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Building Decarbonization Barrier Busting

Panama Bartholomy

Building Decarbonization – Scale, Equipment, and Emerging Solutions Workshop

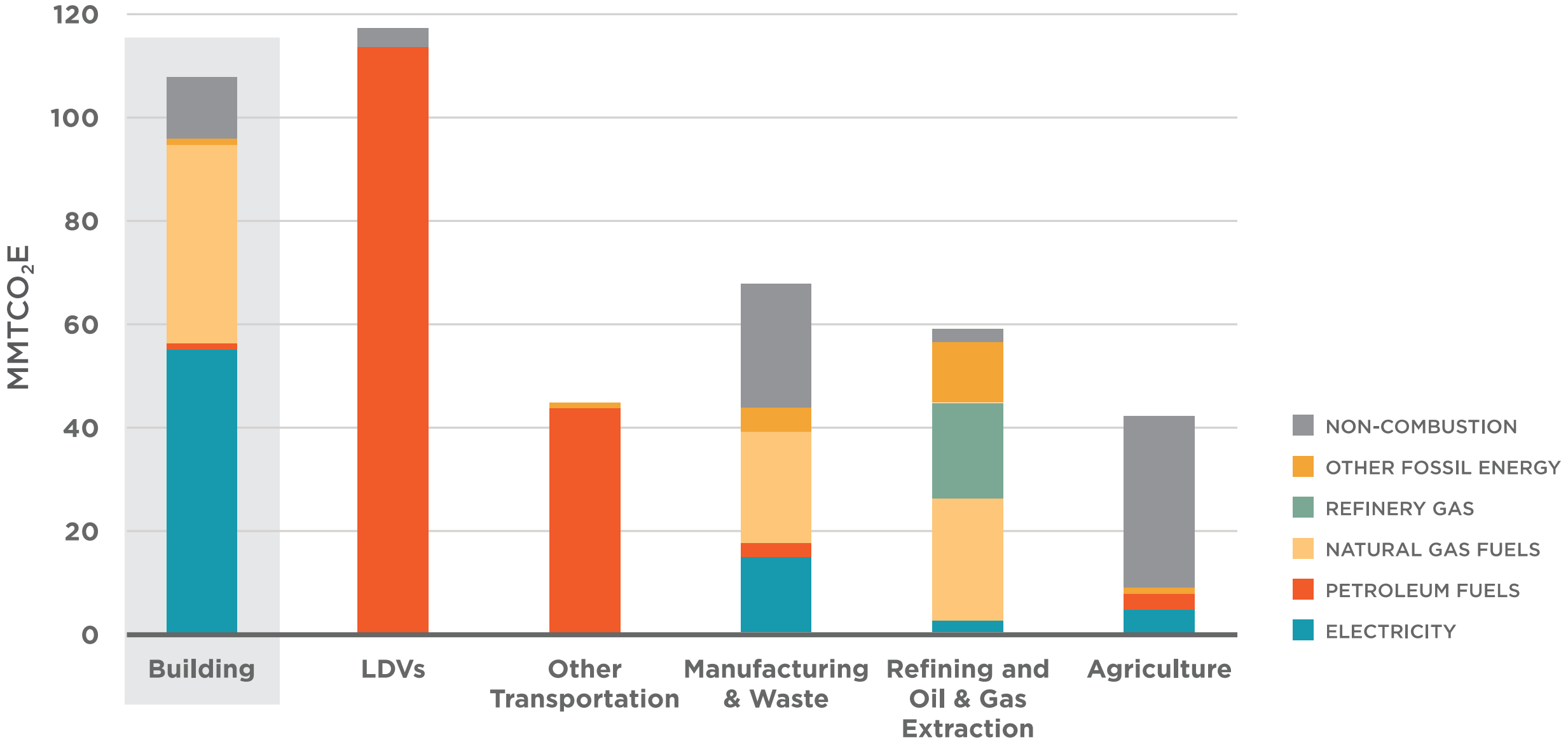
2021 Integrated Energy Policy Report

June 22, 2021

OUR MEMBERS

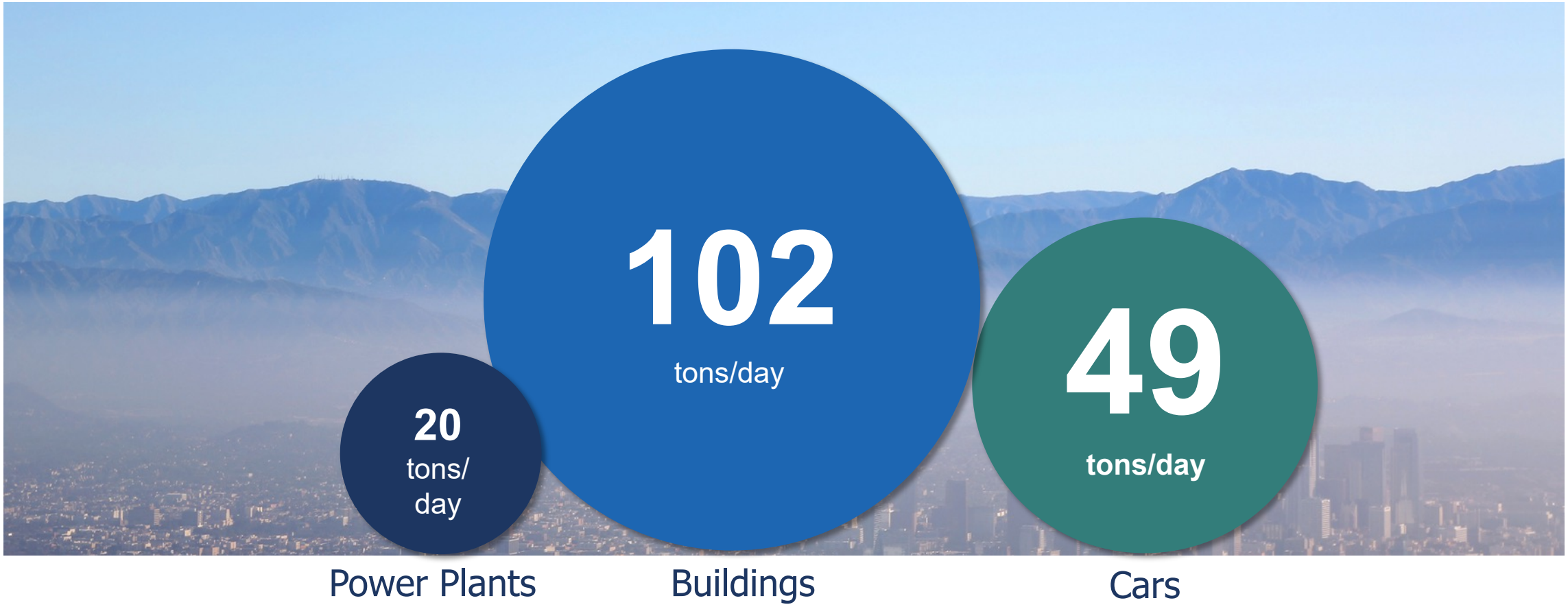

City of Palo Alto Utilities
East Bay Community Energy
LA DWP Los Angeles Department of Water & Power
NYSERDA
Sonoma Clean Power
Pacific Gas and Electric Company
SMUD
Silicon Valley Clean Energy
Southern California Edison
Association for Energy Affordability
Bay Area Air Quality Management District
BAYREN
City of Menlo Park
Ecology Action
Helping people act now
the Energy Coalition
Johnson Controls
MCE
My community. My choice.
Mitsubishi Electric
Monterey Bay Community Power
NRDC
Natural Resources Defense Council
Peninsula Clean Energy
Resource Refocus
Rheem
Sierra Club
Silicon Valley Power
StopWaste
2050 Partners
350 sacramento
Active SGV
AIM
Alameda Municipal Power
Alter
A.O. Smith
Innovation has a name.
Ardenna Energy
BC Hydro
Power smart
Beyond Efficiency
Bradford White
Bright Green Strategies
Bright Power
Brummitt Energy Associates Inc
British Columbia
Build It Green
The Building Electrification Initiative
Burohappold Engineering
California Air Resources Board
California Geo
CUSP
Palo Alto Carbon Free Challenge
Celeritas Engineering
Center for Sustainable Energy
Urban Institute
CDC
CityGreen
City of Boulder
City of Emeryville
City of Fremont
City of Morgan Hill
City of Oakland
City of San Jose
Capital of Silicon Valley
City of Santa Cruz
City of Santa Monica
Clean Coalition
Clean Energy WORKS
CPA Clean Power Alliance
Locally powered energy innovation
Culler
The Climate Reality Project
codecycle
Community Energy Labs
CommonSpark Consulting
Ann V Edminster Design AVEnues LLC
Earthjustice
ECO2
Ecotope
ecotrust canada
EfficiencyFirst California
ehdd architecture
Electrify My Home
electrify now
Elevate Energy
Endeavour
Emerald Cities Collaborative
emerald eco
enwave
ERASE40.org
GRID Alternatives
Greenbank Associates
Guttmann & Blaevoet
HEA
Integral Group
Kitchens to Life
Berkeley Lab
LWV League of Women Voters of California
Local Government Commission
Massachusetts Clean Energy Center
Menlo Spark
Sustainability Alliance
NEOCHARGE
nbi new buildings institute
nep
nyle water heating systems
ohmconnect
slipstream
Olympic International
PAE
Peoples' Self-Help Housing
REDCAR REU
Redwood Energy
Rocky Mountain Institute
RISINGTIDE
SF Climate Emergency Coalition
SF Environment
San Jose Clean Energy
SFO
Siegel & Strain Architects
williams + paddon
WRNS Studio
zero energy project
SL Climate Coalition
SWEEP
Schiller Consulting
Sustainable San Mateo County
Sustainable Silicon Valley
Taylor Engineering
TerraVerde Energy
ULI
Urban Land Institute

