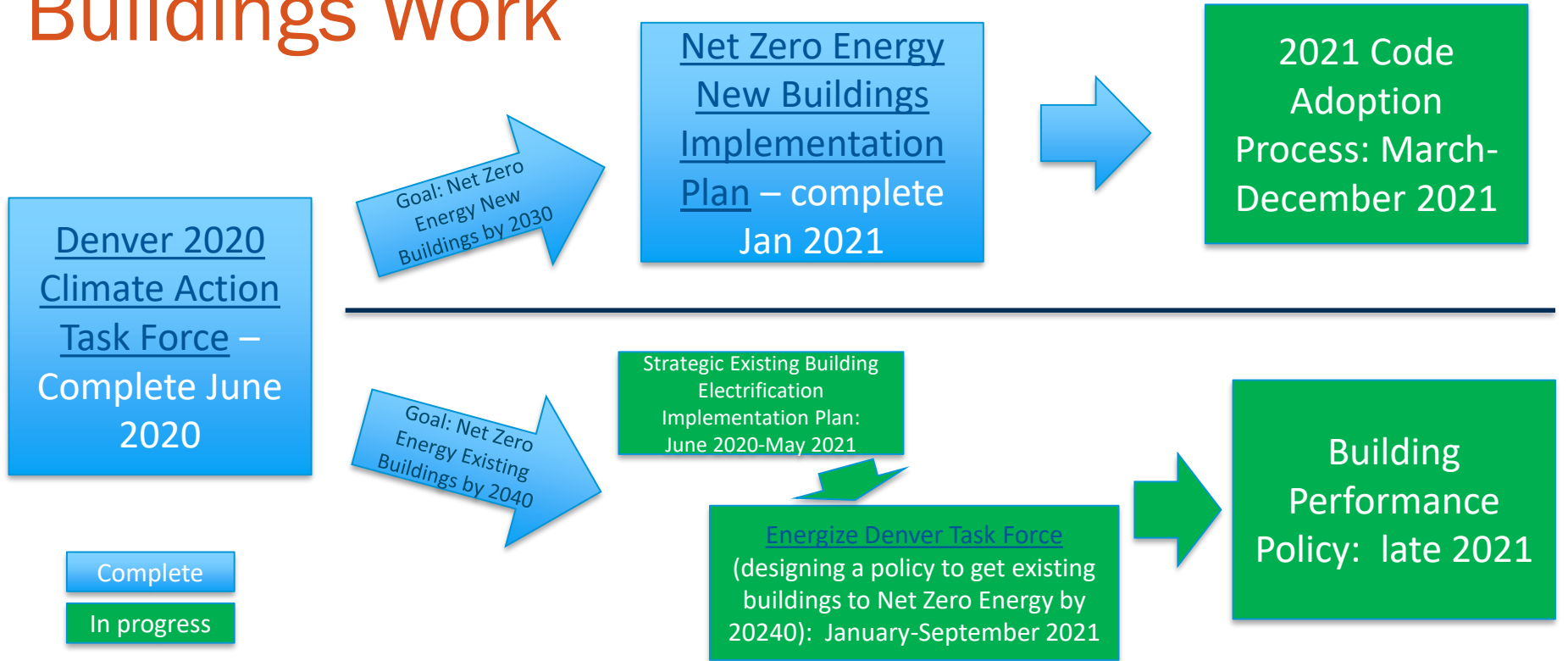




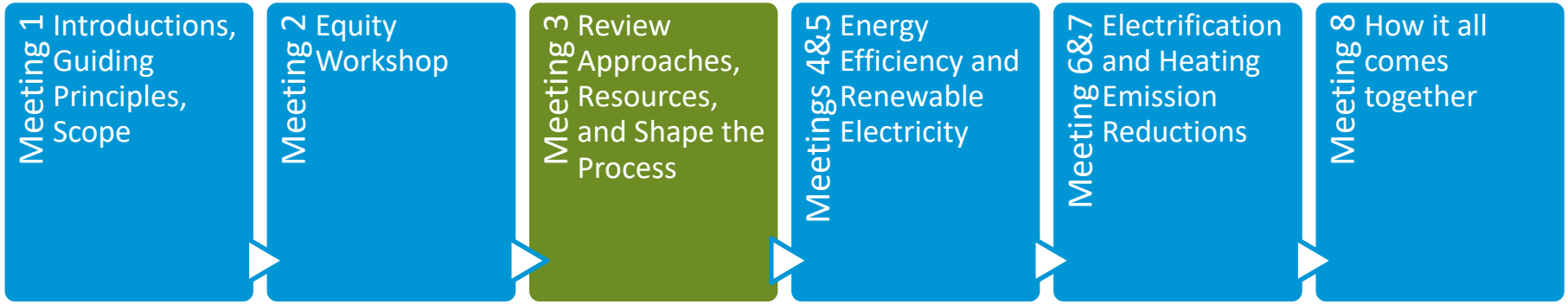
# Energize Denver Task Force

Meeting 3 prep-briefing, March 8<sup>th</sup>, 2021

# Buildings Work

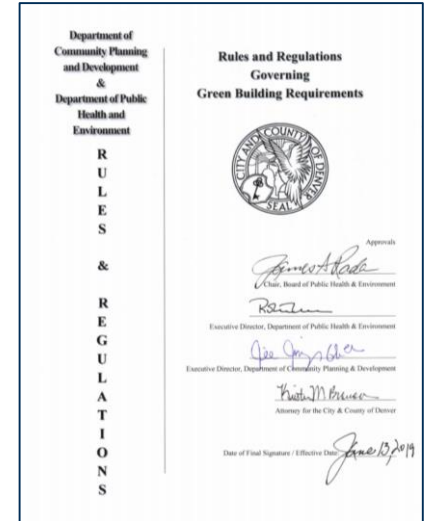
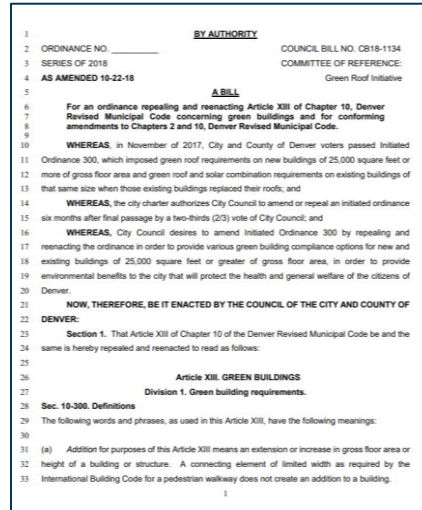
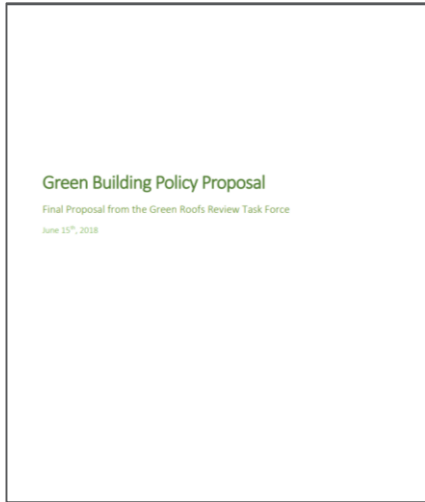


# Task Force Draft Schedule



Workgroups:  
Equity Workgroup  
Workforce Workgroup  
Climate Solutions Workgroup

