



# We will be starting soon!

*Thanks for joining us*





# The Electrification Path – A Case Study

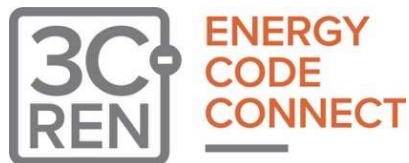
*Larry Waters – Electrify My Home*

October 20, 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)**
  - Industry Trainings and Regional Forums
  - Energy Code Coach: Title 24 Compliance Support Hotline (805) 220-9991
- **Building Performance Training (BPT)**
  - Industry Trainings & Certification for current and perspective building professionals
  - Helps workers thrive in an evolving industry
- **Home Energy Savings (HES)**
  - Flexible Home Energy Upgrades
  - Multifamily (5+ units) & Single Family (up to 4 units)



# The Electrification Path

## A Case Study







Larry Waters  
President, Electrify My Home  
October 18, 2023

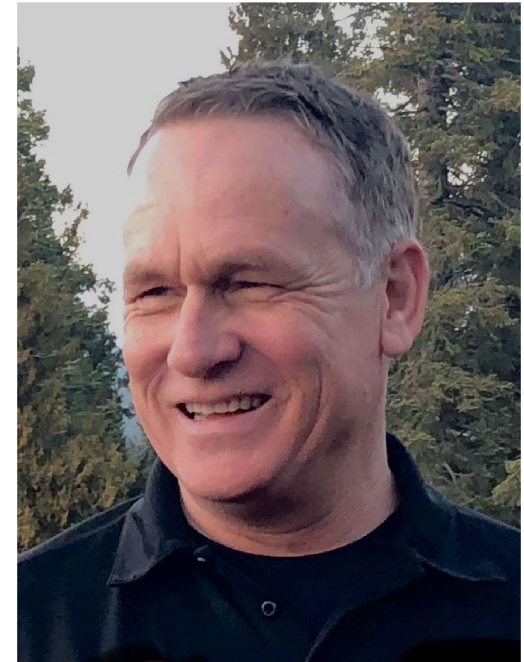


**ELECTRIFY**  
MY HOME

# About Larry Waters



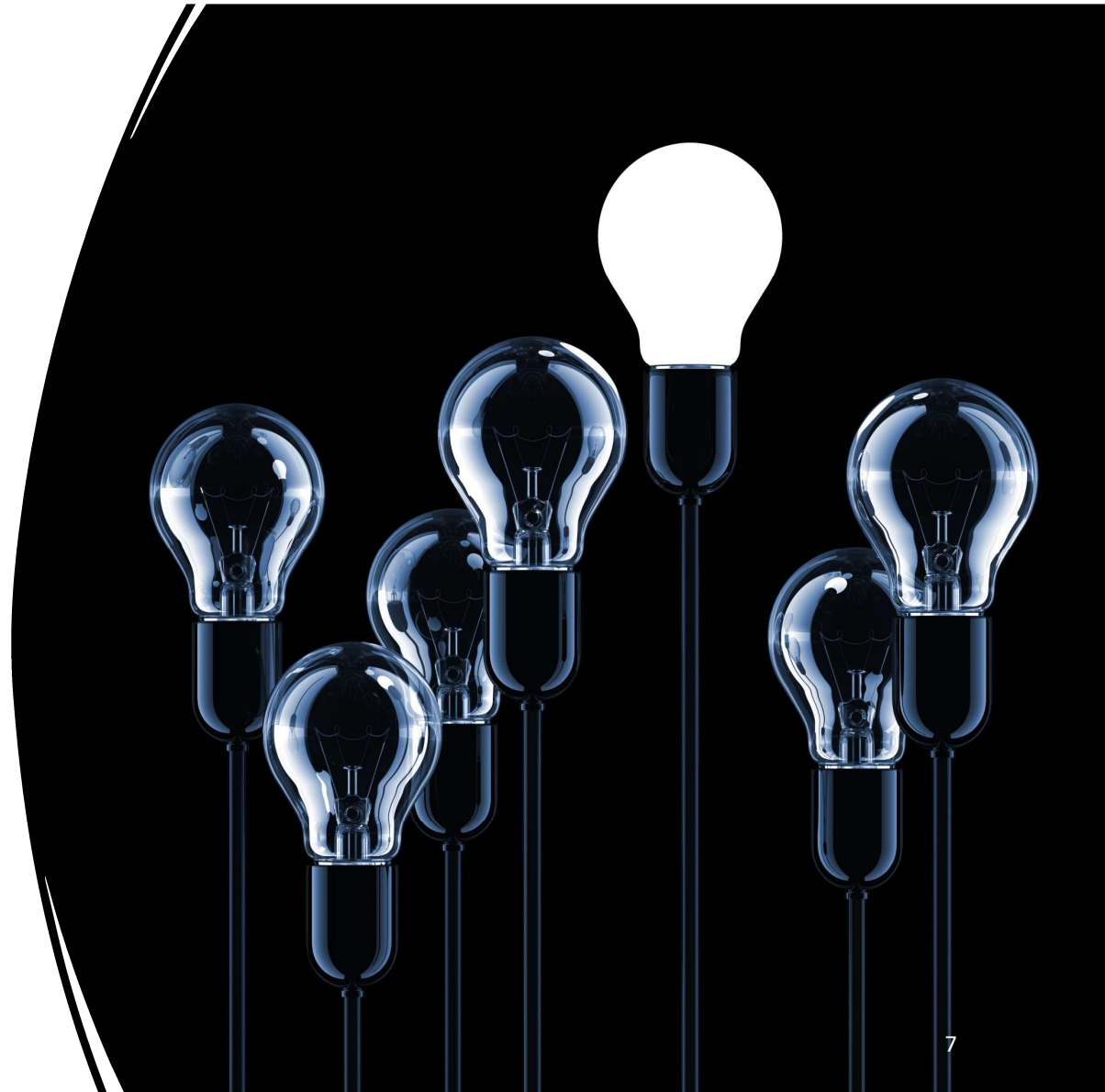
- ⚡ HVAC trade from UTI in 1982 
- ⚡ In the trade before the first cordless drill 
- ⚡ Nate certified 
- ⚡ 2009/ 2010 BPI certification 
- ⚡ Installing only heat pumps since 2015 
- ⚡ Founded Electrify My Home in 2020 



