Kurt Hurley,
Green Building Specialist
Planning and Community Development Department

Dr. Tiffany Wise-West
Sustainability and Climate Action Manager
City Manager's Office

COMMUNITY WORKSHOP 2: BUILDING ELECTRIFICATION POLICY

DOWNTOWN MAIN LIBRARY
FEBRUARY 27, 2020

AGENDA (90 MINS)

- Presentation (45 minutes)
  - Objectives, Agenda and Introduction
  - Why Electrification
- Group Activity (15 minutes)
  - What Other Jurisdictions Have Adopted
  - City Council Directed Policy
- Group Activity (10 minutes)
- Q & A (15 minutes)
- Roundtable evaluation (5 minutes)

OBJECTIVES

1. PROVIDE AN OVERVIEW ON BUILDING ELECTRIFICATION CONCEPT & DRIVERS
2. SHARE CC DIRECTED APPROACH & TIMELINE
3. RECEIVE FEEDBACK FROM COMMUNITY AND ANSWER QUESTIONS

INTRODUCTION

The City of Santa Cruz has declared a climate change emergency

City leaders say urgent action must be taken to combat catastrophic climate change

168
Shares

Phil Gomez
Reporter

RESOLUTION NO.

RESOLUTION OF THE CITY COUNCIL OF THE CITY OF SANTA CRUZ ENDORSING THE HOUSE OF REPRESENTATIVES' EFFORTS TO ENACT HOUSE RESOLUTION 109, THE GREEN NEW DEAL

DRIVERS TO EXPLORING ELECTRIFICATION

- City Council directed staff to bring back options and align timeline with Monterey Bay Community Power's rollout of support incentives
- Monterey Bay Community Power's Electrification Strategic Plan calls for transportation and building electrification as key emissions reduction strategies for region + incentives
- Contributes to State's carbon neutrality by 2045 target

CA HAS AMBITIOUS CLIMATE GOALS, BUT NO POLICY PATHWAY TO ZERO-EMISSIONS BUILDINGS YET

- 40% GHG reduction by 2030

SB 32 (2016)

NEW!

- Electric sector:
- 60% renewable / 2030
- 100% carbon-free / 2045

SB 100 (2018)

NEW!

- Carbon neutrality by 2045

Gov. Exec Order (2018)

NEW!

- 40% GHG reductions in buildings / 2030 (assessment)

AB 3232

NEW!

- $200M incentives for low-emissions buildings and equipment

SB 1477

EXISTING GREEN BUILDING PROGRAM

- Water Use Reduction
- Building Material Supply Chain Impacts Reduction
- Improves Occupant Health Outcomes
- Improves Building Longevity
- Reduces Maintenance Costs
- Improves Disaster Resiliency
- Increases Waste Diversion Rate
- Educates & Optimizes All-Electric Design
- Reduces Cost of Ownership
- Leads by Example

Base Code Requirements

	2016	2019
Building Electrification	None	Electrification-ready water heating for residential
Electric Vehicle Charging Infrastructure	”EV Capable” parking requirements for single family, multifamily and commercial CALGreen	Same *
Solar PV	Solar readiness for single-family, multi-family (up to 10 stories) & low-rise commercial (except healthcare)	+ Mandatory PV for low-rise residential

*City adopted parking ordinance amendment requiring EV charging installation

WHY ELECTRIFICATION?

WHY ELECTRIFICATION?

Monterey Bay Community Power

Reduce emissions by switching

appliances and systems to

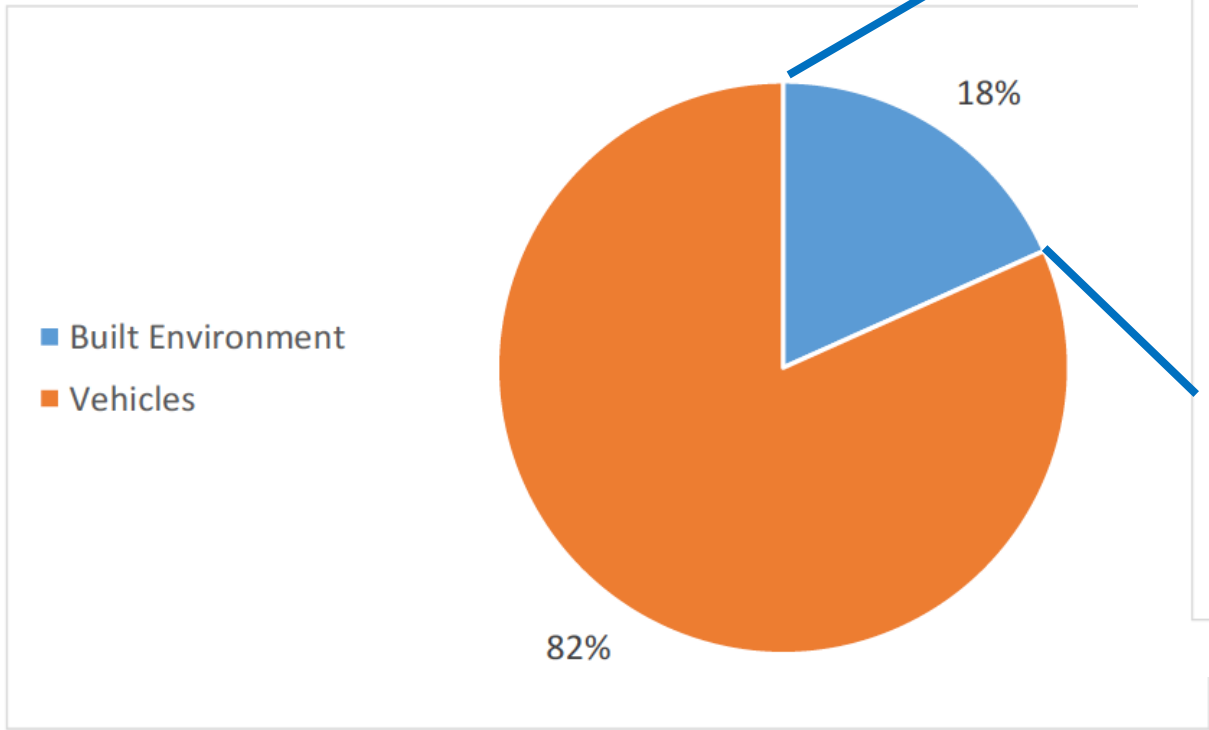
electric powered by

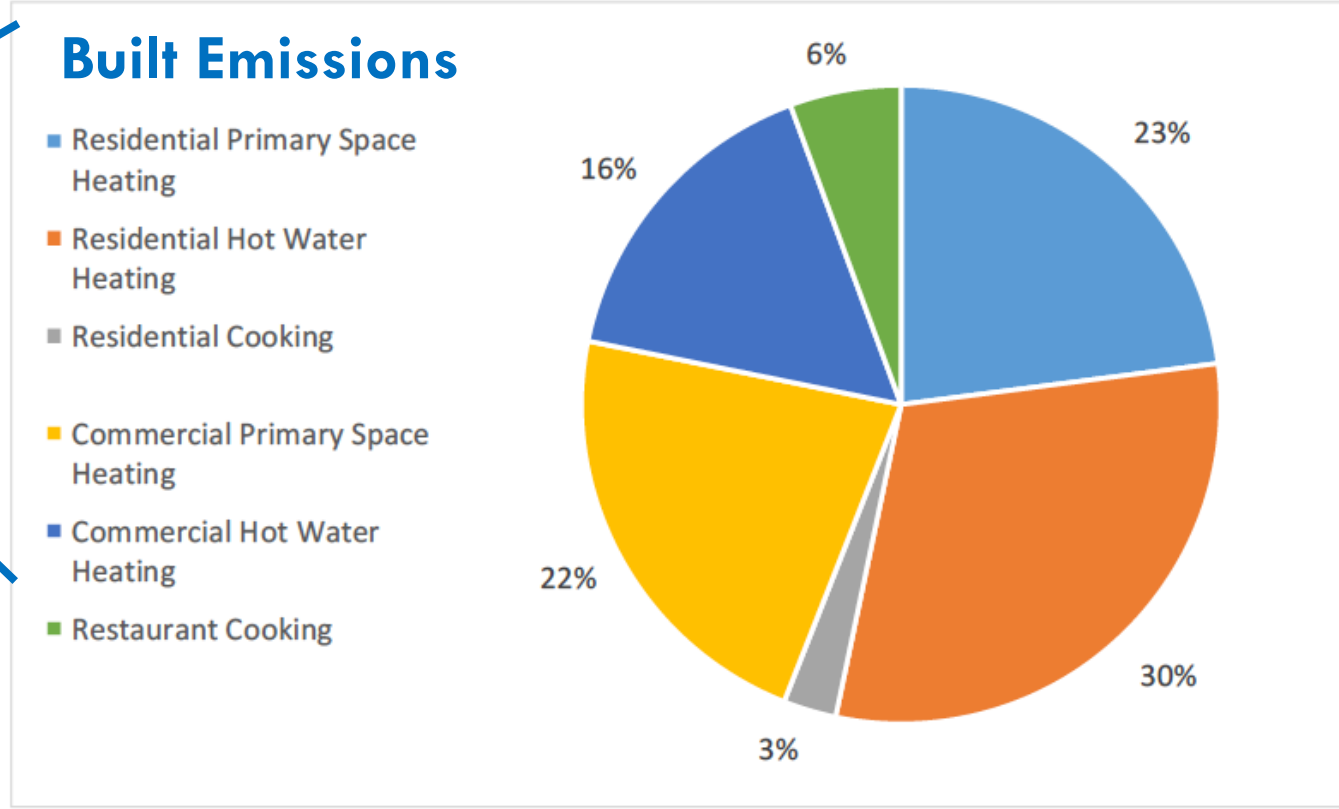
carbon-free sourced electricity

RESIDENTIAL CUSTOMER OPT OUT	RESIDENTIAL CUSTOMER MBchoice	RESIDENTIAL CUSTOMER MBprime
47% Carbon Free, 39% Renewable	66% Carbon Free, 34% Renewable	100% Renewable
$74.49 PG&E Delivery	$74.49 PG&E Delivery	$74.49 PG&E Delivery
$58.89 Electric Generation	$41.85 Electric Generation	$46.85 Electric Generation
$0.00 PG&E Added Fees	$13.89 PG&E Added Fees	$13.89 PG&E Added Fees
$133.38 Average Total Monthly Cost	**$130.23** Average Total Monthly Cost	**$135.23** Average Total Monthly Cost