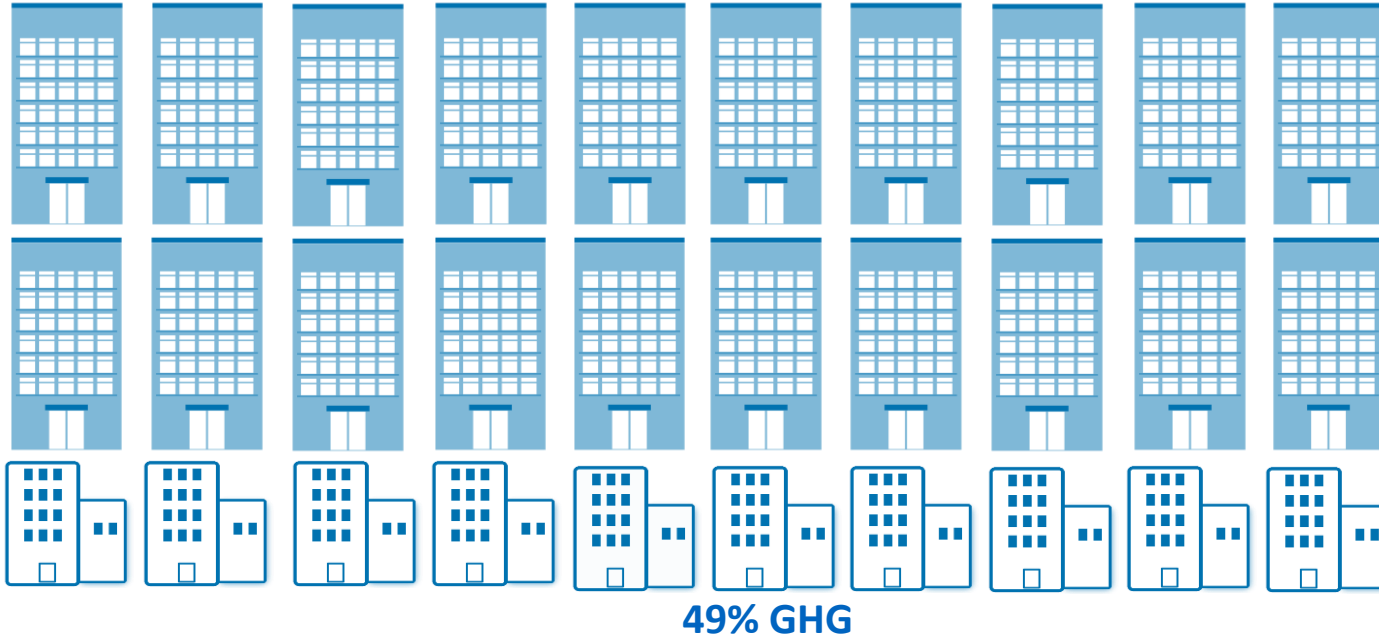
# Expected Outcomes: An example



The Green Roof Review Task Force's  
18 pages of recommendations

Green Building Ordinance and Green  
Building Rules and Regulations

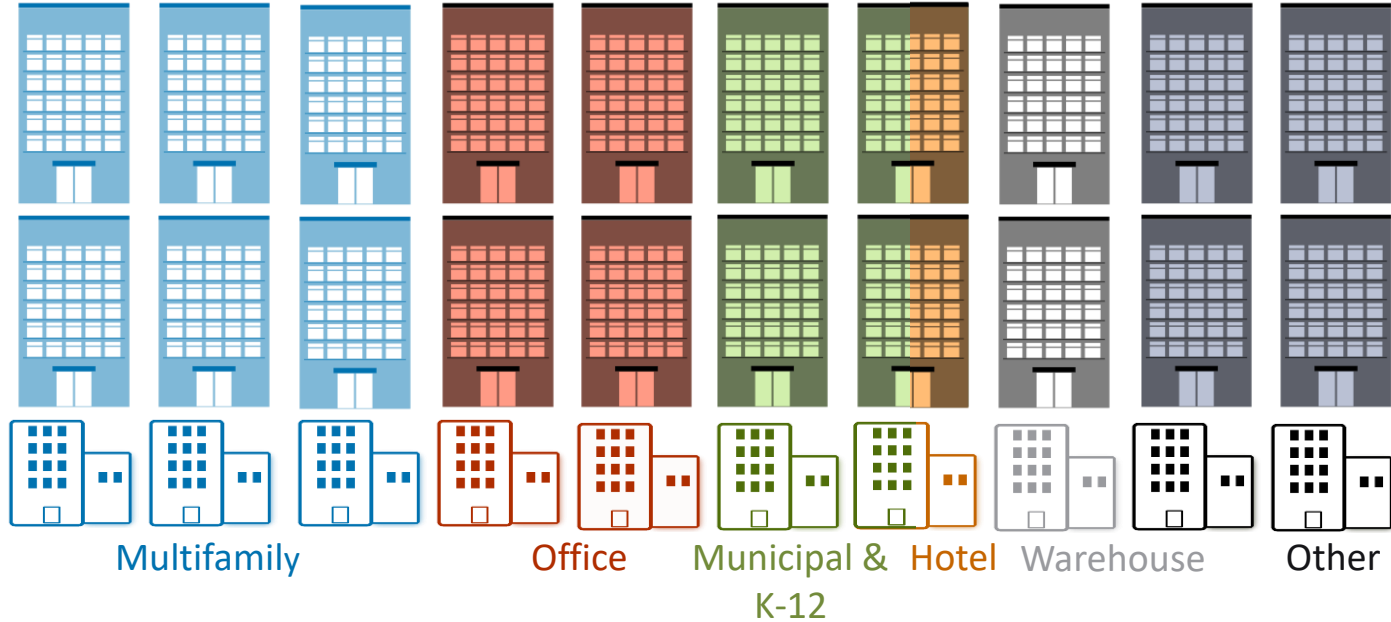
# Commercial and Multifamily Buildings Account for 49% of Denver's GHG Emissions



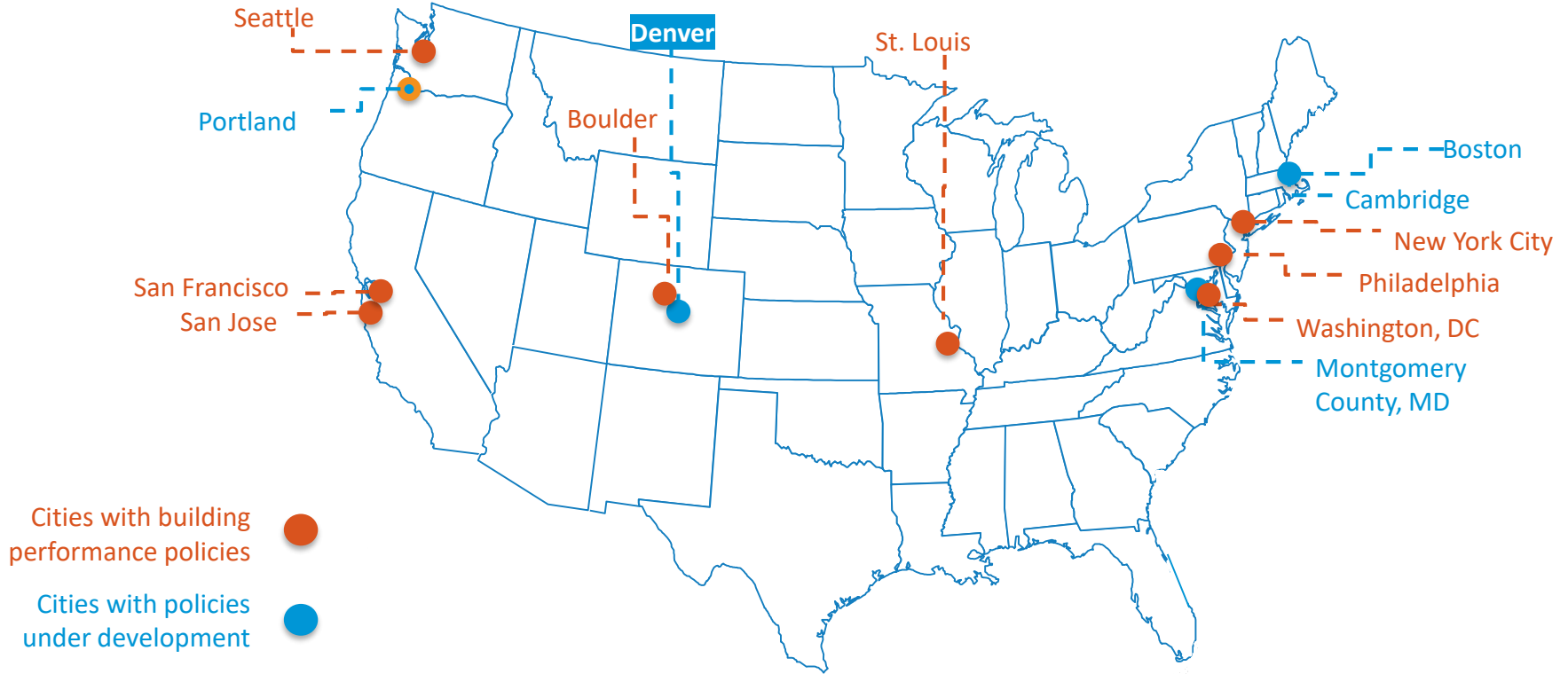
- >25,000 sq ft:
- 82% of square footage
  - **3,000** buildings

