



# We will be starting soon!

*Thanks for joining us*



# Preparing for Electrification on the Central Coast



Larry Waters, Electrify My Home

Alex Sloan, Electrify My Home

June 27th, 2023



# 3C-REN: Tri-County Regional Energy Network

- Three counties working together to improve energy efficiency in the region
- Services for –
  - **Building Professionals:** industry events, training, and energy code compliance support
  - **Households:** free and discounted home upgrades
- Funded by ratepayer dollars that 3C-REN returns to the region



# 3C-REN Programs

- **Energy Code Connect (ECC)**
  - Energy Code Coach: Title 24 Compliance Support Hotline (805) 220-9991
- **Building Performance Training (BPT)**
  - Industry Trainings & Certification for current and perspective building professionals
- **Home Energy Savings (HES)**
  - Flexible Home Energy Upgrades for Multifamily and Single Family homes





HOME  
ENERGY  
SAVINGS

## Single Family Program

- Discounted pricing available from enrolled contractors- **up to 75% off project costs.**
- **Any project that saves energy (gas or electricity)\* is eligible for savings when you work with an enrolled contractor.**
- Actual discount depends on how much energy the project saves  
*\*not solar*

Visit [3C-REN.org/for-residents](https://3C-REN.org/for-residents)



# How much can I really save?

**Example project: replace furnace with heat pump**

- Single Family Program Incentive: ~\$2,000
- Other local/state programs: ~\$2,500
- Tax Credit: ~\$2,000
- **TOTAL SAVINGS: ~\$6,500**

Or, potentially half off of a \$12,000 project.



# How to Electrify Your Home

## ... Preparing for Electrification

Larry Waters  
President, Electrify My Home  
June 27, 2023



**ELECTRIFY**  
MY HOME

# About Larry Waters



⚡ HVAC trade from UTI in 1982



⚡ In the trade before the first cordless drill



⚡ Nate certified



⚡ 2009/ 2010 BPI certification



⚡ Installing only heat pumps since 2015



⚡ Founded Electrify My Home in 2020

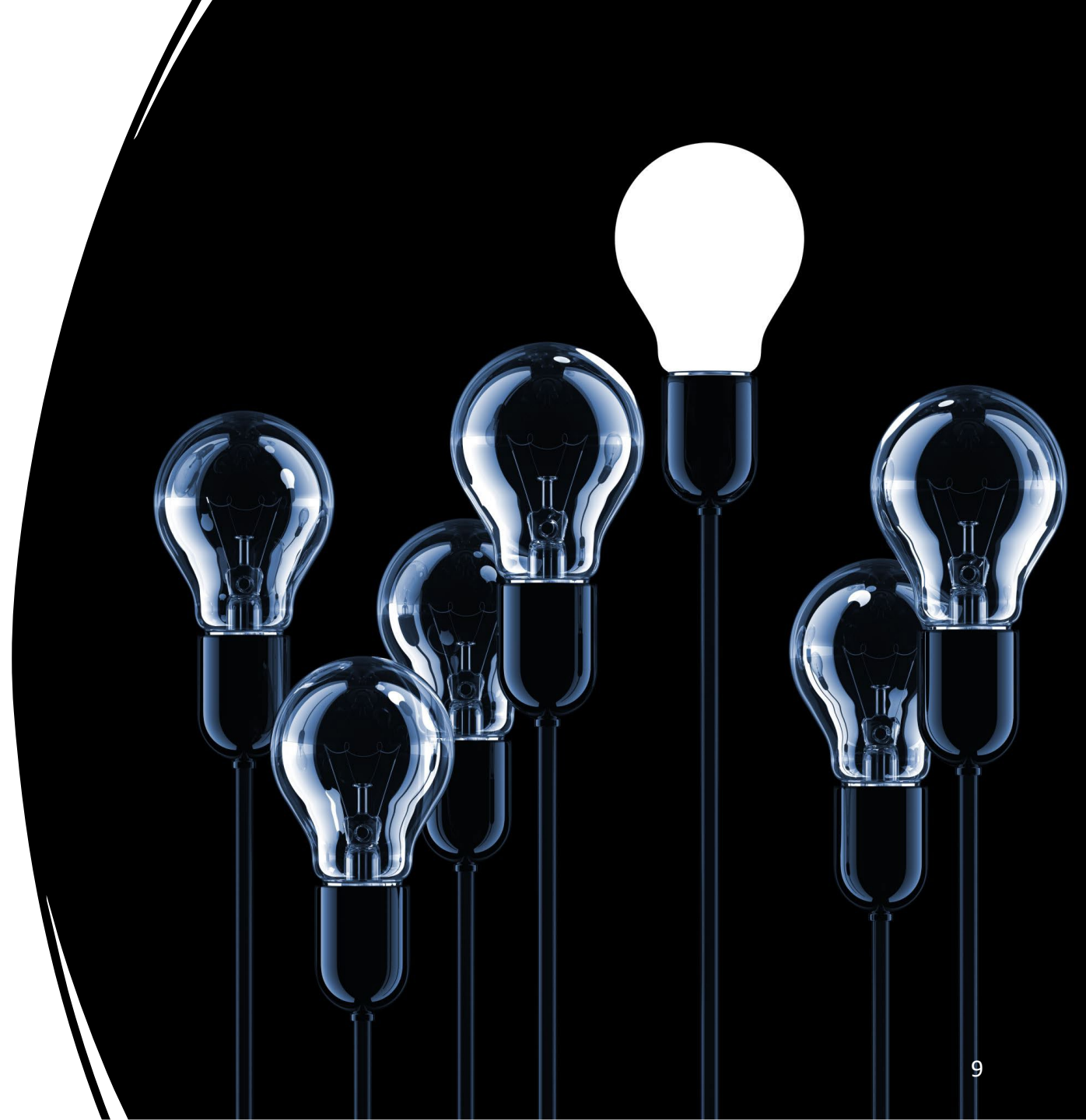




# Agenda

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- 🔌 Introductions
- 🔌 Validating the Switch
- 🔌 Where to Start
- 🔌 Order of Operations
- 🔌 Good Electrification



# Electrify My Home – Electrification Pioneers

## Our Mission:

*To provide the **most efficient** cost-effective electrification solutions to California homeowners, to practice **good stewardship** of the electrical panel, and to **train and influence** other contractors to do the same.*



**ELECTRIFY**  
**MY HOME**

A hand holding a compass over a desert landscape. The hand is wearing a light blue long-sleeved shirt. The compass is a standard analog compass with a white face and black markings. The background shows a desert landscape with a dirt road and sand dunes under a clear sky.

# Part 1: The Basics

## “Validating the Switch”

# Building Electrification is Here to Stay!



Office of Governor  
**GAVIN NEWSOM** July 2022

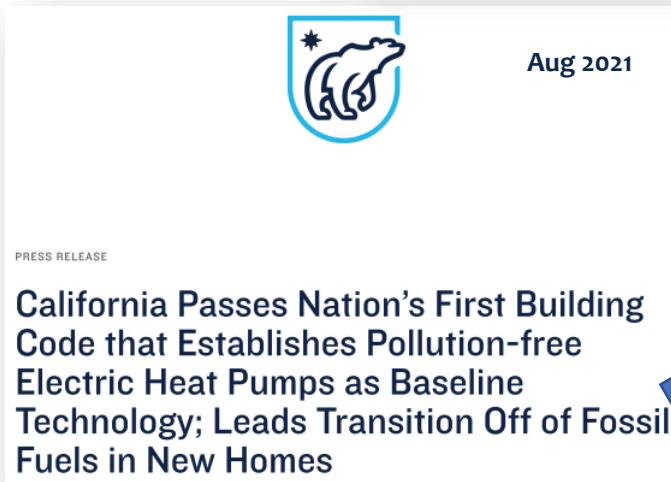
## Governor Newsom Calls for Bold Actions to Move Faster Toward Climate Goals

