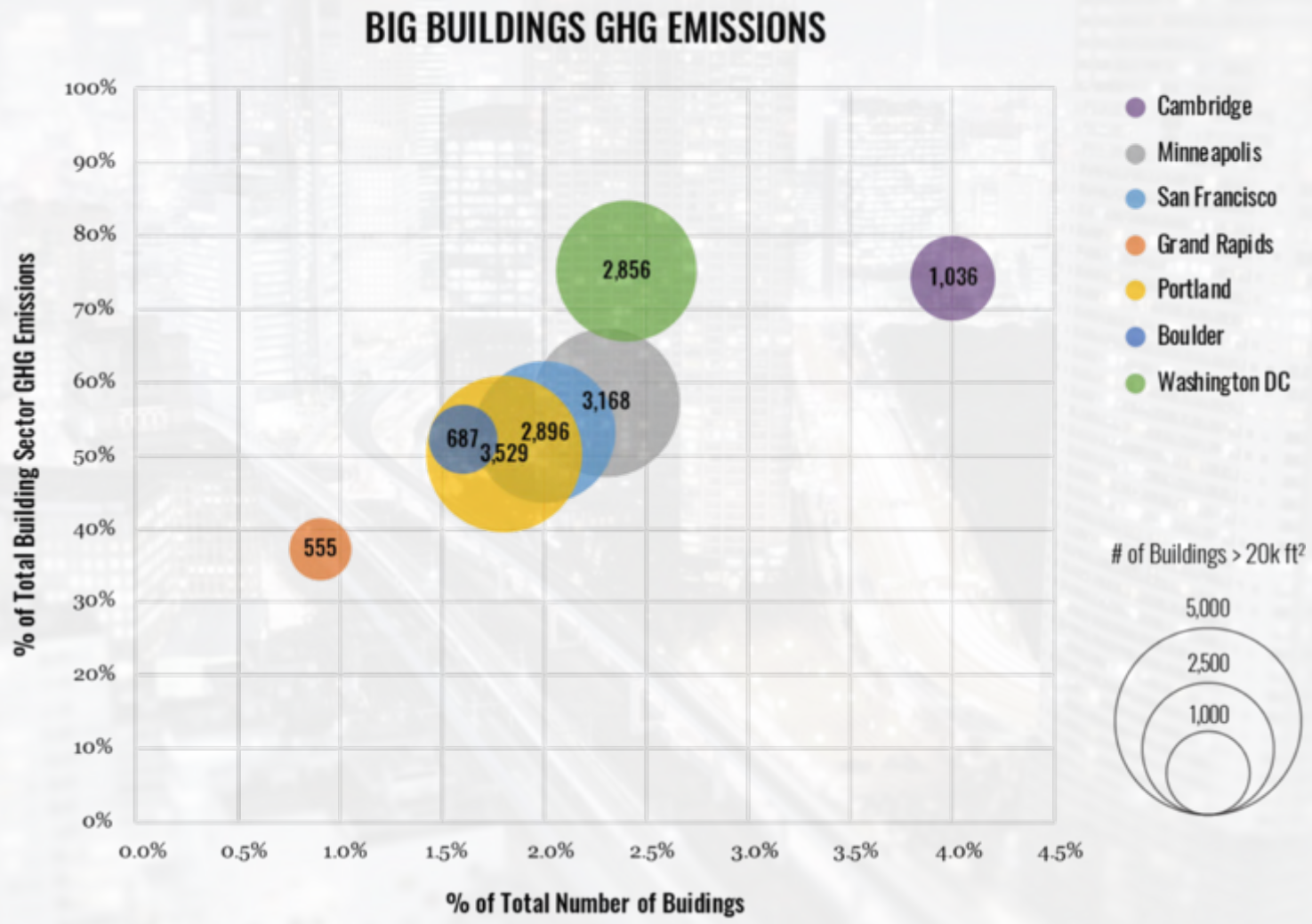
but, successful decarbonization policies for existing buildings
are not one size fits all

Decarbonizing Existing Buildings
Achieving Zero Insights





Decarbonizing Existing Buildings
Achieving Zero Insights



Decarbonizing Existing Buildings

Achieving Zero Insights: Big Buildings

- Typically have long-term capital improvement cycles and budgets → Date-specific energy and carbon targets allow energy upgrade requirements to be planned around capital cycles
- Small number of buildings affected → Date-specific energy and carbon targets present less risk of overtaxing local labor, equipment, and financing resources.
- Systems are complex typically vary significantly from building to building → Performance and prescriptive compliance pathways allow for most flexibility

What is a Building Performance Standard?

Key Elements

Establishes Performance Targets for Market Confidence

A BPS clearly establishes intermediate and final building performance targets, providing owners, tenants, investors, and financers with the time and certainty needed for confident long-term planning.

Includes Multiple Compliance Pathways for Optimal Flexibility

A BPS typically offers multiple compliance pathways including prescriptive and performance options, so owners and tenants can choose optimal timelines, technologies, and strategies.

Has Consistent Reporting Framework and Period

BPS typically build off, and complement, existing benchmarking and disclosure ordinances.

