



# Energize Denver Task Force

Technical Briefing, 7-21-2021

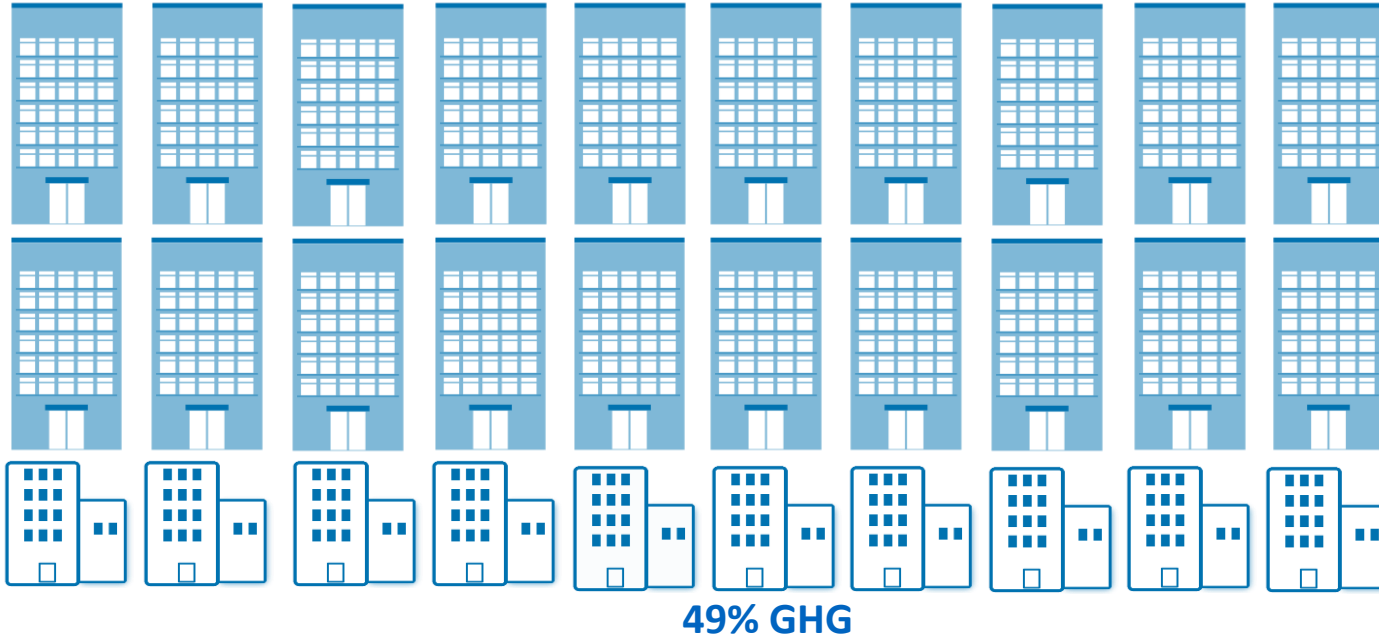


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# Background on City Climate Efforts in Buildings

A summary of work leading up to the Energize Denver Task Force

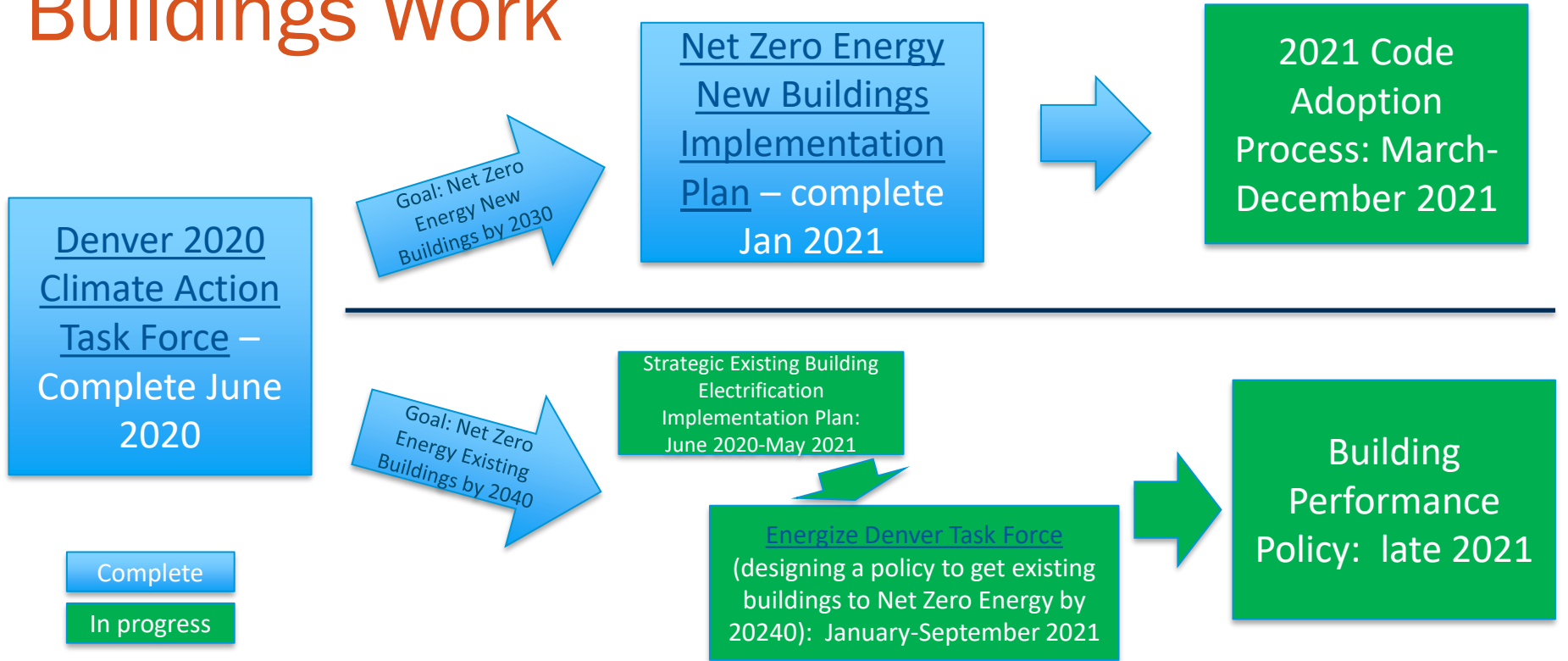
# Commercial and Multifamily Buildings Account for 49% of Denver's GHG Emissions