MBCP SERVICE AREA TOTAL ANNUAL GHG BY SOURCE

FROM THE ELECTRIFICATION STRATEGIC PLAN





BUILT ENVIRONMENT INCENTIVES

All-Electric Building Grants

Total funds Available: $1.2M

Goal: Provide a grant to incentivize developers to build new all-electric Multi-Unit Dwellings (MUDs)

Target Customers: housing developers building MUDs in MBCP territory

Benefits: immediate GHG reductions, long term customer savings, supporting Regional Housing Needs Assessment (RHNA) goals, lowest cost approach to building electrification, support Reach Code transition

Monterey Bay Community Power

BUILT ENVIRONMENT INCENTIVES

Home Electrification Rebates

Total funds Available: $260K

Goal: Incentivize homeowners to electrify

Target Customers: Residential, including low income

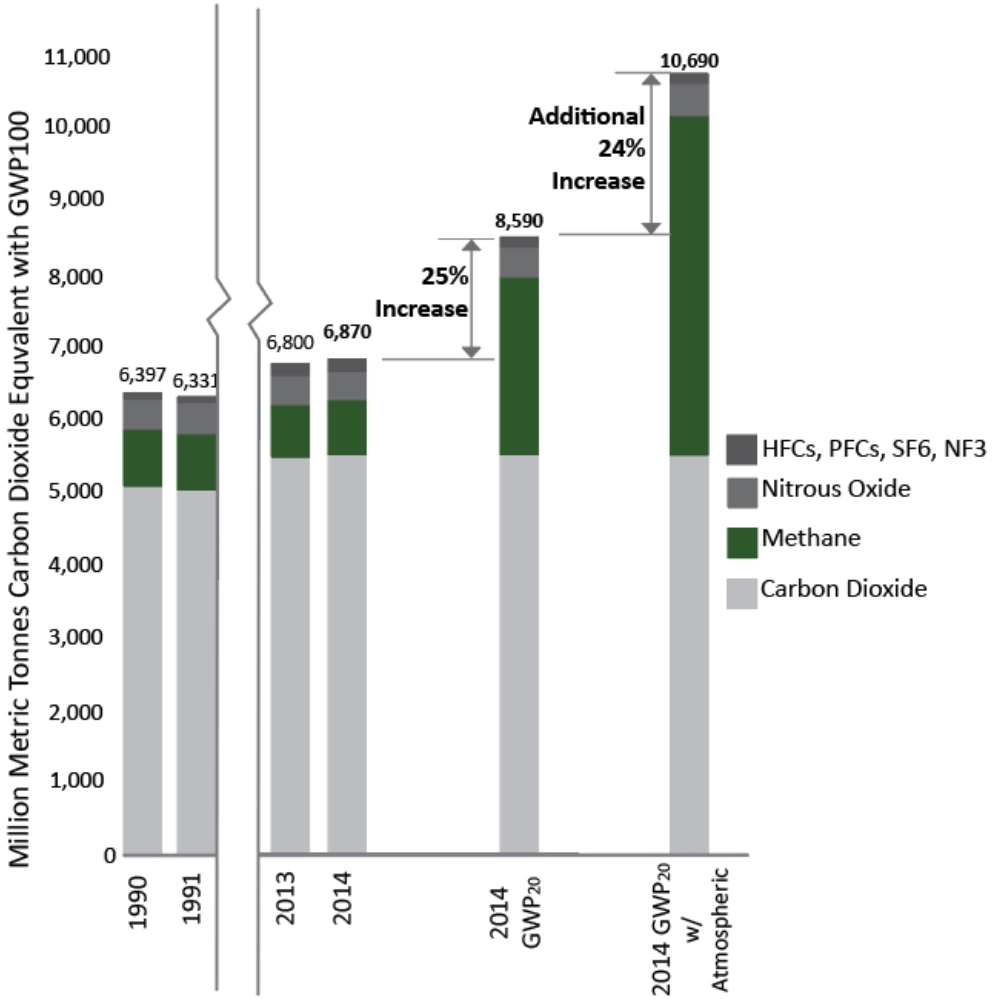
Technologies: Heat Pump Hot Water Heaters, Home EV Chargers, Panel Upgrade

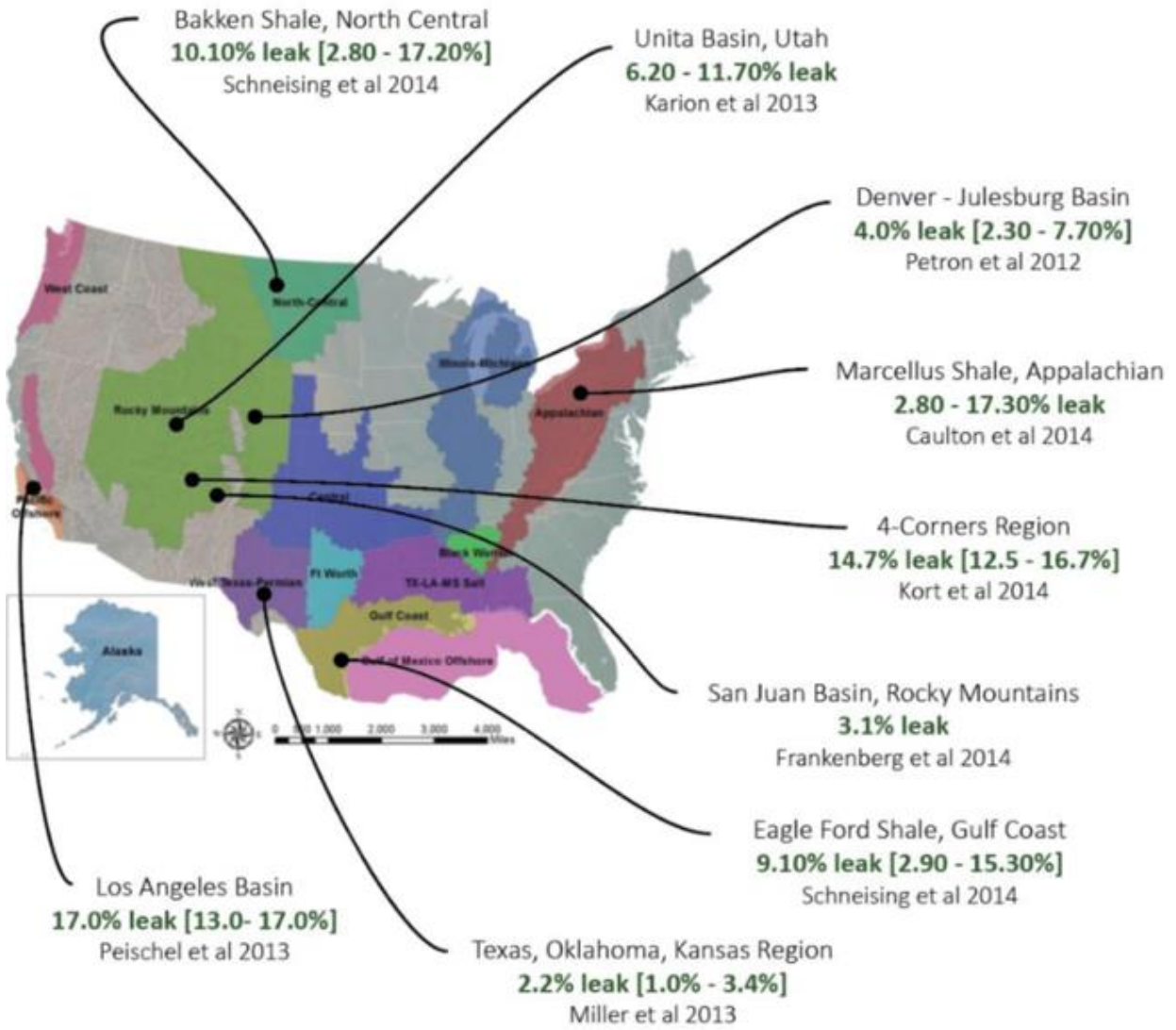
Benefits: savings for homeowners, safer & healthier homes, future demand management potential

Monterey Bay Community Power

IPCC Update of Methane's Global Warming Potential and New Leakage Data Illustrates Causes of Near Term Climate Change

Figure 7: USGHGI Increase with Atmospheric Measurement



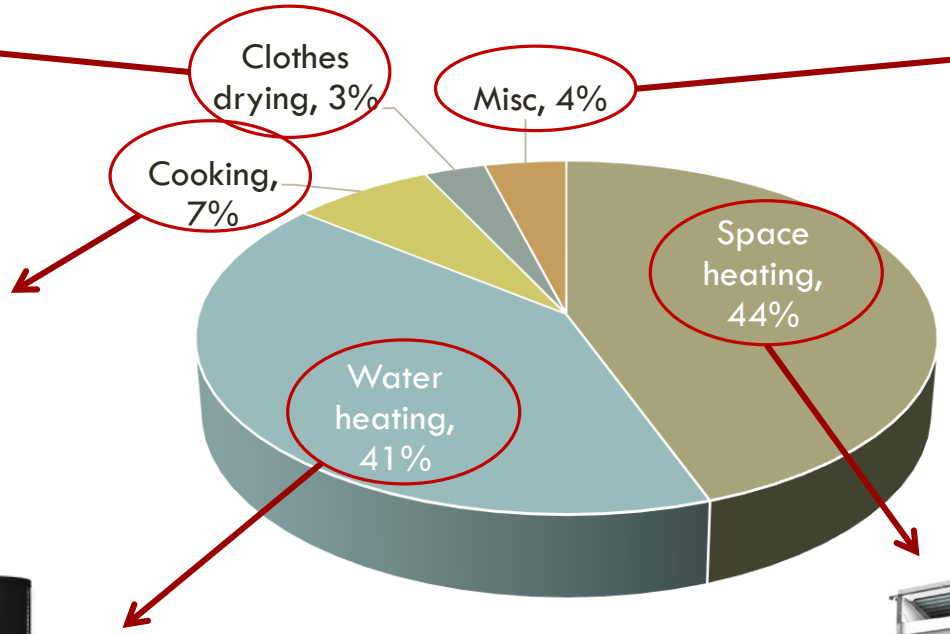


BENEFITS OF BUILDING ELECTRIFICATION

Heat-pump clothes dryer

Electric fireplaces

CA Gas Use in Homes – 2018*



Induction or ceramic cooktop

Heat-pump water heater

Heat pump space heating

*CEC, 6/14/2018 IEPR workshop

Electrification benefits: not just emissions!