Building Performance Standards

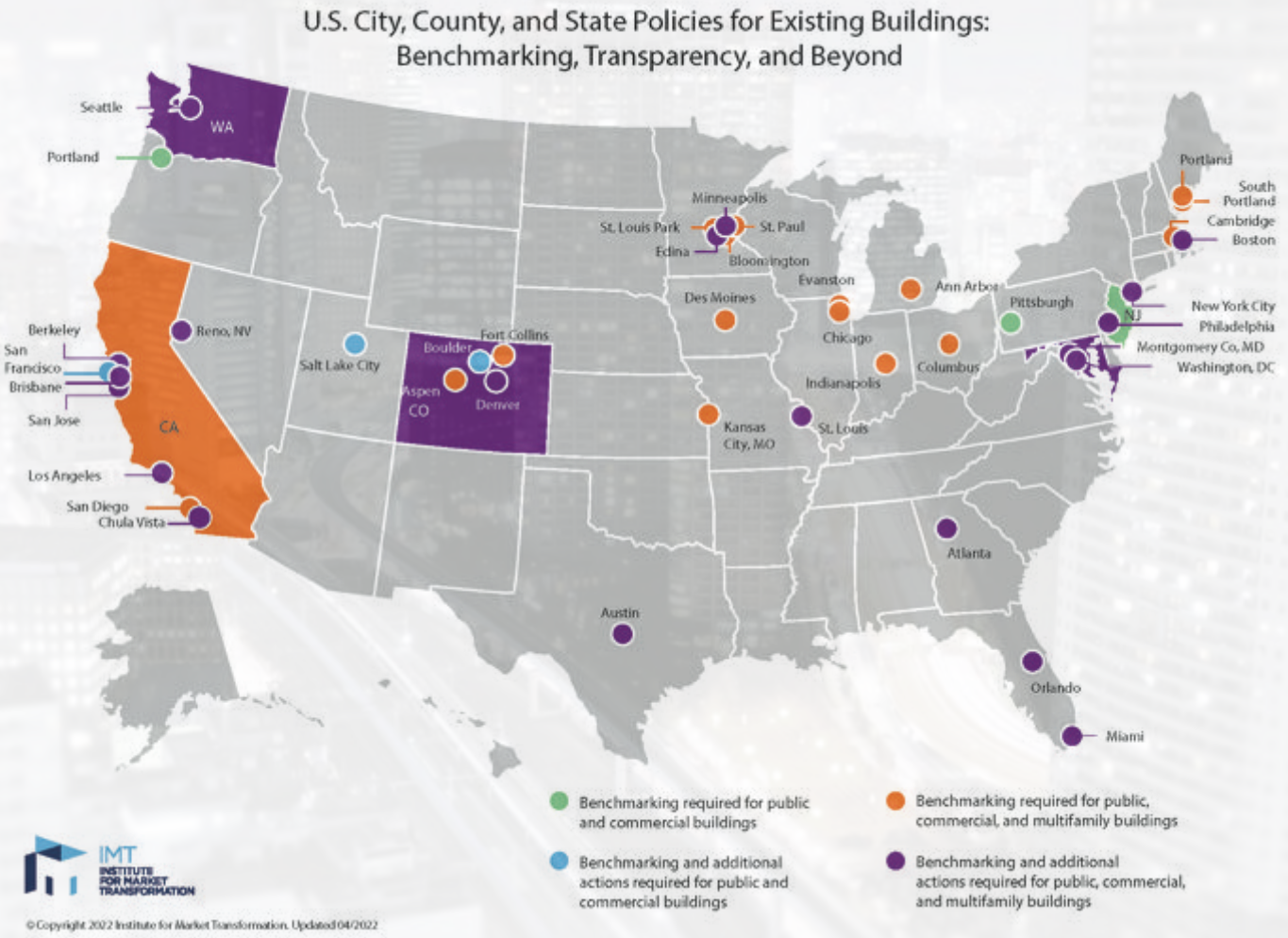
Architecture 2030 Insights

it's crucial to set carbon targets in addition to energy targets

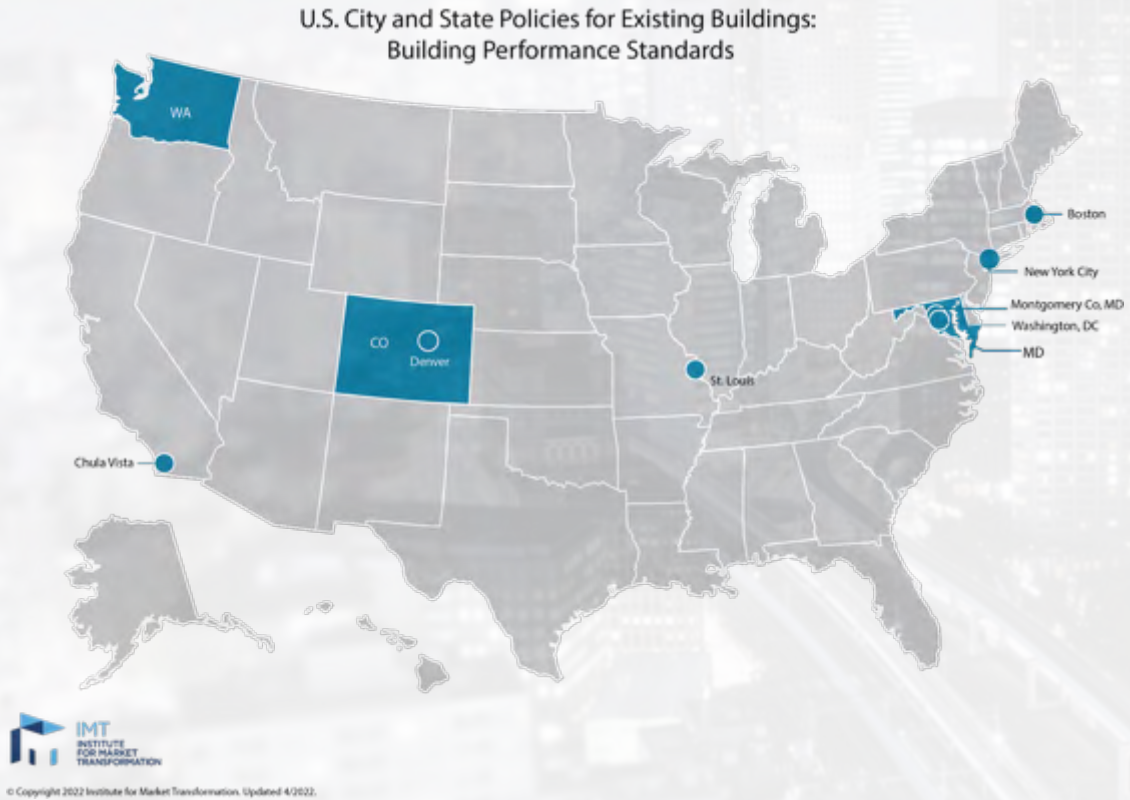
incremental performance targets should be significant, and final target should be zero operating emissions

appropriate targets should be set based on building type and/or size

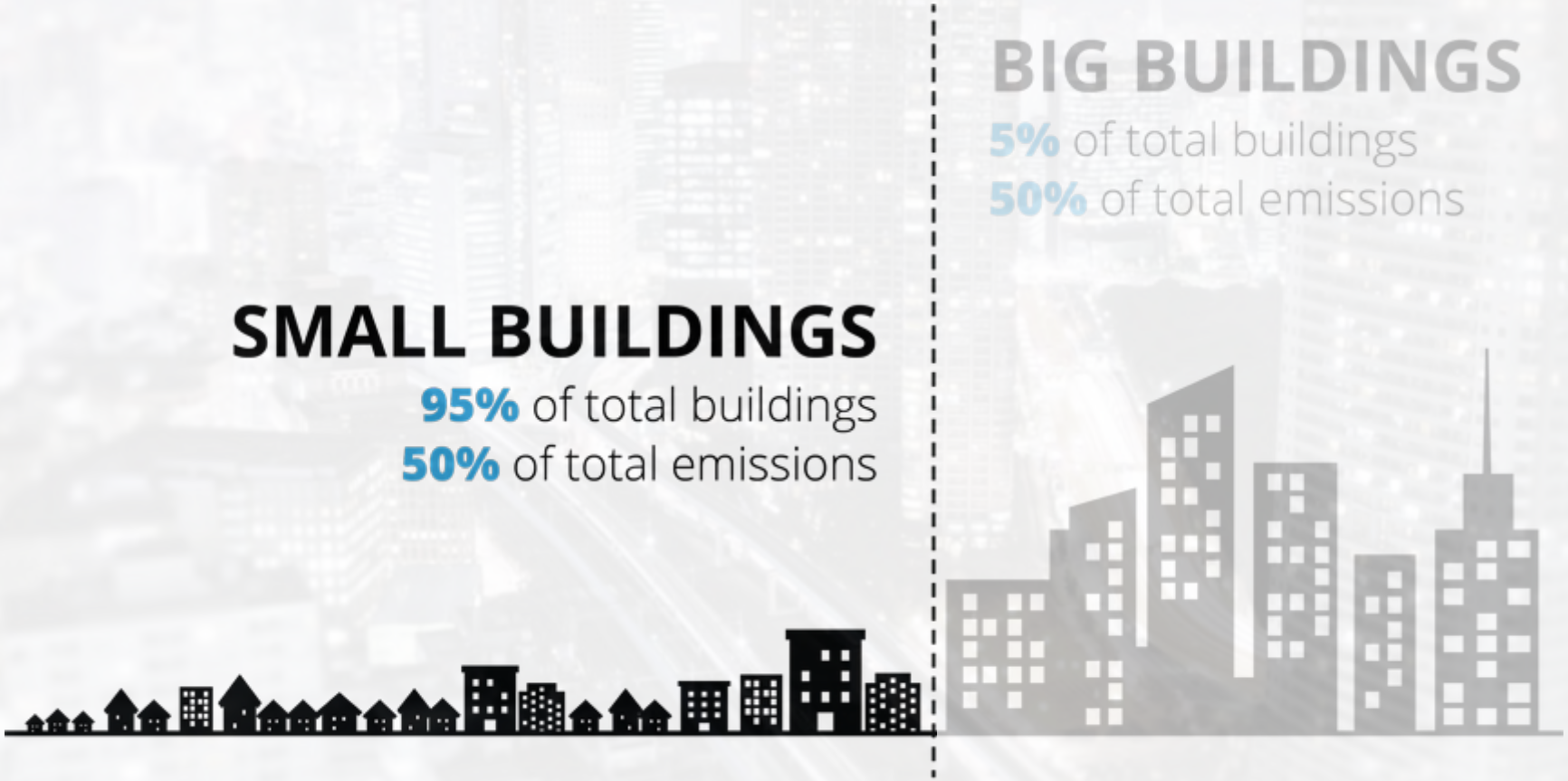
Big Existing Building Benchmarking and Transparency Policies in the U.S.



