

# Energy & Climate Solutions: The Challenge and Opportunity for Cities



Energy Innovation Celebration  
“Solutions from the Ground Up”  
The Great Plains Institute  
October 11, 2017



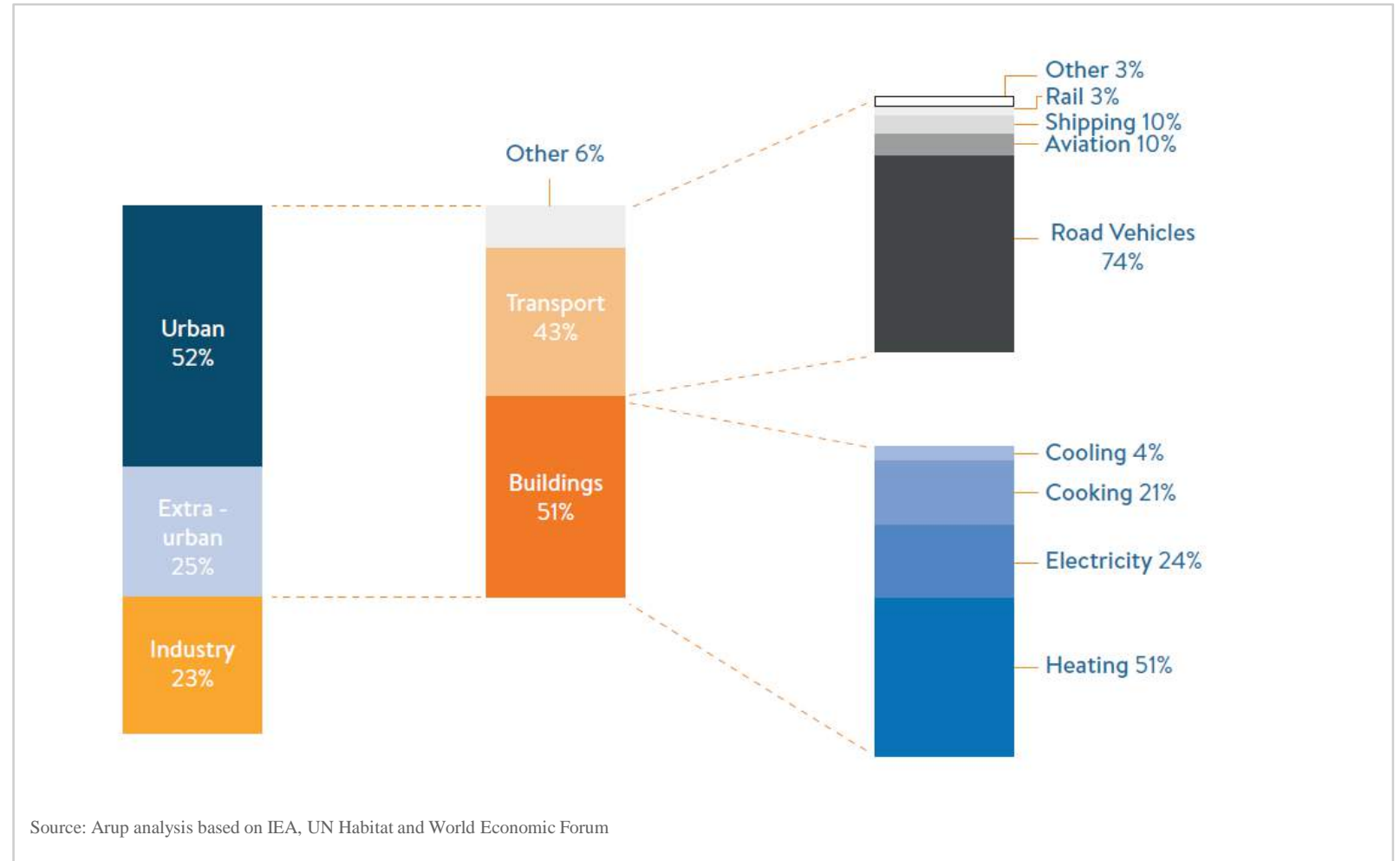
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# Common Challenges and Opportunities

