The Next Step in the Clean Energy Transition – Decarbonizing Heating Energy in Buildings

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February 12, 2018

SIERRA CLUB

NRDC

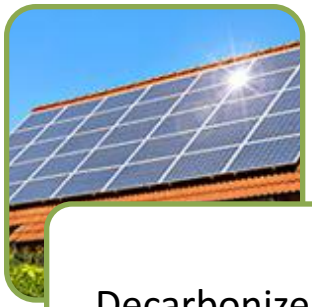
Agenda

- Decarbonization of space and water heating in buildings: Problem, solutions, barriers
- Proposed legislation: objective and content
- How can local jurisdictions help?

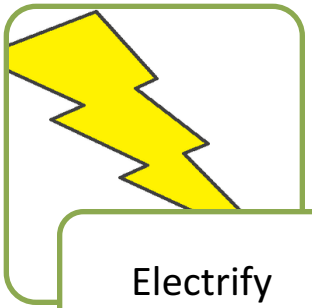
Electrification of buildings in context

To minimize climate change impacts, we need to reduce GHG emissions by 80% by 2050 (below 1990)

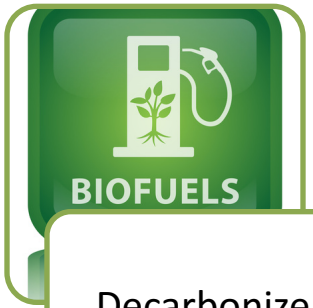
Energy Efficiency



Decarbonize the grid



Electrify vehicles **and buildings**

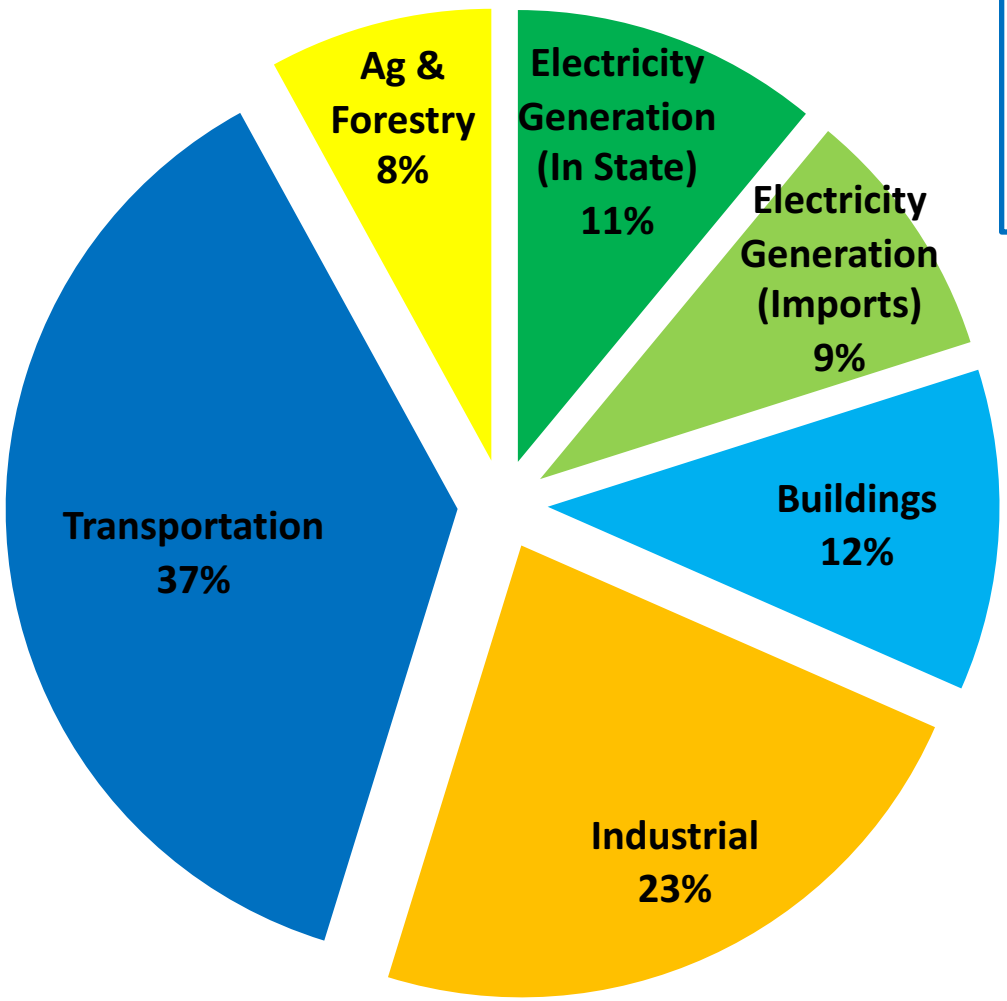


Decarbonize remaining fuels

80/50 Decarbonization Framework

Emissions from buildings higher than power plants

California GHG Emissions (2011-2015)



Buildings = ~2nd largest source of GHGs (includes emissions from electricity use)

Mostly from on-site combustion of gas for water heating and space heating.

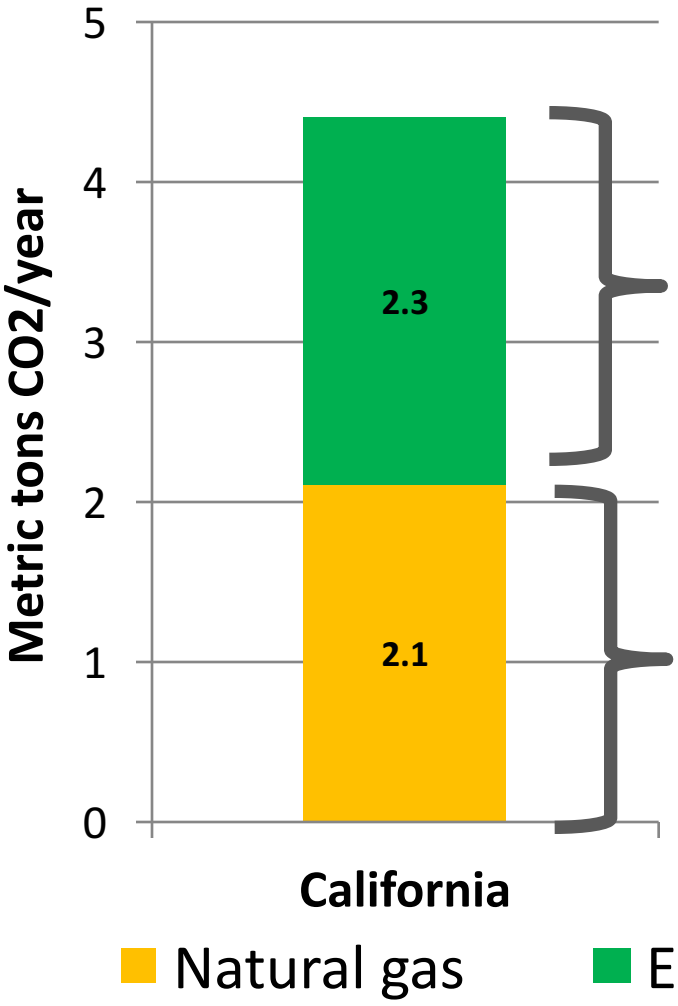
Emissions could ~double when including methane leakage.

