ET Summit 2024

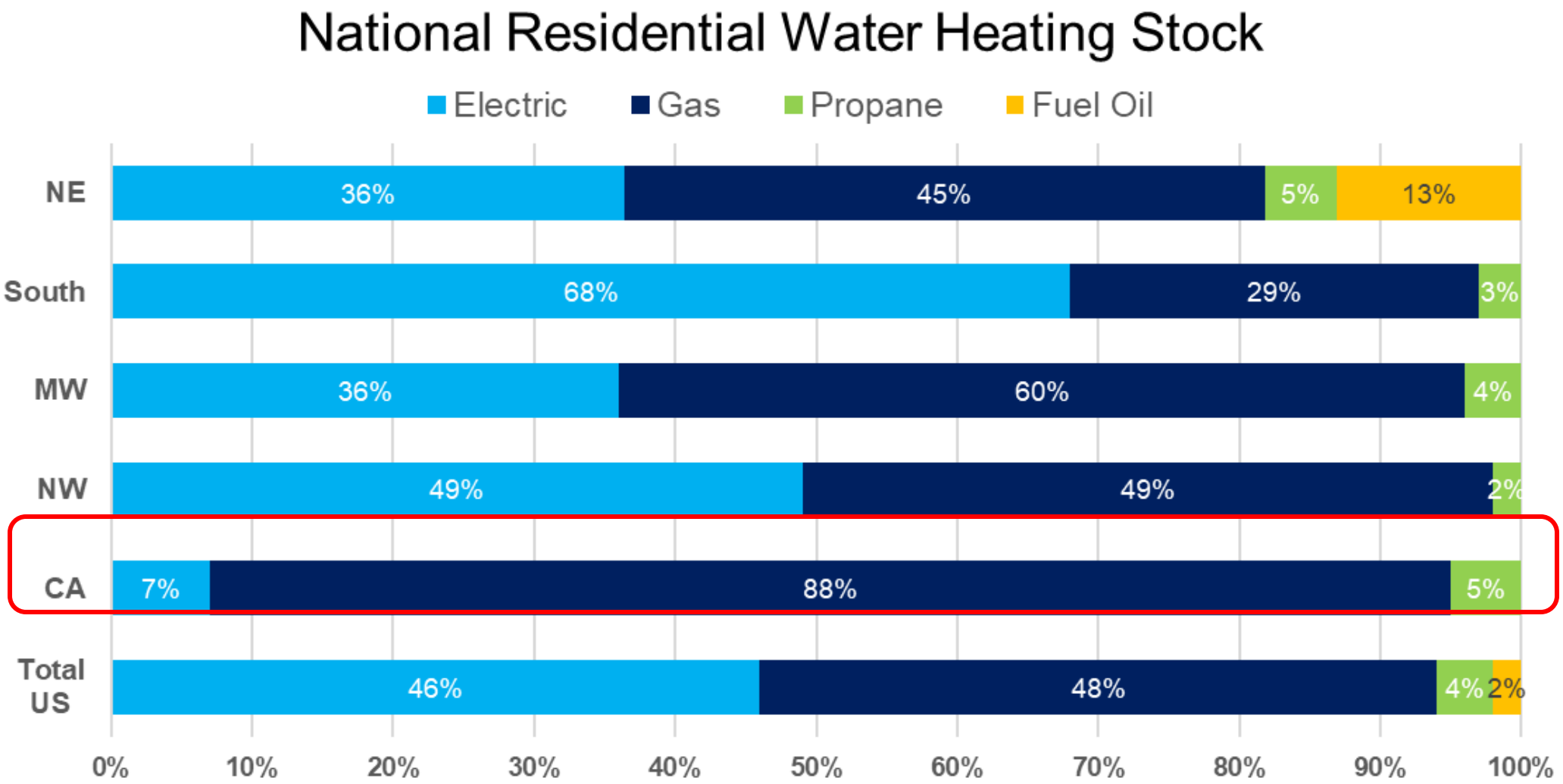
Presented by

120V Heat Pump Water Heaters

A silver bullet for fuel switching in single-family homes

Noah Gabriel
Project Manager