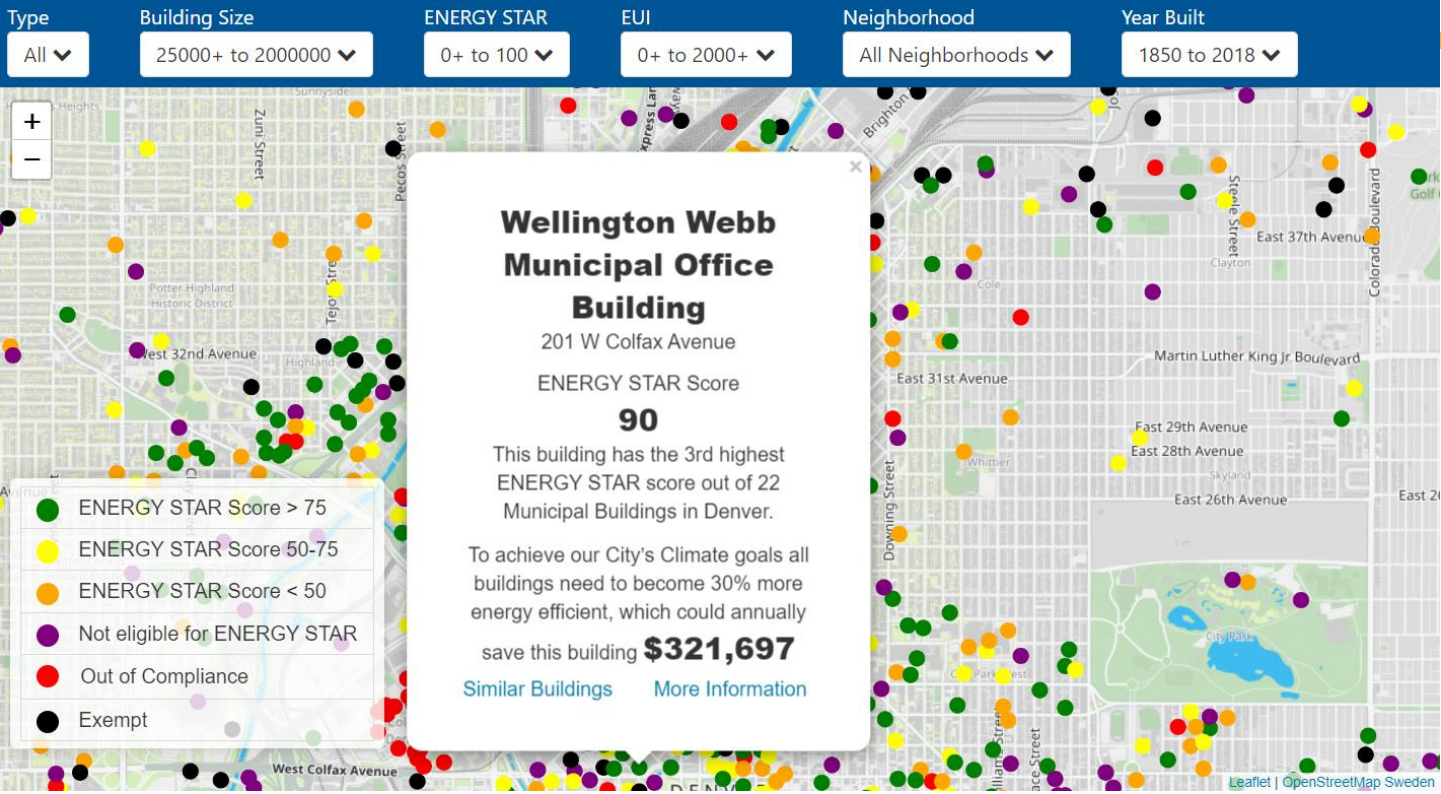


- >25,000 sq ft:
- 82% of square footage
  - **3,000** buildings

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

# Buildings Work





5 years of Benchmarking data: [www.energizeddenver.org](http://www.energizeddenver.org)

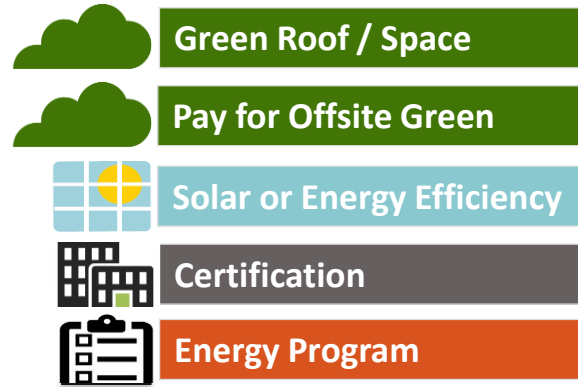
# Green Buildings Ordinance: Existing Buildings

Buildings over  
25,000 sqft

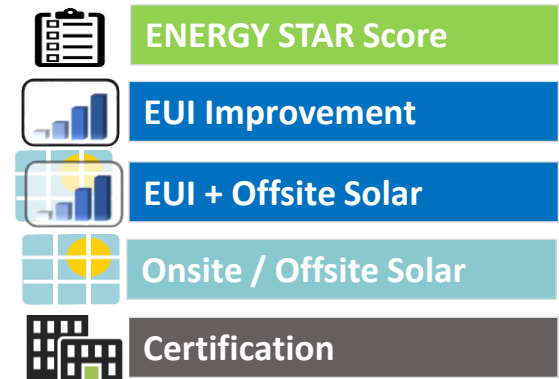


Cool Roof  
Required  
+  
ONE of the  
Following  
Compliance  
Options

## Compliance Options for Existing Buildings



## Energy Program Options



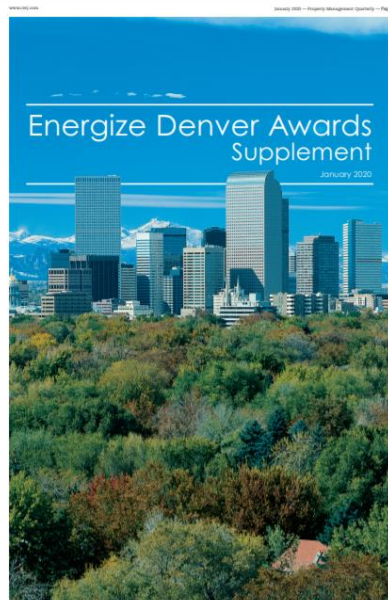


# Energize Denver Awards Nominations are open now!

## Categories:

- Electrification
- Energy Saving Retrofit
- Community Leadership

Submit a nomination at  
[www.denvergov.org/energize-denver](http://www.denvergov.org/energize-denver)



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

# C-PACE Financing Pays 100% of Improvements

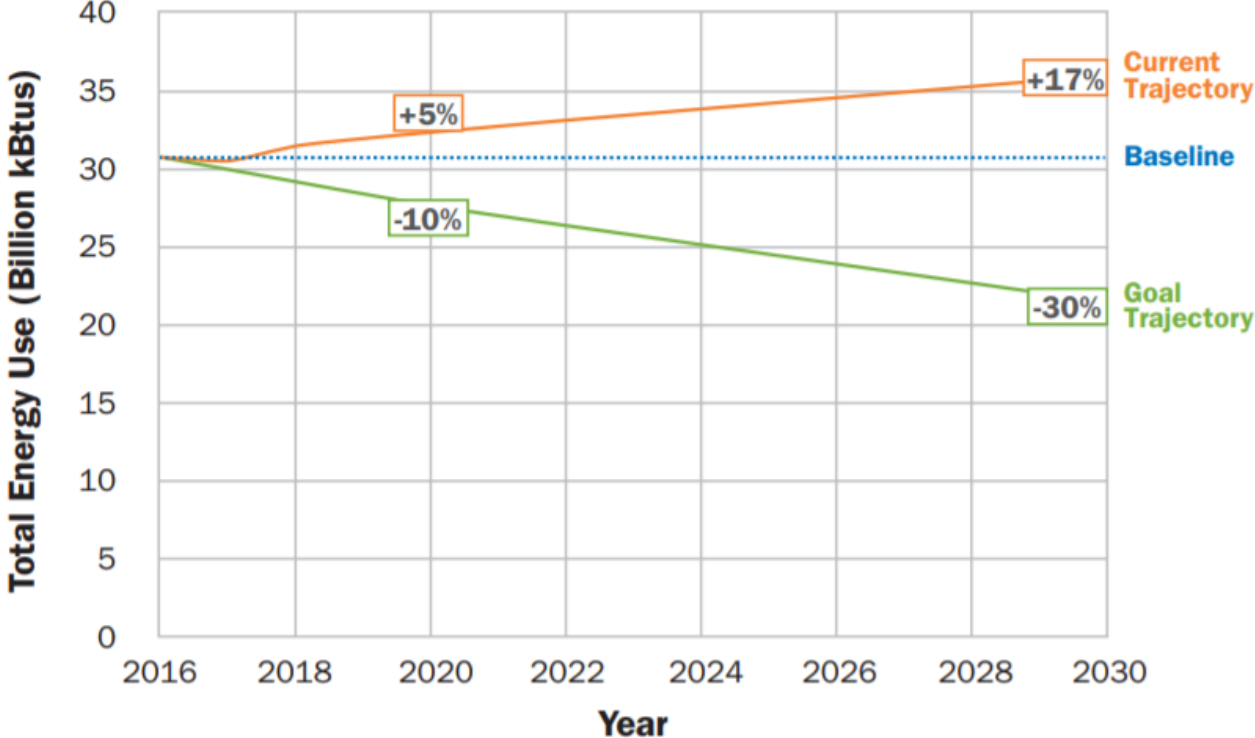
- Energy efficiency, renewable energy, and water conservation may be financed.
- 100% financing, no money down.
- Long term financing, up to 25 years.
- Loan is repaid via a special purpose assessment (akin to sewer assessment).
- Assessment stays with the property on sale. Tenants usually pay assessments.