Total: ~444 MMtCO2e/year

Source: CA ARB GHG Inventory; 5-average of emissions by economic sector

Gas responsible for ½ of GHGs in homes

Average CA Residential GHG by Source



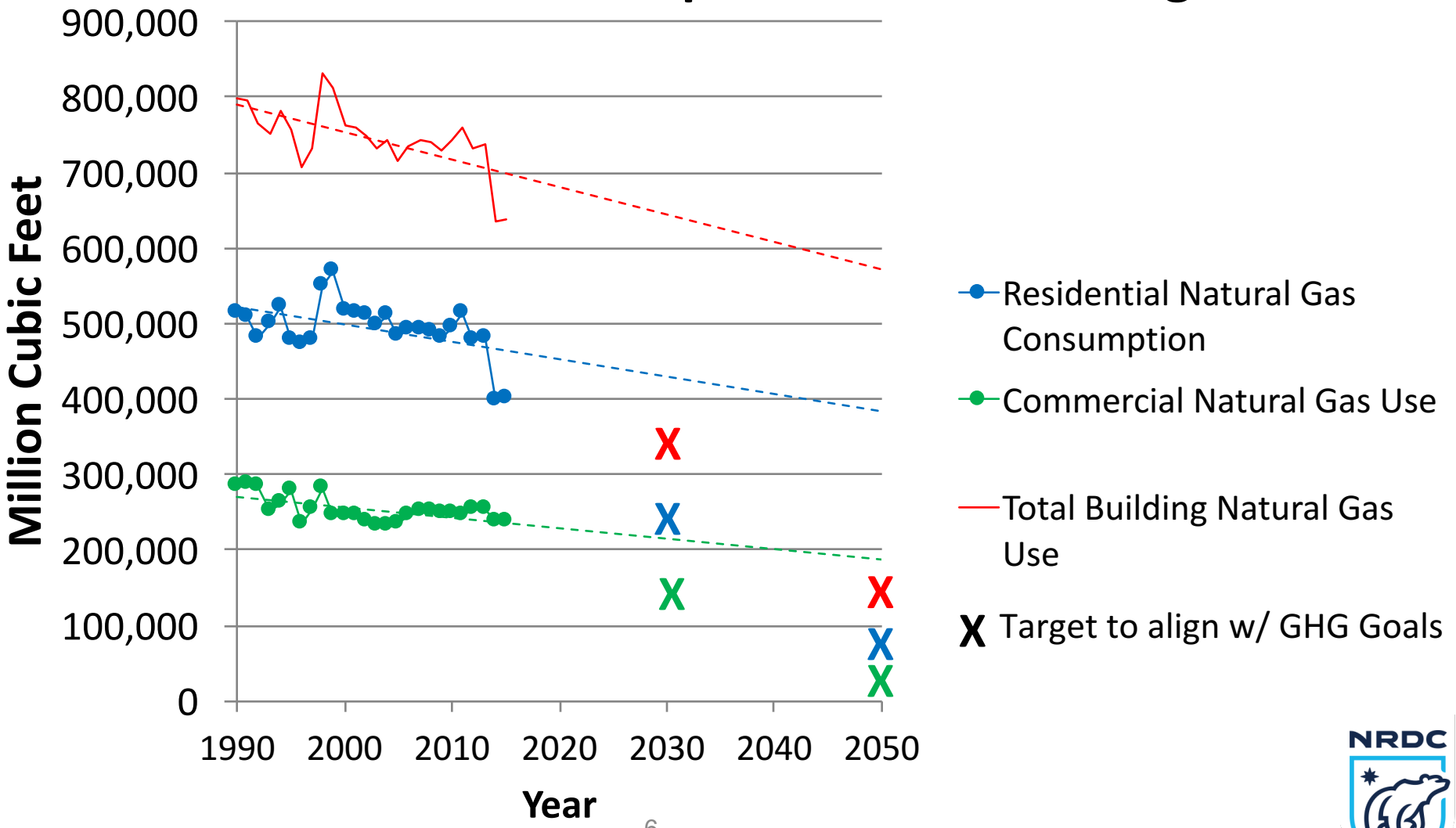
Many policies to cut GHGs from electricity, including RPS, EE, ZNE

Major policy gap to cut GHGs from gas

Source: Jones C., Kammen D., "Bay Area Consumption-Based GHG Emissions Inventory", Jan. 2016

Need policy action to achieve GHG goals

Natural Gas Consumption in CA's Buildings



Source: EIA Gas Consumption https://www.eia.gov/dnav/ng/ng_cons_sum_dcu_SCA_a.htm

