

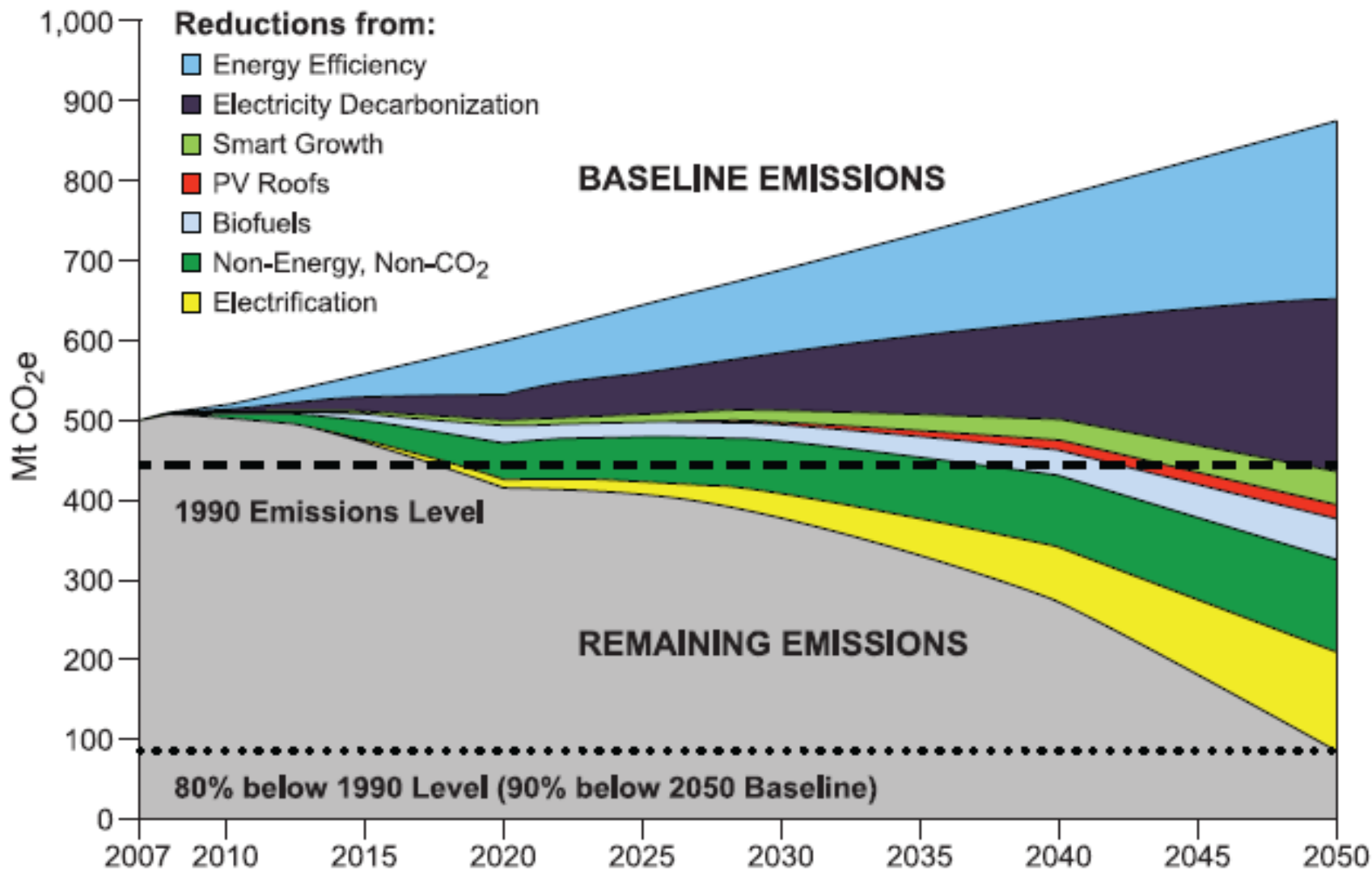


CA Energy Efficiency Programs: Looking Forward



BayREN Forum, September 2019





Science

AAAS

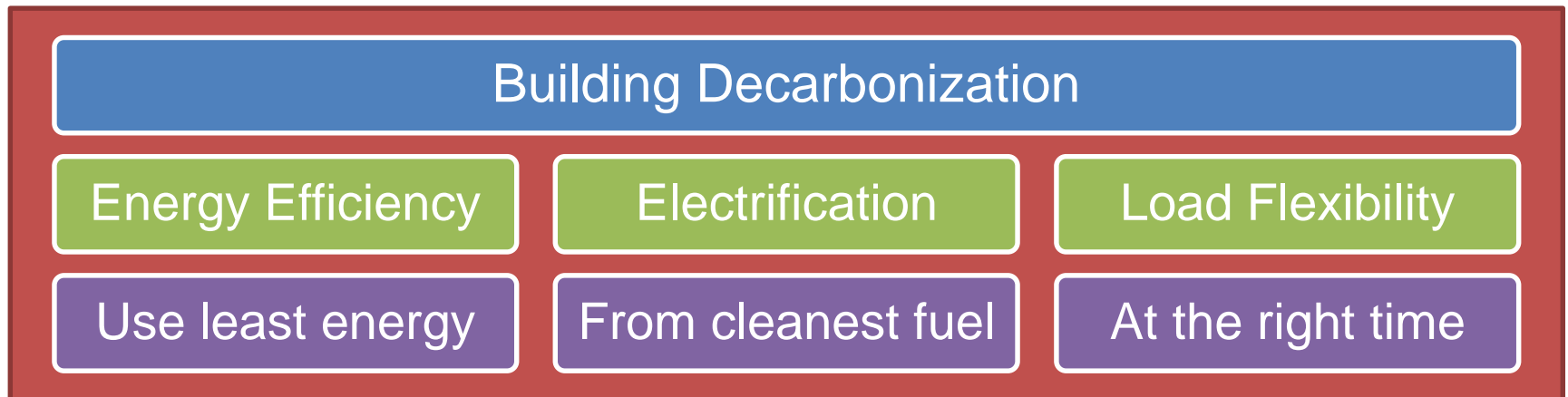
The Technology Path to Deep Greenhouse Gas Emissions Cuts by 2050: The Pivotal Role of Electricity

James H. Williams, *et al.*

Science **335**, 53 (2012);