# Why is Urban Energy Important?

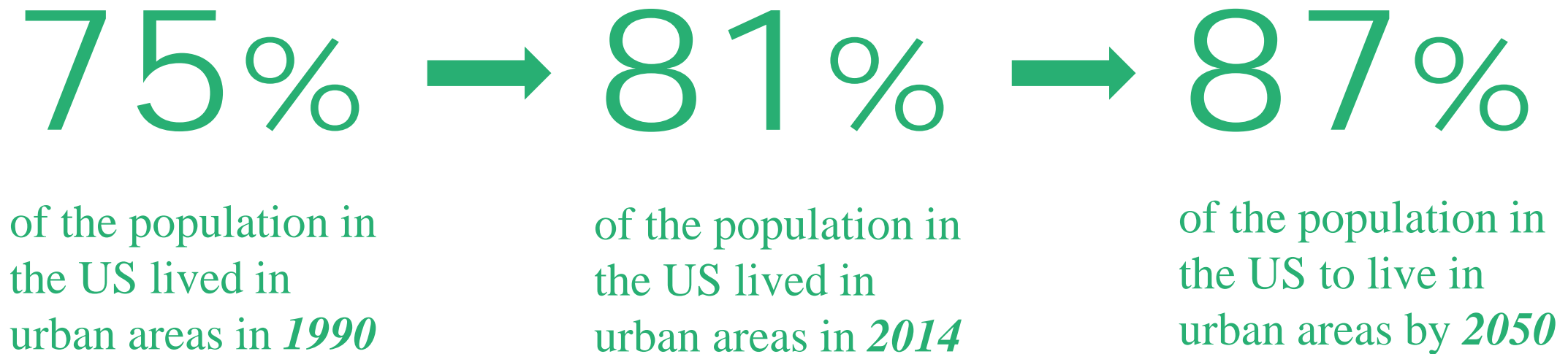
Cities account for more than half of global energy consumption and 40% of GHG emissions

*Buildings account for the largest share of emissions in urban areas*



# Urban Population Growth in the US

The percentage of the population in the United States living in urban areas is substantially higher than the global urban population.





Technology changes cities.  
Technology changes.





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Rapidly Increasing  
urban development