# Agenda

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- 🔌 Introductions
- 🔌 The Electrification Path
- 🔌 Things to Consider
- 🔌 Case Study
- 🔌 EMH Customer Interview



# Electrify My Home – Electrification Pioneers

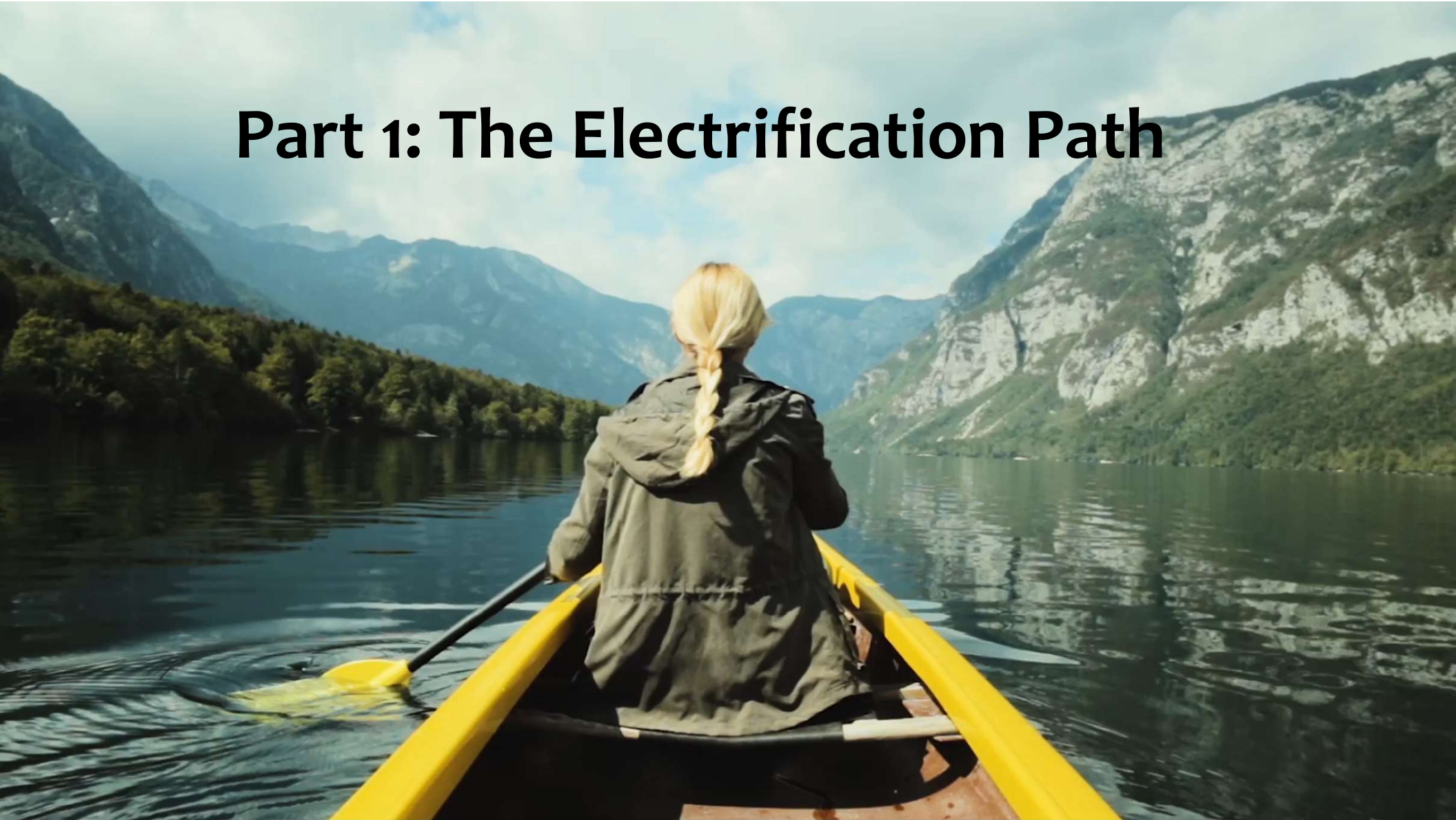
## Our Mission:

*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.*





# Part 1: The Electrification Path



# Gas Assessment & Inventory

## 🔌 Step 1: Look at the 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](http://pge.com/homecheckup)

🔌 Home Intel (w/ disaggregation & electrification report): [electrifymyhome.hea.com](http://electrifymyhome.hea.com)

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

🔌 Furnace(s)

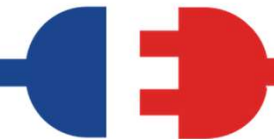
🔌 Dryer

🔌 Water heater(s)

