



BAY AREA  
AIR QUALITY  
MANAGEMENT  
DISTRICT

**AGENDA: 3**

# **Staff Update: Rule 9-6, Zero Nitrogen Oxides (NOx) Residential Water Heaters (Continued Item 25 from December 4, 2024 Meeting)**

**Board of Directors Special Meeting  
December 11, 2024**

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# Outline



- Overview of Zero Nitrogen Oxide (NOx) Amendments to Rules 9-4 and 9-6
- Purpose and Scope of Informational Update
- Implementation Working Group
- Findings
- Equity Concerns
- Next Steps

# Why are building appliances important?

Because building appliances can emit NO<sub>x</sub> and other harmful air pollutants

## What is NO<sub>x</sub>?

Nitrogen Oxides (or NO<sub>x</sub>) contribute to the:

- Development or worsening of respiratory illnesses
- Formation of particulate matter (or PM) and ozone (main component of smog)

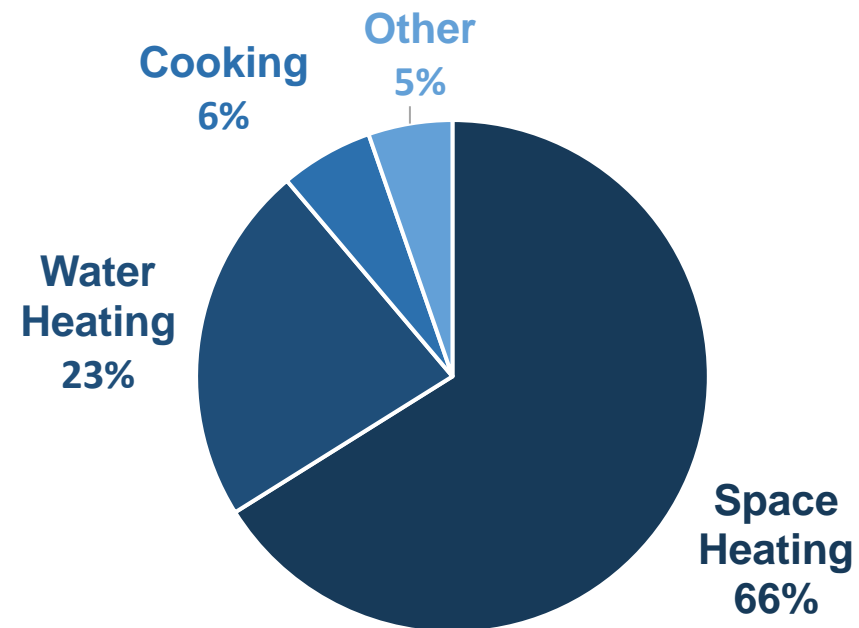
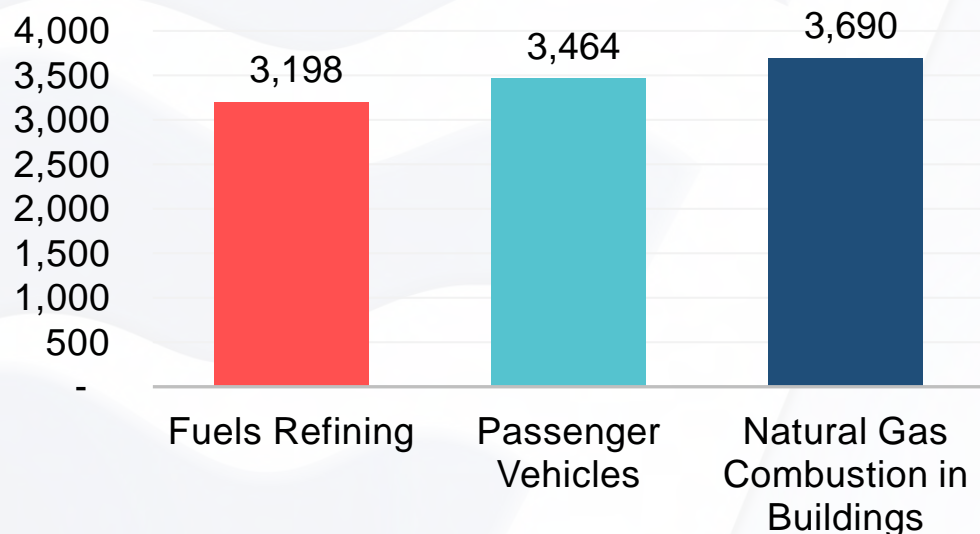


*Source: Stock photo owned by Air District*

# Residential Appliance Emissions

Natural gas combustion from space and water heating emits more NOx than either fuels refining or passenger vehicles in the Bay Area!