New Buildings Institute

Water Heating Fuel Mix



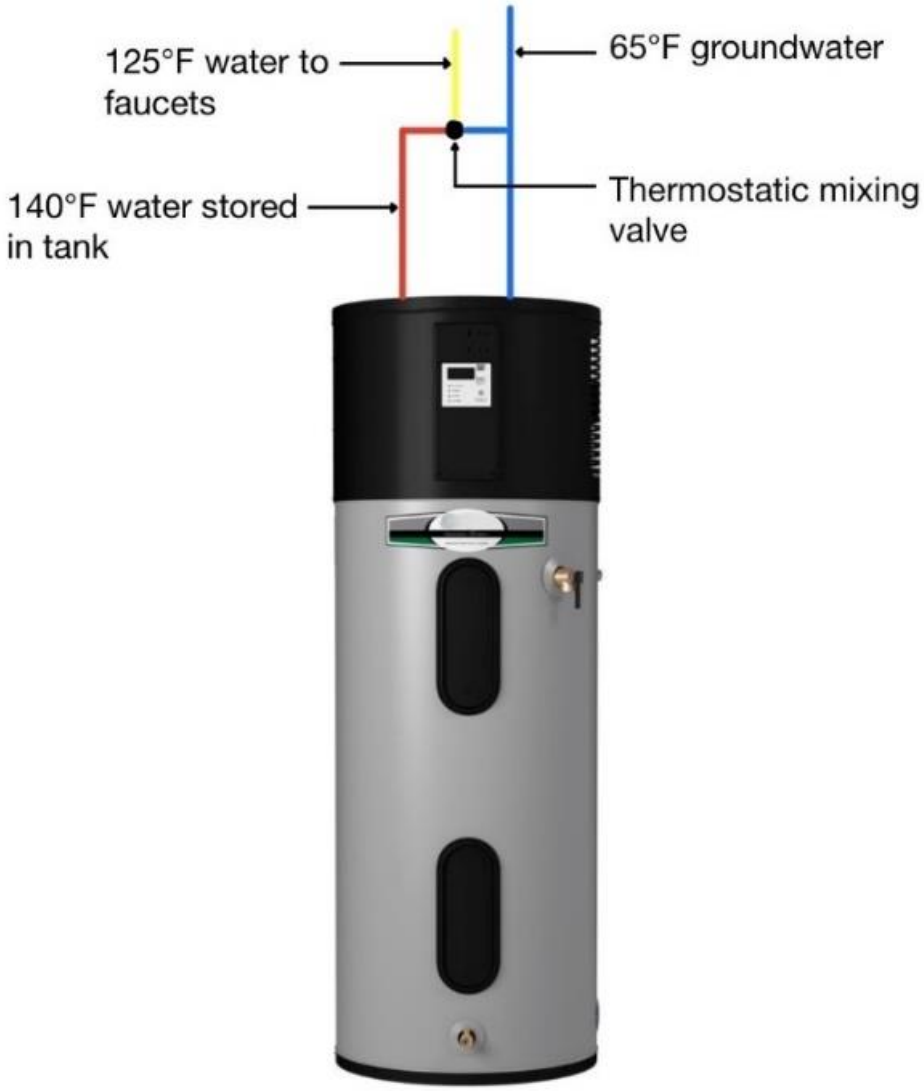
Source: NBI 2020 – based on data from RASS 2019 and 2015 RECS

What is a 120-volt HPWH?

