Designing the Right Building Performance Standards for Your City

Wednesday, 6/14 at 1:15pm

- Ariana Vito, City of Santa Monica
- Ammon Reagan, City of Berkley
- Shelby Buso, City of San Diego

BPS Overview

Additional content provided by the Institute for Market Transformation (IMT) and Building Electrification Institute (BEI)

City of Santa Monica

What is a Building Performance Standard?

- Establishes requirements for existing buildings to improve performance over time
- Applies to buildings over a certain size on preset dates
- *Example: Buildings >50,000 sf reduce site EUI 50% by 2030 and 100% by 2050*

Why BPS?

- Buildings contribute up to 70% of carbon emissions in U.S. cities
- Existing buildings = less efficient and more polluting
  - public health and safety hazards from air pollution, poor-quality construction, maintenance deficiencies
- Biggest bang for our buck → targets the largest buildings
- Spur energy improvements - only ~2% of commercial buildings and < 0.3% of multifamily buildings are upgraded annually (BEI)

What Are the Equity Opportunities of a BPS?

High-road jobs and economic opportunities for historically marginalized populations

Reduced housing and energy costs, provided there are protections for low-income residents and tenants

Health, safety, comfort, and resiliency benefits that could be delivered to those who need them most

The State of Building Performance Standards in the U.S.

March 2023

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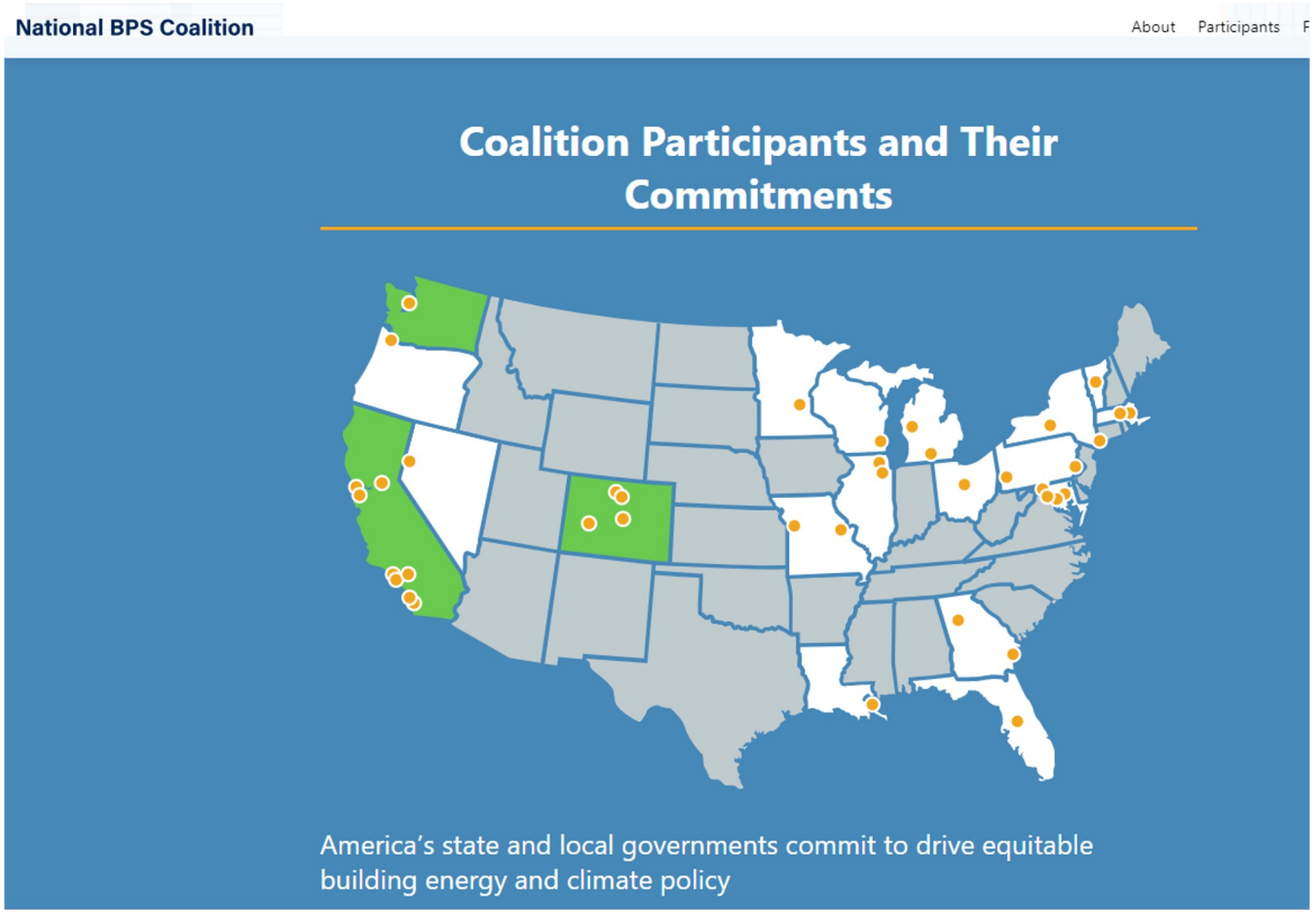
TRANSFORMATION

National BPS Coalition

- >40 cities, including San Diego, Berkeley, and Santa Monica
- Commitment to develop or adopt a BPS by Earth Day 2024



Building Performance Standards in U.S. Cities*

New York City, NY

Building Size: >25,000 sq. ft.

Building Types: Commercial and Multifamily

Metric: GHG emissions per sq. ft.; separate prescriptive measures for affordable housing

Compliance Timeline: Targets set every 5 years between 2025-2050

Washington, DC

Building Size: >10,000 sq. ft.

Building Types: Commercial and Multifamily

Metric: Options of site EUI per sq. ft., ENERGY STAR, prescriptive pathway, or alternative compliance pathways

Compliance Timeline: Targets set every 6 years beginning in 2021

Denver, CO

Building Size: >25,000 sq. ft.

Building Types: Commercial and Multifamily

Metric: Site EUI per sq. ft. plus addl. electrification requirements at time of appliance replacement

Compliance Timeline: Targets set every 3 years between 2023-2030

Boston, MA

Building Size: >20,000 sq. ft.

Building Types: Commercial and Multifamily

Metric: GHG emissions per sq. ft., plus alternative compliance pathways

Compliance Timeline: Targets set every 5 years between 2025-2050

St. Louis, MO

Building Size: >50,000 sq. ft.

Building Types: Commercial and Multifamily

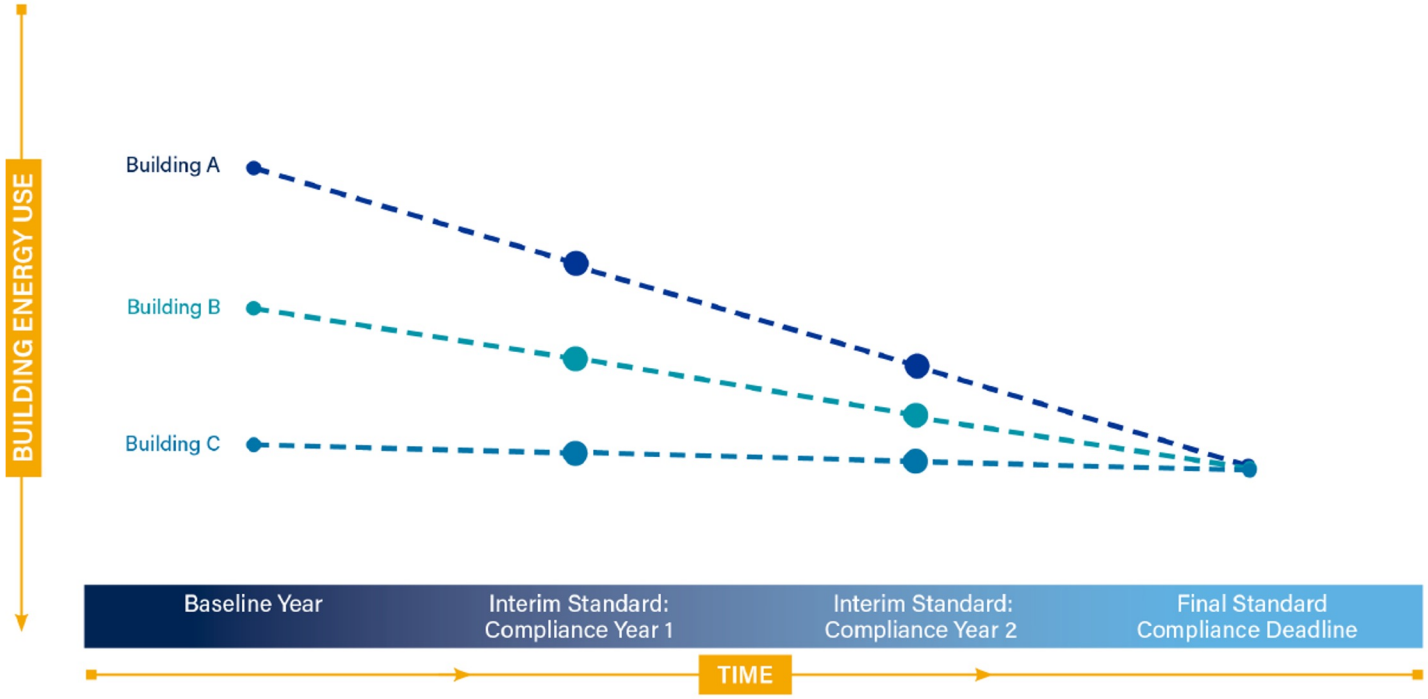
Metric: Site EUI per sq. ft.

Compliance Timeline: Targets set every 5 years beginning in 2020

Building Electrification Institute

*U.S. cities with building performance standards as of July 2022

Example: Final and Interim Standards for 3 Office Buildings



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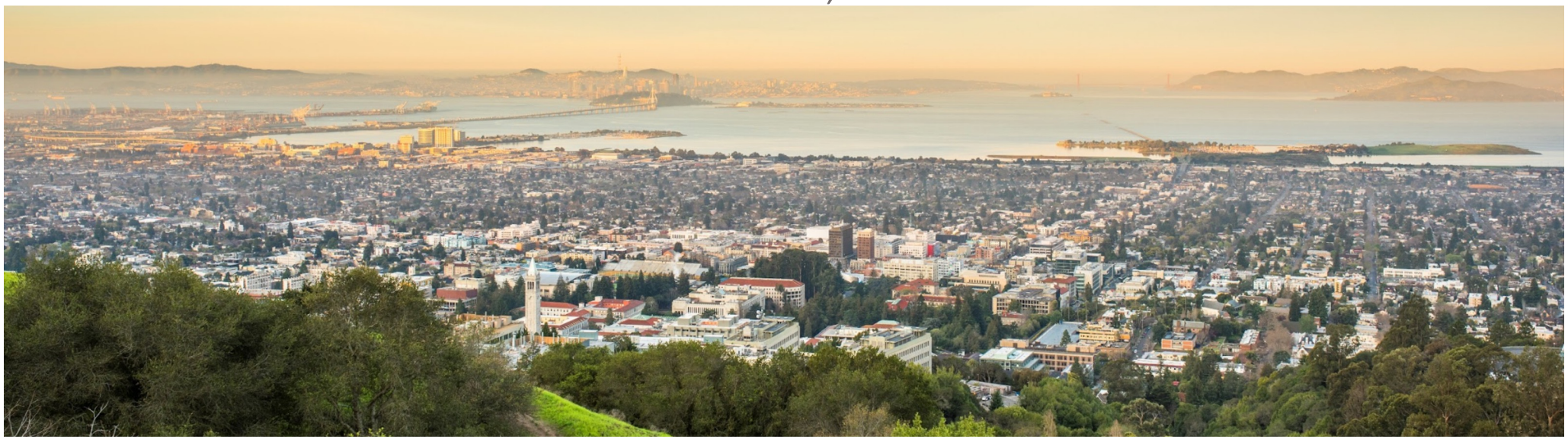
Berkeley's BPS Future