California's GHG emissions today – Buildings 24%

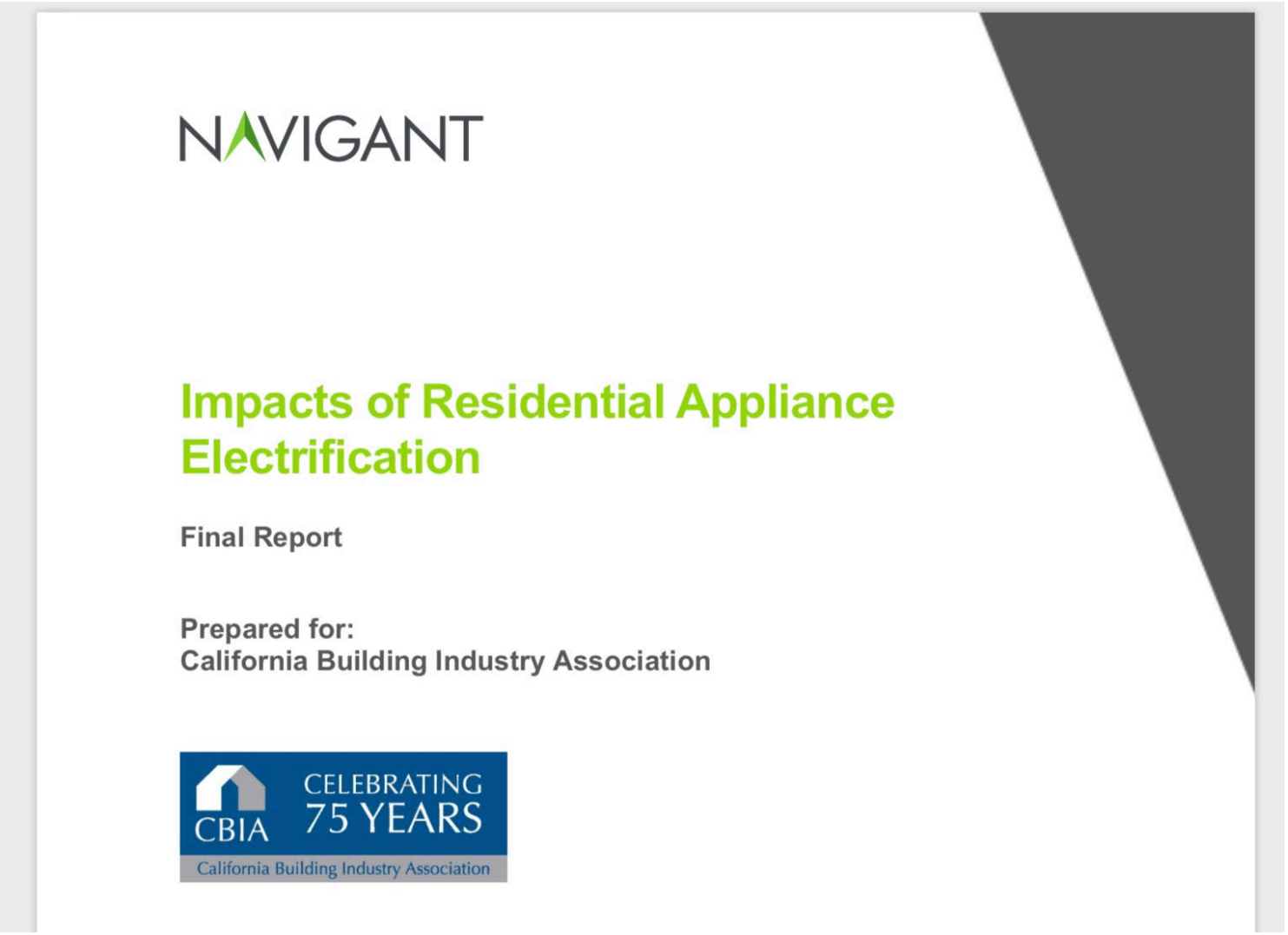


Outdoor Air Quality:
Burning Fossil Fuels in Buildings is a Big Part of California's Ozone/PM2.5 Problem

Nitrogen Oxides (NO_X) in California, 2020 forecast



Source: CARB's Standard Emission Tool Emissions Projections, 2020 forecasted data

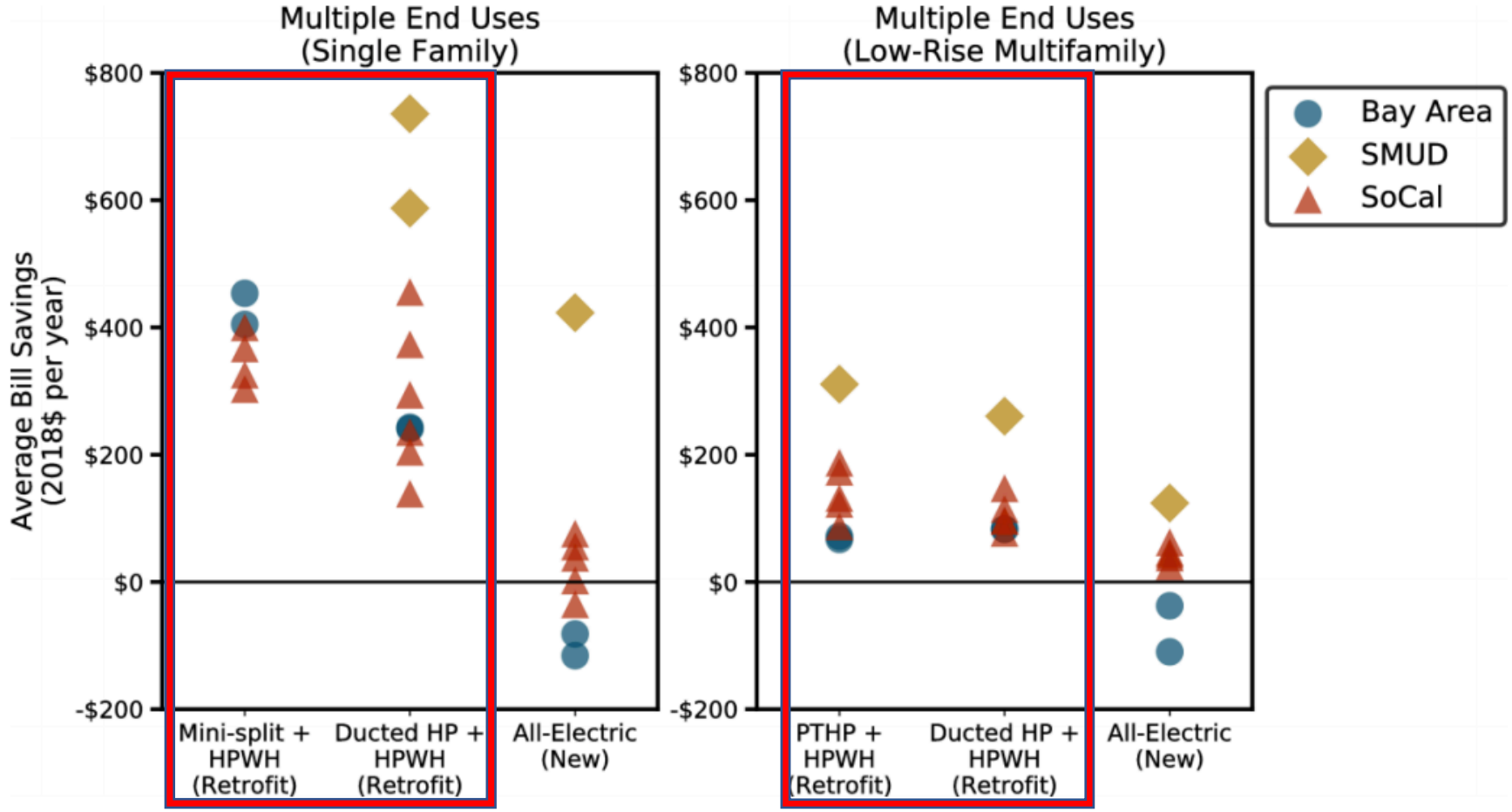


"..electric appliances have similar or lower costs than natural gas appliances.." Pg. IV

Heat pumps save energy costs in all modeled retrofit homes

Consumer Bill Impacts of Building Electrification

Figure 3-17 Average consumer bill impacts of electrifying multiple end uses, using base case assumptions



Source: E3

2018 Integrated Energy Policy Report

The Case for Building Electrification

There is a growing consensus that building electrification is the most viable and predictable path to zero-emission buildings. This consensus is due to the availability of off-the-shelf, highly efficient electric technologies (such as heat pumps) and the continued reduction of emission intensities in the electricity sector.

