Lessons learned with Electrification Stretch codes

2023 National Energy Codes Conference

Presented by:
Shilpa Surana, Moderator, 2050 Partners, Inc.
Amy Rider, Speaker, Building Decarbonization Coalition
Courtney Anderson, Speaker, City & County of Denver
Kelly Cunningham, Speaker, Pacific Gas & Electric

Shilpa Surana
Moderator

Shilpa Surana is a **Senior Consultant at 2050 Partners**, Inc and currently leads the IECC Residential Codes advocacy efforts on behalf of the California Investor-Owned Utilities. She leverages her consulting and energy modeling experience in advancing building codes and appliance standards at both state and national level. She is a voting member of the 2024 IECC Residential Economics, Modeling and Whole building metrics subcommittee. She was the first recipient of the Net Zero Fellowship, Energy Trust of Oregon grant in 2017-2018. Shilpa holds a Bachelor of Science in Architecture from India with two Masters of Science degrees from Carnegie Mellon University and London School of Economics and Political Sciences. She loves to hike and explore the outside with her husband and two kids.

Amy Rider
Speaker

Amy Rider is the **Director of Policy Acceleration for the Building Decarbonization Coalition** where she works to collect and disseminate best practices for eliminating building-related pollution. She has held positions with local government agencies and consulting firms for more than 20 years, working to optimize local climate action through knowledge sharing, behavior change and technology implementation. She holds a bachelor's degree in Energy Management and Design and a master’s degree in Water Resources Policy and Planning. Outside of work, she describes herself as a tree-hugging, sports-loving bibliophile with a not-so-secret love of social science fiction and creating new (though not always successful) recipes with her children.

Courtney Anderson
Speaker

Courtney Anderson leads **Net Zero Energy New Buildings and Homes for the City & County of Denver in the Office of Climate Action, Sustainability and Resiliency**. As a member of the Buildings and Homes Team, she works to ensure Denver is on track to meet its climate target of all new buildings achieving net zero energy by 2030. She also serves at national subcommittee levels with the International Code Council to advocate for more sustainable codes nationally. Her background as an architect includes experience in residential, commercial, green building consulting, sustainability, codes and standards, design, construction administration, and research. She received her master's in architecture from Ball State University, where she explored her passion for design, sustainability, and traveling the world.

Kelly Cunningham
Speaker

Kelly Cunningham currently serves as a **program manager on Pacific Gas & Electric's Codes and Standards team**. Her role includes managing the program responsible for the development of codes and standards enhancement proposals to advance California's Energy Code, leading the Local Energy Codes program which offers technical assistance to jurisdictions pursuing energy ordinances, and supporting the evolution of national building energy model codes.

BUILDING DECARBONIZATION COALITION

State and Municipal Building Decarbonization

Progress, Trends, and Predictions

DOE Codes Conference: May 4, 2023

Overview

- Why Building Electrification
- What Options Exist
- Who Has Taken Action
- Policy Trends

Why Building Electrification

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Why Buildings Matter

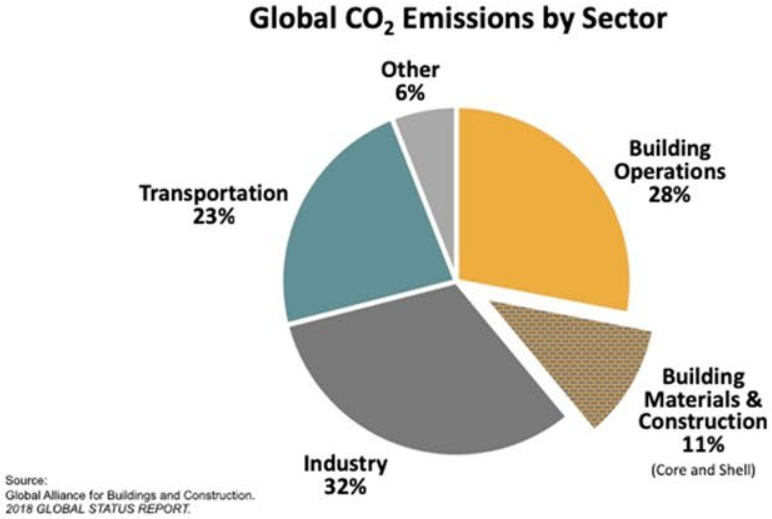
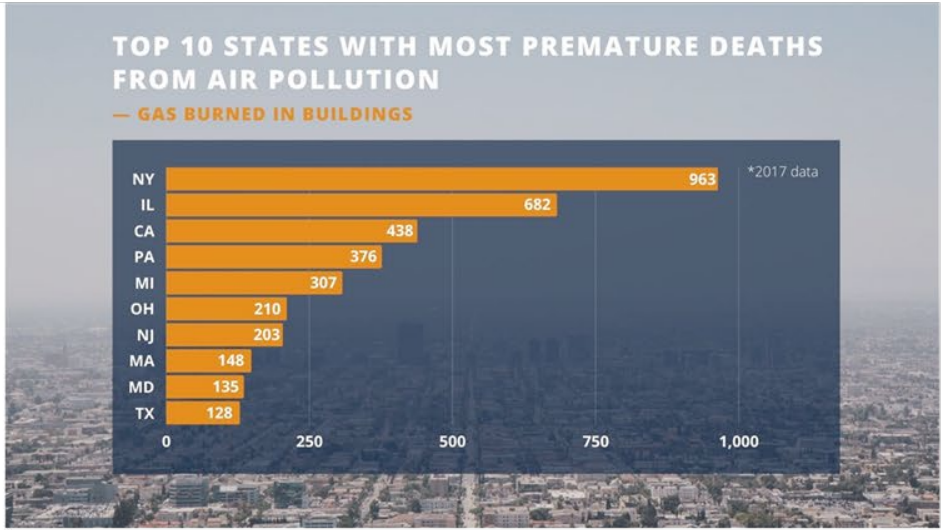


Image credit: Architecture 2030



Graphic from RMI based on Harvard study: Jonathan J Buonocore *et al* 2021 *Environ. Res. Lett.* **16** 054030

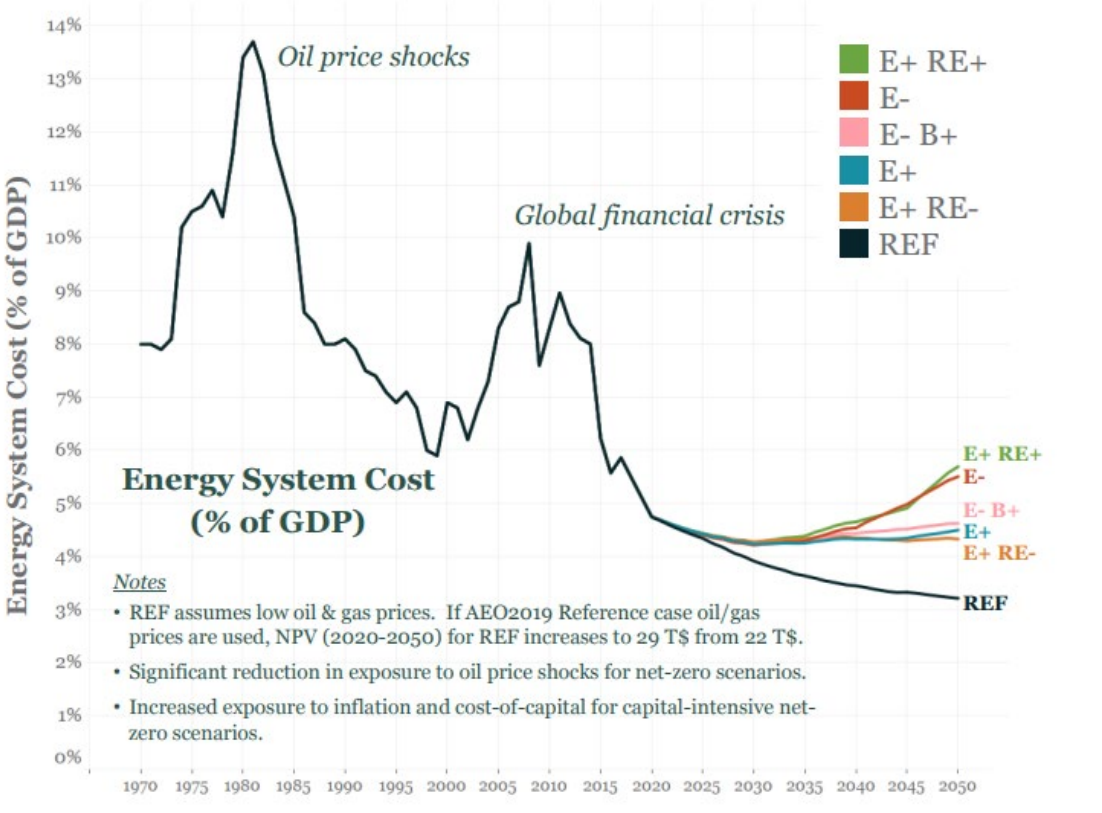
Buildings generate nearly 40% of annual global greenhouse gas emissions.

Air pollution from buildings contributes to thousands of deaths annually

Why Buildings Matter

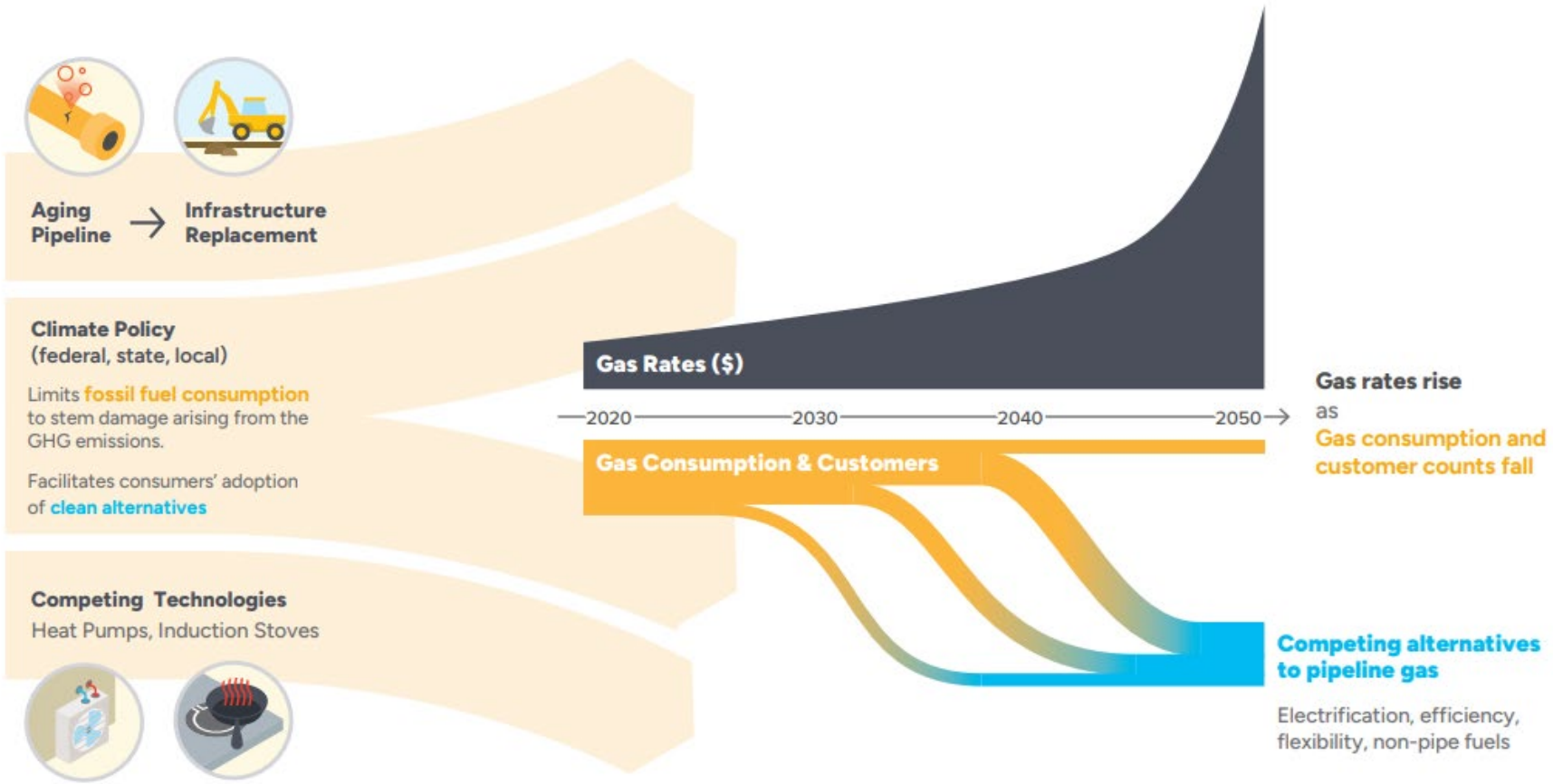
- Clean electricity (supply side decarbonization) + clean appliances (demand side electrification) = low -to-no emission buildings
- Benefits:
  - **Climate:** only way to meet emissions goals of local and state climate plans
  - **Health:** burning gas in homes releases more nitrogen dioxide (NO2) and carbon monoxide (CO) than EPA allows outdoors. Studies show gas stoves correlate to significant increase of childhood asthma
  - **Equity:** higher indoor pollution levels in older, smaller homes, which typically correlates to income/race. Tenants have less control over the quality of their built environment. Higher rates of outdoor air pollution.

