



# We will be starting soon!

*Thanks for joining us*



# Electrification Products for the Central Coast Climate



Larry Waters, Electrify My Home

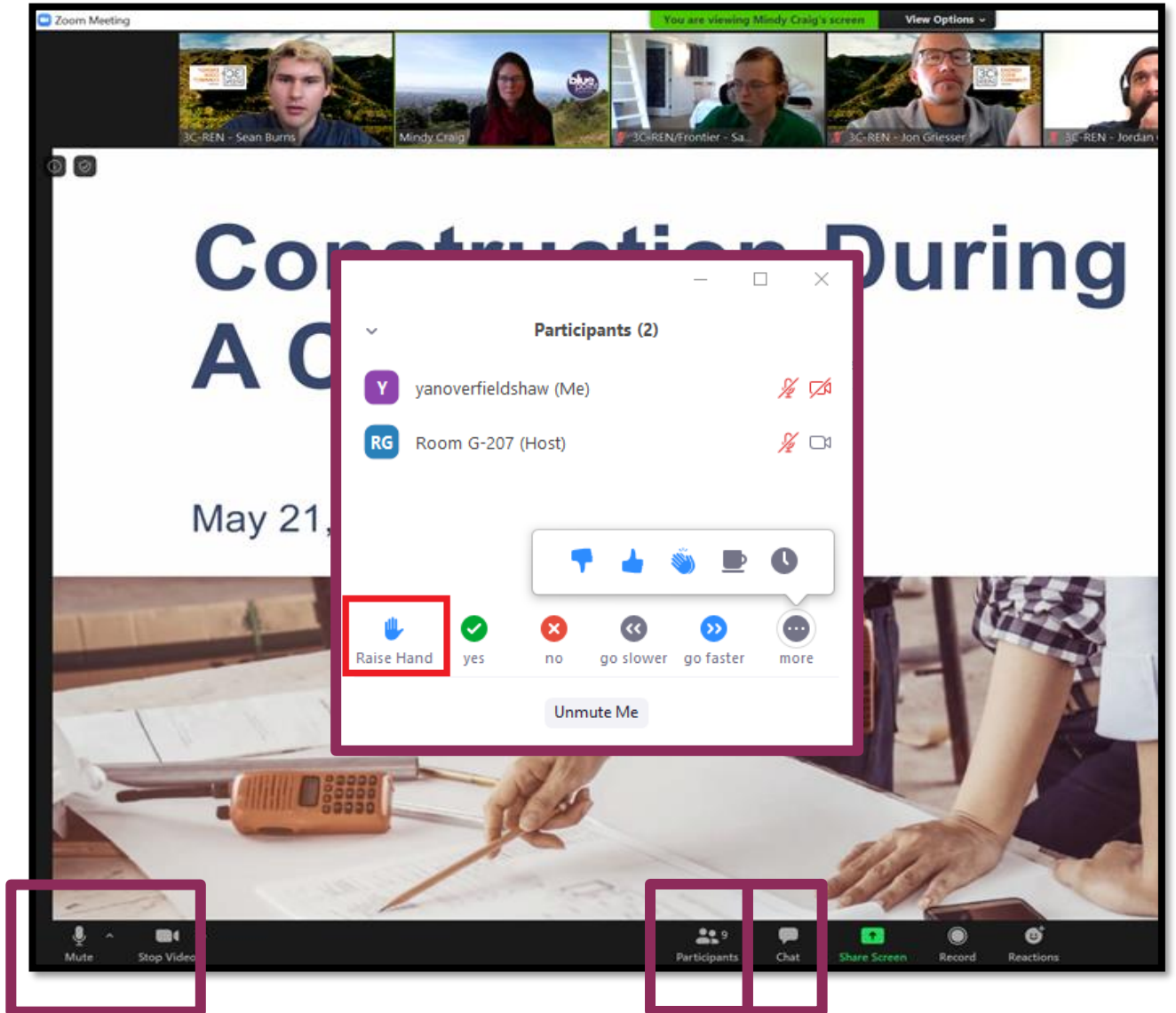
Alex Sloan, Electrify My Home

April 18th, 2023



# Zoom Orientation

- Please be sure your full name is displayed (for our reporting)
- Please **mute** upon joining
- Use "Chat" box to share questions or comments
- Under "Participant" select "Raise Hand" to share a question or comment verbally
- The session may be **recorded** and posted to 3C-REN's on-demand page. Feel free to ask questions via the chat and keep video off if you want to remain anonymous in the recording.





# 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)



# Agenda

- ⚡ Introductions 3C REN
- ⚡ Product/Manufacturer Disclaimer
- ⚡ Electric options for HVAC and water heating
- ⚡ Electric options for other home appliances



# About Larry Waters



🔌 HVAC trade from UTI in 1982



🔌 In the trade before the first cordless drill



🔌 Nate certified



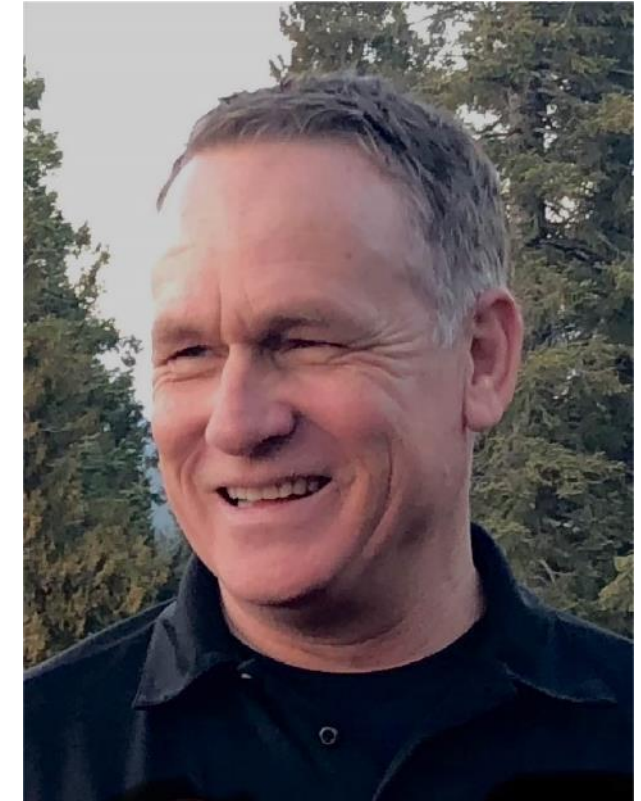
🔌 2009/ 2010 BPI certification



🔌 Installing only heat pumps since 2015



🔌 Founded Electrify My Home in 2020



# 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.*



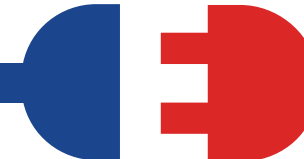
**ELECTRIFY**  
**MY HOME**



# Before We Get Started...

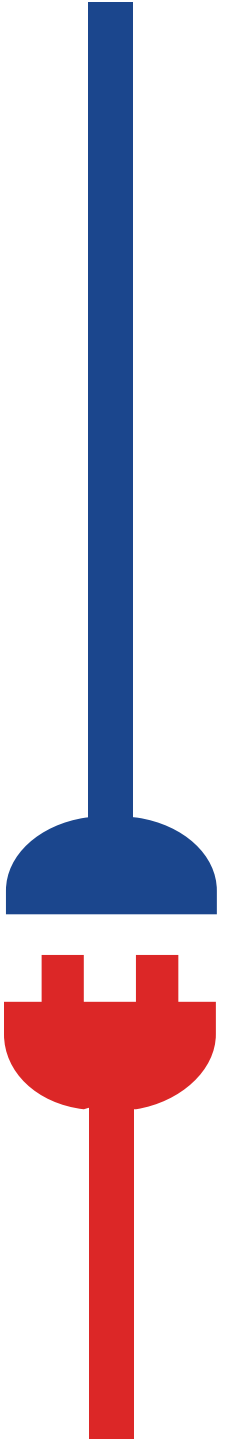
Disclaimer: The products and brands shown in this presentation are provided as examples of potential electrification solutions.

Electrify My Home does not endorse, recommend, favor, or receive payment from any of the product manufacturers or distributors of examples shown herein.

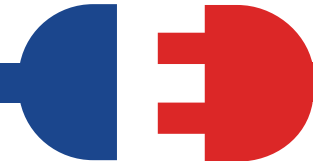




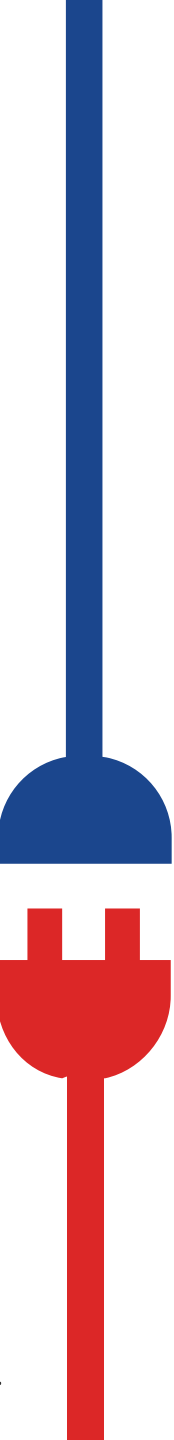
# Electric HVAC Products (Heat Pumps!)