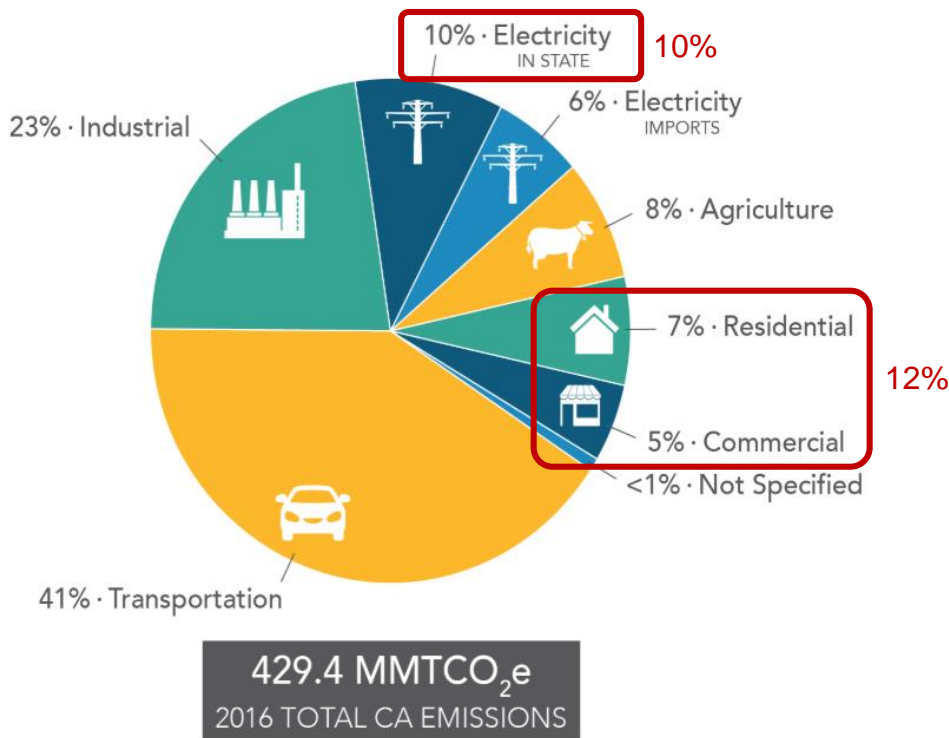
DOI: 10.1126/science.1208365

What does this mean for buildings?



Gas use in buildings > GHG than all in-state power plants

Emissions by Economic Sector



- Gas combustion in buildings (12%) > all in-state power plants (10%)
- Not including building emissions from electricity and fugitive methane