- <25,000 sq ft:
- 18% of square footage
  - **14,000** buildings

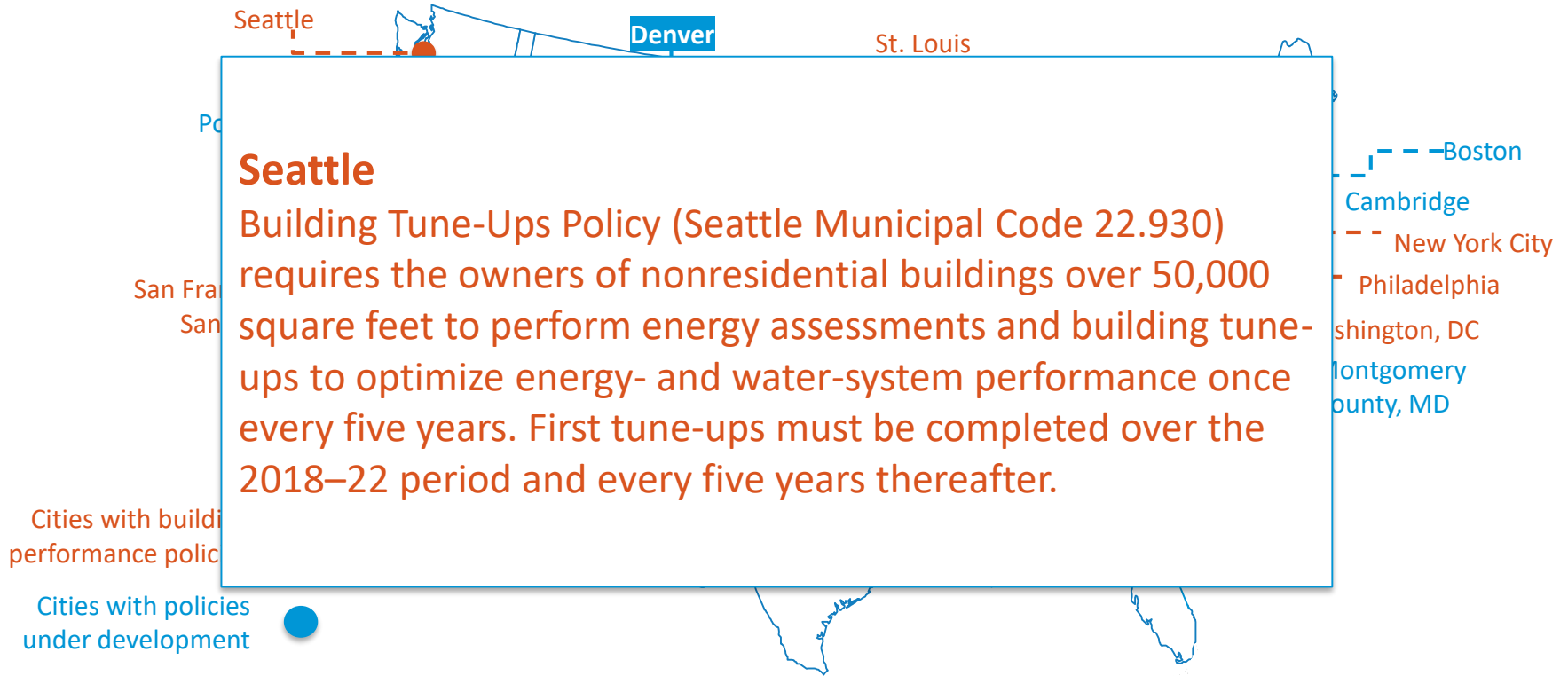
# Building Types and Sizes



# Building Performance Policies in Other Cities



# Building Performance Policies in Other Cities





# Building Performance Policies in Other Cities

Seattle      Denver      St. Louis

## St. Louis

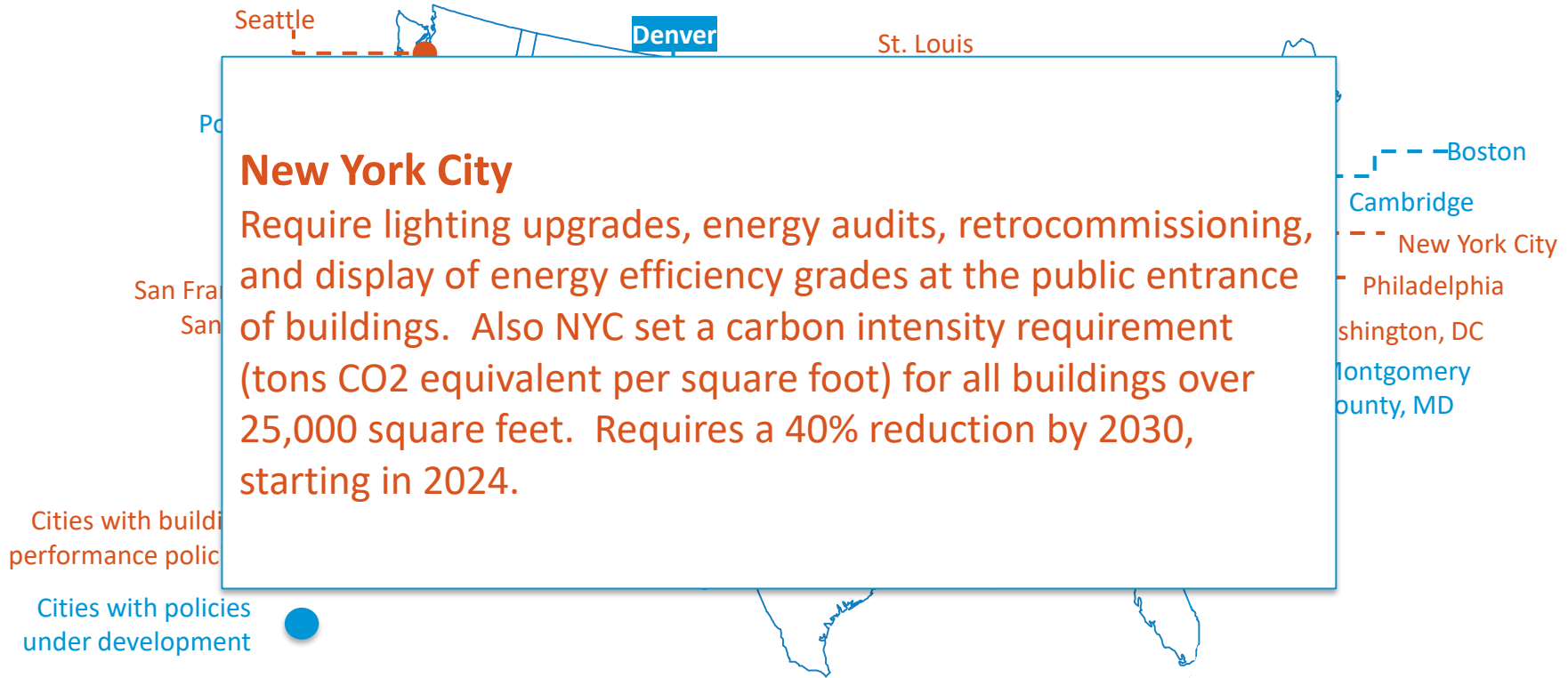
Requires site energy intensity (kbtu/sq ft) performance standards for buildings over 50,000 square feet. Initial standards must be adopted by May 2021 and take effect four years later. The standards must be updated every four years. The standards can be no lower than the 65th percentile of current buildings of each type, meaning that at least 65% of buildings must upgrade each cycle.