🔌 Fireplace

🔌 Stove/Range

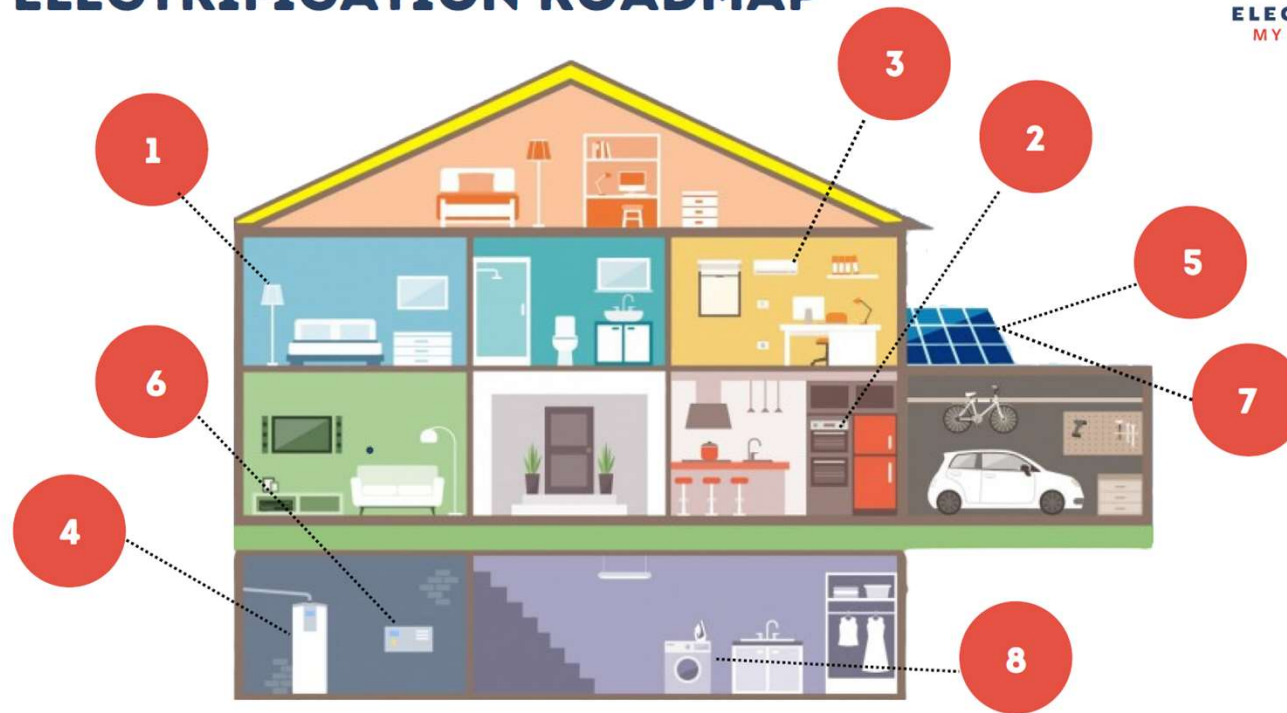
🔌 Pool Heater



# Build Your Roadmap



## ELECTRIFICATION ROADMAP

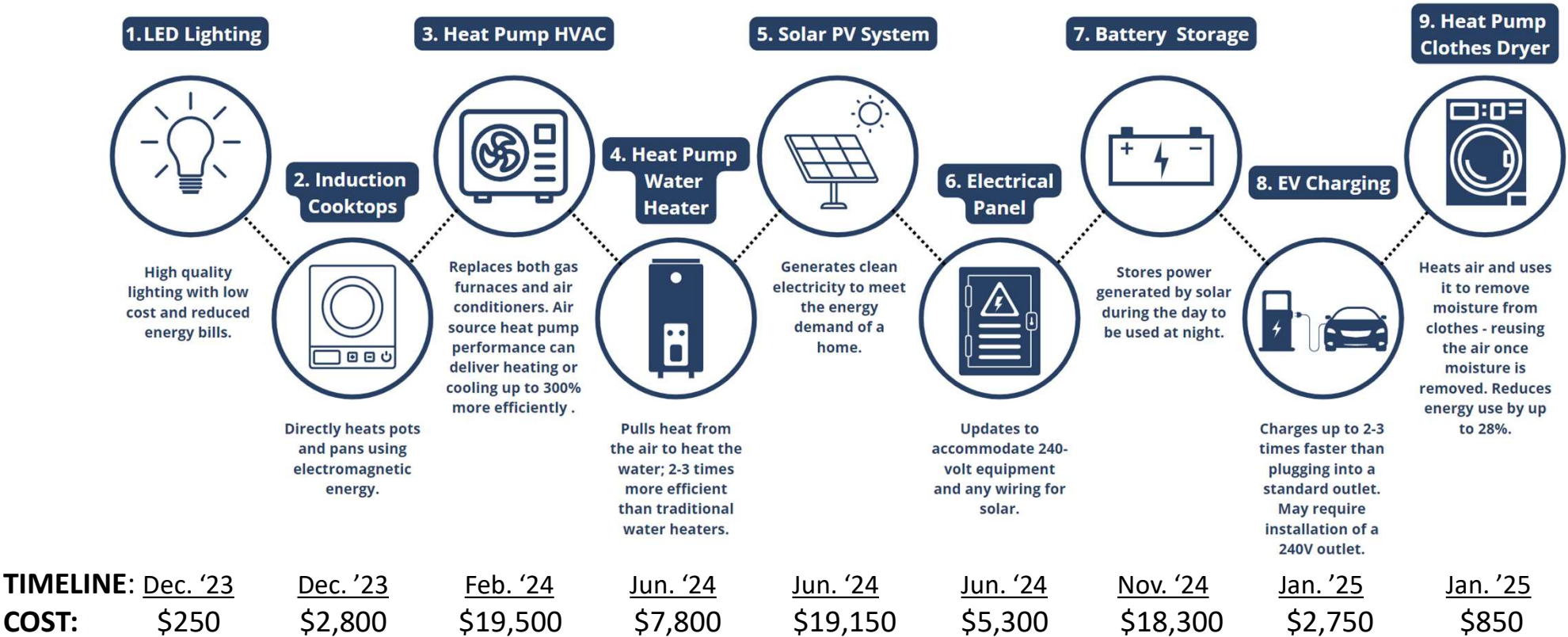


Graphic prepared for Electrify My Home by UC Davis Zero Net Energy students



# Chart a Course & Plan Your Budget

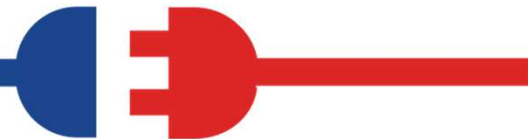
*Hint: Incentives Help!*



# Ideal Contractor Abilities

## *For Good Electrification*

- ✦ 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 pros/cons)
- ✦ Pull permits!