Superior comfort (air source heat pumps)

Air quality and health

Safety and resiliency

Save energy and lower bills*

* Depends on electricity tariffs, rooftop solar, and local conditions

Renewable energy integration

New jobs to retrofit buildings, install heat pumps

Slashes GHGs, path to Zero Emissions Buildings

IMPROVE PUBLIC SAFETY BY ELIMINATING LEADING NG INFRASTRUCTURE

1994: Ruptured gas line after 1994 Northridge Earthquake destroys two homes on Balboa Boulevard, LA. *The Atlantic, Jan 14, 2014.*

2010: Ruptured gas line in San Bruno kills 8, destroys 38 homes, PG&E fined for hiding responsibility. *KPCC News, 2016*.

2015: Aliso Canyon leak sends hundreds of children home from school with mass nose bleeds and vomiting, 12,000 citizens evacuated. *EDF, 2015*.

ADDRESS INDOOR AIR POLLUTION

Carbon monoxide,
Nitrogen dioxide,
Nitric oxide,
Formaldehyde,
Acetaldehyde,
Ultrafine particles…

Air pollution levels in 55 – 70% of homes with gas stoves would be illegal if found outdoors. (LBNL)

GROUP ACTIVITY

IMAGINE AN ALL-ELECTRIC BUILT ENVIRONMENT

1. Use the knowledge within your group to imagine an all-electric built environment (5-10 mins)
   - Sketch the built environment and people within it
   - Be prepared to describe what it smells and sounds like

Group leader report back (1-2 minutes per group)

COST EFFECTIVENESS

REDUCE ECONOMY-WIDE ENERGY CONSUMPTION

According to several analyses, widespread building electrification in the U.S. will likely increase electricity consumption, but will decrease total economy-wide energy consumption when including the net decrease of fossil fuels.

Increased Electricity Consumption

- A recent scenario analysis by NREL suggests that that widespread deployment of electrification technologies (including EVs, heat pumps, etc.) could **increase 2050 U.S electricity consumption by 20-38%**

+

More Efficient Technologies

- Since electrification technologies are highly efficient, the quantity of electricity required to produce a specified output (e.g. heat an average home) is less energy intensive than the quantity of energy required to produce the same output through direct combustion of fossil fuels.

=

Decreased Economy-Wide Energy Consumption

- Despite the increase in *electricity* consumption from electrification, NREL's analysis suggests that the efficiency of electrification technologies (along with overall improvements in appliance and building efficiency) could result in **13-21% lower final energy consumption.**

ELECTRIFICATION IMPROVES AFFORDABILITY

Building all-electric saves $1,500 to $6,000 in construction costs.

Residents save $4,000-$10,000 on utility bills over 20 years.

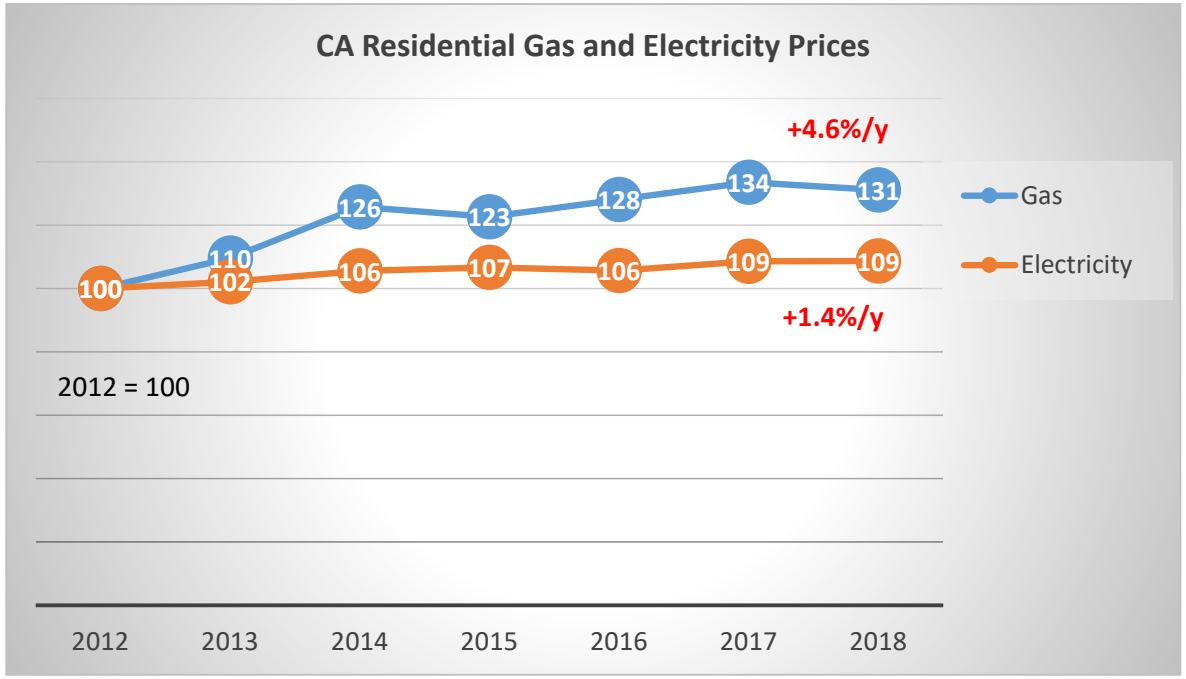
Adding solar lowers utility bills by an additional $500 per year.

Gas rates rising. Utilities expect 24-46% rate hike between 2019-2022

Source: E3 Study 2019 and Synapse 2018

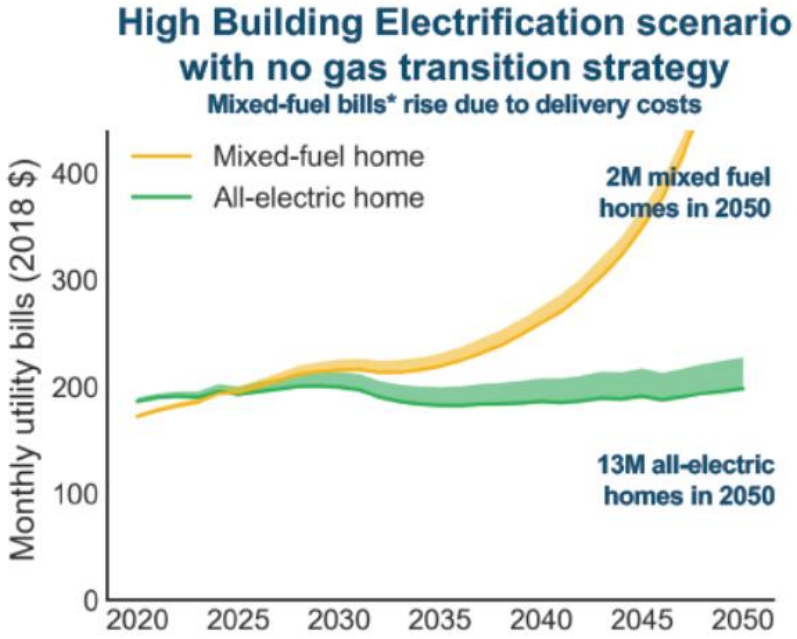
NATURAL GAS COSTS CLIMBING

CA residential natural gas prices increased 3x faster than electricity prices from 2012 to 2018



Source: EIA
https://www.eia.gov/dnav/ng/hist/n3010ca3m.htm
https://www.eia.gov/electricity/data/browser/#/topic/7?agg=2,0,1&geo=g&freq=M

Trend expected to accelerate:



CEC Workshop June 6, 2019: Draft Results from E3 study on the Future of Natural Gas Distribution in California

WHAT DOES BUILDING ELECTRIFICATION LOOK LIKE ACROSS STATE?

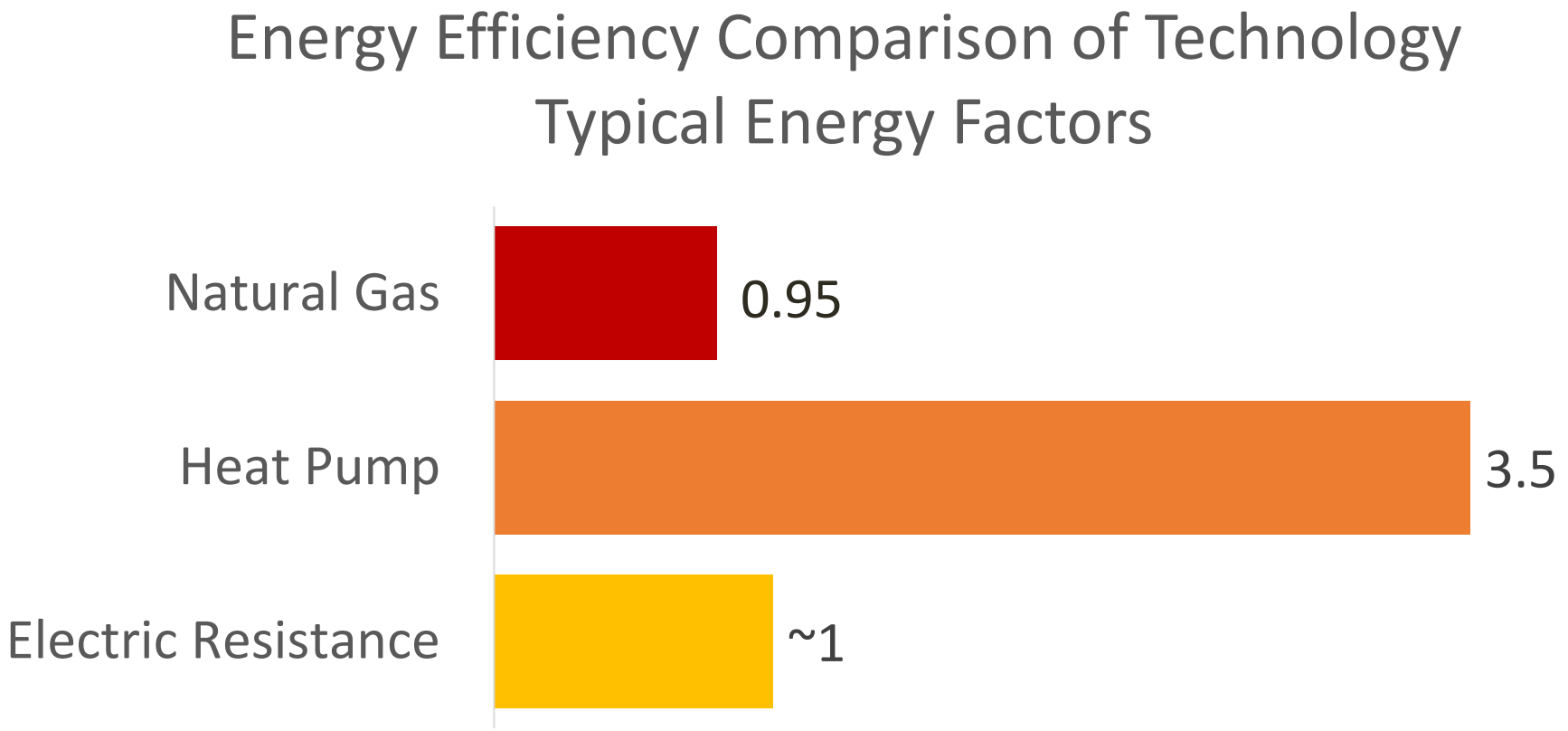
OTHER JURISDICTIONS HAVE ADDRESSED

1. Natural Gas prohibitions
2. Electric-preferred and All-electric buildings
3. All-electric retrofit ready buildings
4. Additional solar PV requirements and/or carbon in lieu of fees
5. Additional electric vehicle charging requirements