Building Performance Standards in the U.S.



Decarbonizing Existing Buildings
Achieving Zero Insights



Intervention Points Policies for Small Buildings

Intervention points include:

- Planned Capital Improvement Cycles
- Point of Sale
  - Lease
  - Renovation
  - Equipment Replacement
- Life-Safety and Resiliency Upgrades

Benefits of aligning policy requirements with intervention points include:

- Can reduce upgrade costs
- Increases financing options
- Reduces disruption to occupants
- Establishes and ensures long-term energy upgrade workforce and market

Decarbonizing Existing Buildings
Achieving Zero Insights: Small Buildings

- Do not typically have planned capital improvement cycles and budgets – adequate financing is critical barrier

→ Alignment with building intervention points increases financing opportunities

- Tens of thousands of buildings affected

→ Date-specific policies could overtax local resources. Intervention point policies ensure even and steady distribution of upgrades and ensures the consistency and longevity of the energy upgrade job market.

- Systems are typically simple and consistent from building to building (and we know EXACTLY where the carbon is)

→ Prescriptive compliance pathways offer the simplest approach and save time and money by eliminating the need for complex pre- and post-upgrade audits

Small Existing Building Decarbonization in the U.S.

FAST COMPANY

CO.DESIGN TECH WORK LIFE NEWS IMPACT PODCASTS VIDEO RECOMMENDER INNOVATION FESTIVAL 360 SUBSCRIBE

11-09-21 | THE NEW CAPITALISM

Ithaca says it will decarbonize every building in the city. Here's how

You have to help building owners pay for upgrades—but you also need to force them to make the upgrades.

[Photo: Jonathan W. Cohen/iStock]

BY ADELE PETERS 3 MINUTE READ

Two years ago, when the small city of Ithaca, New York, set a goal to become carbon neutral by 2030 it was as much symbolic as practical—the government didn't have a firm path to make it actually happen. But the city just took an aggressive early step: It plans to decarbonize every building in the city through a program designed to find a new way to pay for retrofitting and electrifying old homes and businesses.

MORE LIKE THIS

An AR-15 designed for children

The Washington Post

Climate Solutions

This U.S. city just voted to decarbonize every single building

Following a common council vote, Ithaca, N.Y., is set to be the first city in the country to electrify its buildings with the help of BlocPower

Listen to article

By Tik Root

DECARBONIZING
the Building Sector

New Building Decarbonization

NEW BUILDINGS

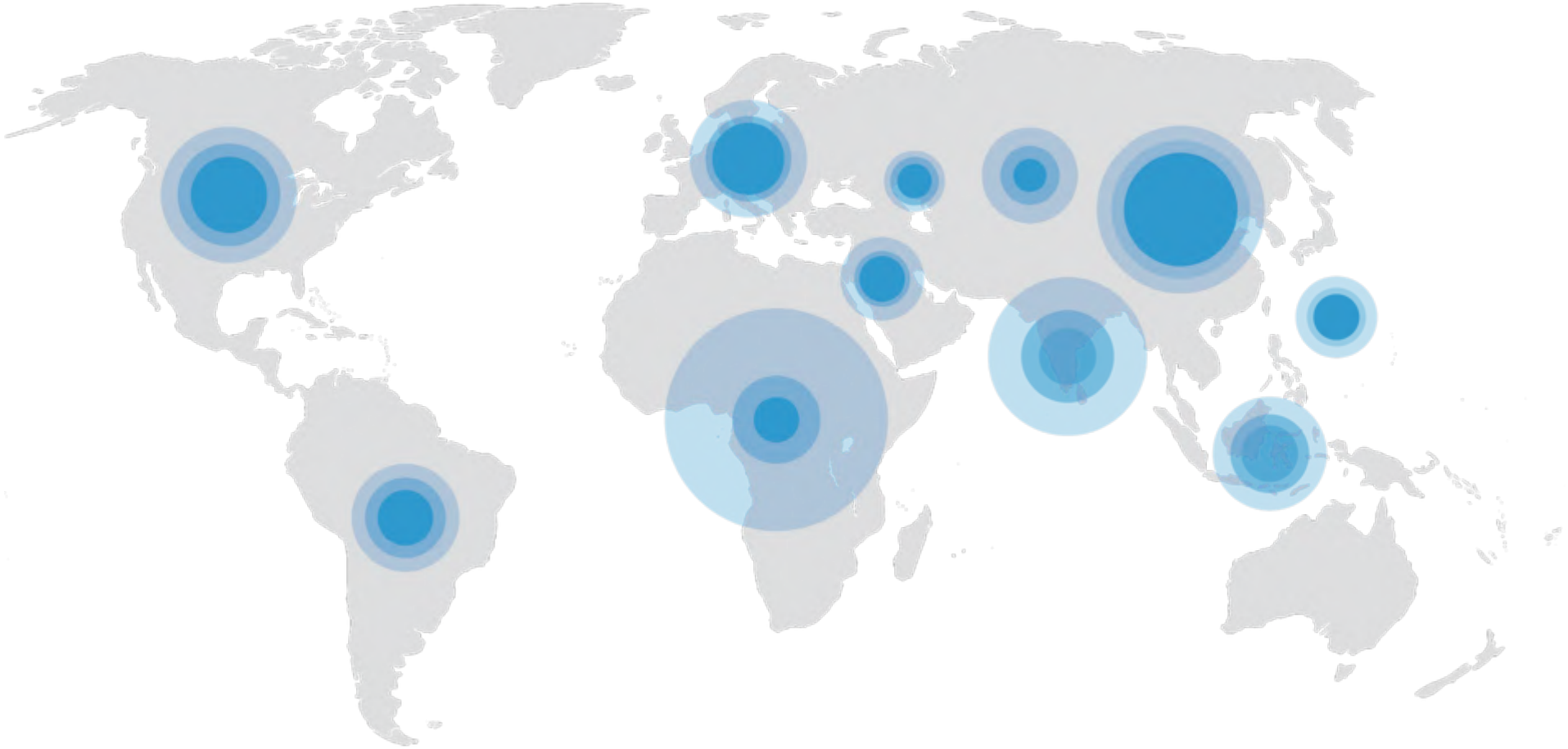
EXISTING BUILDINGS

EMBODIED CARBON

WHY THE BUILT ENVIRONMENT?

new buildings

Global building floor area is expected to **double** by 2060.