# How Much Have Furnaces Changed? 150-year-old Technology



Vehicles  
Are  
Evolving  
--  
So Is HVAC



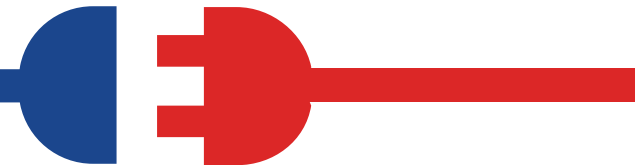


# Typical Outdoor Unit Classifications

## Unitary



## Mini Split Platform





# Typical Indoor Unit Classifications

## Conventional Ducted



## Slim Ducted

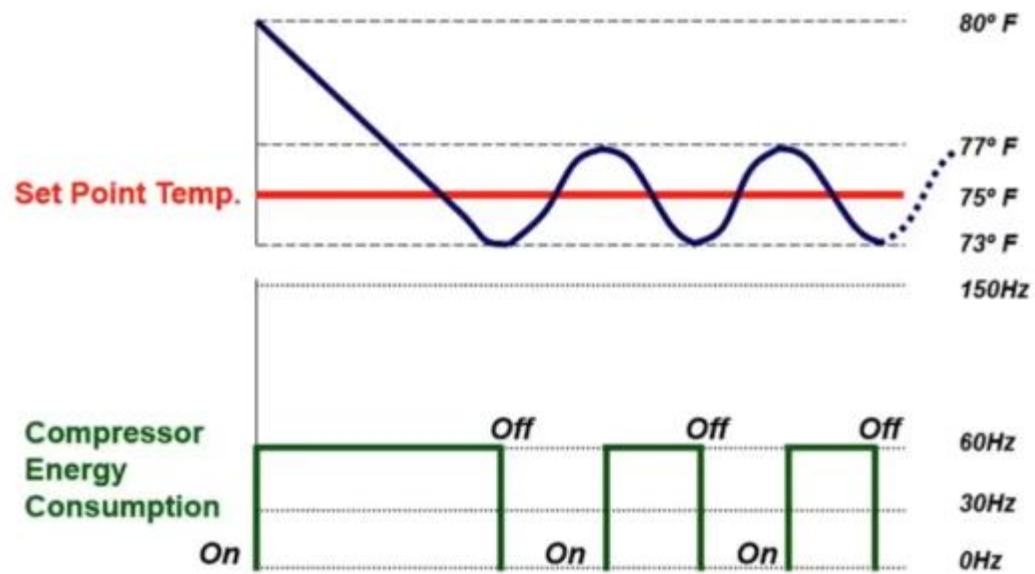


## Ductless "Heads"

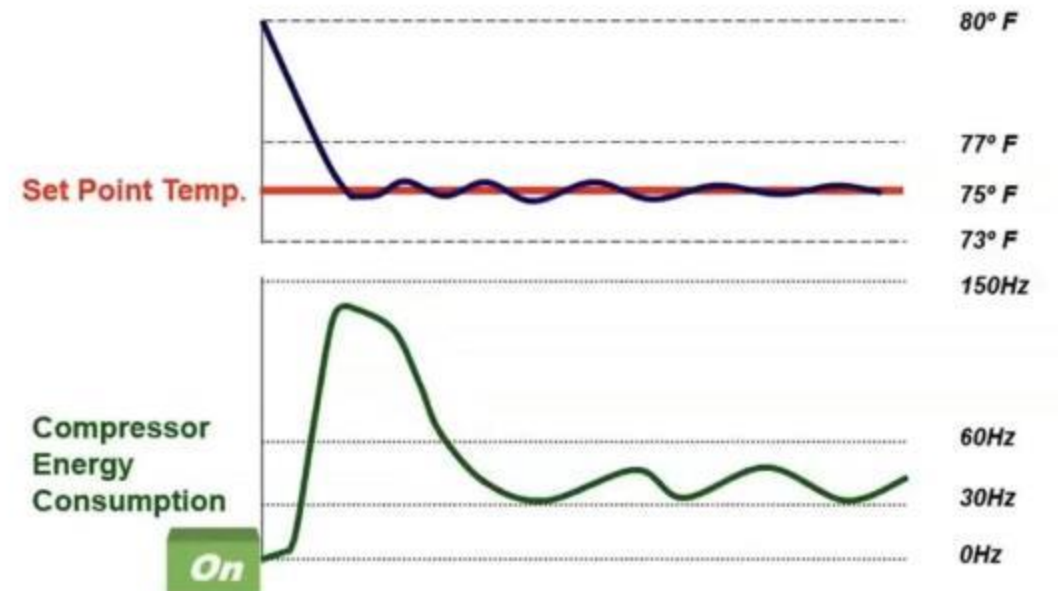


# What is an Inverter?

## Traditional Compressor

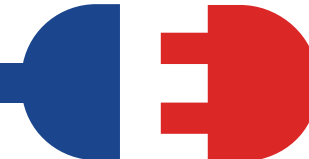


## INVERTER-driven Compressor



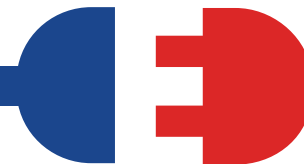
# Inverter Differences

Feature	Fully modulating and communicating inverter	Temperature-sensing and pressure-based inverter
<b>SYSTEM TYPE</b>	Mini-split based; some very high end unitary	Unitary
<b>EFFICIENCY</b>	Based on nominal rated outputs	Great efficiencies
<b>CONTROLLER</b>	Manufacturer communicating controller	Traditional on/off thermostat, 24-volt
<b>CONTROL FEATURE</b>	Adjusts output based on control setting	Does not respond to t-stat changes in real time
<b>COMPRESSOR SPEED</b>	Up to 700+ points of communication	Based on coil temp
<b>AIR SPEED</b>	No fixed air speed	Fixed blower speed ECM
<b>COMPONENT COMMUNICATION</b>	All components	NA
<b>POWER (Air Handler)</b>	Wire from air handler to outdoor unit (typically)	Air handler requires its own circuit
<b>CAPACITY</b>	Some run 20% to 130%	Adjustable based on setting



# Advantages of Mini & Multi Split Inverters

- ⚡ Inverter gives large range of operating capacity
- ⚡ Slim to fit - just 20 inches off the wall
- ⚡ 56 Db is a loud one; some are <47 Db
- ⚡ One power wire for most applications
- ⚡ Low static pressure models for small applications
- ⚡ Mid static products open new opportunities



# Mini Split Heat Pumps Ductless vs Ducted

## Ductless Advantages

- 🔌 Single zones 1-1 wall mounts efficiency up to 31 SEER +
- 🔌 Lots of configurations and styles
- 🔌 Great for 1-3 room with multi zone



## Ductless Disadvantages

- 🔌 Condensation drain dictates location
- 🔌 Outside wall or pump
- 🔌 Difficult for service
- 🔌 Tough sell for because of aesthetics





# Multi-Zone Systems



## Advantages

- ✦ Flexibility for multi-room solutions (ducted and/or ductless)
- ✦ Houses with a separate climate zones
- ✦ Branch boxes reduce line set lengths
- ✦ Less space needed

## Disadvantages

- ✦ More refrigerant
- ✦ More chance for leaks
- ✦ Capacity penalty
- ✦ Less efficient
- ✦ No redundancy
- ✦ More difficult to repair
- ✦ More complicated installation



# Single Zone Ducted

## Advantages

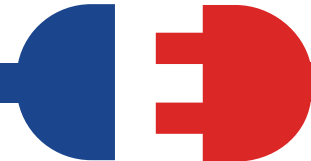
- ⚡ Multiple rooms with 1 unit
- ⚡ Smaller capacity needed compared to multiple wall units
- ⚡ Quieter
- ⚡ Discrete
- ⚡ Higher efficiencies in one-to-one application
- ⚡ Easier sell to the aesthetic eye
- ⚡ Works like central forced air



## Disadvantages

- ⚡ More involved installation
- ⚡ Needs “better install quality”
- ⚡ Needs a load calc for best result
- ⚡ Labor hours
- ⚡ Correct registers

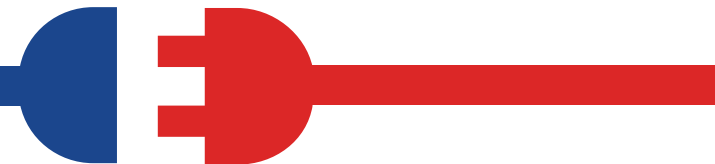
# Room Options – Great for Adding AC In Coastal Areas



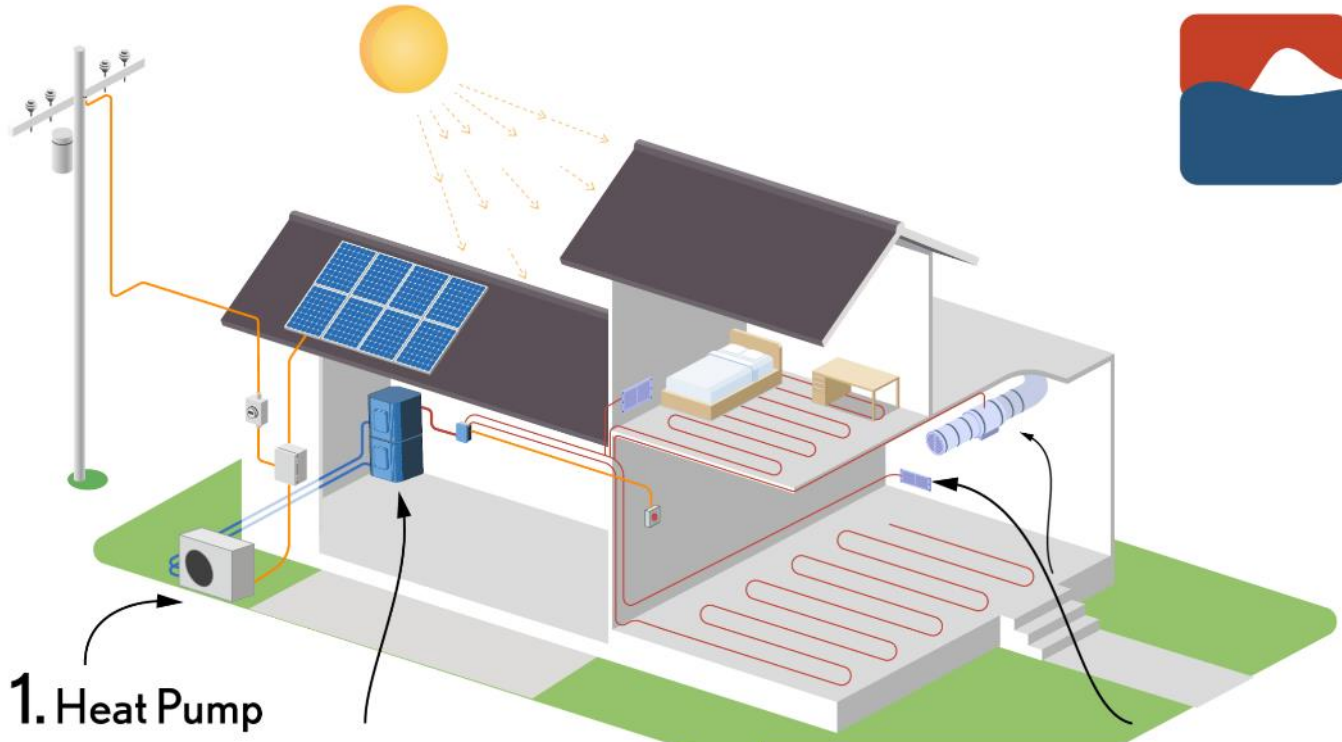
# Furnace Backup/Resistance Backup



Image Source: <https://evergreenhomeheatingandenergy.com/blog/bid-219238-types-of-heat-pumps>



# Air to Water Heat Pumps for Hydronic Fan Coils or Radiant



## 1. Heat Pump

Super efficient heating powered by the grid or roof-top solar.

## 2. Energy storage

Space saving modular energy storage

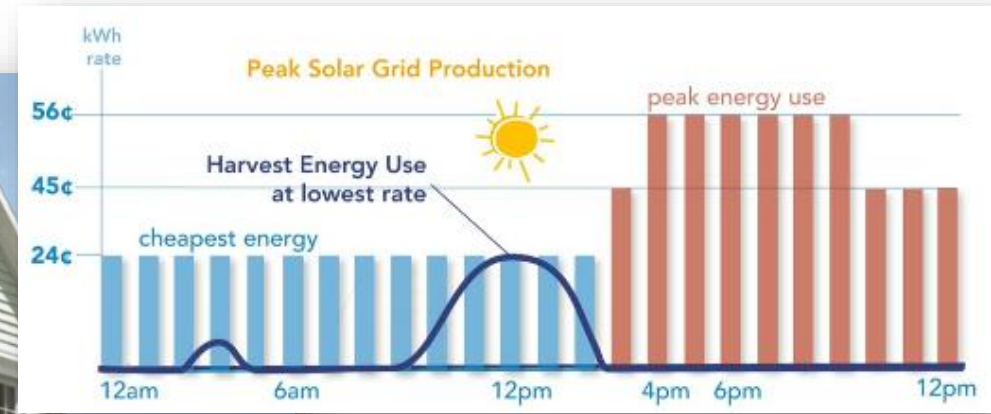
## 3. Heating and air conditioning

Existing ductwork or hydronic system integrates seamlessly with the Sensible system