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





# Progress Towards Goals: All Buildings



# Climate Action Task Force: Existing Buildings and Homes Recommendations Overview

- Implement building performance policy that includes the strategic electrification of all existing buildings & homes so they achieve net zero energy by 2040.
- Equitably enhance affordable housing incentives and low-income programs.



# Climate Action Task Force: Goals for Existing Buildings

2025

## 40% Reduction

- Incentives are in place and effective in ensuring 50% of residential housing implements efficiency, electrification, and indoor air quality measures.
- Requirements for electrification at time of HVAC equipment replacement, no new natural gas equipment.

2030

## 60% Reduction

- 50% of all existing homes and buildings have zero heating emissions and are providers of demand flexibility to the grid.
- Buildings use 30% less energy.
- Incentives are in place to put all existing homes and buildings on a path to net zero emissions.

2040

## 100% Reduction

- All existing buildings have zero heating emissions and are providers of demand flexibility to the grid.
- Buildings use 50% less energy.
- Require that by 2040 all natural gas equipment has been replaced where possible.



# Climate Protection Fund (2A)

- Resident-led and City Council-supported ballot initiative that passed in November of 2020
- New 0.25% sales tax
- Estimated to generate \$35-40M annually to eliminate greenhouse gases and adapt to climate change
- Requires 50% of the fund to directly benefit climate-vulnerable communities

# Renewable Heating and Cooling Plan

*Resilient Existing Building and Homes*

*Released by the City June 2021*

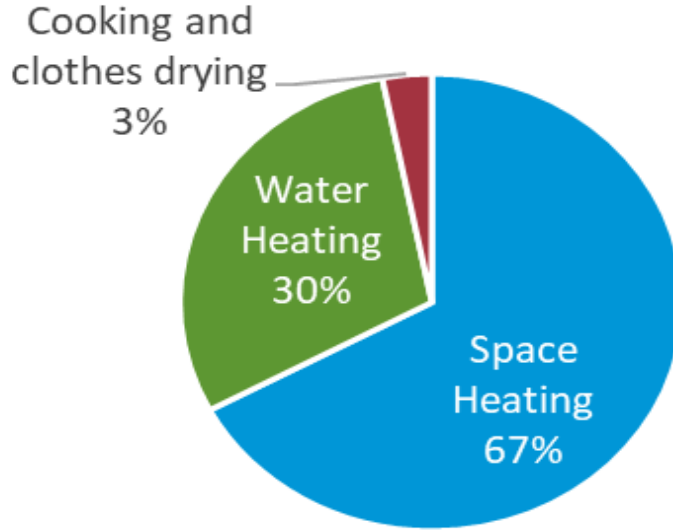
*Background information for the task force's policy recommendations*

## Contents of Denver's Renewable Heating and Cooling Plan

- Engaging the Community
- Why Renewable Heating and Cooling
- The Electric Grid
- Conversion Plan for Major Heating Systems
- Denver's Renewable Heating and Cooling Implementation Strategy



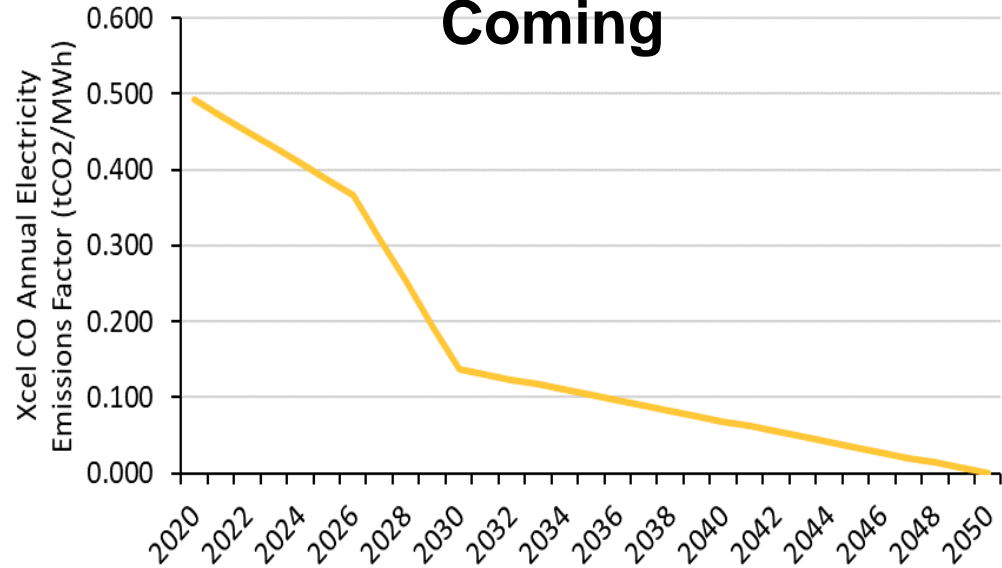
# Gas Use in Buildings and Homes



# High Impact Climate Benefits

- Methane, the primary component of natural gas, is released when we use gas and causes 80 times the amount of climate change as standard carbon dioxide emissions.
- As the grid moves to 100% renewable power, electric renewable heating and cooling is the clear path to reducing these emissions generated by homes and buildings.

## Zero Emission Electricity is Coming



# Heat Pumps

- Heat pumps move heat instead of creating it achieving 200-300% efficiency
- 100% efficiency is based on a source that creates heat



# Improved Equity and Safety

- In 30% of low-income homes in Denver today, gas equipment fails carbon monoxide tests, compared to less than 5% of market rate homes.



# Better Outcomes, Same Cost

- When a furnace, A/C compressor, or hot water heater fails, most homes and buildings can replace it with an electric equivalent with a similar cost for both installation and operation, as they would pay with a new gas system.



# Increases Grid Utilization

- Denver's electric system is already built to withstand high air conditioning load during the summer, therefore winter heating needs can shift to renewable electricity without significant infrastructure build-out.