Data Sources: Global ABC, Global Status Report 2017

Decarbonizing New Buildings
Will Require

EFFICIENCY + ELECTRIFICATION + RENEWABLE ENERGY

PASSIVE HOUSE ACCELERATOR

Catalyst for Zero Carbon Building

Passive House 101 Attend Explore

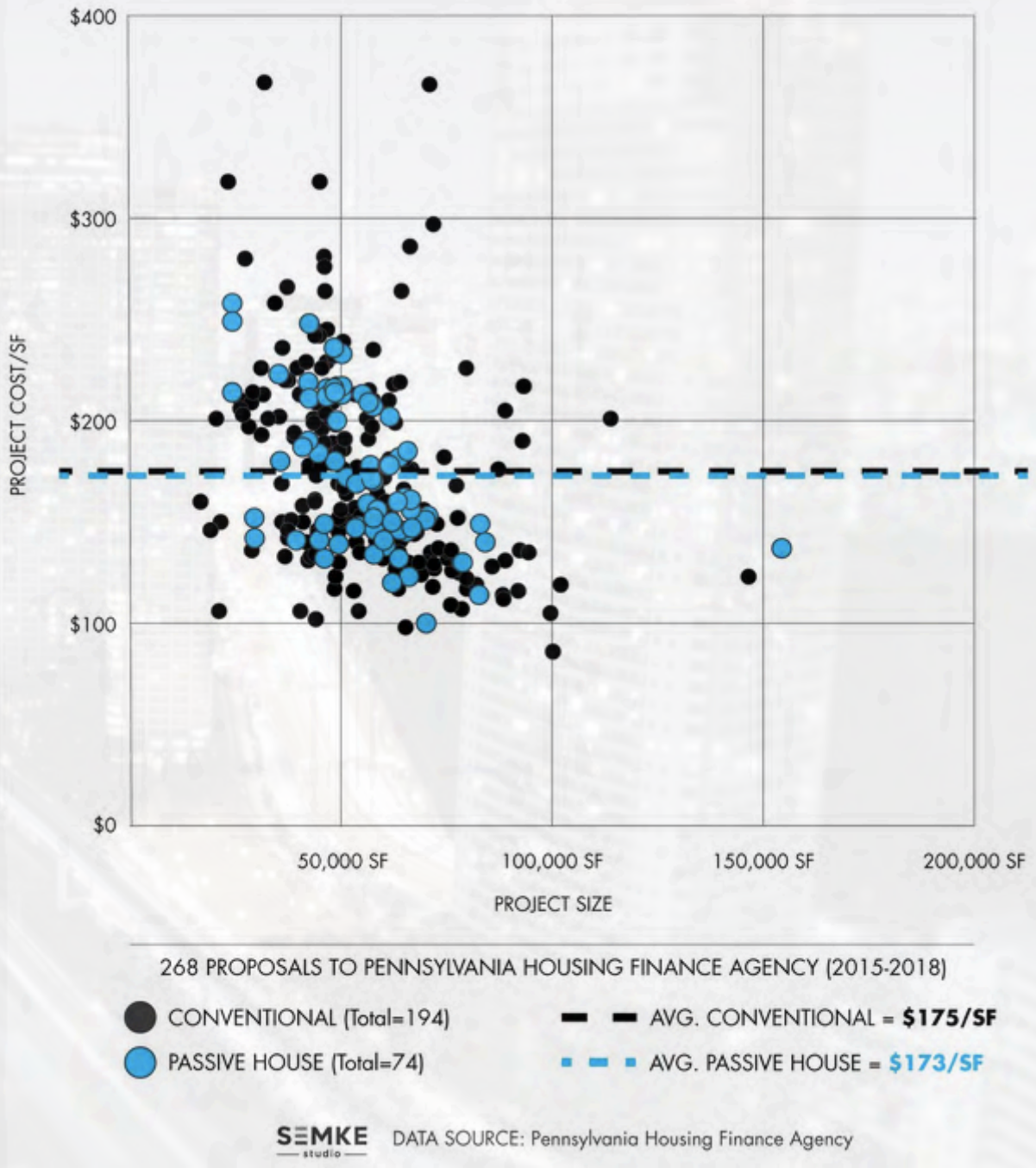
Articles

LOW INCOME HOUSING CREDIT: A SLEEPER PH CATALYST

Zachary Semke

"Twenty-six Passive House projects were awarded LITHCs during that time, meaning that nearly 900 units of Passive House affordable housing have been built or are underway in Pennsylvania today."

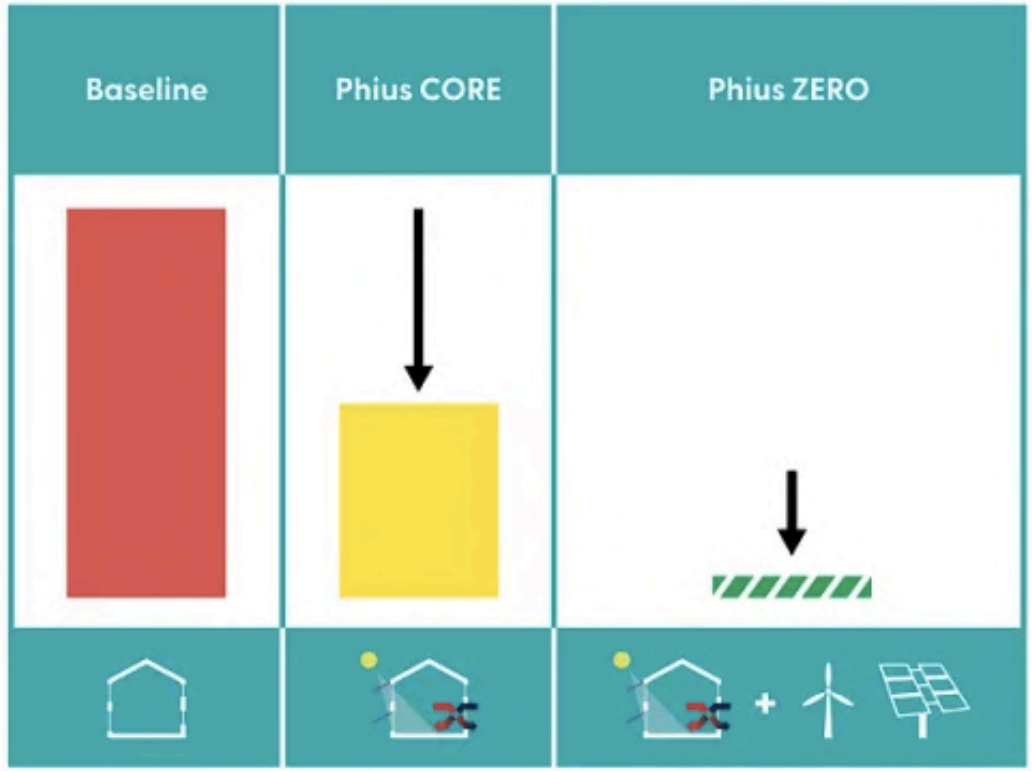
"Notably, the Passive House projects don't seem to be more expensive to build than conventional buildings, likely thanks to the early integrated design process that development teams are compelled to engage in so that their LIHTC proposals can be competitive."