6MM Heat Pumps by 2030

## THE HILL

### San Francisco Bay Area to phase out natural gas furnaces and water heaters

Air Quality Concerns Driving Policy



Aug 2021

PRESS RELEASE

### California Passes Nation's First Building Code that Establishes Pollution-free Electric Heat Pumps as Baseline Technology; Leads Transition Off of Fossil Fuels in New Homes

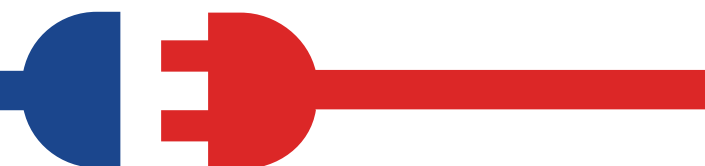
Code Prioritizing Heat Pumps



Sep 2022 Los Angeles Times

### California moves to ban natural gas furnaces and heaters by 2030

Plans Signaling Demise of Furnaces





# 76 CA Municipalities Have Adopted Building Codes to Phase-Out Gas in Buildings

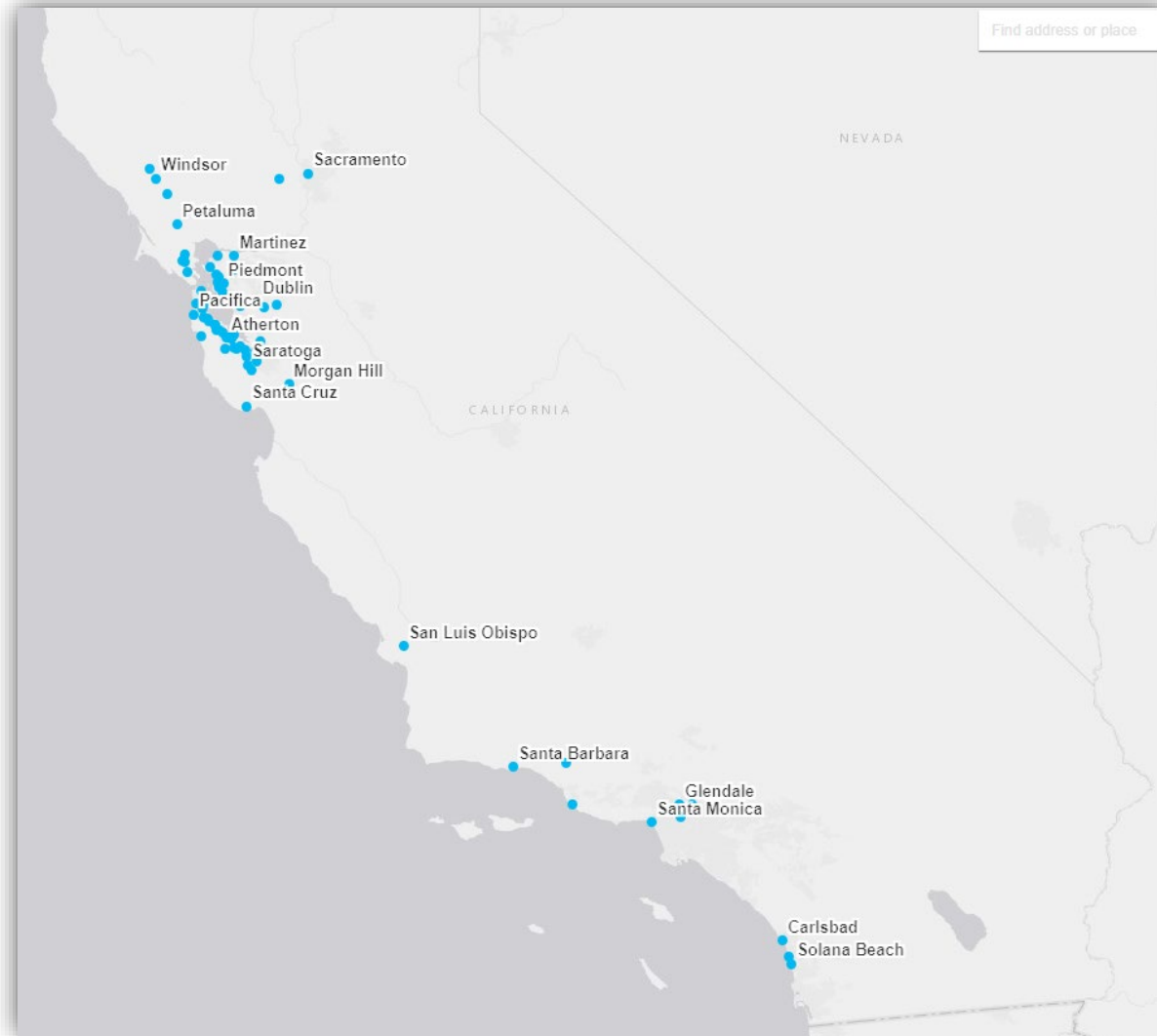
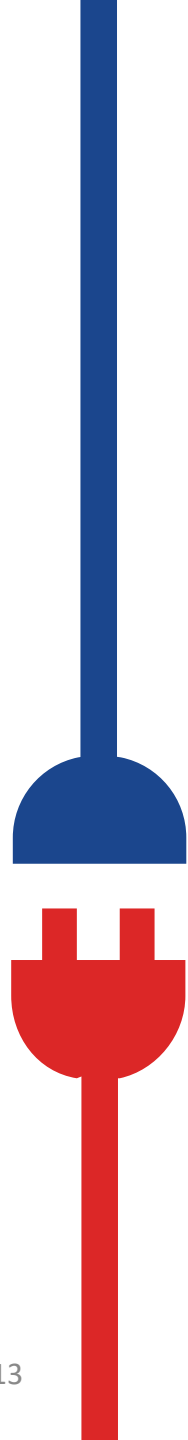



Image Source: Sierra Club



# California's Transition from Natural Gas

 **Components of a gas transition**

- Reduce barriers to building electrification
- Targeted building electrification pilots
- Avoid gas system expansion, reduce costs**
- Targeted retirements of gas distribution system**
- Accelerated depreciation
- Changes to rate design and cost allocation
- Exit fees for departing gas customers**
- Other funds to manage the equity impacts**
- Shut-down gas distribution system and replace any remaining gas-connected end-uses with electric or other fuels

1. Market transformation of building electrification

2. Decrease gas distribution system costs

3. Change in gas rate design

4. Gas cost recovery from electric rates or additional funds

5. Shut-down the gas distribution system

Energy+Environmental Economics 27

E3, "Draft Results: Future of Natural Gas Distribution in California," presented at the California Energy Commission staff workshop on June 6, 2019, slide 16. 14

# Big Opportunity, Big Risk (If Done Poorly)

90%

90% of CA homes rely on gas for **space or water heating** <sup>1</sup>

11.7  
Million

CA homes (96%) with gas or elec resistance **heating** <sup>2</sup>

12  
Million

CA homes (99%) with gas or elec resistance **water heaters** <sup>2</sup>

3.4  
Million

CA homes with **no AC** <sup>3</sup>

<sup>1</sup>Decarbonization of Heating Energy Use in California Buildings. Synapse Energy Economics, Inc. 2018.