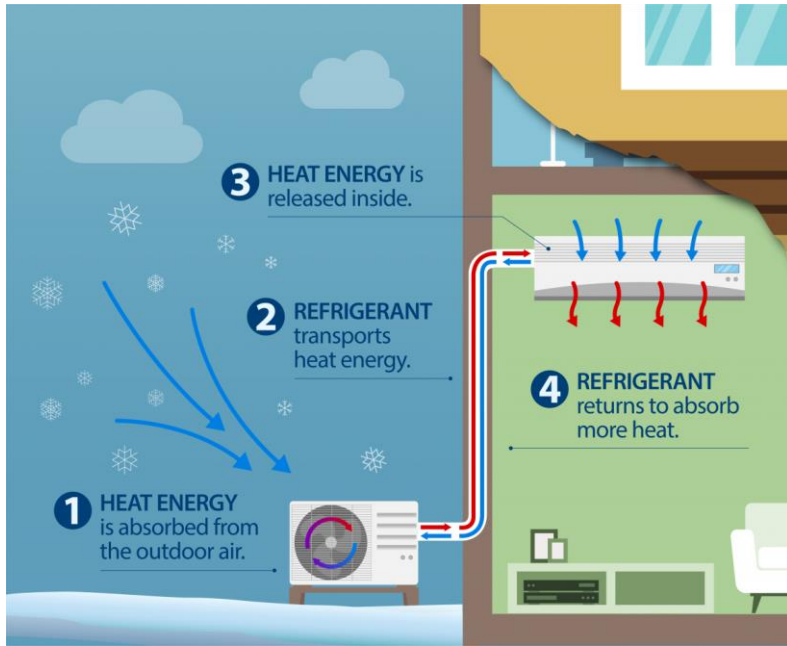


# Proven, Reliable Technology

- Heat pumps have been in use since the 1800s in American refrigerators.
- And, for decades to heat homes and buildings Asia and Europe.



# Space Heating Systems 1 & 2



Furnace



Rooftop Units

# Space Heating Systems 3 & 4



PTAC



Boilers

# What is Cost Effective to Electrify Today

Furnace (32% C&MF)



Rooftop Units (RTU) (25%)



Packaged Terminal Air Conditioner (PTAC) (3%)

**not yet**

Boiler (12%)

**not yet**



# Water Heating Typologies 1, 2 & 3



Individual System with Tank



Central System with Tank



Point of Use

# What is Cost Effective to Electrify Today

Individual System with Tank (96% MFU) (~100% res)



Central System with Tank (48%)



Point of Use (21%)







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# Energize Denver Task Force

DRAFT recommendations as of 7-19-2021

# Charge

The Energize Denver Task Force will help the City design a building performance policy for existing buildings that:

- ***Improves Health and Equity:*** Improve indoor air quality, comfort and health outcomes. Lower energy costs for businesses and improving energy equity. Ensure under resourced communities can thrive under the policy.
- ***Creates Jobs:*** Create clean energy jobs and driving economic recovery from COVID.
- ***Drives Climate Solutions in Buildings:*** Buildings are responsible for over half of the greenhouse gas emissions in Denver today. The task force will design a policy that will require existing buildings to achieve Net Zero Energy by 2040. The task force will help the City design a regulatory path that enables all buildings achieve this goal. Net Zero Energy means highly efficient, all electric, grid flexible, and powered by 100% renewable electricity.

The Energize Denver Task Force is focused on existing commercial and multifamily buildings