2019 Air District NOx Emissions (tons)



Air District Residential Natural Gas Combustion NOx Emissions (2019)

Water and space heating account for about 90% of residential natural gas combustion NOx emissions

# Significant Public Health Benefits From Zero NOx Amendments to Rules 9-4 and 9-6

IMPROVE OVERALL  
REGIONAL AIR QUALITY

FROM THE  
OUTDOOR VENTING  
OF APPLIANCES



LOWER **PM<sub>2.5</sub>**

EXPOSURE

PARTICULARLY IN  
COMMUNITIES  
OF COLOR



AVOID UP TO  
**\$890M**



PER YEAR IN HEALTH  
IMPACTS DUE TO  
AIR POLLUTION  
EXPOSURE



**PREVENT**

UP TO  
**PREMATURE**

**85**  
**DEATHS**  
PER YEAR



# Rules 9-4 and 9-6 Overview

- **Regulation 9, Rule 4:** Nitrogen Oxides from Fan Type Residential Central Furnaces
- **Regulation 9, Rule 6:** Nitrogen Oxides from Natural Gas-Fired Boilers and Water Heaters
- **Zero NOx amendments** adopted on March 15, 2023, with future implementation dates:

1/1/2027	Water heaters less than 75,000 BTU/hr*
1/1/2029	All applicable natural gas-fired furnaces (e.g., residential and commercial; including direct-vent units)
1/1/2031	Water heaters 75,000 to 2 million (M) BTU/hr

\*BTU/hr = British thermal units per hour

# Purpose and Scope of Informational Update

- Rule 9-6 section 404 requires informational updates two years prior to each compliance date
- This update focuses on the January 2027 compliance deadline for <75,000 BTU/hr water heaters
  - Includes tanked ~75 gallon and below
- This update does NOT include:
  - Tanked water heaters greater than 75 gallons
  - Gas tankless on-demand water heaters
  - Central water heaters seen in large multi-family buildings

# Implementation Working Group (IWG)

**Advisory group** that helped inform staff update to Air District Board on two aspects of rule implementation:



**Technical Readiness**



**Equitable Transition**

**40+ members**

Environmental  
Justice and  
Community-  
Based  
Organizations

Subject Matter  
Experts on  
Energy,  
Buildings, and  
Technology

Regional/Local  
Government  
and State  
Agencies

Labor and  
Trade  
Organizations

Utilities and  
Community  
Choice  
Aggregators

## Meetings

**6** Public  
Plenary

**5** Steering  
Committee

**5** Technical  
Subcommittee

**5** Equity  
Subcommittee



# Additional Engagement 2023 – 2024

## Community Outreach

- Invited Community Advisory Council (CAC) to join IWG Equity Subcommittee; three members participated in meetings and follow-up discussions
- Conducted lived experience interviews with nine Bay Area renters
- Engaged with over 12 additional Community-Based Organizations to those in the IWG
- Held Public Learning Session on building appliance rules in October 2024

## Coordination with State and Local Agencies

- Met regularly with California Air Resources Board (CARB) and South Coast Air District to discuss their upcoming building appliance rules

# Additional Engagement 2023 – 2024 (cont.)

## Coordination with Utilities and Community Choice Aggregators (CCAs)

- Met with Pacific Gas & Electric (PG&E), California Public Utilities Commission, and California Energy Commission to discuss energy code, proceedings, pilots, grid, etc.
- Met quarterly with CCAs on outreach and heat pump programs

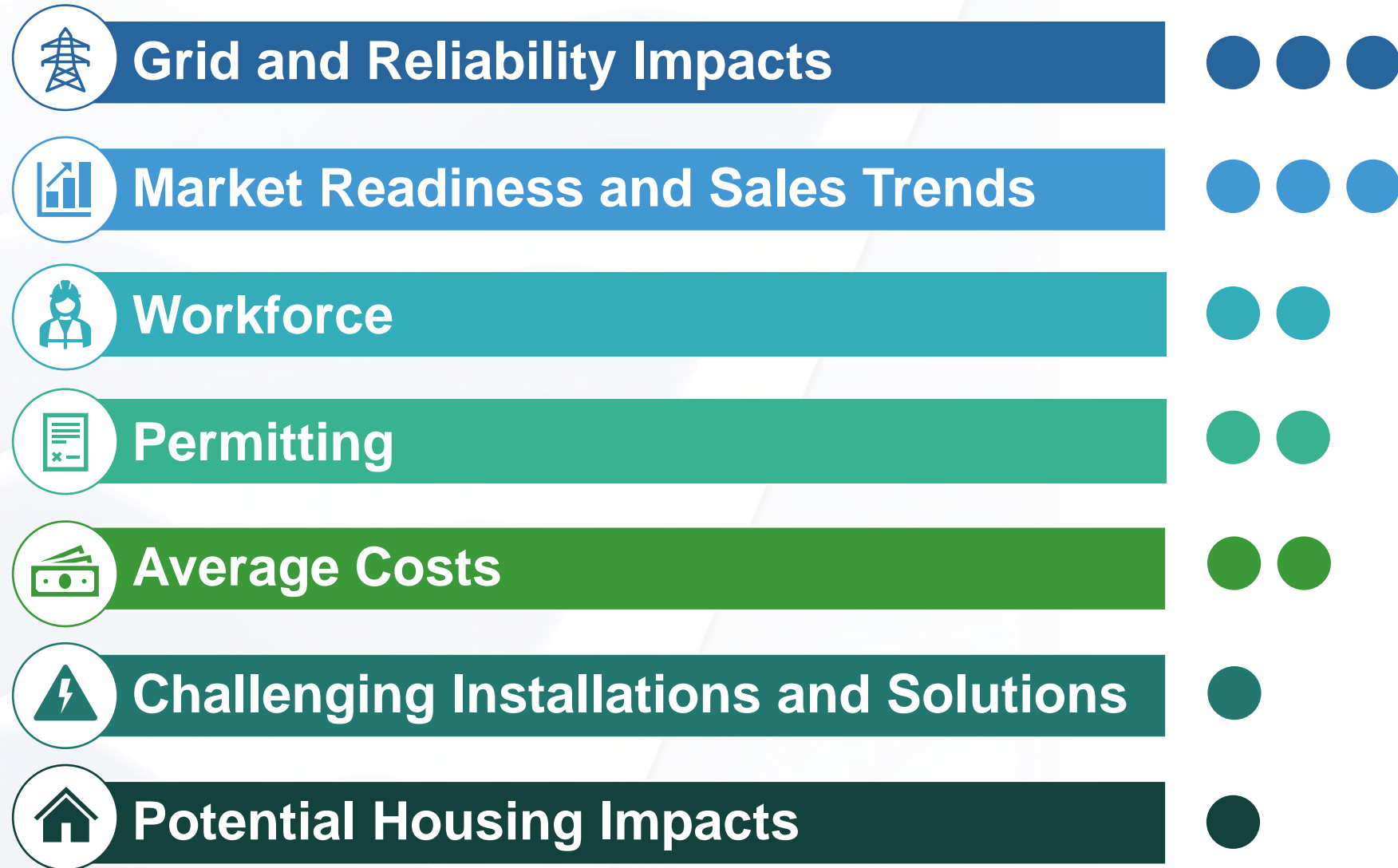
## Participation at Public Events and other Forums