Source: www.arb.ca.gov/cc/inventory/data/data.htm, 2016

(1) For a 2.3% leakage rate and 20-year GWP



NOX EMISSIONS

12 TONS of NOX per Day



POWERPLANTS
BURNING GAS

82

TONS of
NOX per
Day

OFFICE



HOMES & COMMERCIAL
BUILDINGS BURNING GAS

SOURCE: CALIFORNIA AIR RESOURCES BOARD 2019 NO_x EMISSIONS ESTIMATES

High-efficiency electric alternatives to gas use in residential buildings

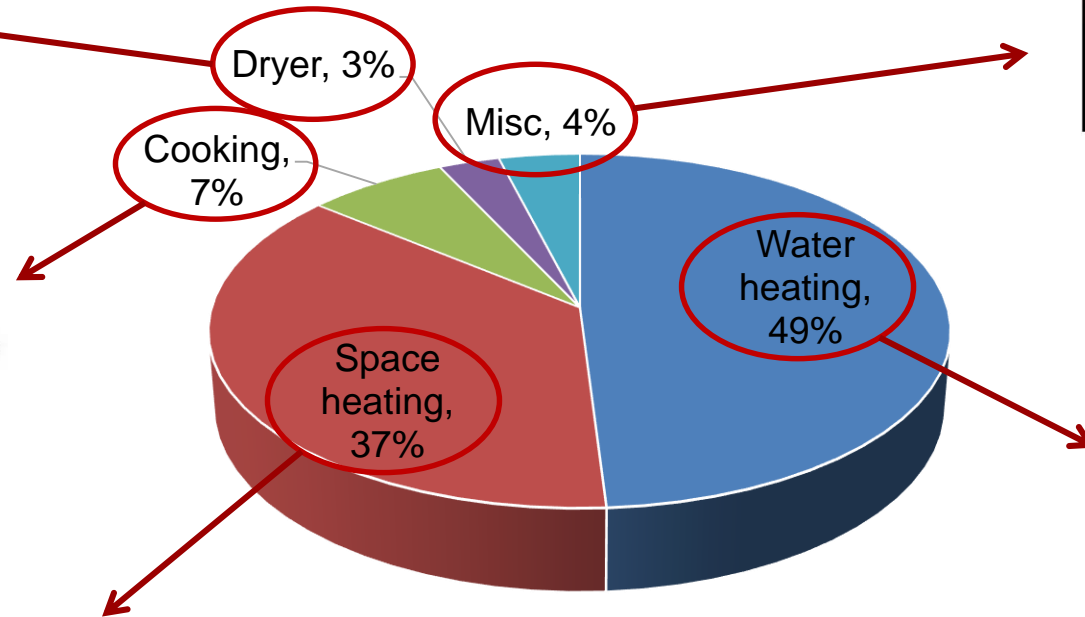
Heat-pump clothes dryer



Electric fireplaces



CA Gas Use in Homes - 2010



Induction cooktop



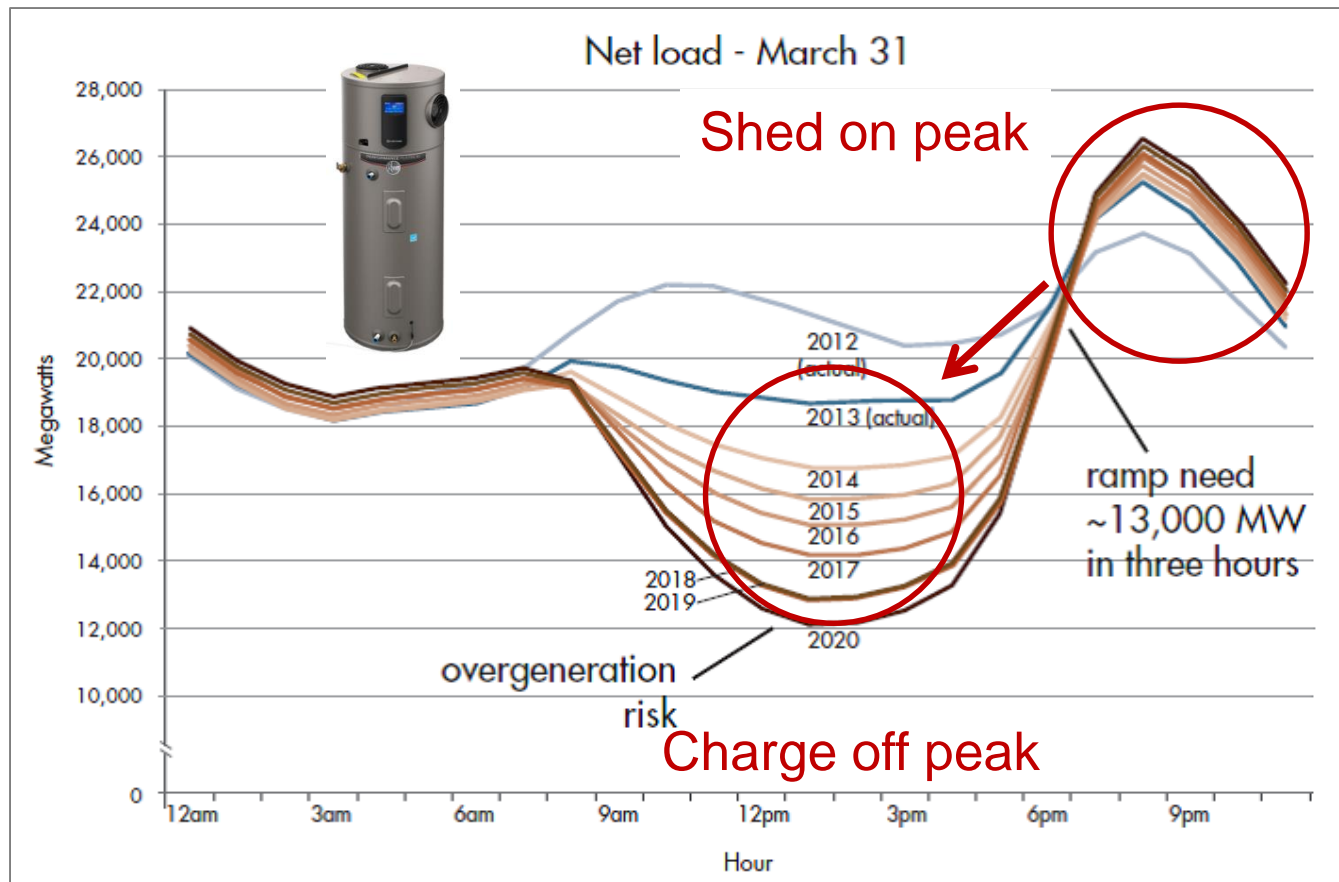
Heat-pump water heater



Heat pump space heating



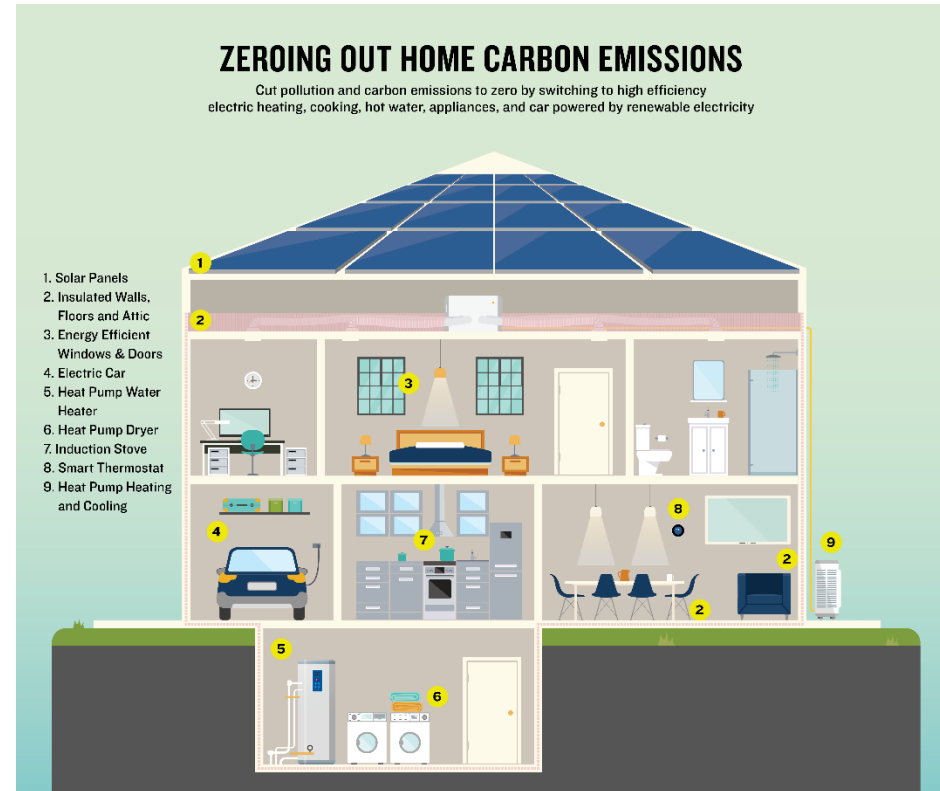
With load management, water heating can be electrified using clean renewable energy without adding to peak load



NRDC and Ecotope study, ACEEE Aug. 2018

Policy Opportunities in California

- Existing examples (LIWP, Advanced Energy Rebuild)
- State building code and local govt reach codes
- CPUC-funded energy efficiency programs
- New building decarbonization programs (SB 1477)
- Self Generation Incentive program (SGIP) funds?



CPUC-funded energy efficiency programs

- 3-Prong Test ****HUGE WIN****
 - The new “Fuel Substitution Test” will allow efficiency fuel substitution (gas<->electricity)
 - **Opportunity for Action:** 1) Work together now to identify and request approval for a set of high-opportunity electrification measures; 2) Work with EE program administrators to shape and launch new EE programs
- New Market Transformation Framework
 - Decision pending in the EE proceeding



SB 1477 provides \$200 million over 4 years

This is a huge opportunity, but not a lot of money given the challenge...