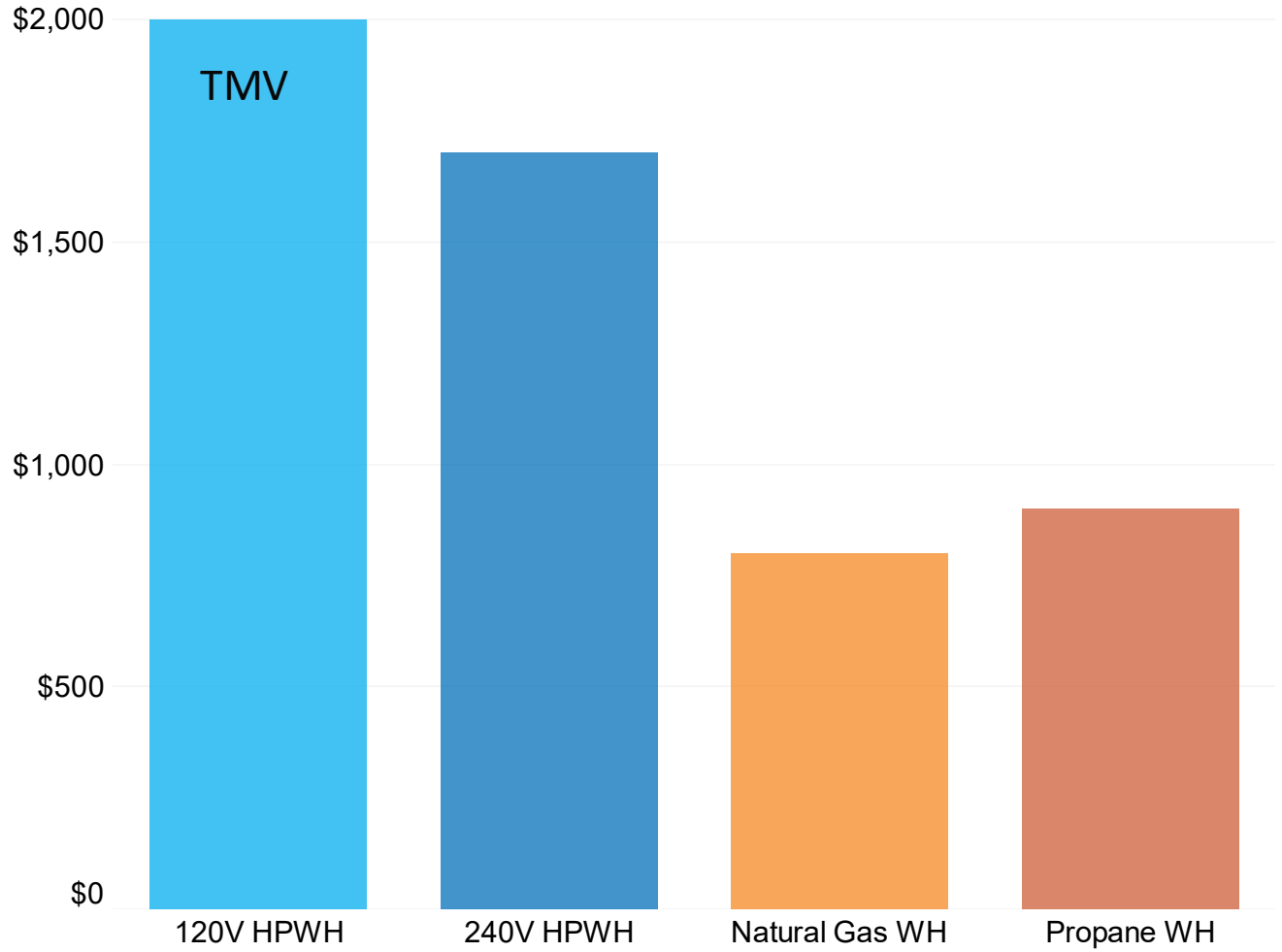
Operates on a 120-volt, 15-amp circuit

Usually has a thermostatic mixing valve (TMV)

Trades power for increased thermal storage



How much do 120-volt HPWHs cost?

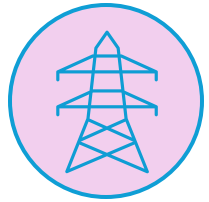


Price varies by OEM!