- Presented at 12 events including electrification fairs, contractor education and workforce events, and forums on zero NOx rules, permitting, building electrification, sustainability, etc.



Source: Microsoft stock photo

# Topic Overview



**LEVELS**

- ● ● READY
- ● ON-TRACK
- MORE WORK NEEDED

# Grid and Reliability



- New electrical loads resulting from rule implementation are highly unlikely to cause power outages
- Large majority of power outages are caused by physical impacts (downed trees, storms, etc.) or public safety power shutoffs, which have significantly declined since 2019
- At the appliance level, zero NOx and new NOx-emitting gas water heaters have similar reliability in power outages



Source: Microsoft stock photo

# Market Readiness: Public Drivers

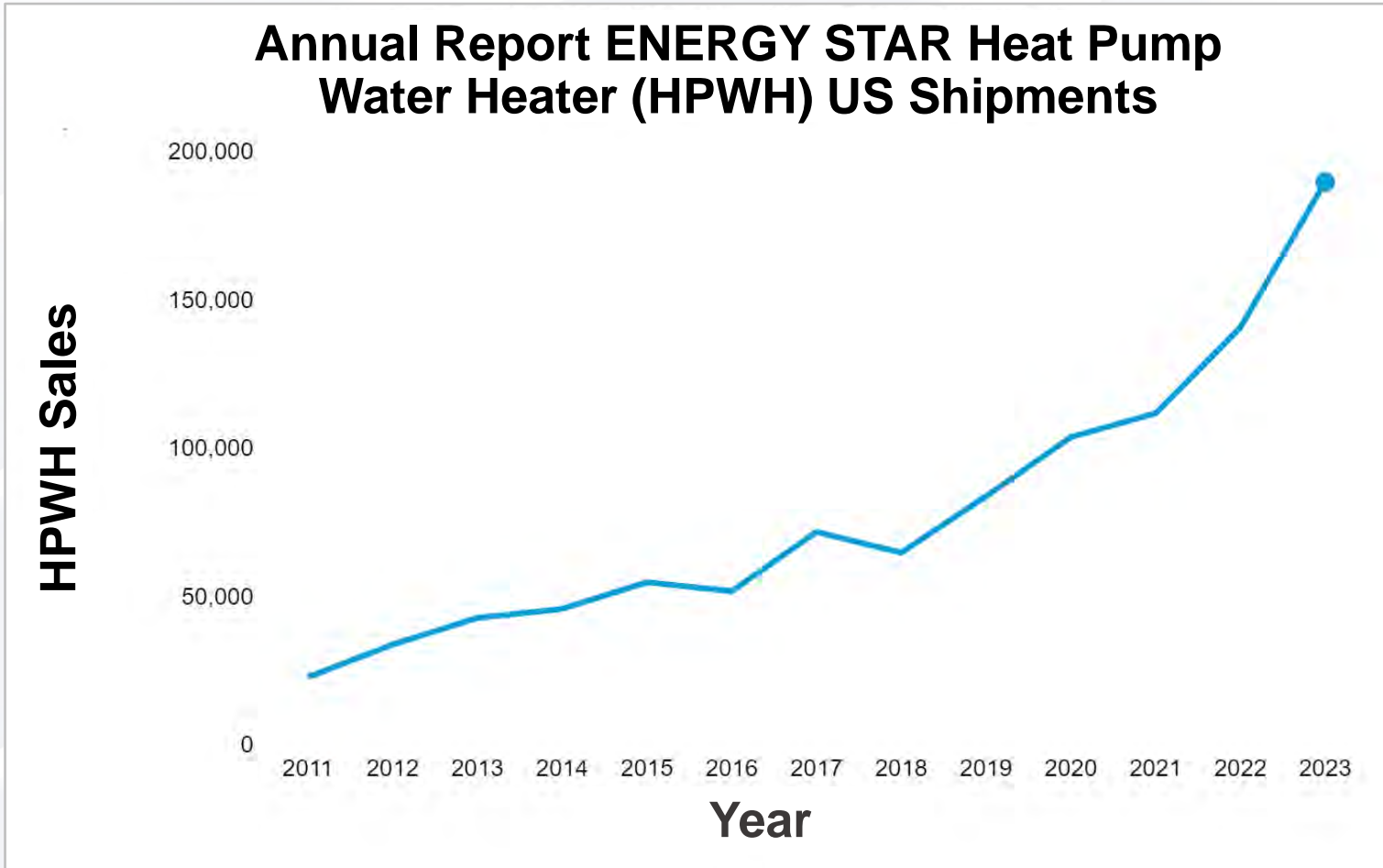


- Local programs, pilot programs, and policies from cities, CCAs, and Bay Area Regional Energy Network
- State market development through programs including TECH Clean CA and CA Heat Pump Partnership
- Federal Inflation Reduction Act (IRA) funds and US Department of Energy electric water heater efficiency standards passed in 2024



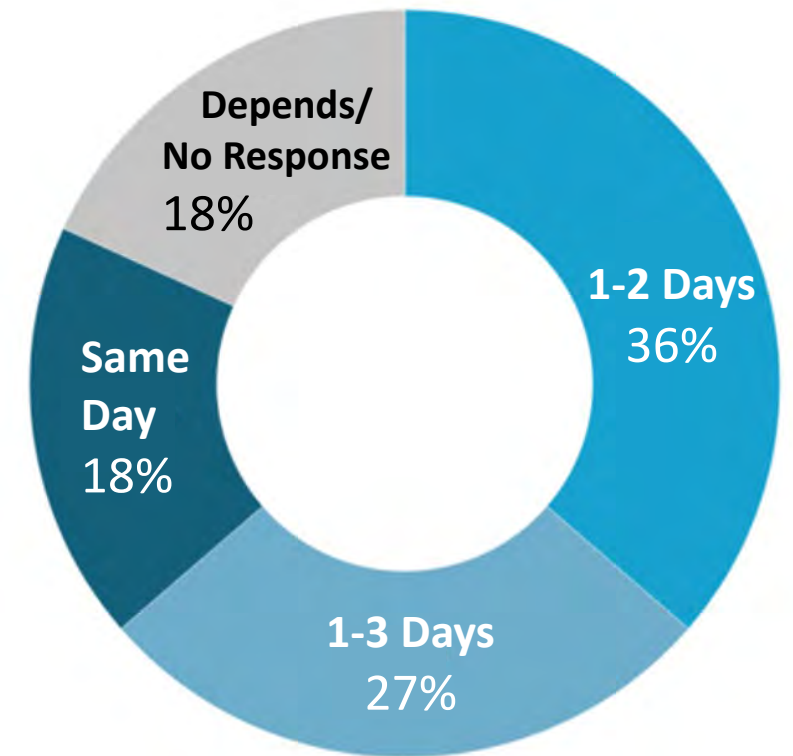
Source: Microsoft stock photo

# Market Readiness: Wait Times and Sales Trends



Source: Advanced Water Heating Initiative

## Bay Area contractors wait times for HPWHs



Source: Appendix C of Staff Report: Informational Update on Rule 9-6

# Workforce: Benchmarking and Surveys



**National metrics show Bay Area workforce concentration is close to national averages (0.86 – 0.98)**

## Findings from surveys and interviews

- Majority of contractors are available for emergency failures within a couple of days