Electrification = clean alternative to gas appliances

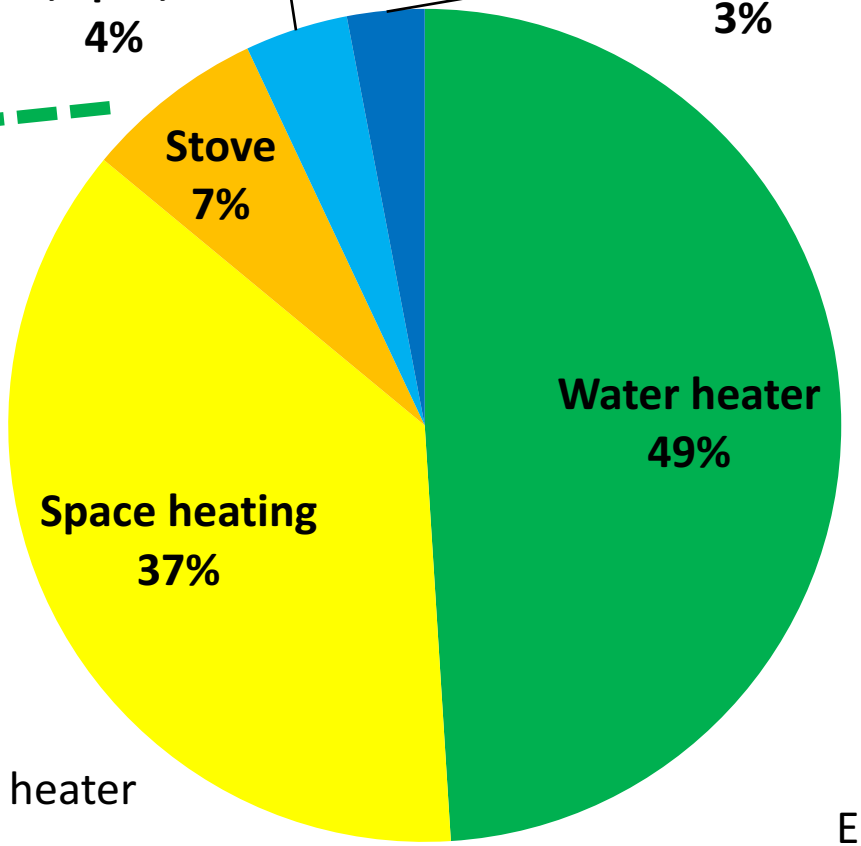
Household Gas Consumption in CA and climate-friendly electric options