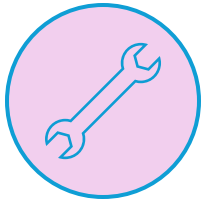
Research questions

How much homeowners save on installation costs, and what is a typical operating cost?

How energy efficient were the HPWHs?



How did installers rate the installation and how long did they take?



Were users satisfied with HPWH performance?

Research Methods

To answer the research questions, we completed:

- ✓ Equipment monitoring
- ✓ Baseline modeling
- ✓ Cost analysis
  - Equipment and installation costs
  - Operational costs
- ✓ Customer and installer surveys

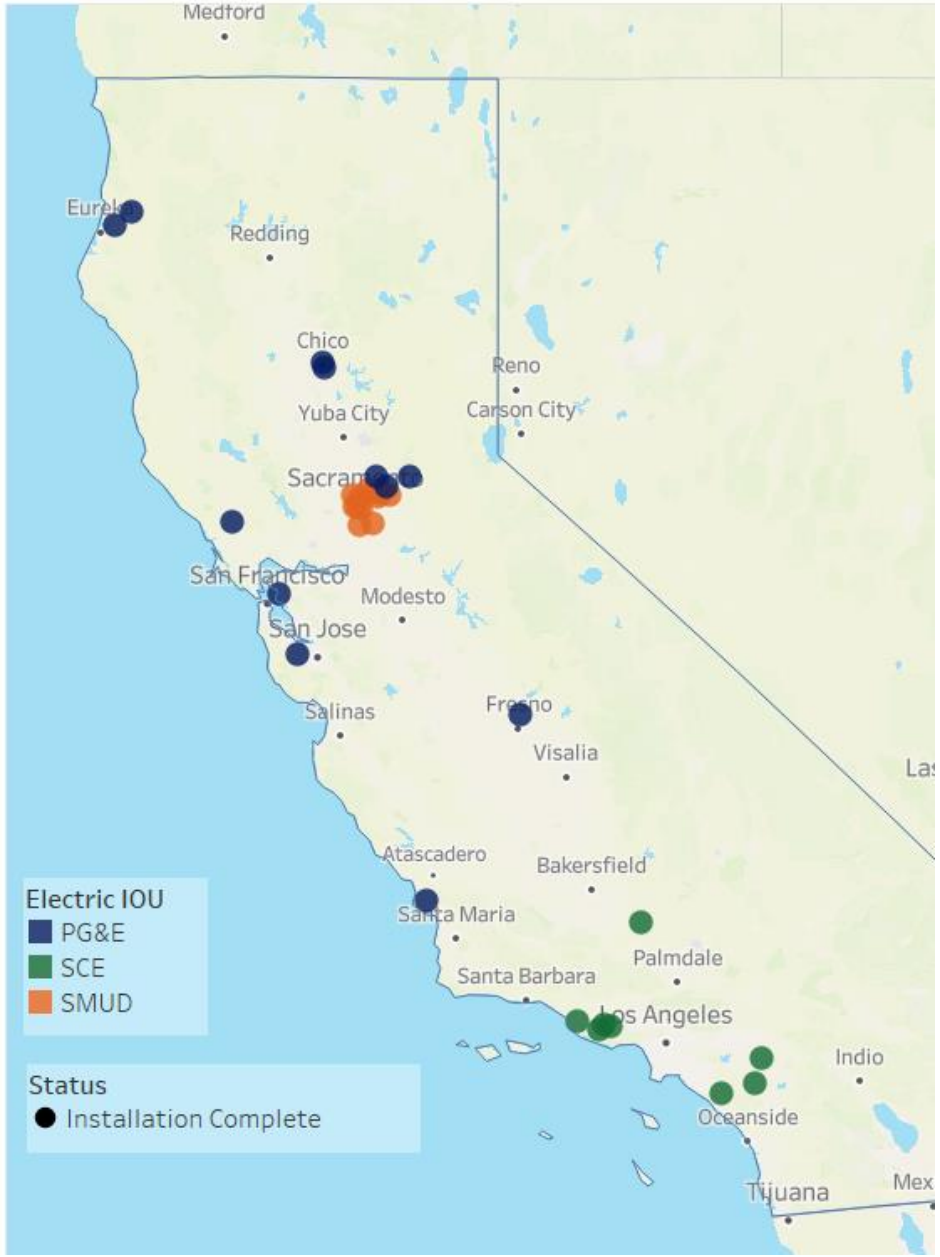
photo by Northwest Energy Efficiency Alliance (NEEA)