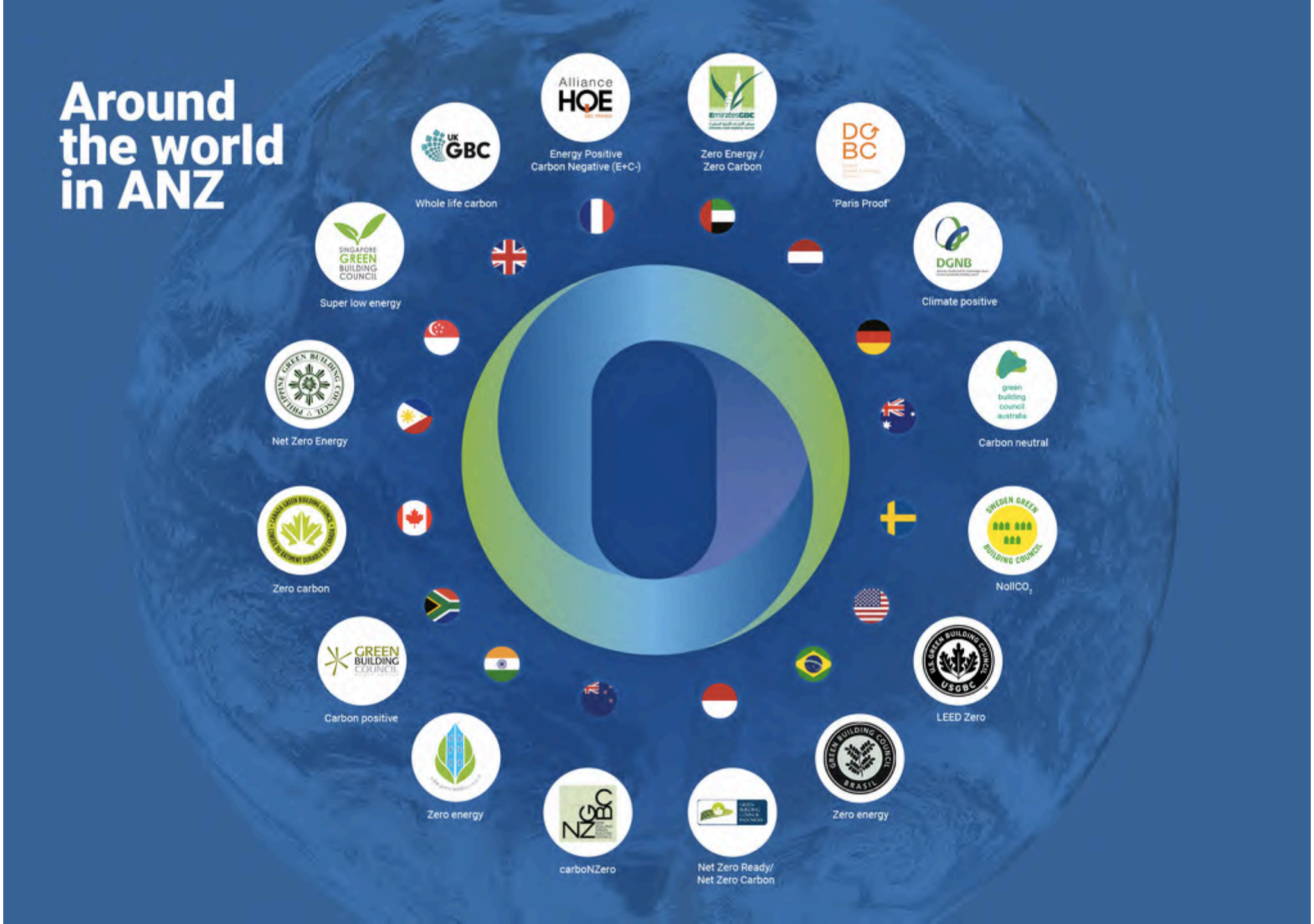
Phius ZERO

Phius' fastest growing performance standard, setting the industry standard for net zero energy design. It defines a conservation-and-quality first approach for zero energy design placing emphasis on quality, durability, healthy, safety, and cost-optimized conservation.

phius ZERO



Around the world in ANZ



Advancing Net Zero Snapshot: United States

WORLD GREEN BUILDING COUNCIL

Context

Residential and commercial buildings account for roughly 29 percent of total U.S. greenhouse gas emissions. For more than two decades, LEED has provided a framework for high performance buildings and spaces and to reduce greenhouse gas emissions. Building on that work, USGBC has developed LEED Zero, a certification complement to LEED that verifies the achievement of net zero goals in four categories: carbon, energy, water and waste. It encourages a holistic approach for buildings and places in recognition of the critical role buildings play in accelerating the transition to a low-carbon society and enhancing the health of natural and human ecosystems.

Pathway: Certification

LEED Zero

Launch date: November 2018

LEED Zero Carbon recognises buildings operating with net zero carbon emissions over the course of the past year. This certification provides a transparent accounting of the balance of carbon caused from energy consumption and occupant transportation, to carbon emissions avoided or offset. In future it will expand to incorporate carbon emisions from water consumption, waste generation, and the embodied carbon of materials used into the carbon balance. To obtain LEED Zero Carbon certification, a project must achieve a carbon-dioxide equivalent (CO_2e) balance of zero:

Carbon Balance = Total Carbon Caused – Total Carbon Avoided

LEED Zero Energy recognises buildings that achieve a source energy use balance of zero for the past year. The net zero energy balance is based on the quantity of energy consumed and the quantity of energy generated by the project:

Source Energy Balance = Total Energy Consumed – Total Energy Generated On-Site or Procured Off-Site

GBC Definition

A net zero carbon building is a highly efficient building that achieves a zero balance of carbon emissions: emitted to carbon avoided during operations.

1. Measure and Disclose Carbon

Projects must provide 12 months of performance data for LEED Zero Carbon or LEED Zero Energy, demonstrating a carbon dioxide equivalent (CO_2e) balance of zero, or a source energy use balance of zero respectively.

2. Reduce Energy Demand

Projects pursuing LEED Zero Carbon or LEED Zero Energy are required to achieve enhanced levels of energy efficiency beyond code requirements as part of base LEED certification.

3. Generate Balance from Renewables

LEED Zero Carbon and LEED Zero Energy projects should follow a hierarchy for selecting renewable energy sources: on-site generation; local generation, such as community solar or wind; other offsite generation projects such as virtual PPAs; energy attribute certificates (EACs).

For LEED Zero Carbon, the carbon avoided is based on the carbon intensity of the grid receiving renewable energy; and may also include certified carbon offsets.

4. Improve Verification and Rigour

Methodology and Verification

- Projects must be LEED certified under the BD+C or O+M rating systems.
- Projects submit performance data required for the desired certification to GBCI through LEED Online.
- Projects must provide data for 12 months in order to gain certification and resubmit every three years to maintain certification.

Additional Information

- For required calculations explanations please refer to the LEED Zero Program Guide.
- Carbon emissions from occupant transportation and building energy consumption can be calculated using the Arc platform.

Find out more

- LEED Zero Program Guide
- Education at USGBC
- Arc platform
- WorldGBC's Advancing Net Zero global project
- Contact USGBC: leedzero@usgbc.org

Advancing Net Zero

WorldGBC's global project to accelerate uptake of net zero carbon buildings to 100% by 2050. These snapshots outline specific GBC action, and how it relates to the project framework, including the four key principles shown left.