Ammon Reagan, Sustainability Program Coordinator

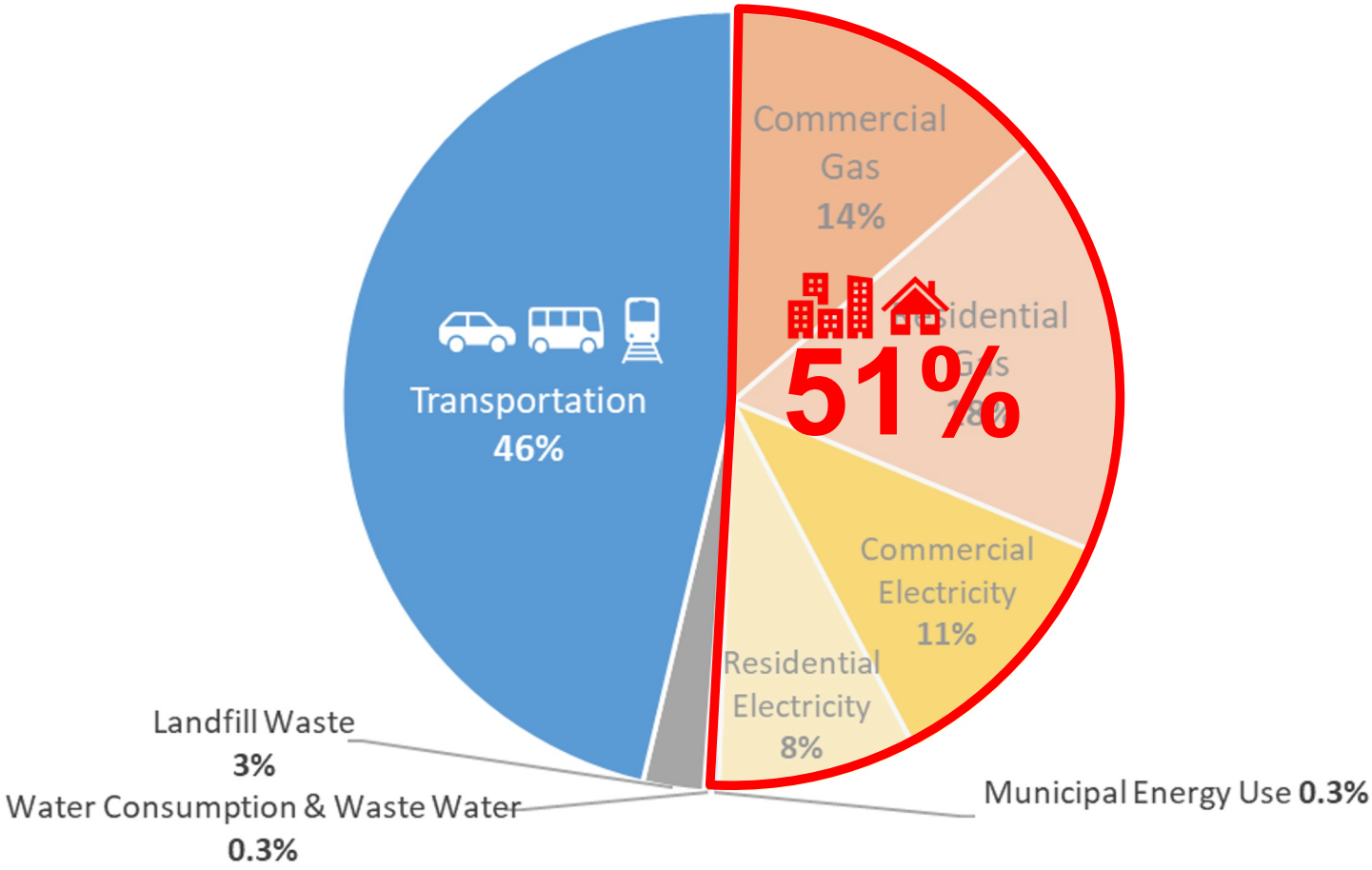
June 14, 2023



Berkeley's Ambitious Climate Action Goals

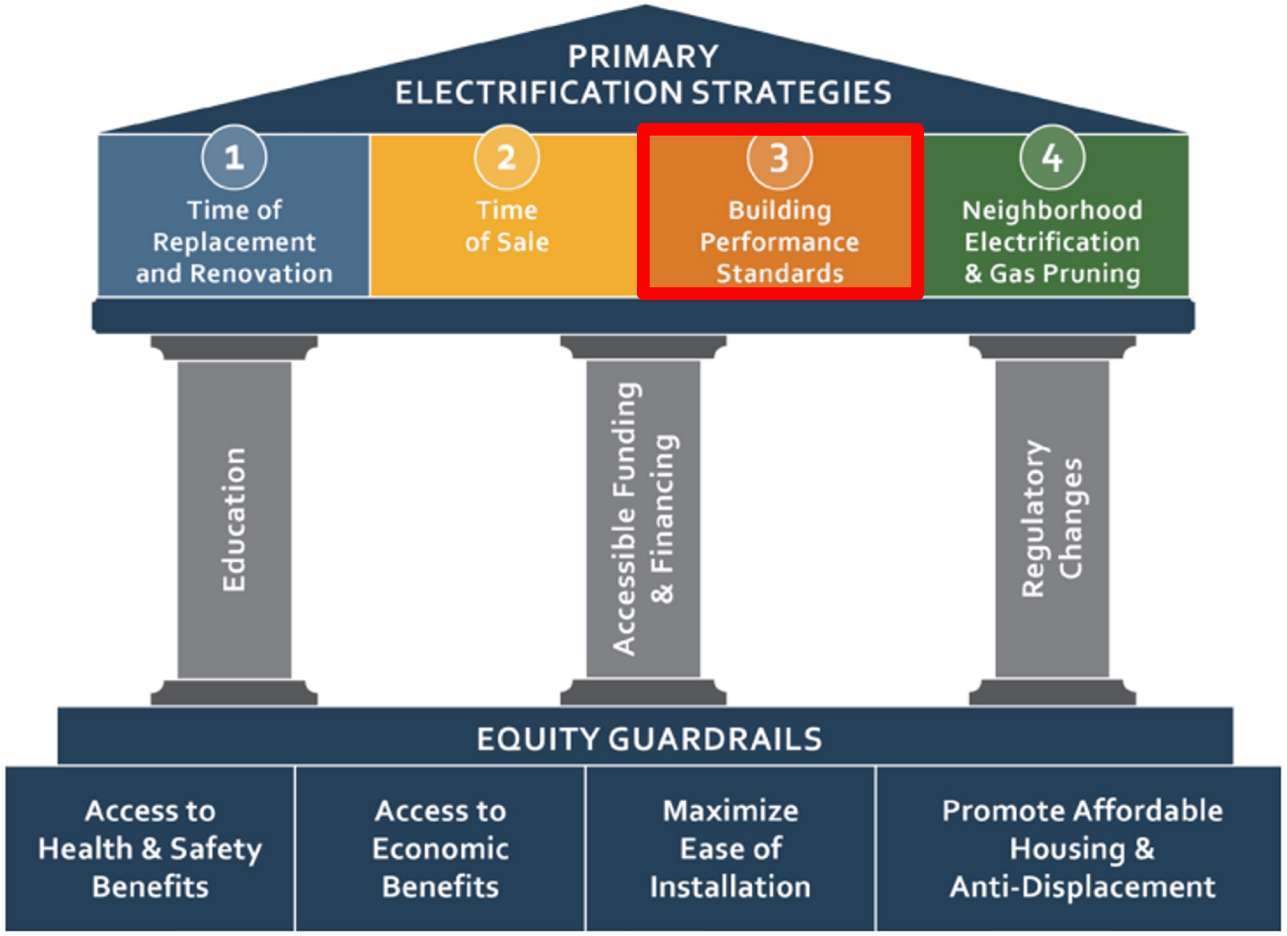
- Climate Action Plan (2009)
- Fossil Fuel Free City (2018)
- Climate Emergency Declaration (2018)
- Net Zero Carbon Emissions by 2045 (2018)
- Race to Zero (2021)
- National Building Performance Standards Coalition (2023)

Existing buildings are key



*Based on Berkeley's 2020 GHG emissions inventory

Berkeley's Existing Building Electrification Strategy



Berkeley's History with Energy Efficiency

1987 .. RECO .. Homes required to complete 11 minimal energy efficiency measures at sale, transfer, or major renovation

1993 .. CECO .. Commercial buildings required to meet minimal energy efficiency measures at sale or transfer