--- Boston  
Cambridge  
--- New York City  
Philadelphia  
Washington, DC  
Montgomery County, MD

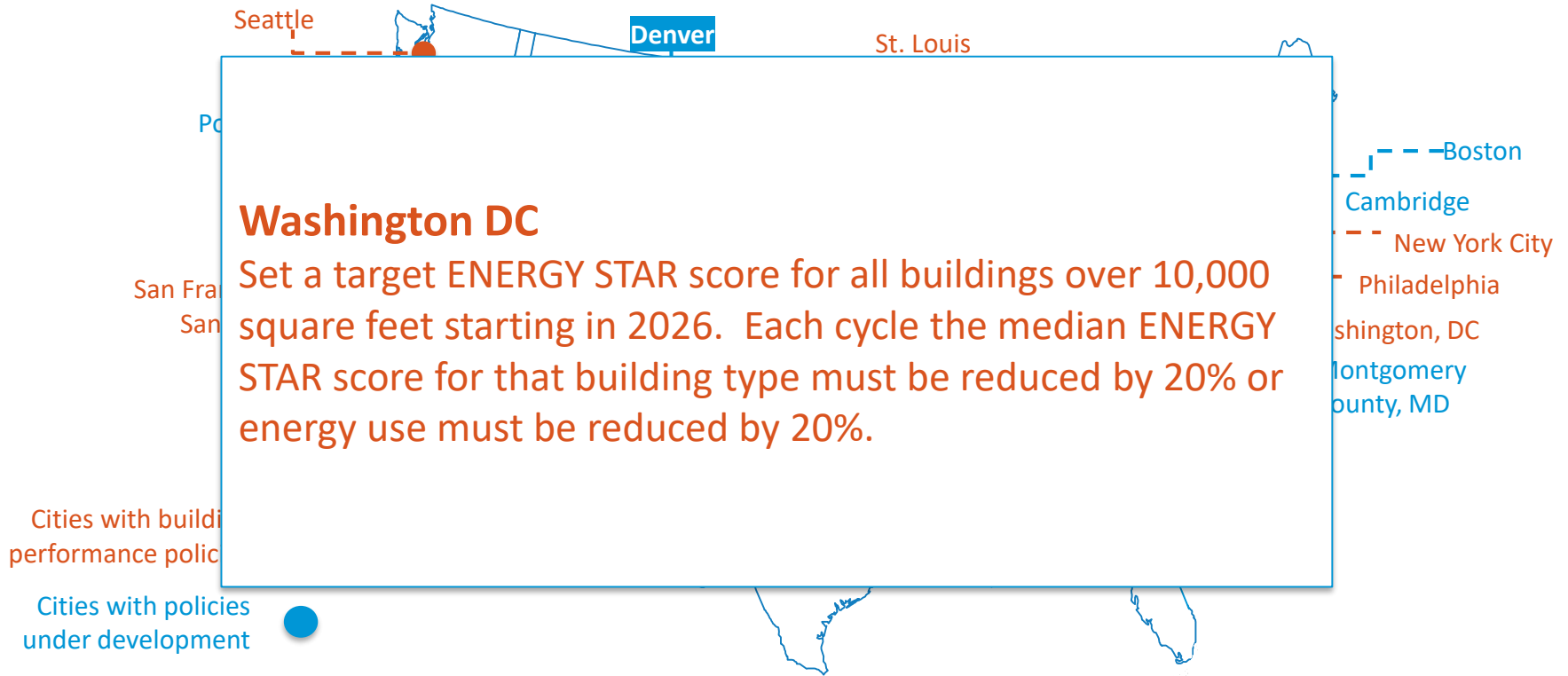
Cities with building performance policies

Cities with policies under development

# Building Performance Policies in Other Cities



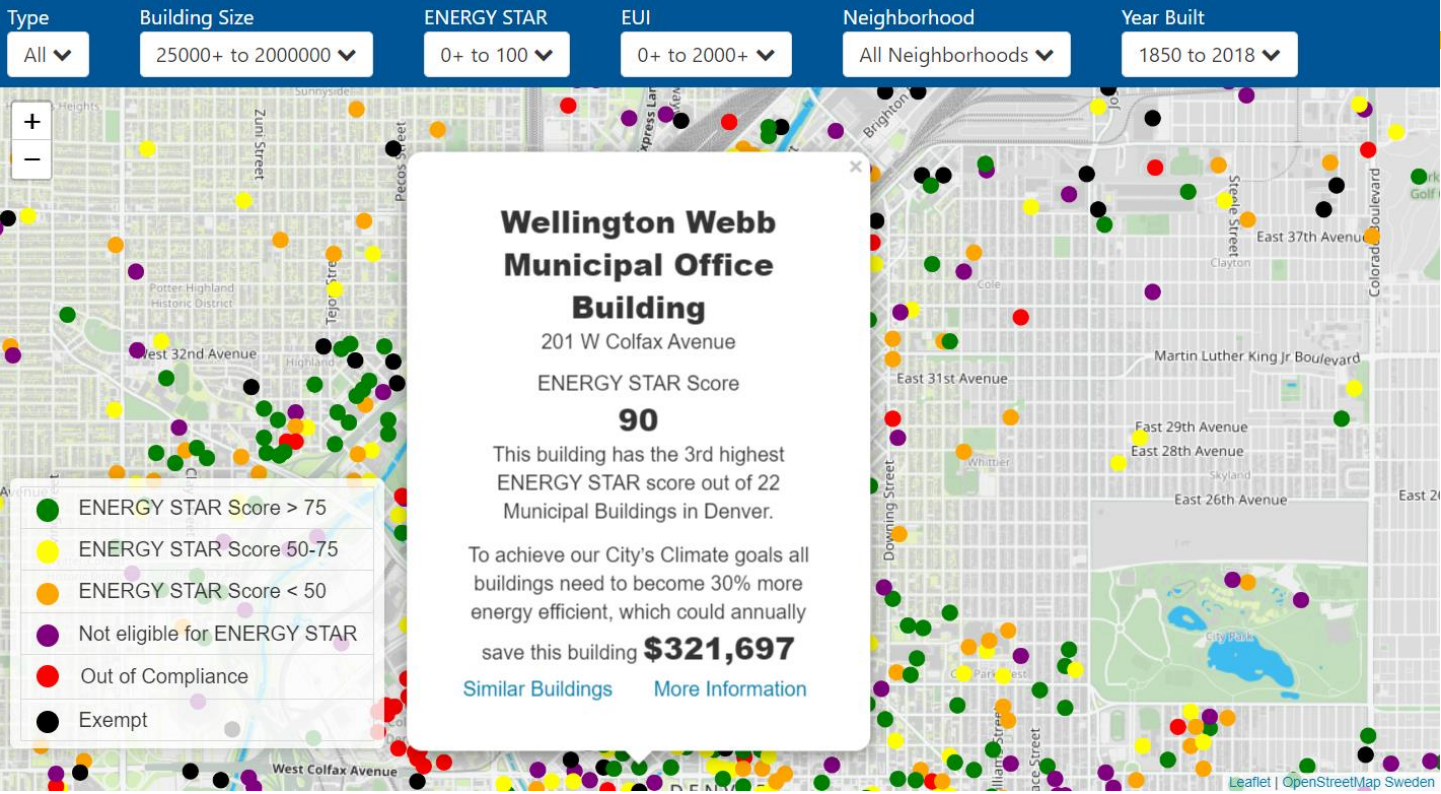
# Building Performance Policies in Other Cities