Full Electrification + Renewables is Lowest Cost Net Zero Option



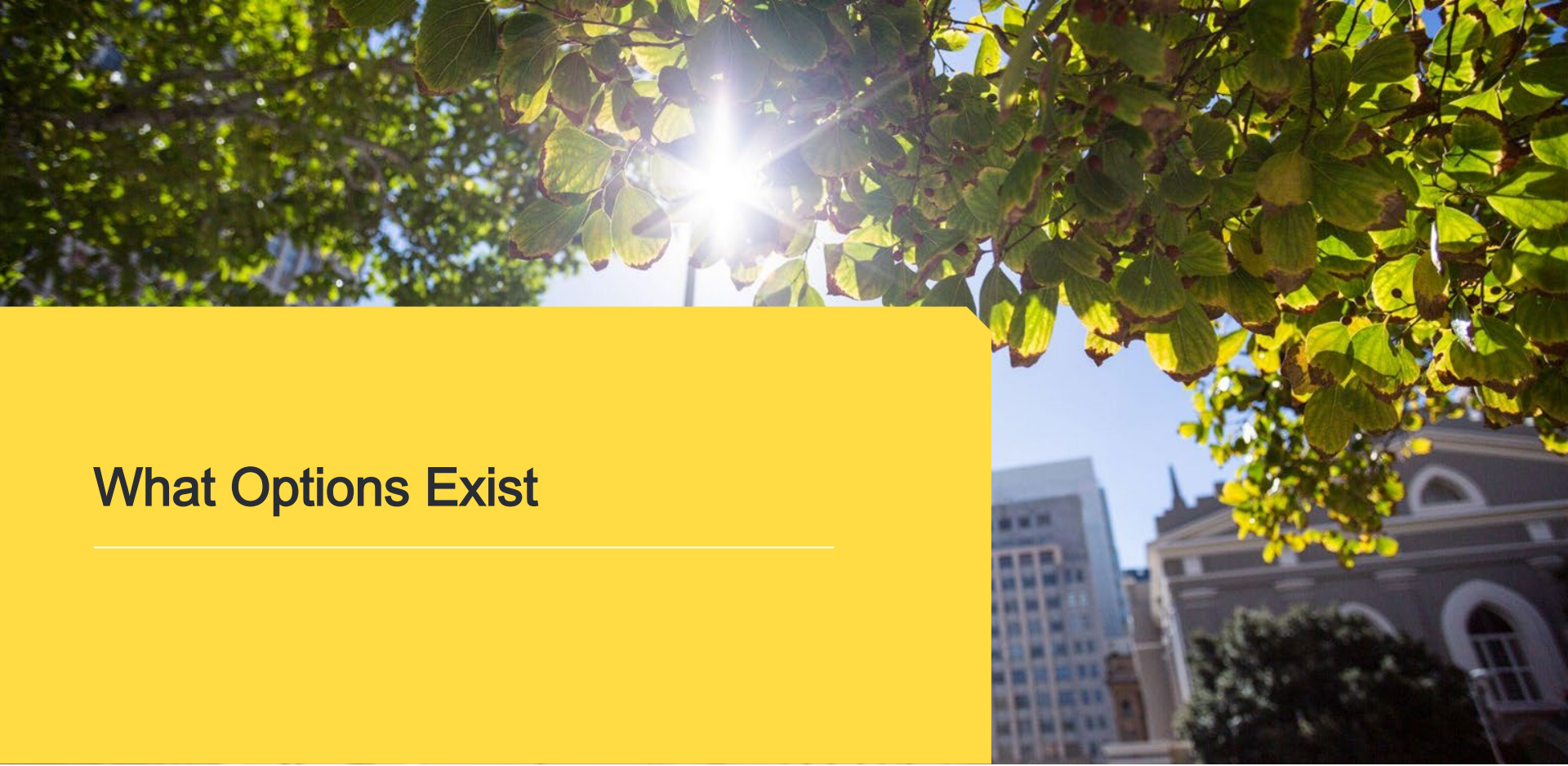
Source: Princeton Net Zero America study 2021

Figure 5. Causes and effects of the self-reinforcing negative feedback loop on gas utilities and their ratepayers



Source: The Future of Gas in New York State, BDC: 2023.


WHY
NOW?
GAS INFRASTRUCTURE LIFETIME
60 – 80 YEARS



What Options Exist

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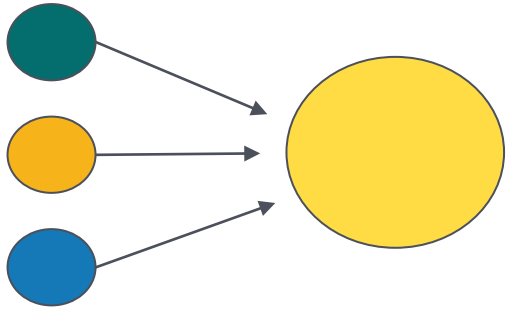
Locals and States Set the Stage

Municipal, regional, and state efforts, including reach codes, are the place for experimentation and proof of concept that can then roll up to statewide, federal, codes and policies.



Options

- Incentives
- Financing
- Education
- Lead by Example

- Internal Policy and Practice
- Local Ordinances
- Regional Influence

Who Can Do What?*

Local Governments

- Municipal Equipment Purchasing Policies
  - Electrify City Properties
- Planning, Zoning, Permitting
- Local Ordinances (where allowed)
- Performance Standards
- Incentives

Regional Agencies

- Appliance Standards
- Incentives / Financing
- Education

State Agencies

- Building Codes
- Appliance Standards
- Performance Standards
- Structural Support for Cities
- Incentives / Financing
- Education
  - Labeling / Disclosure requirements
- Equipment Purchasing Policies and Programs
  - Electrify State Properties
- Transition Planning
  - Subsidy Reform
  - Rate Reform
  - Pilot Programs

Legal limitations may apply.

Who Has Taken Action

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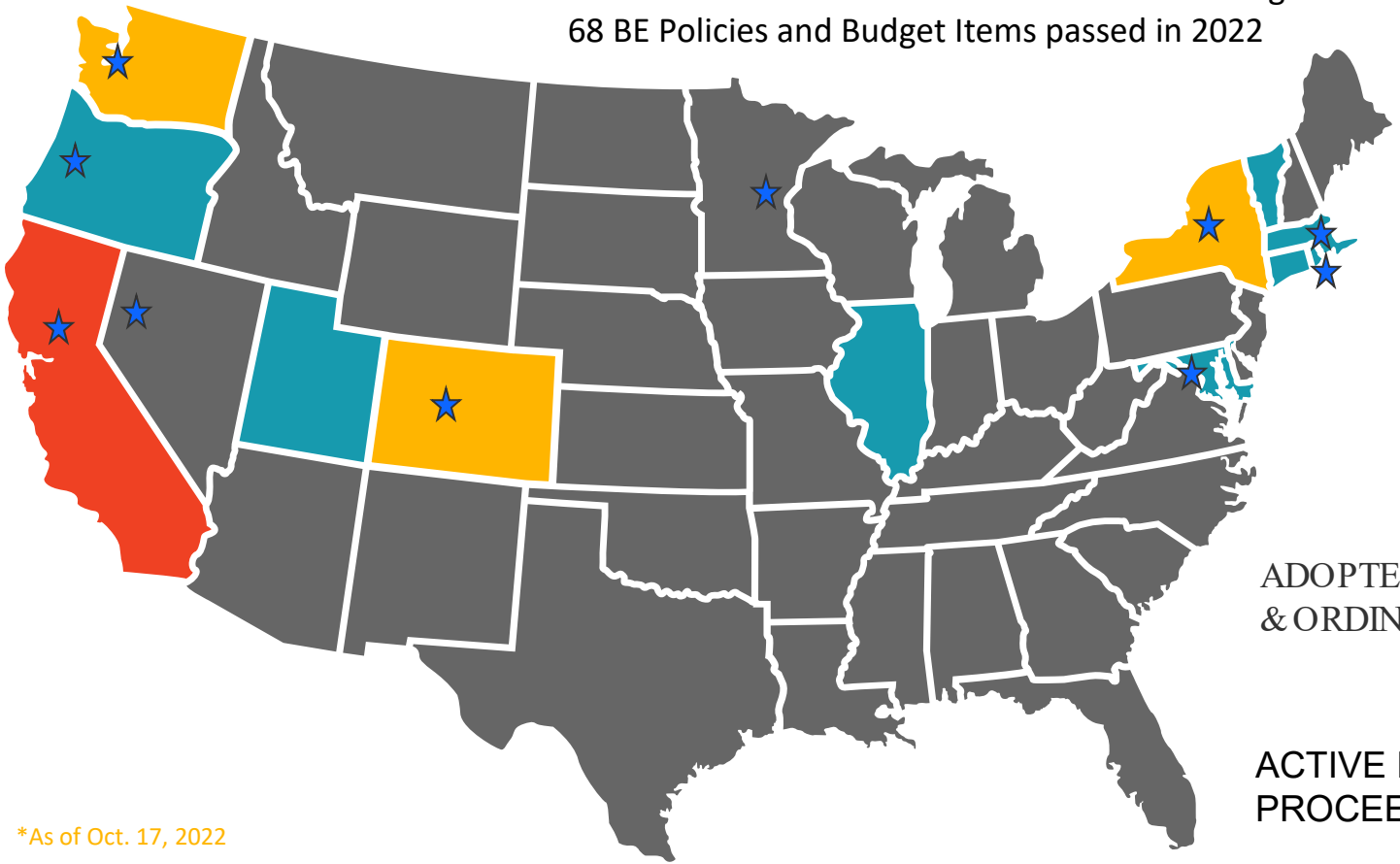
100+ Local Government and 4 State Codes & Ordinances