Site selection (2021-2022)

200+ applicants

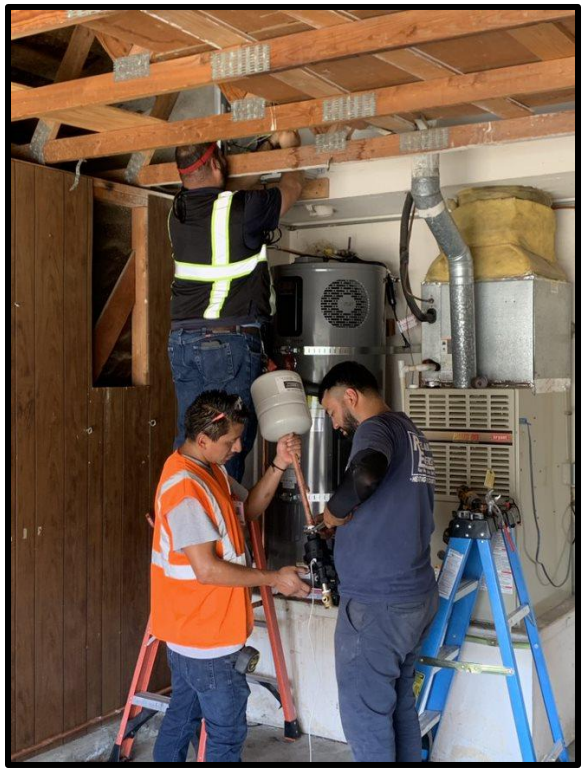
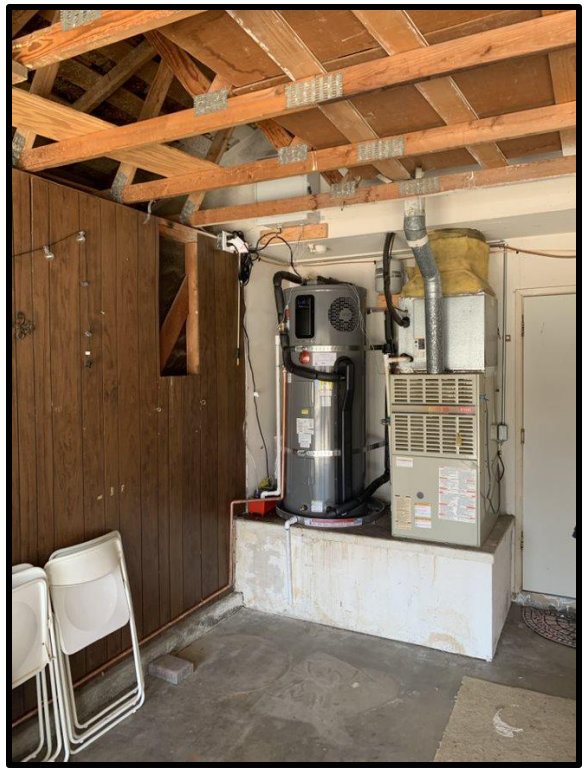
32 sites ultimately selected, **8** in SCE territory

Climate Zones	1-6, 8-13, 16
Vintages	Pre-1950 to post-2000
Occupants/demand	1, 2, 3, and 4
Home Type	Single-family
Install Locations	Garage, External closet, Conditioned space inside the home (e.g., Laundry room), Basement



Installation (May 2022- Feb 2023)