We must use these funds wisely to set us on the path to 2045
= under \$20 per CA household

In comparison:

~\$1 billion / year for Energy Efficiency

\$100 million / year Solar on Multifamily Affordable Housing (MF only)

~\$2 billion California Solar Initiative

\$1.2 billion Self-Generation Incentive Program

\$400 million New Solar Homes Partnership (new homes only)



BUILD + TECH Programs

BUILD (Building Initiative for Low-Emissions Development)

BUILD provides incentives that tap into the ingenuity of California's builders to find innovative and low-cost ways to "build clean from the start" and gain market experience to make clean heating technologies common practice in new construction. SB 1477 is patterned on the successful New Solar Homes Partnership, which helped kickstart the market for rooftop solar in new buildings.

TECH (Technology and Equipment for Clean Heating)

TECH spurs market development for low-emissions space and water heating technologies by incentivizing distributors and retailers to make equipment available, and providing customer education and contractor training. This program will focus on technologies that have the greatest potential to reduce climate pollution, and that improve the health and safety of, and energy affordability for, low-income households.



Table 1: Summary of BUILD and TECH		
	BUILD	TECH
OBJECTIVE	Provide incentives for the deployment of near-zero emission technologies in new building construction	Accelerate the market development and sales of high efficiency electric heating equipment in existing homes
TARGETS	New residential buildings, low-income	Existing residential buildings customers most likely to see utility bill savings
ANNUAL BUDGET	\$20M	\$30M
ADMINISTRATION	Energy Commission	Third Party Administrator
OVERSIGHT	CPUC	CPUC
PROGRAM DESIGN	Energy Commission	Third Party Administrator
TECHNICAL SPECIFICATIONS	Energy Commission	Energy Commission
DATA COLLECTION	Energy Commission	Third Party Administrator
EVAULATION	Independent Evaluator	Independent Evaluator
EVALUATION METRICS	Total avoided GHGs, number of low-emission systems installed, projected utility bill savings, cost per metric ton of avoided GHG emissions	Total avoided GHGs, market share of eligible technologies, projected utility bill savings, cost per metric ton of avoided GHG emissions

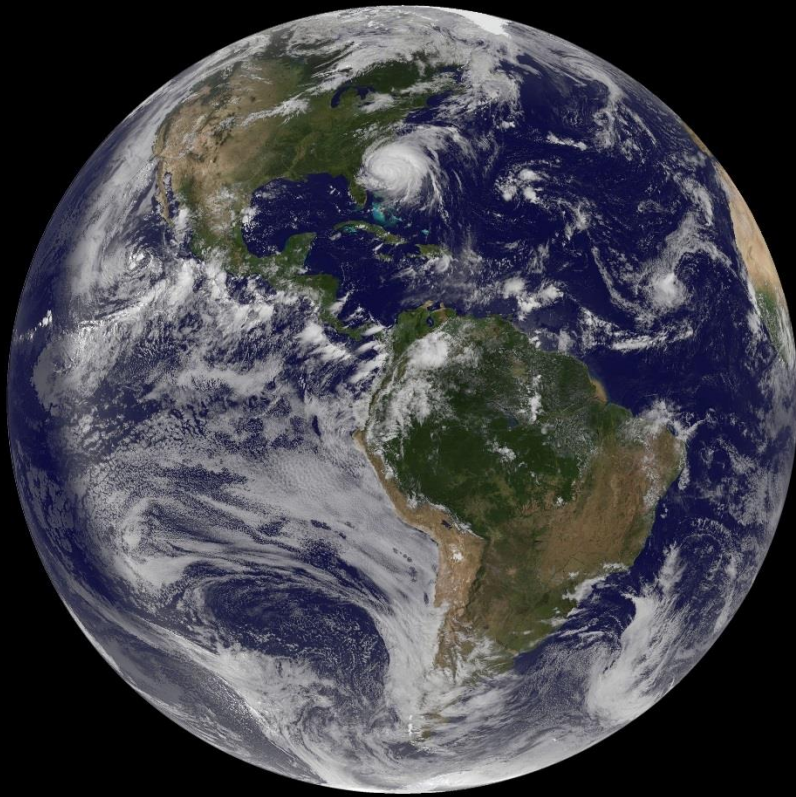
CPUC Staff Proposal (not final)



SB 1477 Opportunities for Local Govt

- Track the 1477 proceeding and make your voice heard where possible (e.g. BayREN has submitted comments)
- Partner with the TECH and BUILD implementers to ensure the new programs meet the needs of your constituents
- Look for ways to layer incentives and coordinate 1477 activities with local govt action and programs
- Grant opportunities may be one opportunity through TECH – stay tuned! (decision expected by December 2019)





Thank you!