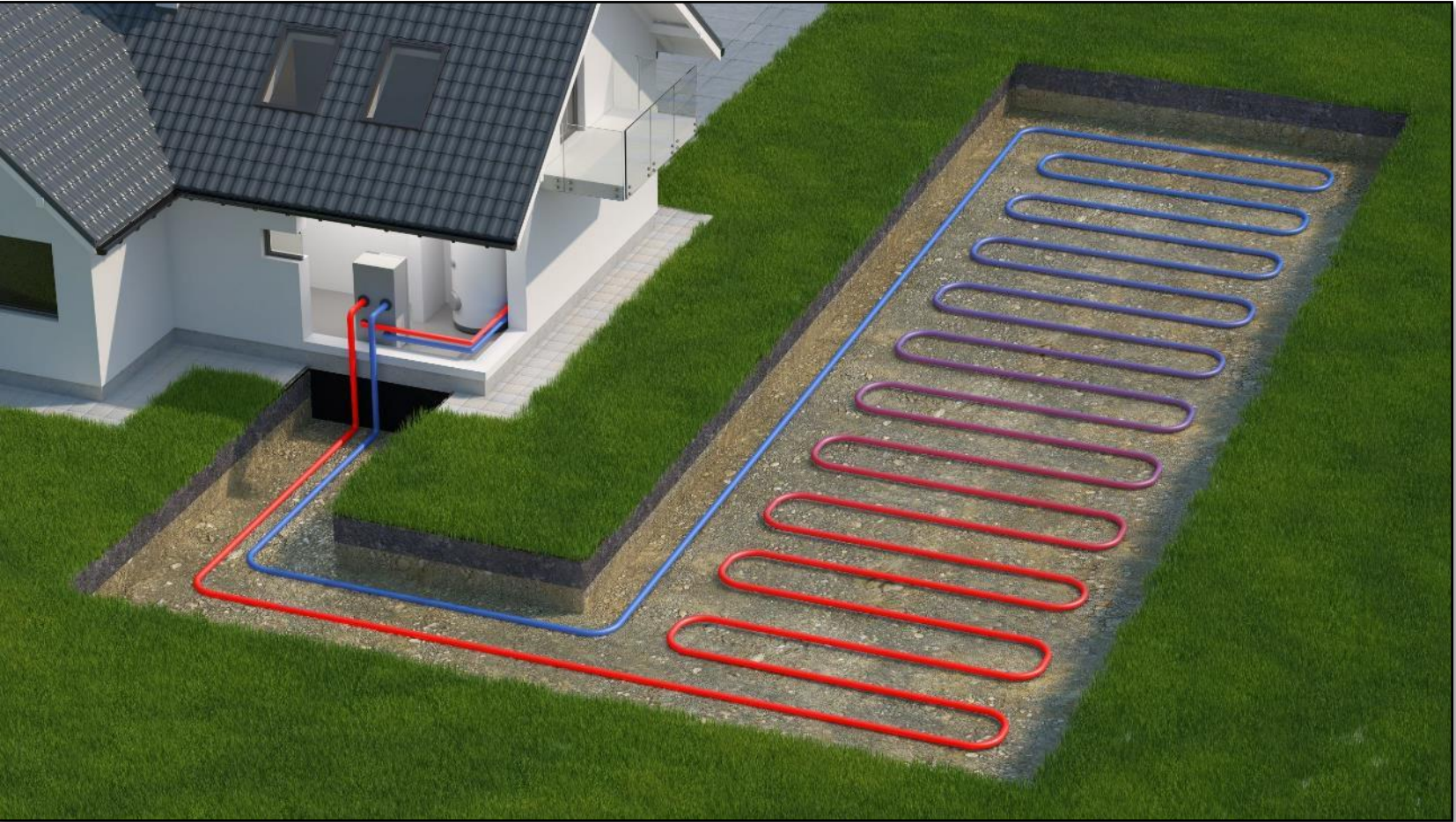


# Harvest Thermal





# Geothermal



Not best for mild climate great for areas with cold winters



## Air Source and Ground Source Heat Pumps for Radiant Floors (and swimming pools and hot tubs)



**GeoCool**



**Nordic**  
R Series Residential



**Water Furnace**  
7 Series - 700A11



**Arctic**  
Heat Pump 020A



**Spacepak**  
Split System  
Inverter



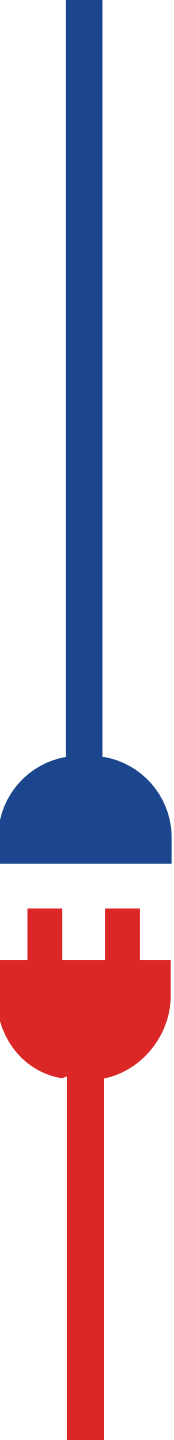
**Aermec**  
**ANK**  
(030,045,050)



**Chiltrix**  
CX34



# Retrofitting Heat Pumps Into Hydronic Homes





# A Tale of Two Cities: The Mitsubishi Multi “City” Variable Refrigerant Flow Systems

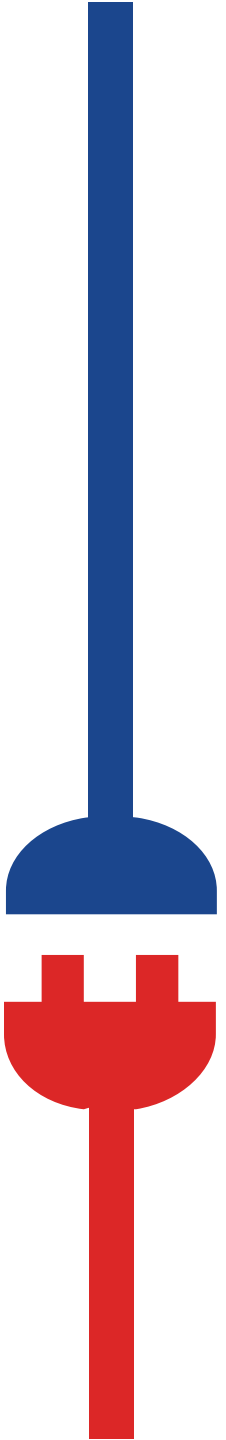


Ross Family Residence in Amherst, MA

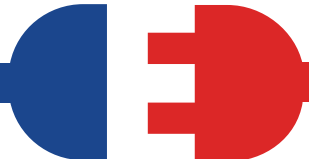




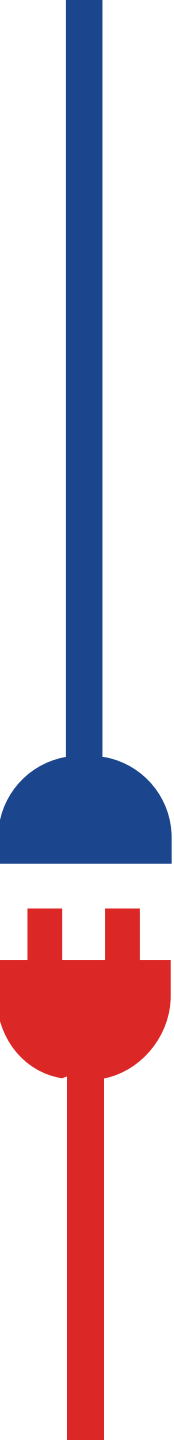
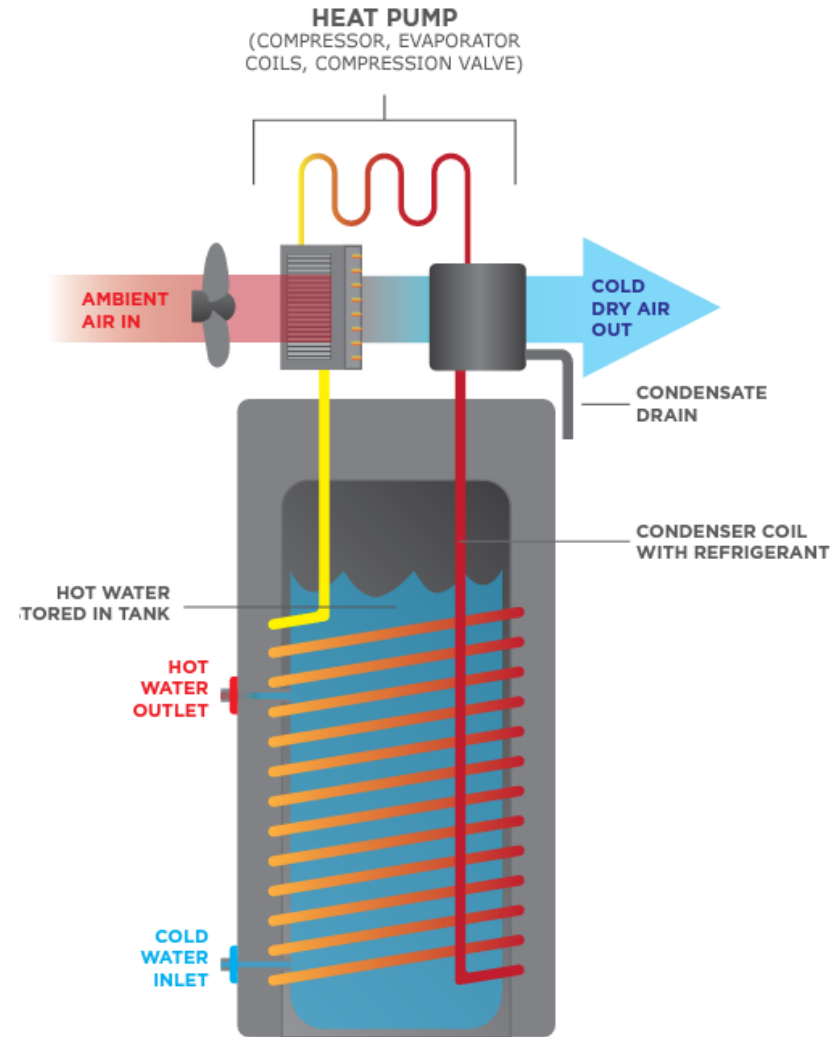
# Electric Water Heating Products



# Alternatives to Traditional Water Heaters?



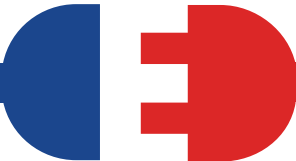
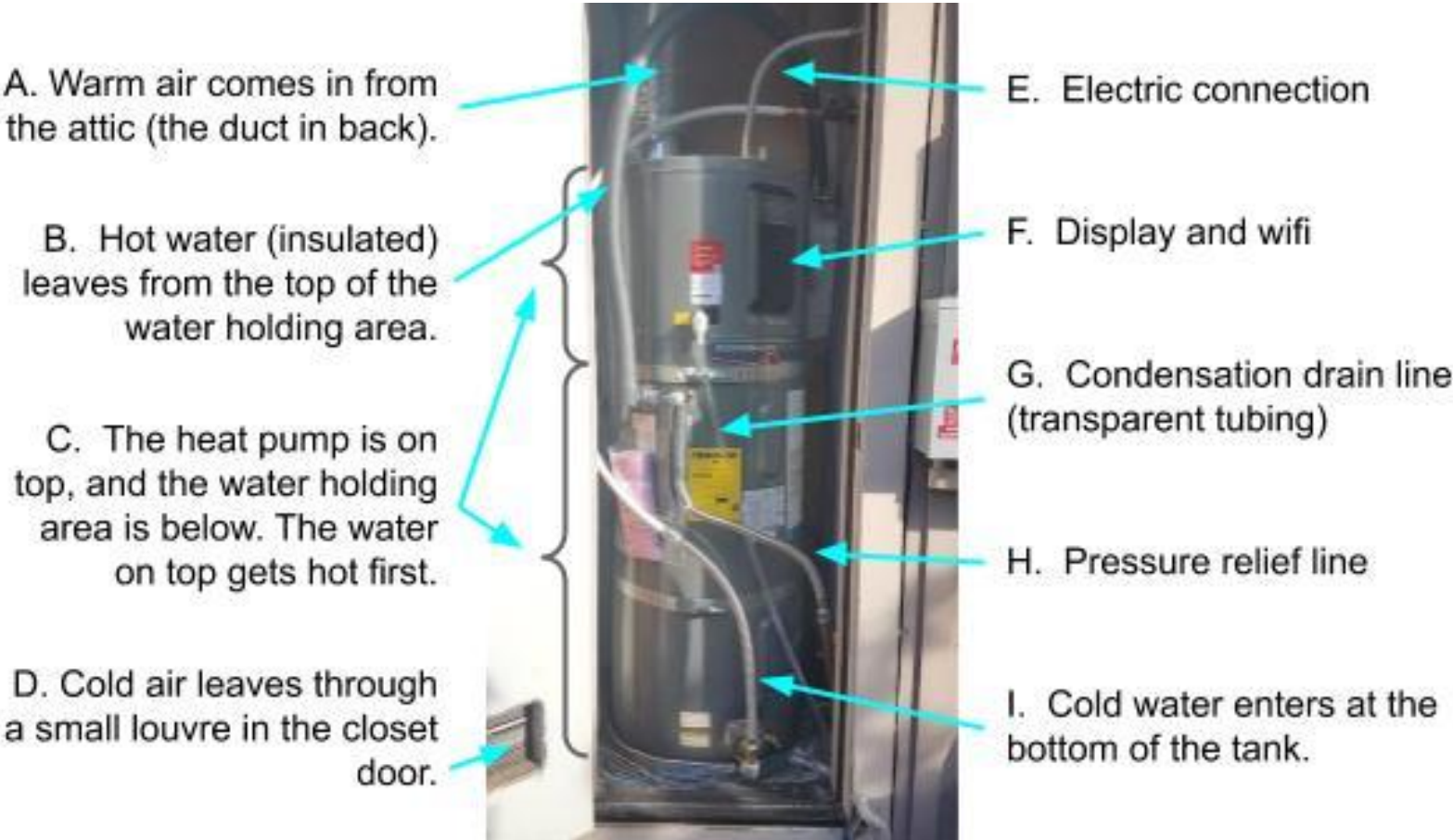
# How Does A Heat Pump Water Heater Work?