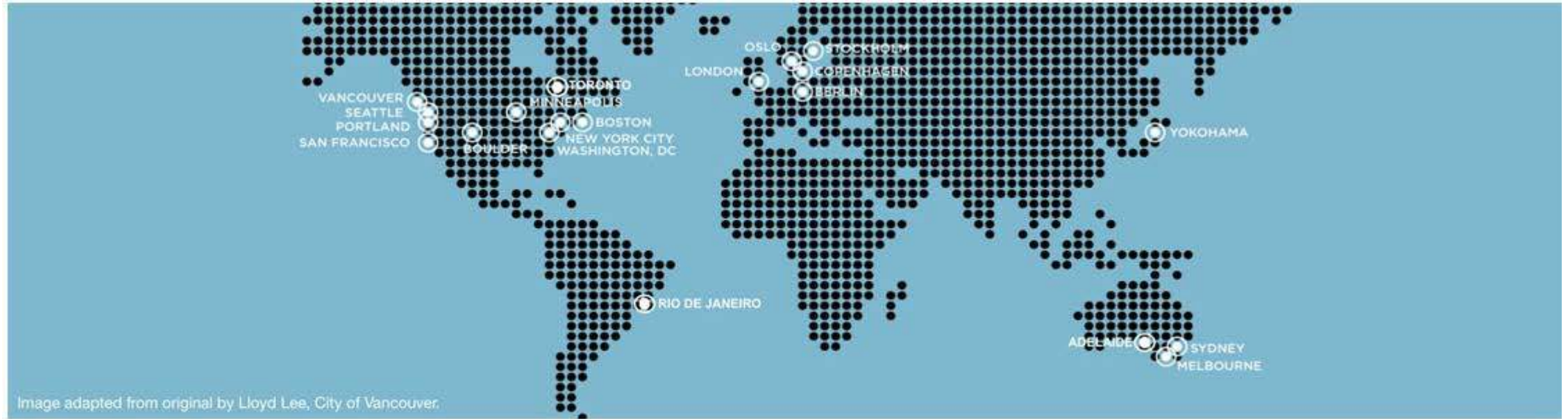
Rapidly Increasing  
urban development



# Current Trends

# City Networks

# Carbon Neutral Cities Alliance



- Cities commit to an 80% emissions reduction by 2050
- 20 member cities
- 8 of those are in the US