9 States + DC have Active Future of Gas Proceedings
68 BE Policies and Budget Items passed in 2022



ADOPTED CODES & ORDINANCES

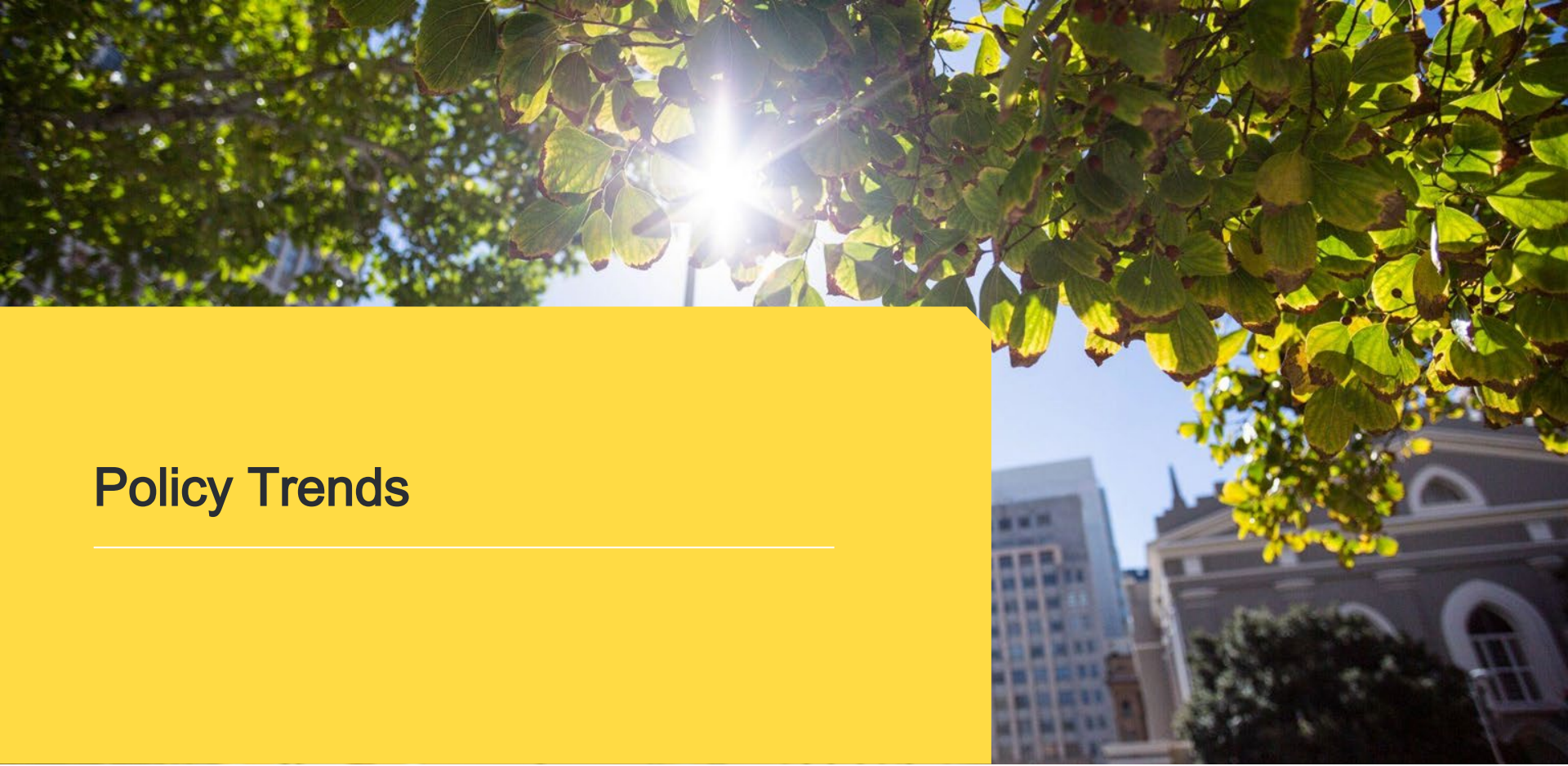
1-3
4-9
10 +

ACTIVE FUTURE OF GAS PROCEEDING*

*As of Oct. 17, 2022

Local Government Limitations

- Local governments are responsible for all code enforcement
  - Life / safety requirements are building officials primary function
  - Other requirements often take a backseat
- Local governments are not staffed equally, often understaffed in general
- Larger cities are more likely to have sustainability focused staff, not all do
- Other challenges:
  - Equity, eviction protections
  - Permit avoidance
  - Politics
  - Regional inconsistency



Policy Trends

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Lessons So Far

Early Approaches:

- Encouraging or Requiring Electrification
- Building Types:
  - New Construction Codes
  - Exceptions
    - Laboratories
    - R&D Facilities
- Scope:
  - Commercial Cooking Equipment
  - Residential Stoves
  - Multifamily Water Heating

Current Best Practice:

- Requiring Electrification
  - Electric-Readiness where not required
- Building Types:
  - New Construction Codes
  - Some Remodels
  - Building Performance Standards
    - Emissions-Based
- Scope:
  - Waiver for Technical and Physical Infeasibility
  - Phase in Dates (eg Commercial Cooking)
- Supported with Incentives and Financing

Equity Considerations and Guardrails

Considerations

- Potential for upfront cost pass through upon sale
- Potential for rental price increase
- Energy cost burden:
  - going too soon / waiting too long
- Increased risk of eviction from increased cost or perception of value increase
- Electrification taking priority over basic safety/comfort/weatherization measures

Guardrails

- Tenant protections
  - Displacement protections and eviction defense
- Affordable, electric-friendly rates
- Targeted incentives with built in protections
  - Whole-home incentives
- Tariffed on-bill financing

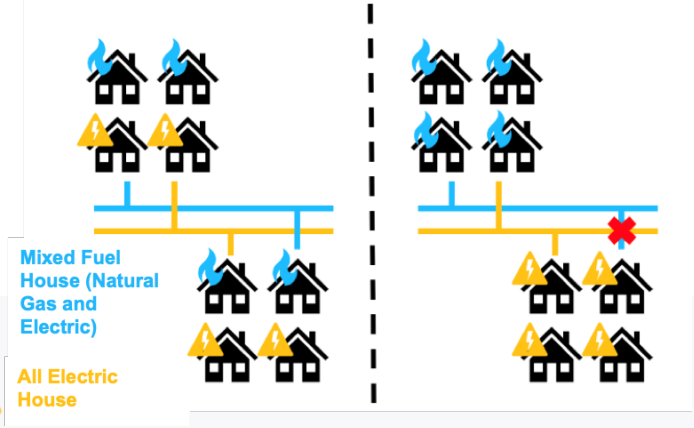
Implementation Considerations

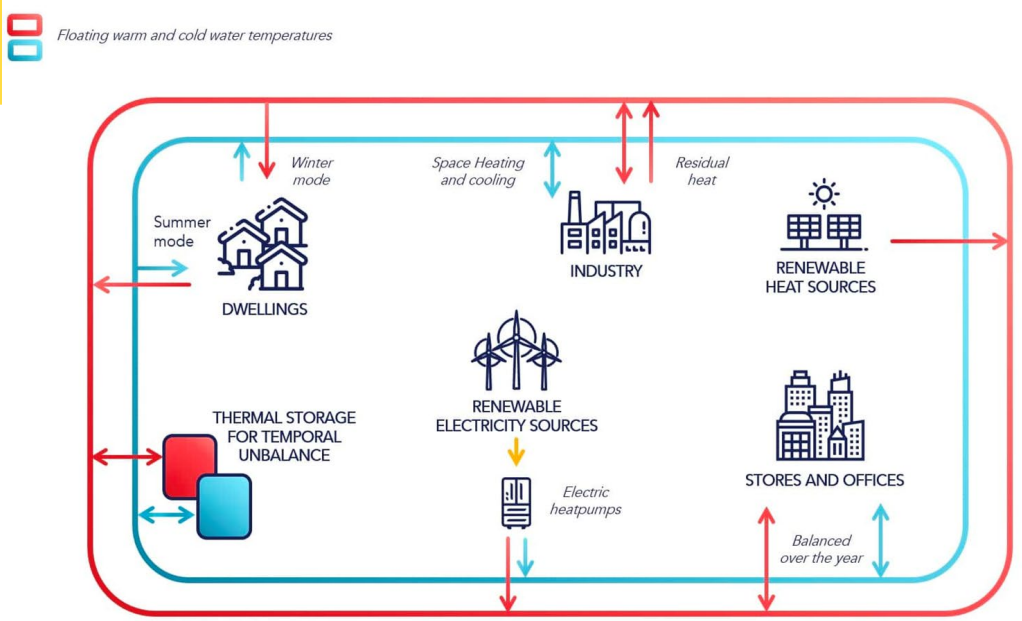
- Emergency nature of some repairs
- Potential for permit non-compliance
- High levels of variability in building stock
  - Panel upgrades
  - Knowledge of how/when panel upgrades can be avoided
- Staff time requirements
- Staff training, including for two-step replacement in emergencies
- Piecemeal approach
  - Potentially more costly than planned pruning
  - Not all enforcement triggers capture all occupancies equally

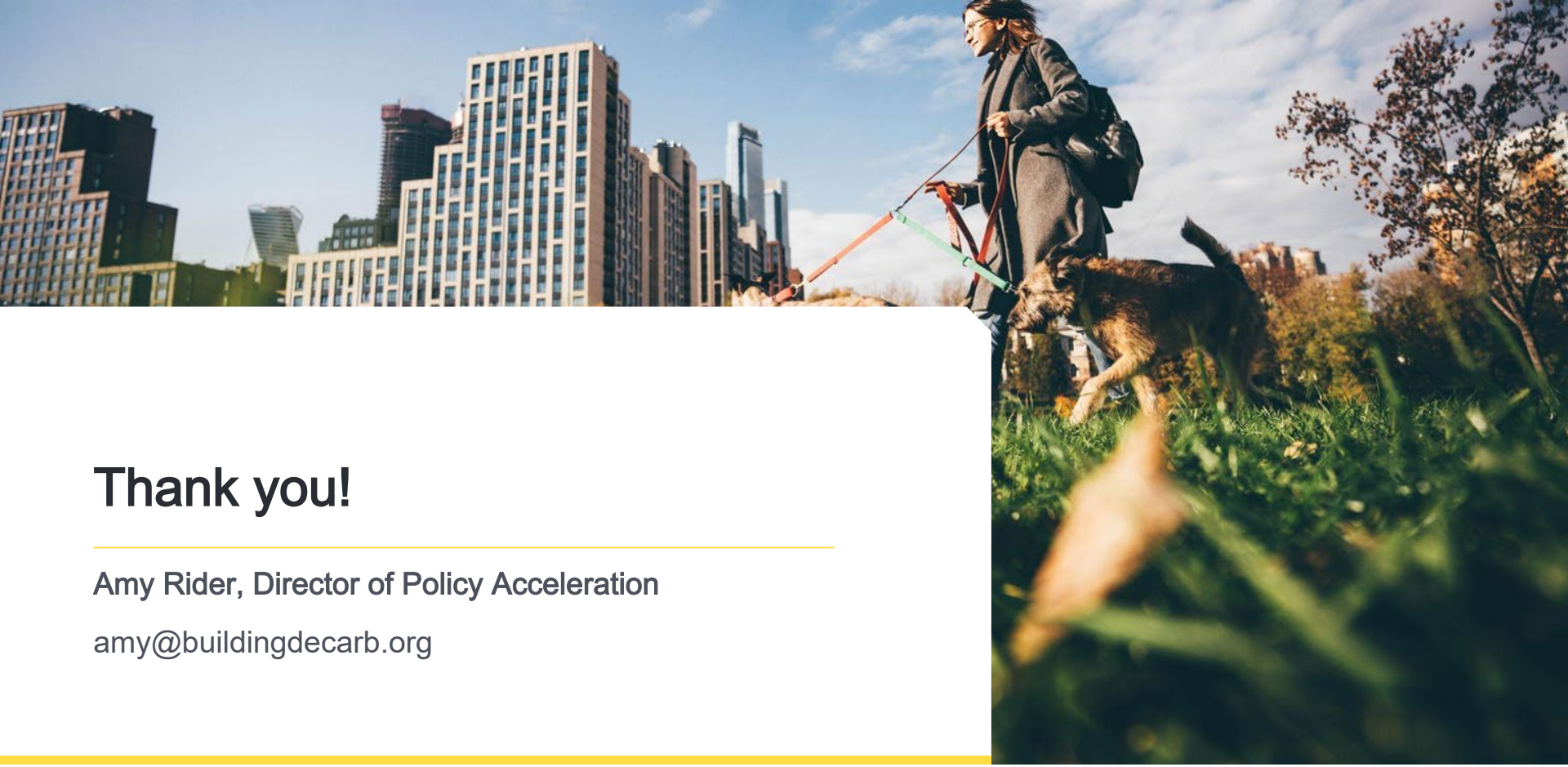
Emerging Trends

We're starting to see:

- Appliance Phase Outs
  - San Francisco Bay Area by 2027
  - New York and California by 2030
- Community Scale Projects
  - Thermal Energy Networks
  - Targeted Electrification







Thank you!