California prepares to shift away from natural gas, while keeping power reliable and affordable

By Liane Randolph, Special to CalMatters

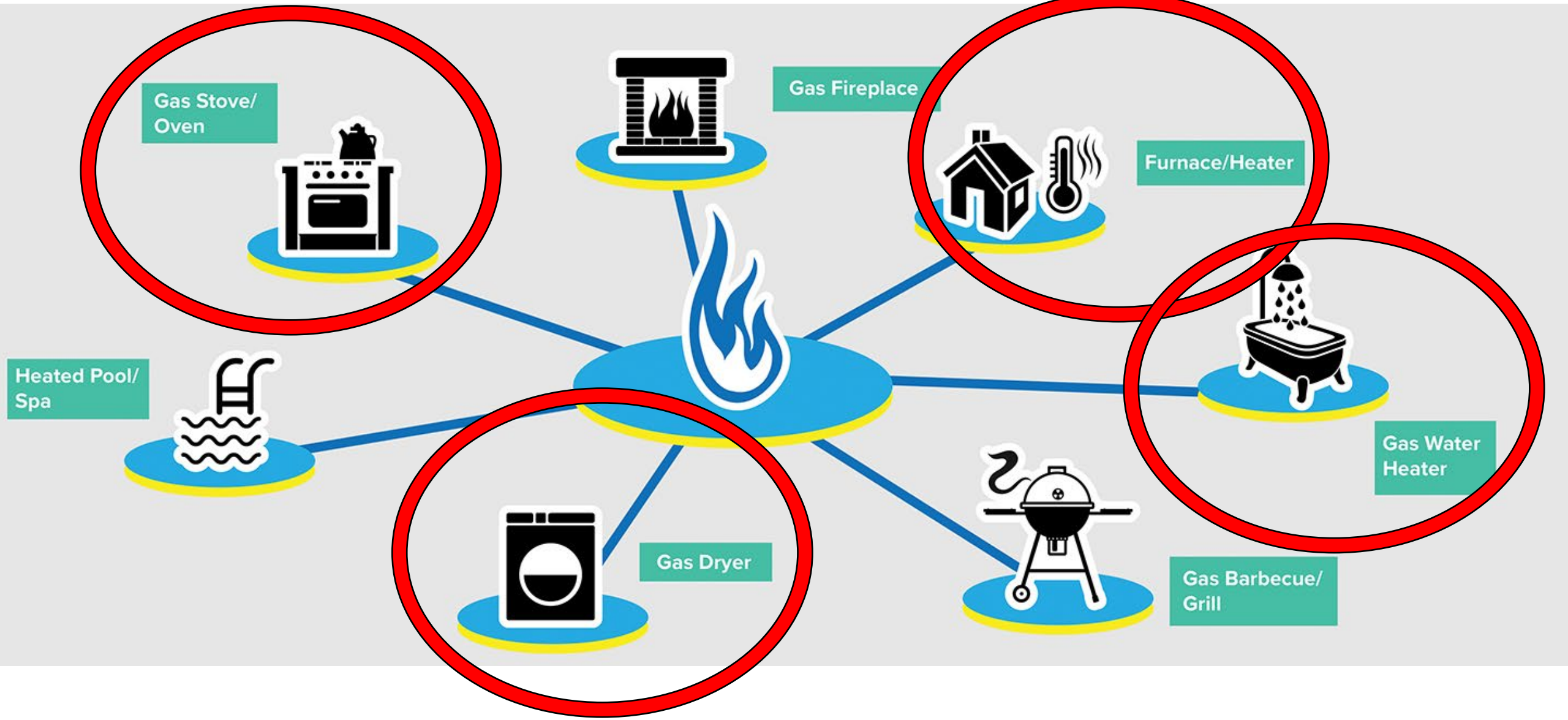
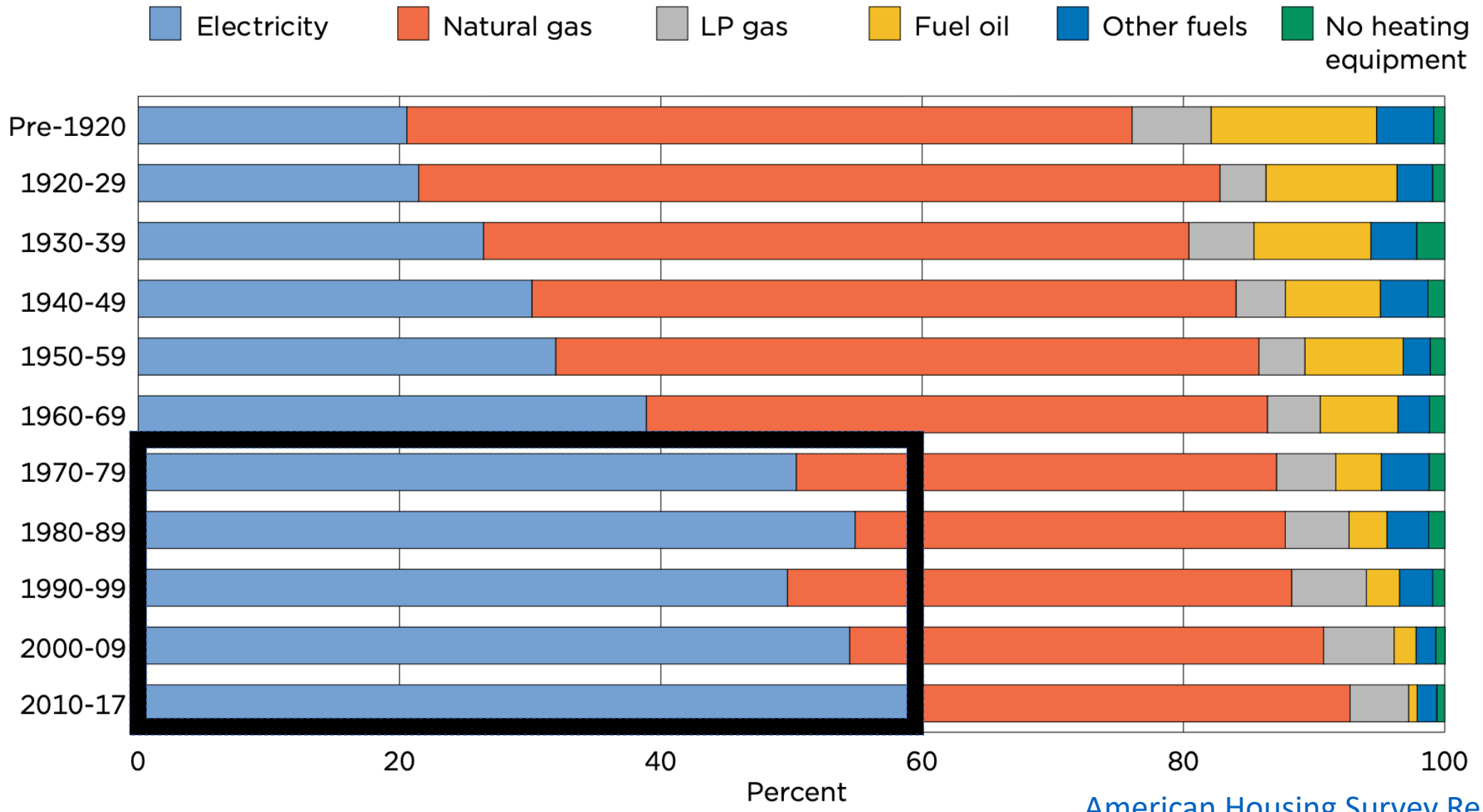

Gas Stove/
Oven
Gas Fireplace
Furnace/Heater
Heated Pool/
Spa
Gas Water
Heater
Gas Dryer
Gas Barbecue/
Grill

Figure 3.

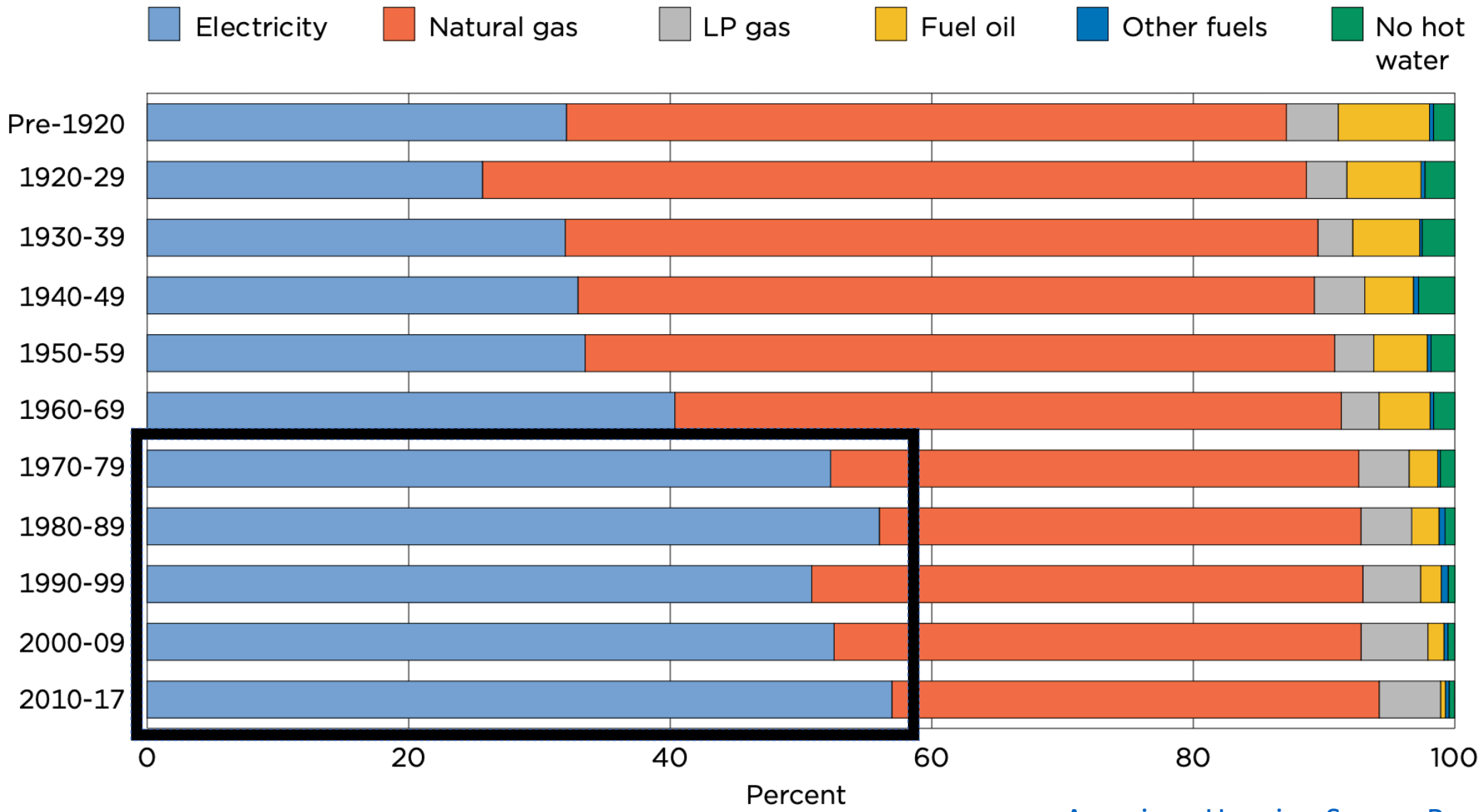
Home Heating Fuel by Decade Home Was Built



American Housing Survey Report 2019

Figure 5.