2009 .. Berkeley Climate Action Plan ..  Buildings

Reduce Emissions 30% by 2020
80% by 2050

2015 .. **B**uilding **E**nergy **S**aving **O**rdinance

2020 .. **B**uilding **E**MMISSIONS **S**aving **O**rdinance

Covers all buildings…

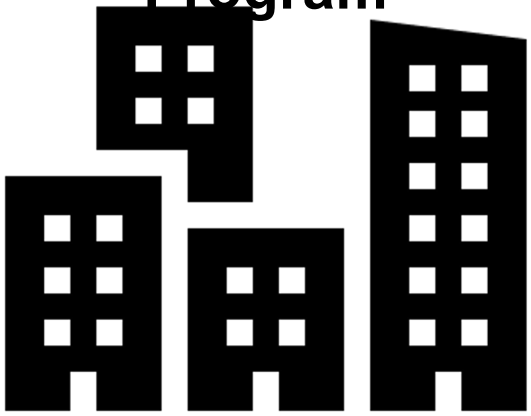
Covers all buildings…

Building Emissions Saving Ordinance

Time of Sale Program

Buildings **less** than 25,000 sqft

Large Building Program



Buildings **greater** than 25,000 sqft

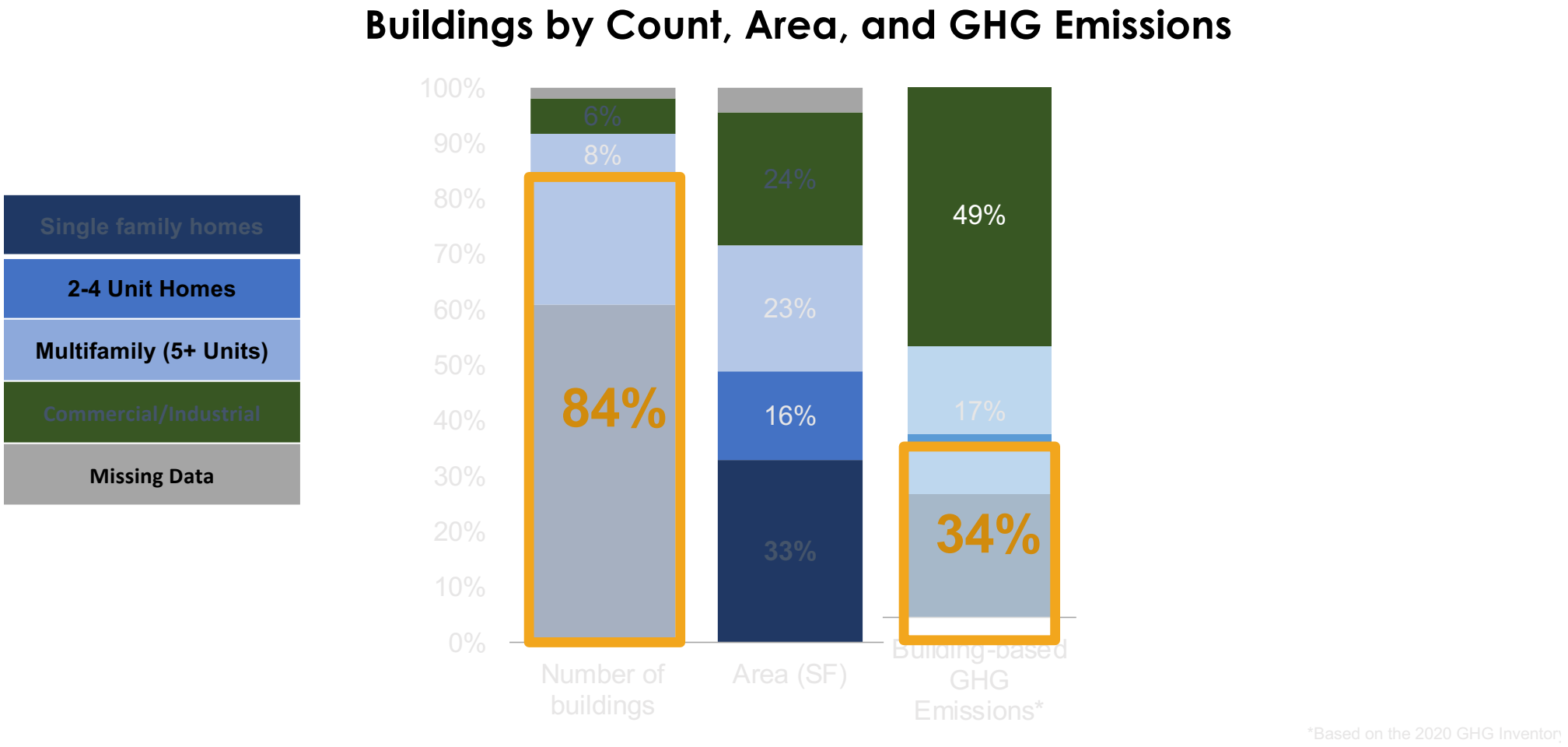
BESO - Time of Sale Program

- Requires an **energy/electrification assessment** prior to listing a building for sale.
  - Home Energy Score for Single family homes
  - Provides information to potential buyers

- Refers building owners into local incentive programs to complete voluntary upgrades

“BPS” for Small Residential

Emissions from Small Residential Buildings



Annual turnover of 1-4 unit buildings

2-3%

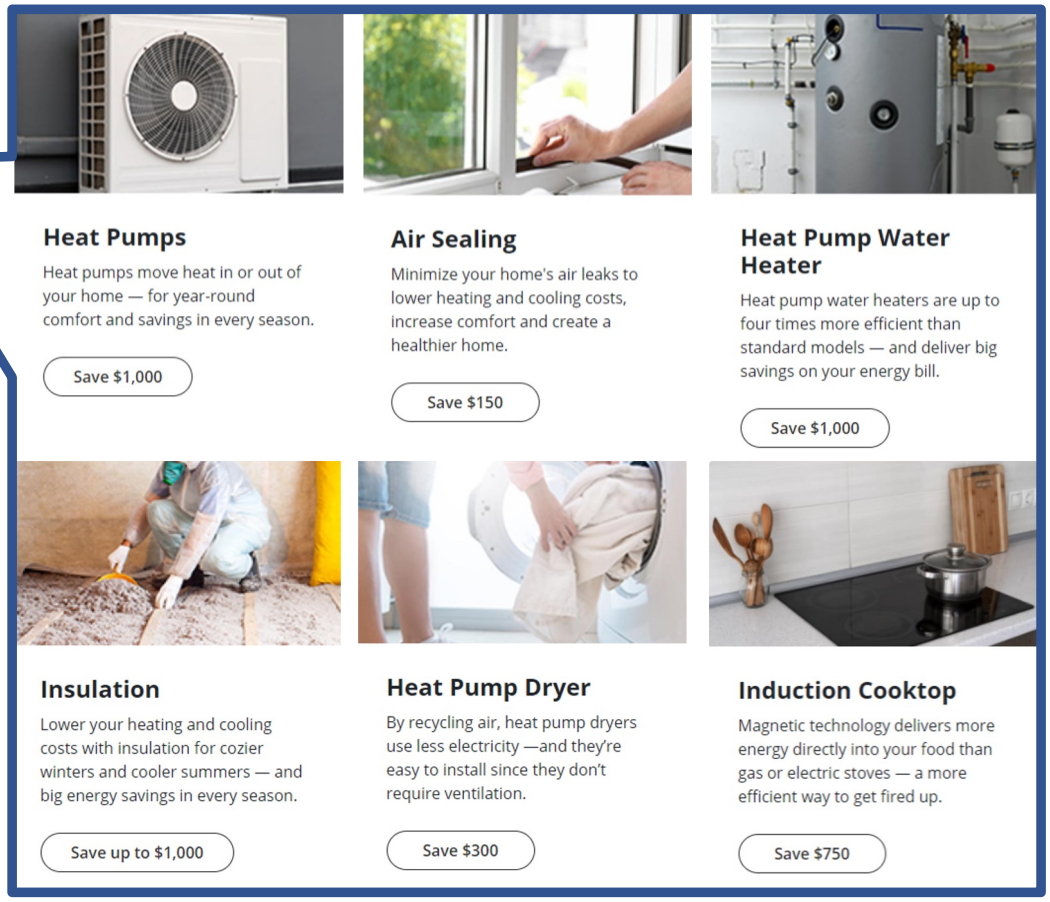
Many new homeowners renovate

Budgeted costs

More rebates and support available

BAYREN Home+

Inflation Reduction Act
Energy Efficient Home Improvement Credit



Zero-Emission Appliance Rule

BAY AREA AIR QUALITY MANAGEMENT DISTRICT

Leading “BPS” Idea – Small Residential

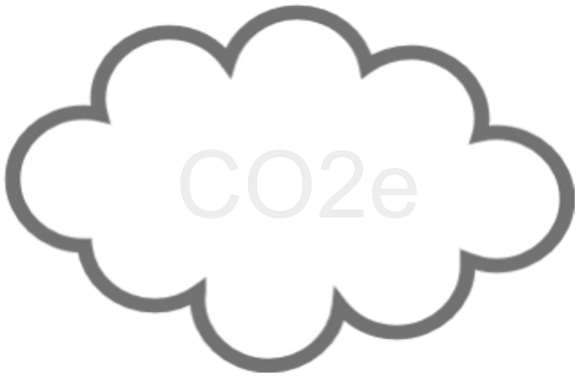
- Require at least **one heat pump system** when a property is listed for sale
- Maintain a **deferral to buyer** option to accommodate the range of selling situations
- Provide **alternative flexible compliance path**:
  - Covers range of building conditions
  - Buyers can prioritize other upgrades for health, safety, or comfort

BESO - Large Building Program

- Requires:
  - Annual Energy Benchmarking
    - Buildings 15k+ sqft
  - Energy Assessments every 5 years
    - Buildings 25k+ sqft

Potential BPS Metrics for Berkeley

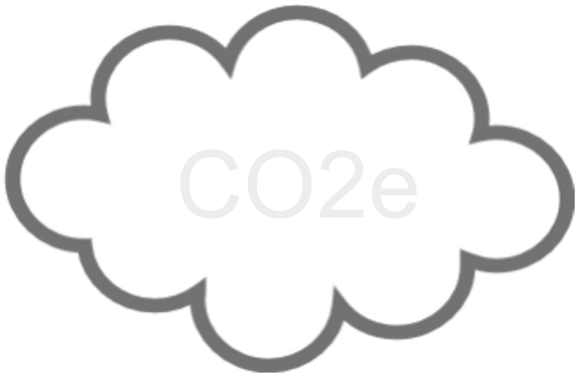
GHG Emissions



- Measures exactly what we want to mitigate
- Challenging to calculate with multiple electricity products with varying emissions factors

Potential BPS Metrics for Berkeley

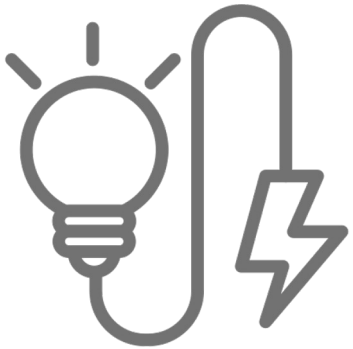
GHG Emissions



- ✓ Measures exactly what we want to mitigate
- ✗ Challenging to calculate with multiple electricity products with varying emissions factors

VS

Site Energy Use Intensity (EUI)



- ✗ EUI might not correspond to reduced emissions (Electricity is zero emissions in Berkeley)
- ✗ Don't want to incentivize installation of new efficient gas appliances

Potential BPS Metrics for Berkeley

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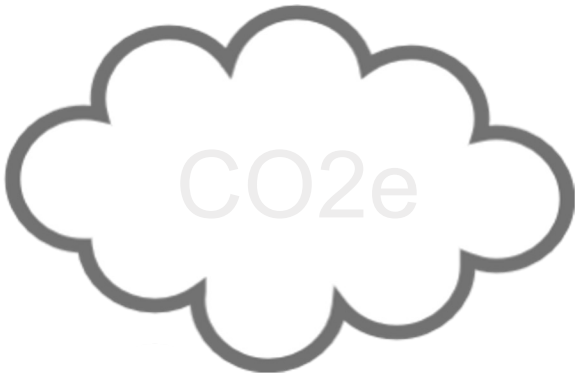

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vs

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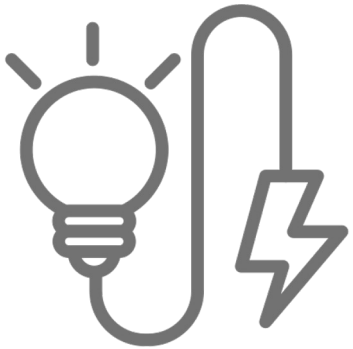