TYPE OF POLICY	JURISDICTIONS ADOPTING
Natural Gas Infrastructure Moratorium	Alameda, Berkeley, Morgan Hill, San Francisco, San Jose
All Electric Reach Code	Brisbane, Campbell, Carlsbad, Cupertino, Healdsburg, Los Altos Hills, Los Gatos, Menlo Park, Mountain View, Pacifica, Palo Alto, Santa Rosa, Saratoga, Windsor
Electric Preferred	Berkeley, Davis, Marin County, Mill Valley, Milpitas, Palo Alto, San Francisco, San Jose, San Luis Obispo, San Mateo, San Mateo County, Santa Monica

WHAT IS THE RANGE OF ELECTRIC EQUIPMENT AVAILABLE?

EQUIPMENT EFFICIENCY

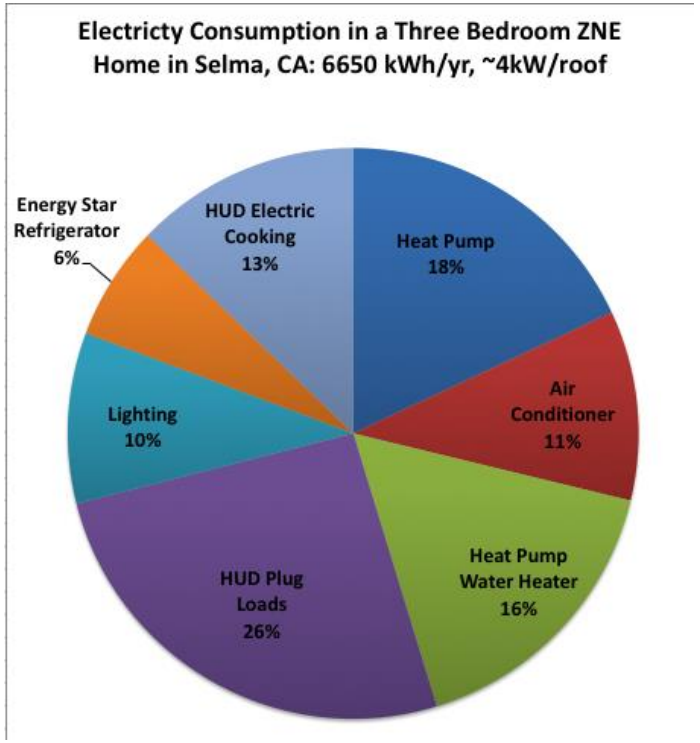


Modern electric equipment

	Space Heating	Water Heating	Cooking	Clothes Drying
Residential				
Commercial				

The New Valley View Homes of Selma, CA

PSH1BG iQ Drive® | Maytag® M1200 up to 19 SEER, 10 HSPF Heat Pump

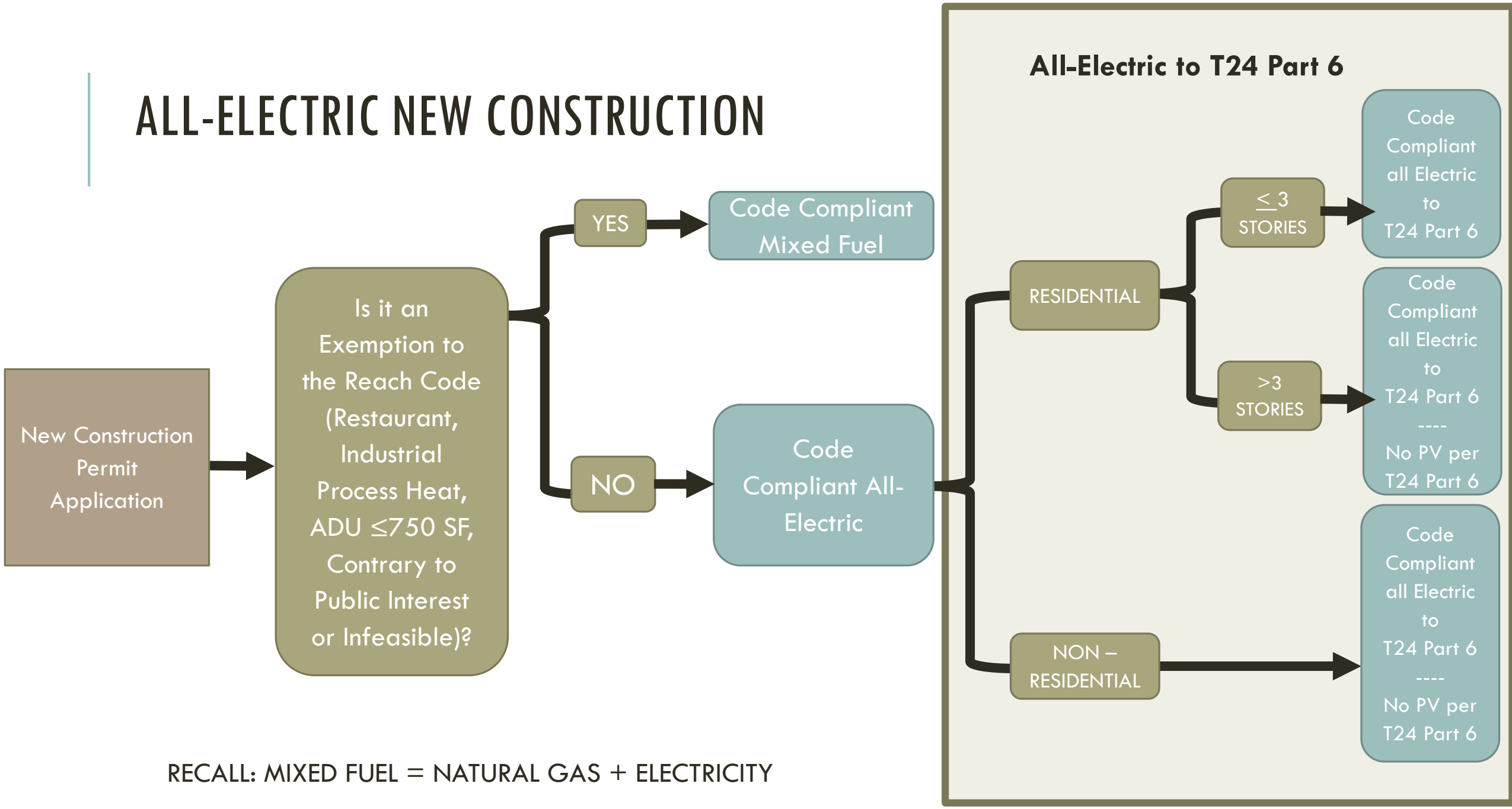


HYATT REGENCY®

WAIKIKI BEACH RESORT AND SPA

CITY COUNCIL DIRECTED POLICY APPROACH

ALL-ELECTRIC NEW CONSTRUCTION



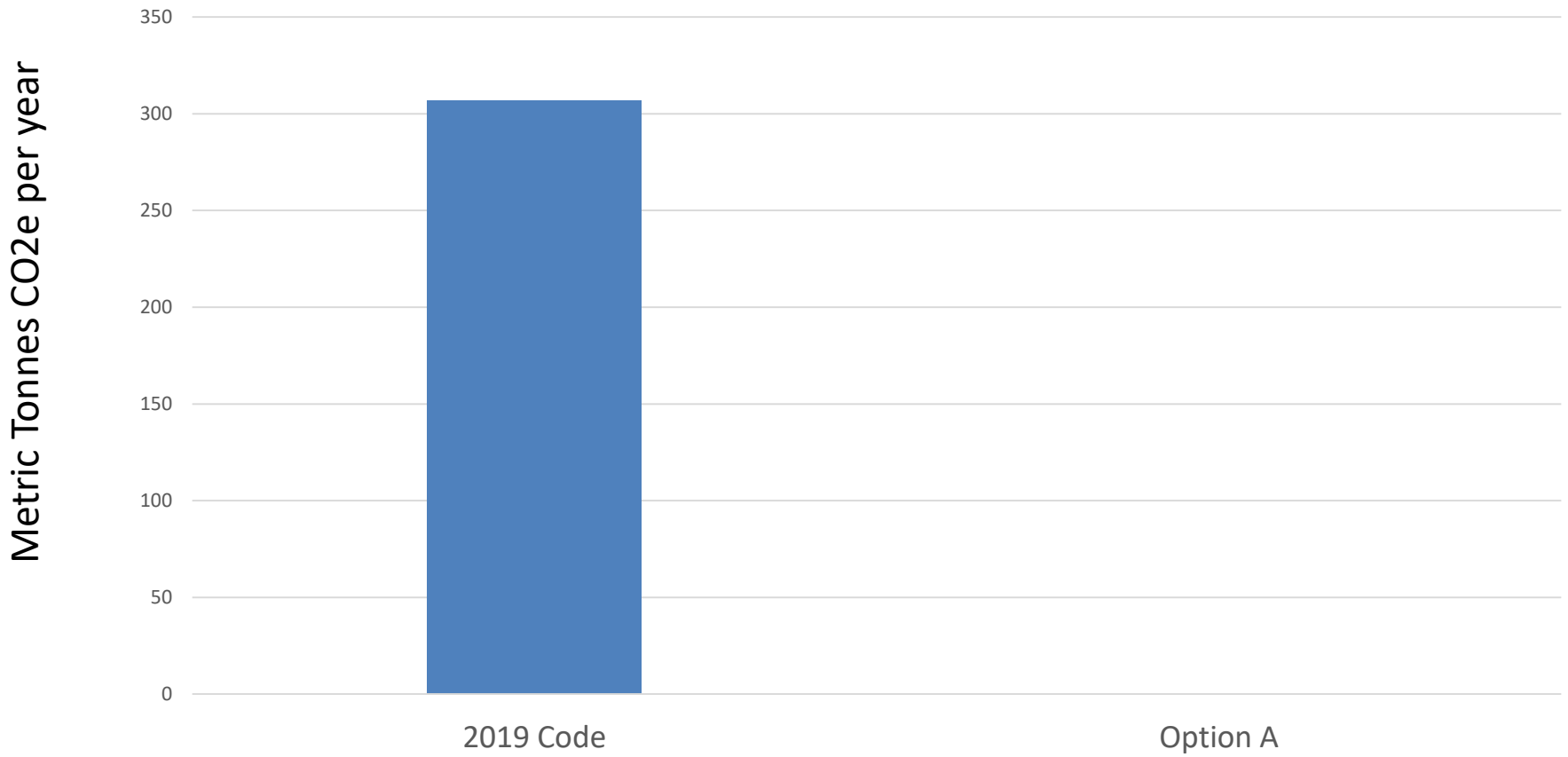
RECALL: MIXED FUEL = NATURAL GAS + ELECTRICITY