Water Heating Fuel by Decade Home Was Built



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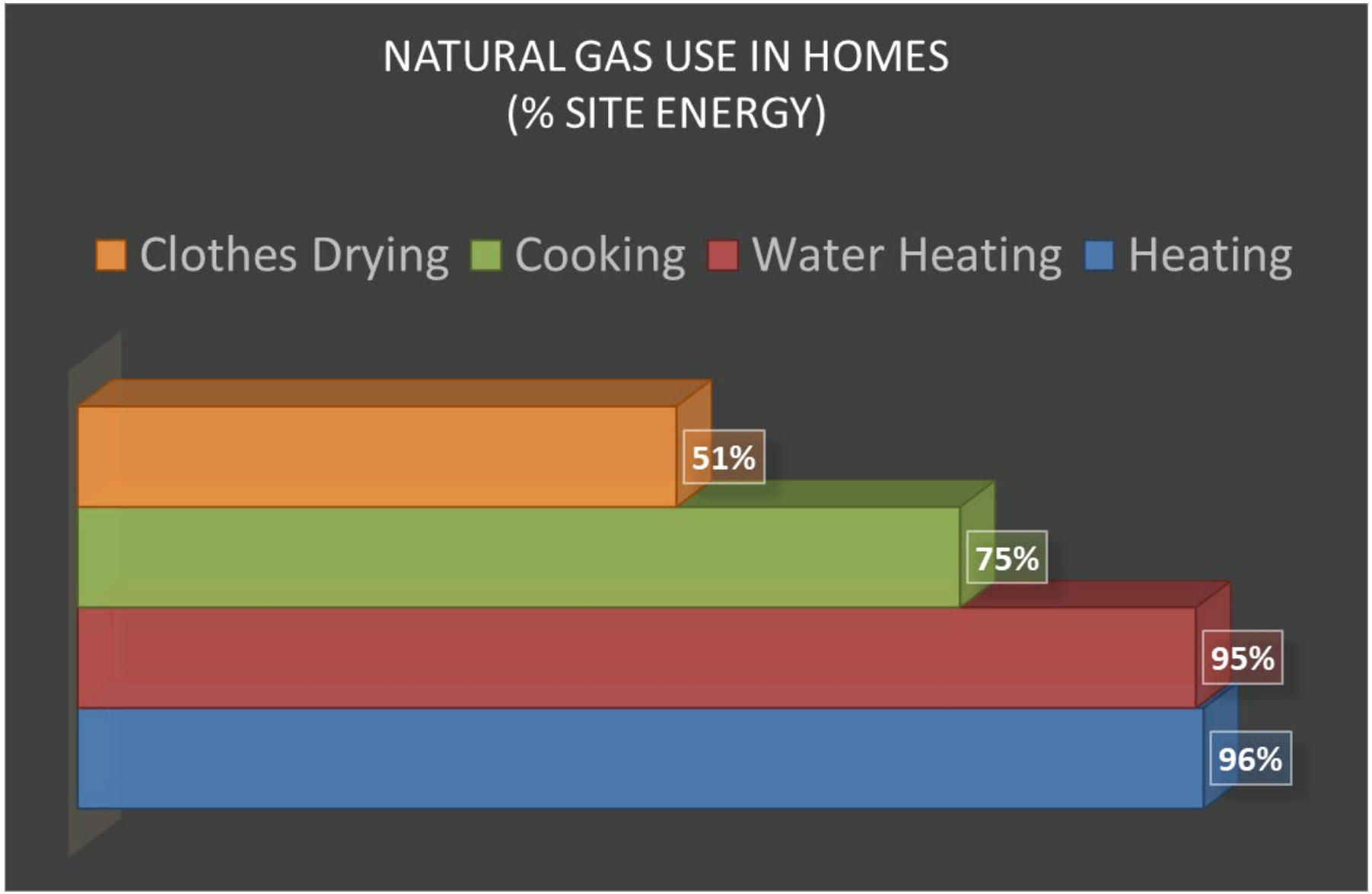
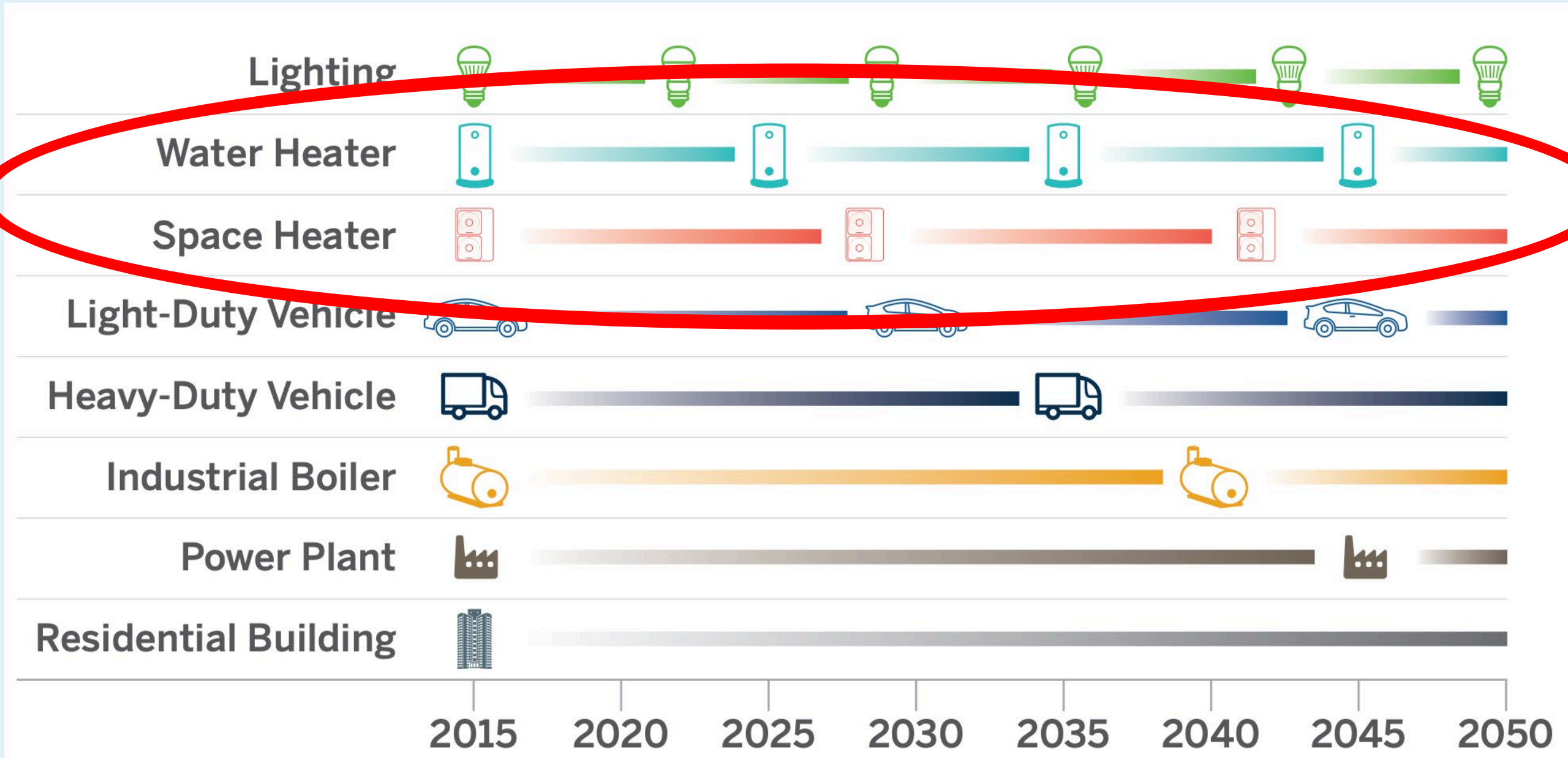
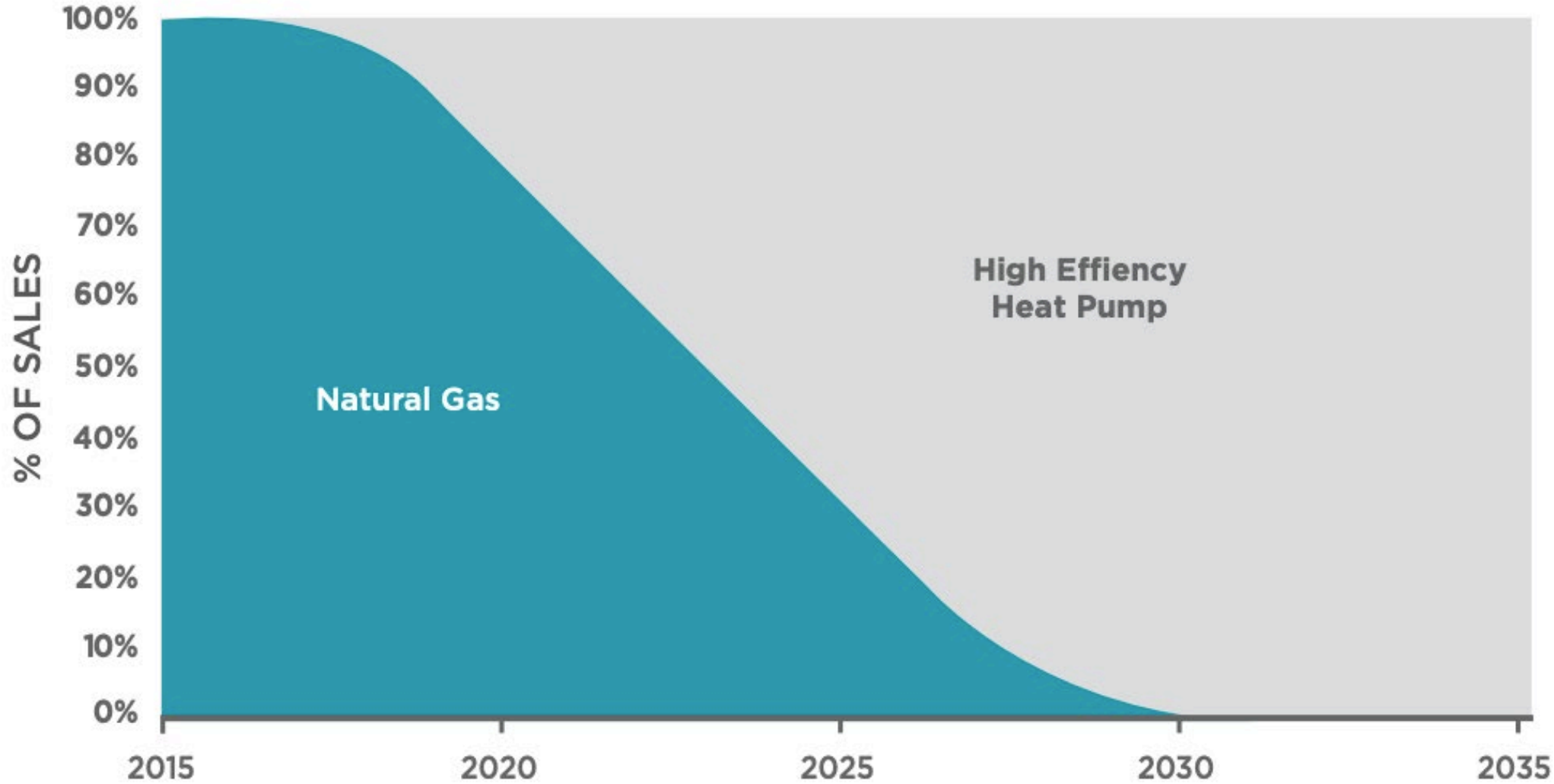