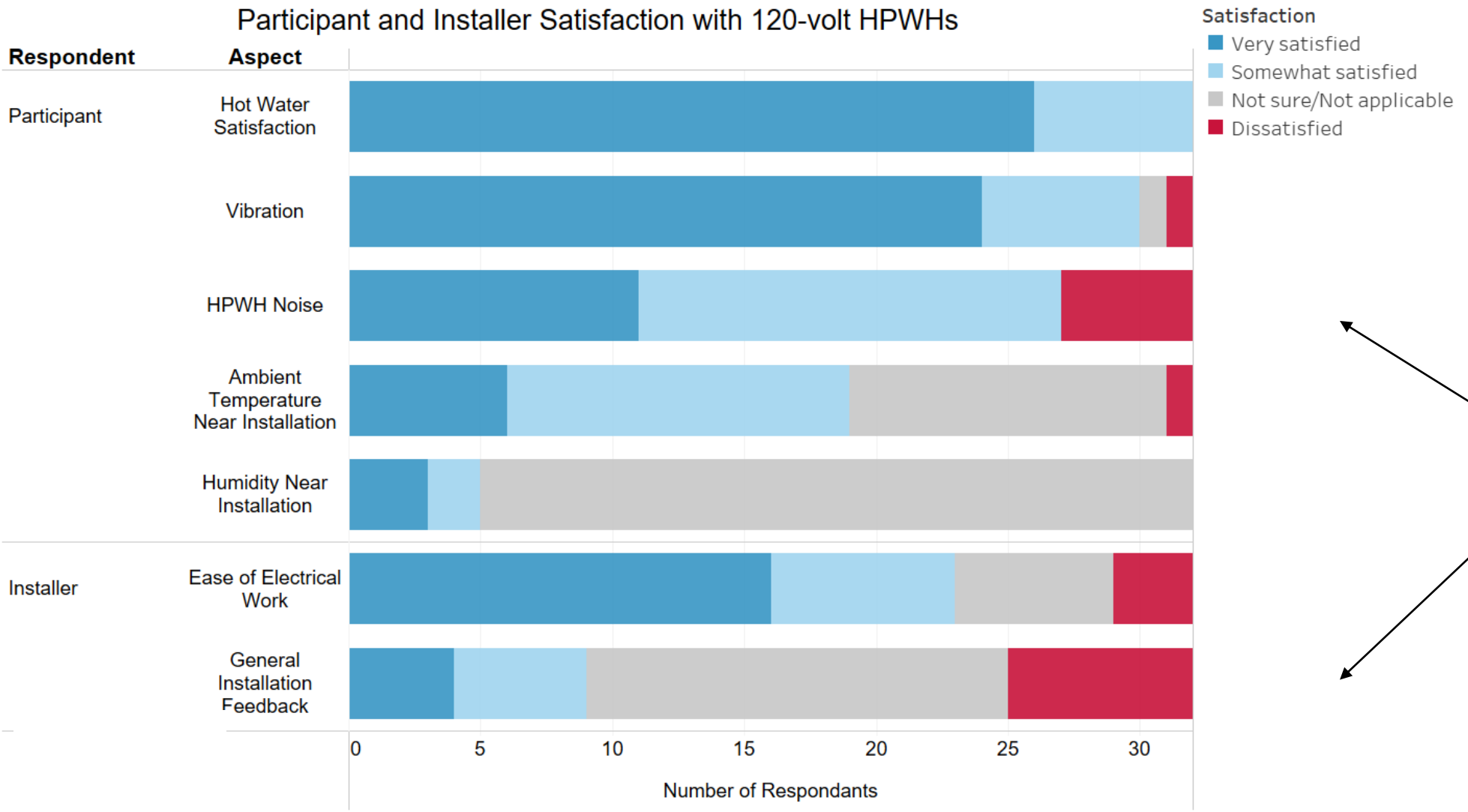


Were users satisfied with **HPWH performance**?