ALL-ELECTRIC NEW CONSTRUCTION

Policy	Natural Gas Prohibition Ordinance	2019 CA Energy Reach Code	Green Building Program
Requirements	Prohibits Natural Gas infrastructure in Newly Constructed Buildings* with a New Chapter in Santa Cruz Title 6 Health and Sanitation	Two Compliance Pathways: [1] All-Electric [2] Mixed Fuel + Efficiency EDR Margin = 10 LR Res 95% Standard Des 4+ Res Non Res 90% Standard Des Office/Retail 95% Standard Des HVAC+L	Encourages: [1] R744 Heat Pump WH+ HRV/ERV + 24 SEER AC [2] Demand Response HVAC Interface ADR2.0 [3] CHWDS + Induction Electric Cooktops
Covered Buildings	Newly Constructed Buildings* requiring: [1] Zoning Clearance or LUA [2] Admin or Special Use Permit [3] Ministerial Building Permit [4] ADUs > 750SF	All New Buildings† with Building Permit application after e.g. 07/01/20 + ADUs > 750SF	New Residential and Alterations/Additions > 350SF New Non Res or a TI > 1,000 SF or $200K
Exemptions	[1] Infeasibility + Alterations+ Add [2] Contrary to Public Interest [3] Industrial Process Heat [4] Restaurants & ADUs ≤ 750SF	ADUs ≤ 750SF Alterations Additions	Residential Utility Structures < 1,000 SF
Status	Planning Commission notification – March 5 City Council first reading/hearing – March 24 City Council 2nd reading/hearing – April 7	Draft Ready	Updated to 2019 Code

* Within the new chapter for Santa Cruz Title 6, 'Newly Constructed Building' is 'a building that has never been used or occupied for any purpose'

PROJECTED GHG EMISSIONS FROM 2024 ONWARD WITH 600 DWELLING UNITS BUILT 2020-2024



Where about 1% of Building Stock Turns over each Year

GROUP ACTIVITY

HOW CAN WE FACILITATE ALL-ELECTRIC BUILDINGS OTHER THAN THE POLICY?

Brainstorm Ideas! 10 minutes

OUTREACH & TIMELINE TO ADOPTION

OUTREACH THRU FEBRUARY

- ✓ **Community Workshop 1: Building Electrification 101**
  >>Feb. 4 | City Council Chambers | 6 – 7:30 pm
- ✓ **City Council Study Session**
  >>Feb. 18 | City Council Chambers | 1 – 3:30 pm
- ✓ **Developer's Roundtable**
  >>Feb. 26 | Civic Auditorium Tony Hill A, B C Room| 3:30 – 5 pm
- ✓ **Community Workshop 2: Bldg Electrification Policy Options**
  >>Feb. 27 | Downtown Main Library Community Room | 6 – 7:30 pm
- **Electrification Coffee Talk with Trades, Vendors, Designers and Builders**
  >>Tuesdays Feb. 11 – March 10 | 11th Hour Coffee | 8:30-9:30 am

POLICY PROCESS

PLANNING COMMISSION
>>March 5 | City Council Chambers | 7 pm

CITY COUNCIL – FIRST ORDINANCE HEARING
>>March 24 | | TBD time

CITY COUNCIL – SECOND ORDINANCE HEARING
>>April 7 | City Council Chambers | TBD time

BUILDING ELECTRIFICATION EXPO AT EARTH DAY
>>April 18 | San Lorenzo Park | 11 am – 4 pm

IMPLEMENTATION = TENTATIVELY JULY 1, 2020

OTHER RESOURCES

- FREQUENTLY ASKED QUESTIONS (continuously updated)
- DEVELOPER'S ROUNDTABLE SLIDE DECK
- COMMUNITY WORKSHOP 1 SLIDE DECK
- CITY COUNCIL STUDY SESSION SLIDE DECK
- BERKELEY'S HOME ELECRIFICATION FACT SHEET: ELECTRIC INDUCTION COOK TOPS
- BERKELEY'S HOME ELECRIFICATION FACT SHEET: ELECTRIC HEAT PUMP WATER HEATERS
- SANTA CRUZ ELECTRIFICATION RESOURCES (IN DEVELOPMENT)

WWW.CITYOFSANTACRUZ.COM/POLICY

Q & A

THANK YOU + QUESTIONS?

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Dr. Tiffany Wise-West
Sustainability and Climate Action Manager
twise-west@cityofsantacruz.com | 831.420.5433

https://www.facebook.com/SantaCruzClimateAction/

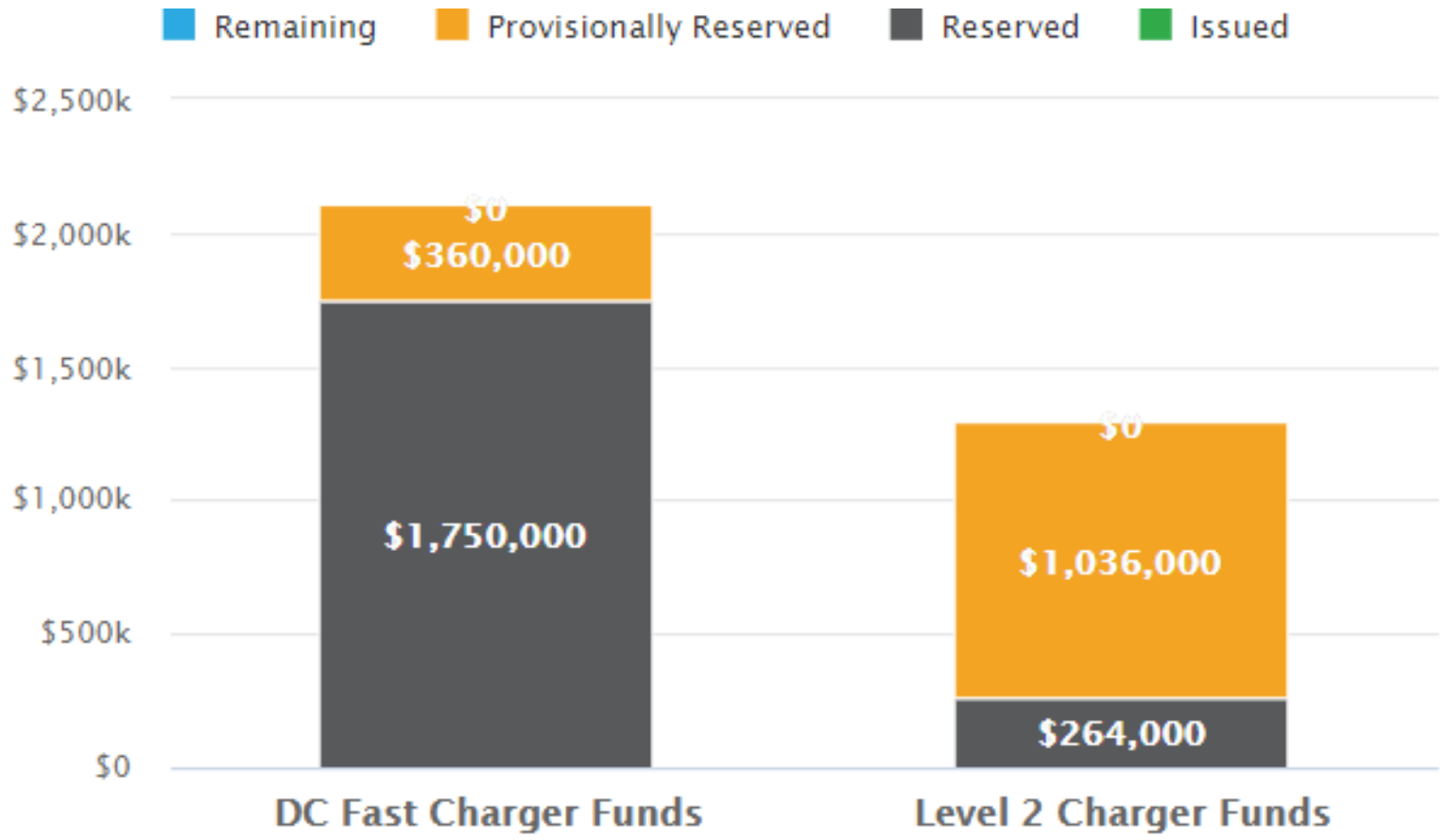
EXTRA SLIDES FOR REFERENCE

TRANSPORTATION ELECTRIFICATION

- ~500 JUMP bikes
- 20 miles bike lanes, >90% Rail Trail funded
- Go Santa Cruz transportation demand mgmt platform
- Electrify America electric vehicle charging investment
- 14 public and 20+ fleet electric vehicle charging
- Electric passenger vehicle and bike fleet
- MBCP and Air District: EV and EV charging incentives
- State and Federal EV rebates