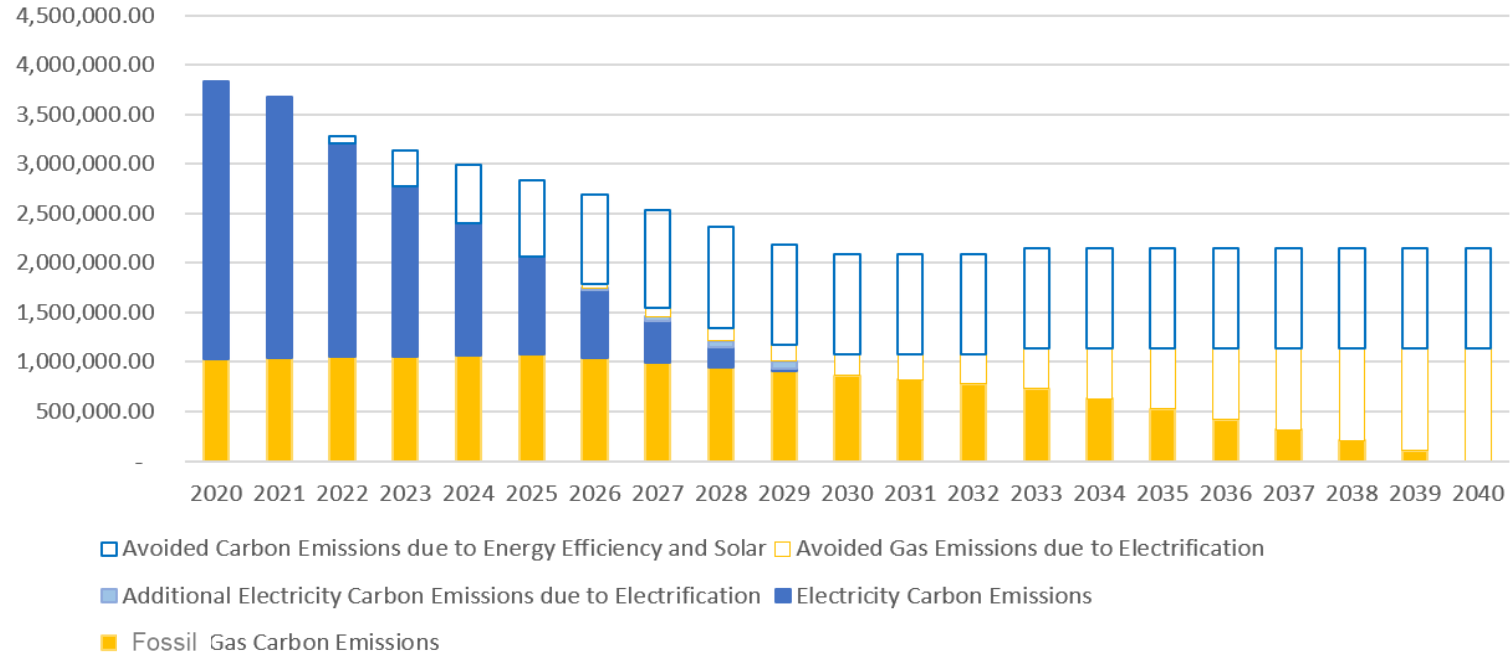
Not single-family homes

# Net Zero Energy

- Highly Energy Efficient
- All-Electric
- Renewable Energy
- Demand Flexible



# Goal of the Task Force: NZE by 2040

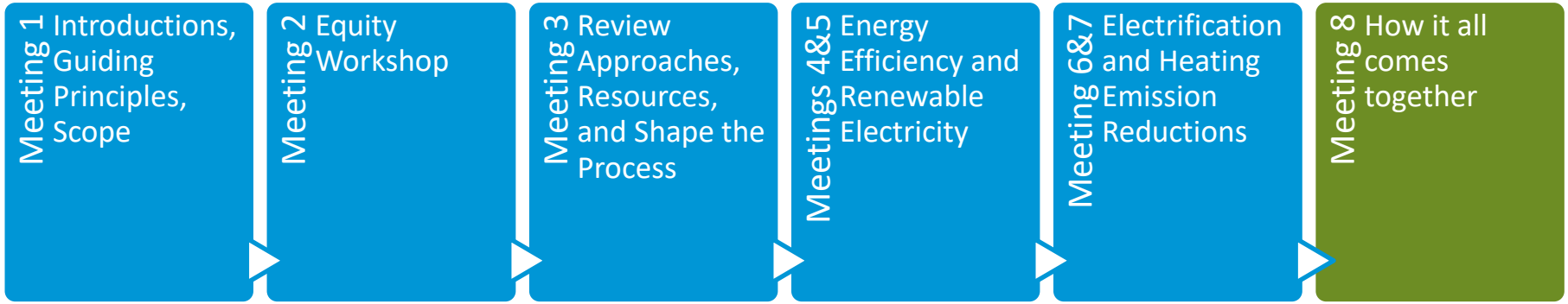


# Energize Denver Task Force Members

Building Owners/Managers	Amie Mayhew, Colorado Hotel & Lodging Association Frank Arellano, LBA Realty Jon Buerge, Urban Villages Kathie Barstnar, NAIOP Colorado Lori Pace, Denver Metro Association of Realtors Peter Muccio, Apartment Association of Metro Denver Stephen Shepard, Denver Metro BOMA
Utility/Oil and Gas	Tyler Smith, Xcel Energy Sam Knaizer, bp, bpx energy Scott Prestidge, Colorado Oil and Gas Association
Residents/Tenants/ Non-Profit Representatives	Aaron Martinez, Urban Land Conservancy Angela Fletcher, Denver Housing Authority Jennifer Gremmert, Energy Outreach Colorado Jonathan Cappelli, Neighborhood Development Collaborative
Labor/Workforce Training	Eddie Bustamante, LiUNA! Local 720 Jennie Gonzales, IBEW 68 Sergio Cordova, Pipefitters Local Union No. 208
Environment/ Clean Energy	Ariana Gonzalez, Natural Resources Defense Council Celeste Cizik, Group 14 Engineering Christine Brinker, Southwest Energy Efficiency Project (SWEEP) Jenny Wilford, Colorado Sierra Club Mike Kruger, Colorado Solar and Storage Association (COSSA) Monique Dyers, Ensign Energy Consulting Steve Morgan, Bolder Energy Engineers, Rocky Mountain Assocx of Energy Engineers
City Council	Jolon Clark, Denver City Council District 7



# Task Force Draft Schedule



Workgroups:  
Equity Workgroup  
Workforce Workgroup  
Climate Solutions Workgroup

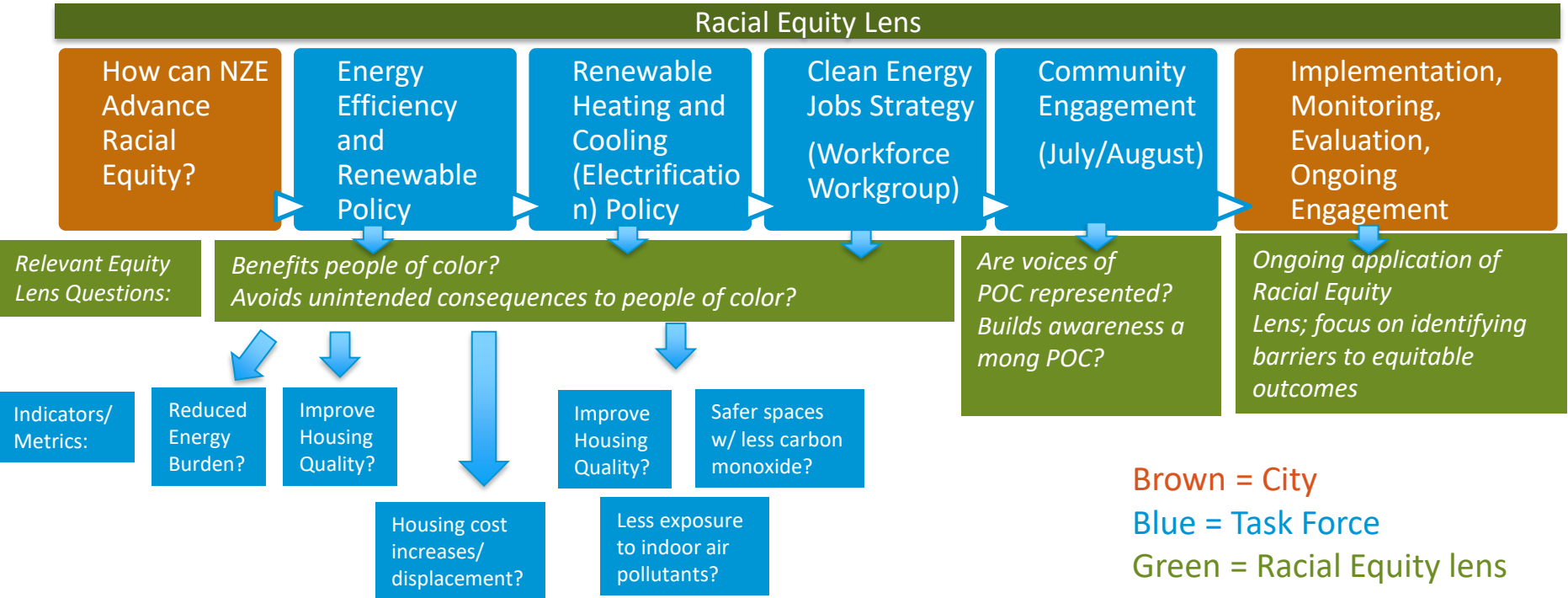


# Racial Equity Lens

We are using a racial equity lens, but it is designed to also promote equity for other historically under resourced groups. We are centering on race because we know data shows designing around people of color raises all boats of other historically under resourced groups. Our goal is to keep the lens on at all times – more like lasik than glasses.

1. Does our process ensure that the voice of people of color is **present**, that the process is **accessible**?
2. Are we ensuring the outcomes **prioritize, provide benefits and improve lives of** people of color?
3. How will this proposed policy or decision be **perceived by** people of color?
4. Does this policy or decision ignore or worsen existing disparities or produce unintended consequences?
5. What are the barriers to more equitable outcomes? (e.g. mandated, political, emotional, financial, programmatic, or managerial).
6. **CHECK POINT:** Based on the above responses, what revisions are needed in the decision under discussion? Are there other things to take into consideration?

# Racial Equity Roadmap



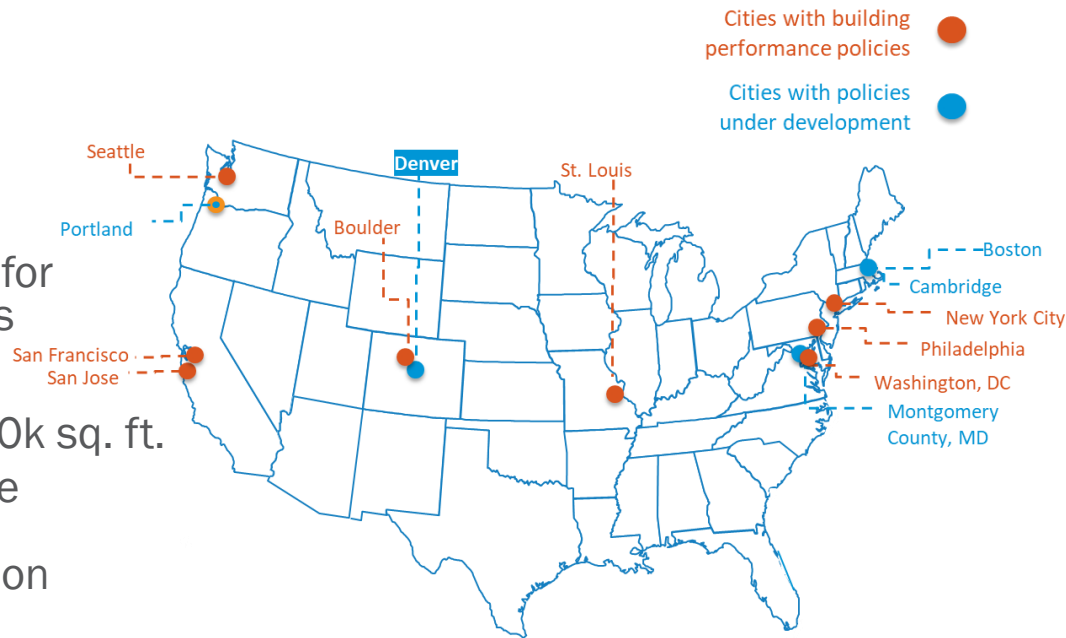
# What have other cities done

**Seattle, WA:** Requires building tune-ups for buildings over 50k sq. ft. every five years

**St. Louis, MO:** Requires buildings over 50k sq. ft. to exceed performance of 65<sup>th</sup> percentile

**New York City, NY:** Requires 40% reduction in carbon intensity (Co2/sqft) by 2030

**Washington DC:** Requires 20% reduction in energy every five years from all buildings over 10k sq. ft.



# Colorado HB 21-1286: Energy Performance for Buildings

The final bill applies only to buildings above 50,000 square feet and includes the following:

- Benchmarking starting in 2022 with 2021 data,
- A task force that will develop the performance standards to reach a minimum of 7% GHG savings by 2026 and 20% GHG savings by 2030 across covered buildings.