Electric induction stove

Electric heat pump dryer

Electric heat pump space heater

Electric heat pump water heater



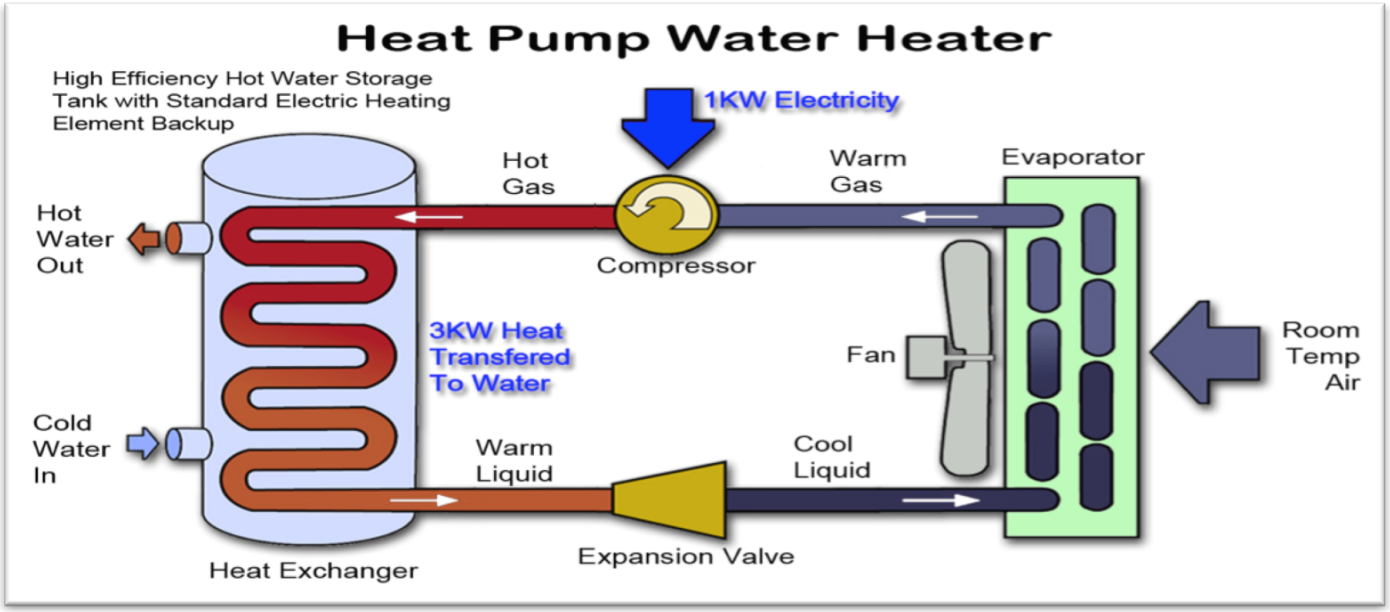
Source: CA Residential Appliance Saturation Study 2010

Heat pumps 101

Extracts, concentrates, and moves (or “pumps”) heat from surrounding air into tank or building

Like an A/C or a fridge in reverse

250 to 400% efficient!



Multi-family and commercial too!

Multi-family

- ❑ Dedicated (same as single family)
- ❑ Shared (central heat and hot water systems)