INTERNATIONAL
LIVING FUTURE
INSTITUTE™

Zero Carbon Standard 1.0

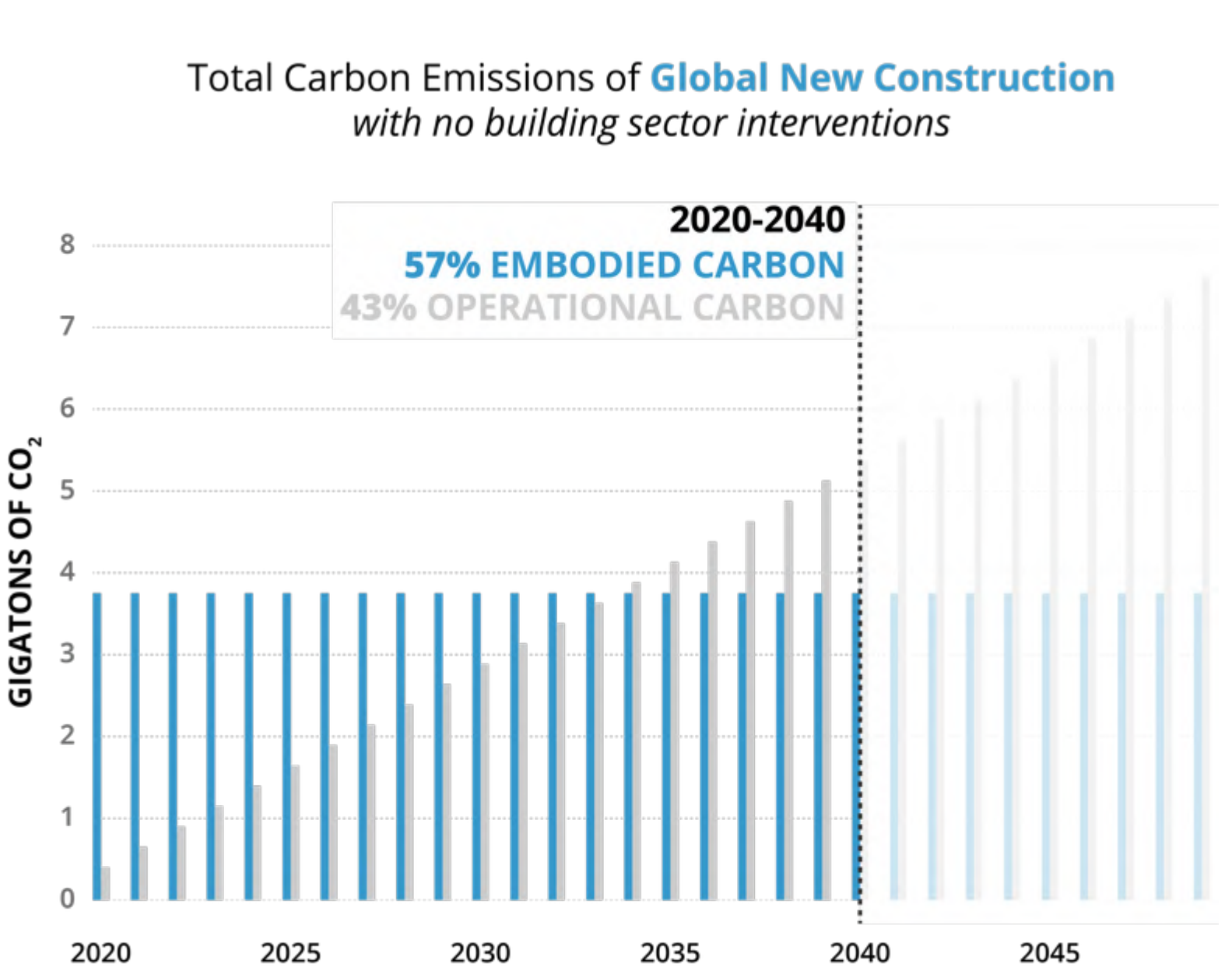
A program to catalyze progress towards a carbon-positive built evironment.

DECARBONIZING
the Building Sector

Embodied Carbon Reduction Polices

WHY THE BUILT ENVIRONMENT?

embodied carbon



Data Sources: UN Environment Global Status Report 2017; EIA International Energy Outlook 2017

ACTIONS FOR A ZERO CARBON BUILT ENVIRONMENT

embodied carbon

Reuse + **Reduce** + **Sequester**

CLIMATE ACTION

CarbonPositive: Evolving the Embodied Carbon Landscape

Building industry disciplines must collaborate in order to create sustainable and equitable communities, writes Architecture 2030 president Vincent Martinez.