# State Bill - Proposed

- 50,000 sq ft and up
- Requires benchmarking
- Requires by 2026 buildings receive an ENERGY STAR score of 75 or higher –or- improve ENERGY STAR score by 15 points –or- hit a sector specific energy use intensity (EUI target –or- reduce EUI 15%
- Alternate compliance options exist for buildings with solar panels.
- Targets may update the next compliance cycle

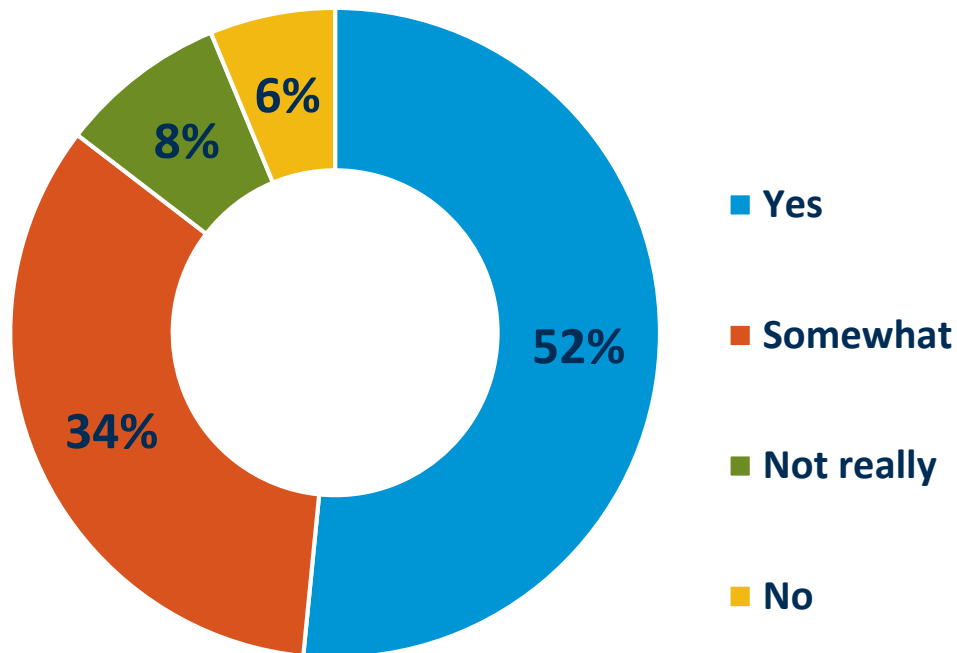
# City Work to Date



Benchmarking: [www.energizeddenver.org](http://www.energizeddenver.org)

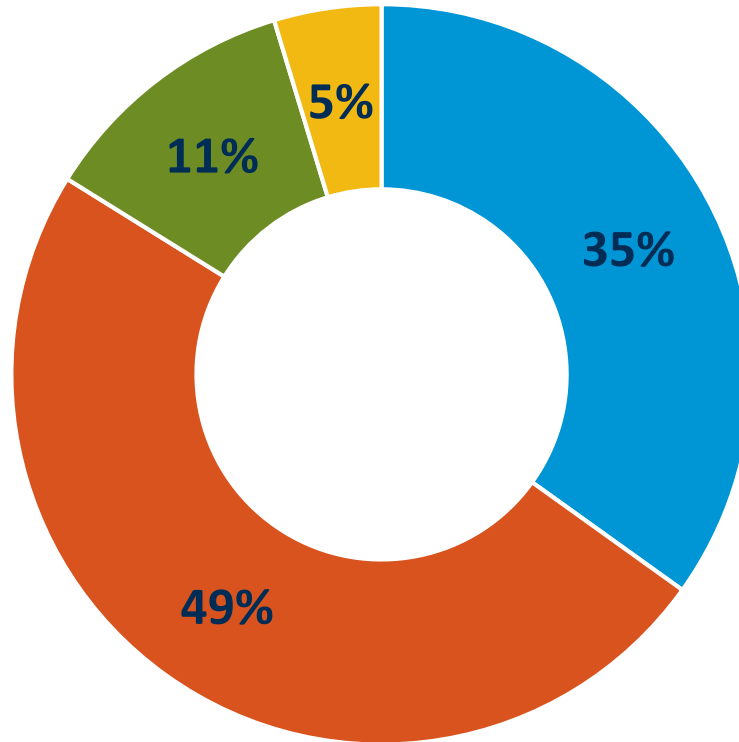
# Survey of Benchmarked Building Managers, December 2020

Are you aware that buildings are responsible for over half of all greenhouse gas emissions in Denver, and that the City is working to reduce greenhouse gas emissions in buildings?



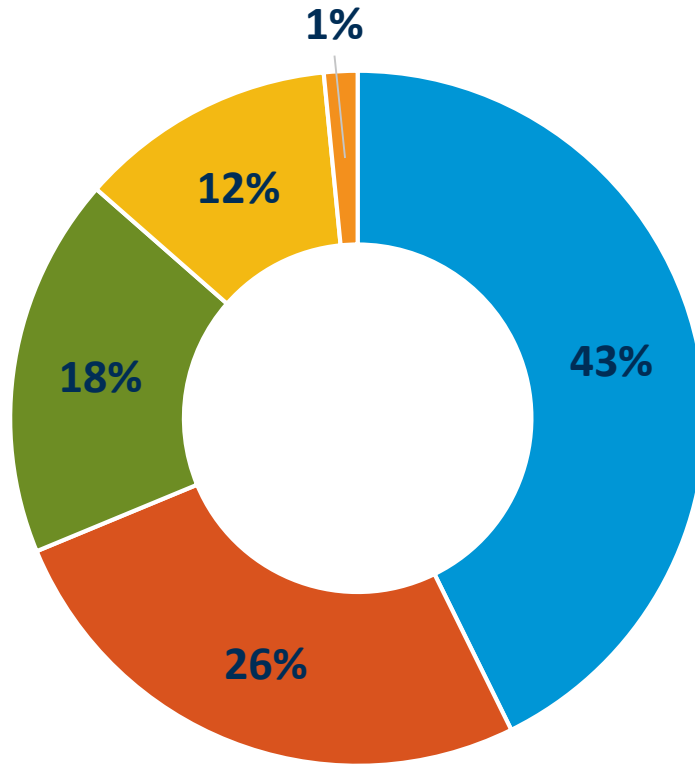


Do you consider the energy performance of your building central to your building management practice?



- Yes. And, we dedicate significant resources to energy performance
- Somewhat. It's important, but we don't dedicate a lot of resources to energy performance
- Not Really
- No

Which energy performance building metric do you use to measure the efficiency of your building? If you do not currently measure the efficiency of your property, which metric are you most comfortable/familiar with?