# Policy Design Tool

- A tool that 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

## Energy Efficiency & Renewable Energy Policies

### Policy Inputs

#### Energy Efficiency and Renewable Policy Parameters

Large building =

#### Large Building Parameters

EUI Reduction Target:

Date:

Average EUI Reduction Target:

#### Small Building Parameters

Policy Path:

Number of Phases:

### Selected Policy Impacts

#### Carbon Impact

Task Force Goal  
Benefit of EE & RE policies  
Benefit of electrification policies  
Benefit of all policies

#### Cumulative Carbon Reduction by 2040

Task Force Goal	13,744,214
Benefit of EE & RE policies	7,265,364
Benefit of electrification policies	3,575,939
Benefit of all policies	10,841,303

**CARBON REDUCTION GOAL NOT MET**

Annual Policy Benefit to Denver

#### Cumulative avoided social cost by 2040

Annual Policy Benefit to Denver	\$824,981,265
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#### Implementability

Buildings Impacted  
# of buildings impacted  
% total building area  
% of total energy use

	Large Buildings	Small Buildings
# of buildings impacted	3,400	14,158
% total building area	82%	18%
% of total energy use	76%	24%



# Energy Efficiency and Renewable Energy

*DRAFT policy recommendations*

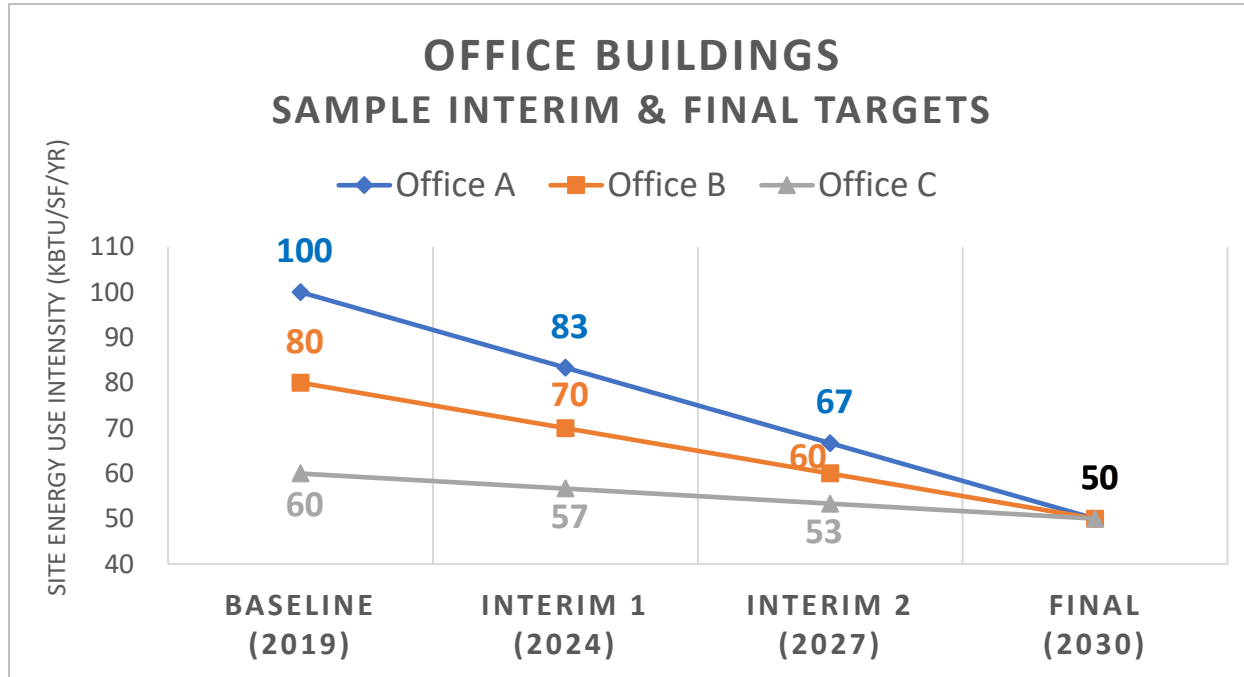
# EE/RE options considered

1. Performance with prescriptive back-up
  - Final EUI and interim targets set for every building
  - Onsite solar can counts fully
  - Prior to fines, consider customer performance plans or prescriptive packages
2. Performance only
  - ENERGY STAR Score 75 or higher OR improvement score by 15 points
  - EUI sector-specific targets or 15% reduction in 5 years
  - On-site solar reduces requirements
3. Prescriptive with performance options
  - Must undertake: tune-up, audit, Lighting upgrade, VFD and motor upgrades
  - Exemptions exist for meeting performance targets, custom compliance plans, can be tiered to require more measures from lower performing buildings

# 30% Improvement in Energy Performance by 2030

- All buildings over certain **size** covered 25,000 sq ft
- Long-term **performance target** created for each building type, measured through Energy Use Intensity (**EUI**)
- Required **interim** targets for 2024 and 2027 set for **each building**, by drawing straight line from the building's baseline EUI to final EUI target
- **Solar** on-site fully credited towards energy use, directly lowering a building's net EUI
- Credit for **high performers**: the 15% of buildings that already meet the target EUI for that building type (or better) need no further action

# 30% Improvement in Energy Performance by 2030



# Target EUI's for different building types

Property Type	2030 Target EUI
Multifamily Housing	45
Office	50
Hotel	62
Medical Office	72
Non-Refrigerated Warehouse	31
Distribution Center	28
Self-Storage Facility	8
Strip Mall	73
Supermarket/Grocery Store	167
Retail Store	47
Senior Care Community	68
College/University	62

# 3-year compliance cycles

**2022** City communicates target EUI's, steps to take, resources available in early 2022 to allow time for planning and budgeting for improvements in 2023.

**2023** Building owners and managers:  
Complete initial quick-payback improvement projects and tune-ups.  
Begin to plan for alternate timelines or end goals if that seems necessary for a building.

**2024** Interim Compliance Year  
Energy usage data from Jan-December this year will count for compliance.

**2025** June 1: Reporting Deadline to demonstrate compliance with 2024 target.  
City supports development of alternate timeline plans where targets are missed.  
*City communicates 2027 targets, encourages planning and budgeting for improvements in 2026 to reach 2027 targets.*

# Alternate Compliance Option 1: Request a Different Compliance Timeline

- Apply for a timeline that is more cost effective or feasible. Allows upgrades to be timed around :
  - End of system life
  - Refinancing for capital constrained affordable housing
  - Major renovation
  - Change in major tenant.
- Application should include:
  - Reason for the delay
  - Simple plan for achieving target EUI in the future
  - Proof that easy items have been completed



# Alternate Compliance Option 2: Adjust the End Goal

- A building's target EUI can be adjusted due to:
  - Inherent characteristics of the building
  - Substantial change in use (ex – new data center or 24 hour call center moved in)
- A standard analysis that a building owner can hire an engineer to complete will be developed to adjust targets.