Several Brands Available, One w/ 120V, Two with Top Connections



# Installers Must Be Trained, DIY Not Recommended







How Quiet Is Your Lifestyle?

# Split Configuration Helps with Application Challenges



Split system HPWH solves several problems

- ✦ Location
- ✦ Sound – 37 DbA
- ✦ Faster Heat – 115 gal (83-gal system) 145°F temp
- ✦ Best for environment – CO<sub>2</sub> = GWP of 1
- ✦ 15A breaker

## Disadvantages

- ✦ Cost higher
- ✦ Additional time required
- ✦ Outdoor unit must be kept upright and level
- ✦ TIP: Need to sell for more than \$10,000 to make good margin





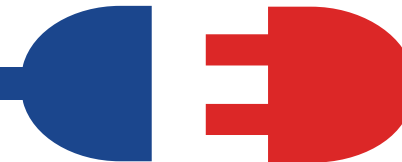
# What About Electric Tankless?



- ⚡ Not practical (whole home)
- ⚡ Huge capacity penalty

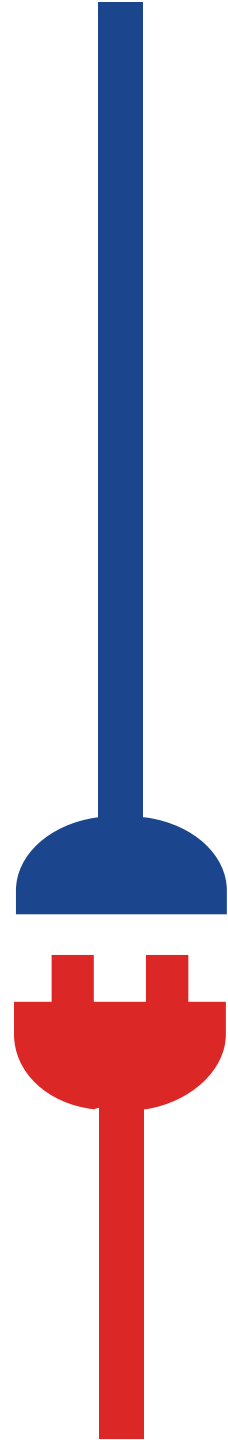


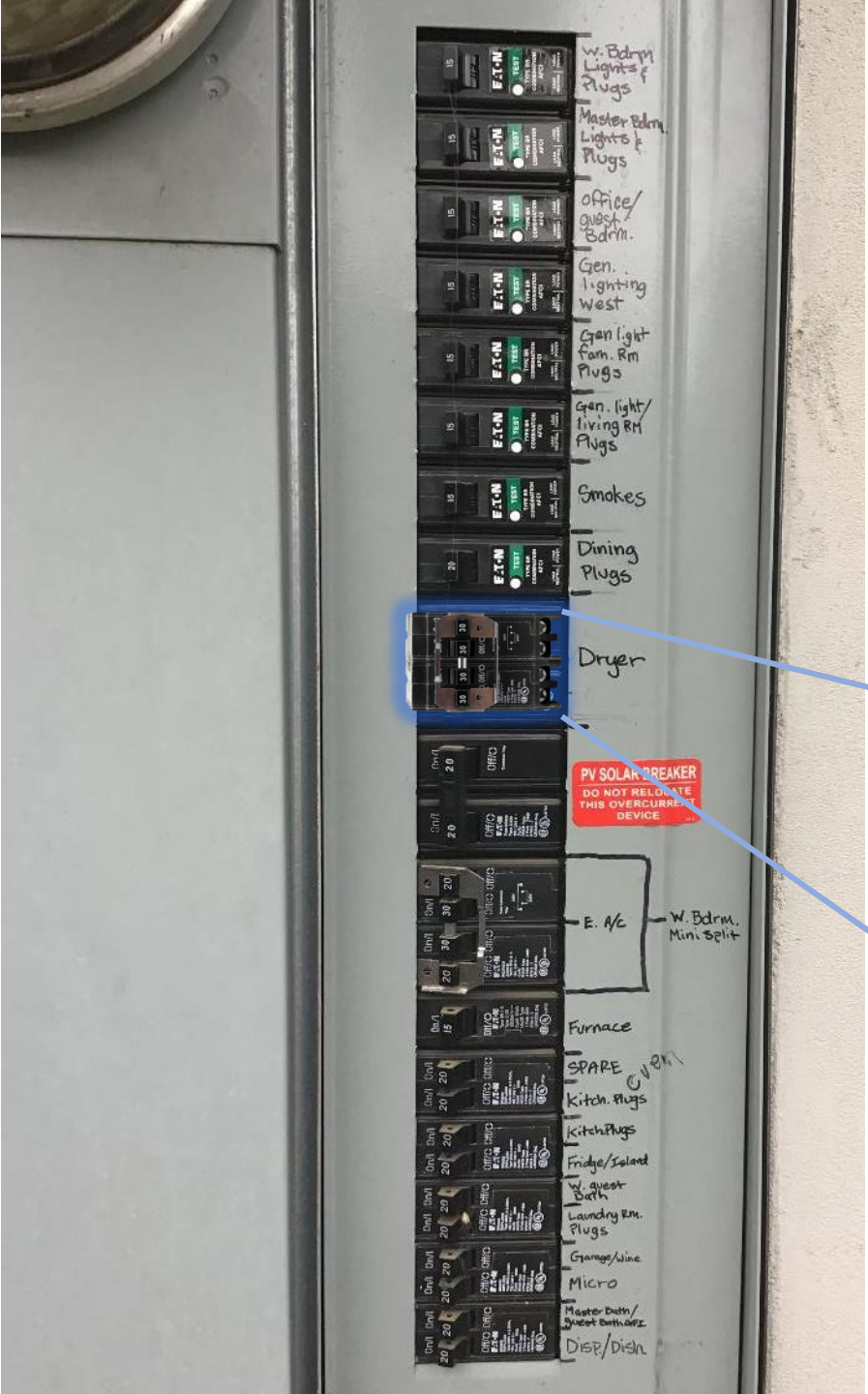
- ⚡ Buyer Beware





# Electric Panel Products

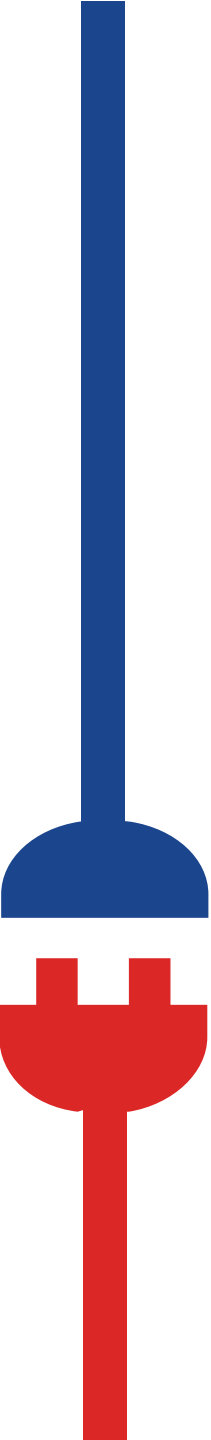
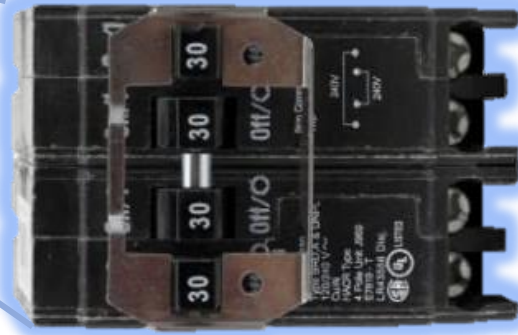




# Solutions to “Full” Panels

Task: Add a HPWH Circuit

🔌 Option 1: Quad it out!