- About 2/3 of contractors had awareness of zero NOx amendments and incentive programs
- Almost 1/3 of contractors plan to provide additional heat pump training to their staff
- Almost 1/4 of plumbers expect to expand their workforce



# Permitting: Local Building Permits



## Findings from surveys and interviews with 11 Bay Area local governments:

- Turnaround time for zero NOx water heater permits takes less than 3 days in most jurisdictions
- Most cities surveyed have a single permit for HPWHs
- Growing number of local jurisdictions are pursuing best practices for HPWH permitting, informed by efforts from:
  - BayREN and TECH Clean California's Permitting Pilot
  - San Mateo County
  - Silicon Valley Clean Energy (SVCE)



Source: Microsoft stock photo



# Costs: Billing Impacts



- Most high-usage households (5,000 kWh or more annual usage before electrifying) see savings
- Some low-usage households see increase of ~\$2 per month
- Discount rate for low-income and electrification-specific rate are key

Usage	Sector	Customer	% Customers who Switch to E-ELEC	Bill Impact	% Customers	Avg \$/Month
Low	SF Res	CARE	8%	Increase	12%	\$1.33
		CARE	8%	Decrease	88%	-\$8.28
	Non-CARE	10%	Increase	34%	\$1.73	
		10%	Decrease	66%	-\$7.51	
	MF Res	CARE	13%	Increase	10%	\$1.33
		CARE	13%	Decrease	90%	-\$7.89
Non-CARE	18%	Increase	59%	\$2.09		
	18%	Decrease	41%	-\$7.65		
High	SF Res	CARE	62%	Increase	4%	\$1.50
		CARE	62%	Decrease	96%	-\$15.38
	Non-CARE	64%	Increase	5%	\$1.71	
		64%	Decrease	95%	-\$32.97	
	MF Res	CARE	48%	Increase	7%	\$1.42
		CARE	48%	Decrease	93%	-\$16.58
Non-CARE	76%	Increase	3%	\$1.24		
Non-CARE	76%	Decrease	97%	-\$27.59		