# Part 3: Order of Operations

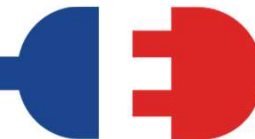
*Remember, Every Home is Unique!  
Our Recommended Cadence*



# Order of Operations

## Take a strategic approach:

- ♣ 1) Fix safety issues
- ♣ 2) Electrical panel assessment
- ♣ 3) Pre-wire future appliances
- ♣ 4) Address your ductwork
- ♣ 5) Improve your building envelope
- ♣ 6) Bury your ductwork
- ♣ 7) Perform an HVAC load calculation
- ♣ 8) Begin replacing appliances





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

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





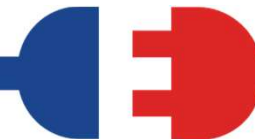
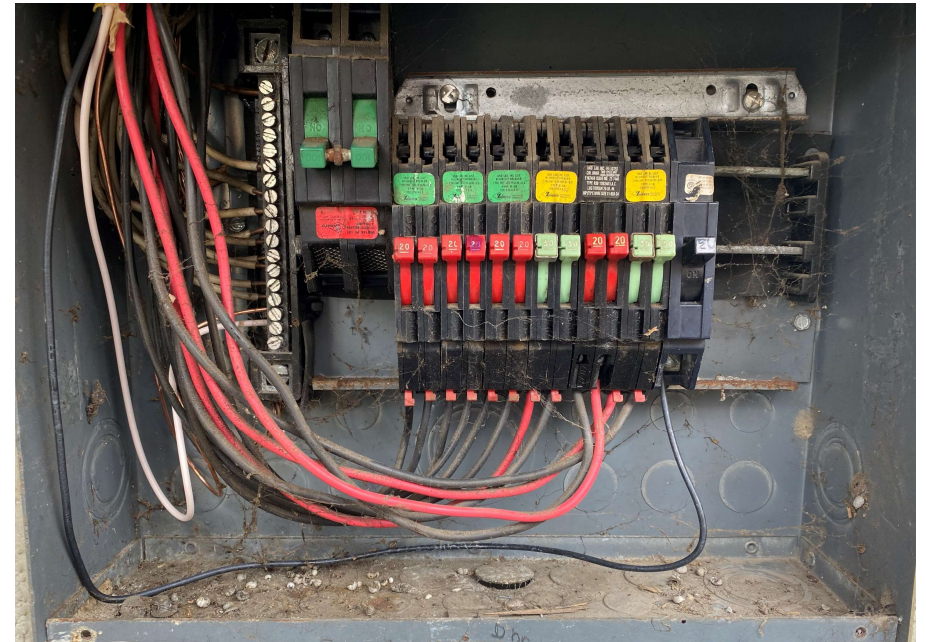
## #2 – Electrical Panel Assessment

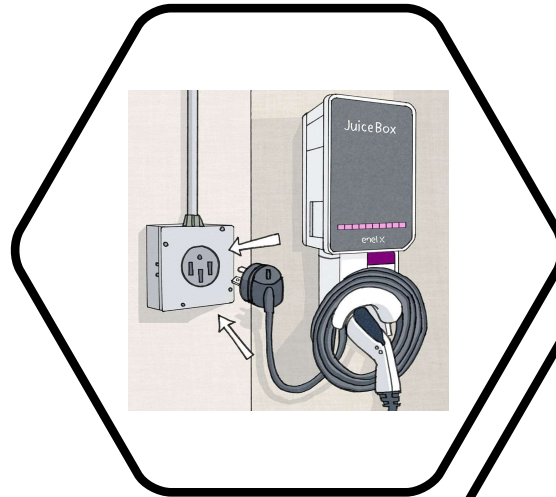
### Important Questions To Ask:

- ⚡ What additional electrification is left
- ⚡ Incoming Service Level
- ⚡ Main panel rated amps
- ⚡ Panel age
- ⚡ Evidence of burning/arcing?
- ⚡ Is there space (physical & capacity)?
  - ⚡ Perform an NEC load calculation

### Outcomes of This Exercise:

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





## #3 – Pre-Wiring

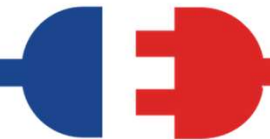
Pre-wire to be “electric-ready”

- ⚡ Most replacements are “replace on burnout”
- ⚡ Start with your water heater location
- ⚡ Stove/Oven and Dryer as well!