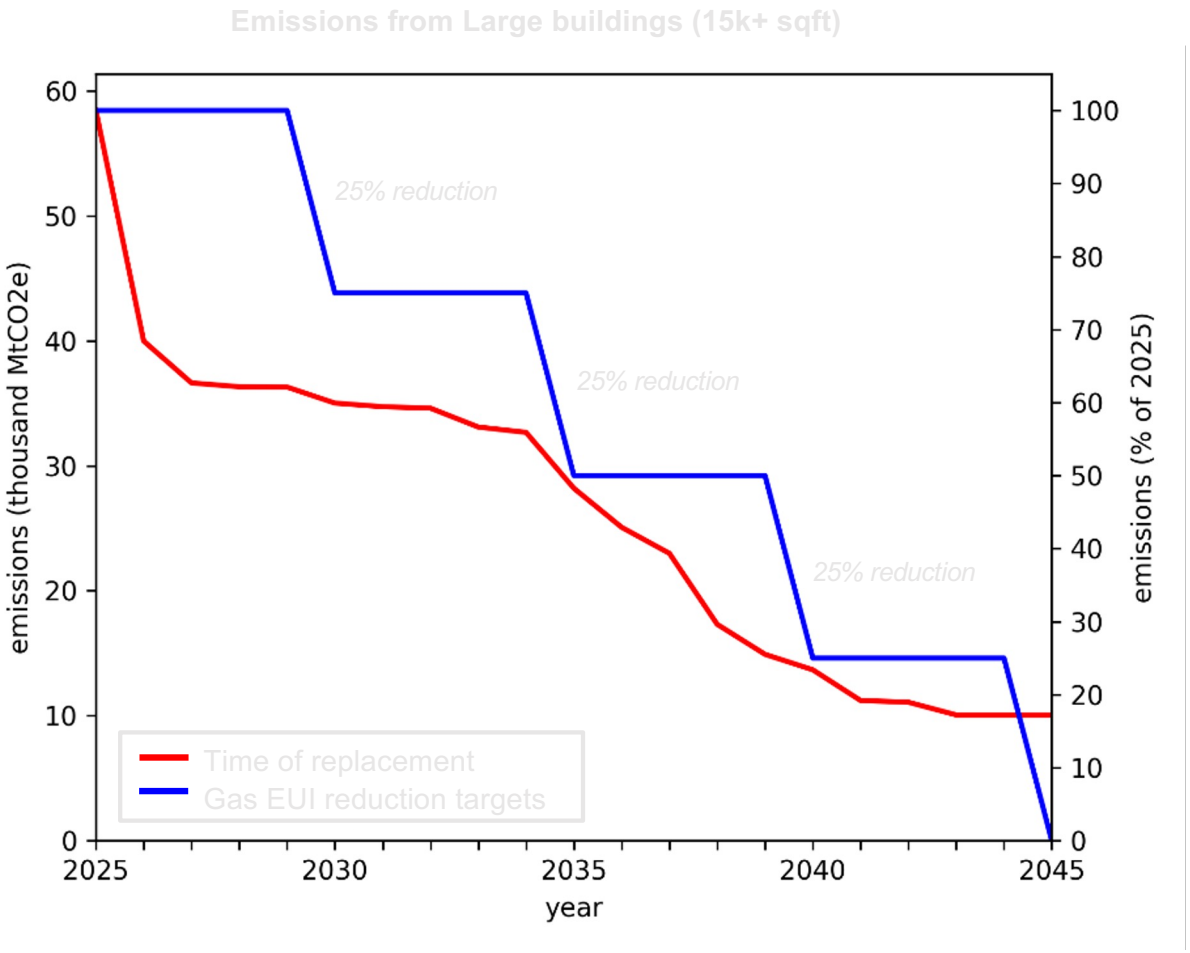
- ✗ EUI might not correspond to reduced emissions (Electricity is zero emissions in Berkeley)
- ✗ Don't want to incentivize installation of new efficient gas appliances

vs

Natural Gas

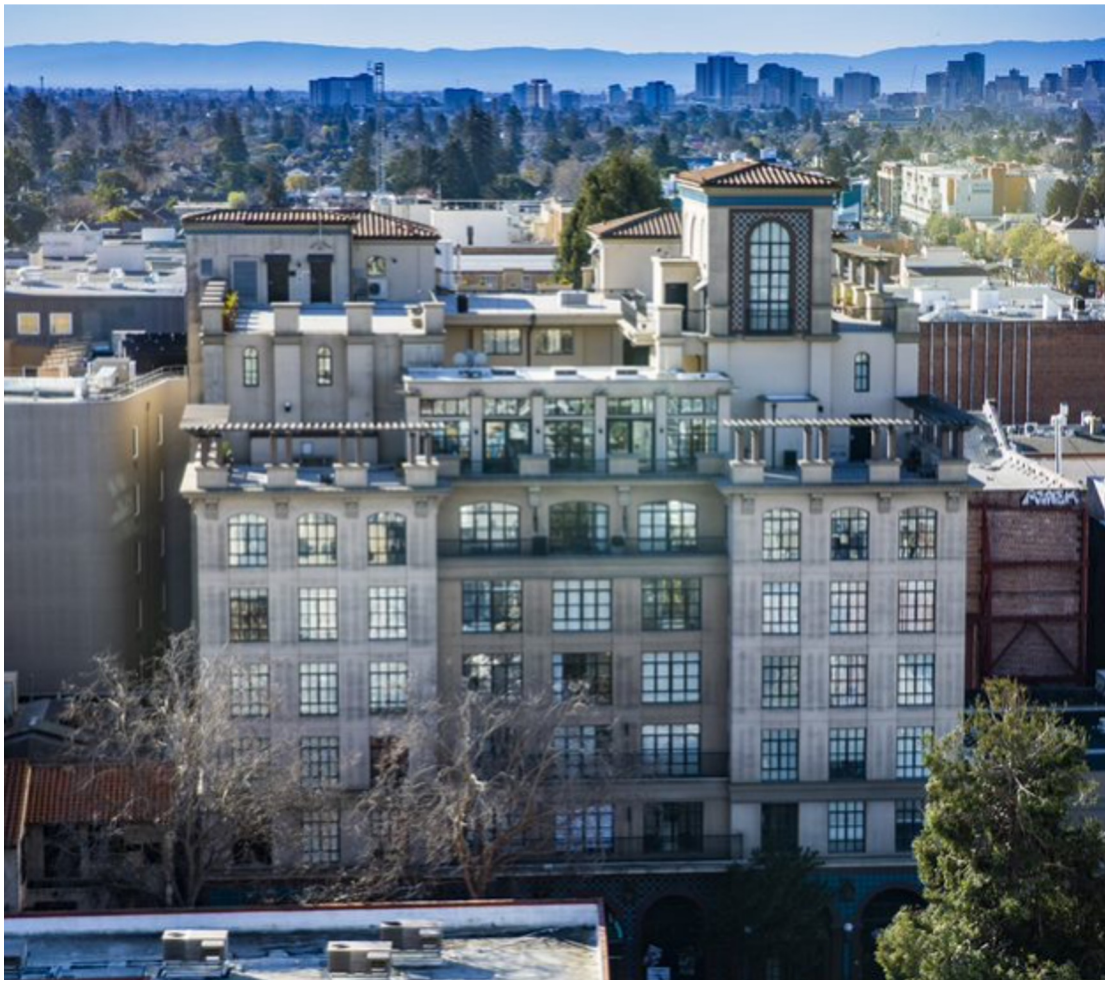
- ✓ Aligns with City's electrification and fossil fuel free goals
- ✗ Doesn't allow for incremental reductions

LBNL BPS Policy Analysis



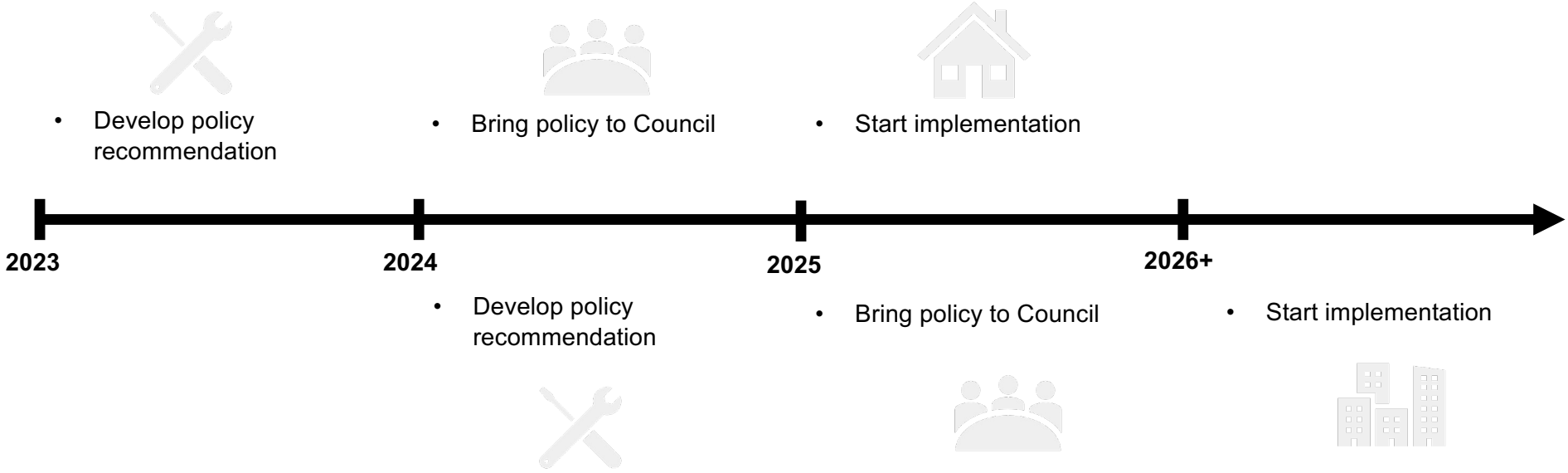
Leading BPS Idea

- Intertwine a BPS policy with a time of replacement policy
- Prevent the replacement of new efficient gas systems
- Focus a BPS on ways to help building owners **plan** and **prepare** for building electrification



Existing Building Policy Timeline

Small Residential: Time of Sale



Medium/Large Buildings: BPS

Thank You!

Ammon Reagan
Sustainability Program Coordinator
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City of San Diego: Building Decarbonization

Shelby Rust Busó, Chief Sustainability Officer

2022 Climate Action Plan

Net Zero Emissions by 2035

Need for "**immediate**, **rapid**, and **large-scale reductions** in greenhouse gas emissions,"