- Energy Star Score
- Efficiency of individual systems like furnaces, boilers, hot water heaters, lighting, windows, etc.
- None of the above
- Energy Use Intensity (EUI) – Energy Use/Sq Ft
- Carbon emissions

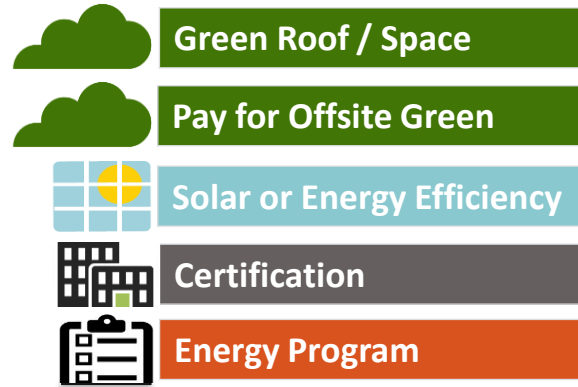
# Green Buildings Ordinance: Existing Buildings

Buildings over  
25,000 sqft

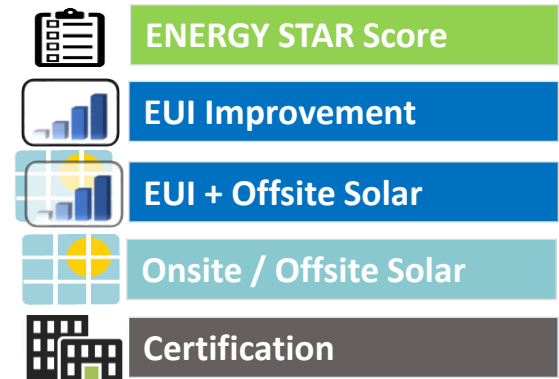


Cool Roof  
Required  
+  
ONE of the  
Following  
Compliance  
Options

## Compliance Options for Existing Buildings



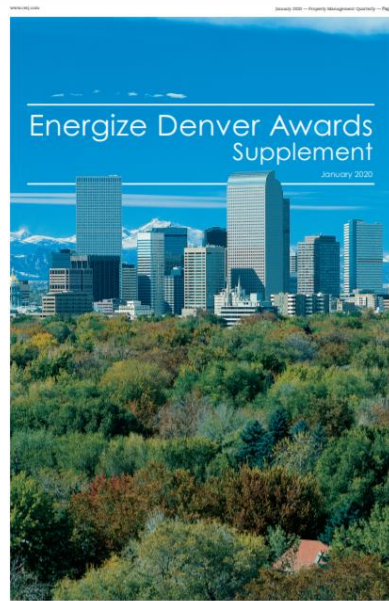
## Energy Program Options



# Energize Denver Awards

## Categories:

- Office
- Multifamily
- Hotel
- COVID Response
- Individual Leadership



1<sup>st</sup> Place Apartment 2019: Trivium Apartments  
26% energy savings



# SMART LEASING DENVER

The program provides **tools**, **training** and **resources** to better align the interests of tenants and landlords to achieve **healthy**, **high-performance**, **energy-efficient** buildings **through better conversations** at all stages of the leasing process.

# C-PACE Financing Pays 100% of Improvements

- Energy efficiency, renewable energy, and water conservation may be financed.
- 100% financing, no money down.
- Long term financing, up to 25 years.
- Loan is repaid via a special purpose assessment (akin to sewer assessment).
- Assessment stays with the property on sale. Tenants usually pay assessments.

[www.copace.com](http://www.copace.com)