Amy Rider, Director of Policy Acceleration

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2022 Denver Energy Code Summary

The Office of Climate Action, Sustainability, and Resiliency

In partnership with:

Community Planning and Development

Buildings and Homes are responsible for 64% of Denver's GHG Emissions

Denver will eliminate greenhouse gas emissions by 2040.

- All **new** buildings and homes "net zero energy" by 2030
- All **existing** buildings and homes "net zero energy" by 2040

Xcel Energy Renewable Goals

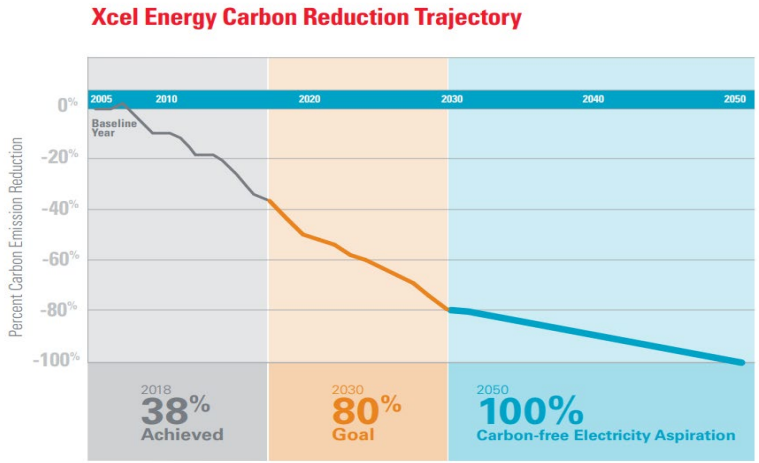
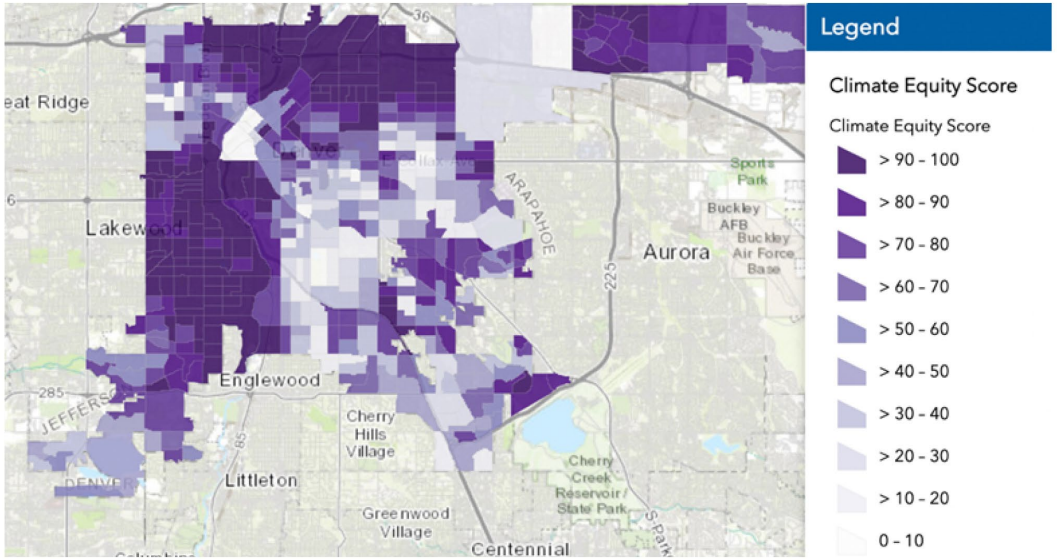


Figure 1: Our vision for the clean energy transition 2030 and 2050

Equity Priority in Buildings and Homes

Climate Equity Score for Denver Area



Equity Priority Buildings serve frontline communities with less access to resources, who may face more barriers adapting to a changing climate.

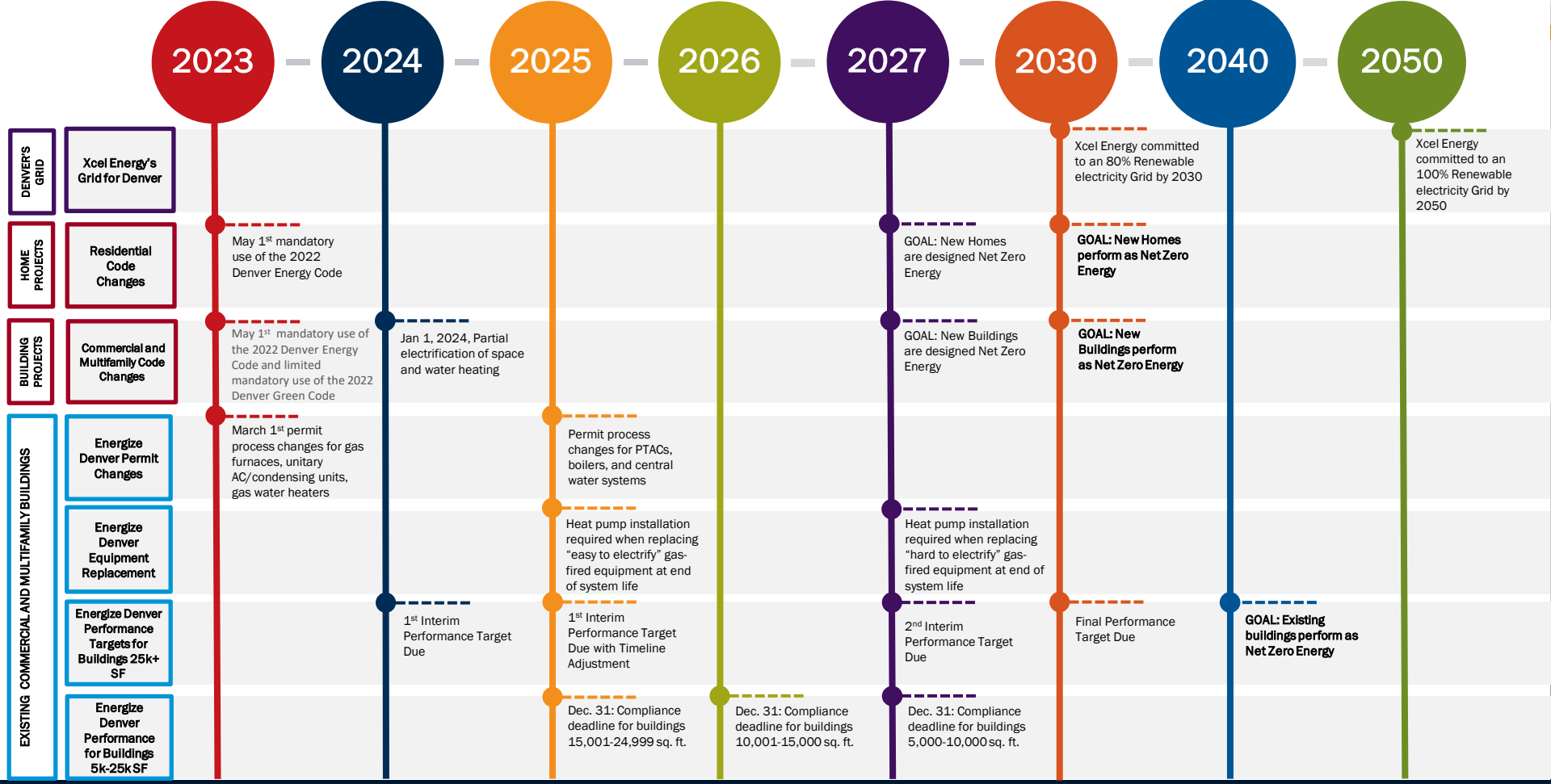
Putting the Human Touch in Building Decarbonization

Goal: Create an equitable implementation to achieve net zero energy from all buildings and homes by 2040

Identify	Identify Equity Priority Buildings + Homes
Engage	Engage the community
Avoid	Avoid unintentional harm through analysis and evaluation
Direct	Direct Investments and programming

Improves equity:

- **Lowering the energy burden** through lower utility bills
- **Providing air conditioning** to those who lack it today
- **Improving safety** – 30% of income-qualified homes in Denver, gas equipment fails carbon monoxide tests
- **Lowering exposure to indoor air pollutants**. - Residents of homes with gas appliances have nearly three times the rate of asthma compared to homes with electric appliances