<sup>3</sup> Canary Media. "California could ban new gas heaters after 2030. The goal: healthier air." 2022

# Part 2: Where Do I Start?





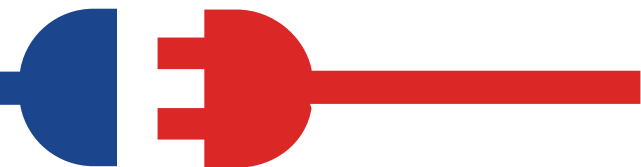
# Gas Assessment & Inventory

## 🔌 Step 1: Look at your existing **gas usage/bills**.

- 🔌 SoCalGas online portal → Analyze Bill
- 🔌 Electric – SCE EnergyManager® online portal makes it easy
- 🔌 If PG&E - Home Energy Checkup: [pge.com/homecheckup](https://pge.com/homecheckup)
- 🔌 Home Intel (w/ disaggregation & electrification report): [electrifymyhome.hea.com](https://electrifymyhome.hea.com)

## 🔌 Step 2: Build a **list of gas** appliances in the house

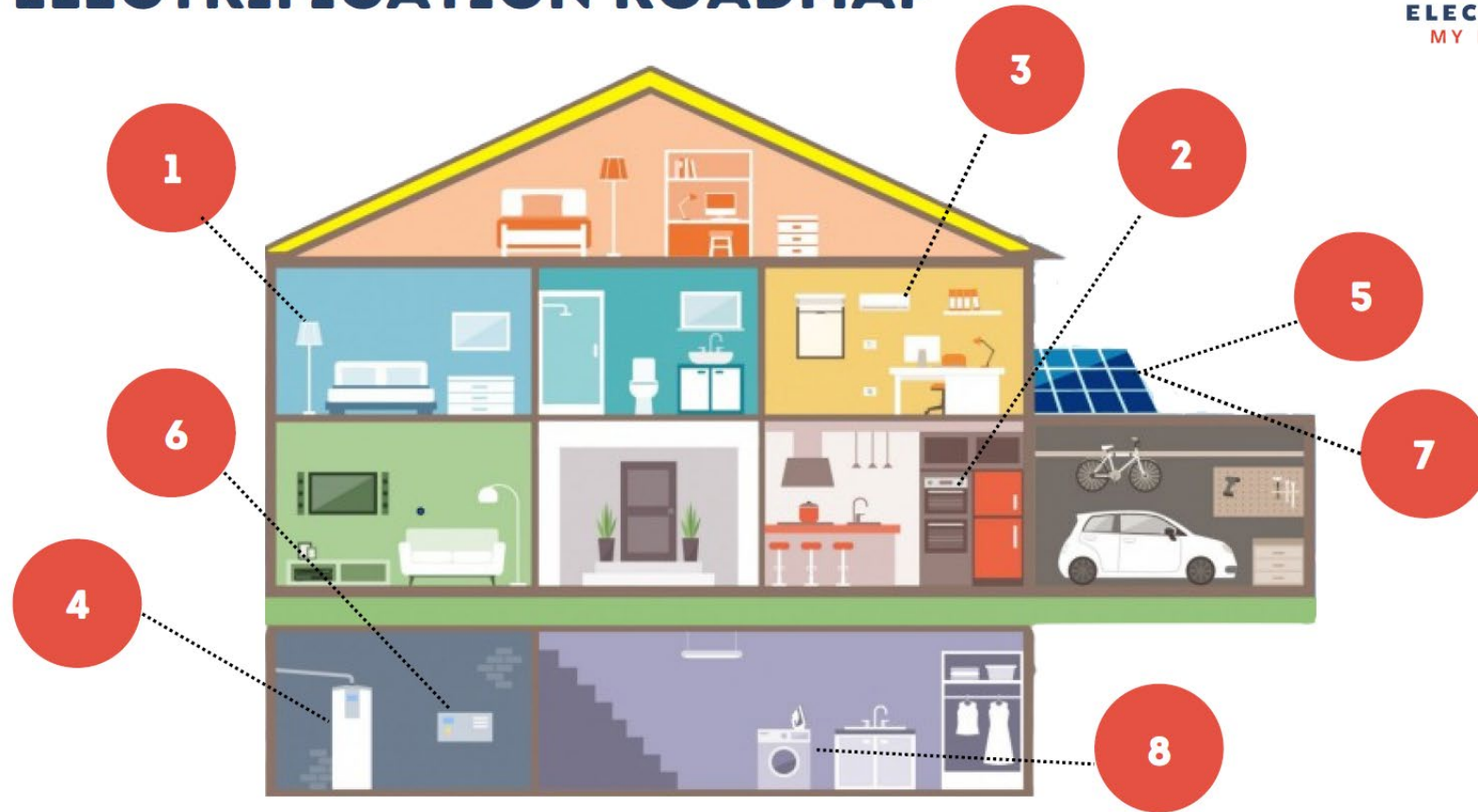
- |                   |               |
|-------------------|---------------|
| 🔌 Furnace(s)      | 🔌 Dryer       |
| 🔌 Water heater(s) | 🔌 Fireplace   |
| 🔌 Stove/Range     | 🔌 Pool Heater |