Intergovernmental Panel on Climate Change, Annual Report 6

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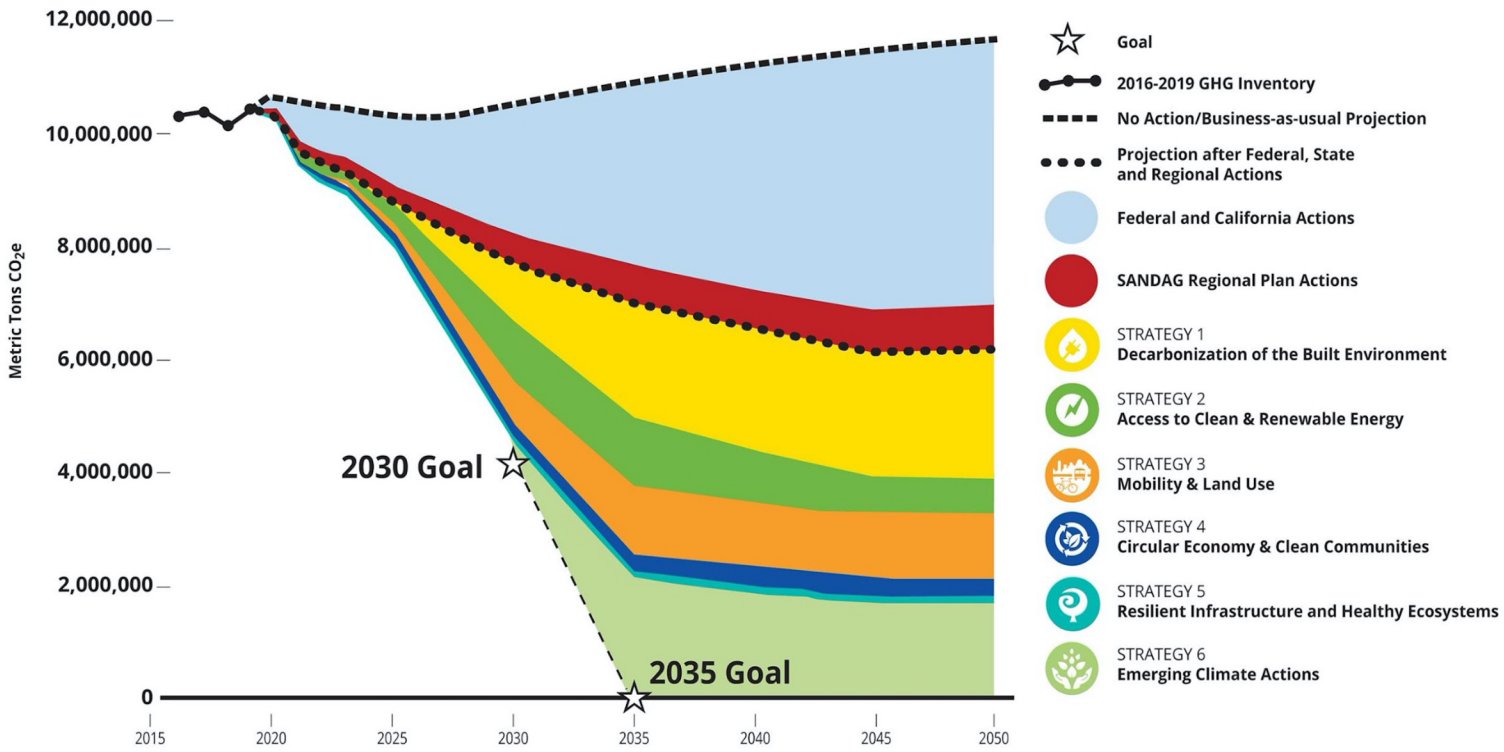
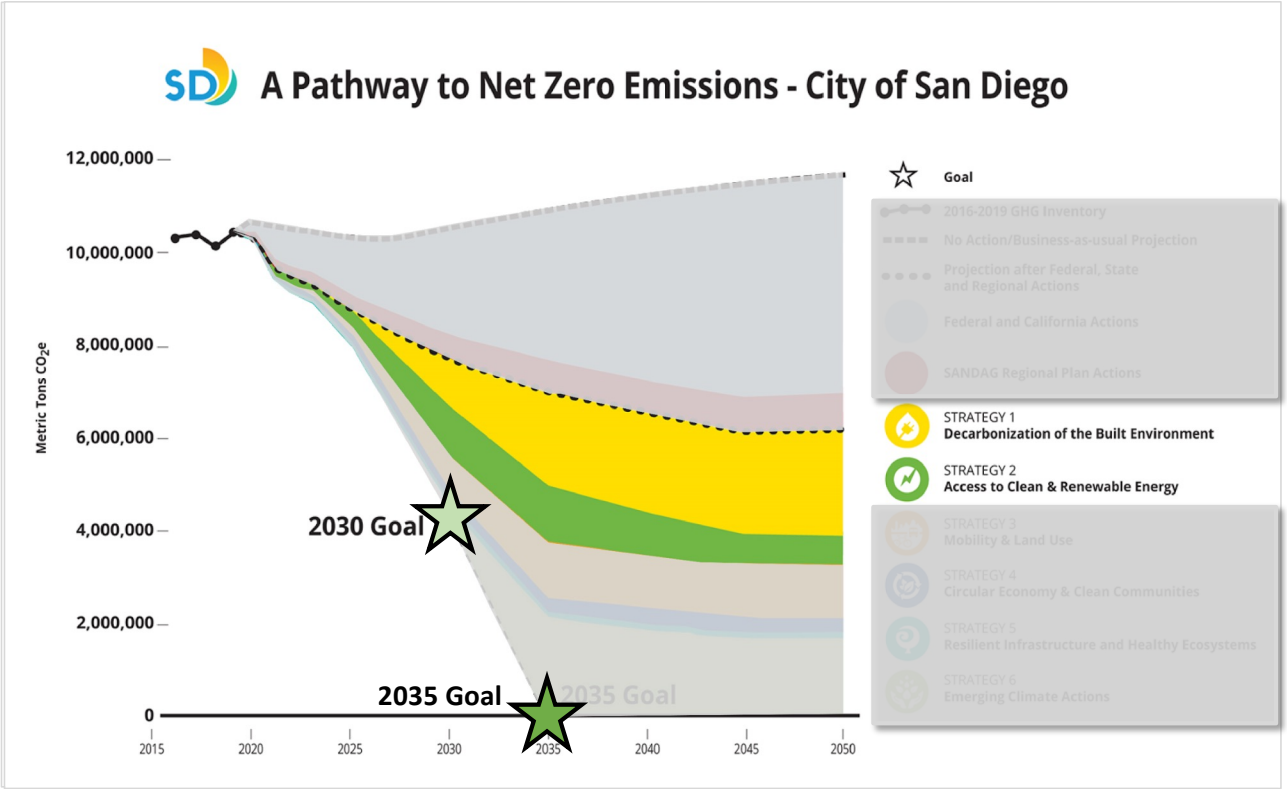
OUR CLIMATE OUR FUTURE
City of San Diego Climate Action Plan

A Pathway to Net Zero Emissions - City of San Diego





Areas of largest local impact:

- Decarbonization of the Built Environment
- Access to Clean and Renewable Energy

Strategy 1: Decarbonization of the Built Environment

2030 Target	2035 Target
Phase out **45%** of natural gas usage from existing buildings	Phase out **90%** of natural gas usage from existing buildings
All-electric reach code starting 2023 at new residential and commercial development	
Phrase out **50%** of natural gas usage in municipal facilities	Phase out **100%** natural gas usage in municipal facilities

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OUR CLIMATE OUR FUTURE
City of San Diego Climate Action Plan

Strategy 1: Decarbonization of the Built Environment

Strategy	2030 Target	2035 Target	Measure
Strategy 1: Decarbonization of the Built Environment	Phase out **45%** of natural gas usage from existing buildings	Phase out **90%** of natural gas usage from existing buildings	Measure 1.1: **Decarbonize Existing Buildings**
	All-electric reach code starting 2023 at new residential and commercial development		Measure 1.2: **Decarbonize New Development**
	Phrase out **50%** of natural gas usage in municipal facilities	Phase out **100%** natural gas usage in municipal facilities	Measure 1.3: **Decarbonize City Facilities**

Strategy 2: Access to Clean & Renewable Energy

Strategy	2030 Target	2035 Target	Measure
Strategy 2: Access to Clean & Renewable Energy	**100%** renewable or GHG-free power for all SDCP customers in the City of San Diego.		Measure 2.1: **Citywide Renewable Energy Generation**
	Percent of all municipal fleet vehicles to be **ZEVs: LDV: 50% MDV: 50% HDV: 50%**	Percent of all municipal fleet vehicles to be **ZEVs: LDV: 100% MDV: 75% HDV: 75%**	Measure 2.2: **Increase Municipal Zero Emission Vehicles**
	16% e-VMT out of all Light-duty VMT	**25% e-VMT** out of all Light-duty VMT	Measure 2.3: **Increase Electric Vehicle Adoption**


400
municipal facilities using natural gas
4,000
fleet vehicles on the road (< 50 EVs)
~~12~~ 11
years to convert to electric solutions

Updates

1. ZEMBOP Applicability Checklist
2. Fossil Fuel Elimination Plans
3. Municipal Clean Energy Retrofits

1. ZEMBOP Applicability Checklist

- Who should use this tool? At what project phase?
  - AMD reps when preparing for CIP or DGS project intake
  - E&CP PPD staff when preparing the Prelim Environmental Assessment or Prelim Engineering Report
  - E&CP Project Managers, upon assignment of the project (more scope detail available)
  - A&E Design teams, to inform scope of work and project design
  - E&CP Project Managers, upon any major changes in the scope
  - DGS FSD staff when preparing for an in-house project, and upon any major changes in scope
- Will be available on the web at https://www.sandiego.gov/sustainability/energy-and-water-efficiency/me-policies-plans
- Please send completed forms to SuMo using the 'Submit by Email' button
- Email energy@sandiego.gov with questions or concerns

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The City of SAN DIEGO

Council Policy 900-03: Zero Emissions Municipal Buildings and Operations Policy Applicability Checklist

All projects are required to adhere to the requirements of Council Policy 900-03: Zero Emissions Municipal Buildings and Operations Policy (ZEMBOP). If a project includes multiple buildings or facilities, submit a form for each building or facility individually.

Project Name:		Project Address:			
WBS Number:		Design Phase (%):		Estimated Project Cost:	
Managing Department:		Project Manager Name and E-mail:			
Preparer Name and E-mail:				Date Prepared	
Preparer Organization/Department:					

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2. Fossil Fuel Elimination Plan Development

E. Fossil Fuel Elimination Plans

1. By May 1, 2023, all AMD shall subm… …l equipment inventory to the Mayor or City Manager …

   a) An inventor… …ns, their install dates, and th… …stems.

   b) Any known or … …-specific obstacles that would prevent replacem… …ric equipment.

Underway (Thanks for your assistance!)

2. By January 1, 2024, all AMDs shall submit a detailed *Fossil Fuel* elimination plan to the Mayor or City Manager that identifies and prioritizes the strategies needed to eliminate *Fossil Fuel* combustion within each facility by 2035. This plan shall include:

   a) The necessary actions, funding, and investments needed to eliminate Fossil Fuel Systems;

   b) A timeline for substantial alterations and system replacement efforts;

   c) Priority actions for system replacement efforts that have the greatest potential return on investment based on cost analysis that includes the cost of carbon emission impacts;

   d) Demonstration that the plan achieves at least a 33% reduction of the department's direct *GHG Emissions* from *Fossil Fuel* combustion relative to 2019 levels by January 1, 2028; 55% reduction by January 1, 2030; 67% reduction by January 1, 2031; and 100% reduction by January 1, 2035; and

   e) Potential locations for the installation of *On-Site Renewable Energy Systems*.

3. Municipal Clean Energy Retrofits

- SuMo is currently procuring a short list of clean energy vendors in 3 categories:
  1. Energy Services Companies (ESCOs)
  2. Solar PV/Battery Energy Storage System (BESS) Companies
  3. Microgrid Companies

- RFQ closes on June 7; selections completed by the end of July

- Immediately thereafter, we plan to invite one ESCO to begin Preliminary Assessments at a portfolio of ~50 facilities
  - ESCO will determine which sites are a good fit for P3s ESCO will then perform Investment Grade Audits at those sites IGA will enable ESCO to develop scopes of work and long-term funding/financing strategy

- Ideally, SuMo and participating AMDs will take proposed projects to Council by end of FY24

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Building Energy Code?

Like a “structural code” helps protect people in buildings, the energy code specifies how buildings must be constructed or perform and protect people from high energy bills and drafty buildings. States or local governments adopt and enforce energy codes for their jurisdictions.

Purpose:

- **Increase efficiency** (maintain cost-effectiveness)
- **Reduce energy consumption**

Reach Code?