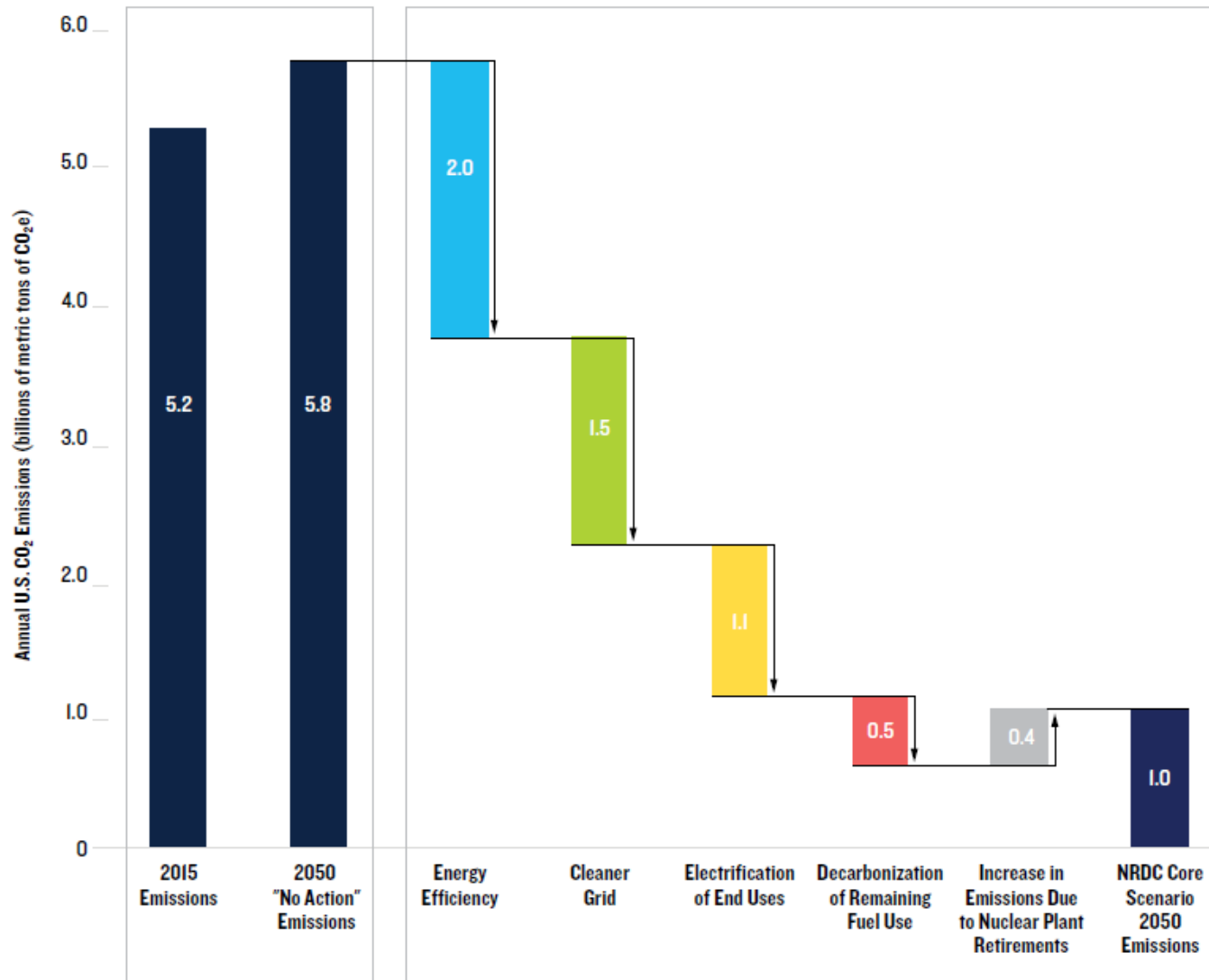
Contact info:

Merrian Borgeson

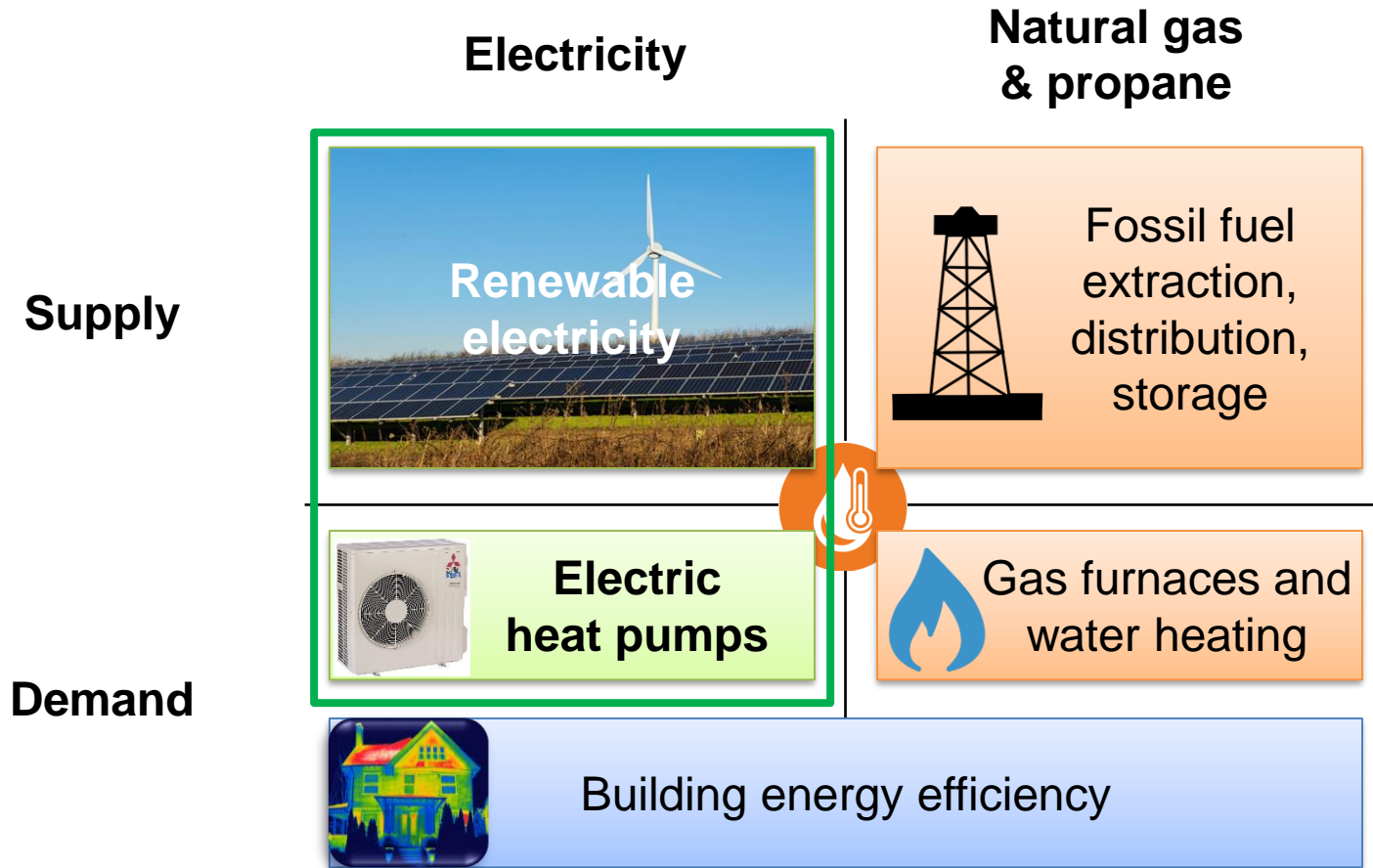
Mborgeson@nrdc.org



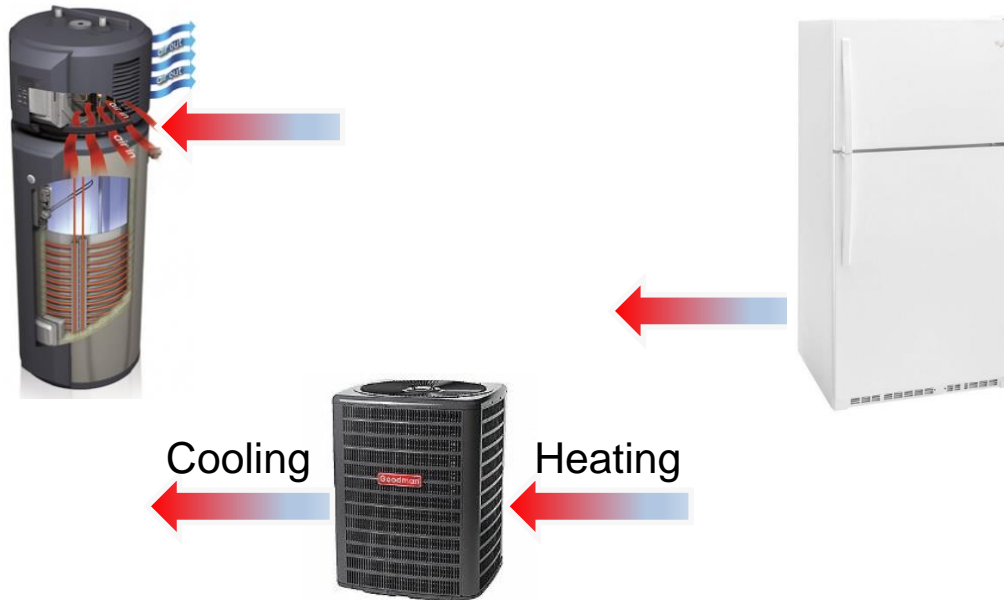
Cut energy use, clean up the grid, electrify



How to reduce heating emissions?