# Alternate Compliance Option 3: Prescriptive Option

- Buildings 25,000-100,000 square feet
- Prescriptive steps count in 2024 and 2027
  - Electrify space and water heat (partially or fully)
  - Verify they have all-LED lights (honor system, City will spot check)
- Building still needs to meet it's 2030 EUI target, but these two steps should get most buildings most of the way there.

# Alternate Compliance Option 4: Manufacturing/Agriculture

- Option for a building where a manufacturing or agricultural process uses significant energy (not a distribution center or warehouse).
- Rules to be developed by manufacturing and agricultural stakeholders to achieve 30% savings by 2030 across this sector.
- One option: Use [ENERGY STAR Energy Performance Indicators for plants](#) and achieve and maintain a score of 75 or higher.

# Penalties

- Fines should be more than the cost of compliance.
- Higher for buildings with an alternate compliance timeline.
- City should explore mechanisms to ensure new owners know the compliance status and obligation, and that alternate compliance timelines are met while ensuring equity.

# Renewable Heating and Cooling (Electrification)

*DRAFT policy recommendations*

Electrification Policy Options Considered	Pros	Cons
<p><b>Full Electrification</b> of all system types starting in 2023 at end of equipment life, all out by 2040.</p>	<p><b>Greatest GHG reductions</b> Begins the energy transition for all buildings and system types</p>	<p><b>Impacts to energy bills (up to 19%)</b> <b>Large incentives needed</b> Large buildings would have to comply “twice”</p>
<p><b>Partial electrification</b> for systems that have <b>capital and operating cost parity</b> (when paired with incentives) starting in 2023 at end of equipment life.</p>	<p>Lesser, but still significant GHG reductions (<b>4.2 vs 5.5 MM tons CO2e</b>) <b>No or minimal change in energy bills (0-5%)</b></p>	<p>Still a need for <b>millions in incentives</b> to maintain capital cost parity</p>
<p><b>Partial electrification with capital and operational cost parity</b> with no incentives at end of equipment life.</p>	<p><b>No change in annual bills</b> Large buildings would only comply with one policy Minimal incentives needed</p>	<p><b>Only 2.5 MM tons CO2e</b> <b>Does not start transition for PTACs, boilers or water heating</b></p>

# Policy and Incentive Recommendations

## Step 1

- Incentives for Electrification Schematic Design and Costing

## Step 2

- Permitting East Equal: Make the permitting process equal because permitting a heat pump is harder than gas system today.
- Incentives for Heat Pumps for All Buildings

## Step 3

- Require heat pumps when systems are replaced.
- Incentives for Heat Pumps for only Under resourced Buildings



# Furnaces, RTU's, Individual Systems with Tanks, Gas Point of Use: Incentives and requirements upon System Replacement

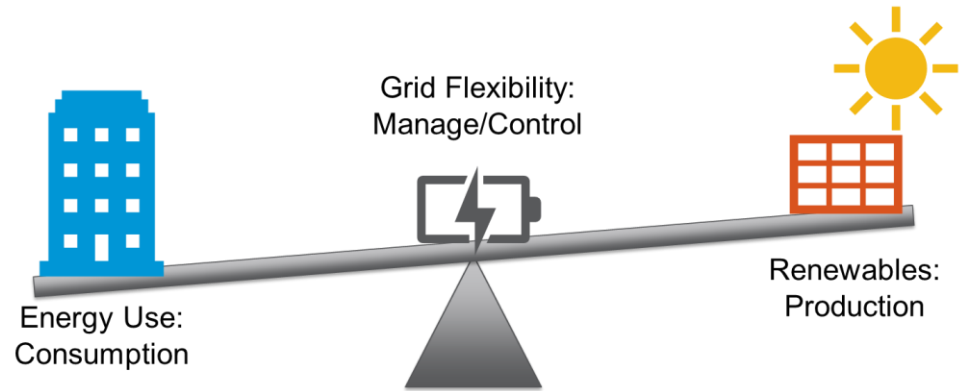
Building Heating System	2022	2023	2025
Gas Furnace	Step 1: Pay for electrification schematic design	Step 2: Incentivize heat pump replacements.  Permitting Difficulty Equal	Step 3: Heat pumps required as the primary heating source (with fossil gas back-up allowed for space heat, and electric resistance allowed for point of use).  Incentives only for under resourced buildings.
RTU			
Individual System with Tank			
Gas Point of Use System			
<i>Total</i>			

# PTAC's, Boilers, Central Hot Water: Incentives and Requirements upon system replacement

Building Heating System	2023	2024	2025	2027 (or when partial electrification nears cost parity)
PTAC's	Step 1: Pay for electrification schematic design and costs	Step 2a: Incentivize heat pump replacements for PTACs, and electrification options for boilers and central systems with a tank.	Step 2b: Permitting Difficulty Equal	Step3: PTAC: Heat pumps (PTHP) required as the primary heating source (with fossil gas back-up allowed).  Boilers and central systems: Have to convert, at least partially, to heat pumps if they can, and if no heat pump for your application then not required.  Incentives only for under resourced buildings to meet requirements.
Boilers				
Central System with Tank				
<b>Total</b>				

# Providers of demand flexibility

All water heaters installed in commercial buildings should be compatible with the ANSI/CTA-2045 demand response protocol so that they can be providers of demand responses to the grid.



# Support and Incentives

*DRAFT policy recommendations*

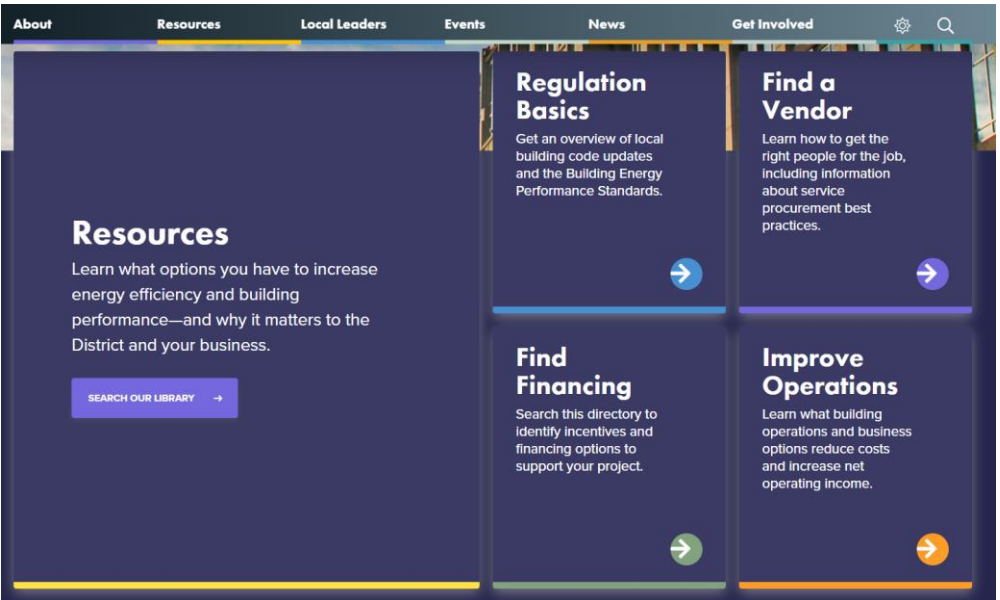
# Incentives, Supports and Outreach

- Performance **Portal**
- Web **Resources**
- **Materials**: how-to guide, check lists
- Targeted **Outreach** and **Education**
- **Technical** Assistance
- **Financial** Assistance
- Community **Engagement**
- Recognition/awards