Local building code that goes beyond the minimum requirements set by the state for **energy efficiency and energy performance** of buildings.

Reach codes can also indirectly **support reduction of GHG emissions** through requirements related to EV readiness.

Where else have they been implemented?

70 jurisdictions in California have adopted Reach Codes in the 2022 Code Cycle.

63 of those jurisdictions adopted All Electric Reach Codes.

40 jurisdictions have adopted Electric Vehicle Supply Equipment Reach Codes for the 2022 Code Cycle .

What does San Diego's Reach Code propose?

All *newly constructed* buildings:

	Occupancy Type		
	Single Family, Duplex, ADU	**Multi-family**	**Non-Residential**
Energy Requirements	All-electric required	All-electric required	All-electric required*
EV Charging Infrastructure Requirements	Single-family: no change Multi-family: no change		40% EV Capable Spaces (dependent on amount of parking)

*proposed deviations: industrial/academic/lab uses, commercial food preparation, critical facilities back-up generation

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Building & Housing Stock Analysis | Background

Goal: Provide building stock data and key considerations for segmentation for future decarbonization policies and programs, elevating data that highlights the specific needs of disadvantaged communities and under-resourced buildings within the City.

Types of Indicators

Technical Indicators

Help identify buildings that have high opportunity or specific technical challenges for building electrification

Social Vulnerability & Environmental Risk

Help identify buildings that may need greater assistance and public investments to help the City design appropriate programs and strategies

Ownership & Decision-Making

Help identify buildings with owners or decision-makers who may need tailored outreach and support to help electrify

Building & Housing Stock Analysis | Background

Goal: Provide building stock data and segmentation to identify key considerations for future decarbonization policies and programs, elevating the needs of disadvantaged communities and under-resourced buildings

Potential Uses for Analysis

- **Share centralized building inventory and typologies** to establish a common understanding of the building stock and policy thresholds
- **Ground discussions with community groups** on priorities, needs, and approaches to existing buildings
- **Identify buildings that may need additional support** to avoid unintended harm from requirements
- **Calculate potential costs and job impacts** from existing building electrification retrofits

Analysis Indicators | Priority Indicators

Technical Indicators

- Number of Buildings
- Building Typologies
- Size
- Vintage
- Residential Units
- Existing Solar PV
- Benchmarked Energy

Social Vulnerability & Environmental Risk Indicators

- Predominant Race
- Heat Risk
- Asthma Rate
- Energy & Housing Cost Burden
- Disadvantaged Communities (DACs)
- Digital Access
- Age
- Flood Risk
- Poverty Rate
- Language
- Communities of Concern
- Fire Risk

Ownership & Decision-Making Indicators

- Regulated Affordable Housing
- Ownership Type
- City Council Districts
- Publicly Owned Buildings
- Owner-Occupied
- Historic Districts

Priority Indicators Tracker

Analysis Indicators | Priority Indicators

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Priority Indicators Tracker

Technical | Building Typologies

Residential: Single Family Homes	212,120	69%	405.2 M	45%
Residential: Manufactured Homes	3,611	1%	2.6 M	0.3%
Residential: 2-4 Unit Homes	26,548	9%	32.8 M	4%
Residential: Condos & Co-Ops	22,171	7%	129.2 M	14%
Multifamily Housing	15,139	5%	107.6 M	12%
Commercial: Hotels & Motels	533	0%	22.9 M	3%
Commercial: General	1,643	1%	10.5 M	1%
Commercial: Public Assembly	1,074	0%	3.1 M	0.3%
Commercial: Office	4,866	2%	68.0 M	8%
Commercial: Retail	732	0%	14.3 M	2%
Commercial: Hospitals, Labs & Medical Offices	726	0%	9.5 M	1%
Education: K-12 Schools (Public & Private)	3,089	1%	3.5 M	0.4%
Education: Other	186	0%	0.5 M	0.1%
Municipal	2,445	1%	7.5 M	1%
Industrial	4,154	1%	79.1 M	9%
Other & Unknown	7,939	3%	9.6 M	1%

There are close to 300,000 buildings in the city of San Diego, situated on approximately 250,000 parcels, totaling close to 1B built square footage.

All Residential Typologies
- **271,500 buildings** (91% of citywide building stock)
- **619.0 M square footage** (77%)

All Commercial Typologies
- **7,987 buildings** (3%)
- **103.8 M square footage** (13%)

All Remaining Typologies
- **17,410 buildings** (6%)
- **84.7 M square footage** (10%)

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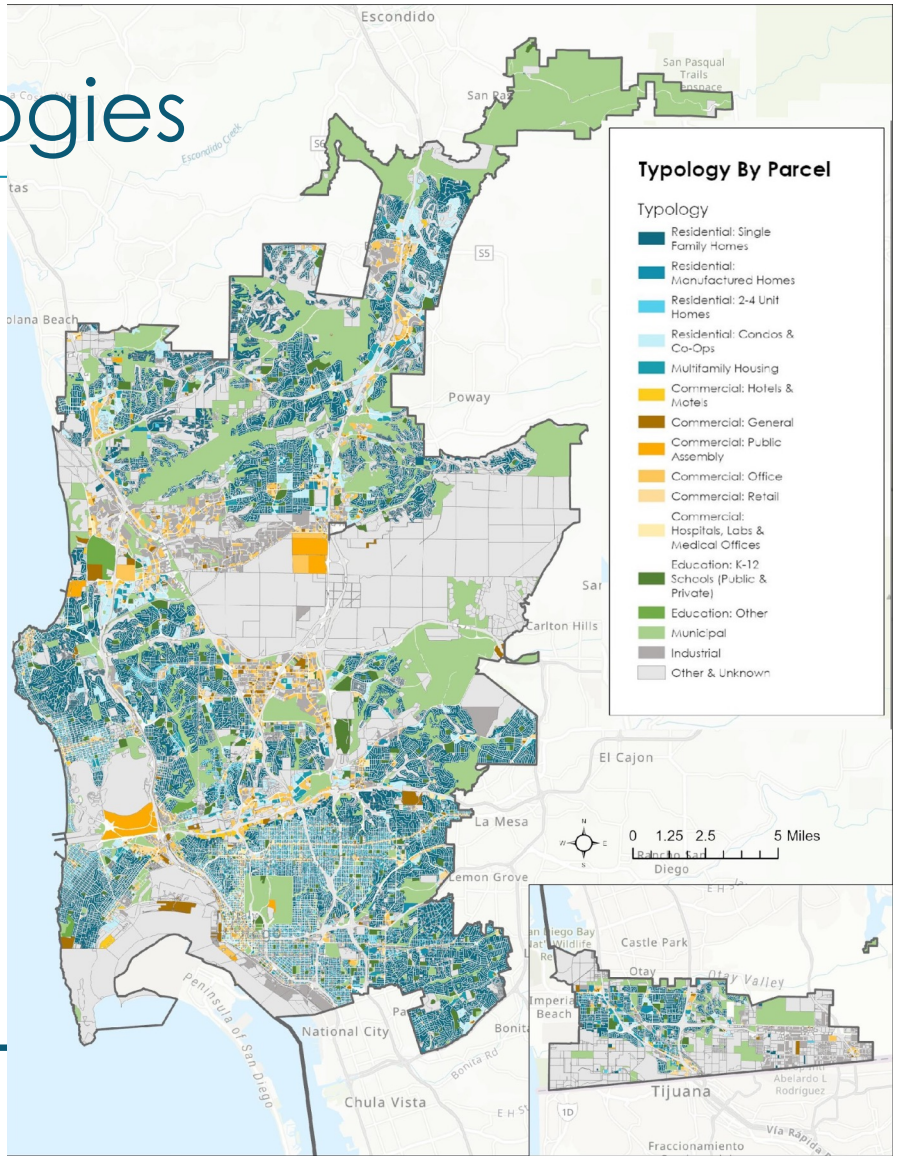
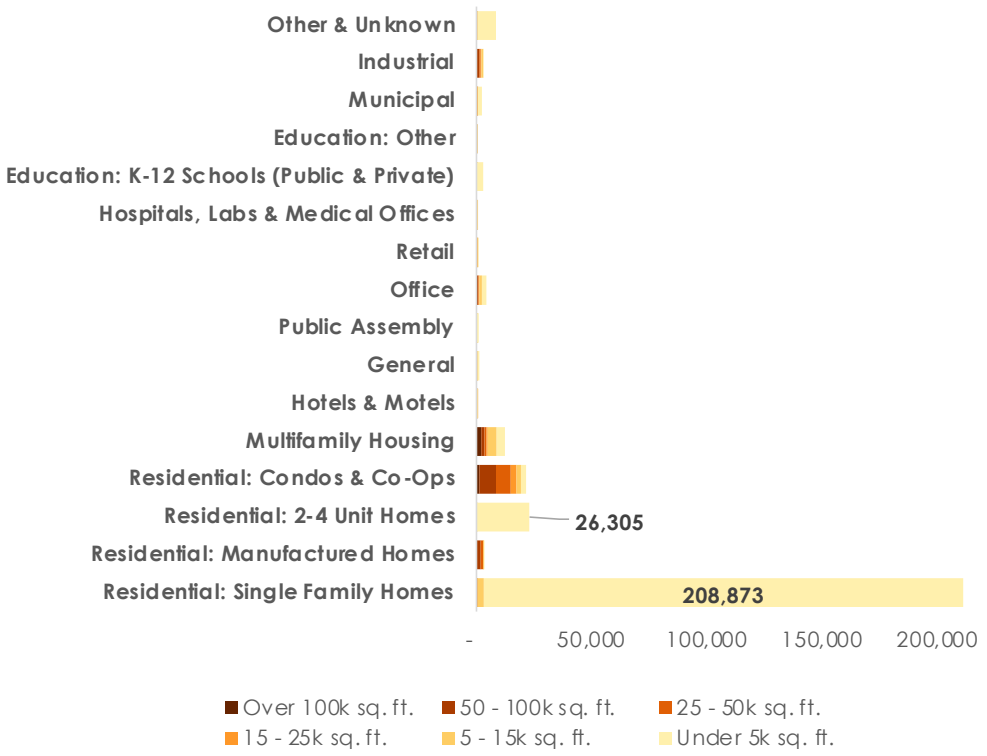
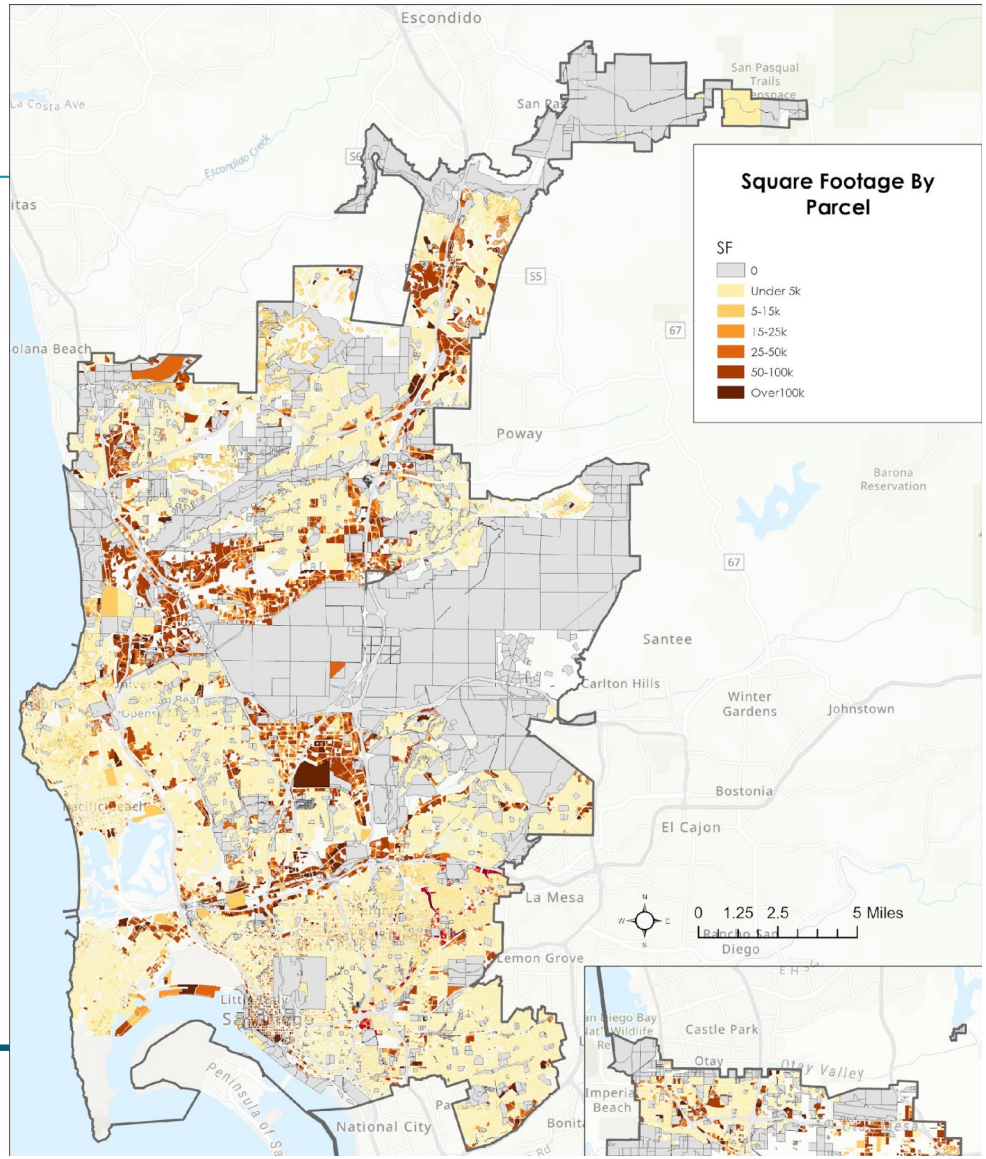