# #4 – Address The 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

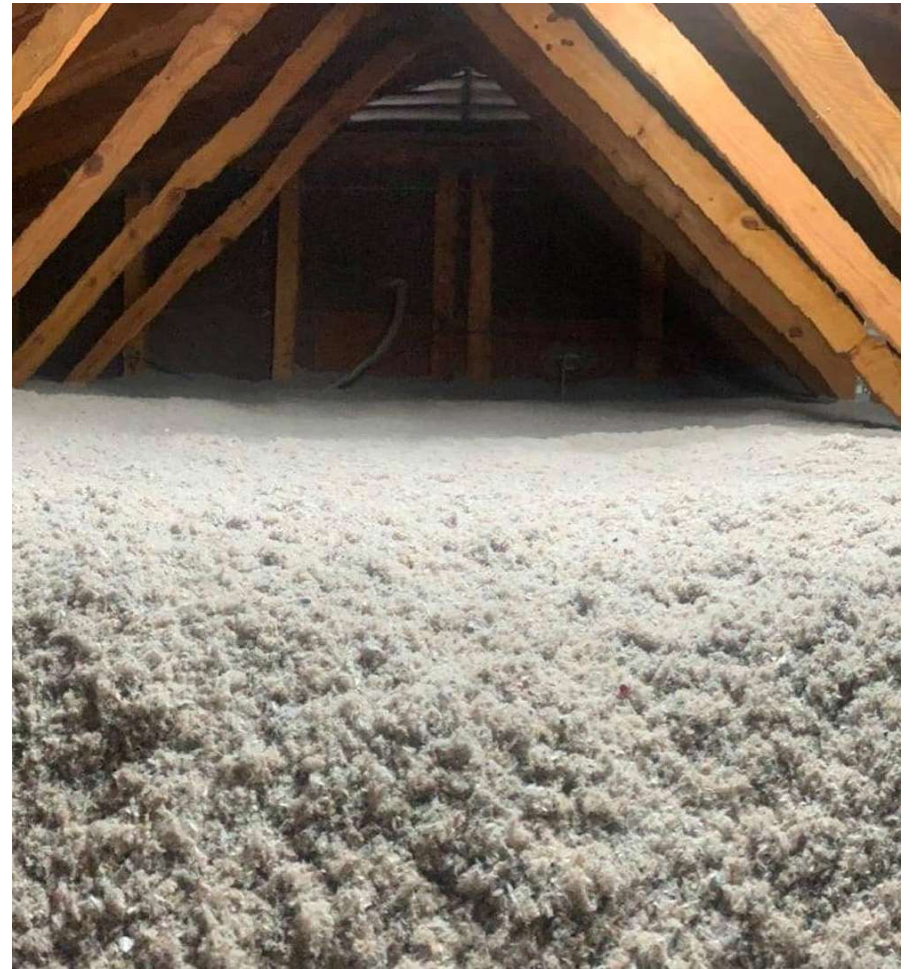




# #5 – Improve The “Envelope” (Air Sealing & Insulation)



## #5 – Improve The “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



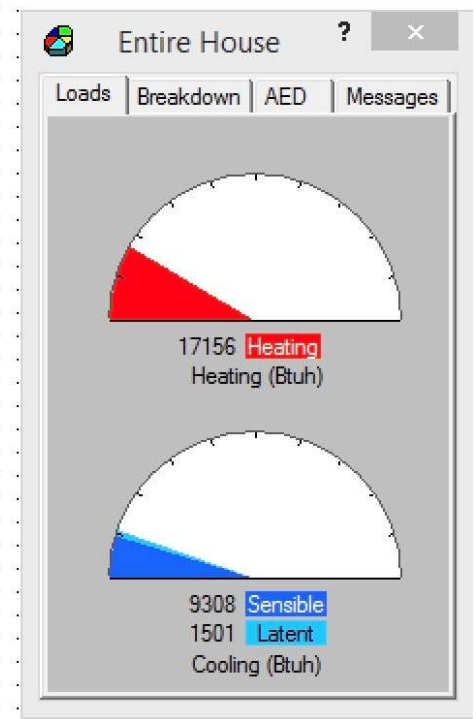
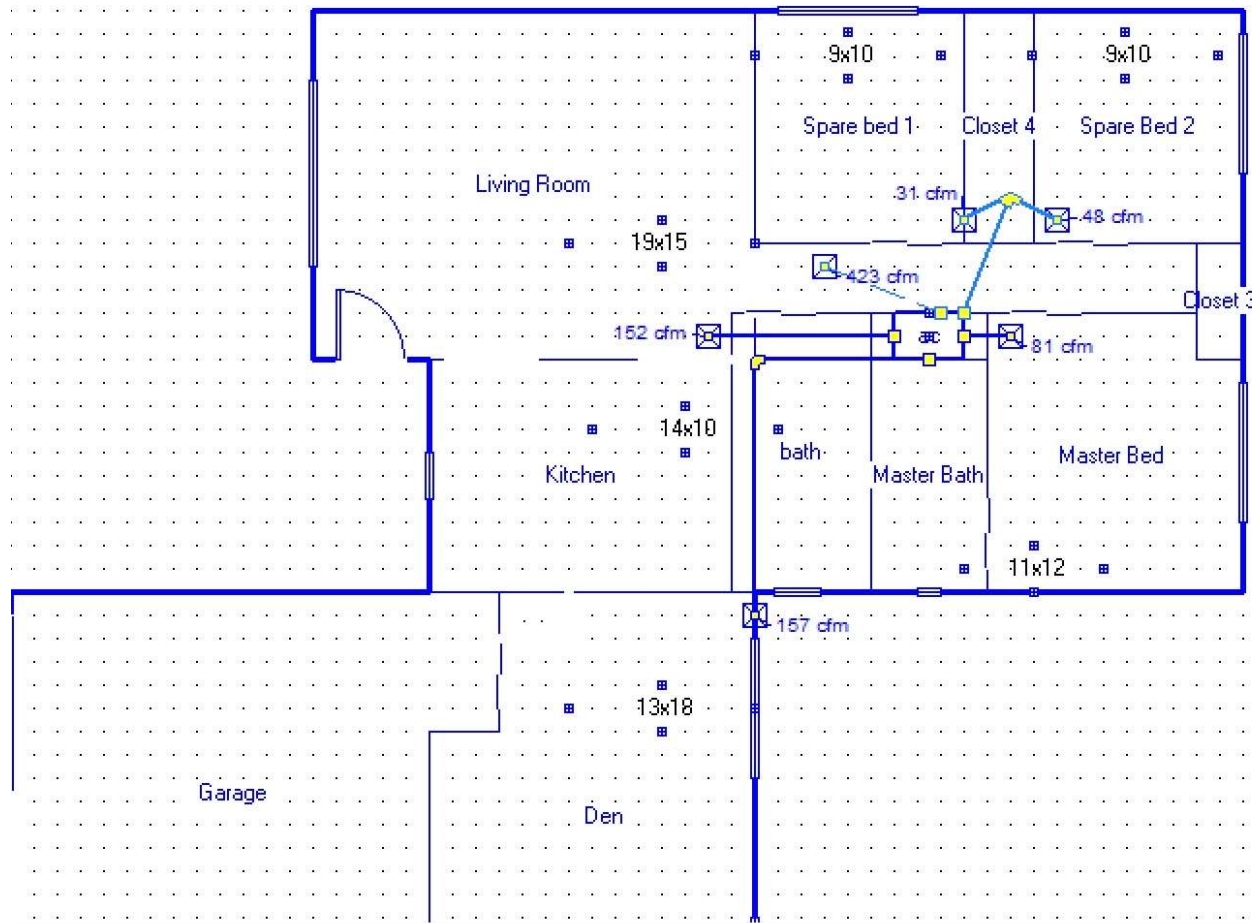
With R-3 ducts:  $\frac{1,500 \times 0.4 \times (125 - 55)}{3} = \frac{42,000}{3} = 14,000 \text{ BTU (1.2 TONS) lost to the hot attic}$