NATURAL GAS USE IN HOMES
(% SITE ENERGY)
Clothes Drying
Cooking
Water Heating
Heating
51%
75%
95%
96%

Stock Turnover



Space Heating

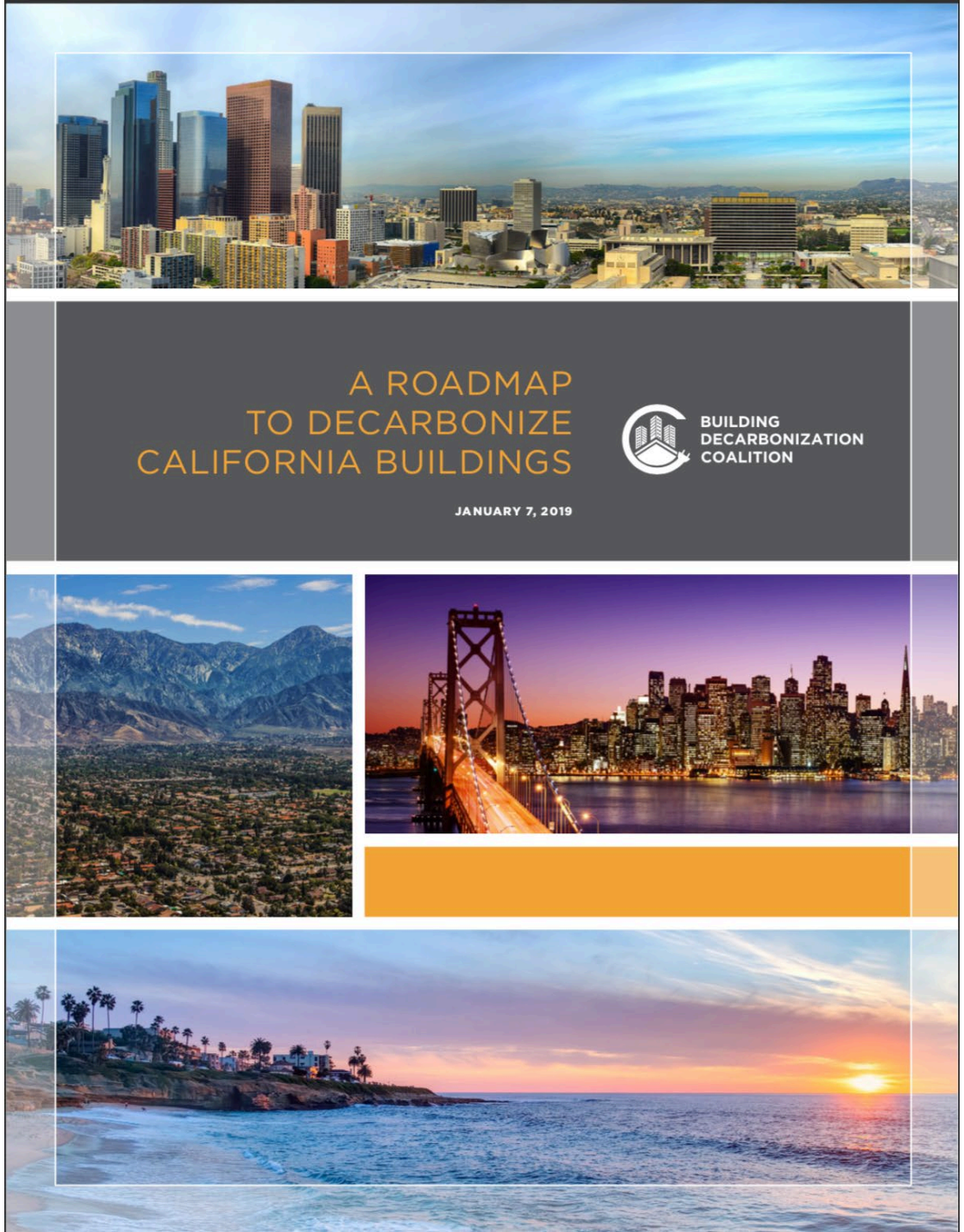
Increase the share of high efficiency heat pumps for space heating from 5% of sales in 2018, to 50% in 2025 and 100 % in 2030.



September 18th, 2018: Kick-off!

Roadmap

- Meetings
  - September 2018
  - November 2018
  - January 2019
- Finished January 2019



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- Meetings
  - September 2018
  - November 2018
  - January 2019
- Finished January 2019

Figure 1: Decarbonization Targets Within the Building Sector		
	Residential	Commercial
New Buildings	2025: Zero Emissions Building Code	2028: Zero Emissions Building Code
Retrofits	% GHG reduction below 1990 levels from the overall building stock: 2025: 20% GHG reductions from building sector 2030: 40% GHG reductions from building sector 2045: 100% GHG reductions from building sector	
•*Increase the share of high efficiency heat pumps for space heating from 5% of sales in 2018, to 50% in 2025 and 100 % in 2030.* •*Increase the share of high efficiency heat pumps for water heating from 1% of sales in 2018, to 50% in 2025 and 100 % in 2030.*		

Phasing

PHASE 1

Market Readiness: Today demand for and supply of building decarbonization measures is minimal. To ready the market, reverse these conditions through **ambitious targets, policy alignment, coordinated marketing, retail price reductions, clear signals** to suppliers and coalition building.

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PHASE 2

Market Deployment: Once readied, deployment of building decarbonization measures can be accelerated through support of the full- supply chain via **mid- and upstream incentives to manufacturers and builders and financing solutions** ready to reach all customers, including underserved communities.

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PHASE 3

Scaling the Market: Leverage the success of Phases 1 and 2 to reach scale through **downstream incentives, grid integration, and targeted solutions** for hard to reach customers.

Barriers to Electrification

Roadmap Goals

Goal 1: Build customer, builder, contractor and policy-maker awareness and interest in decarbonization.

Goal 2: Ensure that customers receive a good value from adopting building decarbonization measures.

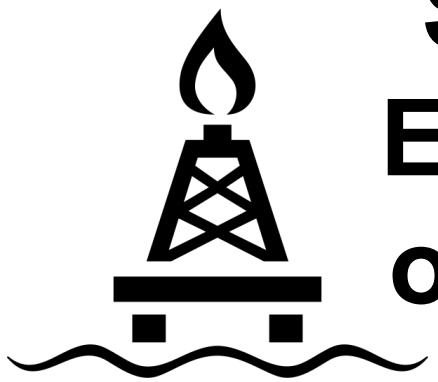
Goal 3: Ensure that building decarbonization provides a better value to builders and contractors than fossil-fuel heating.

Goal 4: Prepare supply-chains and delivery agents to meet rising demand for emission-free building technologies with a quality product.

Goal 5: Align Policy to meet other goals.