Building Electrification Institute

Technical | Building Size

Citywide Building Typologies by Size





Building Electrification Institute

San Diego Energy Benchmarking

- San Diego Council passed Building Energy Benchmarking Ordinance in 2019
- Ordinance requires:
  - Commercial buildings over 50,000 square feet
  - Multifamily and mixed-use buildings greater than 50,000 square feet and with 17 or more residential accounts
  - Must submit energy data to the City of San Diego in ENERGY STAR Portfolio Manager
    - Data must be submitted by June 1 every year

What's Next

- Stakeholder Engagement
  - City Sprints Program
  - Climate Equity Working Group
  - EJ Element
- Decarbonization Roadmap
  - Building Performance Standards

Santa Monica BPS Policy Development

Ariana Vito, Sr. Sustainability Analyst
Office of Sustainability & the Environment

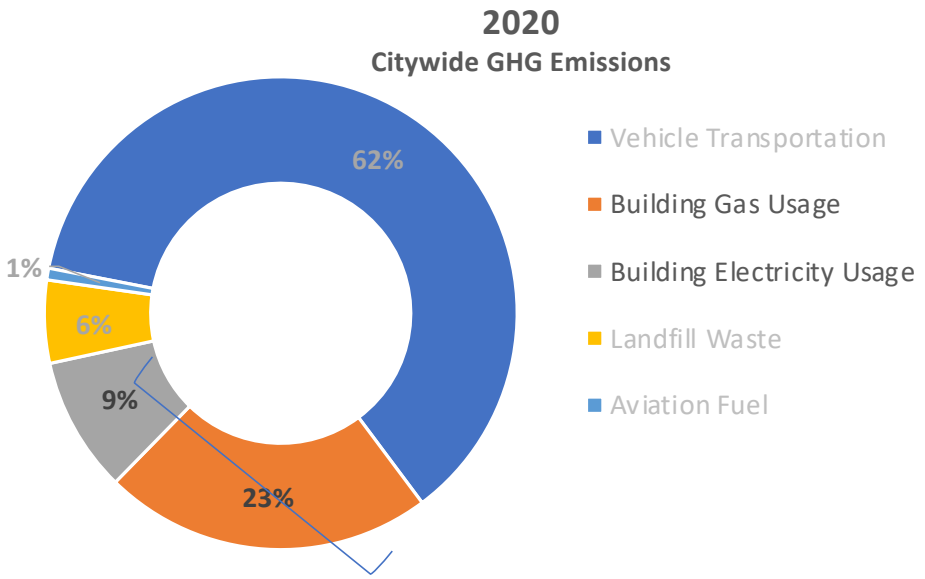
City of Santa Monica

Santa Monica Emissions

- Buildings = 32% of GHG emissions
  - Natural gas burned in buildings is responsible for 23% of emissions (23.5M therms)

- Clean electricity - Clean Power Alliance (CPA): 96% of customers on 100% clean power rate

- ***Next task = reduce emissions from existing buildings***



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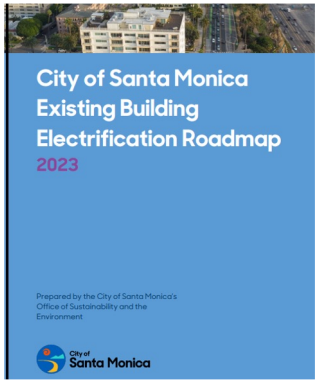
Why Building Performance Standards, Why Now?

- CAAP Goal: 80% x 2030; Reduce fossil fuel use in existing buildings 20% by 2030
  - New Buildings: Zero Emissions Building Code in effect Jan. 2023
  - Existing Buildings: Electrification Roadmap released Feb. 2023

- Focus: building performance/EE & electrification
  - Pollution/GHG
  - Health - indoor AQ, safety
  - Equity
  - Cost



- Policy levers to reduce emissions in existing buildings:
  - **Benchmarking & BPS**
  - Time of upgrade requirements

City of Santa Monica

Santa Monica BPS Sample Timeline

- **2023**
  - BPS Workshops (spring 2023)
  - Joined national CEQ BPS Cohort
  - Building owner working group
  - Draft ordinance language + rulemaking
- **2024**
  - City Council Q1-Q2 2024
  - Rulemaking process
  - Adopt BPS for buildings >50k sq ft
  - Adopt benchmarking for buildings >x sq ft (35k, 20k sq ft)
- **2026-27**
  - Buildings >50k sq ft required to report annually (AB 802)
  - Buildings >50k sq ft required to meet BPS target #1
  - Buildings > 50k sq ft required to benchmark
- **2030**
  - Buildings >50k sq ft required to meet target #2

City of Santa Monica

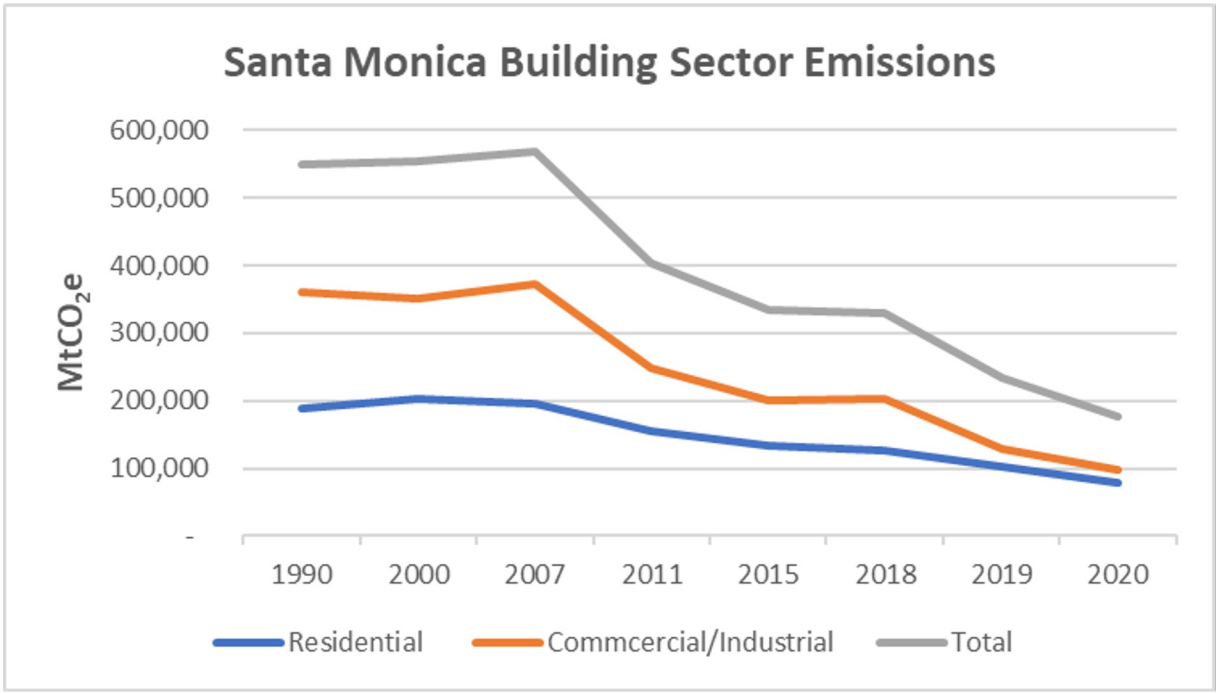
Data Review – Building Sector GHG Inventory

Progress toward CAAP Goal (80% reduction by 2030) => <u>68% reduction</u> in GHG emissions:

- 1990: 549,852 $MtCO_2e$
- 2020: 176,564 $MtCO_2e$

Contributing Factors:

- 2018 - joined Clean Power Alliance → 30% reduction
- Energy Efficiency & Conservation
- Stronger Building Codes
  - 2017 ZNE Building Code
  - 2020 Energy Reach Code
  - (+ new 2023 Zero Emission Building Code)



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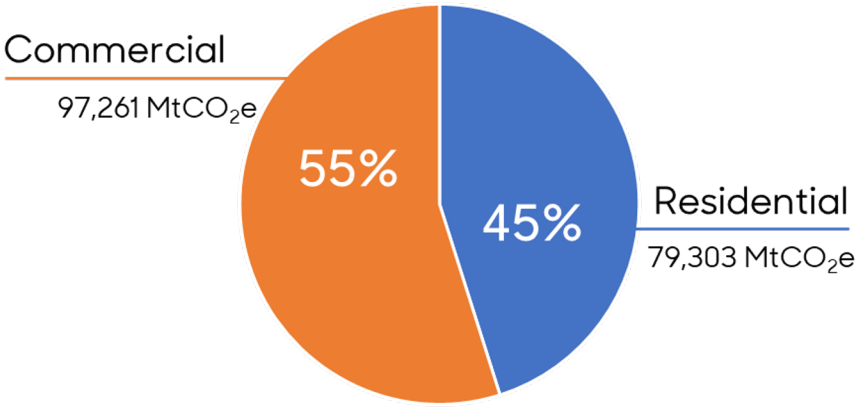
AB 802 – Building Energy Benchmarking