CALEVIP: FUNDING EV INFRASTRUCTURE

SANTA CRUZ PROGRESS



$9.8M of applications received in excess of funds

EV REBATES

ONGOING AVAILABILITY THROUGH PARTNERSHIP WITH MBARD

Goal: Provide rebates to incentivize individuals to purchase or lease an EV

Target Customers: Residential, including low income

Technologies:

- New EVs: $1,000 Used EVs: $750
- New PHEVs: $500 Used PHEVs: $300
- New Electric Motorcycle: $200
- New Hydrogen Fuel Cell Vehicle:$1,500

Amount doubled for low-income applicants

Learn more and apply: MBARD.org/incentives

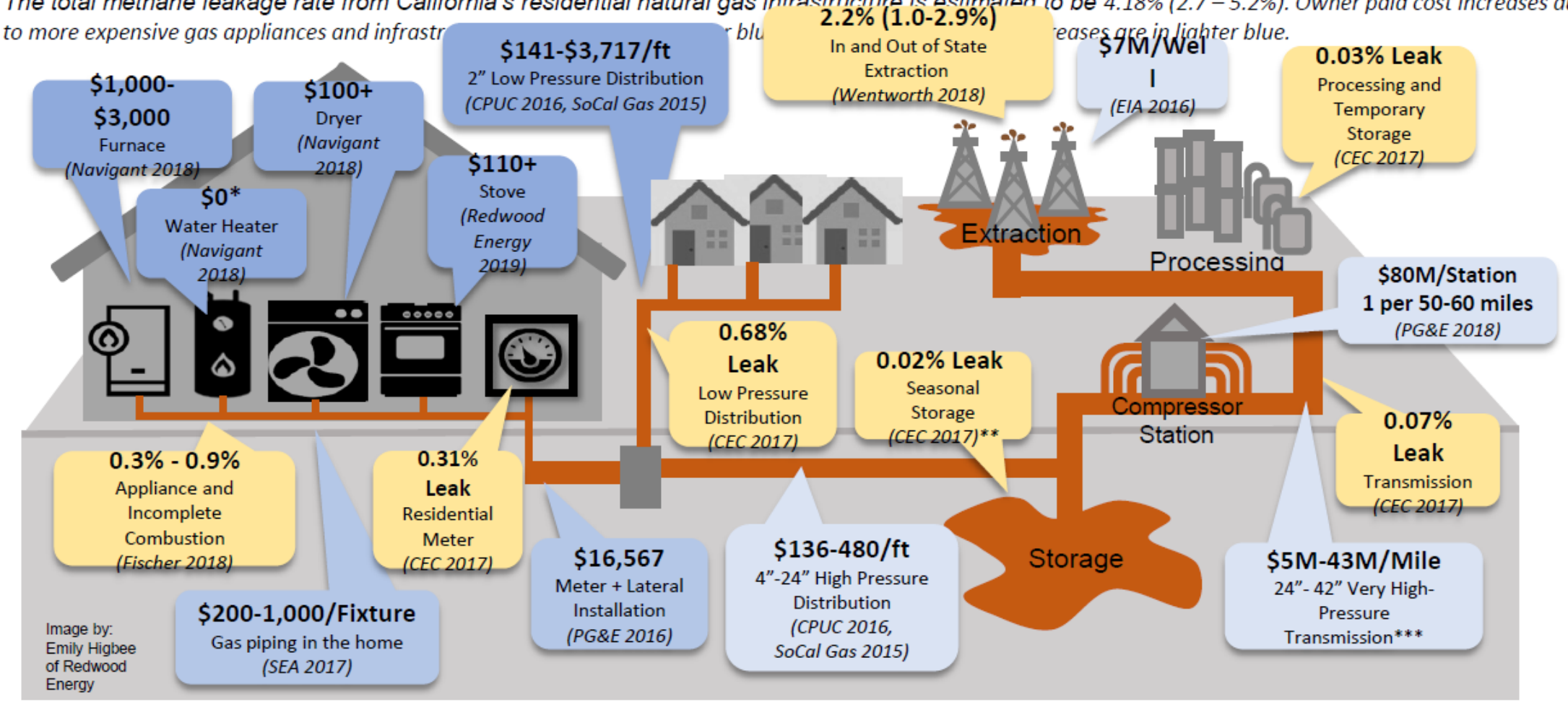
Monterey Bay Community Power

WHAT ABOUT PUBLIC SAFETY POWER SHUTOFFS?

- New water heaters, stoves and heaters all have electric ignitions since pilot lights are no longer legal. As a result, they do not work when the electricity is off regardless of their primary fuel source.
- Gas stoves can sometimes be lit with a match during a power outage; however the exhaust fan will not work making the stove unsafe to operate.
- All-electric appliances can easily be set up to use a backup power source including generators or solar-powered batteries.
- Heat pump water heaters, like other tank-style water heaters hold substantial amounts of hot water, ready to use in case of service disruption.
- Gas negatively impacts disaster recovery time. Not only are gas lines and leaks a dangerous liability during fires, gas service typically take longer to get operational again after a safety shutoff or disaster-related inspection and repair, compared to electricity.

Residential Natural Gas Infrastructure Costs and Methane Leakage: $25,000+ per home, 2.7%-5.2% leakage

The total methane leakage rate from California's residential natural gas infrastructure is estimated to be 4.18% (2.7 – 5.2%). Owner paid cost increases due to more expensive gas appliances and infrastr… blu… eases are in lighter blue.



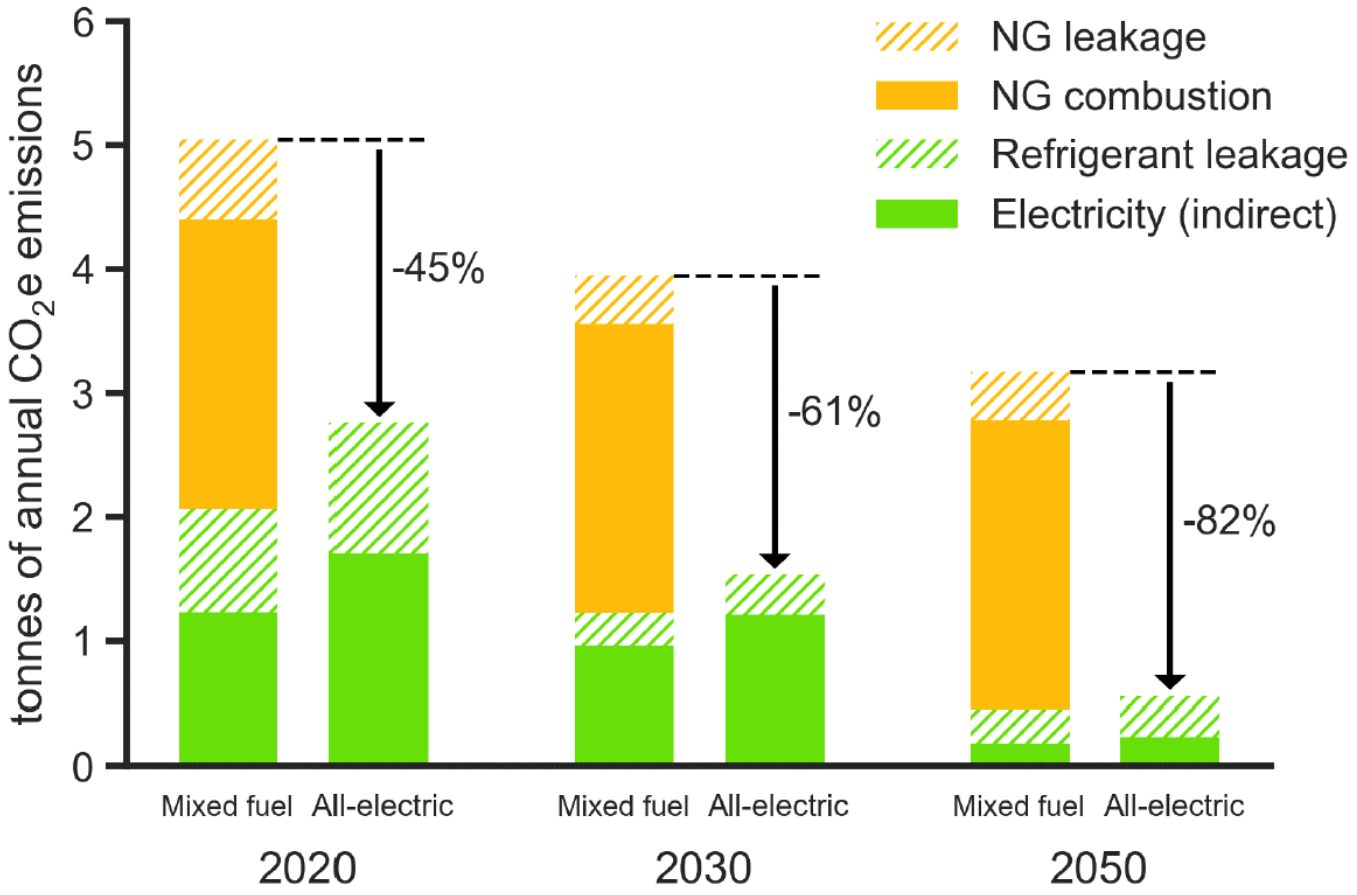
Appliance costs are the marginal cost ($) of gas over all-electric
*heat pump water heater equal in cost to on demand gas water heating
**Aliso Canyon leaked 4.62 Billion cubic feet and alone cost $1.014 billion shared by 5.6 million meters - $181/meter cost (Reuters, Aug 6, 2018)
*** Average of various sources *(Cochran 2018, Lennon 2019, SoCalGas 2014, Nemec 2015, Nogueras 2011)*

Property Owner / Developer Costs in BLUE

Gas Leakage by Segment in YELLOW

REFRIGERANT LEAKAGE

Figure 3-1: Annual GHG emissions from a 1990s vintage single family home for Sacramento