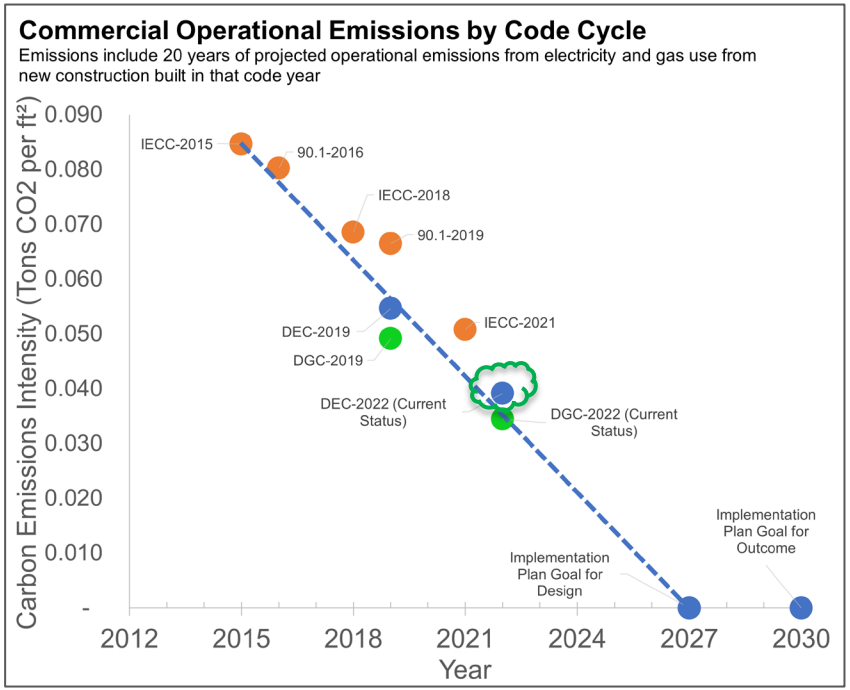

2023
2024
2025
2026
2027
2030
2040
2050
DENVER'S GRID
Xcel Energy's Grid for Denver
Xcel Energy committed to an 80% Renewable electricity Grid by 2030
Xcel Energy committed to an 100% Renewable electricity Grid by 2050
HOME PROJECTS
Residential Code Changes
May 1st mandatory use of the 2022 Denver Energy Code
GOAL: New Homes are designed Net Zero Energy
GOAL: New Homes perform as Net Zero Energy
BUILDING PROJECTS
Commercial and Multifamily Code Changes
May 1st mandatory use of the 2022 Denver Energy Code and limited mandatory use of the 2022 Denver Green Code
Jan 1, 2024, Partial electrification of space and water heating
GOAL: New Buildings are designed Net Zero Energy
GOAL: New Buildings perform as Net Zero Energy
EXISTING COMMERCIAL AND MULTIFAMILY BUILDINGS
Energize Denver Permit Changes
March 1st permit process changes for gas furnaces, unitary AC/condensing units, gas water heaters
Permit process changes for PTACs, boilers, and central water systems
Energize Denver Equipment Replacement
Heat pump installation required when replacing "easy to electrify" gas-fired equipment at end of system life
Heat pump installation required when replacing "hard to electrify" gas-fired equipment at end of system life
Energize Denver Performance Targets for Buildings 25k+ SF
1st Interim Performance Target Due
1st Interim Performance Target Due with Timeline Adjustment
2nd Interim Performance Target Due
Final Performance Target Due
GOAL: Existing buildings perform as Net Zero Energy
Energize Denver Performance for Buildings 5k-25k SF
Dec. 31: Compliance deadline for buildings 15,001-24,999 sq. ft.
Dec. 31: Compliance deadline for buildings 10,001-15,000 sq. ft.
Dec. 31: Compliance deadline for buildings 5,000-10,000 sq. ft.

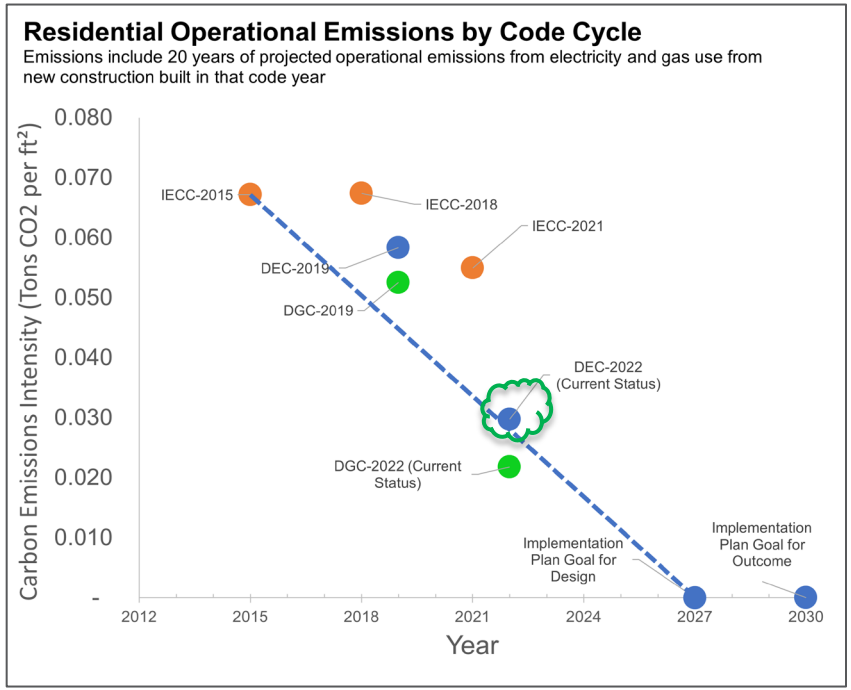
Code Adoption Process for the 2022 Denver Energy Code and the 2022 Denver Green Code

Timeline

- May - June 2021 – Working group meetings begin for the International Energy Conservation Code (IECC) & Denver Green Code (DGC)
- July - December 2021 – Public, industry, and city staff draft and propose possible amendments to be considered in the 2022 code
- January - July 2022 – Formal code committee hearings take place
- August – November – Final code language drafts reviewed and prepared
- Winter 2022/2023 – Legislative review and formal adoption
- January 12th 2023 – Denver City Council adopted the 2022 Denver Building and Fire Code and the 2022 Denver Green Code.
- May 1st, 2023 – Mandatory use of 2022 codes for design.

Energy Code – Accomplishments





2022 Denver Energy Code – Commercial Amendments

1. Commercial Partial Electrification for Space Heating
2. Commercial Partial Electrification for Water Heating

1-2: Aligned with Energize Denver

3. Commercial pEUI Energy Modeling Metric
4. Commercial Appendix G Energy Modeling Metric
5. Commercial Appendix G Site Energy Metric
6. Commercial Prescriptive Path

3-6: To aid electrification, ease of use, and align with the city's Comprehensive Plan 2040

7. Commercial Electric Vehicles Update
8. Additional energy code amendments that advance the goals of Comprehensive Plan 2040 along with updates to coordinate with Energize Denver requirements

Electrification for Space Heating

C403.2.4 – Space heating equipment

- Effective date of **January 1st, 2024**
- Fossil-fuel warm air furnaces and electric resistance space heating equipment are not be permitted for space heating
- Focus on systems with design, technology, and equipment that is currently available
- Aligns with Energize Denver requirements

- **Exceptions:**
  - Emergency power or standby power, as approved by building official
  - Makeup air systems where ERV is prohibited by Denver Mechanical Code
  - Electric resistance used for heat pump supplementary heat
  - Electric resistance up to 5 W/sf
  - Gas furnaces or electric resistance in heated plenums or freeze protection
  - Electric resistance in buildings that use a performance path for compliance
  - Replacement furnaces that comply with Alterations C503.3.3

Electrification for Water Heating

C404.10 Water heaters.

- Effective date of **January 1st, 2024**
- Fossil fuel and electric resistance instantaneous and storage water heaters are not be permitted to provide potable hot water
- Focus on systems with design, technology, and equipment that is currently available
- Aligns with Energize Denver requirements

- **Exceptions:**
  - Electric resistance elements in heat pumps
  - Electric resistance elements for recirculation loop temperature maintenance
  - Electric storage water heaters with a volume <= 20 gallons
  - Instantaneous electric water heaters within 10 feet of point of use
  - Hot water storage tanks without electric resistance or fossil-fuel heating elements
  - Water heating systems that require water temperature >= 141°F
  - Electric resistance equipment where on-site renewables serves 100% the annual service water heating requirement
  - Electric resistance storage water heating equipment where solar thermal serves 75% of the annual service water heating requirement
  - Electric resistance in buildings that use a performance path for compliance
  - Replacements of gas-fired storage water heaters or instantaneous water heaters that comply with Alterations C503.4.1

2022 Denver Energy Code – Residential Amendments

1. Residential Energy Modeling Metric
2. Residential Prescriptive Path
3. Residential Minimum Renewables
4. Residential Electric Vehicle Charging
5. Electric Ready Infrastructure
6. Solar-Ready Zones
7. Additional energy code amendments that advance the goals of Comprehensive Plan 2040

2022 Denver Green Code

Denver Green Code (DGC)

- The Denver Green Code addresses both climate change and biodiversity loss through mitigation, adaptation, and resiliency.
- The DGC is based on the International Green Construction Code. Denver first adopted the green code on a voluntary basis in 2019.
- Starting May 1st, 2023, the city requires commercial and multifamily development to meet *some* provisions from this code, while allowing projects the flexibility to choose which specific provisions to implement.

Denver Green Code: Purpose

Help align Denver development with residents' Comp Plan 2040 vision

- Live in balance with resources
- Support positive ecological evolution
- Cross agency integration
- **Increase stringency of mandatory regulations**
- Change process + thinking
- Community integration
- Regulatory bridge

2022 Denver Green Code: Applicability

1. **<u>Limited</u> Mandatory Use**
   - All new **commercial** projects + major renovations*
   - Choose provisions
   - Gain familiarity

Read + Familiarize
Choose **12/7*** of **116** provisions

2. **Voluntary Enhanced Use**
   - Four options:
     1. As-Written
     2. LEED Platinum
     3. Zero Net Energy, All Electric
     4. Passive House + Non-Energy As-Written

2022 Denver Green Code: Limited Mandatory Use

Limited Mandatory Use

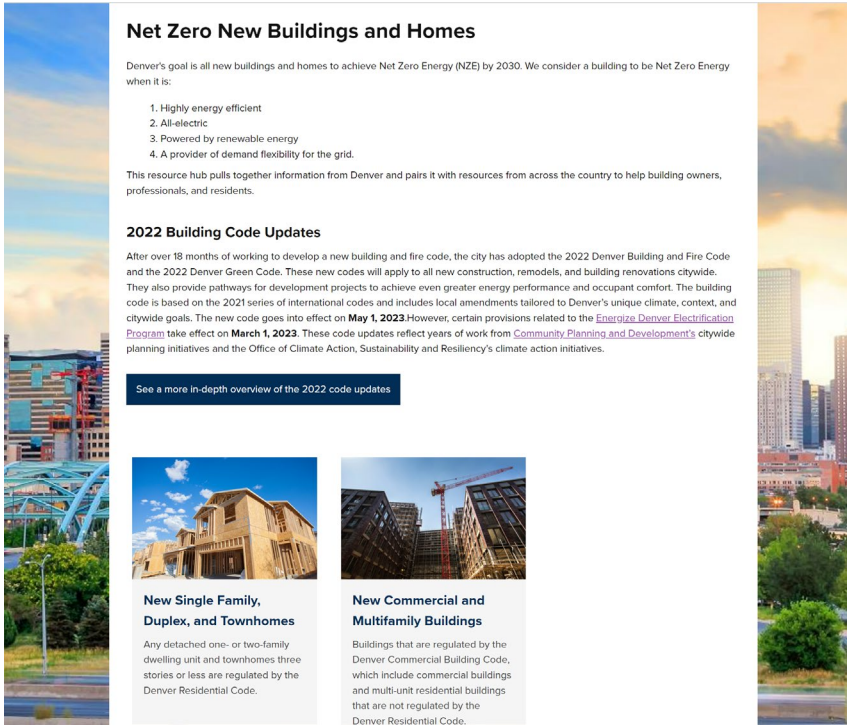
All new **commercial** projects + major renovations*

Chapter	Choose _ of _ Provisions	Topic
1	**0** of 1	Ecological Impact Statement = *optional wildcard provision*
2	**0** of 0	Reserved
3	**0** of 0	Definitions
4	**0** of 10	Residential Energy
5	**4/2*** of 19	Site Sustainability
6	**1/0** of 11	Water Use Efficiency
7	**1** of 36	Commercial Energy
8	**1** of 16	Indoor Environmental Quality
9	**3/1*** of 10	Materials and Resources
10	**2** of 16	Construction and Plans for Operation
Total	**12/7*** of **116**	**All Chapters**

Resources for the 2022 Denver Energy Code and 2022 Denver Green Code

Net Zero New Buildings and Homes Hub

- **Denvergov.org/netzero**
- Intended to help project teams navigate updates **to Denver's Energy and Green Codes**
- **Local and nationwide** resources to support Denver project teams
- Developing specific **2022 Denver Energy Code** resources
  - Trainings, fact sheets, summaries



New Building Electrification Incentive Program

Design Support: partial funding for drawing sets and as-built drawings that can be reviewed by Denver builders to help inform how electrification can work for their projects

Pilot Projects: partial funding for builders or property owners interested in leveraging city funds to help a new building project be built all-electric

Equity Focus: 50% of the pilot project funds will be prioritized for Equity Priority Buildings.