SF Res = Single-family Residential  
MF Res = Multifamily Residential

E-ELECT = Electric Home Rate Plan  
CARE = California Alternate Rates for Energy

Source: Appendix A of Staff Report: Informational Update on Rule 9-6

# Average Costs: Upfront Purchase and Installation



End User	NOx-emitting Baseline Type	NOx-emitting Average Upfront Cost	Zero NOx Average Upfront Cost	Incremental Cost
Single-family	Tanked + Tankless (N=450)	\$5,231	\$7,071	<b>\$1,840</b>
Single-family	Tanked (N=37)	\$3,575	\$7,071	<b>\$3,496</b>
Multi-family	Tanked, tankless	No data	\$8,939	Not available

- Current and upcoming incentives offered at multiple levels: Federal, State, PG&E, and local
- After incentives and tax credits, upfront costs for a new zero NOx water heater can be less than for a new NOx-emitting water heater

# Challenging Installations: Cost of Edge Cases



- The majority of the ~4k HPWH projects evaluated are close to the median and average of ~\$7k for total upfront costs
- But TECH data shows statistical outliers and “edge cases”

Source: Appendix A of Staff Report: Informational Update on Rule 9-6 & TECH Clean CA December 2023



# Challenging Installations: Space Constraints and Emerging Solutions

Early research show space constraints in up to  
~1/4 of homes

- Ventilation measures will be mostly low cost (avg.=\$208; max=\$1.7k) vs. other measures, especially relocation (avg.=\$1.3k; max=\$4.5k)

## Emerging solutions:

- Split-system HPWHs – with unattached, outside condenser or heat pump (*top photo*)
- Electric on-demand tankless water heaters (*bottom photo*)



Source: Embertec.com and Homedepot.com



# Challenging Installations: Panel Upsizing and Emerging Solutions

**Only 3% of single-family and 10% of multi-family homes statewide will need panel upsizing for *full* electrification**

- 120V HPWHs are “plug and play”
  - Growing market: Energy Star lists 68 records
  - \$800 – \$15,000 cost savings vs. 240V HPWH install
- Bay Area projects validated *full* electrification on 100 amps through “watt diet” panel optimization
  - Circuit splitting, sharing, or pausing
  - Smart panels
  - Low-amperage appliances



Source: Grainger.com

# Emerging Solutions: Emergency Replacements



**75 – 90% of water heater replacements only happen when there is a failure**

- New “loaner” programs and pilots from Palo Alto, SVCE, Peninsula Clean Energy, and Marin Clean Energy (MCE)
- Opportunities to encourage pre-planning and readiness:
  - Senate Bill (SB) 382 *Notice to Homebuyers* passed in 2024
  - Potential local government ordinances (e.g., City of Piedmont, Mountain View)
  - Education and outreach
- Potential to speed up installations through contractors, training, and permitting

# Potential Housing Impacts



## Findings from detailed policy research and engagement with key stakeholders, experts, and other agencies

- Capital cost pass-throughs and/or potential rent increases (cost recovery) is a priority issue
- Potential for temporary evictions from construction activities required to make zero NOx replacements (“substantial repair”)



Source: Microsoft stock photo

# Potential Housing Impacts: Lived Experience Interviews with Bay Area Renters



“I am aware of rebates, for switching from gas to electric appliances. My landlord has not taken the measure yet, but he is interested in changing from gas to electric...My landlord should be the one to take care of figuring out the switch.”

“[The water heater] works, but I don’t like it because it’s gas and very old. I don’t feel safe.”

“I didn’t have a contract and it was an informal agreement. Many people like to rent without a formal contract, because sometimes the requirements are a lot, especially for Latinos. I have experienced housing discrimination for being Latino.”

“Disposable income needs to be considered with this trend (electrification), and tenants might not be able to afford the transition. It needs to be affordable.”