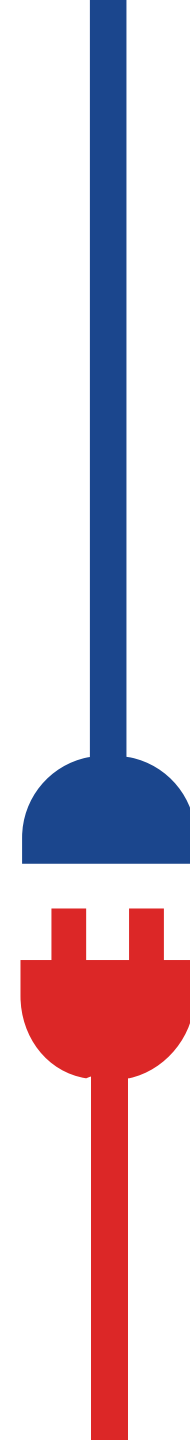
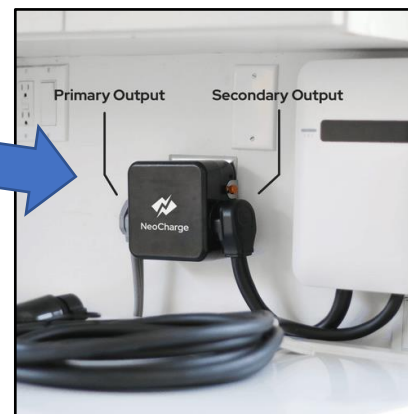
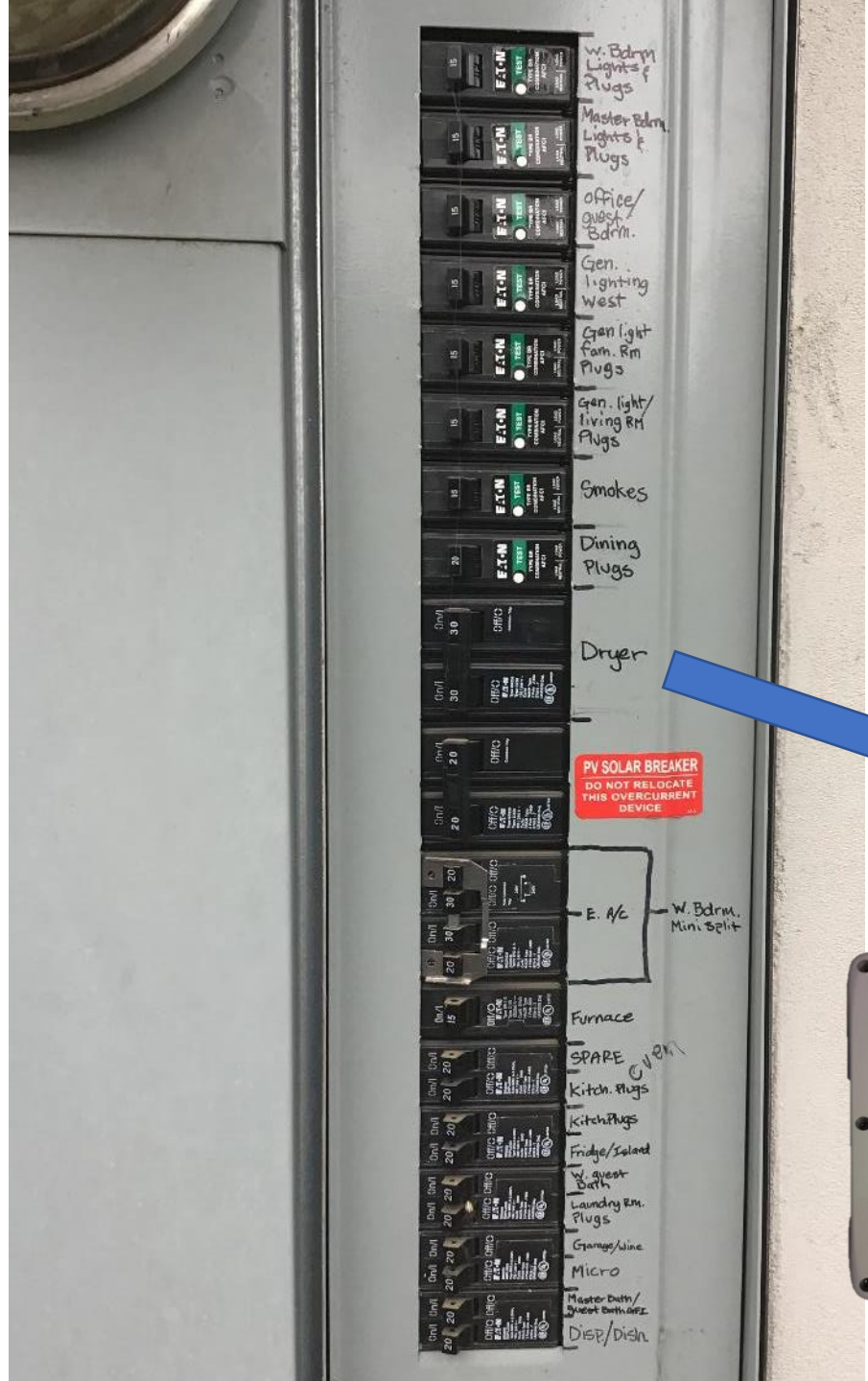


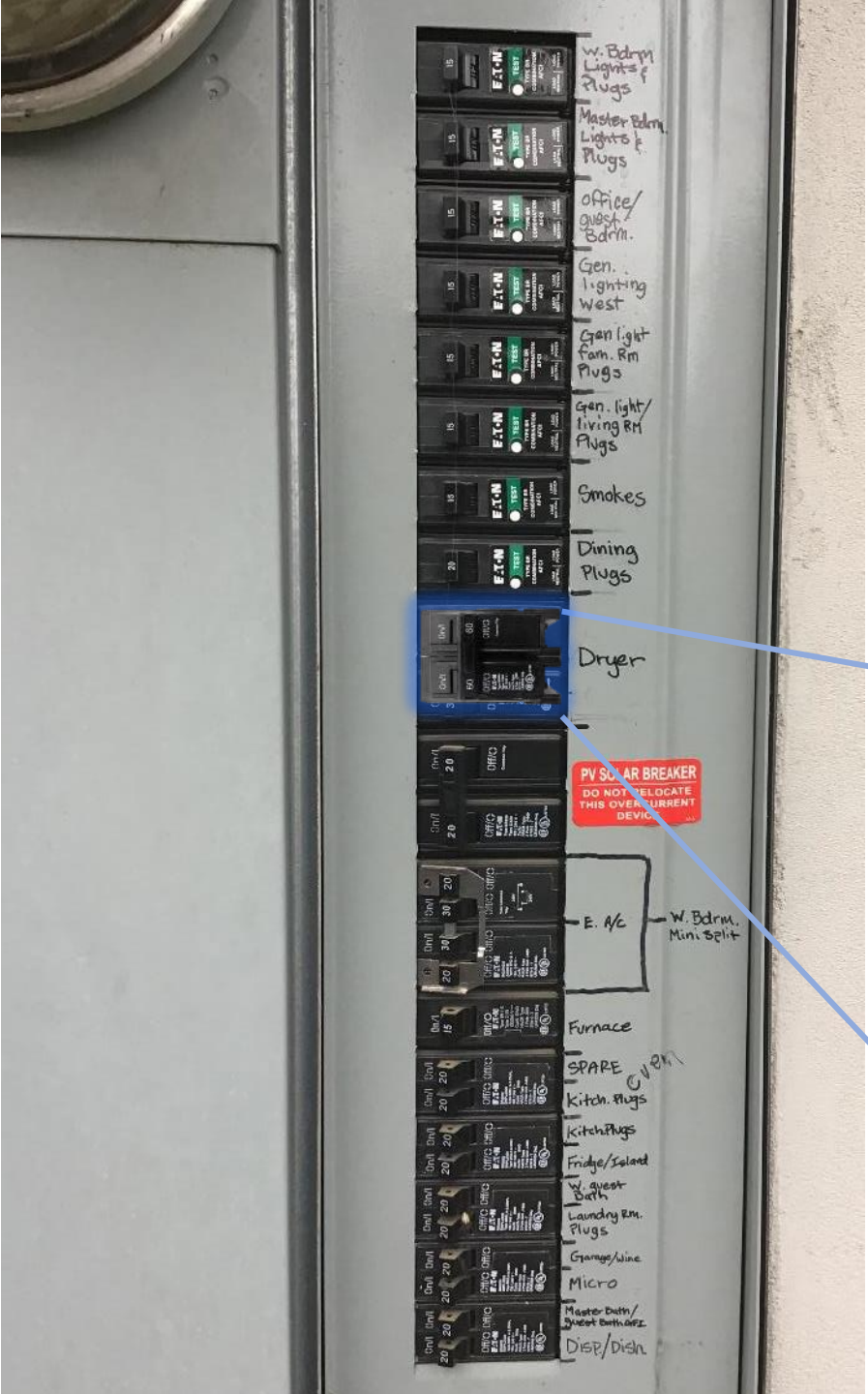


# Solutions to “Full” Panels

## Task: Add a HPWH Circuit

🔌 Option 2: Circuit Splitter!





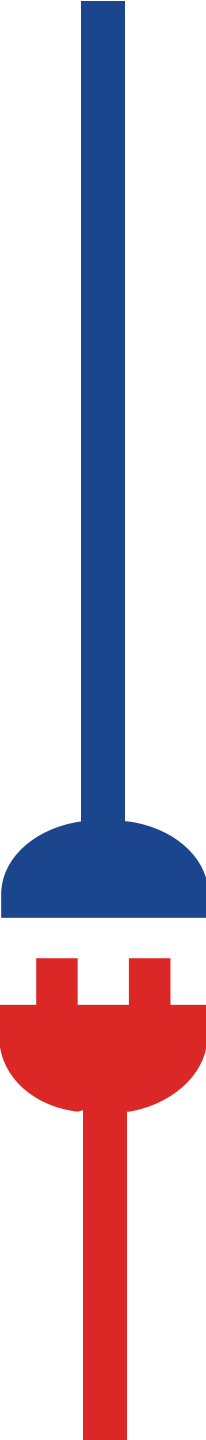
# Solutions to “Full” Panels

Task: Add a HPWH Circuit & a Couple More

🔌 Option 3: Add a Subpanel



🔌 Tip – add the neutral!

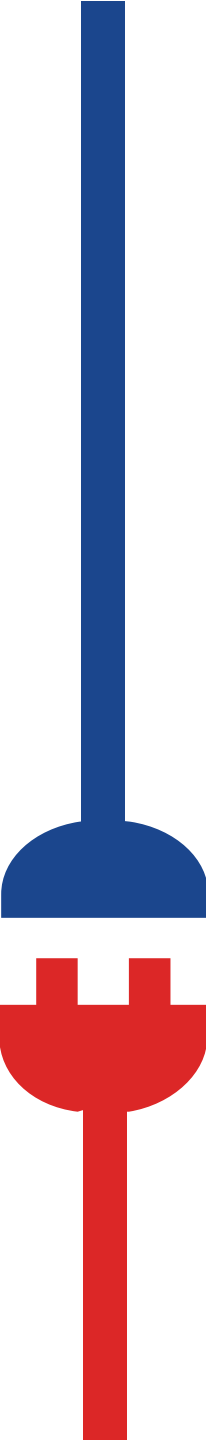




# Solutions to “Full” Panels

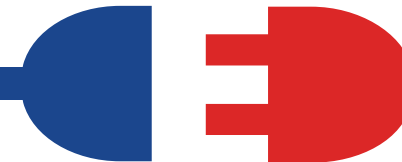
**Task: Add a HPWH Circuit  
(and much more)**

- 🔌 Option 4: Smart Panel

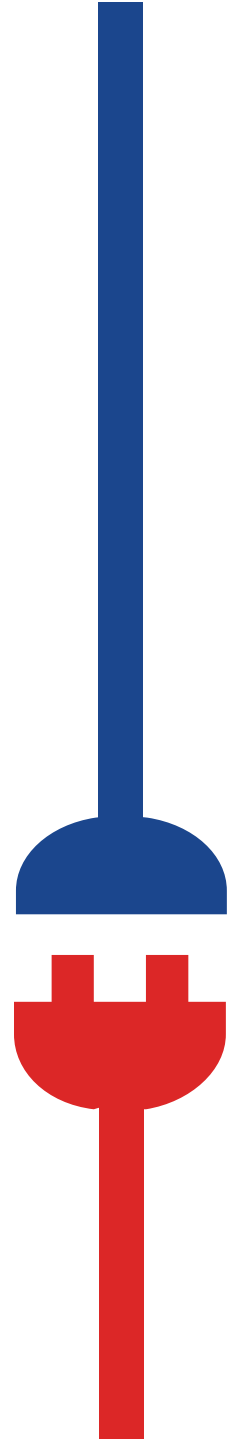


# Sub Circuit Energy Monitoring

- 🔌 Pinpoint energy utilization
- 🔌 Several options available



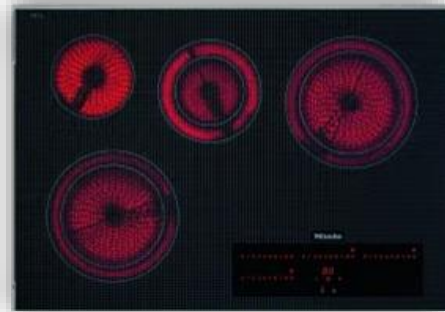
# Part 2 – Other Electrification Products



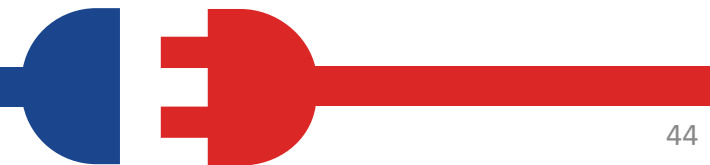
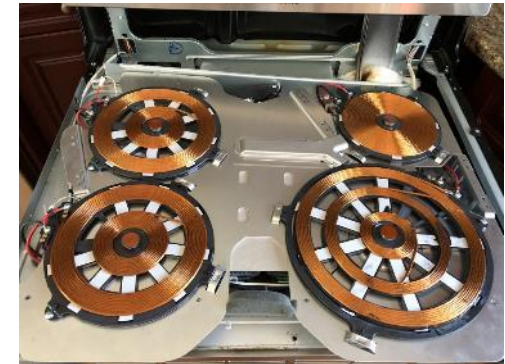