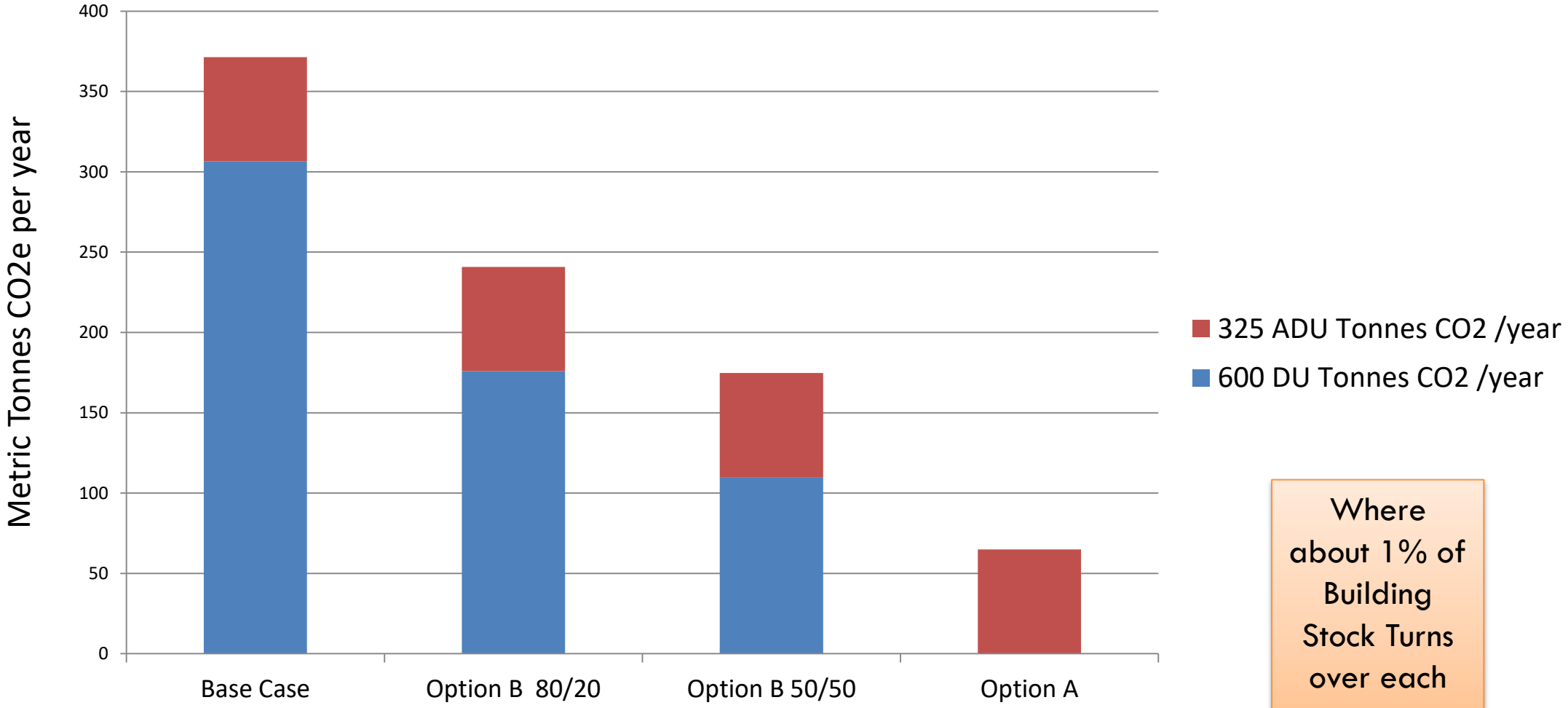


OPTION B MIXED-FUEL EFFICIENCY INCREMENTAL COSTS PER DWELLING

Building Systems (Envelope + Appliance) in Climate Zone 3	SFD	Multifamily per Unit
Incremental Costs	$1,365	$452
Cost Effectiveness On-Bill / TDV	1.91 / 1.97	1.11 / 1.23

SOURCE: 2019 California Energy Codes and Standards PGE / Frontier Energy LR Residential Cost Effectiveness Study

PROJECTED GHG EMISSIONS FROM 2024 ONWARD DWELLING UNITS + ADUs BUILT 2020-2024



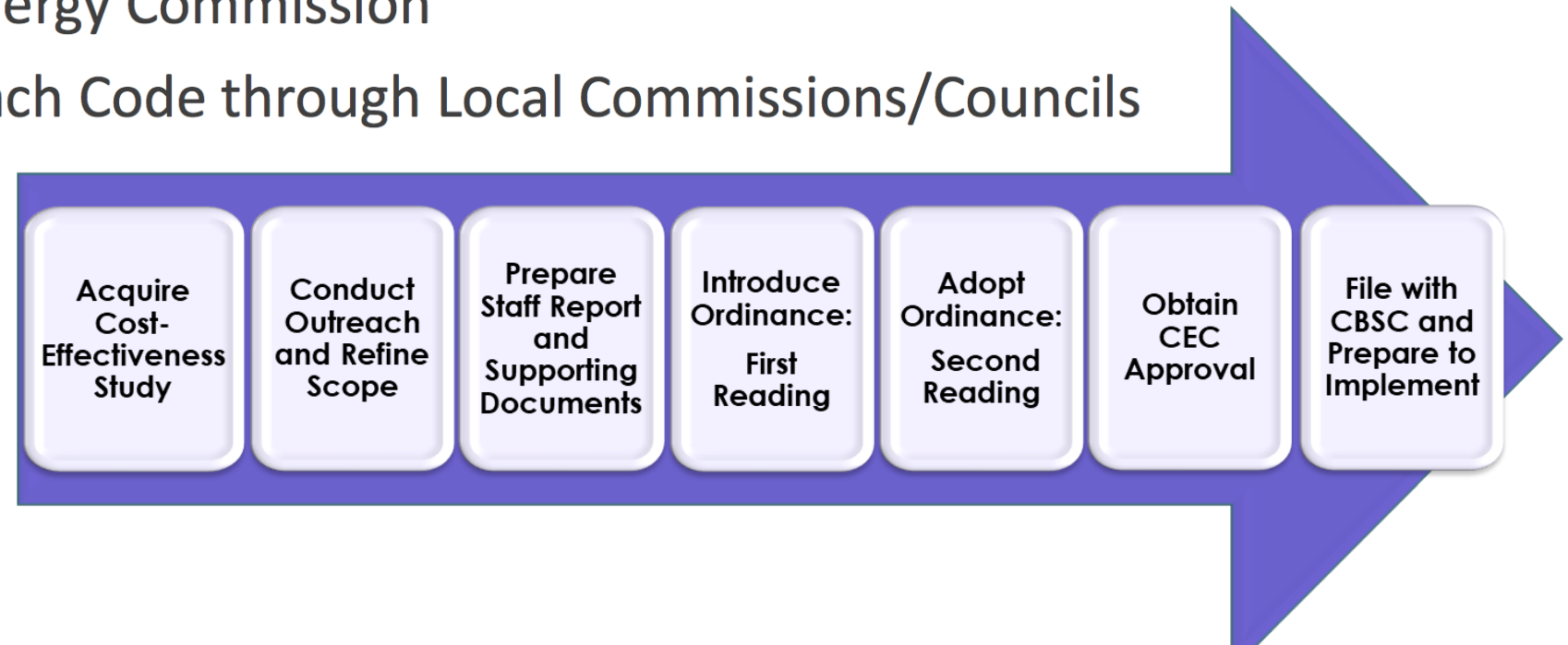
Where about 1% of Building Stock Turns over each Year

PLANNING DEPARTMENT OPERATIONS IMPACT (HEAT MAP)

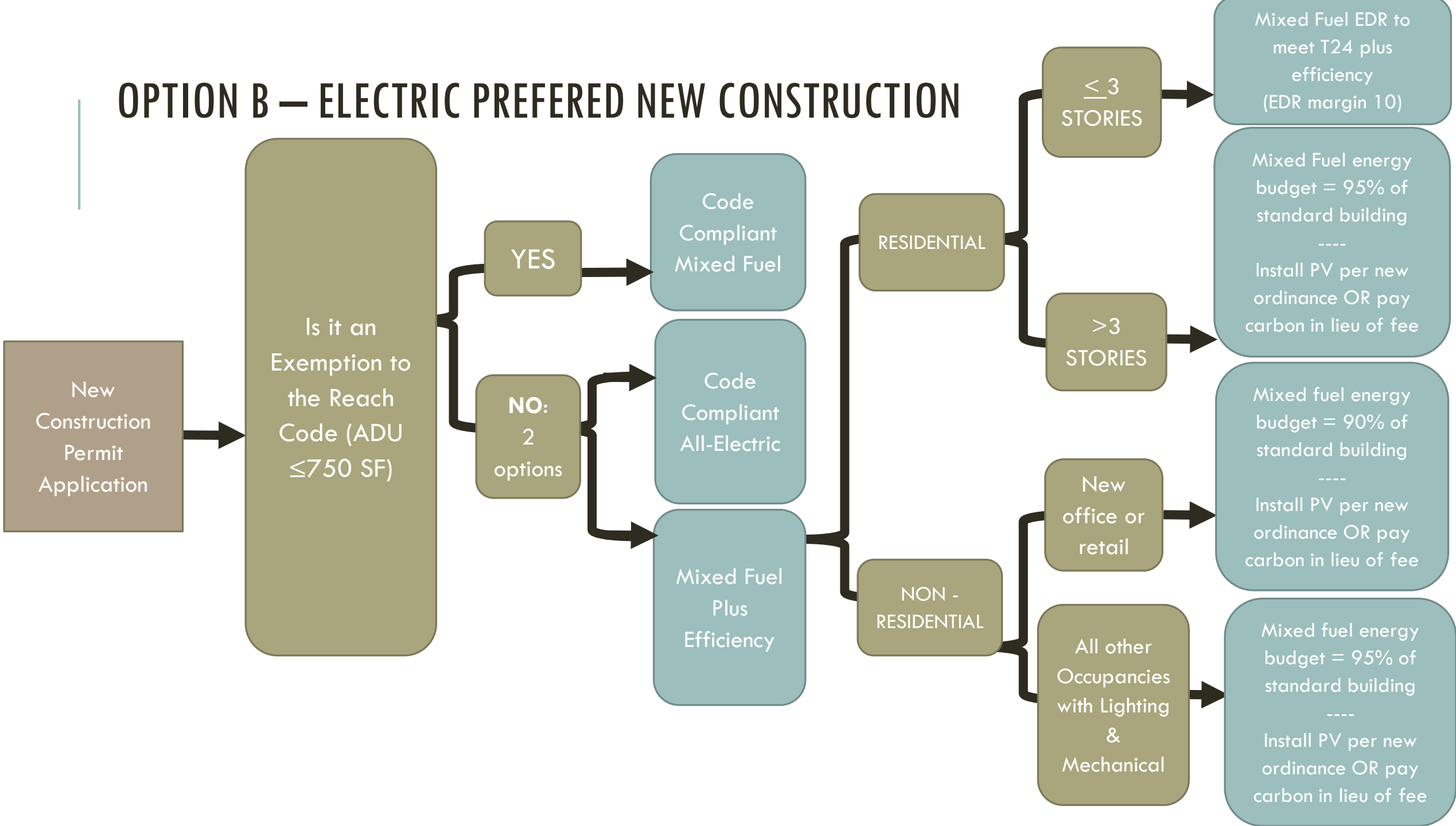
Operations Segment	Option A	Option B
Current Planning	SLIGHT INCREASE	SLIGHT INCREASE
Building Plan Check		SLIGHT INCREASE
Building Field Inspection	MEDIUM DECREASE	