# Task Force's Work

# Net Zero Energy

Highly Energy  
Efficient

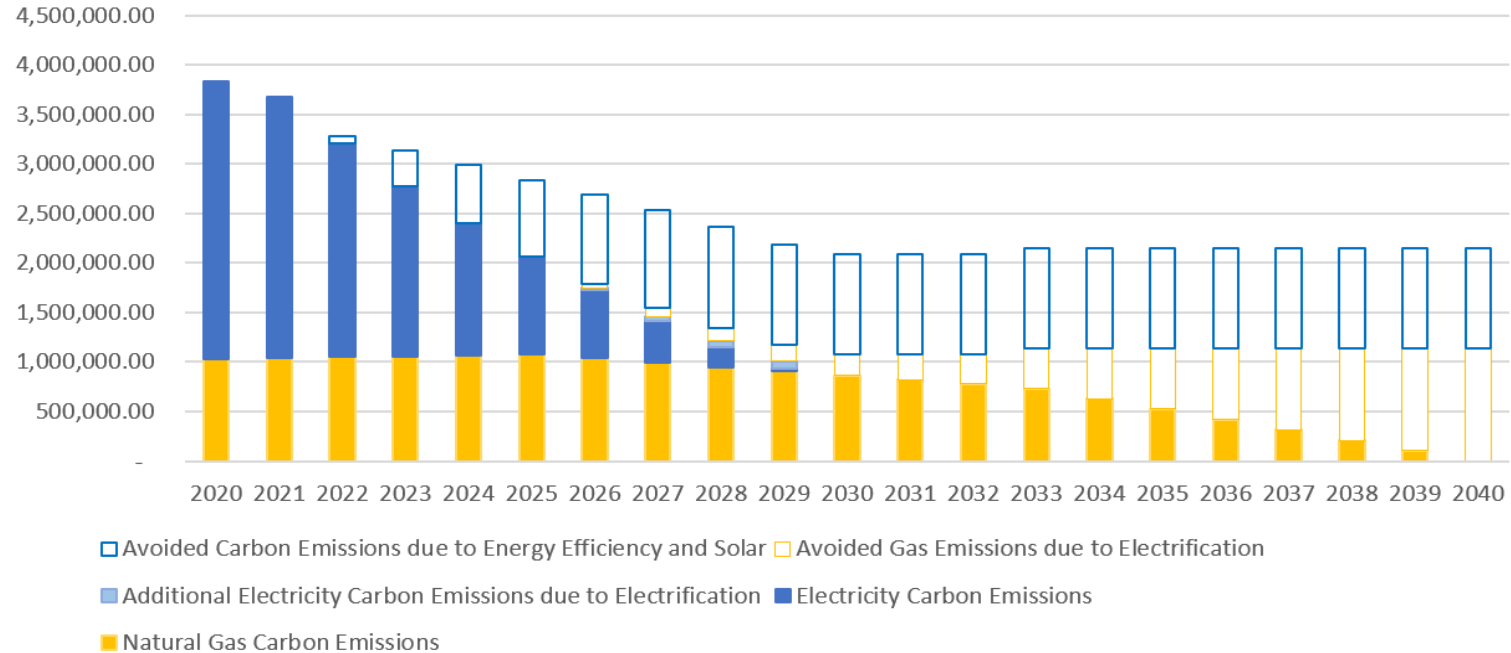
Renewable  
Energy

Demand  
Flexible

All-Electric



# Goal of the Task Force

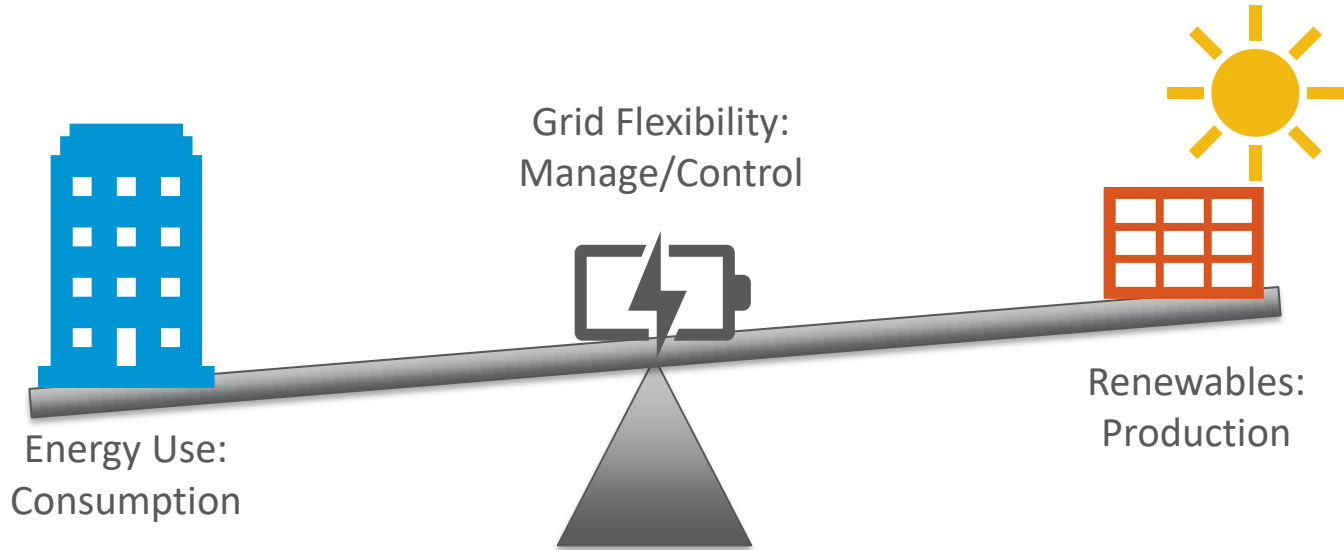


# Energy Efficiency, Renewables, & Demand Flexibility

# Energy Efficiency, the Basis for NZE

- Energy savings from lower energy use
- Ensure cost benefits
- Grid capability & stability
  
- Health/wellness benefits: comfort, indoor air quality, productivity

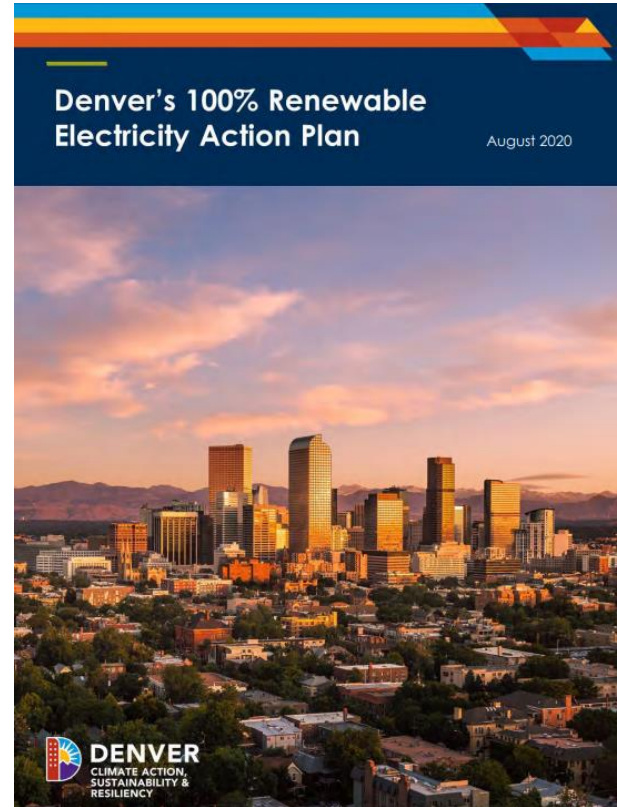
# Balancing Energy



## Denver's 100% Renewable Electricity Action Plan

### Goal:

- Denver's goal is to be powered by 100% renewable by 2030.
- Xcel's grid will be ~80% renewable by 2030.
- Buildings need to fill some of that gap.



# Energy Efficiency Sample Policy Options

- Reduce energy use by a certain percentage
- Reach a certain ENERGY STAR score
- Prescriptive options:
  - Tune-up/RCx
  - Operator training
  - VFD and motor upgrades
  - LED Lighting upgrades
  - Controls installation or upgrade
  - Equipment upgrades
  - Envelope improvements
- Might vary by building size

# Renewable & Demand Flexible Sample Policy Options

## Renewables

- Install onsite solar.
- Pay into a Renewable Energy Fund so the City can build solar gardens

## Demand Flexibility

- Demand response equipment and storage

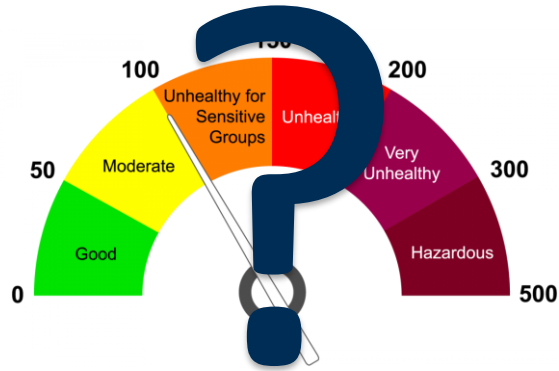
# Electrification

*Building Electrification is “not just a technological solution to climate... [it] works at the intersection of environmental, economic and social justice.”*

*–Emerald Cities Collaborative and NAACP, as part of the Building Electrification Equity Project*



# Health Impacts of Gas Combustion in Homes



- Indoor Air quality is largely unregulated and often worse than outdoor air quality
- Children are particularly vulnerable to pollution from gas appliances. Kids growing up in a household with a gas stove are at a 42% increased risk of developing asthma
- People of color and under resourced communities are the least likely to have carbon monoxide detectors in their home.

# The transition to renewable electric heat is possible today

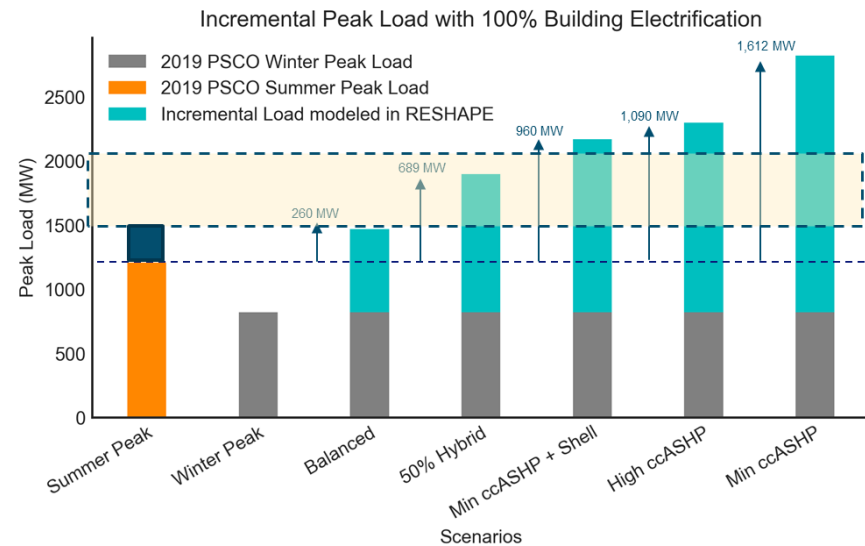
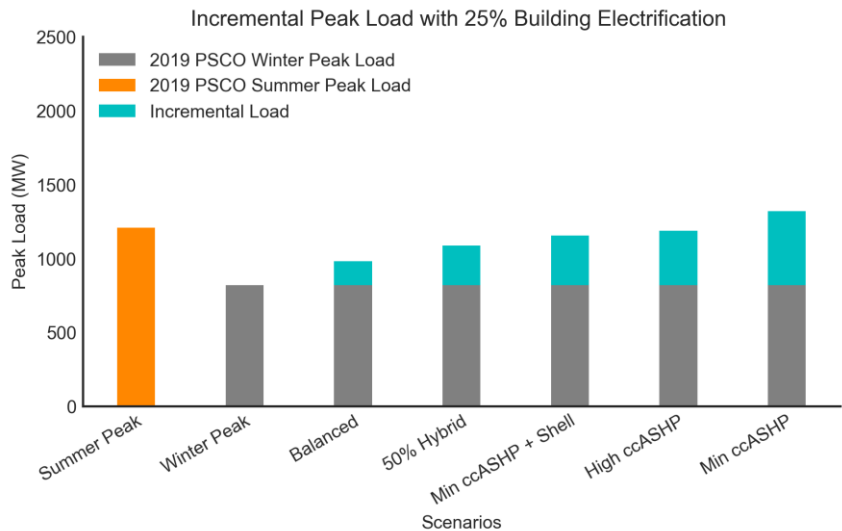
- Heat pumps are 200-300% efficient
- Heat pumps provide heating and cooling
- Like your refrigerator, heat pumps use electricity to move heat from a cool space to a warm space, making the cool space cooler and the warm space warmer.