# 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

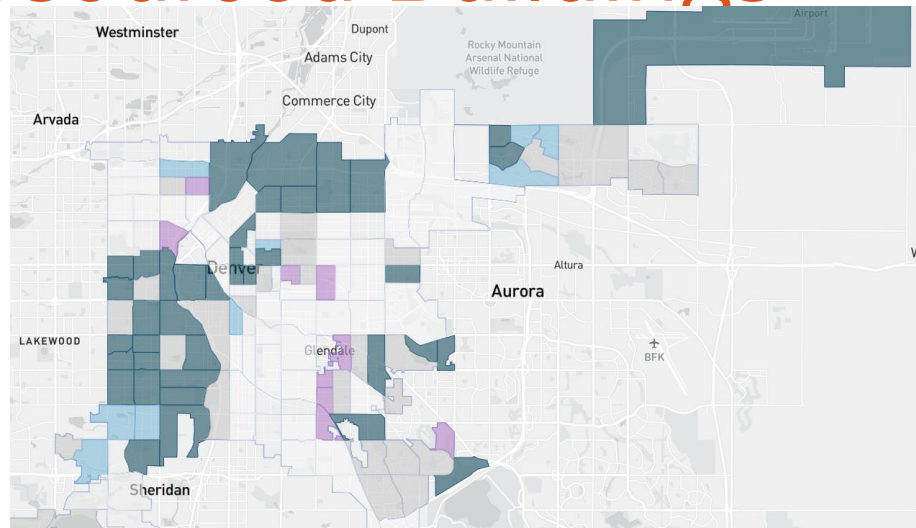
- There are different models of hubs other cities with a building performance policy have implemented:
  - Energy Consultant (Boston)
  - Online Resource Hub (DC)
- Survey from benchmarked building owners



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

# Identifying Under Resourced Buildings

- Buildings serving under resourced communities and people of color or have clear financial, health, or resiliency needs will be identified through a vetting process.
- Buildings with high scores on the Social Equity Index will be presumed under-resourced as part of the vetting process.
- The process should actively facilitate participation of under-resourced buildings that serve people of color or low-income neighborhoods.
- Buildings that are not shown to serve people of color or low-income neighborhoods will be screened out of the process.



Use weighted social equity indicators (**utility burden, income stress, asthma rates, racial composition**) to develop an index score that can be used to identify under resourced buildings at the census tract level



# Incentive Design and Implementation: Principles to Promote Equity

**Phase 1:** Incentivizing Early action for all buildings – with focus on intensive outreach to under resourced buildings (50% target)

**Phase 2:** Helping Under resourced Buildings with Compliance

**Phase 3:** Phase out when cost parity is achieved (with or without utility incentives)

**Ongoing:** Advocate for incentives from others, fit City incentives with those.

# Supports and Outcomes for Under Resourced Buildings

1. Additional technical assistance
  - energy assessments and one on one consultative services.
2. Additional Financial Assistance
  - a. Incentives to achieve cost parity relative to gas systems
  - b. Additional project funding/subsidy by verification

The incentive program should achieve:

1. Energy cost reductions for low-income residents
2. Protection against rent and/or housing cost increases for low-income residents to the extent feasible.
3. Improved health outcomes + lowered health costs for EJ communities

# City Incentive Standards

## (Workforce Workgroup Recommendations Part 1)

The City should ensure City incentive dollars support women and minority owned businesses and high-road jobs through labor standards that ensure job quality and equitable job access. To do that, the City should require contractors to meet one or more of the following requirements to utilize incentive dollars:

1. Women and Minority Owned Business
2. Commitment to high-road labor standards and prevailing wage

# Workforce Training

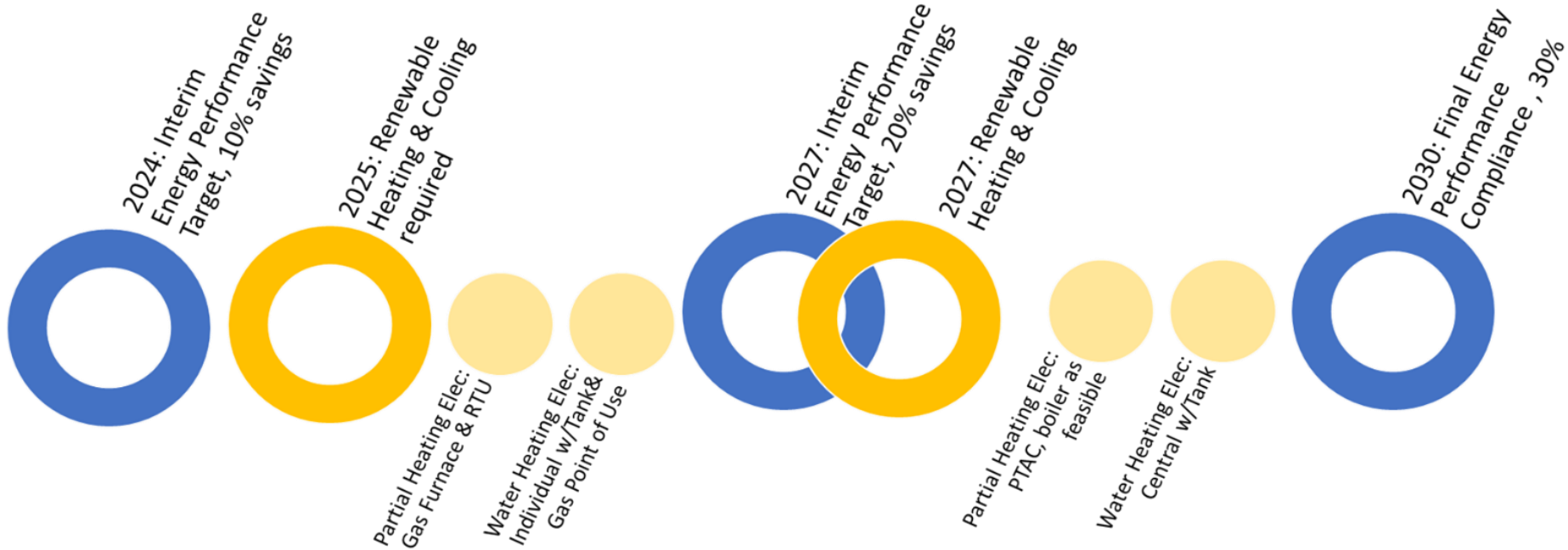
# Workforce Training

## (Workforce Workgroup Recommendations Part 2)

1. **Equitable Access:** Outreach and education to give equitable access to clean energy jobs to people from under-resourced communities, BIOPC & Women
2. **Training Programs and Pathways**
  - a. develop a pipeline of entry level workers
  - b. upskill current workers

# Bringing it all Together

Initial check-in



# Implementation



# Equitable Implementation and Evaluation

- Ensure measurable outcomes by using the identified focus areas, indicators, and metrics
- Develop a Social Equity Index in 2021 to understand impacts and trends over time
- Develop and scope outreach to these buildings beginning in 2022
- Develop incentives and supports
- Develop programs and tools to prevent increased cost burdens and associated gentrification and displacement. The City should work to prevent additional rent burdens on people of color, low-income people, and community-serving businesses or nonprofits.
- Ensure ongoing community outreach to communities and people of color
- Use the mechanism to update policy based on racial equity outcomes
- Ensure funding is assessed based on racial equity

# Technical Advisory Committee

- Role: Ongoing review of adjustments to targets and timelines, racial equity outcomes, and incentives design and amounts.
- Every 5 years: Larger review of compliance options and changes in technology.
- Representation: Property managers, Tenant/resident interests, building energy experts, labor, environmental groups.

# City Staffing

CASR: 5 new staff to implement the policy, more for incentives and community engagement.

CPD: tbd by the August meeting on staffing needs to support electrification permitting.

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# Next Step:

# Tell the task force what you think

Take the Survey by July 29<sup>th</sup>!

<https://www.surveymonkey.com/r/M65BFJK>



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# Thank you!