Reach Code Adoption Process

- City Explores Reach Codes
- Evaluate Reach Code Options
- Engage Stakeholders
- Develop Reach Code Ordinance
- Submit Documentation (including Cost Effectiveness studies) to California Energy Commission
- Approve Reach Code through Local Commissions/Councils



OPTION B – ELECTRIC PREFERED NEW CONSTRUCTION



Option B - Electric Preferred New Construction (Choice of Fuel)

Policy	Prohibition on Natural Gas Ordinance	2019 CA Energy Reach Code	Green Building Program
Requirements	None	Two Compliance Pathways: [1] All-Electric [2] Mixed Fuel + Efficiency EDR Margin = 10 LR Res 95% Standard Des Res 4+ PV or ILOF Non Res PV or ILOF 90% Standard Des Office/Retail 95% Standard Des HVAC+L	Encourages: [1] R744 Heat Pump WH+ HRV/ERV + 24 SEER AC [2] Demand Response HVAC Interface ADR2.0 [3] CHWDS + Induction Electric Cooktops
Covered Buildings	None	All New Buildings[ŧ] with Building Permit application after e.g. 07/01/20	New Residential and Alterations/Additions > 350 SF New Non Res or a TI > 1,000 SF or $200K
Exemptions	NA	ADUs ≤ 750SF Alterations Additions	Residential Utility Structures < 1,000 SF
Status	NA	Pending City Council direction	Updated to 2019 Code

[ŧ] The California Energy Code defines a Newly Constructed Building as 'a building that has never been used or occupied for any purpose'.

ADU Exemption

Why an ADU exemption ≤ 750SF?

Technical Motivation

- Surface Area to Volume of ADU already makes Energy Efficiency Compliance to Code more difficult (2019 Code is 7% EE 46% PV (confirmed with Energy Analysts)
- QII & HRVs will become commonplace

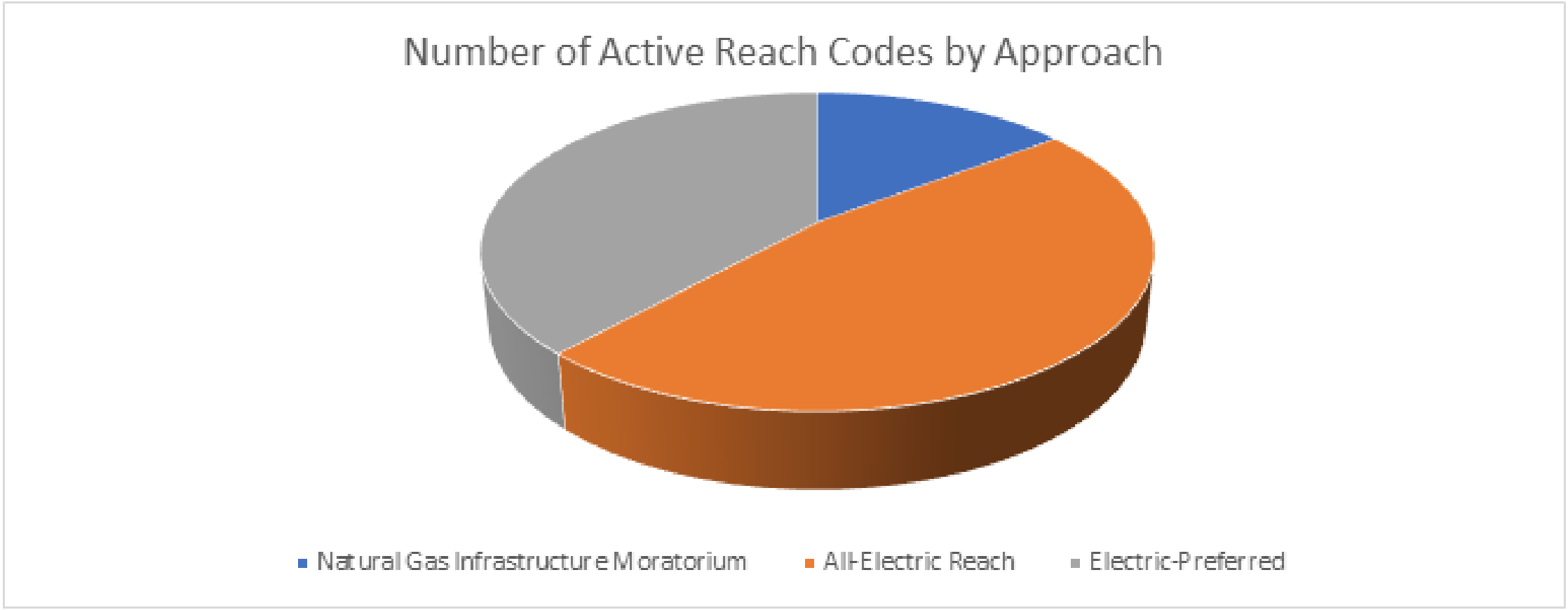
Policy Coordination

- ADUs exempt from Impact Fees up to 750SF
- Eligible for ministerial process up to 800SF

Future ADU Options

- Climate Adaptive/ Ignition Resistant Standard
  to alleviate fuel densification fire risk

OTHER JURISDICTIONS HAVE ADOPTED



IMPROVE INDOOR AIR QUALITY

Eliminate "Supper Smog"

Sean Armstrong: A New Yorker article in April of 2019 about the hidden air pollution in our homes[26] said kitchen air during cooking was so dirty that there is actual smog formation after twenty to thirty minutes of cooking on a gas stove. Was that an exaggeration?

Dr. Brett Singer: If you add pollutants like NO2 from gas stoves to the cooking emissions, it is a mixture of pollutants deserving of a name like "smog," although that name is already taken by outdoor air pollution.

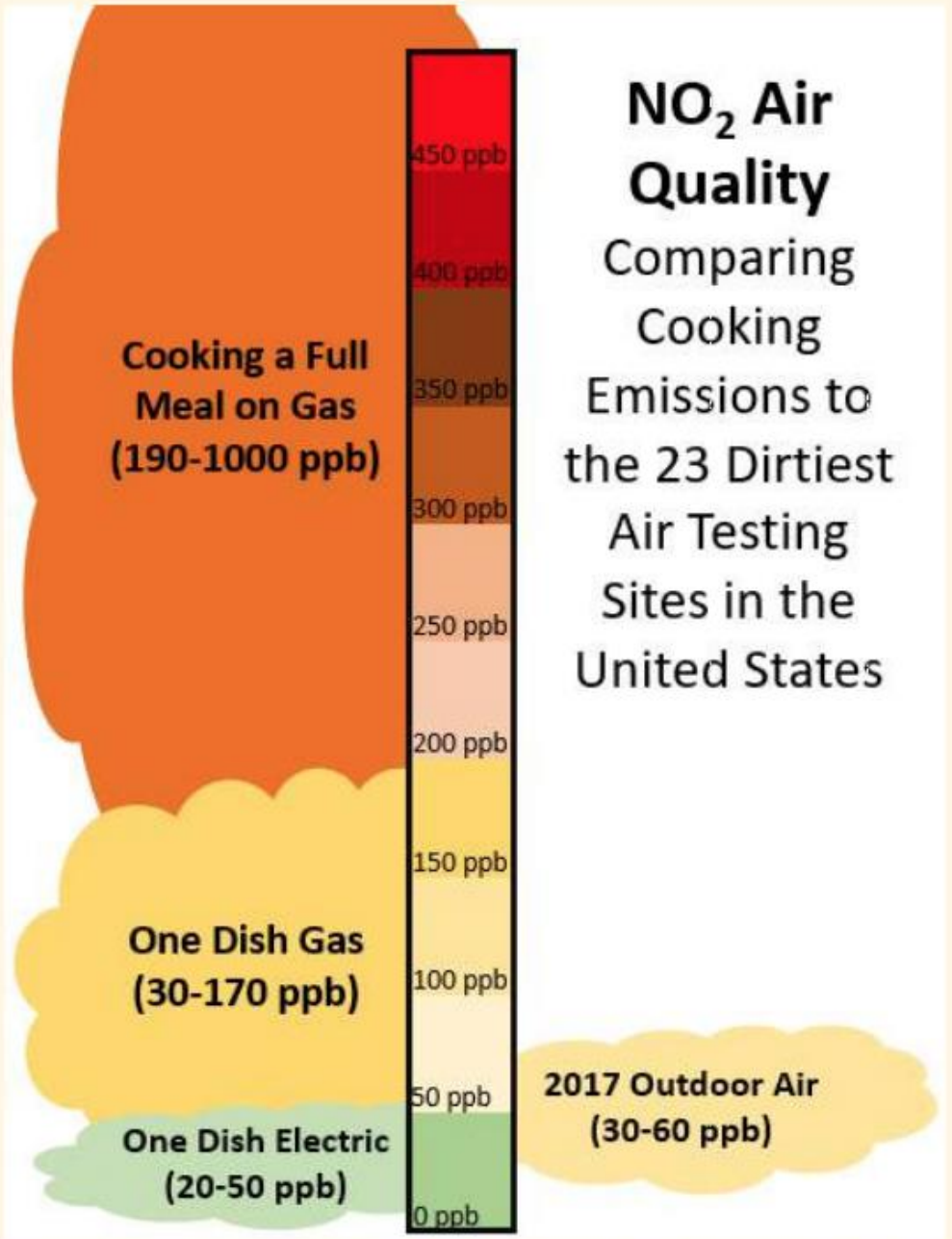


Figure 9: Comparison of 2017 outdoor NO2 air quality data[24] and cooking NO2 emissions for various tests: full meal on gas and single dishes (stir fry, tortillas, French fries)[25].

ELECTRIFICATION REDUCES SAFETY ISSUES

REDUCTION IN FUTURE CODE ENFORCEMENT & RENTAL INSPECTION ISSUES PERTAINING TO COMBUSTION APPLIANCES