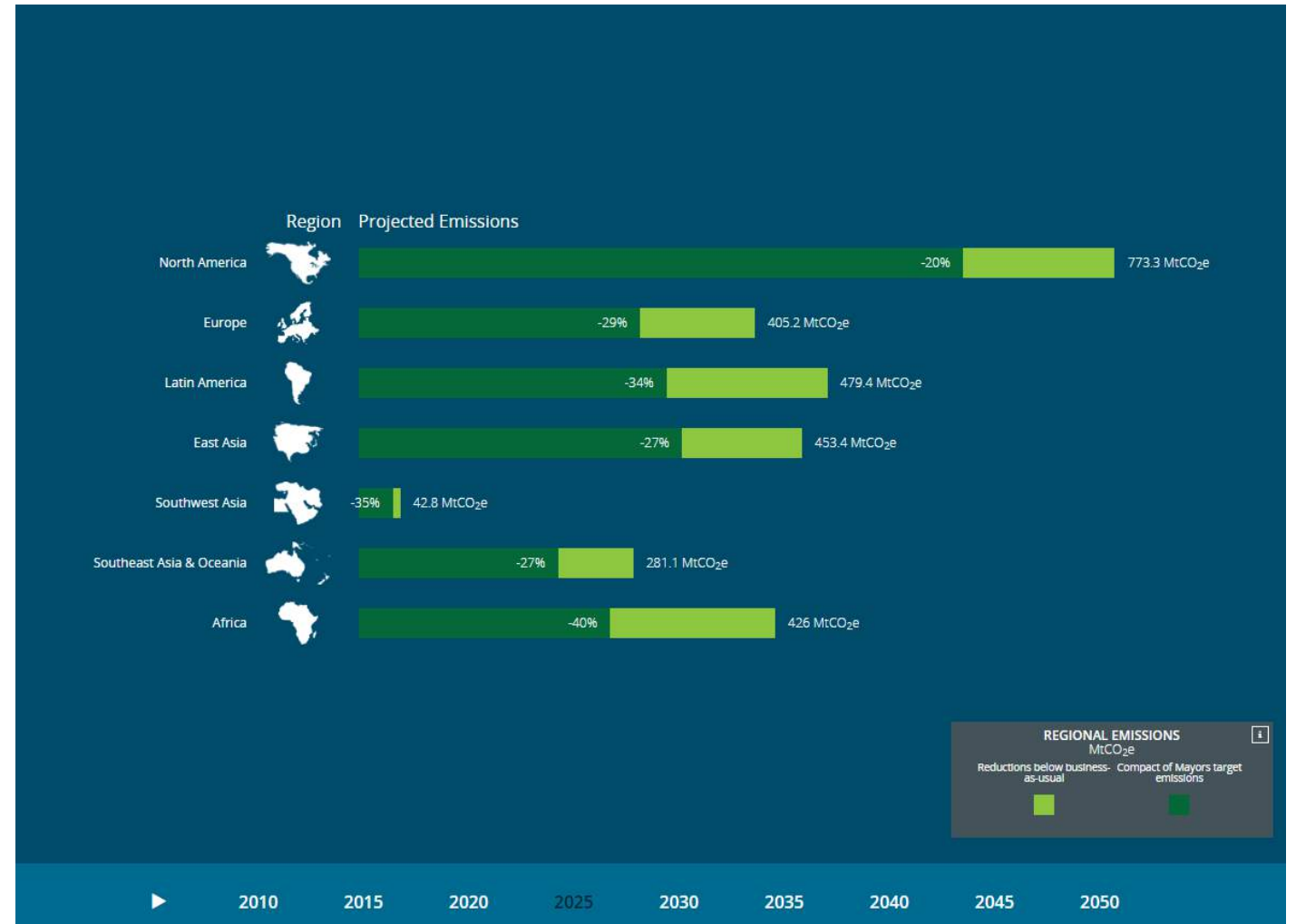


# Global Covenant of Mayors for Climate & Energy

596 global commitments

51 cities have completed the requirements

26% of global GHG emissions reductions by 2030 will be a direct result of the commitments of the Compact cities



# Urban Sustainability Directors Network (USDN)

135 members

Representing cities and counties with a total population of over 70 million people



# Climate Mayors

379 Climate Mayors

## Minnesota Mayors:

- Burnsville
- Carver
- Duluth
- Eden Prairie
- Edina
- Falcon Heights
- Maplewood
- Minneapolis
- Saint Paul



**Cities adopt the Paris Climate Agreement goals**

379 Climate Mayors, representing 67.8 million Americans, commit to uphold the Paris goals

[MAYORS: Click here to sign onto the statement](#)

**We are Climate Mayors**

The MNCAA — founded by Los Angeles Mayor Eric Garcetti, former Houston Mayor Annise Parker, and former Philadelphia Mayor Michael Nutter — commits U.S. mayors to working together to strengthen local efforts for reducing greenhouse gas emissions and to supporting efforts for binding federal and global-level policymaking.



# C40 & the Paris Climate Accord

- **1,666 actions required by 2020** in US C40 cities to accomplish 7% of the total savings across all C40 cities
- If all US cities took actions similar to those of the C40 cities, they **could deliver 36% of the emissions reductions needed** to reach the US Paris Agreement Pledge
- US C40 cities are already leading the way, with an average investment of \$2.9billion in climate action, an **average of \$750million more than non-US cities**
- If other US cities follow suit, the **increase in savings would represent 6% of the global cumulative savings** needed to achieve a limit of 1.5 degrees.



# Non-Profit Efforts

# American Council for an Energy-Efficient Economy (ACEEE)

This new report ranks 51 large U.S. cities on what they are doing to save energy in five key areas. Click on the map to see how each city scored.





# ACEEE Scorecard

## Local Government Operations

- Local government energy efficiency goals
- Performance management
- Procurement and construction policies
- Asset management

## Community-wide Initiatives

- Community-wide energy efficiency goals
- Performance management
- District energy and combined heat and power
- Urban heat island mitigation

## Building Policies

- Building energy code stringency
- Building energy code compliance
- Requirements and incentives for efficient buildings
- Benchmarking, rating, and transparency
- Comprehensive efficiency services

## Energy and Water Utilities

- Electric efficiency spending
- Natural gas efficiency spending
- Electric savings
- Natural gas savings
- Energy efficiency targets and requirements
- Energy data provision
- Efficiency efforts in water services

## Transportation Policies

- Location efficiency
- Mode shift
- Transit
- Efficient vehicles and vehicle behavior
- Freight

# City Energy Project

20 pilot cities

*A national initiative to create healthier and more prosperous American cities by improving the energy efficiency of buildings.*