Heat pumps 101



300% to
400%
efficient!

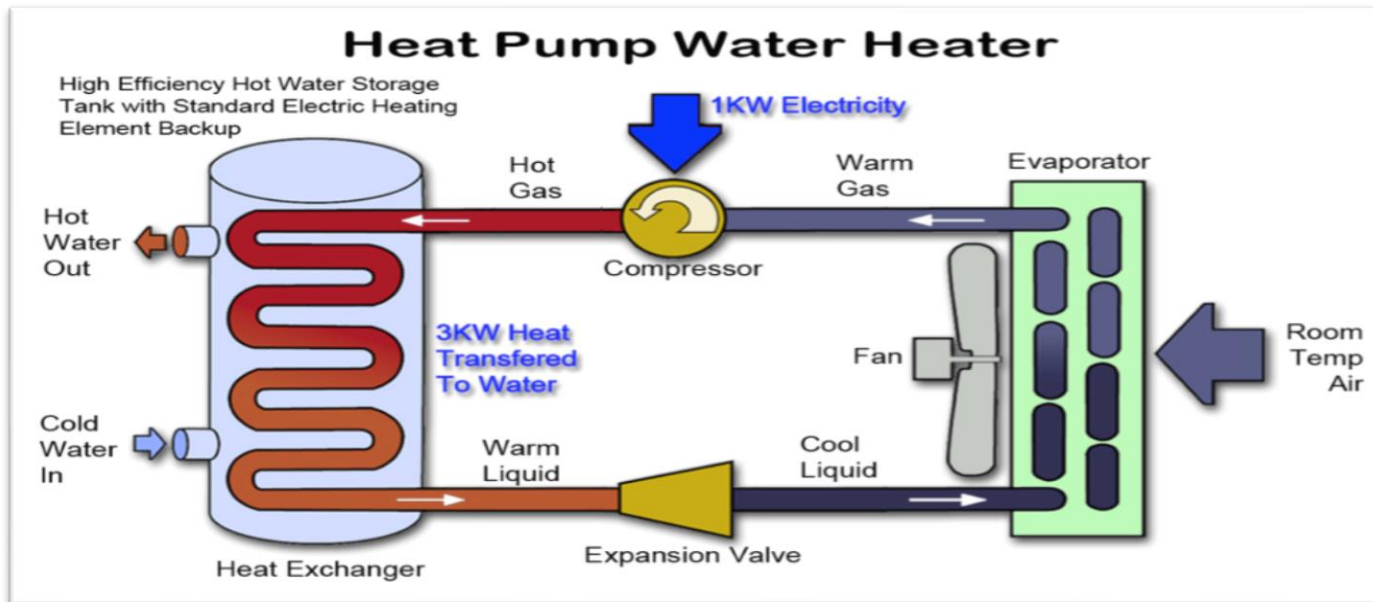
Extracts, concentrates, and moves heat
from surrounding air into tank or building

Like a fridge or A/C in reverse

Heat pumps 101

Collects, concentrates, and moves heat from surrounding air into tank or building

Like a fridge or A/C in reverse



200% to 400% efficient!

Air source / ground source (“geothermal”)



Air-source

- Collects heat from ambient air
- Less efficient in cold weather (but cold climate models operate down to -20 F)
- Most common in CA



Ground-source (“geothermal”)

- Collects heat from the ground
- Higher efficiency at cold temperatures
- Much more expensive.
- Best for very cold climates

Heat pump water heating

Heat pump water heaters are a mature technology with a wide range of affordable models in the market

Popular models:



AO Smith



Bradford
White



Rheem



Stiebel
Eltron



Sanden



100+ ENERGY STAR models



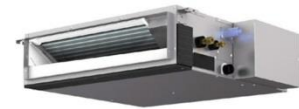
Hybrid heat pumps

Many heat pumps are “hybrids”, they have both a heat pump, and a backup resistive element for:

- high demand periods
- very cold periods

Like plug-in hybrid cars (e.g. Chevy Volt)

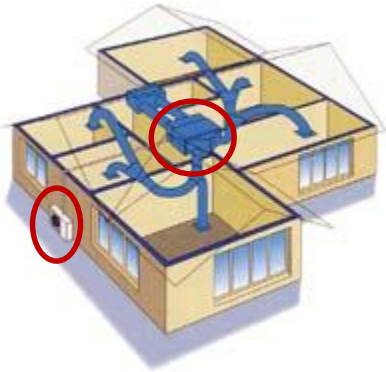
But new technologies can work down to -20F in heat pump only mode



Heat pump space heating

Heat pumps provide both heating and cooling (replace A/C)

Three main types of heat pumps for residential space heating and cooling:



Central heat pump



Ductless heat pump
("Mini-split")



Packaged terminal
heat pump (PTHP)

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...