# Stoves: 60% Are Already Electric in the U.S.





## •Electric Resistance



## •Electric Induction








## Low Cost

<b>Amana</b> <b>AER6303MFS</b> 	<b>Whirlpool</b> <b>WFE320M0ES</b> 	<b>Frigidaire</b> <b>FFEF3052TS</b> 	<b>GE Appliances</b> <b>JBS60DKBB</b> 
1,800	3,000	100-3,000	3,100
\$450	\$550	\$550	\$550

## Mid Range


<b>Frigidaire</b> <b>FFIF3054TS</b> 	<b>LG</b> <b>LSE4616ST</b> 	<b>Frigidaire</b> <b>Gallery</b> <b>FGIH3047VF</b> 	<b>Samsung</b> <b>Virtual Flame</b> <b>NE58K9560WS</b> 	<b>GE</b> <b>Profile</b> <b>PHS930SLSS</b> 
\$1,000	\$1,900	\$2,000	\$2,400	\$2,440

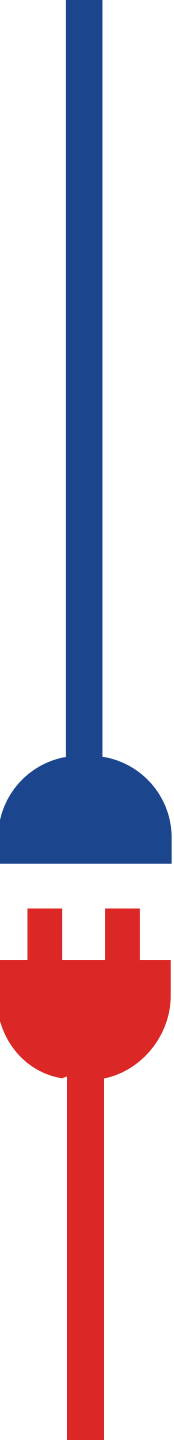
## Retro Luxury

<b>Smeg Range Cooker</b> <b>Victoria TR4110IPG</b> 	<b>Retro Collection</b> <b>BCRI30</b> 	<b>Elmira Northstar</b> <b>1954P</b> 	<b>Ilve Majestic II</b> <b>Collection</b> <b>UMDI10NS3MBP</b> 	<b>AGA Classic</b> <b>ATC3</b> 
\$3,500	\$5,100	\$5,800	\$9,100	\$22,000
				9,600

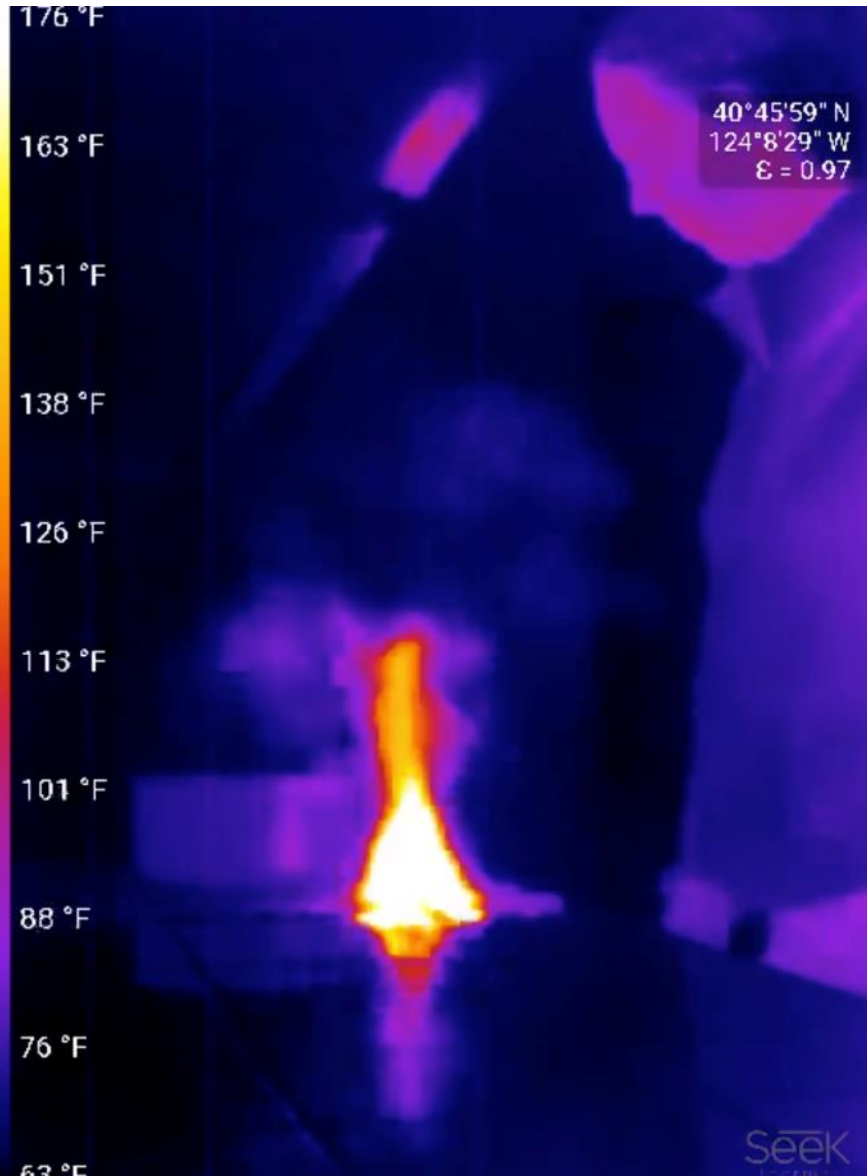
# Taylor Swift Cooks On Countertop Induction



<p><b>Empava</b> IDC-36 36"</p> 	<p><b>KitchenAid</b> KCES556 HSS 36"</p> 	<p><b>Bosch</b> NETP068SUC 30"</p> 	<p><b>Samsung</b> NZ36K7880UG 36"</p> 	<p><b>Frigidaire</b> FPIC3677RF 36"</p> 
\$900	\$1,300	\$1,300	\$2,300	\$2,500

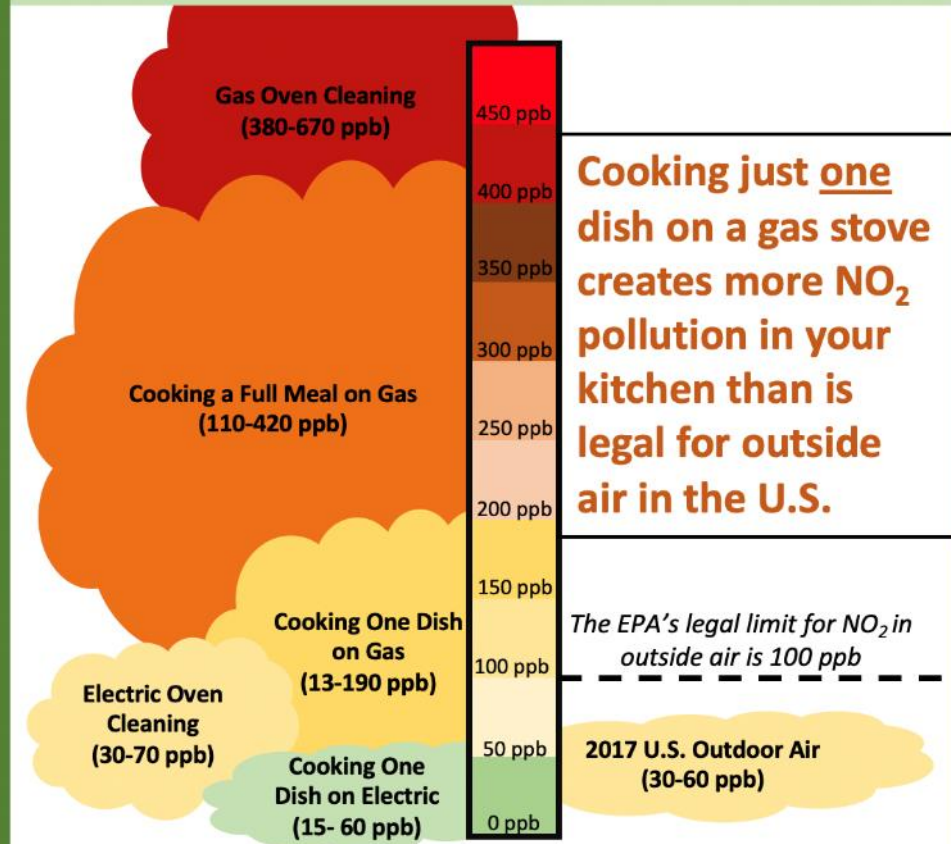


# Gas Stoves: Like A Pack of Cigarettes



## Nitrogen Dioxide (NO<sub>2</sub>) Air Quality

Comparing Cooking Emissions From Gas and Electric Stoves to 22 Outdoor Air Testing Sites in the U.S.

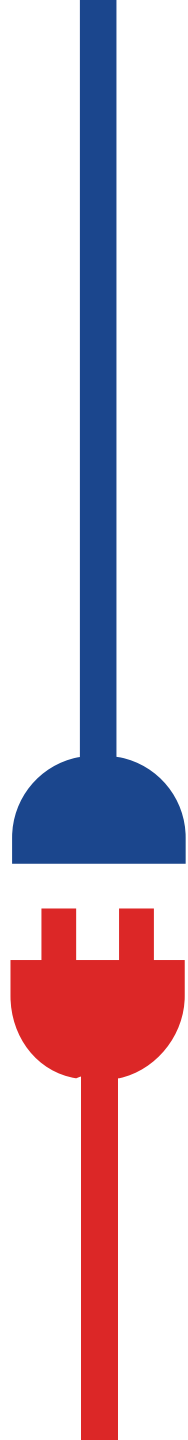
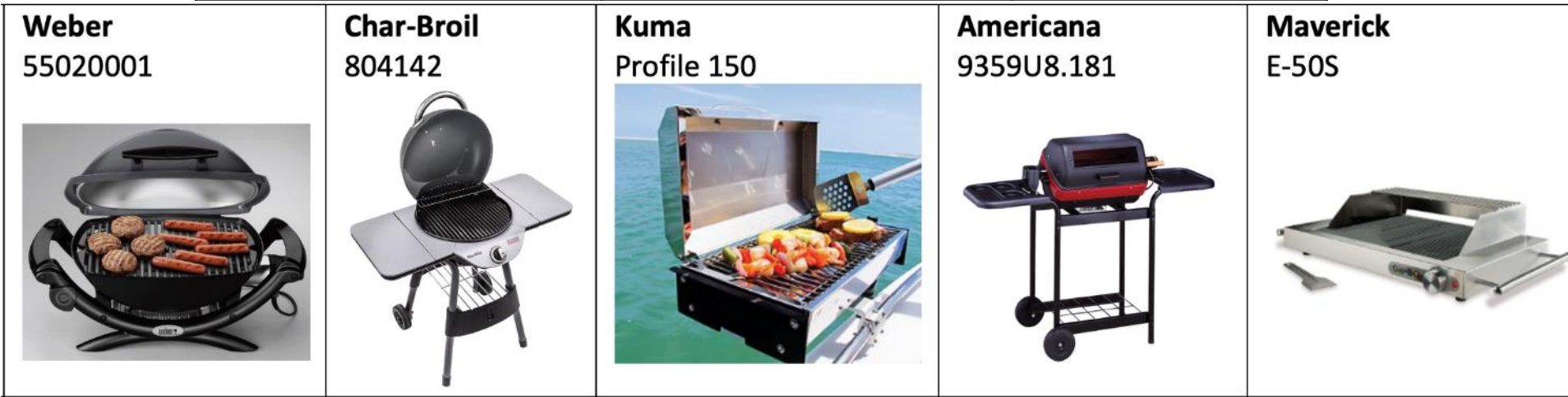