## THE CITY ENERGY PROJECT **THEORY OF CHANGE**



Engage America's leading cities



Focus on large existing buildings, the biggest energy users



Make it easier to invest in efficiency



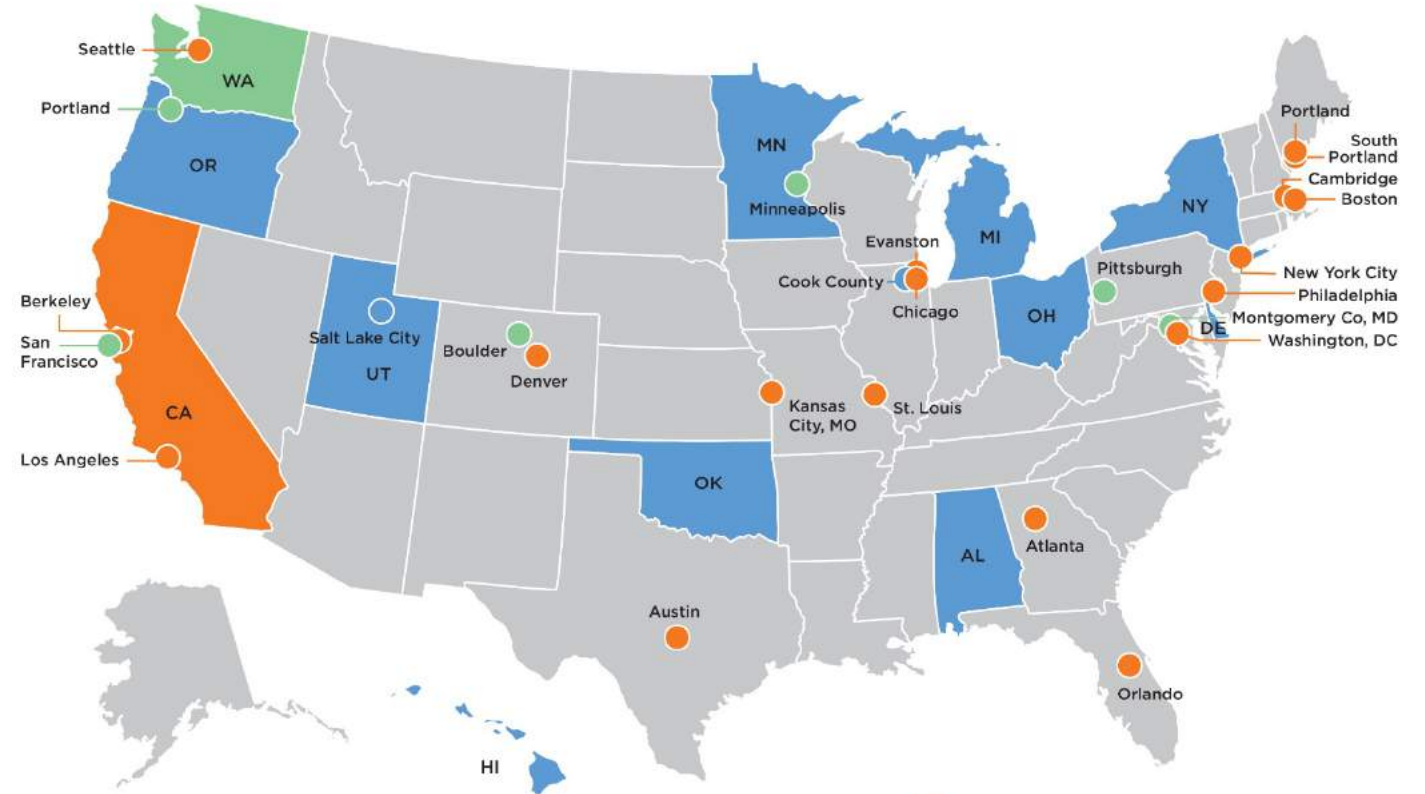
Overcome barriers

# Disclosure of Building Energy Performance Data

24 cities

2 counties

U.S. Building Benchmarking and Transparency Policies



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- Public, commercial, and multifamily building benchmarking policy adopted
- Public and commercial building benchmarking policy adopted
- Public buildings benchmarked