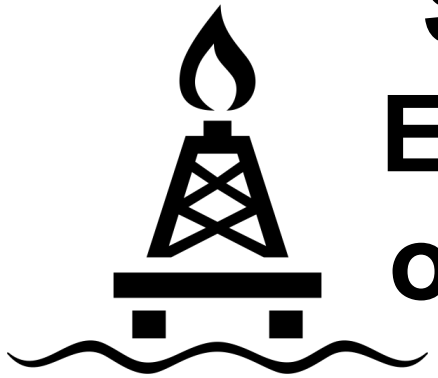
How We Decarbonize Buildings

How We Decarbonize Buildings



Stop The Expansion of the Gas Network

How We Decarbonize Buildings



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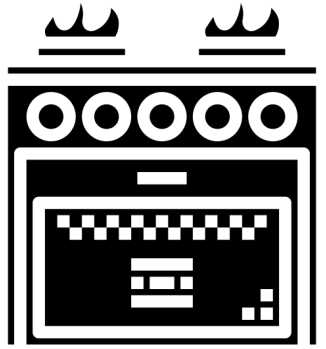
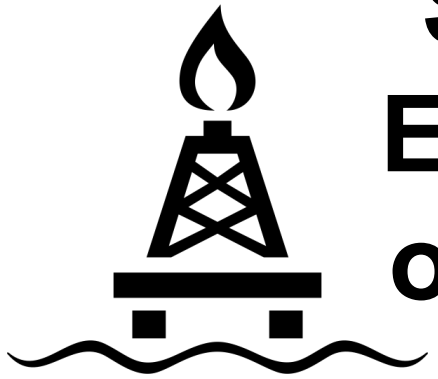


Set a Date for Phase-out of Fossil Fuel Appliance Sales

How We Decarbonize Buildings



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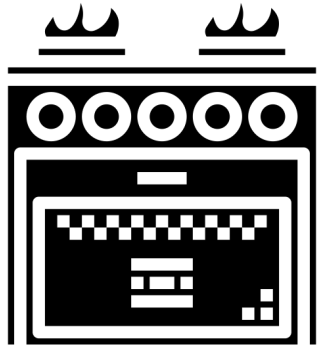

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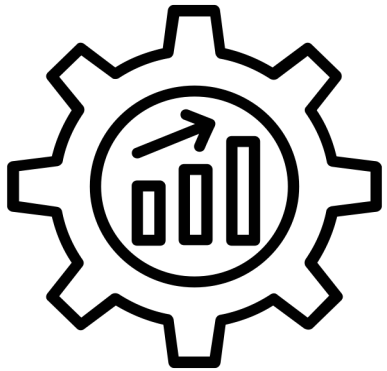
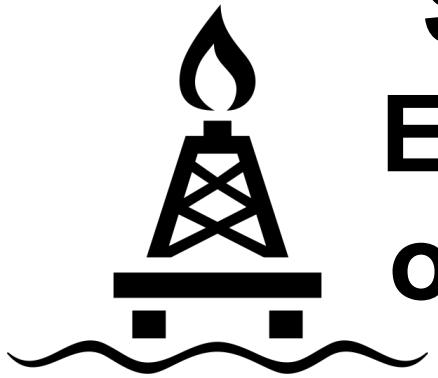


Building Decarbonization Market Development

How We Decarbonize Buildings

Created by Nawicon
from Noun Project



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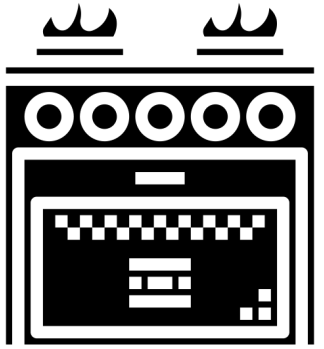

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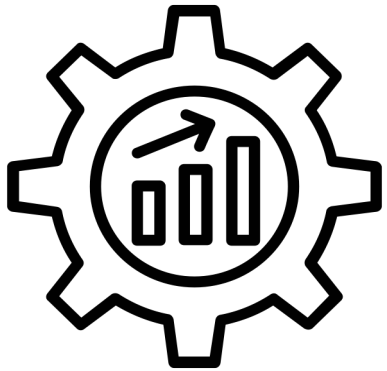
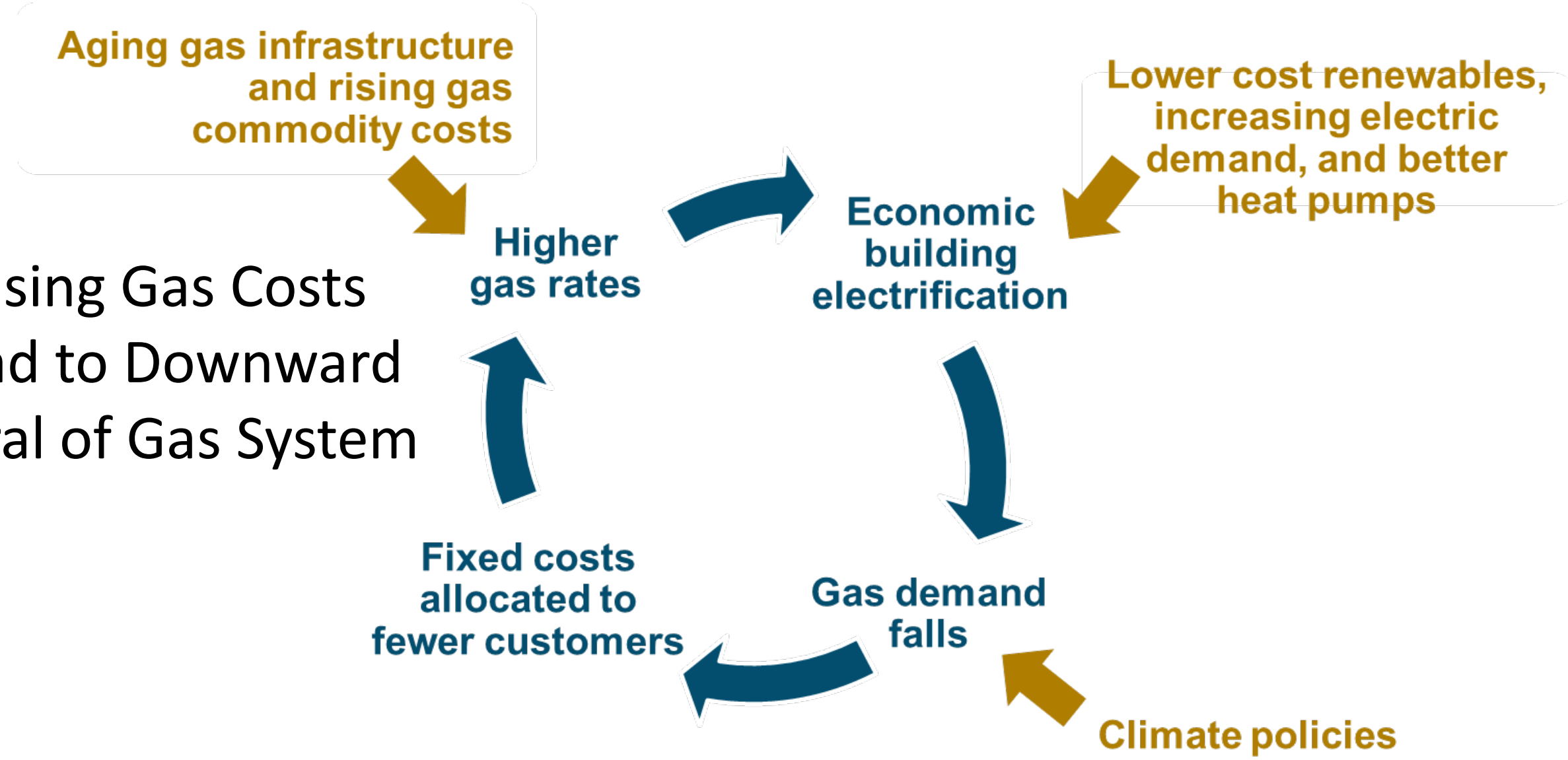


Building Decarbonization Market Development

Rising Gas Costs Lead to Downward Spiral of Gas System



Manufacturer Perspective

The right technologies are available, but the political environment creates unfavorable market conditions.

- Local policies are fracturing the market
- Gas is still heavily subsidized
- State decarbonization policy is not coordinated across departments

Evaluation Matrix

Opportunity	Barrier	Solution	GHG Mitigation Potential	Economic Impact	Distributional Equity	Political Barriers to Adoption	Legal Barriers to Adoption	Implementation Complexity
1. Establish targets for state agencies to achieve deep GHG reductions in homes and buildings across California	CEC and CPUC are not prioritizing emerging decarbonization strategies enough because they do not have sufficient GHG targets.	CEC, CPUC, and CARB should be responsible for achieving specific GHG mitigation goals in buildings that are aligned with the state's broader climate goals.	**Very high**	**Net benefits**	Uniform	Medium	Low	Medium
2. Establish rates that encourage beneficial electrification	Existing rates structures do not do enough to encourage electrification	CPUC can require utilities to offer electrification-encouraging rates to customers.	High	**Net benefits**	Uniform	Low	Low	Medium
3. Increase investment in equitable electrification programs to benefit underserved communities	Low-income Californians have the highest energy burden and are at-risk for higher costs if left behind from electrification.	CPUC should modify existing low-income energy assistance programs and launch new low-income programs to encourage beneficial electrification.	Low	TBD*	**Progressive**	Low	Low	Medium
4. Update the state building code to require all-electric new construction	Continuing to connect new buildings to gas makes it much harder and costlier to convert them to electricity later.	CEC should adopt requirements for all-electric new construction for both residential and commercial buildings.	Medium	**Net benefits**	Uniform	Medium	Low	Medium
5. Eliminate subsidies for new fossil fuel infrastructure	Current gas line extension policy encourages the expansion of natural gas infrastructure in new construction, through line extension allowances, skewing the market towards gas.	CPUC should eliminate any subsidization from existing rate-base towards new gas customers (line extensions).	Medium	**Net benefits**	Uniform	Medium	Low	Medium
6. Include the social cost of air pollution in state agency analyses	CEC and CPUC's cost-effectiveness tests do not adequately account for the social cost of pollution.	CEC and CPUC should consistently account for the social cost of both climate pollution and local air pollution.	High	**Net benefits**	TBD*	High	High	Medium
7. Direct state agencies to purchase high-efficiency, electric appliances	State buildings do not have guidance or technical support to pursue electric-only appliance procurement.	The Governor should direct DGS, CEC, and CARB to develop action plans and a process to facilitate electric-only procurement.	Low	**Net benefits**	Uniform	Low	**Very low**	Medium
8. Establish pollution limits for appliances	CARB has identified unvented and malfunctioning gas appliances as a major source of indoor air pollutants. Additionally, DOE blocks CEC from setting energy efficiency appliance standards for gas appliances.	CARB should set statewide limits for local air pollution emitted by gas appliances.	High	**Net benefits**	Uniform	High	High	High
9. Develop a plan for phasing out utility gas infrastructure	Long-range gas infrastructure planning and investment are not aligned with state climate neutrality goals.	CPUC should direct utilities to conduct comprehensive long-range planning to facilitate equitable decommissioning of much of the state's gas infrastructure.	High	TBD*	TBD*	High	Medium	High
10. Stop state support for fossil fuel infrastructure expansion	California's new construction financing programs and policies are not aligned with the state's climate neutrality goals.	The Governor can require State-funded financing for new construction to phase in all-electric requirements.	Low	**Net benefits**	Uniform	Medium	Low	Medium