ARCHITECT

AIA 2030 COMMITMENT

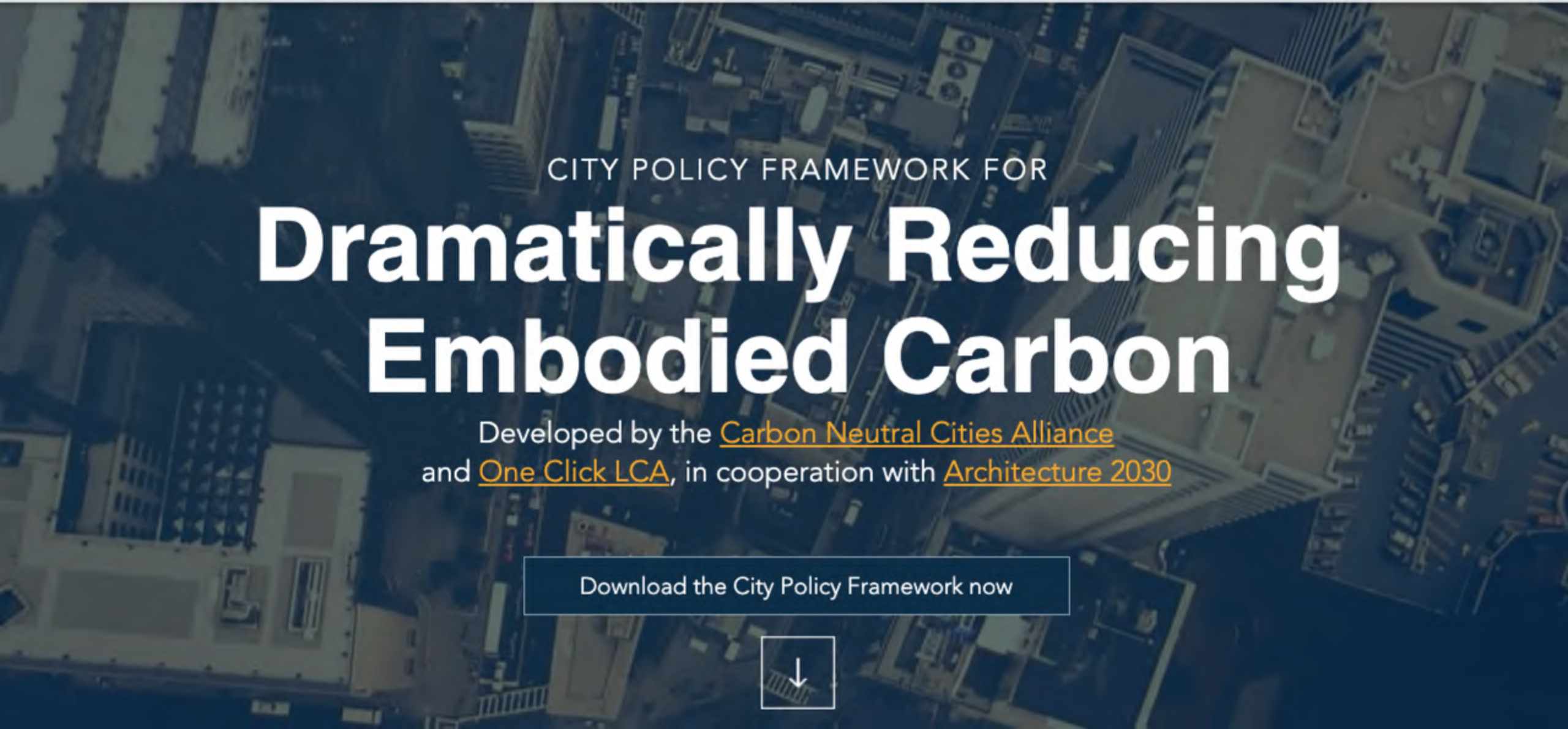
SEI STRUCTURAL ENGINEERING INSTITUTE ASCE

SE2050 COMMITTING TO NET ZERO

MEP 2040 Committing to Zero

climatepositive design

CONTRACTOR'S COMMITMENT

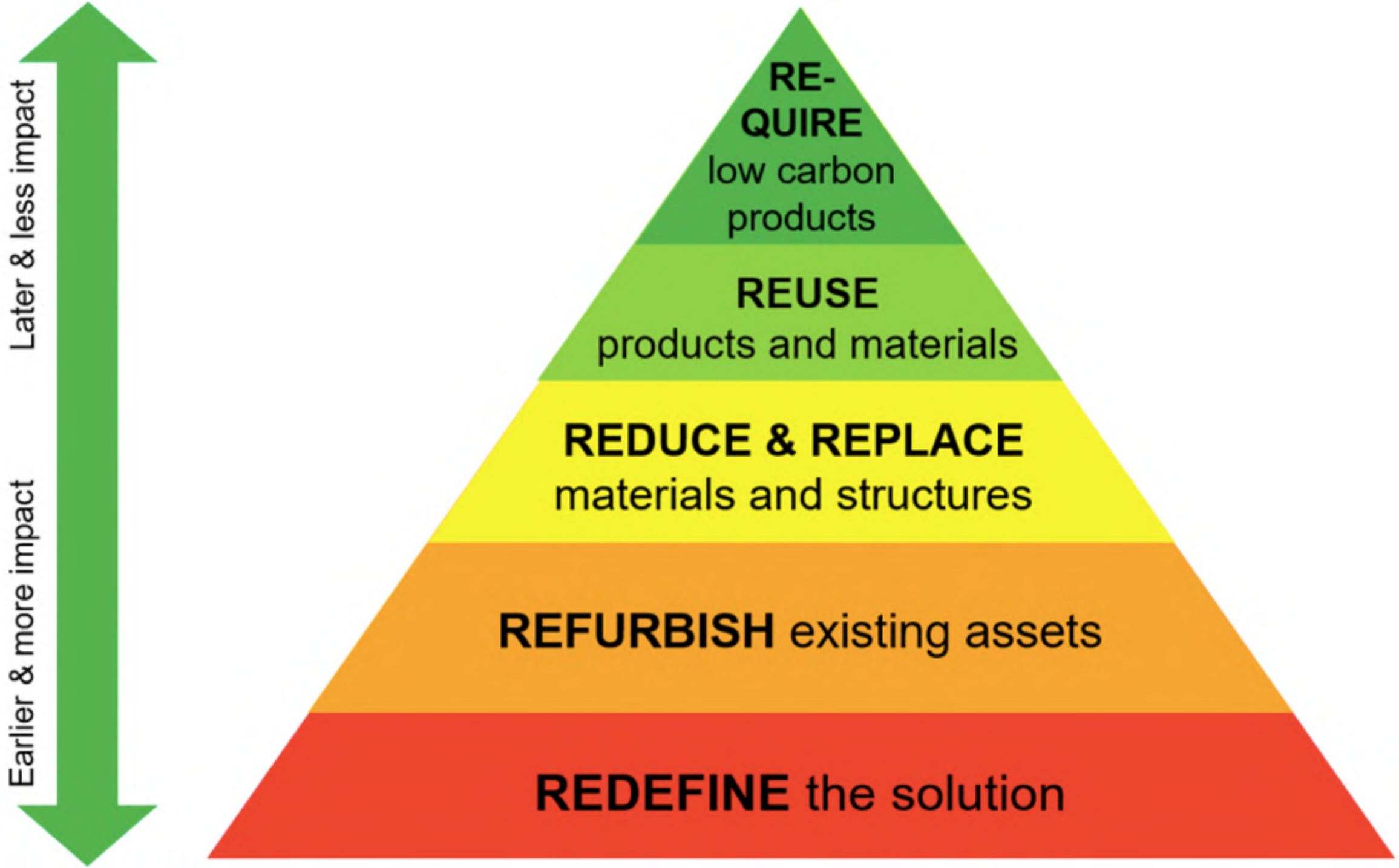


CITY POLICY FRAMEWORK FOR

Dramatically Reducing Embodied Carbon

Developed by the Carbon Neutral Cities Alliance
and One Click LCA, in cooperation with Architecture 2030

Download the City Policy Framework now



SOURCE: City Policy Framework for Dramatically Reducing Embodied Carbon

Embodied carbon policies – Carbon impact

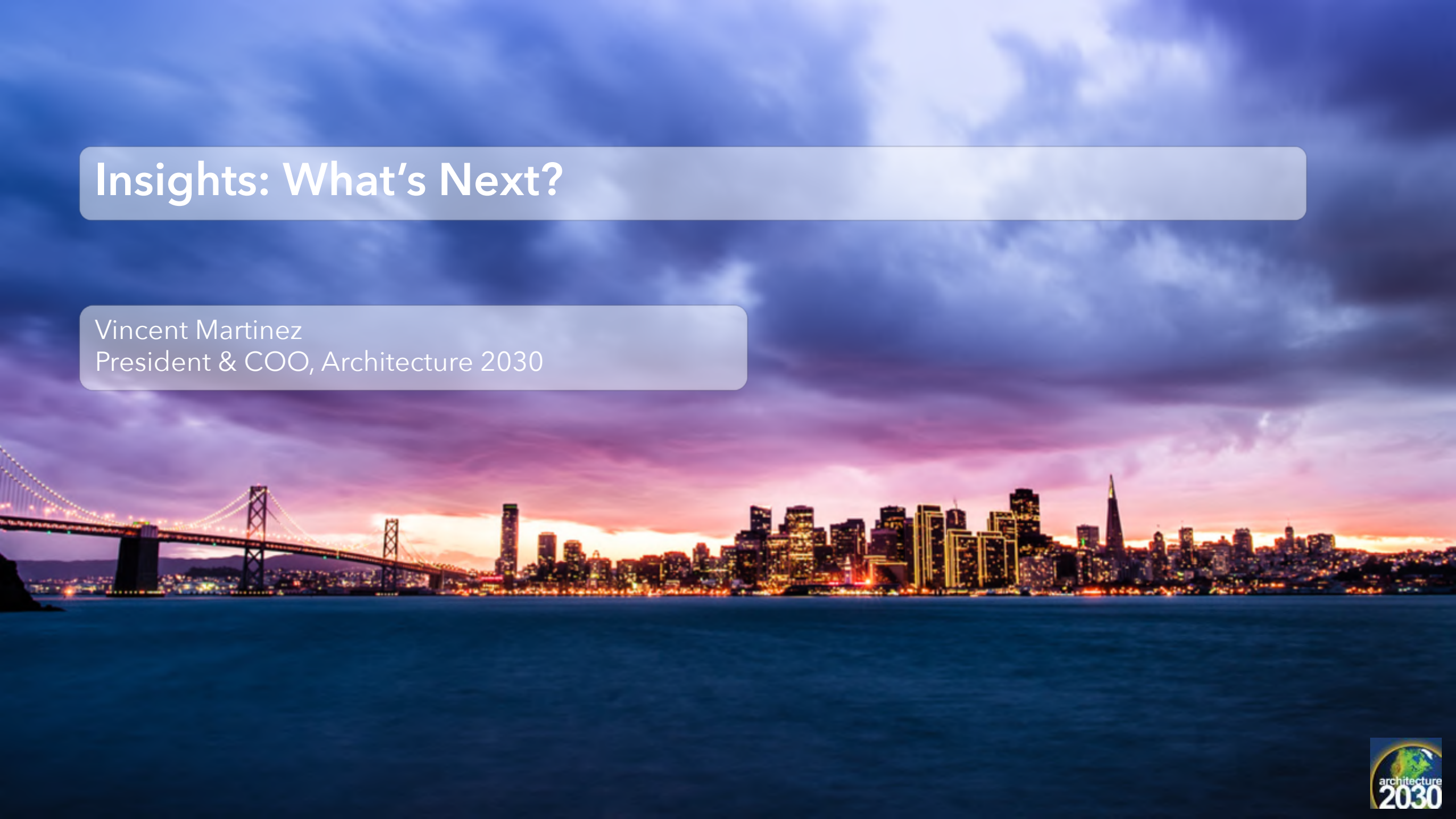
Uncheck categories or click types of impacts above and below the graph to hide selected categories/types of policies