# Properties covered by Building Disclosure Benchmarking





# Resilience in the Energy Sector

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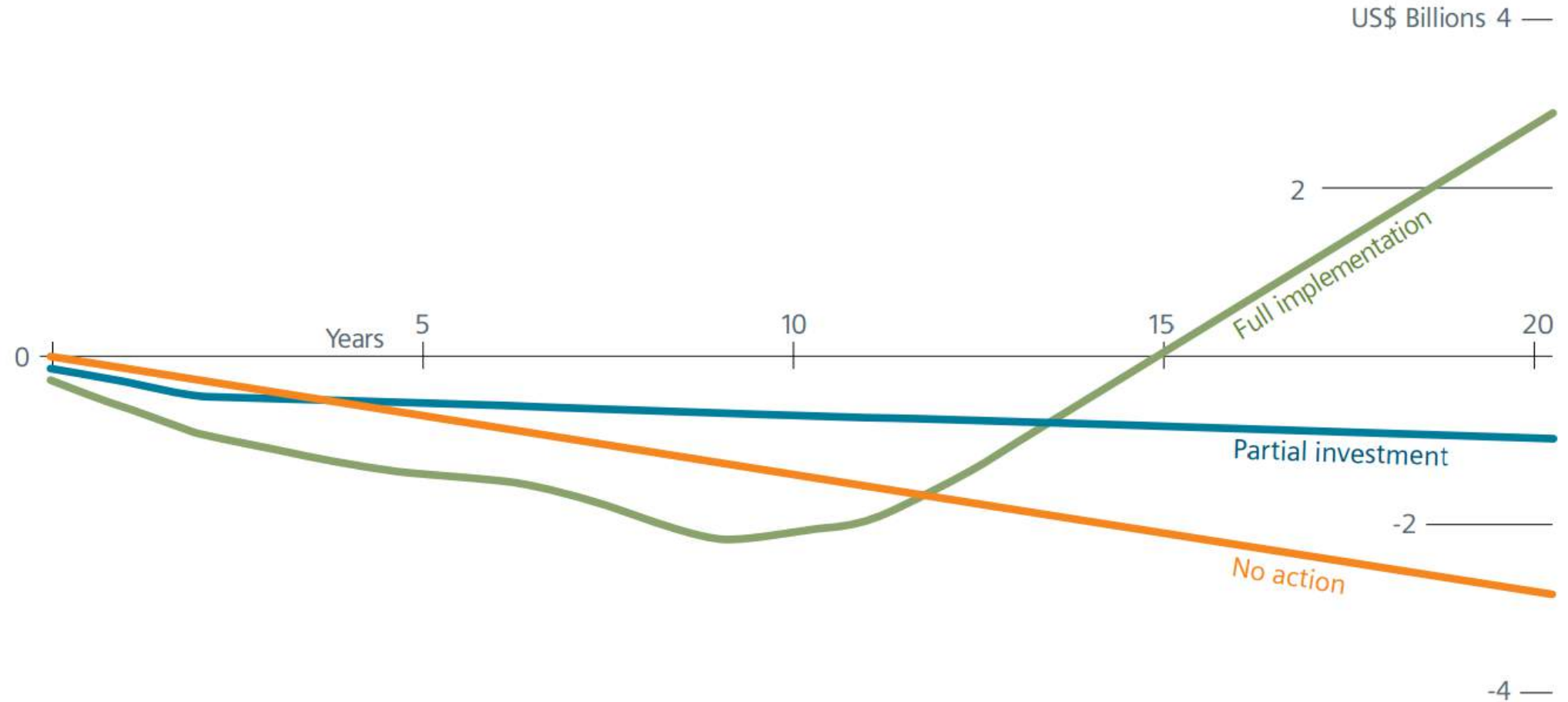
Why is it important?