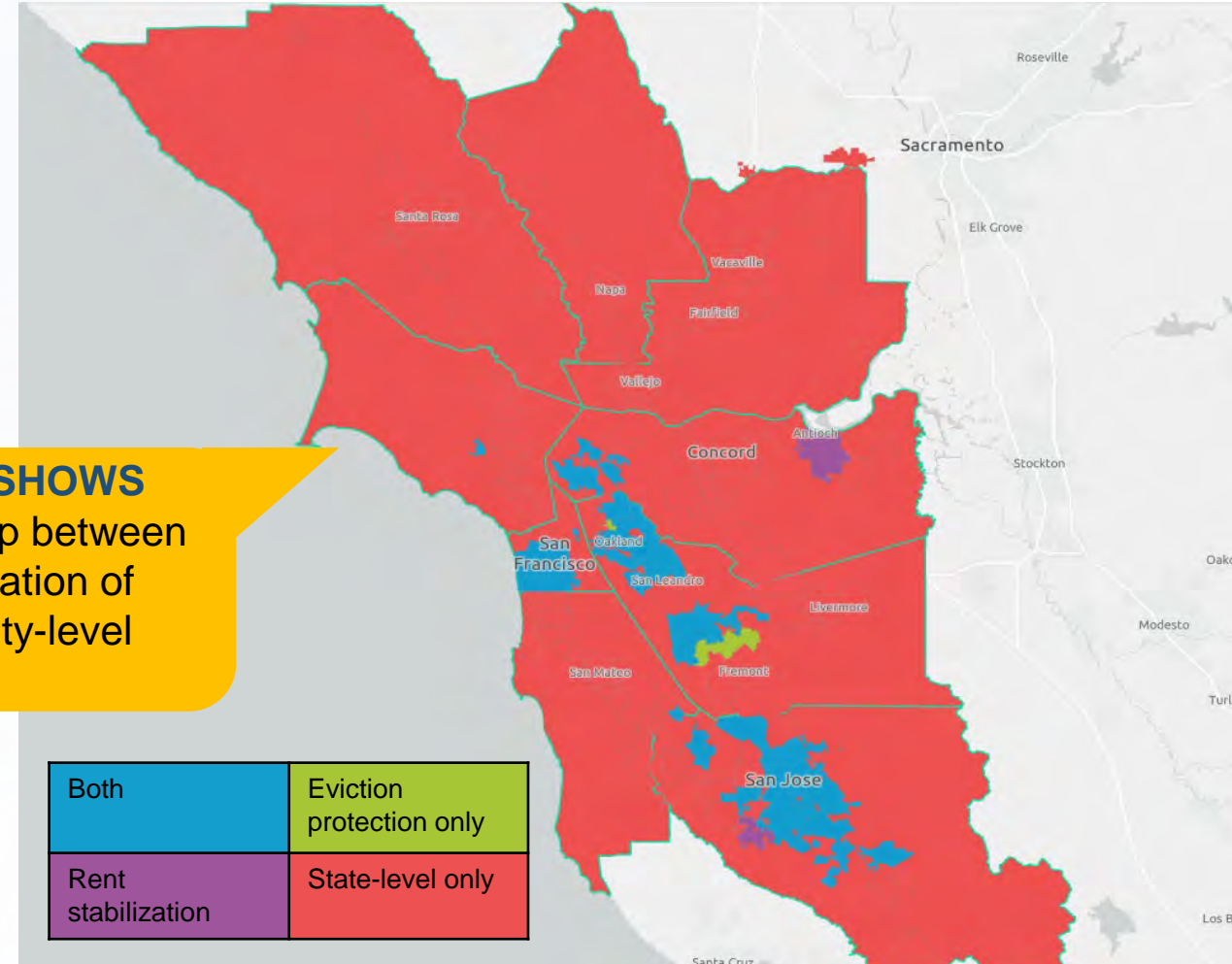
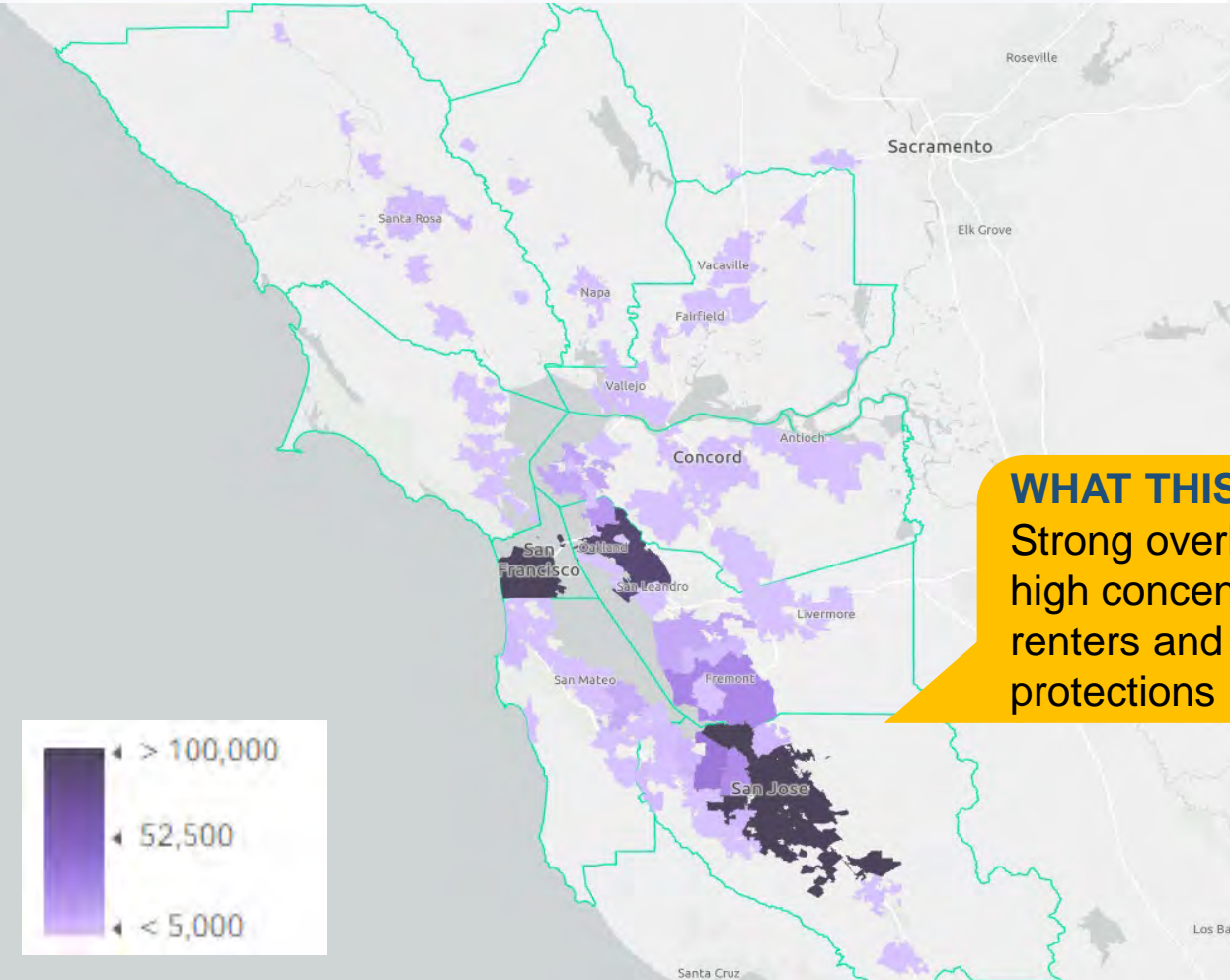