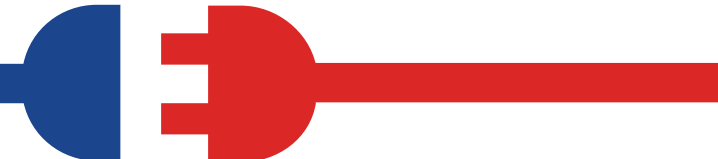
# Step 3: Build Your Roadmap



## ELECTRIFICATION ROADMAP

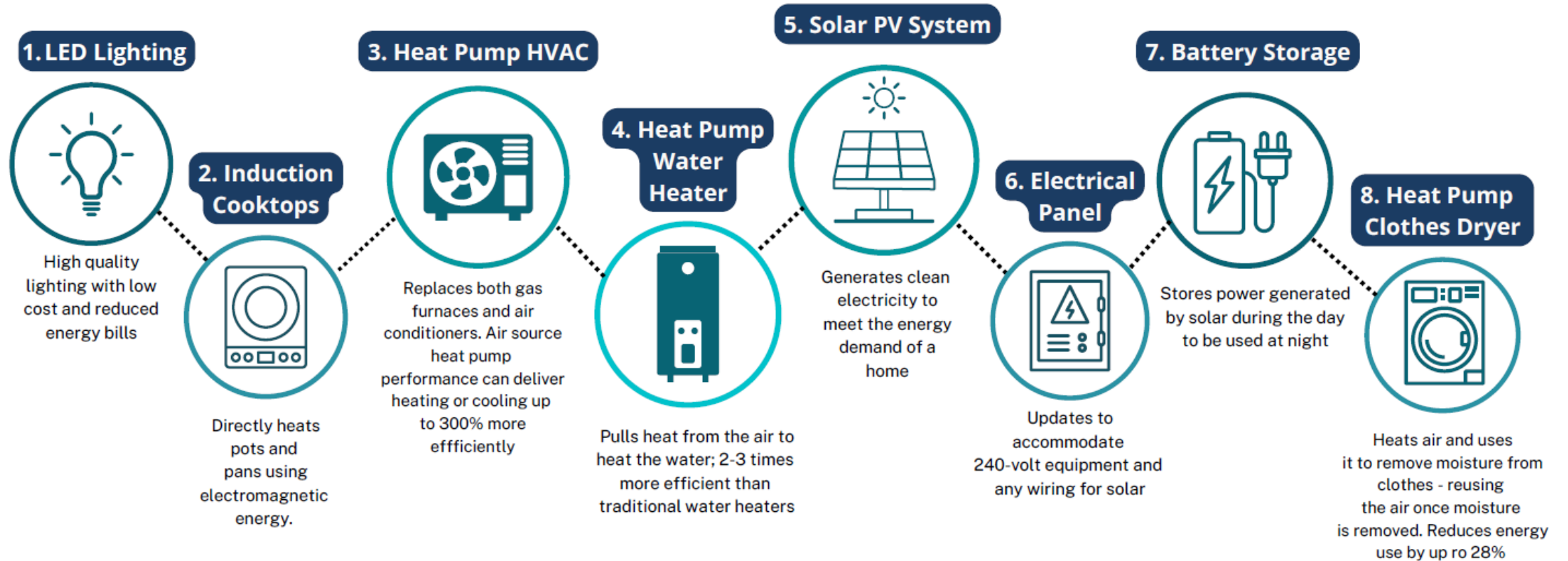


Graphic prepared for Electrify My Home by UC Davis Zero Net Energy students



# Chart a Course & Plan Your Budget

*Hint: Incentives Help!*



**TIMELINE:** Mar. 2023

Jun. 2023

Oct. 2023

Oct. 2023

Oct. 2024

Oct. 2024

Oct. 2024

Jan. 2025

**COST:** \$250

\$2,800

\$19,500

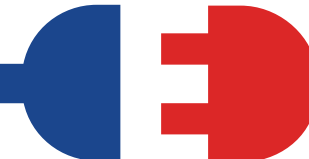
\$7,800

\$19,150

\$5,300

\$18,300

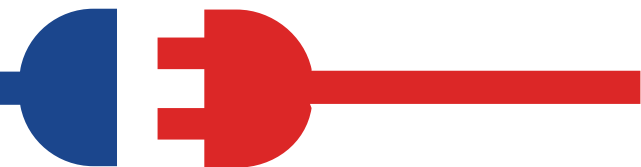
\$850

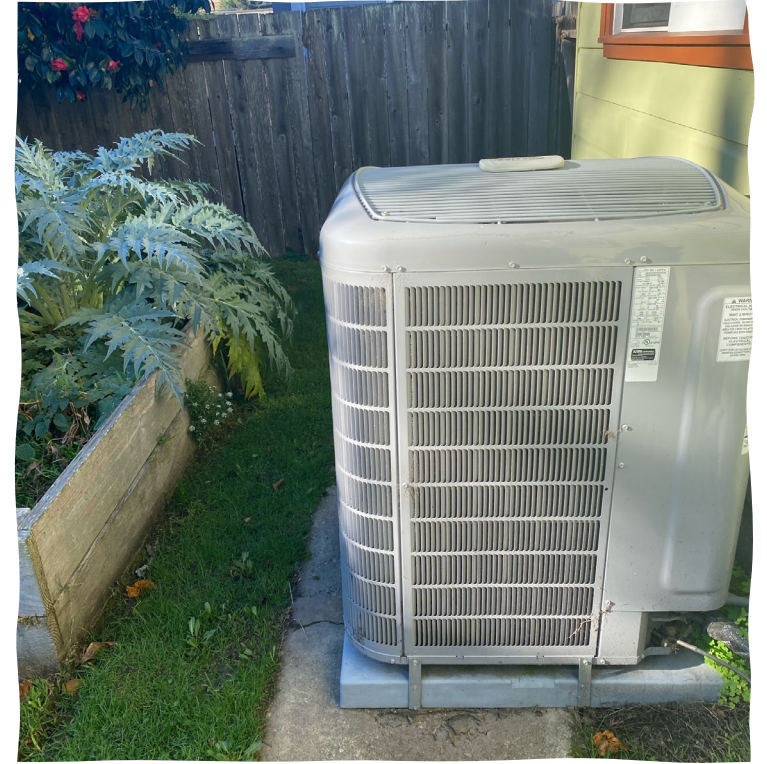


# Find an Electrification Partner

*...may not be your existing HVAC contractor*

- ✦ Experience assessing panel capacity
- ✦ Familiarity with replacement options for all gas loads
- ✦ Understands complexities of running appliance circuits
- ✦ Willing to do a Manual J calculation with room-by-room airflow
- ✦ Understanding of maximizing energy efficiency through downsizing, thermal envelope, and specification of correct equipment
- ✦ Experience installing multiple types of heat pump technology
- ✦ Access to multiple brands (brands have differing capacity ranges & efficiencies)





**Poor workmanship = EXTREMELY COSTLY**

# Thoughts on These?

*...not everyone shares the same idea of quality*



# Part 3: Order of Operations

*Remember, Every Home is Unique!  
Our Recommended Cadence*





## #1 - Fix Safety Issues (Part 1)

- ⚡ Carbon Monoxide, Gas Leaks, Pressure Problems
- ⚡ Identify – BPI Analyst
- ⚡ May impact your electrification plan







## #1 - Fix Safety Issues (Part 2)

- ♣ Asbestos
- ♣ Mold/Organic Growth
- ♣ Rodents
- ♣ Wiring Hazards
- ♣ Ventilation Issues



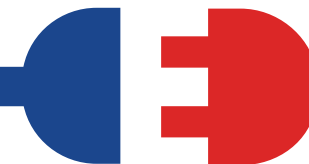
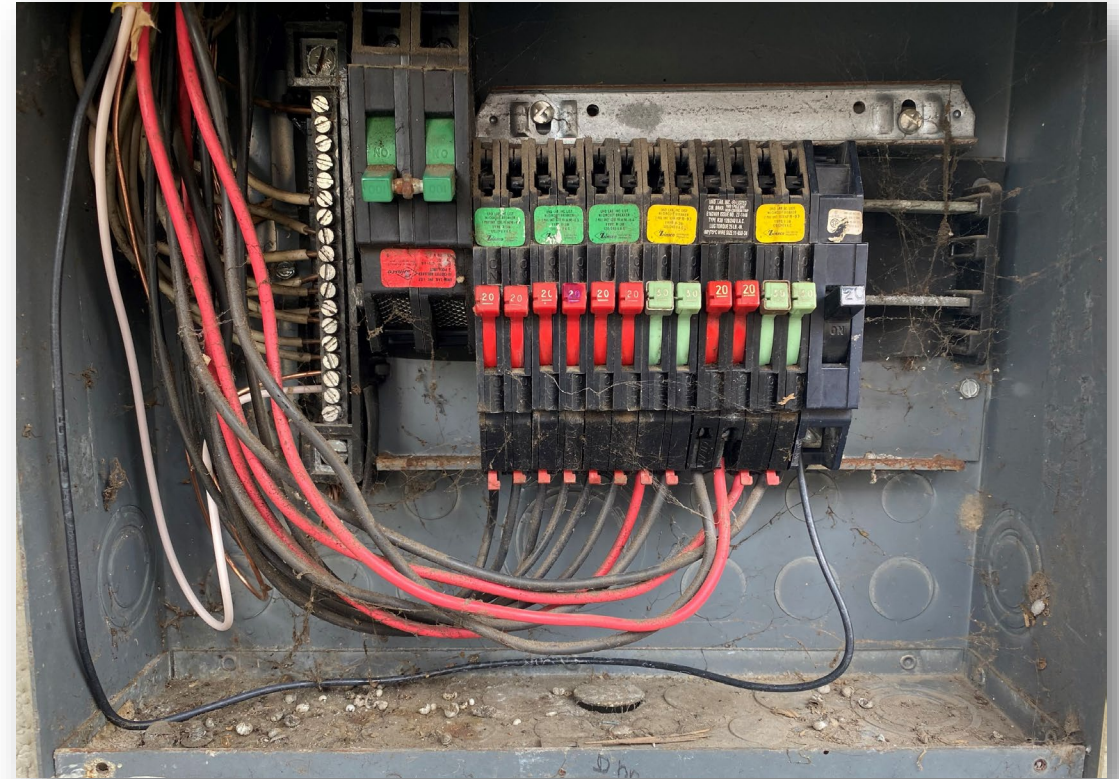
# #2 – Electrical Panel Assessment

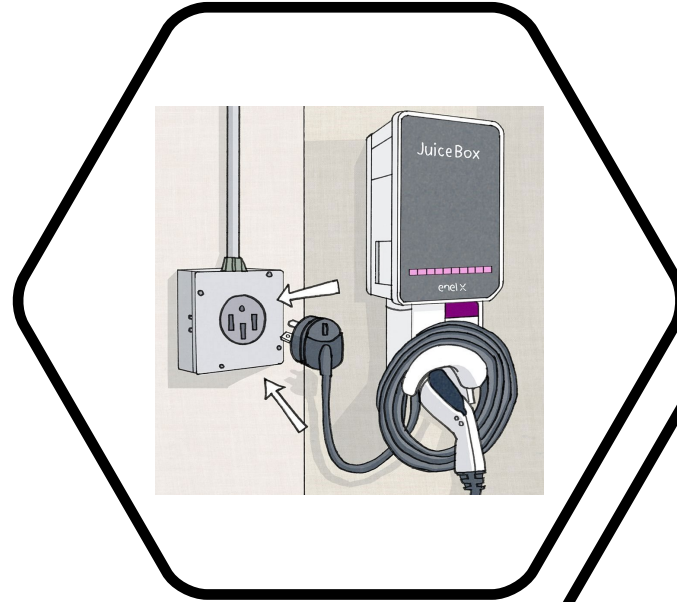
## Important Questions To Ask:

- ⚡ What's the incoming service?
- ⚡ How big is your main panel?
- ⚡ How old is your panel?
- ⚡ Evidence of burning/arcing?
- ⚡ Is there space (physical & capacity)?
- ⚡ Do you have subpanels?