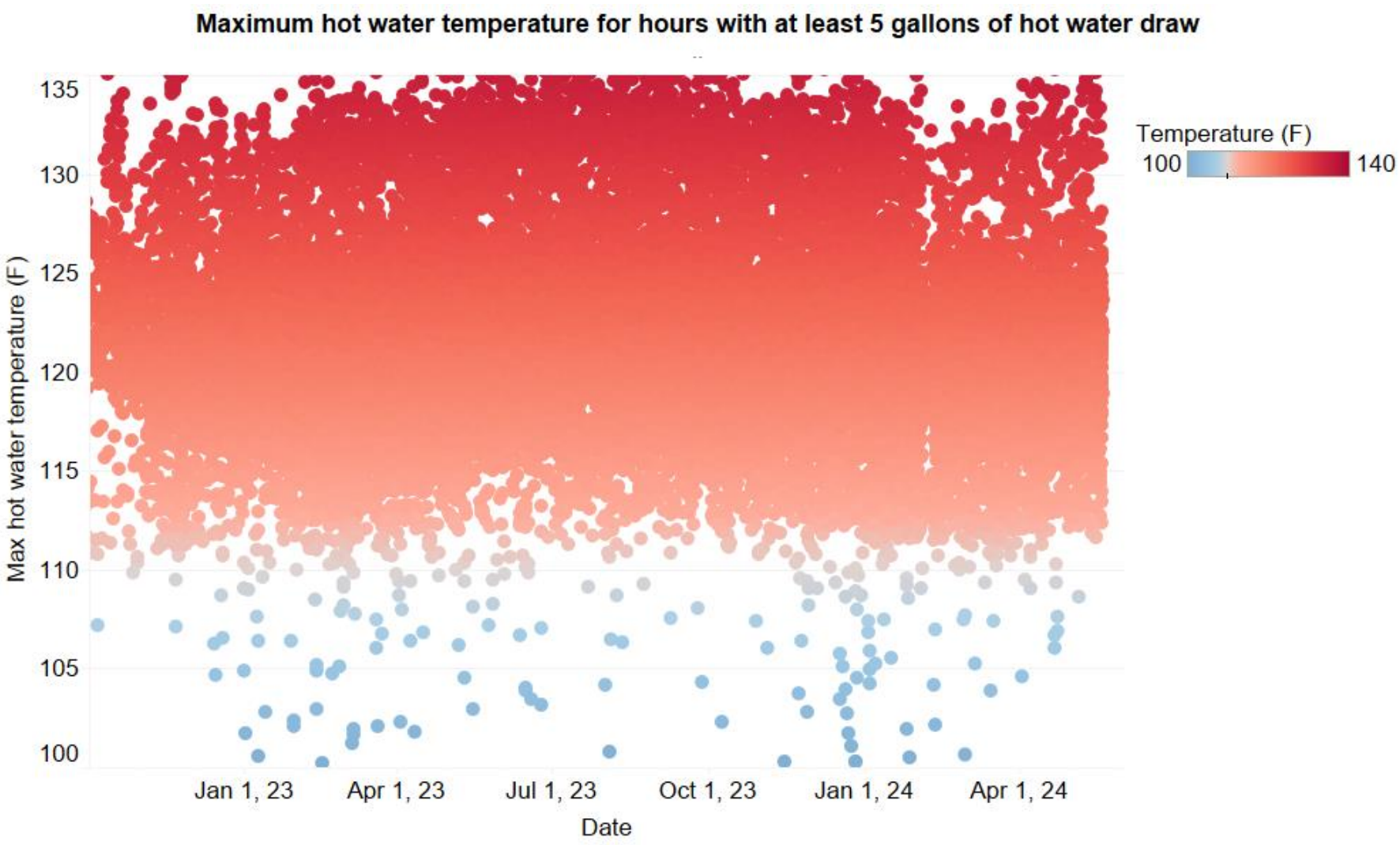
How did **installers** rate the installation and **how long** did they take?