Energize Denver: Existing Buildings

Energize Denver Ordinance

Reduces emissions from buildings 80% by 2040

Applies to all commercial, multifamily, institutional, municipal, manufacturing, agricultural, and industrial buildings

Electrification

- Applicable to all buildings, no matter the size
- Partial electrification of space and water heat and cooling equipment upon system replacement, when cost effective

Benchmarking

- Buildings 25,000 sq. ft. and larger
- Submit energy data annually

Performance

- Minimum energy efficiency requirements for buildings 25,000 sq. ft. and larger
- LED or Renewable requirements for buildings 5,000 -24,999 sq. ft.
- Focused on improvements to energy efficiency and increasing renewables

Support and Resources for Energize Denver: Electrification Program

Resources and technical assistance:

[Electrification Program website]

Thank You!

Contacts:

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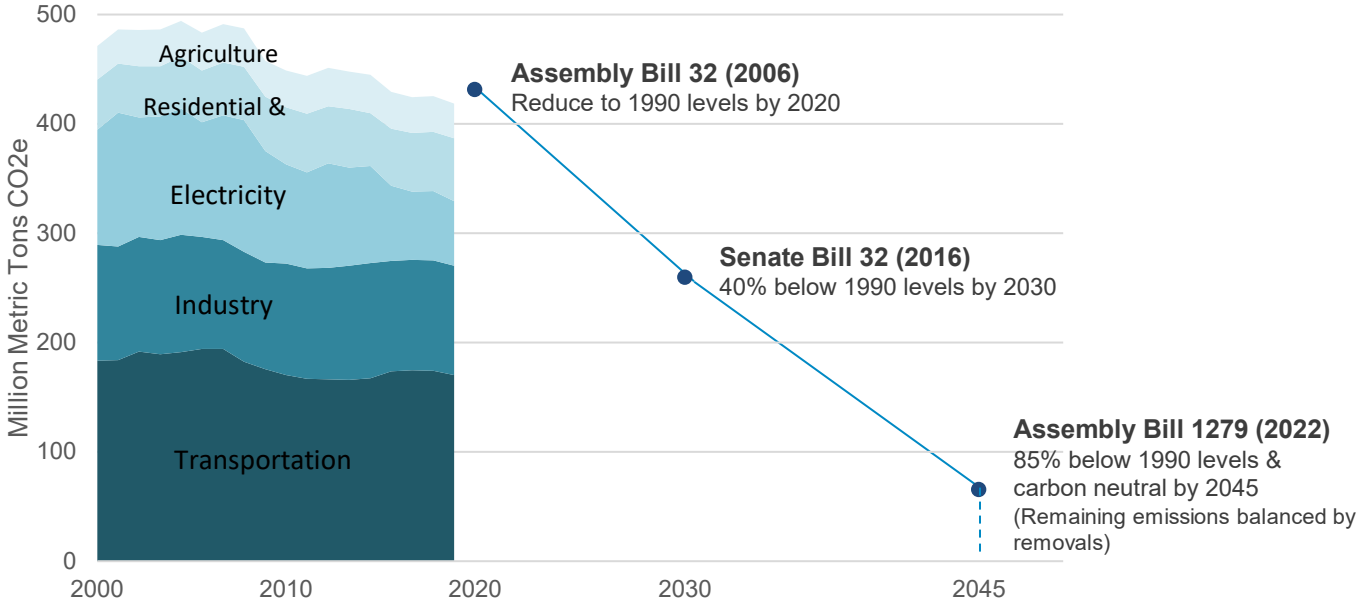
Local Reach Codes & Building Decarbonization: A Utility Perspective

California's 2045 Carbon Neutrality Goal

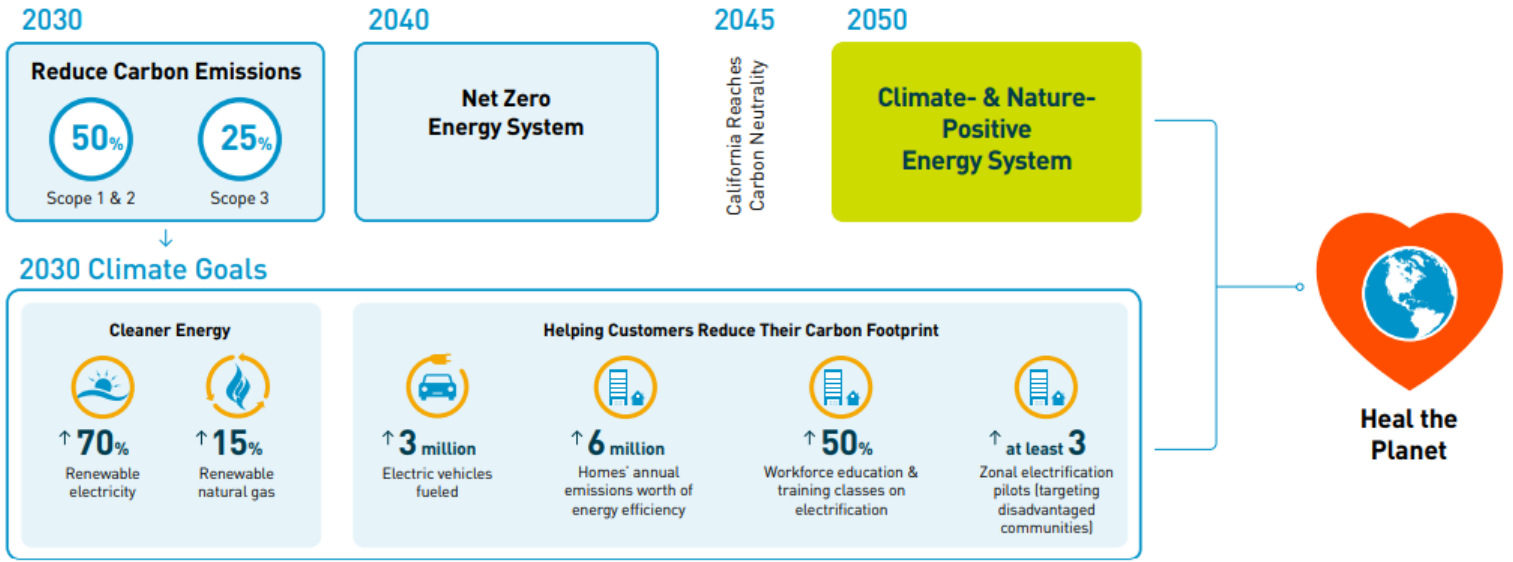
California has a statewide goal to achieve economy-wide carbon neutrality by 2045 and to maintain net negative emissions thereafter.



PG&E's Climate Goals

Our Commitment: Helping to Heal the Planet

Leading an equitable and viable transition that leaves no one behind



Notes:
Scope 1: *Direct* emissions from PG&E's operations.
Scope 2: *Indirect* emissions from facility electricity use and electric line losses.
Scope 3: Emissions resulting from *value chain activities* not owned or controlled by PG&E but that can be indirectly impacted by PG&E actions.
"Scope 4": An emerging term for categorizing emission reductions enabled by a company. PG&E can make a significant contribution by enabling these emission reductions in our service area.

PG&E Gas Strategy

Vision: The gas system evolves to be an affordable, reliable and safe energy delivery platform consistent with California's carbon neutrality goals.

- Decrease Costs to Maintain System
- Reduce Carbon Footprint
- Support Hard-to-Electrify Customers with Gas
- Leverage Innovative Financial Mechanisms

Building Electrification:
New Construction & Retrofits

Active 2022 Building Code Cycle Ordinances

CALGreen
Amending Title 24 , Part 11

Agoura Hills
Alameda
Albany
Atherton
Belmont
Campbell
Carlsbad
Corte Madera
Cudahy
Cupertino
Daly City
Dublin
East Palo Alto
El Monte
Emeryville
Encinitas
Glendale
Hayward
Healdsburg
Livermore
Los Altos
Los Altos Hills
Los Angeles County
Los Gatos
Milpitas
Mountain View
Pacifica
Palo Alto
Pasadena
Pleasanton
Portola Valley
Redwood City
Rolling Hills
San Carlos
San Leandro
San Mateo
Santa Rosa
Saratoga
Sonoma County
Solana Beach
Ventura County
West Hollywood

Municipal Code
Amending Local Municipal Code

Irvine
Los Angeles
Martinez
Marin County
Ojai
Riverside
San Anselmo
San Bruno
San Rafael
Santa Monica
Sunnyvale

Adopted in 2019 Cycle

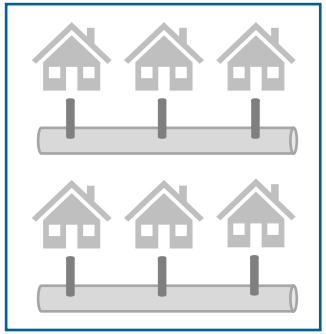
Berkeley
Fairfax
Morgan Hill
Oakland
Petaluma
Richmond
Sacramento
San Francisco
San Jose
Santa Barbara
Santa Cruz
Hercules
Half Moon Bay

Energy Code
Amending Title 24 , Part 6

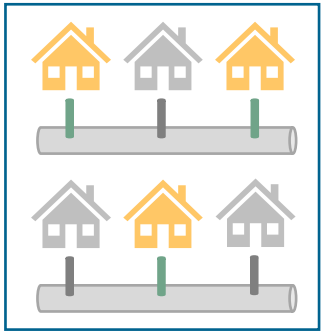
Menlo Park
Los Altos
Millbrae
Piedmont
South San Francisco
Santa Clara
Contra Costa County
Burbank
Carlsbad
Encinitas
Marin County
Mountain View
Fairfax (additions)