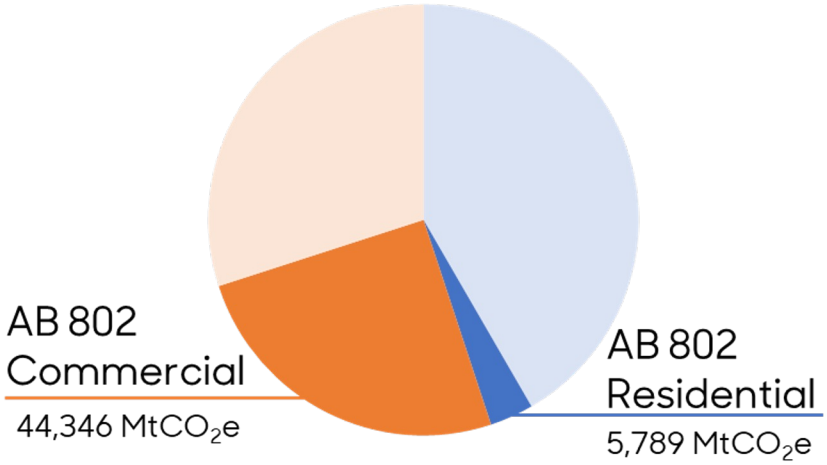
2020 Santa Monica GHG Inventory:
Building Sector Emissions



GHG Emissions
Total: 176,564 $MtCO_2e$

2021 AB 802 Building Energy Benchmarking

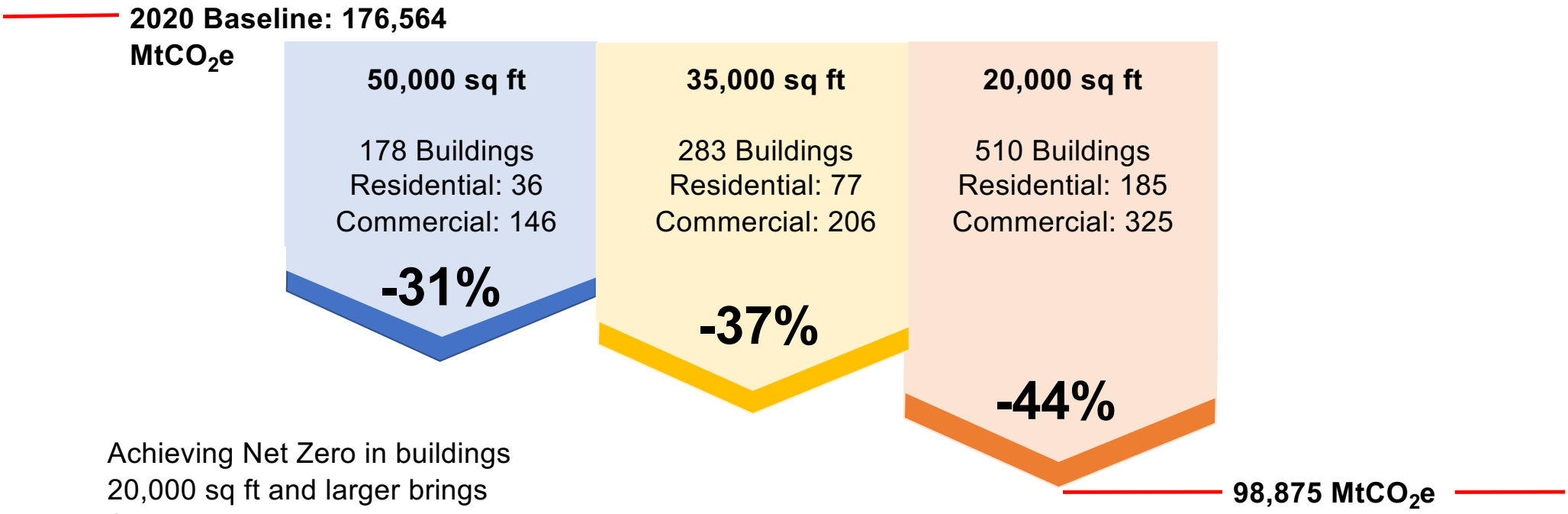
- Buildings of 50,000 sq ft or Larger
- 91 Buildings Reported Data
  - 33 Residential
  - 58 Commercial
- 28% of Building Sector Emissions Reported



Reported Emissions: 50,135 $MtCO_2e$

City of Santa Monica

Impact of Reaching Net Zero



Achieving Net Zero in buildings 20,000 sq ft and larger brings Santa Monica's building sector emissions to **82% below 1990 levels.**

City of Santa Monica

Stakeholder Feedback & Lessons Learned

Topic	Solutions/Takeaways
Benchmarking	• More success w/ compliance in the commercial sector • Including benchmarking for smaller buildings helps w/ market acceptance for larger buildings
Compliance	• Provide resources to upgrade equipment, building envelope, and efficiency • Determine grace period for buildings to comply with BPS. Consider the sensitivities and costs in older large multifamily buildings. • Adjust BPS based on building types due to different efficiency targets
Supplemental Policies/Programs	• Partner with utilities to provide resources to under-resourced buildings • Begin to tackle smaller buildings too, e.g. time of sale reporting for SFUs • Run analytics on benchmarking data to get trends on what improves efficiency
Stakeholder Engagement	• Challenging to grow building contact list to ensure compliance • Form building owner task force to inform the rulemaking process
Policy Development Timeline	• BPS should relate to CAP goals • Ordinance vs. Rulemaking vs. Implementation/technical guidance • Keep ordinance high-level with clear goals to allow flexibility during rulemaking
Implementation	• Reporting platform: ENERGYStar • TouchStone can be used to track data and help administer the program • The administrative burden lessens over time as property owners and staff become familiar

City of Santa Monica

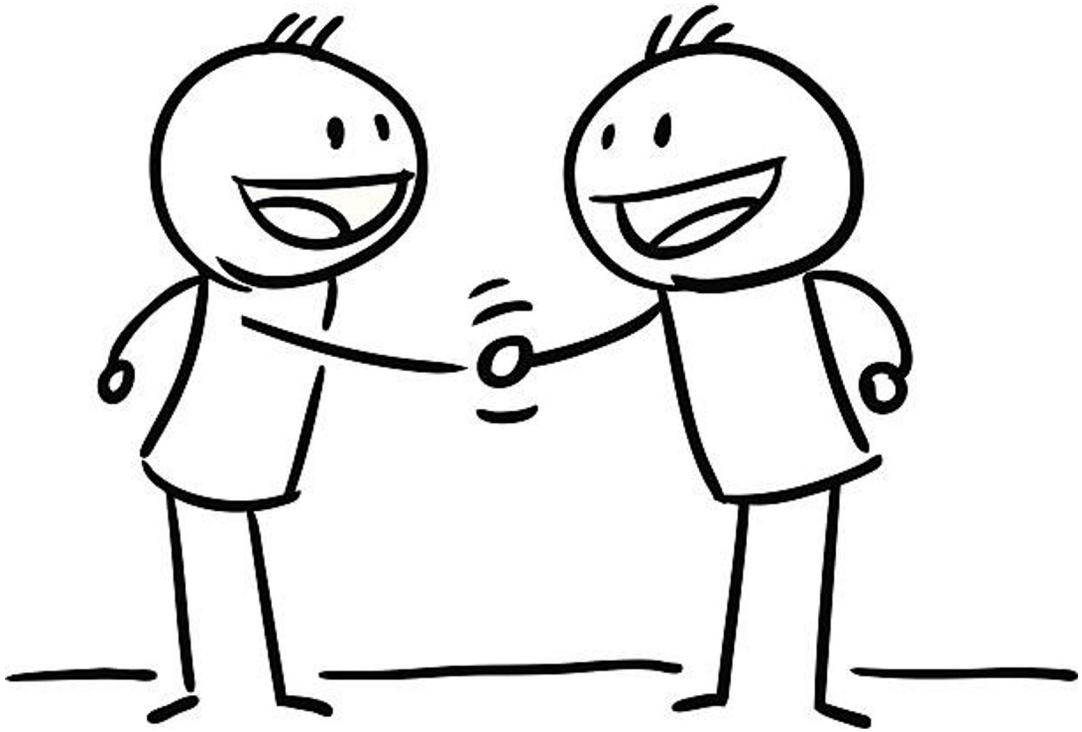
Next Steps

- Large property owner outreach and engagement
- Draft BPS policy stakeholder and Commission reviews
- City Council adoption target: early 2024
- Apply for implementation funding

Breakout Instructions

Intros

- Name
- City/Org
- Where you're at in your BPS journey?
  - Haven't thought about it
  - Just starting
  - Somewhere in the middle
  - Already got one!



You've been hired!

City of EcoHaven

In the visionary city of EcoHaven, the commitment to combat climate change runs deep. From renewable energy projects to sustainable transportation initiatives, its citizens unite in a harmonious pursuit of a greener future. In EcoHaven, environmental stewardship and innovation thrive side by side.

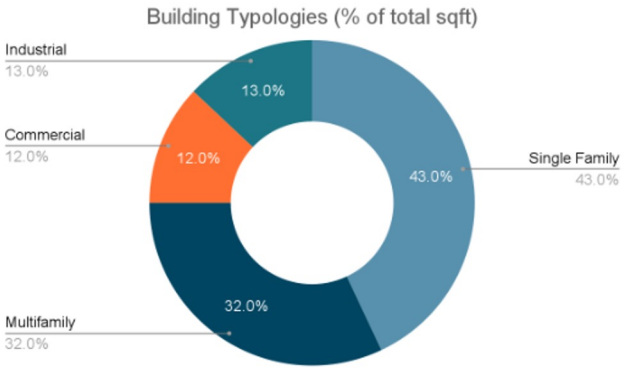
Population: 125,000 people

Demographics:
- **Income levels -**
  - Lower-Income Bracket: 32%
  - Middle-Income Bracket: 36%
  - Upper-Income Bracket : 32%
- **Residential Ownership:**
  - 59% Renters
  - 41% Owners

Electricity:
- Provided by CCA with 100% renewable electricity as the default product

City Climate Goals/Achievements:
- Net Zero Emissions by 2045

Other Characteristics:
- Buildings account for over 50% of citywide emissions with an even split between residential and commercial
- Size of City - 18 square miles
- Benchmarking - existing city policy requires reporting for buildings 15k sq feet or more



Building Size (SF)	# of Buildings	% of Buildings
0-4,999 SF	30,589	90%
5,000-14,999 SF	2,211	6%
15,000-24,999 SF	468	1%
25,000-49,999 SF	354	1%
50,000-249,999 SF	280	1%
250,000+ SF	15	<1%

Examples

Performance Metrics	Compliance Pathways	Companion Policies/Programs
• Site Energy Use Intensity (EUI) • ENERGY STAR Score • Total emissions • Emissions per sqft • Electricity per sqft • Natural Gas per sqft	• EUI/Emissions thresholds • Benchmarking • Audit • Green building certification • Retrocommissioning • Retrofits for electrification	• Benchmarking requirements • Renter protections • Financing Solutions • Building Performance Hub