## Outcomes of This Exercise:

- ⚡ Planned panel upgrade
- ⚡ Additional attention to efficiency to minimize loads





## #3 – Pre-Wiring

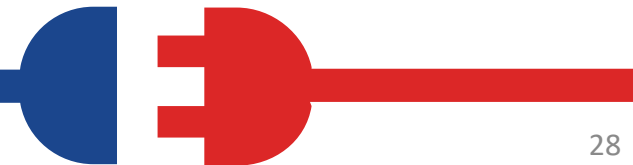
Pre-wire to be “electric-ready”

- ⚡ Most replacements are “replace on burnout”
- ⚡ Start with your water heater location
- ⚡ Don’t forget the EV charger!

# #4 – Address Your Ductwork

Why Aren't Systems Efficient? DISTRIBUTION, NOT SEER!

- ❖ Very low air flow
- ❖ Duct leaks: 30% on old systems
- ❖ Duct conductive losses
- ❖ Size always matters (equipment size, duct size, grille size, etc.)
- ❖ Air delivery problems
  - ❖ Not enough air
  - ❖ Not enough air speed
  - ❖ Air blowing on occupants



# #5 – Improve Your “Envelope” (Air Sealing & Insulation)



## #5 – Improve Your “Envelope” (Air Sealing & Insulation)



# #6 – Buried Ductwork

## Example: Calculating the Duct Gain

- ❖ Square footage of the home X 0.4
- ❖ T/D of the attic and the cold air in duct 125-55=70 degrees
- ❖ Determine the R-value of the ductwork

$$\text{Duct Gain} = \frac{\text{square feet} \times 0.4 \times \text{temp. difference}}{\text{R - value of ductwork}}$$

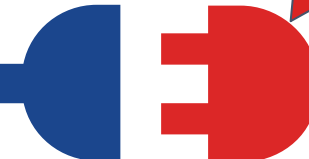
EXAMPLE → 1500 sq ft home, 125 degree attic, 55 degrees supply air, R3 insulation



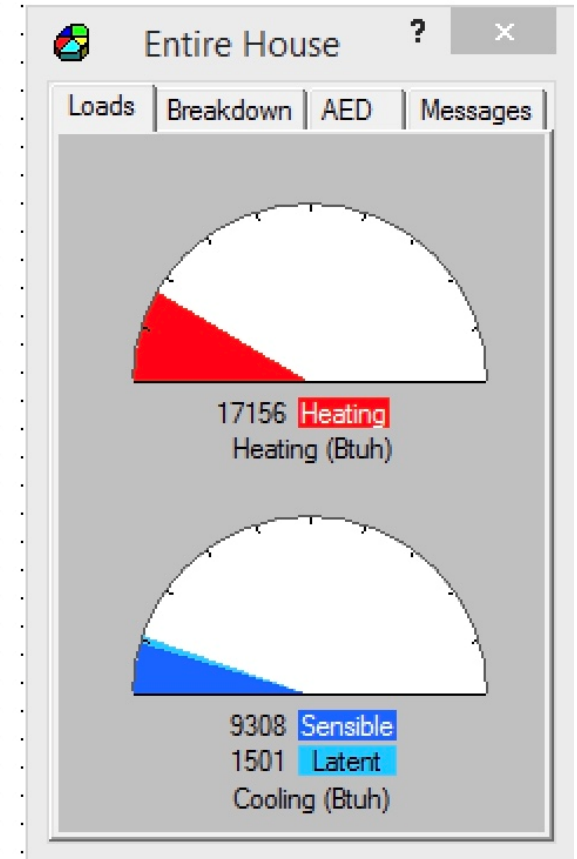
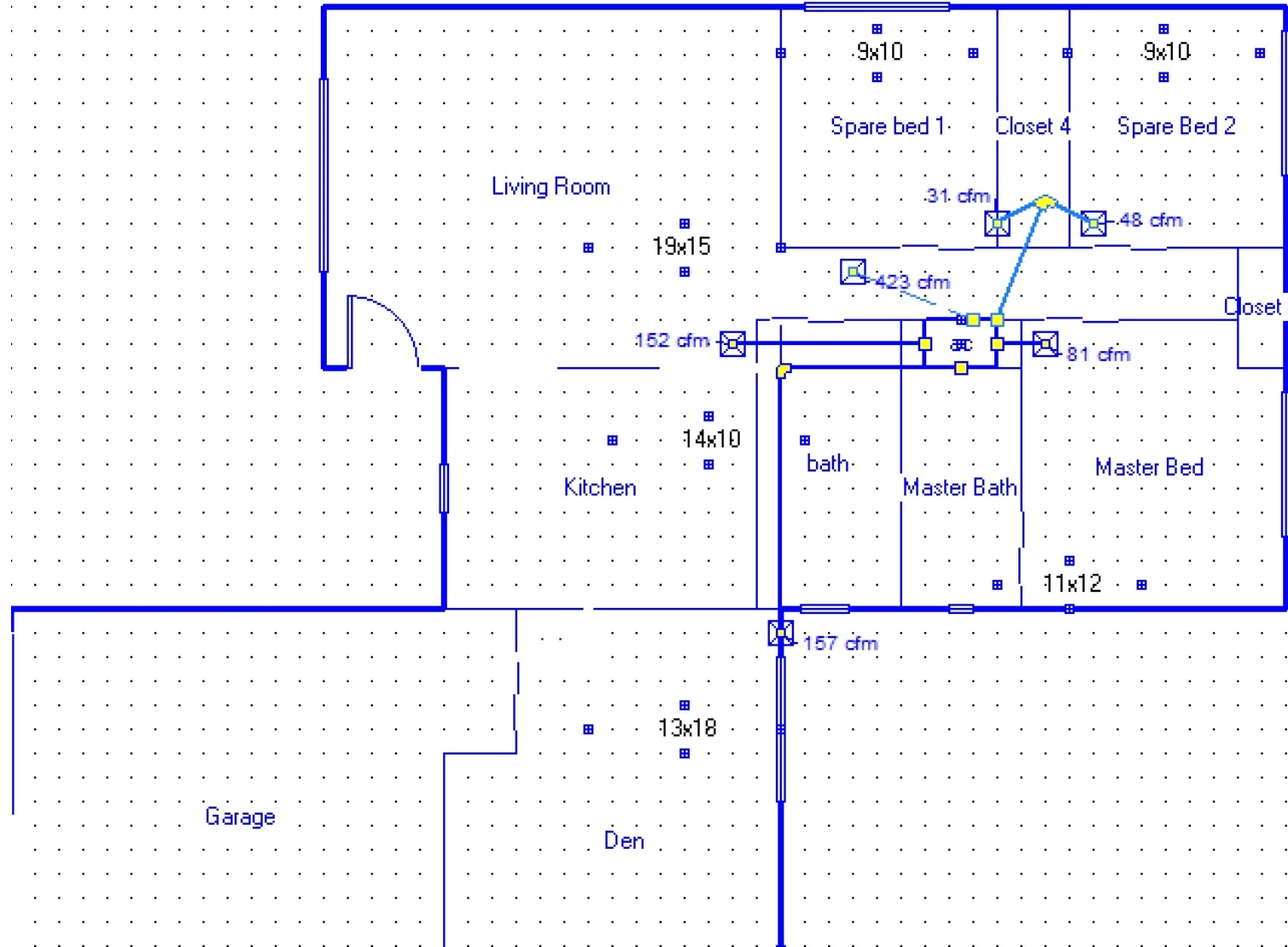
With R-3 ducts:  $\frac{1,500 \times 0.4 \times (125 - 55)}{3} = \frac{42,000}{3} = 14,000 \text{ BTU (1.2 TONS) lost to the hot attic}$

Buried ductwork (R-30):  $\frac{1,500 \times 0.4 \times (125 - 55)}{30} = \frac{42,000}{30} = 1,400 \text{ BTU (0.1 TONS) lost to the hot attic}$

That is over one ton of cooling lost to the attic space!