Cooking data from the Air Resource Board's Residential Cooking Exposure Study (2011):  
<https://ww2.arb.ca.gov/resources/documents/indoor-air-pollution-cooking>  
Outdoor air data from the U.S. Environmental Protection Agency:  
<https://www.epa.gov/air-trends/nitrogen-dioxide-trends>





# Outdoor Entertaining: Heat and BBQ



# Fireplaces That Make Steam and Heat, No Smoke



Dimplex Opti-Myst Pro 1000  
(\$2099)



Napoleon See-thru  
(\$2,008)



Dynasty DY-BT79  
(\$1,299)



Amantii Zero Clearance  
(\$1,308)



Amantii BI-40-SLIM (In/Out)  
(\$1,618)



Modern Flames CLX Series  
(\$7,449)



Dimplex Opti-Myst Pro 500  
(outdoor) (\$1300)



EnerG+ Patio Heater  
(outdoor) (\$186.99)



Touchstone Sideline  
(outdoor) (\$574)



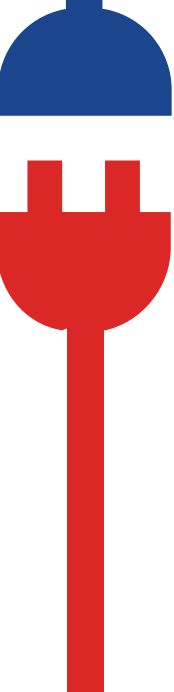
Dimplex Opti-Myst Pro 400  
(\$1749)



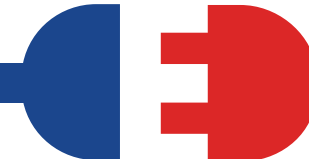
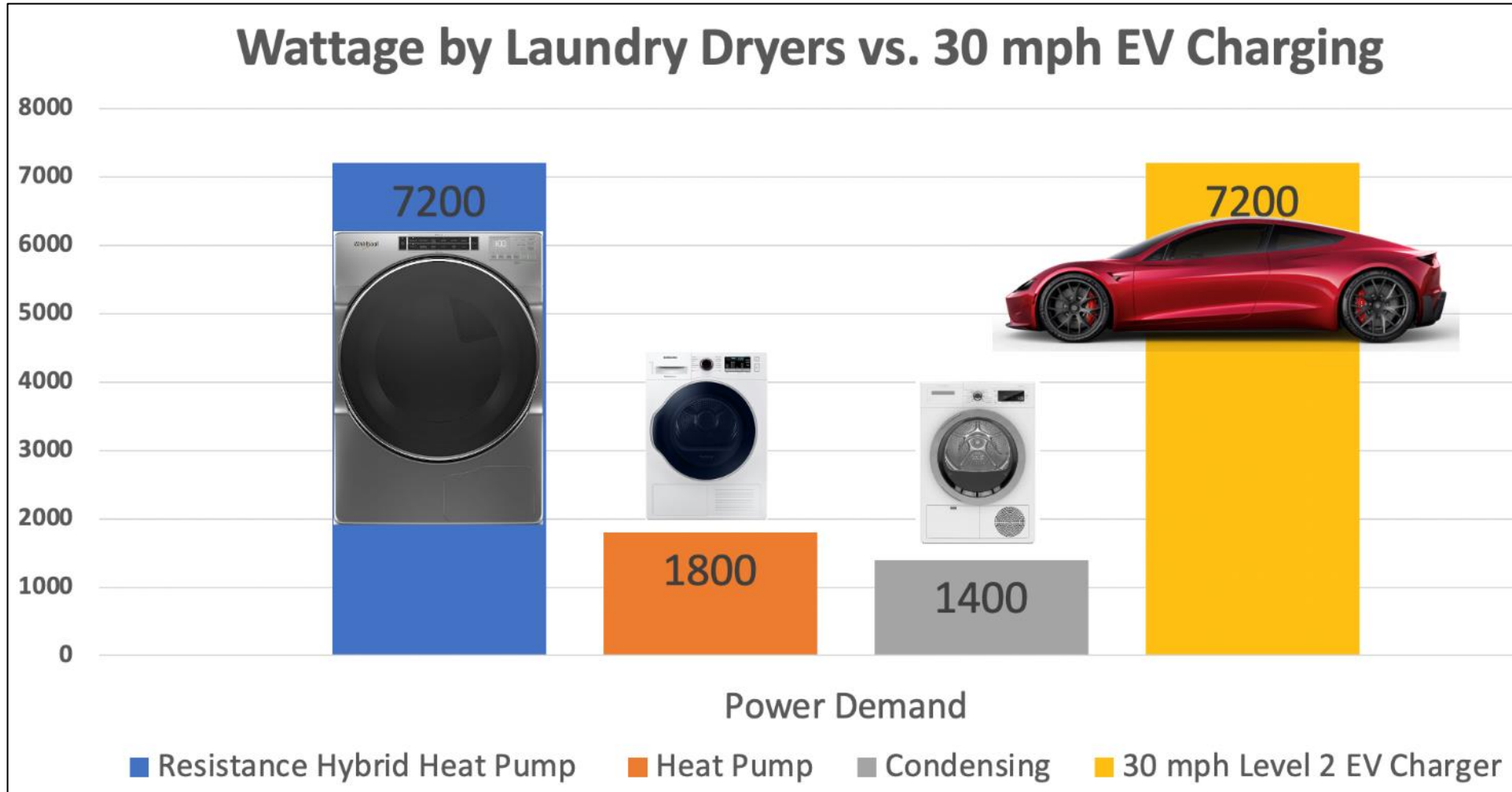
ClassicFlame Felicity  
(\$349.77)



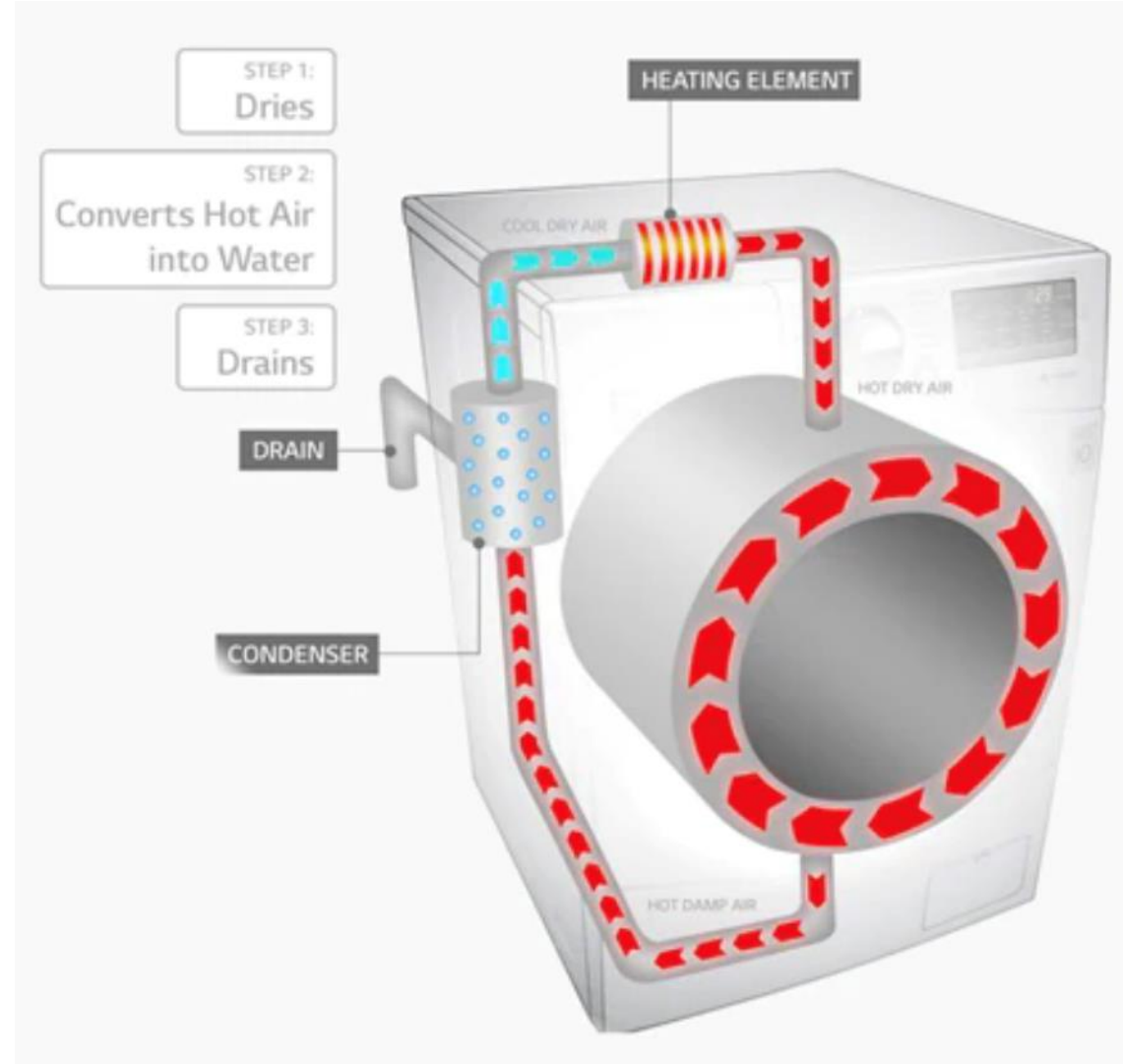
Altra Furniture  
(\$160)



# Laundry Drying Can Take As Much Power as an EV!



What does  
the drying  
cycle look  
like?





# Condensing Washer/Dryers: 120V, no plumbing

\$1200

Equator All-in-one Compact Combo Washer Dryer 1200 RPM spin, Auto water level, Sensor Dry Optional Venting/Condensing in Merlot



\$1300

2.4 cu. ft. White High-Efficiency 120-Volt Ventless Electric All-in-One Washer Dryer Combo  
by GE >



\$1700

27 in. 4.5 cu. ft. Black Steel Ultra Large Capacity Electric All-in-One Washer Dryer Combo  
by LG Electronics >





But what about efficiency? Well, it's an issue...