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!

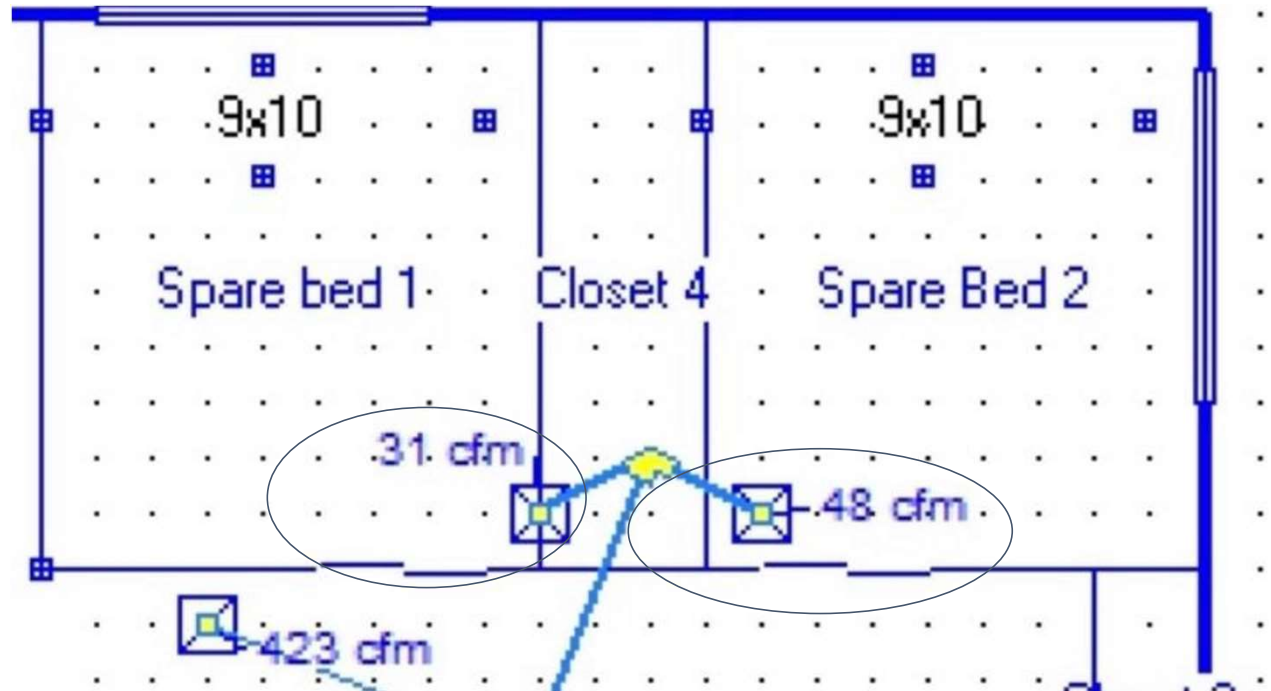


# #7 – Perform an HVAC Load Calculation



## Without a Calculation How Would you Know?

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





# Electrify My Home Case Study

- Oakland, CA



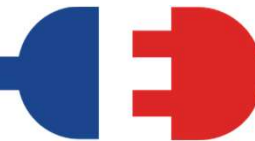
# About The Project



# About the Project

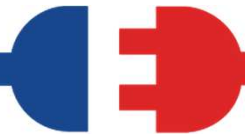


- ✦ **Collaboration on Design:** Electrify My Home & Redwood Energy
- ✦ **Location:** Oakland, CA
- ✦ **Year Built:** 1901
- ✦ **Size:** 2,616 – 2 units
- ✦ **Goals:** Reduce energy costs, upgrade for safety, fix comfort issues
- ✦ **End Goal:** Net Zero!