- Increased heating and cooling demand from more extreme temperatures
- Reduction in energy supply due to reduced efficiency of systems resulting from global warming
- Increased exposure of infrastructure to sea level rise and extreme weather events



# Business Case for Resilience

Economic analysis of future scenarios for New York City electrical grid



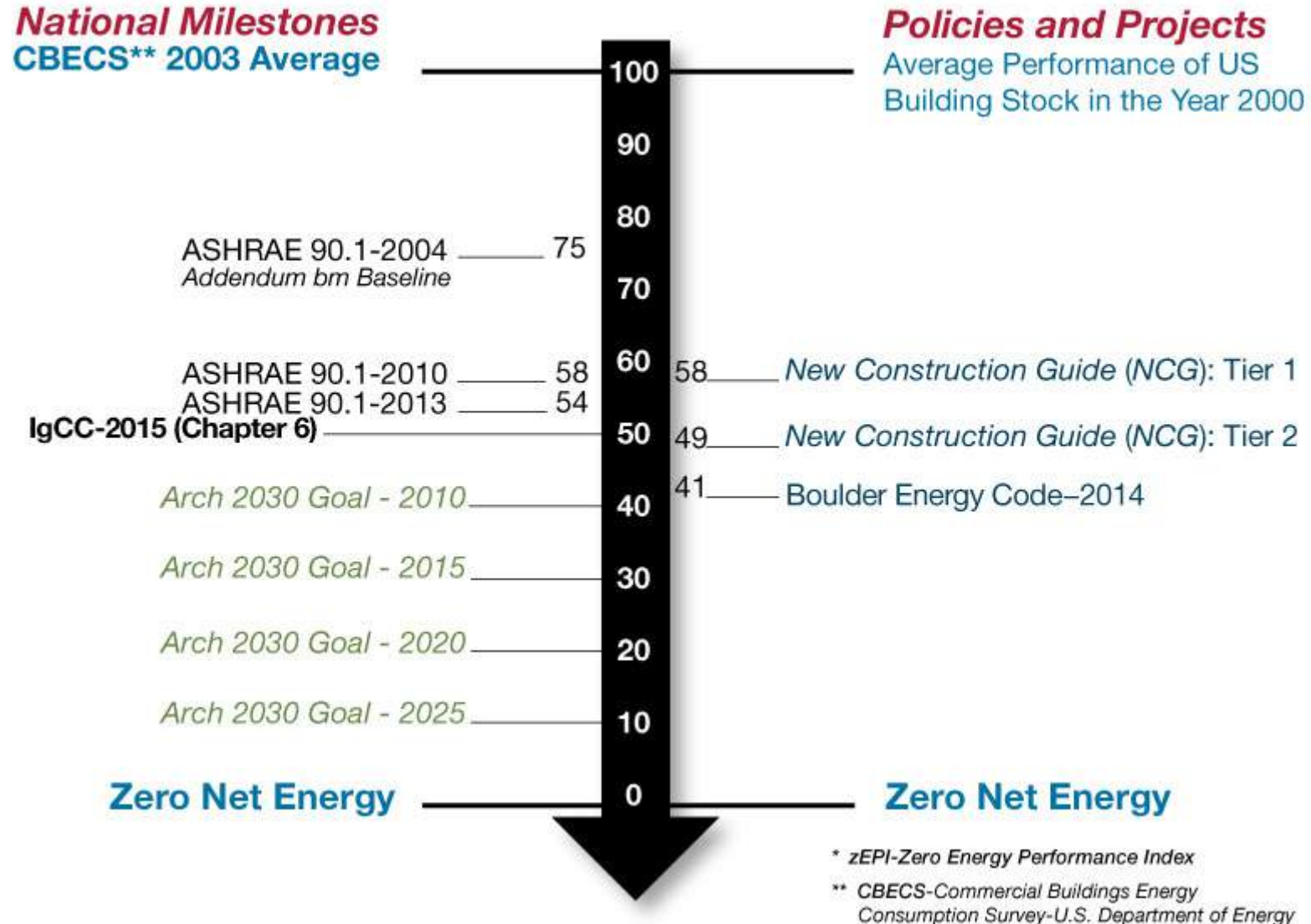
# Codes & Frameworks



# Codes and Frameworks

Passive House	A voluntary standard for energy efficiency in buildings, resulting in ultra-low energy buildings.
International Green Construction Code	Model code regulations that promote safe and sustainable construction practices and address the impact of buildings and structures on the environment.
Zero Energy Performance Index (zEPI)	A provision of the International Green Construction Code that provides a scale for measuring commercial building energy performance.
Net Zero Buildings	Buildings with zero net energy consumption. Total amount of energy used on an annual basis equals the amount of renewable energy created on-site.
Performance-based Code	Codes that require a certain standard of building energy performance, rather than a prescriptive code that specifies the materials and installation methods.

