

Missing Electrification Technologies





Sean Armstrong

Managing Principal
at Redwood Energy

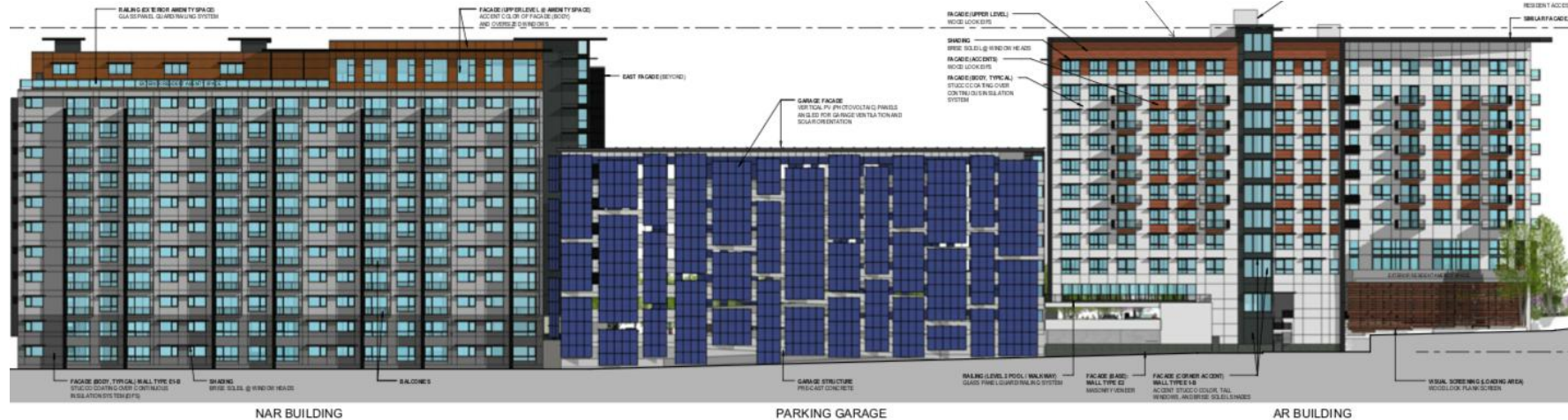
seanarmstrongpm@gmail.com

707.826.1450

sean@redwoodenergy.net

calendly.com/seanarmstrong

- **1995-2019** The Campus Center for Appropriate Technology
- **2002-2005** High School Science Teacher
- **2005-2011** Affordable Housing Project Manager, Pacific West Communities
- **2011-Today** Redwood Energy's Managing Principal. ZNE Design, Research and Education




An advanced easy-install portable and window heat pumps

- High COP at low temperatures (e.g. -5F)
- Low GWP refrigerant (R32)
- Self-cleaning coils
- Quiet (42 dBA)
- 10 Year Warranty

Midea 12000-BTU DOE (14000-BTU ASHRAE) 115-Volt Black Vented Portable Air Conditioner with Heater Wi-fi Compatibility
Item #5019977 Model #MAP14HS1TBL

★★★★★ 1



\$699.00

\$664.05 when you choose 5% savings on eligible purchases every day. [Learn how](#) OR \$117/mo with 6 mo [Learn ho](#)

setPAY Pay \$61.45/month in 12 monthly payments with Set [Learn how](#)

- Innovative Duo Hose Design - Midea's industry-first hose the unit to lock cool air in, and force hot air out
- More than 2x Faster Cooling - Cools down your room not evenly, but also 2x faster
- More than 2X Stronger Cooling - Empowered by the duo optimized air duct system, Midea Duo can lock and maxir

Protect your Product
View available plans & Services

Haier Lowe's

FREE STORE PICKUP
Get it by Wed, May 25 (Est.)

Combining the defrost ability of the single-speed Haier brand with Midea's inverter version (efficiency + capacity + quiet) and advanced hose-in-a-hose design. Haier and Midea are both leading Chinese-owned and made brands.