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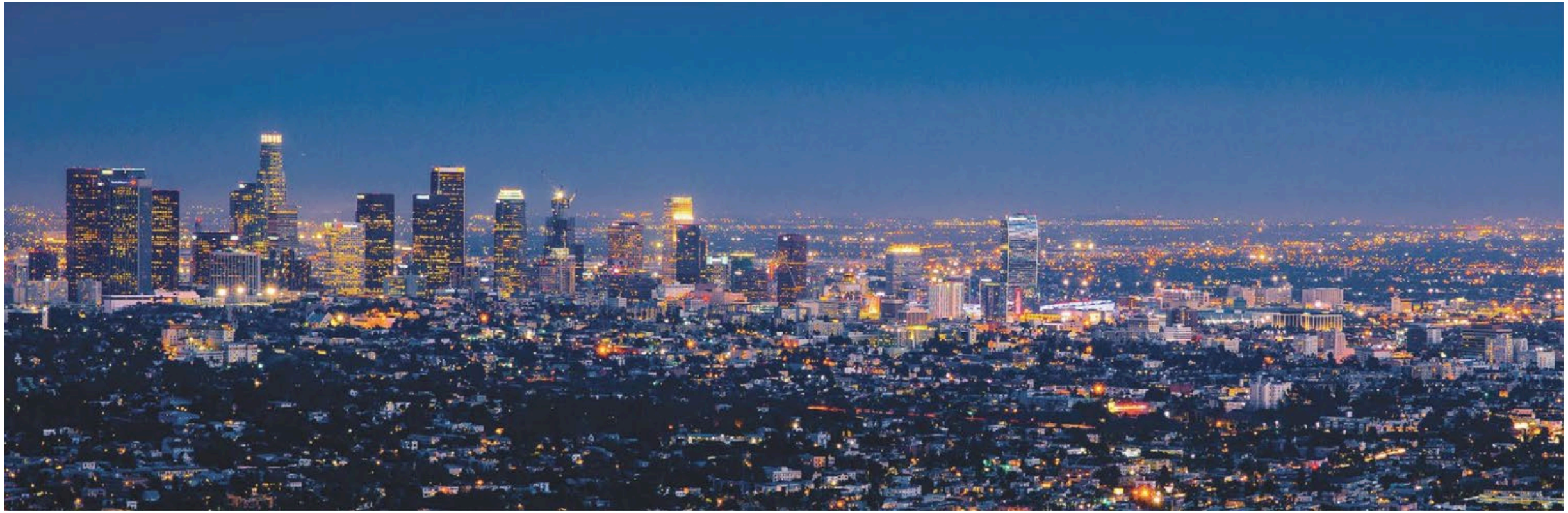
Top Ten

1. Establish targets for state agencies to achieve deep GHG reductions in homes and buildings across California
2. Establish utility rate structures that encourage beneficial electrification
3. Increase investment in equitable electrification programs to benefit underserved communities
4. Update the state building code to require all-electric new construction
5. Eliminate subsidies for new fossil fuel infrastructure
6. Include the social cost of air pollution in state agency analyses
7. Direct state agencies to purchase high-efficiency, electric appliances
8. Set Phase-out date for fossil fuel appliances
9. Develop a plan for phasing out utility gas infrastructure
10. End state support for fossil fuel infrastructure expansion

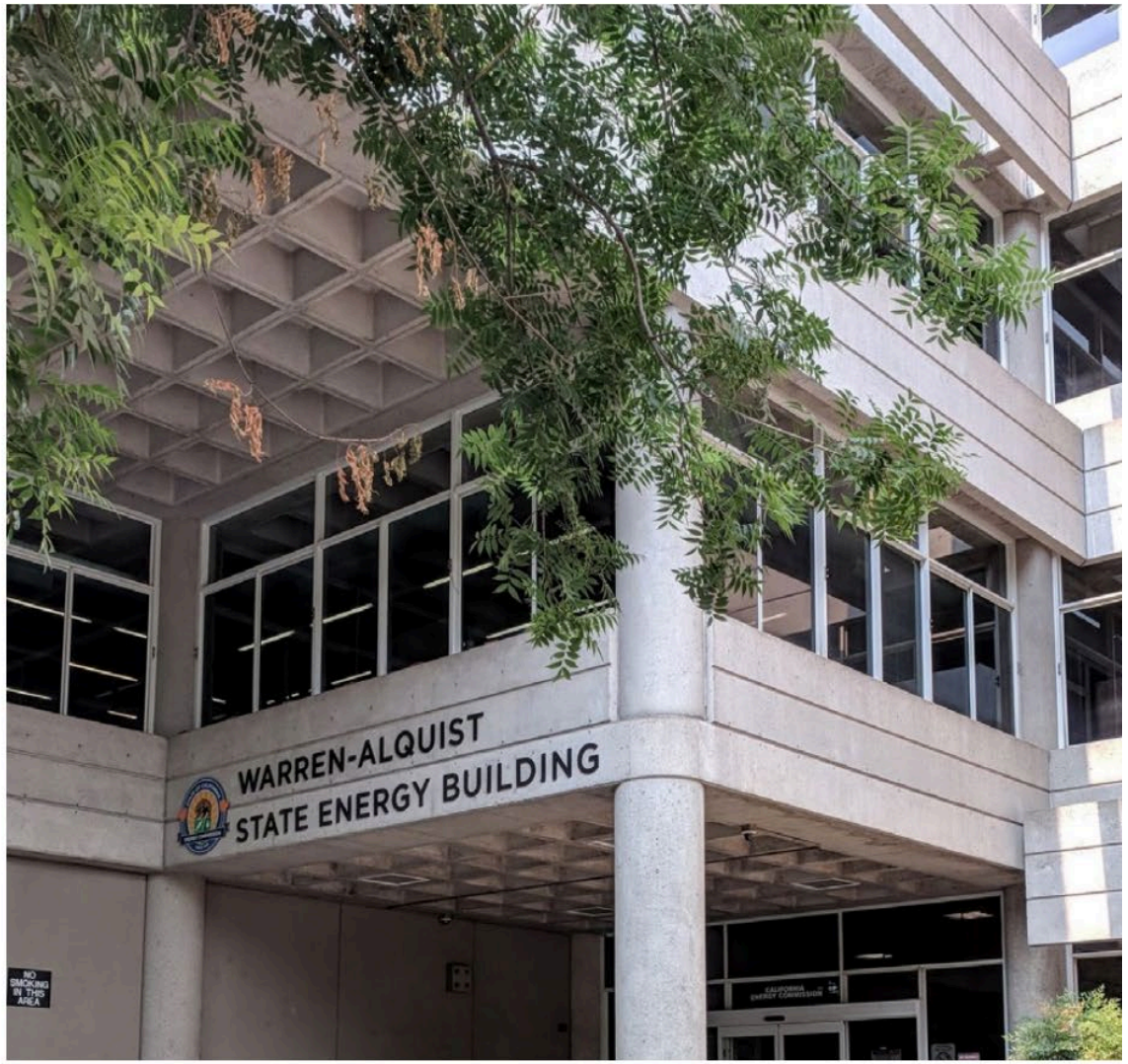
Establish targets for state agencies to achieve deep GHG reductions in homes and buildings across California



Promote utility rate designs that encourage beneficial electrification

Increase investment in equitable electrification programs to benefit underserved communities