# zEPI Scale to Zero Net Energy



# Zero Net Energy Codes



## Santa Monica, CA

### *Zero Net Energy Building Requirement*

World's first city ordinance requiring all new single-family construction to be zero-net energy.



## New York, NY

### *Energy Reductions and On-site Renewables*

2016 energy-related laws requiring new city buildings and major retrofits to achieve LEED v4 Gold and cut energy use by 50%.



## Toronto, ON

### *Results of Modelling Greenhouse Gas Emissions to 2050*

Pathway to 80% GHG reductions by 2050 with identified opportunities for collaborative and sustained efforts by the City, private sector, higher level government, and Toronto residents.



# Recent NYC Efforts

## 1<sup>st</sup> Paris-Compliant Action Plan

- Released September 2017
- Lays out the pace, scale, and impact of actions across that built environment to bring NYC in line with the Paris Agreement
- Key actions identified in recycling, waste, buildings, energy, and transportation
- Commits NYC To lead the development of a global protocol for achieving carbon neutrality by 2050

## Proposal for Required Energy Retrofits

- 67% of NYC's emissions are produced by buildings
- Retrofits required by 2030 for old buildings with more than 25,000 sqft Could affect up to 23,000 buildings (14,500 of which have been identified as “worst performing”)
- Legislation would set max levels of energy usage for buildings
  - Apartments would be permitted 50,000 B.T.U.s per sqft per year (avg. large apartment building currently uses 65,000-70,000 B.T.U.s per sqft)





# Energy Strategies & Technologies

# Energy Strategies & Technologies

Energy Efficiency	Implementing energy efficiency measures in buildings to the best extent possible, including following passive house principles		
Electrification Heating	Electrification of all heating systems grid.	Low-Carbon District Energy Networks	Developing low-carbon non-combustion based district energy networks
Solar PV	Integrating high efficiency solar photovoltaics into building rooftop designs wherever possible, and also integrating solar photovoltaic canopies on site area, where possible.		
Smart (Resilient) Grid	Utilizing smart resiliency measures within the development such as microgrids, batteries		
Transport Mode Shifting	Shifting transportation mode types away from cars to walking, cycling and public transport		
Electrification Transport	Electrification of transport, again, to take advantage of a very clean electricity grid		

# Financing Energy Action

Unlocking financing for projects that will enable a step change in how, and how much, energy they use is a recurring challenge for cities. However, the opportunities for innovations in the energy sector are significant. Recommended financing mechanisms include:

- Energy Performance Contracting
- Property Tax Approaches
- Green Bonds and Capital Markets
- Secondary Markets
- Crowdfunding
- Public Private Partnerships (PPPs or P3)

# Public-Private Partnerships

*P3 is essentially a long-term contract between a private party and a government entity to deliver a public asset or service.* Some recent examples of energy-related PPPs include the following:



imagination at work

General Electric agreed a collaboration deal with the Vietnamese government to provide 1,000MW of wind-power capacity in the country by 2025.



Swindon Council launched its first crowdfunding application for a new solar farm in the UK.



NYC invested \$140 million in the Accelerate Conservation and Efficiency (ACE) program, a competitive funding program for city agencies to identify and implement energy efficiency projects. The city leveraged funding from its own funds and savings and through bond issuance.



Massachusetts Clean Energy Center is a publicly-funded agency dedicated to accelerating the success of clean energy technologies. Recently, grants have been extended to innovative private sector initiatives.



# Questions?