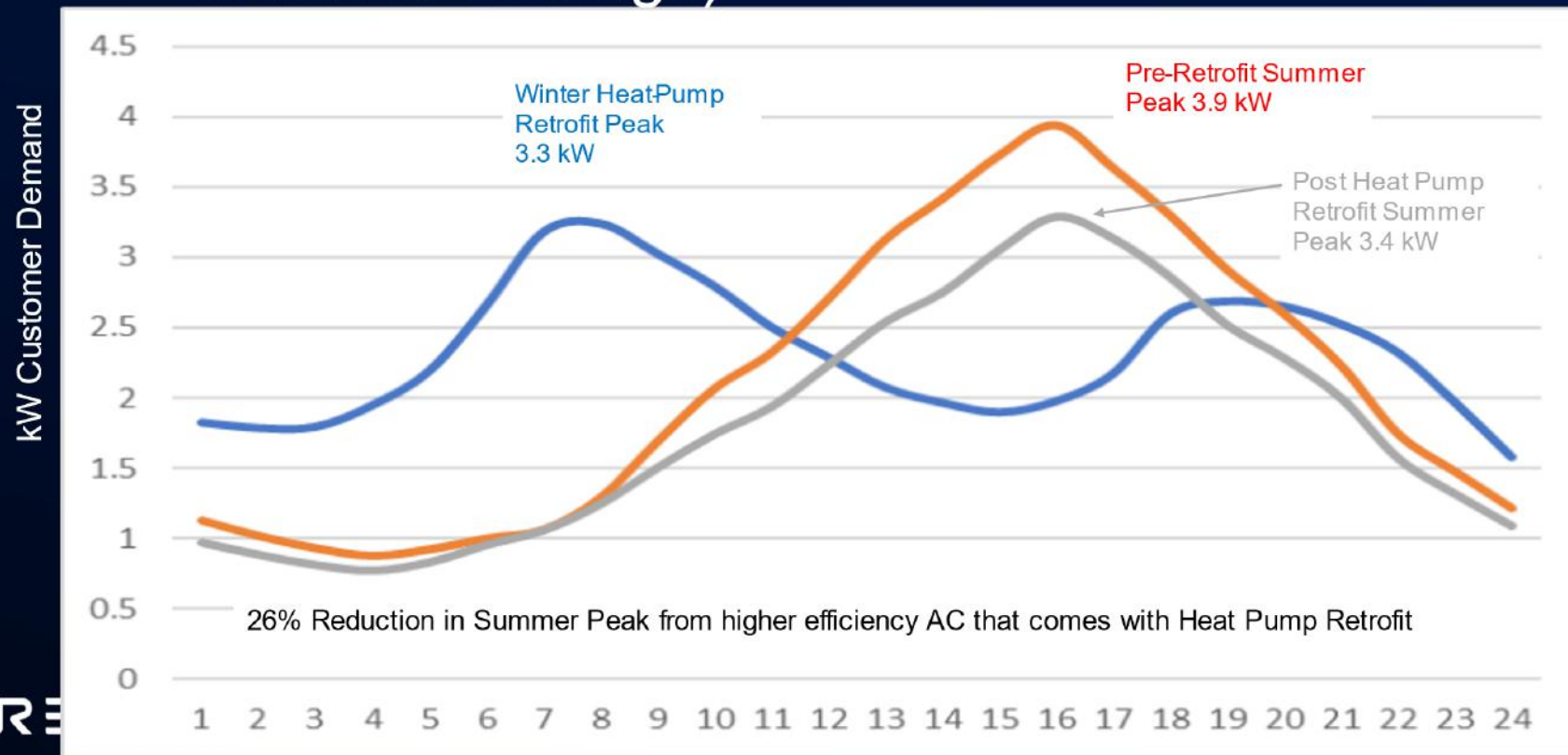
An advanced hotel PTAC

- High COP at low temperatures (e.g. -5F)
- An ERV, reclaiming heat and AC at 1/13th the energy of a heat pump, 1/37th of electric resistance
- MERV 13 Filter for smoke season
- Low GWP refrigerant (R32)
- Self-cleaning coils
- Ultra-quiet (27 dBA)
- 10 Year Warranty
- Little to no leakage
- 4" off of wall, not standard 8"



SMUD Data on High Performance Heat Pump Retrofits

Comparison of Peak -day grid impacts (700 customer Average)



Large CO2 Boilers for space heating, cooling and domestic hot water. Lync and FlowTech



An American-sized CO₂ heat pump water heater, 120V and Less Than 900W

- CO₂ water heaters work below -30F, compared to 40F with R-134a refrigerant tanks
- All the Japanese CO₂ water heaters are sized for 100-150 gallon Japanese sitting tubs, with 4x larger compressors than American showering needs
- 120V and less than 900W to avoid rewiring challenges.



Hung”

We need space constrained heat pump water



More Warrantied EVs for Bidirectional Charging VW, GM, Ford, BMW, Volvo, etc. Promise 2024- 2026