Commercial buildings

- ❑ Same as residential
- ❑ Larger units: RTUs, VRFs…

Benefits of electrification

Slashes GHGs, path to Zero Emissions Buildings

Air quality and health

Safety and resiliency

Extend reach of renewables

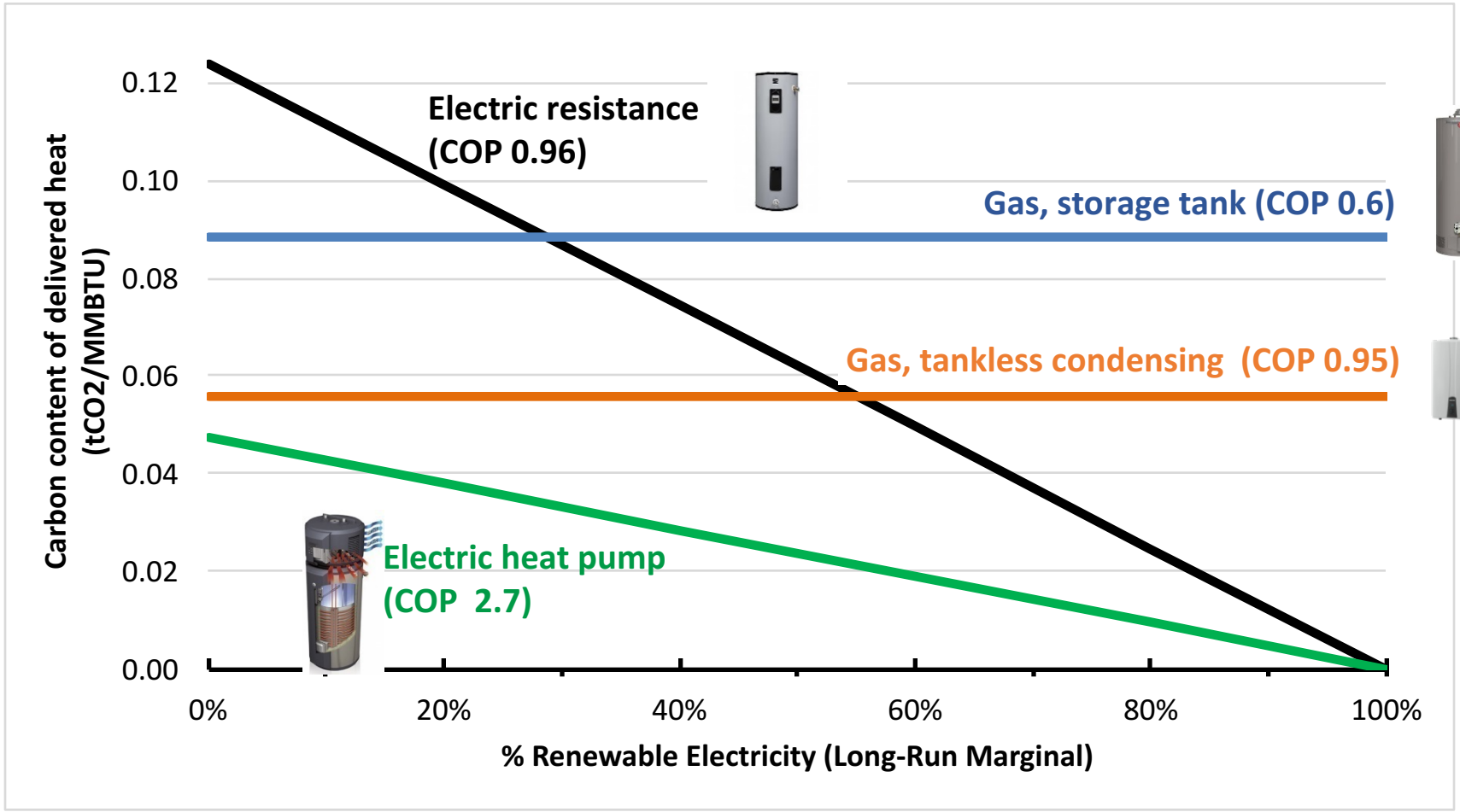
Save energy and lower bills*

New jobs to retrofit buildings, install heat pumps

* Depends on electricity tariffs and local conditions

Water heater CO2 emissions

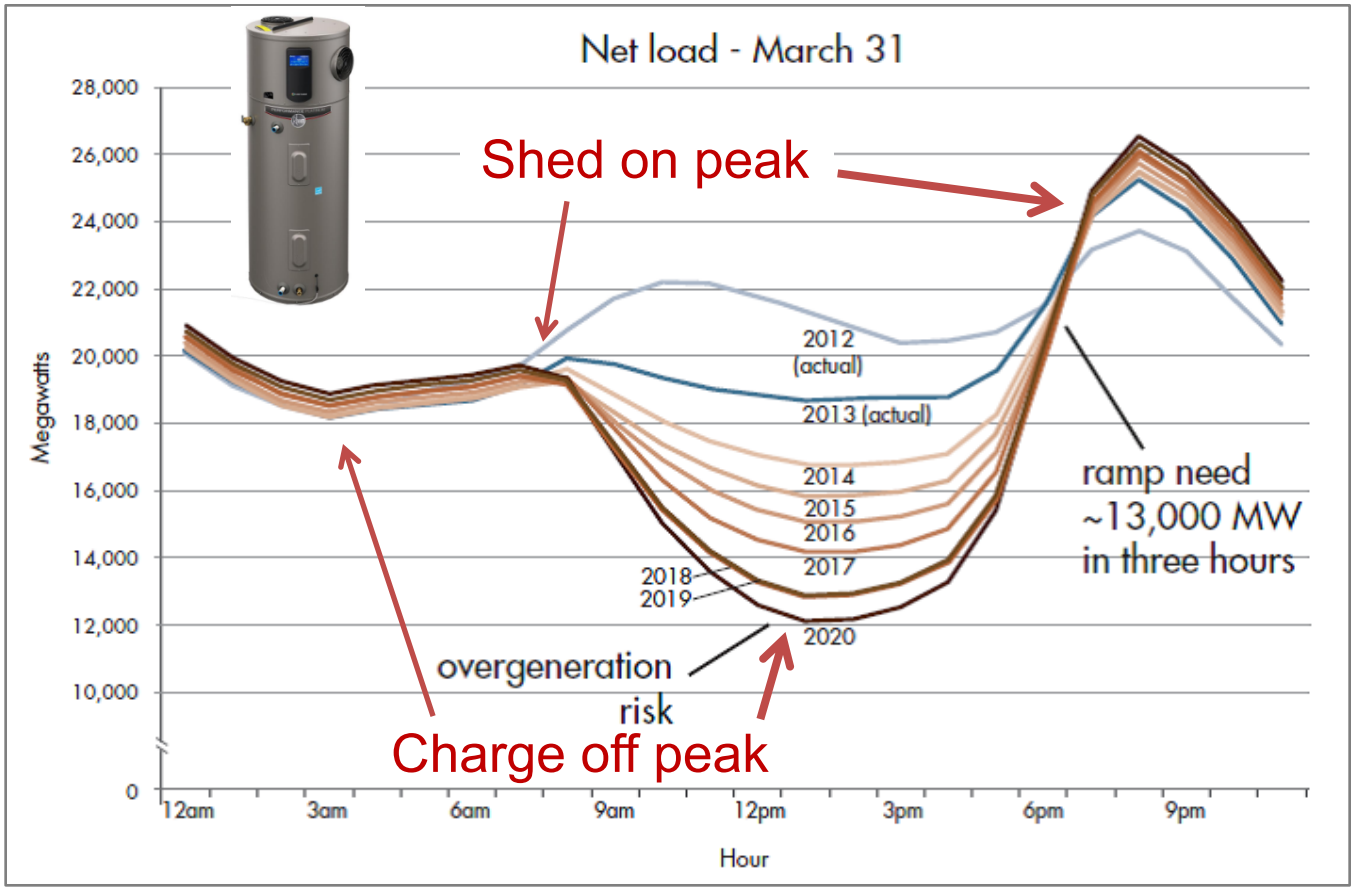
As CA grid gets cleaner, HPWH offer pathway to near zero-GHG hot water



1) Not including fugitive methane emissions, which may roughly double GHG emissions from gas

2) With 45%-efficient combined cycle gas plant as long-run marginal resource

Grid-interactive heat pump water heaters can help deep integration of renewable energy



Barriers: What's hindering adoption?

Awareness/perception

- "Heat what?"
- "Clean natural gas"…
- Gas cooking
- Planned v. emergency replacement

Costs

- Equipment: capital cost
- Installation: circuit, panel
- Operation: rate design

Access

- On truck
- In store
- Supply-chain

Technology

- Installation cost reduction
- Controls
- Cold temperature performance

Regulatory

- CEC: Building code
- CPUC: Incentives, rates…
- Legislature: lack of awareness, direction, funding

Theory of change

1) Increase public awareness + interest	2) Remove policy barriers	3) Develop the market	4) State policy to accelerate ZEBs

Some key policy opportunities in 2018

CPUC

- 3-prong test & cost-effectiveness tests
- San Joaquin Valley
- EE incentives
- Electrification-friendly rates

CEC

- Building Energy Code
- Integrated Energy Policy Report
- SB 350 Double EE Savings by 2030
- AB 758 – Existing Building Energy Efficiency Action Plan

CARB

- GGRF funding
- Implementation of Scoping Plan

Legislation

- Set targets on GHGs in buildings
- Remove regulatory barriers
- Provide additional funding
- Evaluate alternatives to gas infrastructure projects

Local Gov't & Air Districts

- Rebates for low/zero GHG appliances
- Focus on GHGs/air quality not energy
- Workforce development
- Bulk buy programs

POUs & CCAs

- Pilot programs
- Rebates
- Electrification-friendly rates

CA Legislative Objectives

Why pursue California legislation on building decarbonization?