Building Electrification Impact on Long-Term Gas Rates

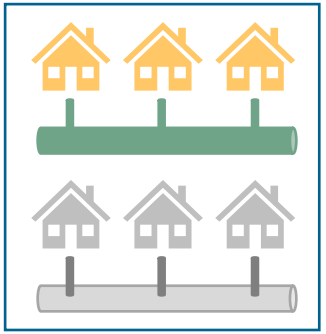
Device-by-device electrification



Whole-building electrification



Zonal/Targeted electrification



Mixed-fuel customer

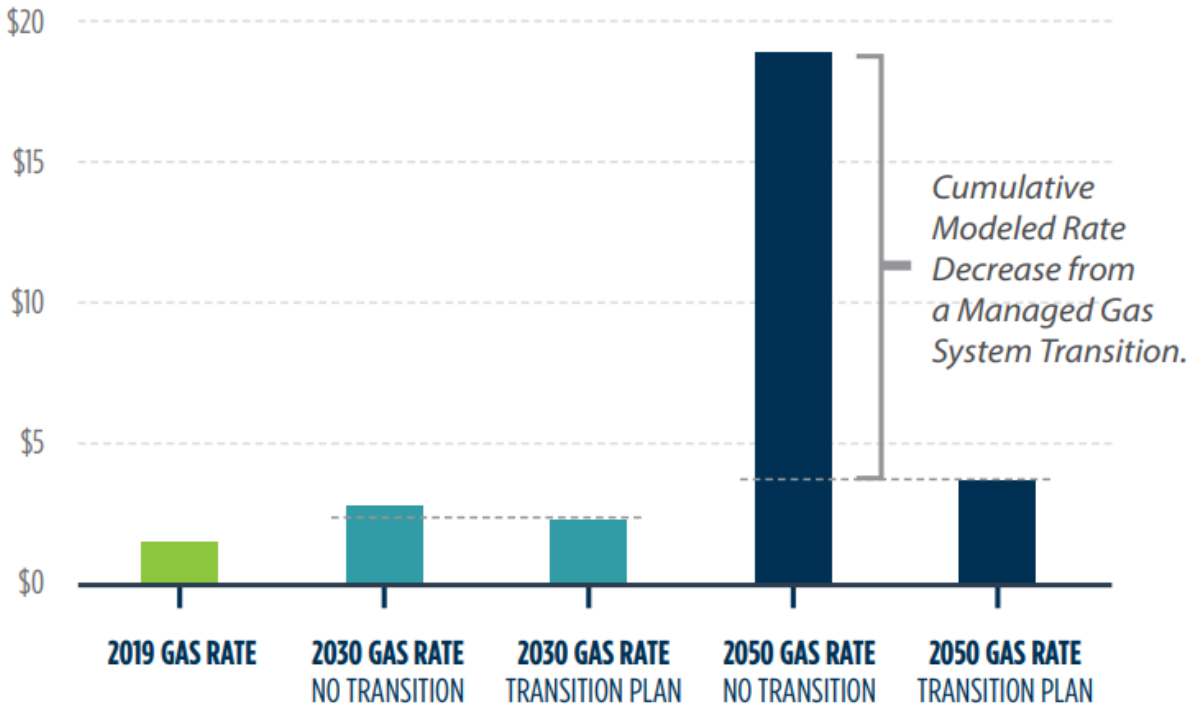
All-electric customer

Main

Service and meter

Potentially decommissioned Service and/or Main

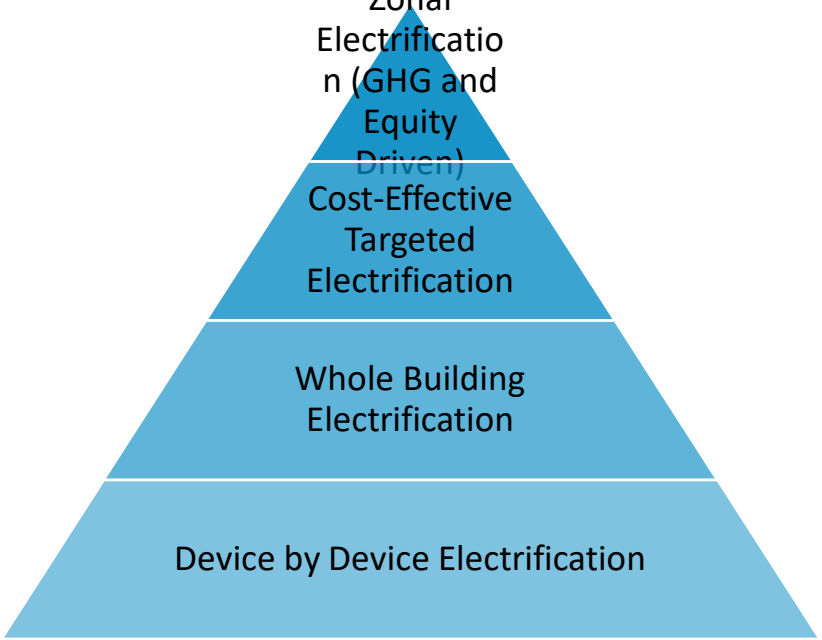
Building Electrification Impact on Long-Term Gas Rates



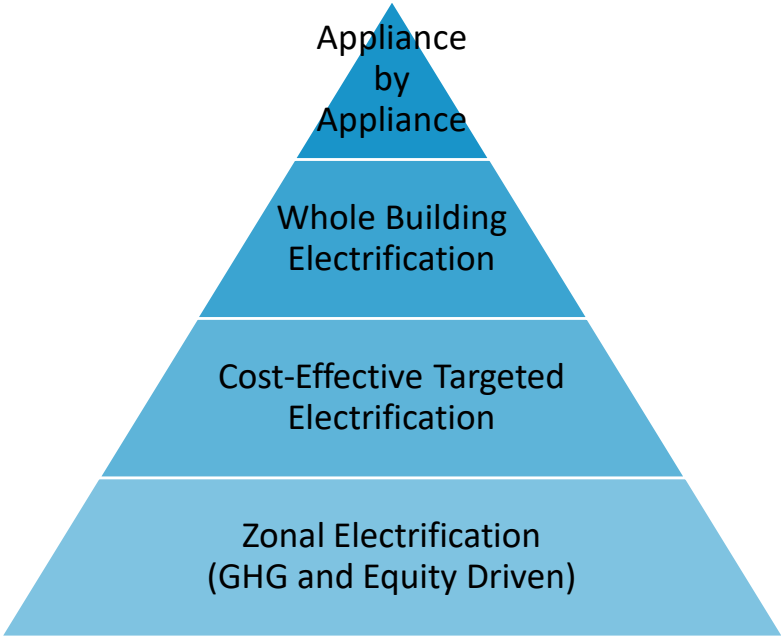
Source: California's_Gas_System_in_Transition.pdf (gridworks.org)

Electrification in California

Current state



Desired end state



Targeted Electrification: A Cost-Based Approach to Electrification

Targeted electrification success story: ~2,000 ft Aldyl-A replacement project

	Status quo gas replacement	Electrification alternative
Pipe replacement/retirement	$1.2M	$20K
Customer electrification	-	$130K
Service retirement	-	$6K
TOTAL	**$1.2M**	**$156K**

Progress to Date

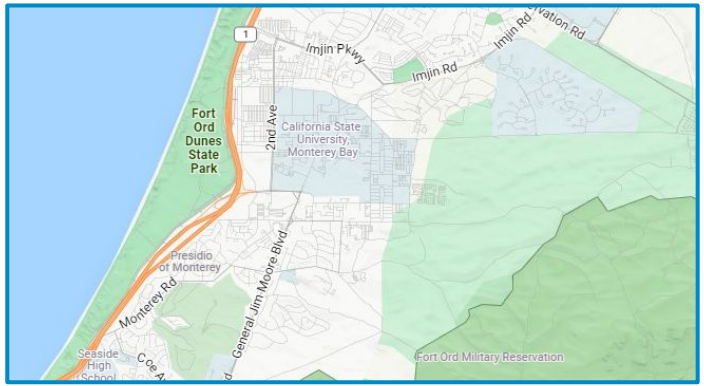
- Established the Gas Investment for the Future (GIFF) team to evaluate alternatives to gas investments and engage customers on alternatives to gas service
- Small-scale projects conducted to date have electrified 102 customers, avoided 80 high-pressure regulator rebuilds and 4.2 miles of distribution main, while enabling the retirement of 22 miles of line

Scaling Early Success

- Scale is dependent on changes to “obligation to serve”, external funding, and ability to capitalize behind-the-meter electrification costs
- Utilities need a streamlined application process for targeted electrification projects to ensure that they can be conducted on a timeline consistent with critical gas safety and/or reliability needs

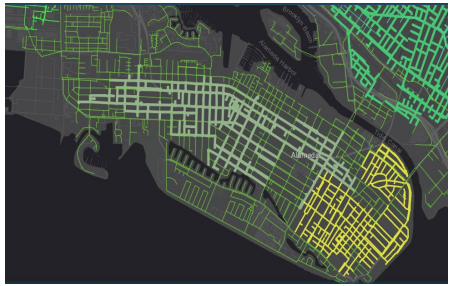
Larger scale targeted electrification project

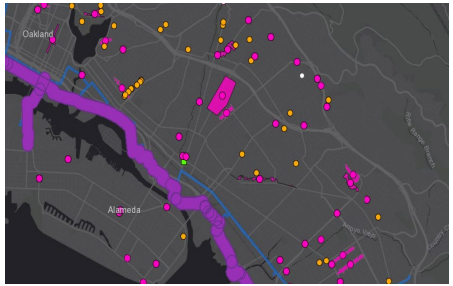
CSU Monterey



- In 2022, PG&E filed an application with the CPUC that asks for up to $17.2M to pursue “zonal” electrification at CSU Monterey Bay
- Includes 8 miles of gas line that requires replacement from 2022-2025
- This project requires electrification of all gas in-unit appliances (space heating, water heating, cooking, laundry) and retirement of the existing gas pipeline
- The costs of the zonal electrification project are anticipated to be fully offset by the avoided gas distribution replacement costs; PG&E is requesting regulatory asset (or “capital”) treatment for the behind-the-meter electrification costs to ensure the project is cost-effective
- As estimated, electrification of CSU Monterey Bay would result in 5 million pounds (2,278 metric tons) of CO_2 emission reductions, the equivalent of retiring 491 gasoline-powered passenger vehicles from the road for one year

Zonal Electrification: increased scale and impact





Progress to Date

- Developed an internal *Gas Asset Analysis Tool* to evaluate potential areas for zonal electrification. The tool includes data such as customer income, prevalence of renters, geographic risks, and electric capacity
- PG&E provides a version of this tool, under NDA, to local governments to allow collaboration on planning efforts
- Submitted a zonal electrification program, targeting low-income neighborhoods, in PG&E's 2023-2027 energy efficiency portfolio

Scaling Early Success

- Similar to targeted electrification "scale is dependent on changes to 'obligation to serve', [significant] external funding, and ability to capitalize behind-the-meter electrification costs"
- Building networks of local, trusted partners is needed to support customer acceptance for community-led electrification

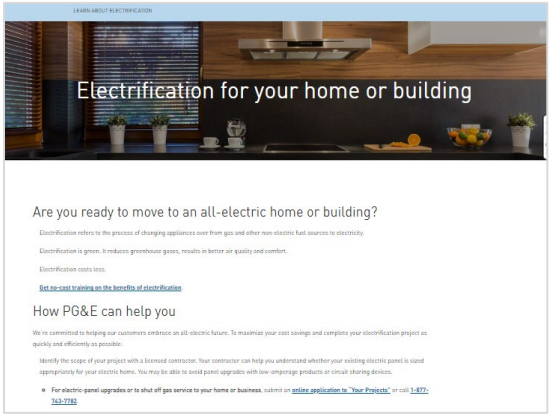
New Construction: Resources

Incentive Programs

- California Energy Smart Homes (residential) and California Energy Design Assistance (non-residential)
  - Incentives for new construction all-electric homes and major retrofits.

Customer Support

- New Electric Home Rate (E-ELEC) and Electric Baseline
- Free technical training on electrification through PG&E Energy Centers
- Customer support available at electrification@pge.com



Retrofits: Resources

Incentive Programs

- Evolved 2024-2027 Energy Efficiency Portfolio focuses on electrification, especially for under-served communities.
- Energy Savings Assistance program (low-income customers)
  - Single appliance incentives available for electric technologies, with direct install options.
  - Whole-building incentives (in pilot phase)
- WatterSaver demand response program for heat pump water heaters.

Additional Customer Support

- Electrification Guidebook
- Electrification Rate Comparison Tool (coming Q2-4 2023)
- Free Induction Cooktop Lending Program (residential) and equipment demonstrations (non-residential)

Energy Codes: Resources

Codes and Standards and Cross-cutting programs

State Building Codes

- Advance energy efficiency and building decarbonization in new construction and existing buildings through the California Energy Code and

State Appliance Standards

- Advance energy efficiency and water savings through California Appliance Standards.
- Support demand flexible

National Codes and Standards

- Improve efficiency and effectiveness of appliances through updated standards and test procedures.

Compliance Improvement

- Maintain high compliance rates.
- Automate code implementer's workflow.
- Empower the compliance

Reach Codes

- Assist with the development of local energy ordinances.
- Support existing building performance standards.
- Support EV-infrastructure and water-efficiency reach

Code Readiness

- Collect high quality data on building and appliance energy use and performance.
- Support building decarbonization.