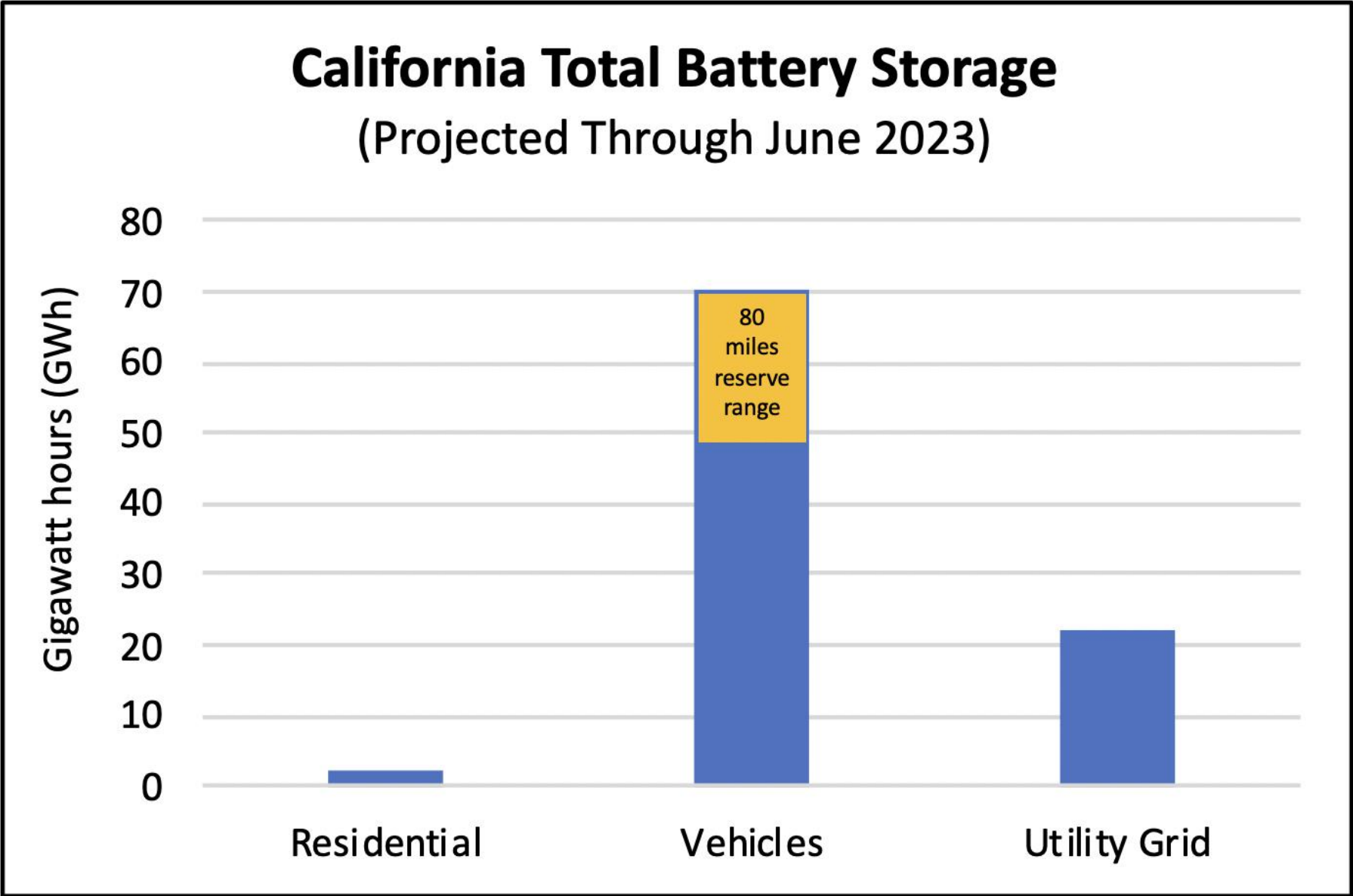


Charging/discharging using quick charge port is possible (even several times a day) if the battery temperature is not near the red zone. If the battery temperature reaches the red zone, in order to protect the battery, charging/discharging is not allowed and the power limitation mode will be triggered. For additional information, see "Li-ion battery temperature gauge" (P. 2-7).

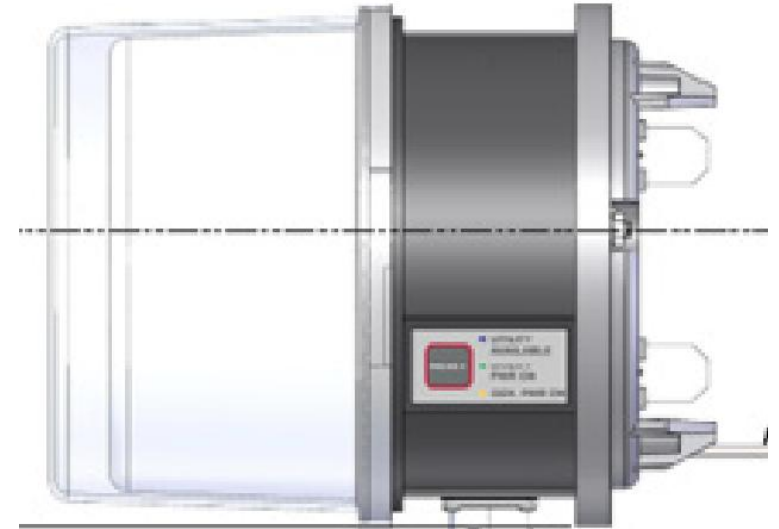
F-150 LIGHTNING



California EVs Have 3x the Battery of Utilities, and 80x the Battery of Homes



Simple Utility Meter Collar for Connecting V2B



A Retrofit Ready Stove- 120V, 1800W, 3 Burners and an Oven



Induction ranges in Japan are commonly 2 and 3 burners, rarely 4

More Battery Back-Up Induction Stoves

Champion Stove Company and the



Chef David Soohoo notes that American woks are limited to 11" induction coils for small "Bow" woks. 18" coils for 24" wide "Chow" Woks don't exist in the U.S. yet.