Combined Energy Factor (CEF) Ⓢ:	2.68
Estimated Annual Energy Use (kWh/yr) Ⓢ:	317

The most efficient **condensing dryer** is less efficient than an inefficient **heat pump dryer**



Combined Energy Factor (CEF) Ⓢ:	3.0
Estimated Annual Energy Use (kWh/yr) Ⓢ:	283



A highest efficiency heat pump dryer: 10.14 lbs/kWh

<b>Combined Energy Factor (CEF):</b>	10.14
<b>Estimated Annual Energy Use (kWh/yr):</b>	236



## GE Profile™ Leads the Industry into the Future of Laundry with an All-In-One Solution

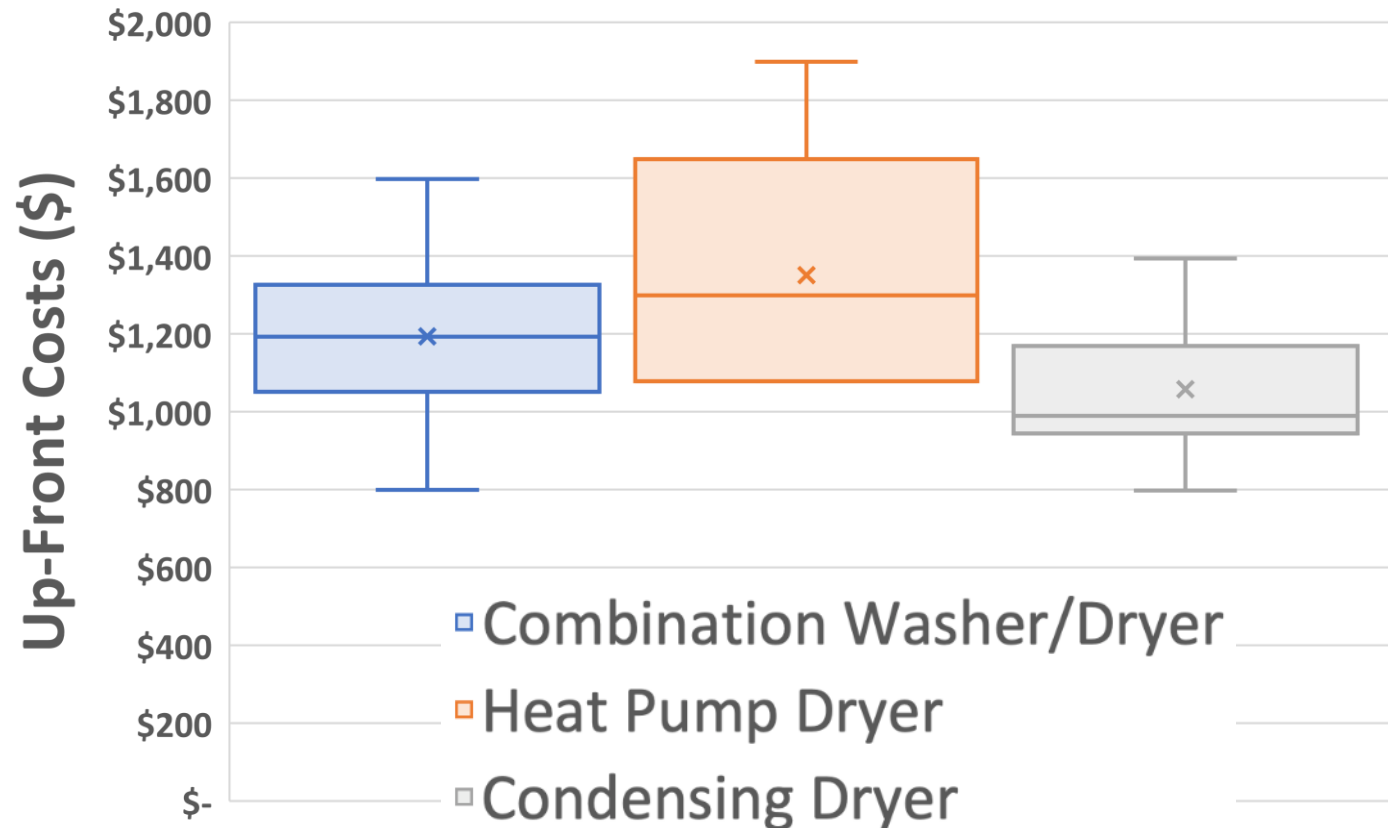


\$2,900

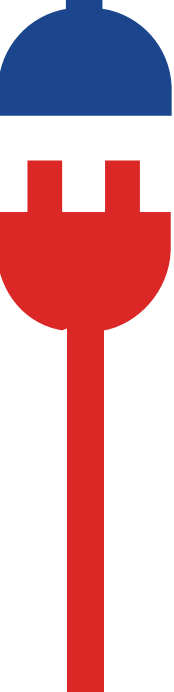


# Does it save purchase costs?

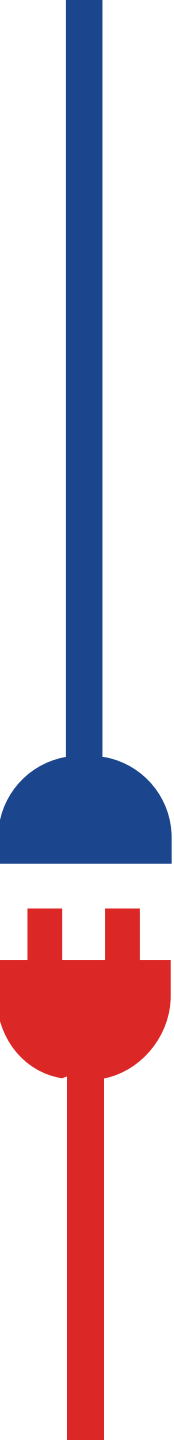
Yes, compared to **also** buying a \$700-\$1200 washer.



# Is The Best Power Outage Solution A Big EV Battery?



# Taiga Snowmobiles





# Taiga Jet Skis



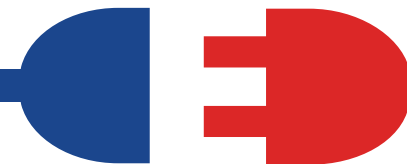
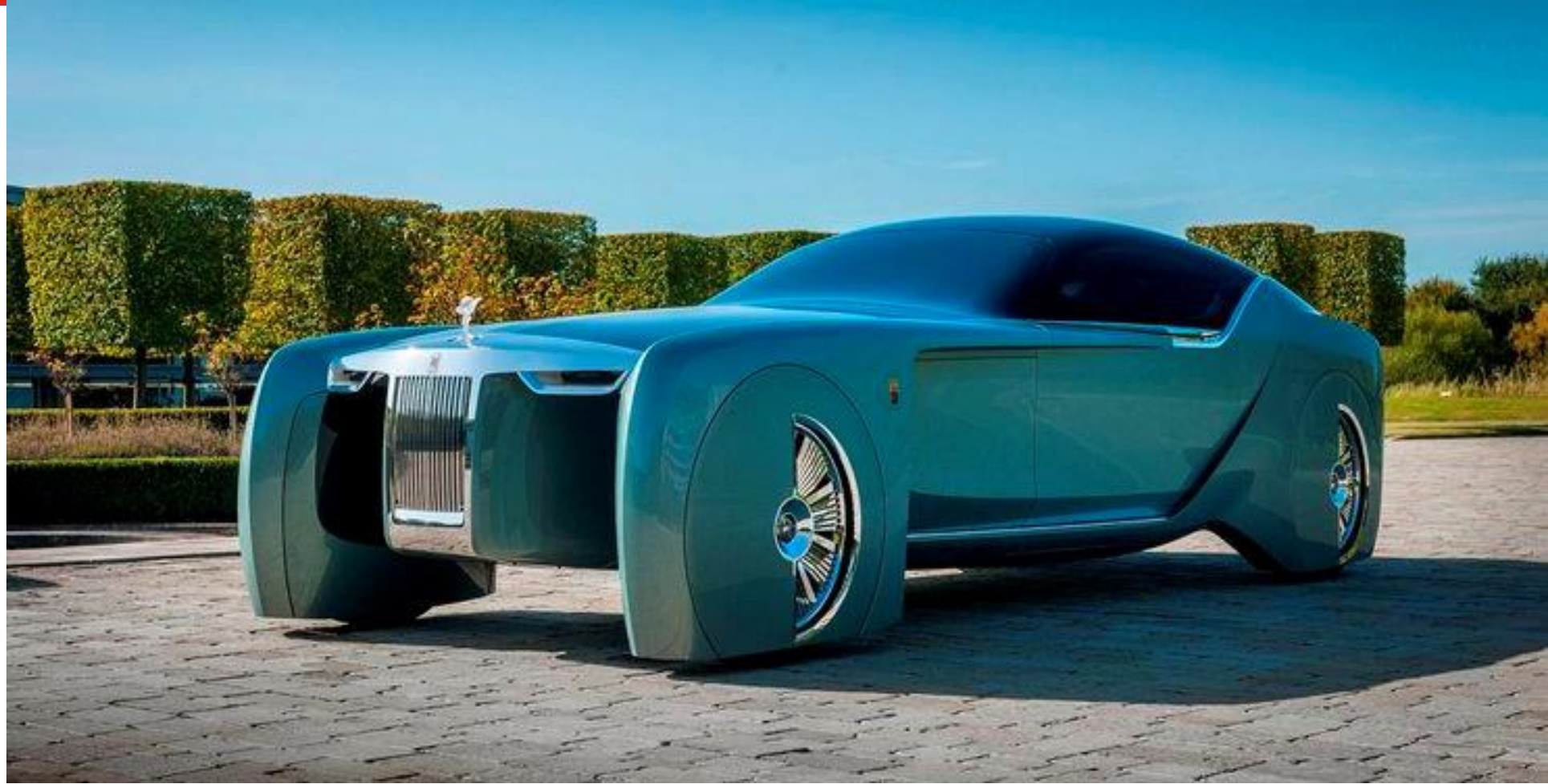


# Rambo Hunting e-bike

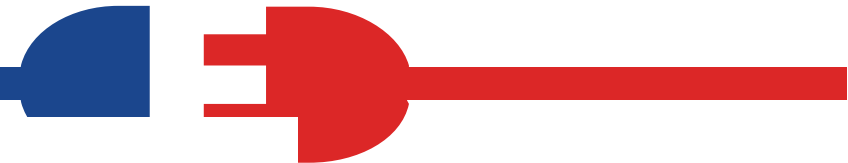




# Rolls Royce 103 EX With An Artificial Intelligence Chauffeur



# Silent 120 Solar Yacht with XP4 Electric Helicopter





# The Silent 120 Comes with an Electric Personal Submarine by U-Boat Worx







POOL HEAT PUMP CUT BILLS IN HALF  
AT TAMARACK CLUB SLOPE SIDE HOTEL, ELLICOTVILLE, NY

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**Case 580EV Backhoe**



**Liebherr LR 1250.1 Crawler Crane**



**Pon/Caterpillar 325F Z-Line Excavator**



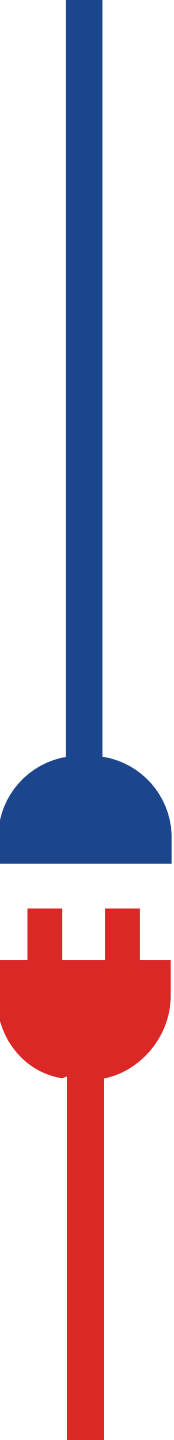
**Volvo L25H Loader**



Oceanbird arrives in 2024 with 90% offset of fossil fuels in Transatlantic Shipping



# Airbus has 3 Zero Emission Planes Planned for 2035



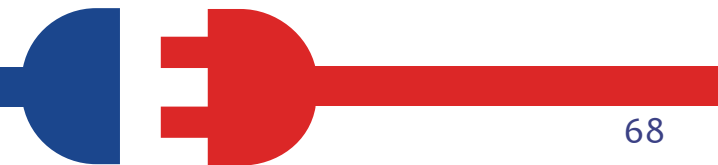


# Questions?

Join us again June 6 at 3:30pm:  
Good Electrification for Solar Contractors: New Business Opportunities



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# Closing

- AIA Learning units
  - Contact [ian.logan@ventura.org](mailto:ian.logan@ventura.org) for AIA LUs
- Coming to Your Inbox Soon!
  - Slides, Recording, & Survey
- Other 3C-REN resources you should be aware of:
  - All other upcoming events: [www.3c-ren.org/events](http://www.3c-ren.org/events)
  - Free energy code technical support: [www.3c-ren.org/code](http://www.3c-ren.org/code)
  - Incentive program for enrolled contractors: [www.3c-ren.org/contractor-participation](http://www.3c-ren.org/contractor-participation)





**Thank you!**

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