# Strategic Existing Building Electrification Implementation Plan

*Summer 2020-Spring 2021*

- Stakeholder Engagement
- Building Stock Analysis
- Technology Characterization
- Workforce Needs
- Electric Grid Impacts
- Barriers, Incentives, Policy

# Strategic Existing Building Electrification Implementation Plan – Grid Impacts



# Heating Emission Reduction Sample Policy Options

- Require electrification at time of heating, and water heating equipment replacement (end of life).
- Require heat pumps at time of cooling equipment replacement (end of life).
- Require electrification/heat pumps by all after a certain date.
- Require synthetic/differentiated gas.
- Dates might vary by equipment and/or building type.

# Policy Design Tool and Supports Needed

# Policy Design Tool

- A tool that will let the task force turn on and off different policy options for different building sizes and types and see if they are on track or off track of their carbon budget, cost effectiveness, implementability, renewables goals, and grid impacts.

# Policy Design Tool – mock up

## Energy Efficiency and Renewable Policy Parameters

Large building =	50,000 SF or greater	
	All Buildings	
	25,000 SF or greater	
	50,000 SF or greater	
	100,000 SF or greater	
<b>Buildings Impacted</b>		<b>Small Buildings</b>
# of buildings impacted:	2,100	15,458
% total building area:	72%	28%
% of total commercial energy use:	50%	50%

## Large Building Parameters

Policy Options:	Energy Efficiency and Solar Required	
	Energy Efficiency	Solar
% Energy Reduction Target:	30%	15%
Compliance Start Date:	2025	

## Package Description:

- Potential Implementation Options:
- RCx/ Energy Audit
  - Operator Training
  - Controls Optimization
  - VFD and Motor Upgrades
  - LED Lighting Upgrade
  - Controls Installation or Upgrade
  - Lighting Controls Installation or Upgrade
  - Equipment Upgrades
  - Envelop Improvements
  - Install Onsite Solar PV

## Selected Policy Impacts

	Cumulative Carbon Reduction by 2040	<b>Example Table</b>
<b>Carbon Impact</b>	<b>(tons eCO2)</b>	<b>% Electricity Covered by Renewables</b>
City Goal:	70,382,044	
Benefit of select policies:	40,209,762	
	<b>CARBON REDUCTION GOAL NOT MET</b>	<b>RENEWABLE ENERGY GOAL NOT MET</b>

## Cost Effectiveness

	Implementation Costs (\$/SF)	Change in Operating Cost (\$/SF)	Simple Payback (years)
<u>Large Buildings</u>			
Energy Efficiency Policies			
Solar Policies			
<u>Small Buildings</u>			
Energy Efficiency Policies			
Solar Policies			

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# Supports Needed

## Denver Support:

- Resources
- Staff



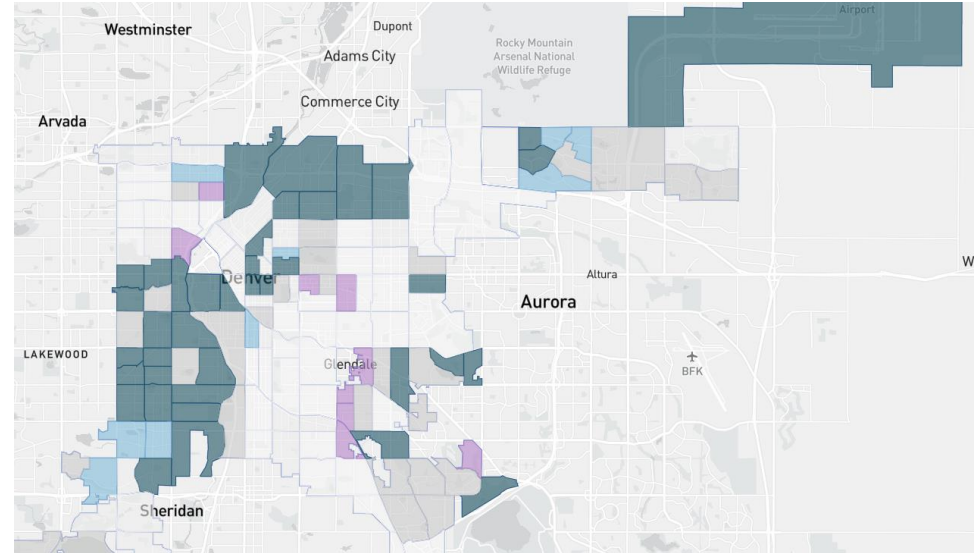
## Community Support:

- Workforce Training
- Outreach and Education
- Financing
- Advocacy
- Education
- Programs

# Social Equity Index

- Tool to help identify under resourced buildings

- Use weighted social equity indicators to develop an index score that can be used to identify under resourced buildings at the census tract level
- GEM Equity Map
  - EX indicators:
    - Utility Burden (gas, water, electric)
    - Income Stress
    - Asthma Rates
    - Racial Composition

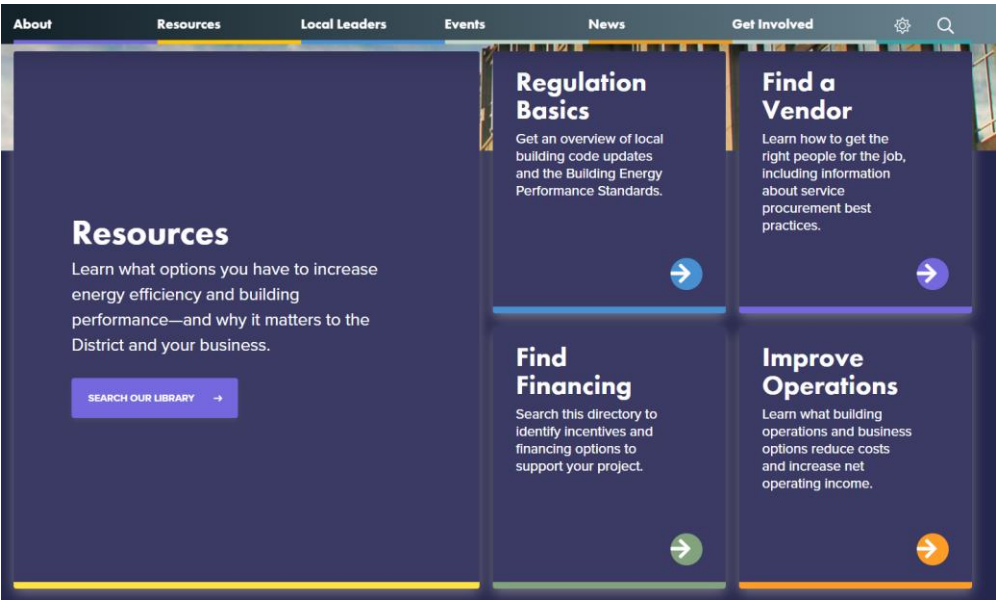


<https://gem.equitymap.org/>

# Building Performance Resource Hub

- A one stop shop for building owners to get supports and resources needed to be successful in meeting the requirements of a building performance policy

- There are different models of hubs other cities with a building performance policy have implemented:
  - Energy Consultant (Boston)
  - Online Resource Hub (DC)
- Survey from benchmarked building owners



<https://buildinginnovationhub.org/> (DC)



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# Thank You!