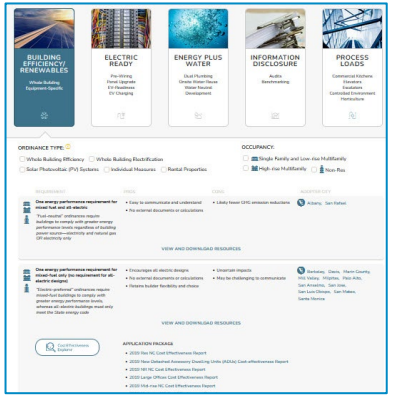
Reach Codes: Local Energy Codes

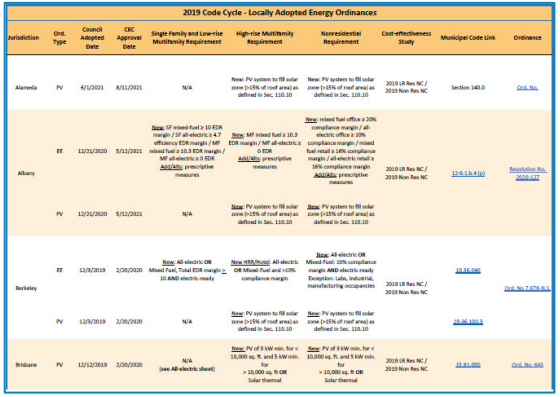
Prepare	Prepare cost-effectiveness analyses
Draft	Draft model language
Develop	Develop adoption and implementation resources and tools
Provide	Provide technical support to staff
Communicate	Communicate study results to stakeholders
Publish	Publish reach codes newsletter

LocalEnergyCodes.com

- Statewide ordinance map & tracking
- Reports / Technical analyses
- Events
- Newsletter
- FAQ
- **Cost Effectiveness Explorer**

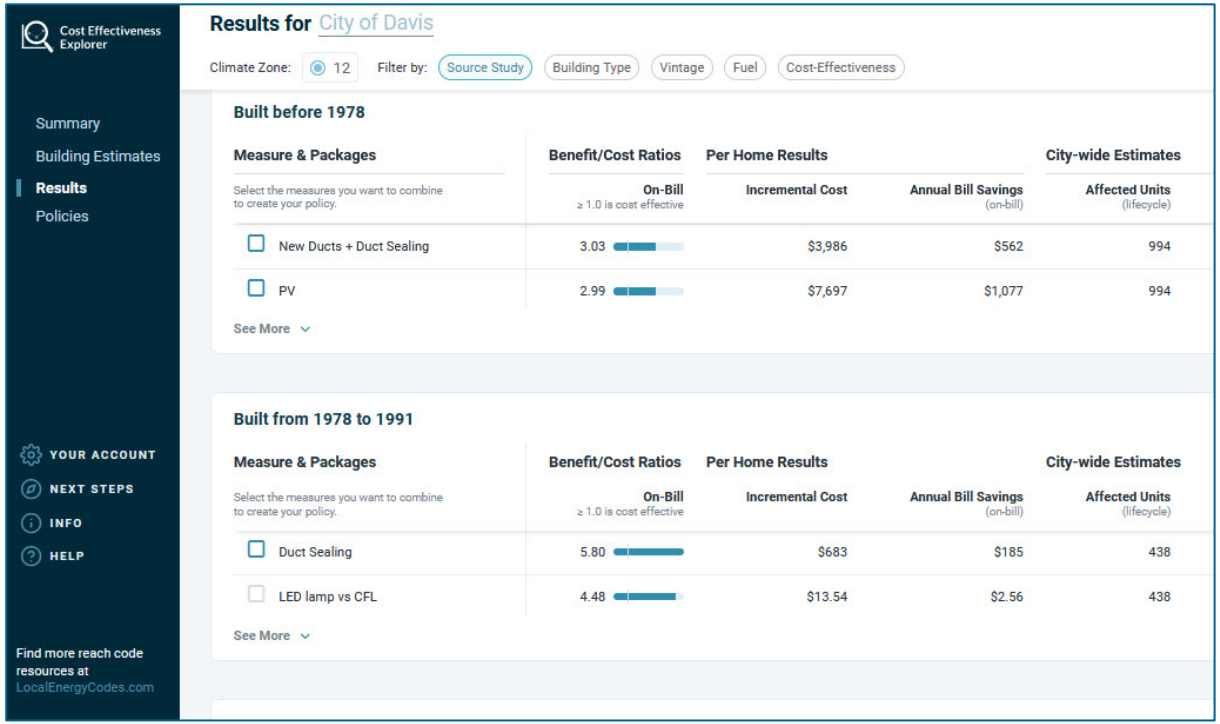
CALIFORNIA ENERGY CODES & STANDARDS
A STATEWIDE UTILITY PROGRAM




2019 Code Cycle - Locally Adopted Energy Ordinances

Jurisdiction	Ord. Type	Council Adopted Date	CEC Approval Date	Single Family and Low-rise Multifamily Requirement	High-rise Multifamily Requirement	Nonresidential Requirement	Cost-effectiveness Study	Municipal Code Link	Ordinance
Alameda	PV	6/1/2021	8/11/2021	N/A	New: PV system to fill solar zone (>15% of roof area) as defined in Sec. 110.10	New: PV system to fill solar zone (>15% of roof area) as defined in Sec. 110.10	2019 LR Res NC / 2019 Non Res NC	Section 140.0	Ord. No.
Albany	EE	12/21/2020	5/12/2021	New: SF mixed-fuel ≥ 10 EDR margin / SF all-electric ≥ 4.7 efficiency EDR margin / MF mixed fuel ≥ 10.3 EDR margin / MF all-electric ≥ 0 EDR Add/Alts: prescriptive measures	New: MF mixed fuel ≥ 10.5 EDR margin / MF all-electric ≥ 0 EDR Add/Alts: prescriptive measures	New: mixed fuel office ≥ 20% compliance margin / all-electric office ≥ 20% compliance margin / mixed fuel retail ≥ 16% compliance margin / all-electric retail ≥ 16% compliance margin Add/Alts: prescriptive measures	2019 LR Res NC / 2019 Non Res NC	12-6.1& 4 (e)	Resolution No. 2020-122
	PV	12/21/2020	5/12/2021	N/A	New: PV system to fill solar zone (>15% of roof area) as defined in Sec. 110.10	New: PV system to fill solar zone (>15% of roof area) as defined in Sec. 110.10			
Berkeley	EE	12/9/2019	2/20/2020	New: All-electric OR Mixed Fuel, Total EDR margin ≥ 10 AND electric-ready	New HSB/Hotel: All-electric OR Mixed Fuel and >10% compliance margin	New: All-electric OR Mixed Fuel: 10% compliance margin AND electric-ready Exception: labs, industrial, manufacturing occupancies	2019 LR Res NC / 2019 Non Res NC	19.36.040	Ord. No 7,678-N.S.
	PV	12/9/2019	2/20/2020	N/A	New: PV system to fill solar zone (>15% of roof area) as defined in Sec. 110.10	New: PV system to fill solar zone (>15% of roof area) as defined in Sec. 110.10		19.36.100.E	
Brisbane	PV	12/12/2019	2/20/2020	N/A (see All-electric sheet)	New: PV of 3 kW min. for < 10,000 sq. ft. and 5 kW min. for > 10,000 sq. ft OR Solar thermal	New: PV of 3 kW min. for < 10,000 sq. ft. and 5 kW min. for > 10,000 sq. ft OR Solar thermal	2019 LR Res NC / 2019 Non Res NC	15.81.050	Ord. No. 643

Cost Effectiveness Explorer



- Web based software to evaluate and develop cost-effective policy options
- Draft model ordinance
- Explore wide range of existing conditions
- Includes implementation support

explorer.localenergycodes.com

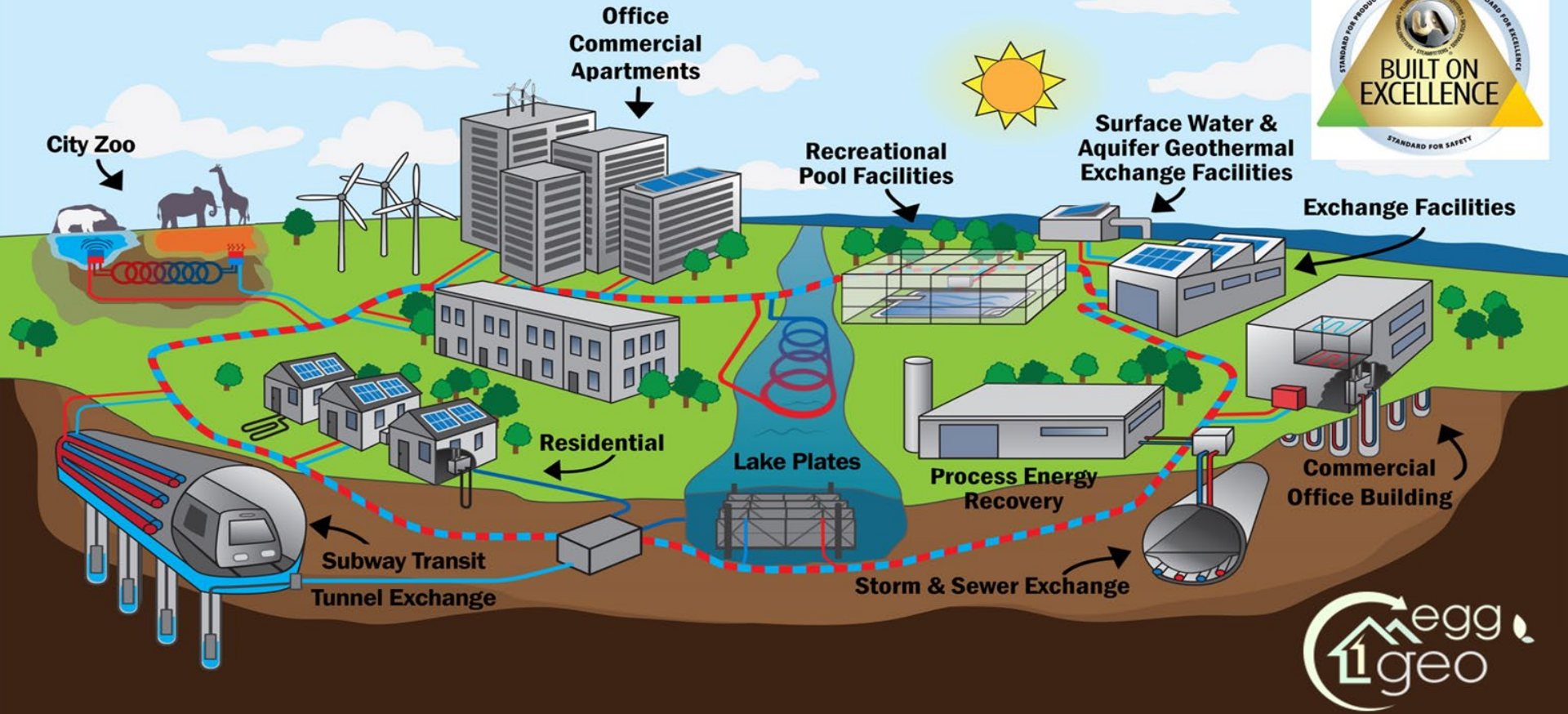
CALIFORNIA ENERGY CODES & STANDARDS
A STATEWIDE UTILITY PROGRAM

Jurisdiction Challenges

Thank you.

Kelly Cunningham
Kelly.Cunningham@pge.com

Thermal Energy Network Infrastructure



BUILT ON EXCELLENCE

STANDARD FOR PRODUCTIVITY

STANDARD FOR EXCELLENCE

STANDARD FOR SAFETY

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