Update the state building code to require all-electric new construction



Eliminate subsidies for new fossil fuel infrastructure

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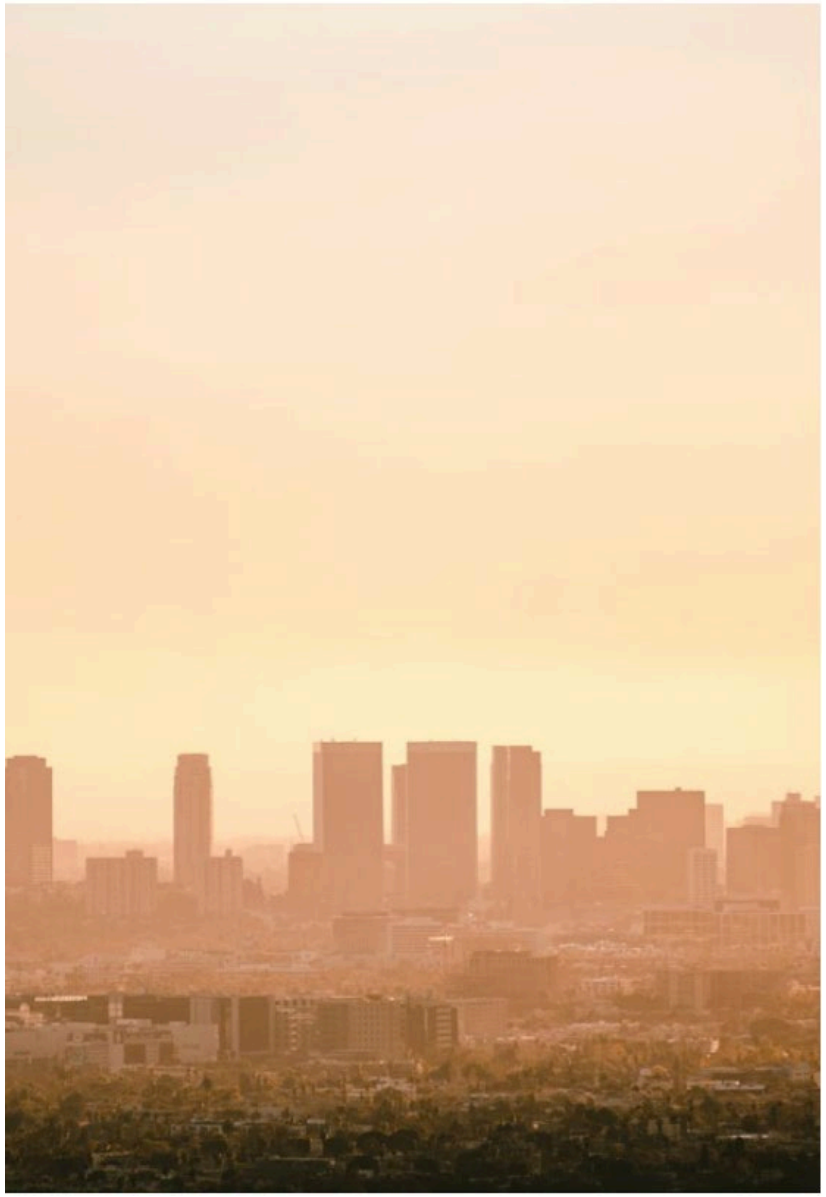

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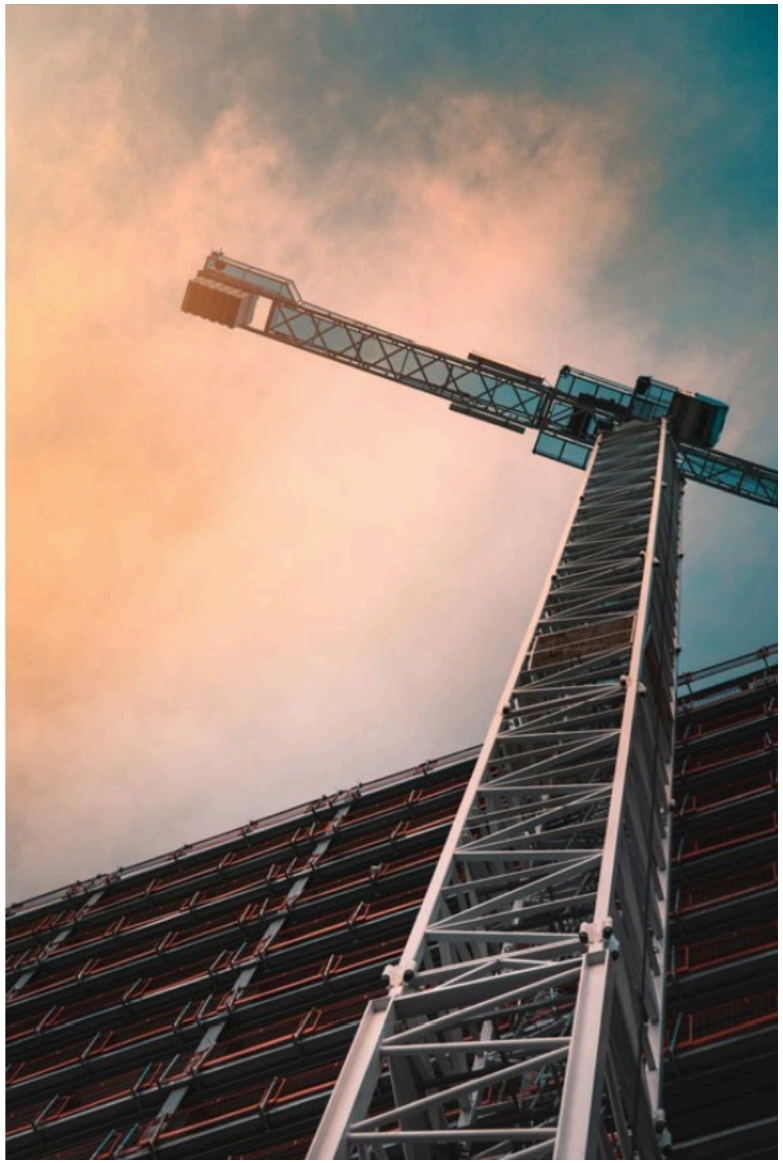

Stop state support for fossil fuel infrastructure expansion

Carbon Neutral Buildings Roadmap

Achieving a carbon neutral building stock in New York State by 2050

Public Webinars – Day 1

June 15, 2021

NEW YORK STATE OF OPPORTUNITY. | NYSERDA

Advanced Codes for new construction built to a resilient and highly efficient, zero emission standard

- **ASAP:** Adopt highly efficient State Energy Code for all new construction in next code cycle

  Scale up building decarbonization requirements in affordable housing and state supported economic development projects

- **2023:** State building code requires solar PV, electrification-readiness, grid-interactive capability, battery readiness, and electric vehicle readiness

- **2025:** Adopt all-electric (and highly efficient) State code for homes and low-rise residential

- **2030:** Adopt all-electric (and highly efficient) State code for multifamily and commercial

NEW YORK STATE OF OPPORTUNITY. | NYSERDA

Prohibit replacement of fossil-fuel heating and hot water equipment; phased out at the end-of-useful life

- **2030:** Zero emission standards prohibiting gas/oil replacements of heating, cooling and domestic hot water equipment in homes
- **2035:** Zero emission standards prohibiting gas/oil replacements of heating, cooling and domestic hot water equipment in multifamily and commercial buildings

  Zero emission standards prohibiting replacement of gas cooking and dryers in residential buildings

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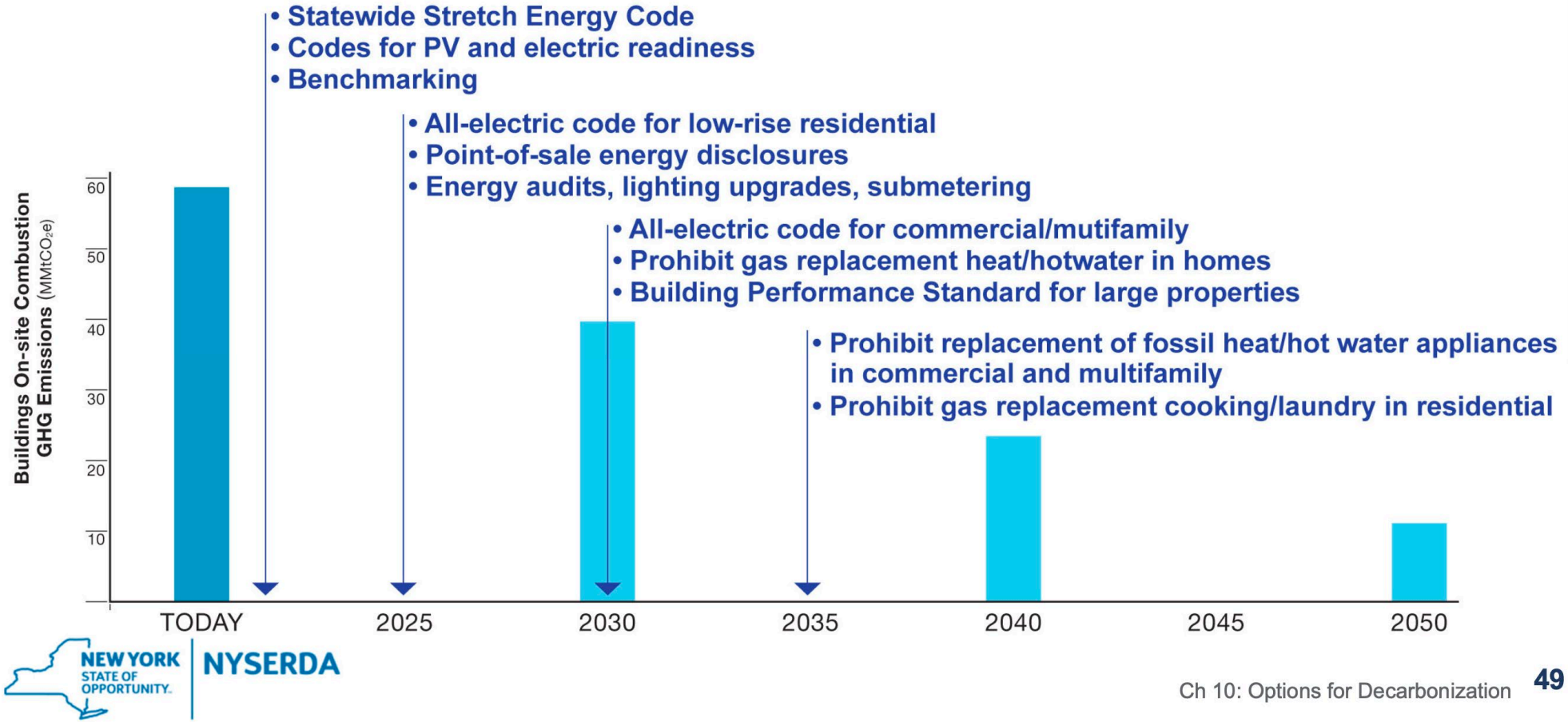
Regulations with dates certain send clear market signals



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In Summary

- Building electrification is the only way we meet our clean air and clean energy goals
- The technology is available, is cheaper to build and can save consumers money on their bills
- The State must send a clear signal about timelines and targets so market can respond
- Must address low-income household costs as a priority