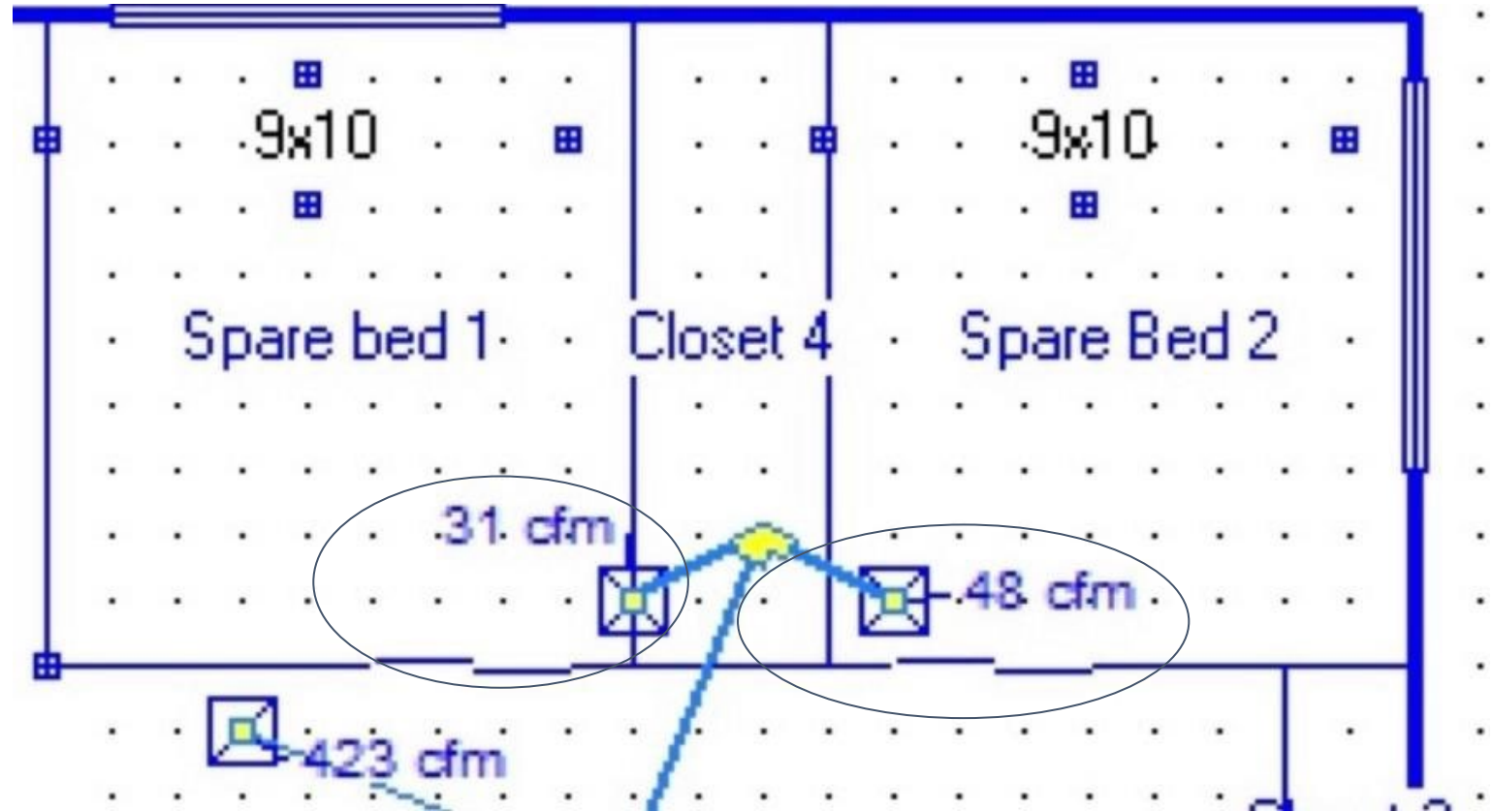
# #6 – Perform an HVAC Load Calculation (If You Can)





# Without a Calculation How Would you Know?

- 🔌 Same size rooms
- 🔌 Same size windows
- 🔌 Same side of the house
- 🔌 Different requirements



# Good Electrification





# What is Good Electrification?

- 🔌 Installing the most efficient solutions
- 🔌 Utilizing existing infrastructure when possible
- 🔌 Consider all electrification requirements from the start

Electrification can't  
be done without  
Heat Pumps!





# What is a Heat Pump?

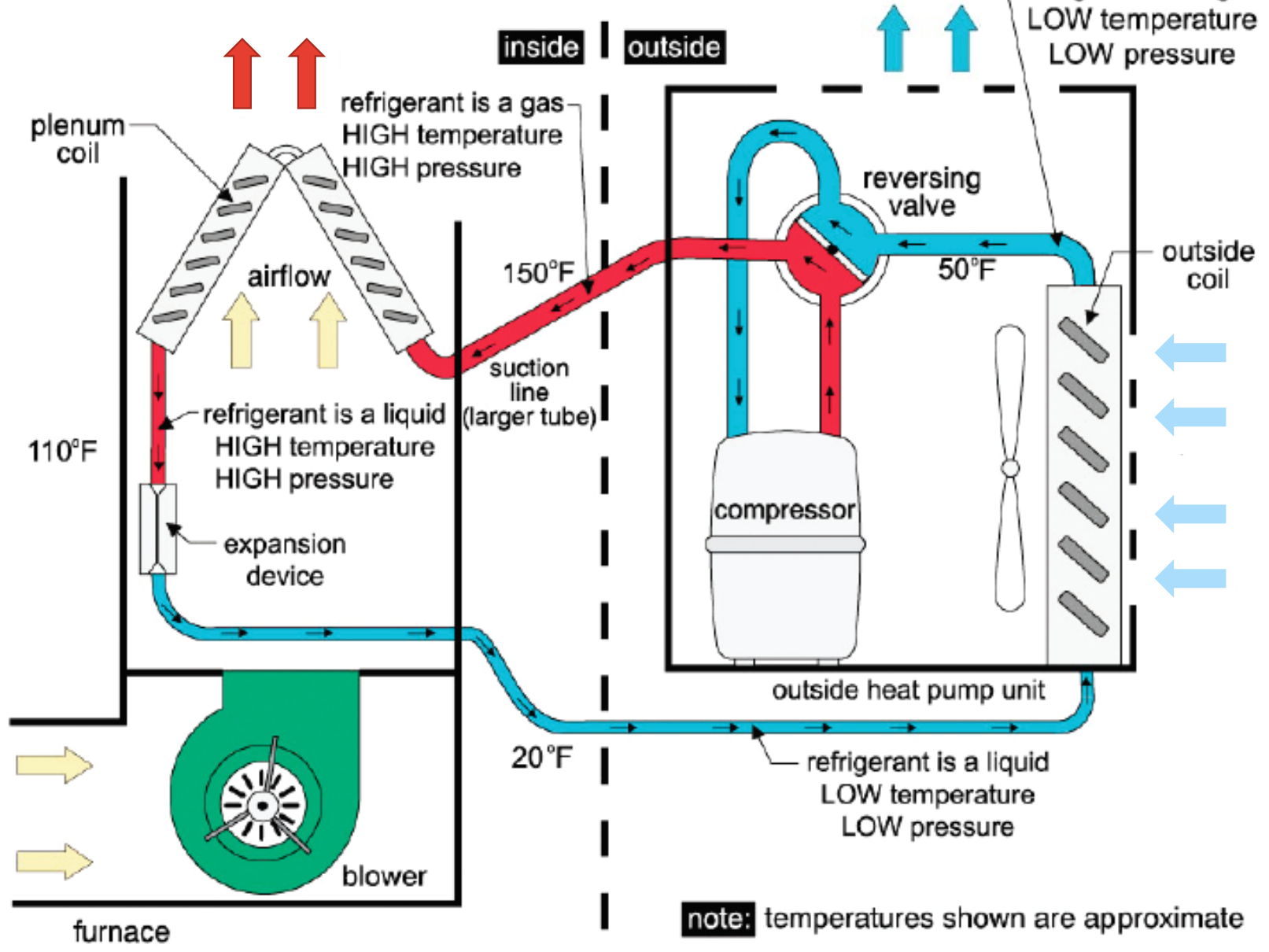
Hint – there's at least one in your house!