- [x] Zoning and land use
- [x] Building regulation
- [x] Procurement
- [x] Infrastructure
- [x] Waste and circularity
- [x] Municipal buildings
- [x] Financial

- Require low carbon products
- Reuse products and materials
- Redefine the solution
- Reduce & replace materials an...
- Refurbish existing assets

Insights: What's Next?

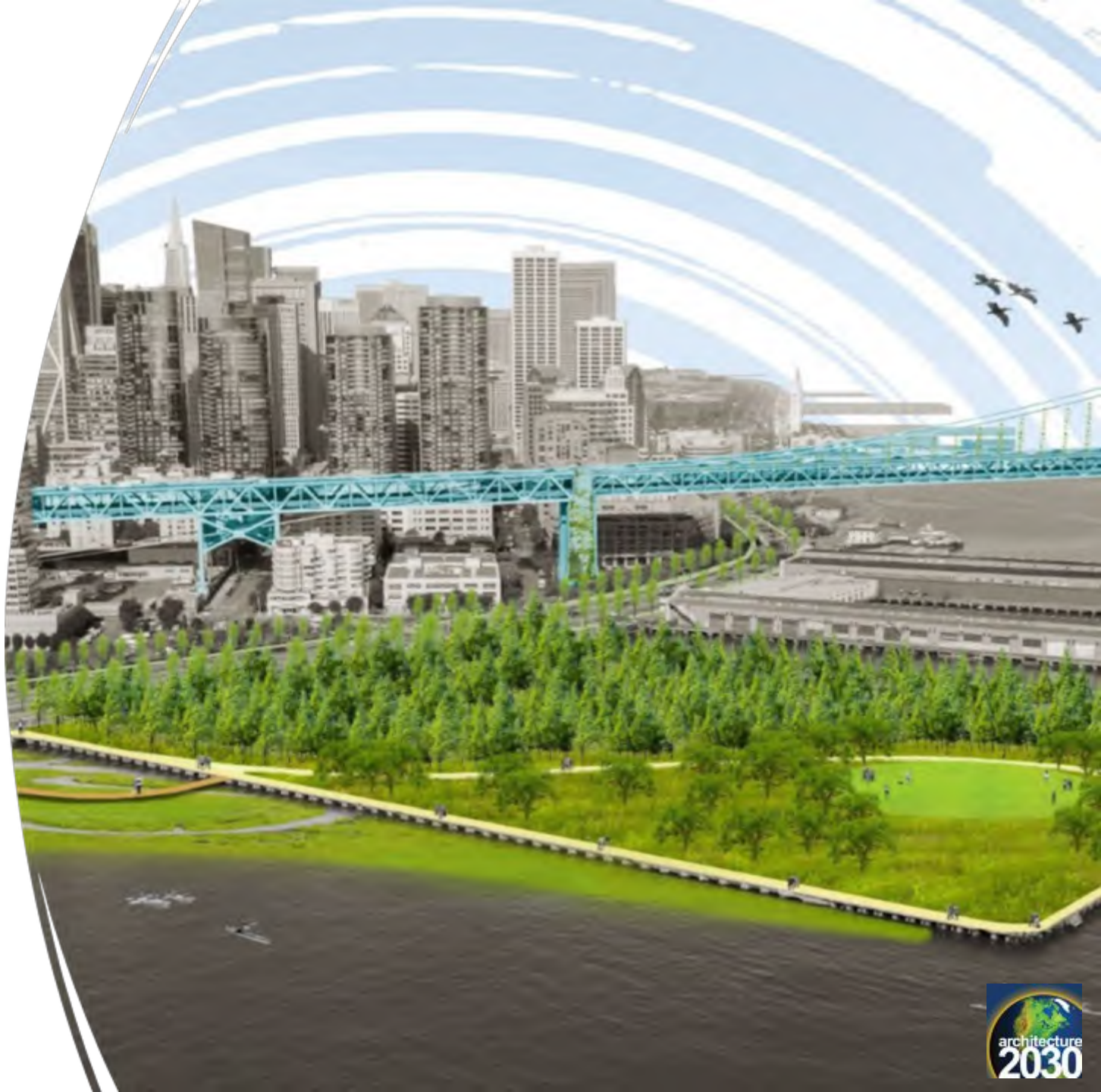
Vincent Martinez
President & COO, Architecture 2030



Climate Positive Planning and Landscapes

Providing a significant contribution to reversing global warming through the exterior built environment.

An often misunderstood and overlooked component of the built environment, site, regional, and infrastructure planning and design present vast opportunities for emissions reductions and active biogenic carbon sequestration.



TRANSIT-ORIENTED DEVELOPMENT

Transit Revitalization Investment District Study
Interface Studio LLC
Philadelphia, Pennsylvania, United States
Credit: Interface Studio LLC.

Transit-Oriented Developments are a mix of housing, retail and/or commercial areas and amenities within walking distance of public transportation.

Transit-Oriented Developments (TOD's) are established within 400 – 800 meters (¼ – ½ mile) walking distance of public transit with areas near transit increasing in density. TOD's conserve land, encourage walking and bicycling, while reducing infrastructure costs and energy consumption.

TOD's are categorized according to the following types:

- Core – dense downtown cores of regional importance with two or more modes of high-capacity transit.
- Center – mixed-use residential and employment districts containing at least two modes of transit.
- Village – smaller centers of local economic and community activity with transit service.
- Destination – institutional and university centers, stadiums, and regional parks.

For detailed information on TOD types, see the 2030 In-Depth Information Page in under Tools + Resources.

The Intersection of **Embodied Carbon Reductions** and **Existing Building Decarbonization**

Existing building retrofits present planners and designers with a unique opportunity to simultaneously impact both operational and embodied carbon emissions while providing place-based social and economic co-benefits.

Material Innovation

Engaging design industry leaders to unlock the potential for widespread low-carbon building systems

Material innovation is growing and offers immediate, scalable, low-carbon and carbon-storing alternative. However, gaps remain between theory and practice, aspirations and market realities, slowing uptake in professional practice and policymaking.

boston planning & development agency

Boston Mass Timber Accelerator

Boston Planning & Development Agency, Boston Society for Architecture announce awardees for Mass Timber Grant Program

On March, 17, 2022, the Boston Planning & Development Agency (BPDA) and the Boston Society for Architecture (BSA) announced the awardees for the Mass Timber Accelerator Program, launched in September 2021 to promote mass timber building practices in Boston and the New England region.

Questions

Vincent Martinez
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