# Key Finding: Cities with the strongest protections have the highest percentage of renters



Total Rented Households (Census Data)

Types of Protections in Place by Jurisdiction



**WHAT THIS SHOWS**  
Strong overlap between high concentration of renters and city-level protections

# Potential Housing Impacts: Emerging Solutions



## Pass Throughs

- Consider ways to *prohibit or limit pass through* costs for zero NOx appliance upgrades in local rent laws
- Conduct *outreach to landlords* to increase participation in incentive programs to lower costs and pass through amounts

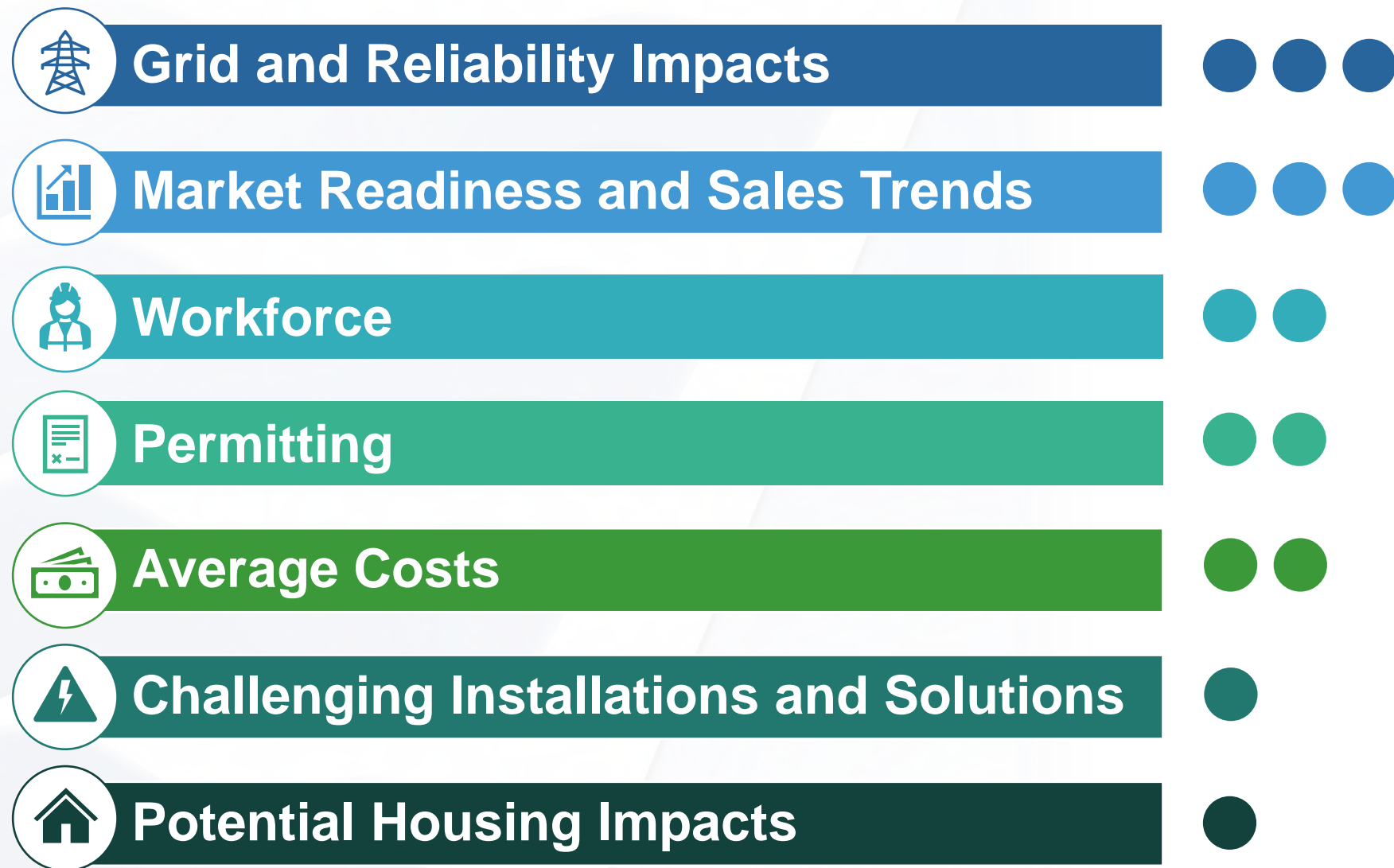
## Eviction Protections

- Explore ways to limit “substantial repair” for zero NOx appliance replacements
- Expand relocation assistance for affected tenants
- Address and prevent “renovictions”