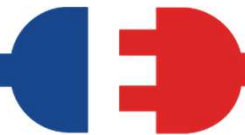
# HVAC (Pre-Install)





## Existing Ductwork and Insulation

# Domestic Hot Water



# Game Planning







# Water Heating (Post Install)

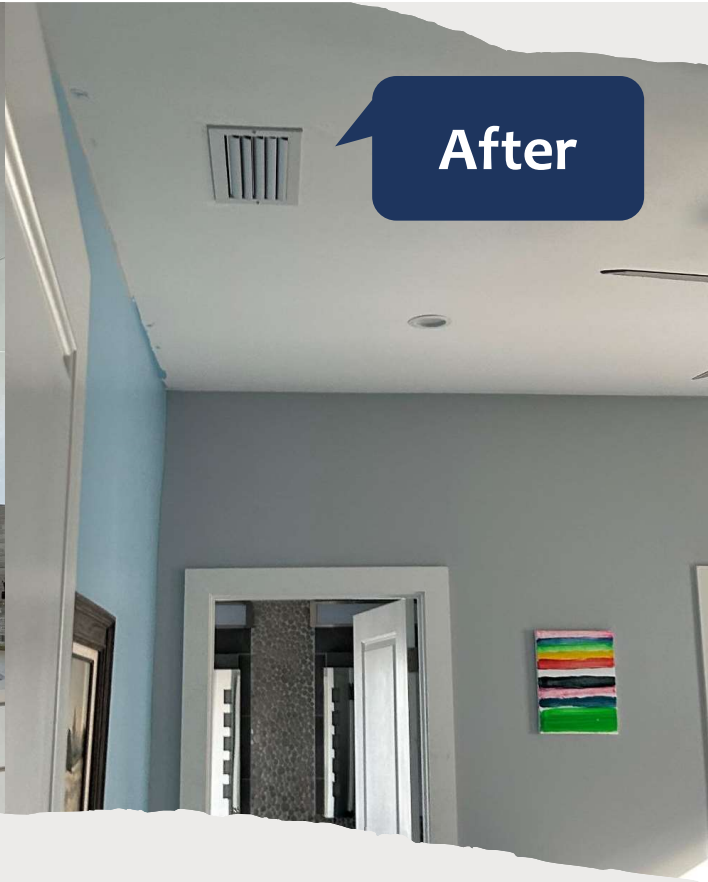




## HVAC (Post Install)



**Before**



**After**



**After**

# Using the Correct Registers

# R50 Insulation (Buried Ducts)





Pre-Wired  
for  
Induction  
Ranges x2  
*... tricky!*



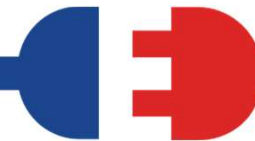


The Heart & Soul





This is What We LOVE!



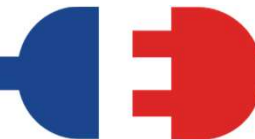


# Customer Interview



## Key Takeaways – “Thanks for changing our life!”

- ✦ **Journey:** “We just went for it – all appliances installed, at one time. Except the gas stoves, which will happen soon.”
- ✦ **DHW:** “It’s a dream come true.” “[they are] right near my office and I don’t hear anything”
- ✦ **HVAC:** “It’s right near our front door and we don’t hear anything.”
- ✦ **Registers:** “All the vents were redone... which shockingly worked.”
- ✦ **Comfort:** “That first night, I hadn’t slept that well in three years of living here. When you’re the same temperature, your whole life changes.”
- ✦ **Operational Costs:** “Excited to get solar installed. The economics is going to change our lifestyle. The amount of money we’re saving is \$500-700. So, we’ll be saving for college education for our child.”
- ✦ **Safety:** “We were living with an explosive tool on the side of the house.”



Bay Area Family Benefits  
From Home Performance  
with a ½ Sized Heat Pump



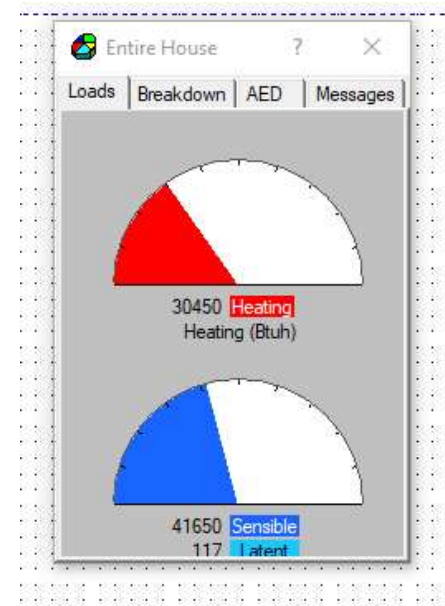
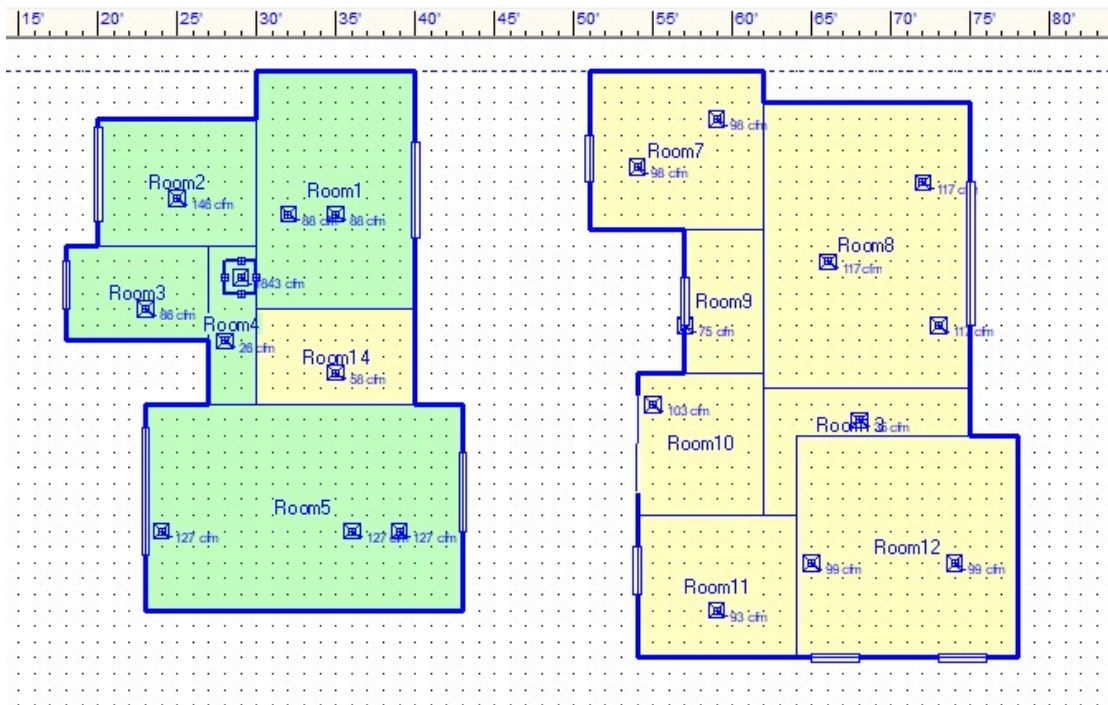