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- 🔌 Heat pumps **MOVE** heat
- 🔌 Gas Furnaces **CREATE** Heat



# Heat pump schematic - winter mode



# Common Residential Heat Pump Technologies

## Unitary On/Off

- ⚡ Traditional heat pump solution
- ⚡ 1 to 2 stages
- ⚡ Base efficiencies (up to 6 breakers!)
- ⚡ Loss of performance at lower temps

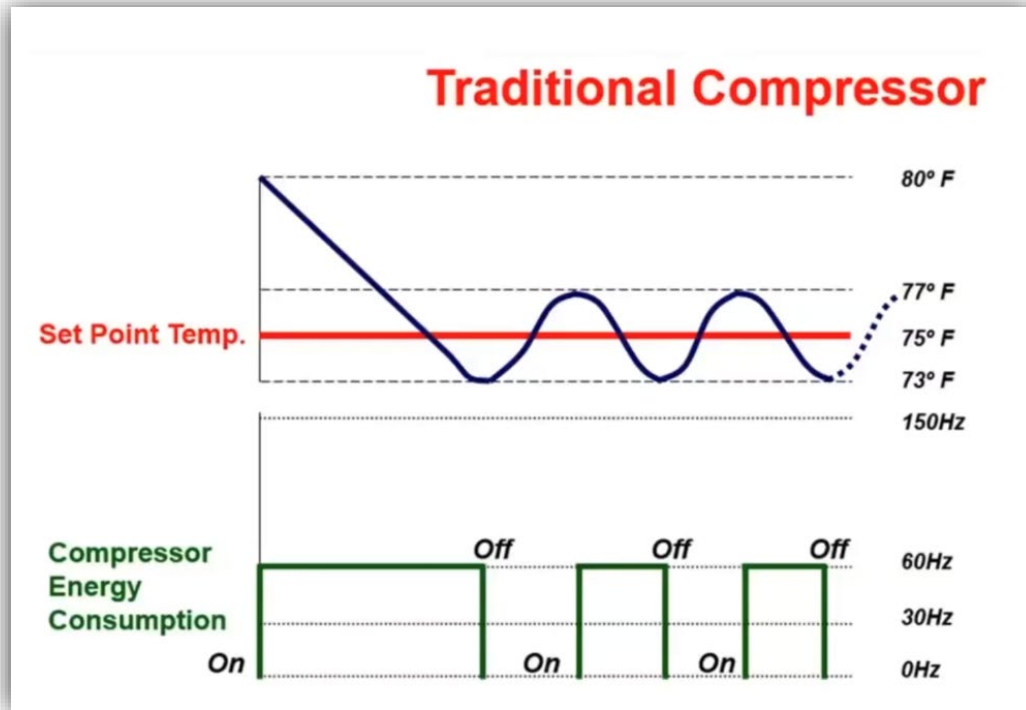


## Inverter/Modulation

- ⚡ Mini split
- ⚡ Ductless and ducted
- ⚡ Multi-zone

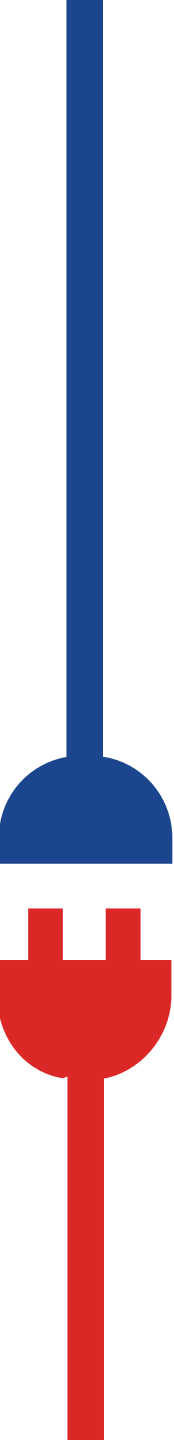


# Traditional Heat Pumps



- ❖ On/Off nature limits comfort
- ❖ Noisy operation

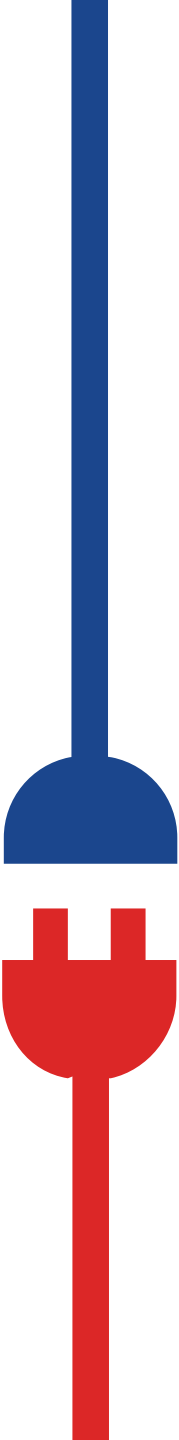
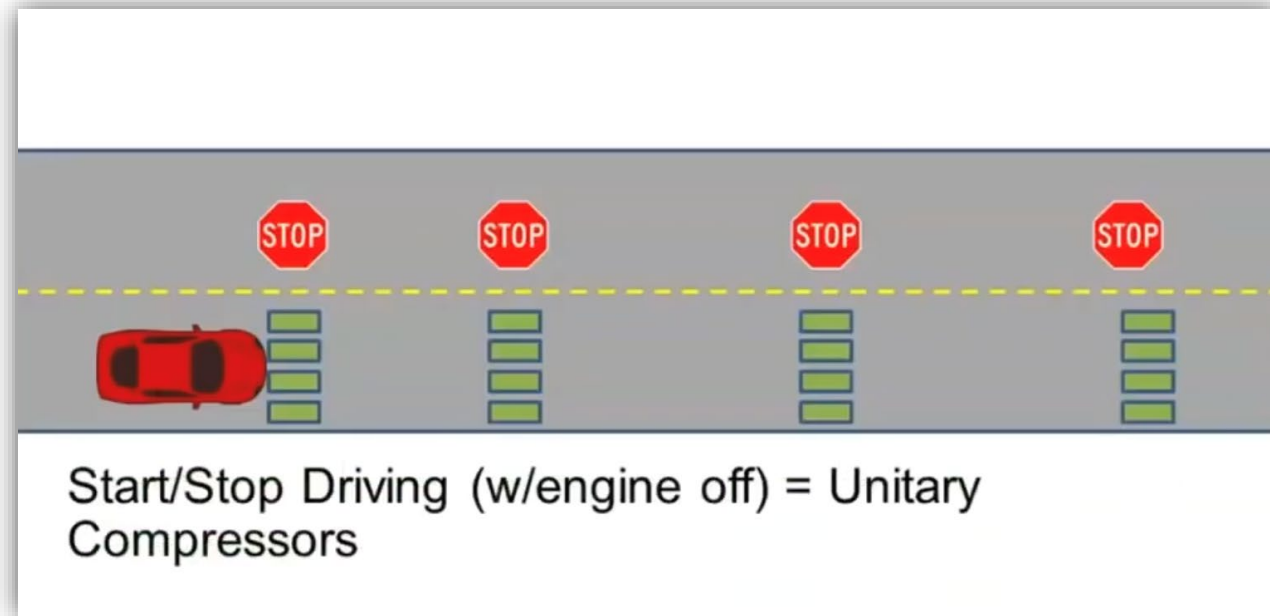
- ❖ May require backup heat
- ❖ Limited to 1 or 2 stages
- ❖ Up to 6 breaker spaces