1. Raise awareness among CA policymakers, to lay ground work for sustained action over next decade
2. Establish political leadership and buy-in from legislature
3. Strengthen agency authority to shift to carbon-focused building policies
4. Provide backstop for CEC & CPUC proceedings (IEPR, 3-prong test…)

Bill(s) Concept

Set long-term vision

- Set 2030 and 2050 GHG targets for building sector
- Evolve ZNE to ZEB
- Develop Action Plan to achieve these targets

Remove regulatory barriers

- New CPUC proceeding:
  - 3-prong test
  - Societal cost test
  - Rate design
  - CAHP & other incentive programs
  - Thermal storage
- CEC 2022 building code and beyond
- Electrification-ready incentive / requirements
- “Power Content Label” for buildings fossil fuel intensity
- Update PRC and PUC

Funding

- Extend and repurpose NSHP
- Other non-ratepayer funding sources

Gas emissions and infrastructure

- Estimate out-of-state upstream emissions from fossil gas
- Account for upstream emissions in building GHG performance
- Evaluate “non-pipe” alternatives to gas infrastructure extensions & upgrades

Timeline

Language to Legislative Counsel	Jan. 19
Introduce bill	Feb. 16
Support letters	March-April
Assembly committee hearings, amendments	March-April
Assembly floor	May
Senate committee hearings and floor	June-August
Governor signature!	September

Building Decarbonization Policy Action Supporters (as of 2/7/2018)

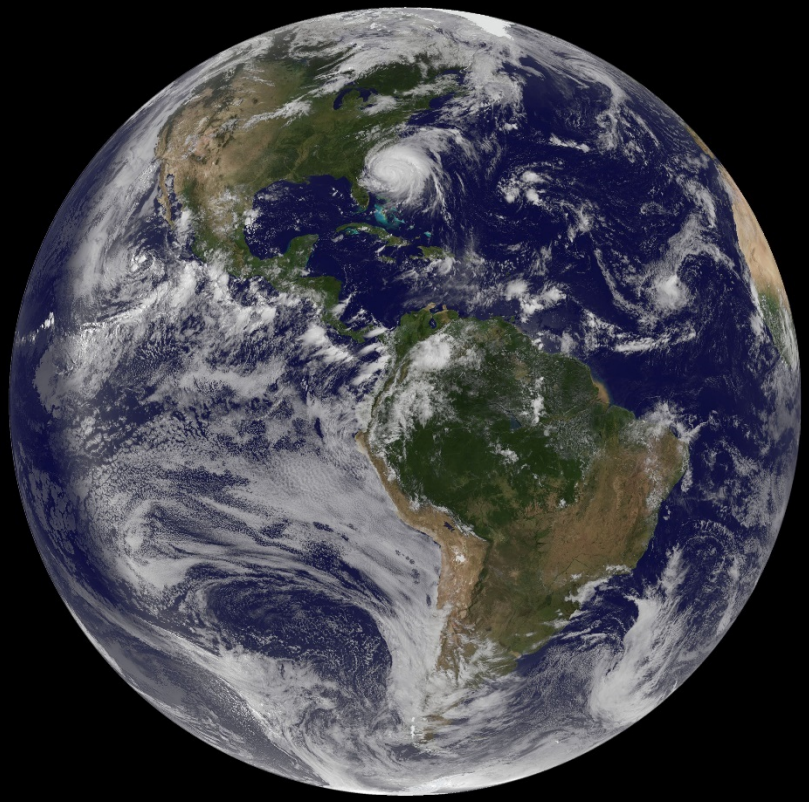
What can local governments do?

Take Action Locally

- ❑ Build interest among public
- ❑ Educate and train contractors
- ❑ Local reach codes
- ❑ “Time of sale” requirements
- ❑ Community outreach programs
- ❑ Bulk buy programs

Leverage Political Influence

- ❑ Sign onto support letters (bills, proceedings)
- ❑ Participate and comment in public proceedings at CEC and CPUC



Questions? Comments?

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