Example 2



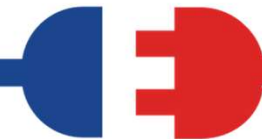
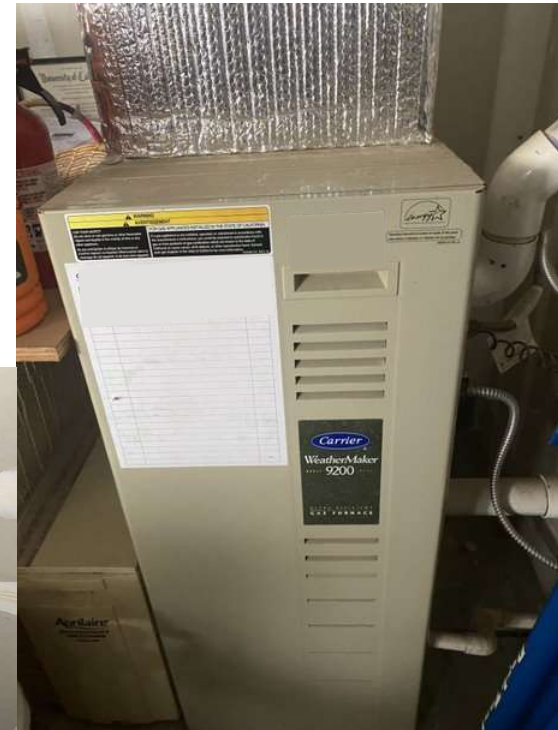


# Berkeley Home Load Calc

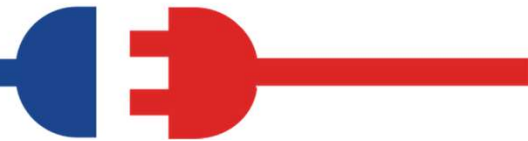


# Existing BGF 80,000 BTU

- ⚡ Existing Furnace 92% 80k BTU 74k delivered
- ⚡ Attic was bad massive envelope air leaks
- ⚡ Bad insulation
- ⚡ Fixed attic in 12-man hours
- ⚡ Relaced water heater as well



# Attic Was Bad, Jr Air Sealer at Work!





After sealing  
and  
Reinsulating



# The Installed Mechanicals



- 🔧 65-gallon Bradford White Heat Pump Water Heater
- 🔧 Complete design and installation of a mini split inverter heat pump
- 🔧 36 kbtu Mitsubishi SUZ-KA36NAR1 outdoor unit and SVZ-KP36NA air handler
- 🔧 Modified existing newer ductwork to be suitable for heat pump and air balancing

# A Happy Customer With a Half-Sized System

★★★★★ a month ago

Electrify My Home does great work for a reasonable price. We had them install a heat pump, hot water heat pump and insulation. They were super knowledgeable and informative about options, as well as rebates. They also provided all we needed for the final inspection from the city of Berkeley. Both the heat pump and hot water heat pump work great and are much cheaper to run. The heat pump is also much quieter than our previous gas furnace. And the extra insulation that was added has been a major improvement – even without the heat pump our upstairs rooms are much more stable in terms of temperature – both summer and winter. Highly recommend Larry, Alex and the rest of the Electrify My Home team.





# 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



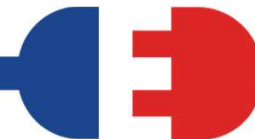
# Questions?



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



Stay in Touch!



# Closing

- Continuing Education Units Available
  - Contact <ian.logan@ventura.org> for AIA LUs
- Coming to Your Inbox Soon!
  - Slides & Survey – Please Take It and Help Us Out!
- Upcoming Events:
  - 10/24 Modeling All Electric Homes in the 2022 Energy Code
  - 10/26 HERS Registries
  - 10/30-11/3 Passive Design/Build Bootcamp – Certified Passive House Tradesperson Certification
  - 11/7 Residential Compliance Forms for Permitting
  - 11/14 The Power of Existing Buildings
  - 11/16 Home Assessments for Decarbonization
- For more information about upcoming events please visit: <https://www.3c-ren.org/events>





**Thank you!**

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

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



**TRI-COUNTY REGIONAL ENERGY NETWORK**  
SAN LUIS OBISPO • SANTA BARBARA • VENTURA