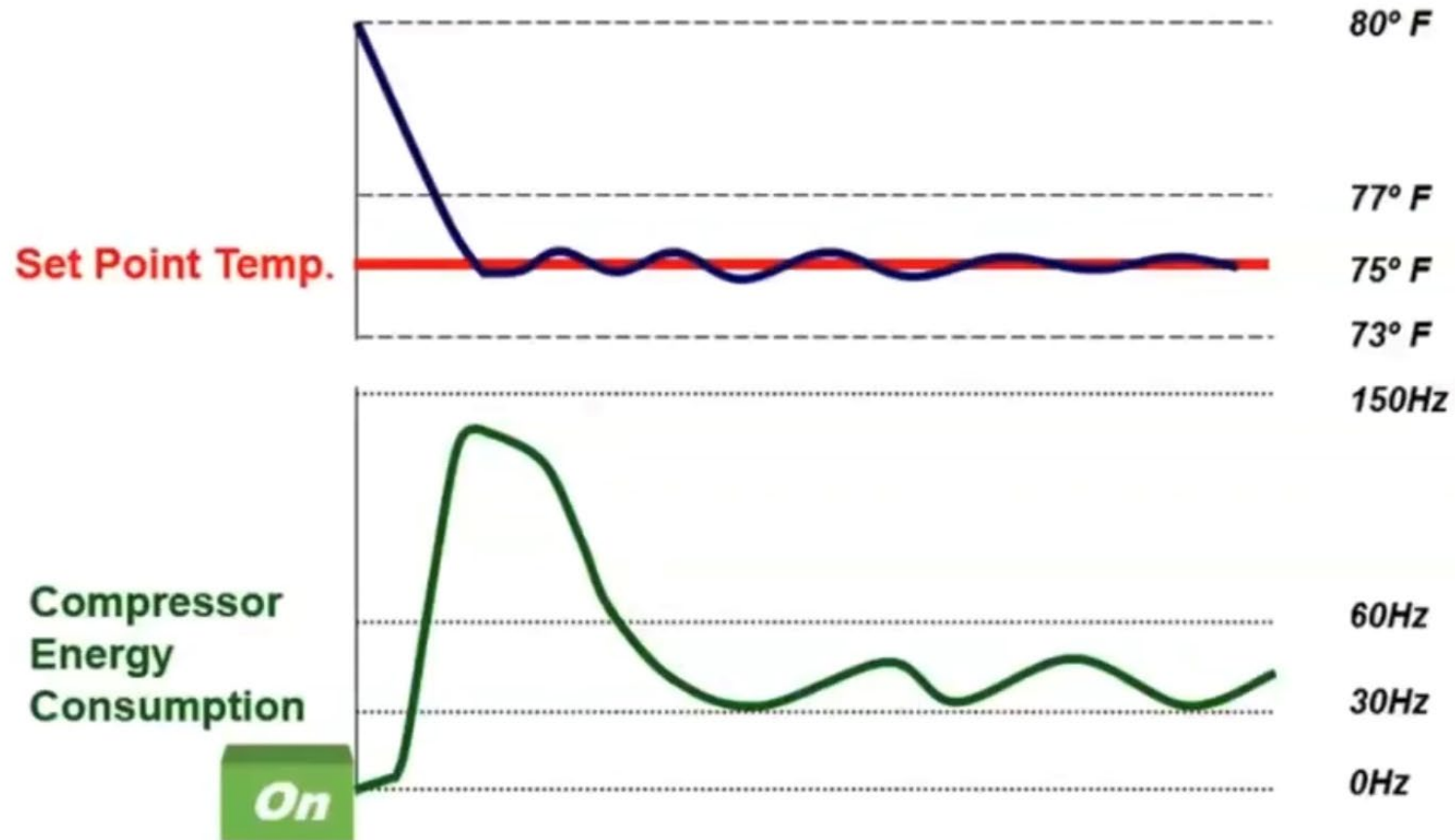




# Is This Efficient?



# Inverter-Driven Heat Pumps

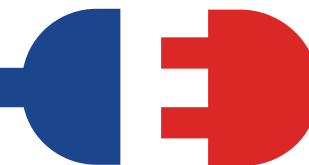


- ⚡ Converts Single Phase AC to DC, backconverts to 3-phase AC

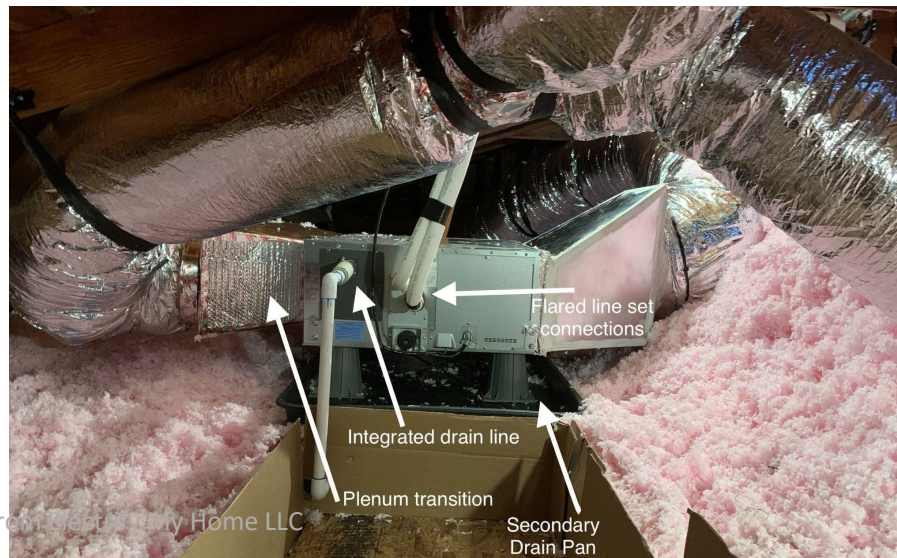
# Trying to “Plug & Play” Heat Pumps Can be Disastrous

## Things we must keep in mind:

- ⚡ Velocity
- ⚡ Low temps
- ⚡ Air blowing on occupants
- ⚡ Sizing
- ⚡ Panel Planning
- ⚡ Educating customers
- ⚡ Wrong registers



# Good Workmanship Saves Money In the Long Run



# “Right sized” Heat Pumps Bring BIG Benefits

- 1) Better Comfort
- 2) Quiet
- 3) Enviro. Friendly
- 4) Safer
- 5) Indoor Air Quality





# Summary

- ⚡ Electrification is here to stay
- ⚡ Start with creating a plan and clear roadmap
- ⚡ Prioritize safety, pre-wiring, ductwork, load reduction, and load calculations
- ⚡ Heat pumps are a necessary element, but must be done carefully



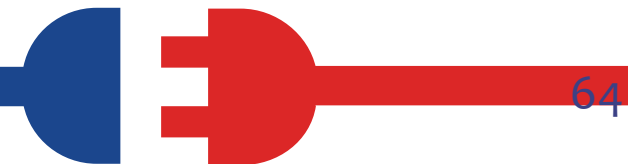
# Questions?



Larry Waters | 707-840-3411  
[electrifymyhome.com](http://electrifymyhome.com) | [info@electrifymyhome.com](mailto:info@electrifymyhome.com)



Stay in Touch!



# Closing

- Coming to Your Inbox Soon!
  - Slides and Recording

Sign up to connect to a 3C-REN participating contractor for incentives:

[www.3c-ren.org/for-residents](http://www.3c-ren.org/for-residents)







**Thank you!**

For more info:  
[3c-ren.org](https://3c-ren.org)

For questions:  
[info@3c-ren.org](mailto:info@3c-ren.org)



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