Source: Microsoft stock photo

# Current Implementation Readiness



**LEVELS**

- ● ● READY
- ● ON-TRACK
- MORE WORK NEEDED

# Equity Concerns: Costs

- Higher upfront incremental costs without incentives
- Scale and continuity of incentives
  - Approximately 120k Bay Area small water heaters will be replaced annually, with a substantial number of those being in lower-income households
  - Current and upcoming electrification and energy efficiency incentives that include HPWHs offered from multiple sources: federal, state, PG&E, local utilities and CCAs
  - Funding programs are a snapshot in time



Source: Microsoft stock photo

# Equity Concerns: Potential Housing Impacts

- Cost pass throughs from owner to tenant in privately-owned rented buildings
- Potential temporary displacement of tenants due to additional construction activities for more complex installations; for example:
  - Electrical service upgrades
  - Building constraints for installation that require reconfiguration

# Next Steps: Communications and Outreach

- Continue and grow robust key stakeholder engagement
  - Local government and CCAs
  - Contractors
  - Multifamily building owners and residents
- Research and advocacy for funding and policy changes to address remaining challenges
- As implementation dates near
  - Broader public education and outreach campaign



Source: Microsoft stock photo

# Next Steps: Rule Development

EPA requested changes  
for State Implementation  
Plan compliance

Conditional approval  
expected in January 2025

Administrative rule changes  
to be completed in 2025

Possible changes to  
introduce flexibility

Stationary Source  
Committee planned for  
Quarter 2 2025

Discuss strategies to  
address remaining gaps  
including benefits and  
resource implications

EPA = Environmental Protection Agency



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**AGENDA: 4**

# **Election and Federal Policy Impacts**

**Board of Directors Special Meeting  
December 11, 2024**

**Dr. Philip M. Fine**  
**Executive Officer / Air Pollution Control Officer**  
[pfine@baaqmd.gov](mailto:pfine@baaqmd.gov)



# Presentation Outline

Review potential impacts on the Air District's work from the upcoming change in Presidential administration in the following areas:

- Legal authorities
- Funding impacts
- Policy work

# Air District Legal Authority

- **Air District regulations come from state law, not federal law**
  - Exercise of the state's police power under the California Constitution
  - California Legislature provides authority in the Health & Safety Code
  - If Congress were to repeal the Clean Air Act (CAA), California law would still stand
- **Federal law can override conflicting state/local laws and regulations under the Supremacy Clause in the US Constitution**
  - E.g., motor vehicle emissions standards
    - Trump administration could deny California "waiver"
    - First Trump Administration tried this – California, Bay Area Air Quality Management District (BAAQMD) & others sued
- **Supremacy Clause concerns mostly affect mobile source regulation**
  - For stationary sources, CAA explicitly authorizes more stringent local regulations

# Funding Impacts

- **Federal funding of Air District activities**

- Two recurring grants from United States Environmental Protection Agency (US EPA) totaling \$1.7 million (M); these funds are about 1.5% of total recurring revenue
- These funds have been stable through past changes in administrations

- **Federal pass-through, project and incentive funds**

- \$1.5 M for the Biowatch program; this is a Homeland Security project that we outsource to contractors, these funds are not used for internal staffing or other Air District expenses
- \$1.5 M for projects that the Air District is conducting; these grants have been awarded and the funds are in our bank accounts
- \$2 M for incentive program to replace wood stoves with heat pumps; awarded in 2021, we are reimbursed after we fund projects
- \$5 M in Congestion Mitigation Air Quality funds to support Electric Vehicle (EV) programs; >\$4 M received
- \$15 M for charging infrastructure (only initial \$1.6 M currently under contract)

- **Federal Funds that Support Air District Priorities**

- Funding for clean vehicles and related infrastructure (EV rebates)
- Funding for clean building appliances (heat pump rebates)

# Air District Leadership into the Future

- **Leading Locally for Lasting Change: Our Strategic Plan in Action**
  - Even as federal support fluctuates, our Strategic Plan empowers us to drive meaningful, lasting improvements in air quality, climate resilience, and public health across the Bay Area
  - Still laser-focused on Environmental Justice
- **Bridging Federal Shortfalls with State and Local Incentives**
  - In the face of reduced federal support, collaboration with state partners is essential to expand and optimize incentives. At same time, state budget constraints call for prioritizing high-impact funding streams that drive air quality improvements beyond regulatory requirements and sustain progress
- **Standing with Partners to Challenge Illegal Rollbacks**
  - As in the first Trump administration, the Air District can partner with the California Attorney General, like-minded states, and others to challenge any illegal rollbacks of air quality and climate regulations or initiatives