Overall, participants were satisfied



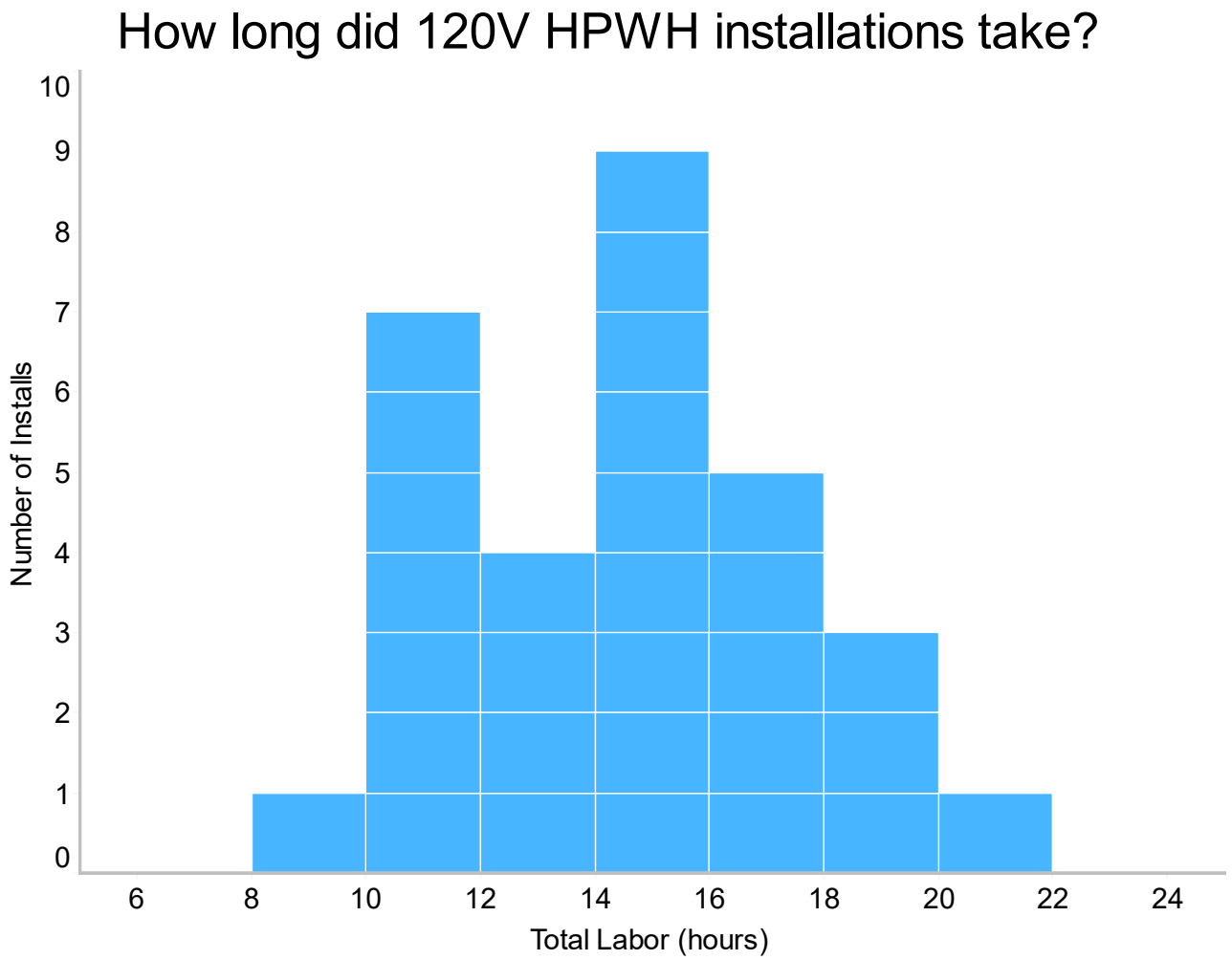
Key barriers to address

Evaluating comfort… with statistics!



Typical shower temp: 100-105F

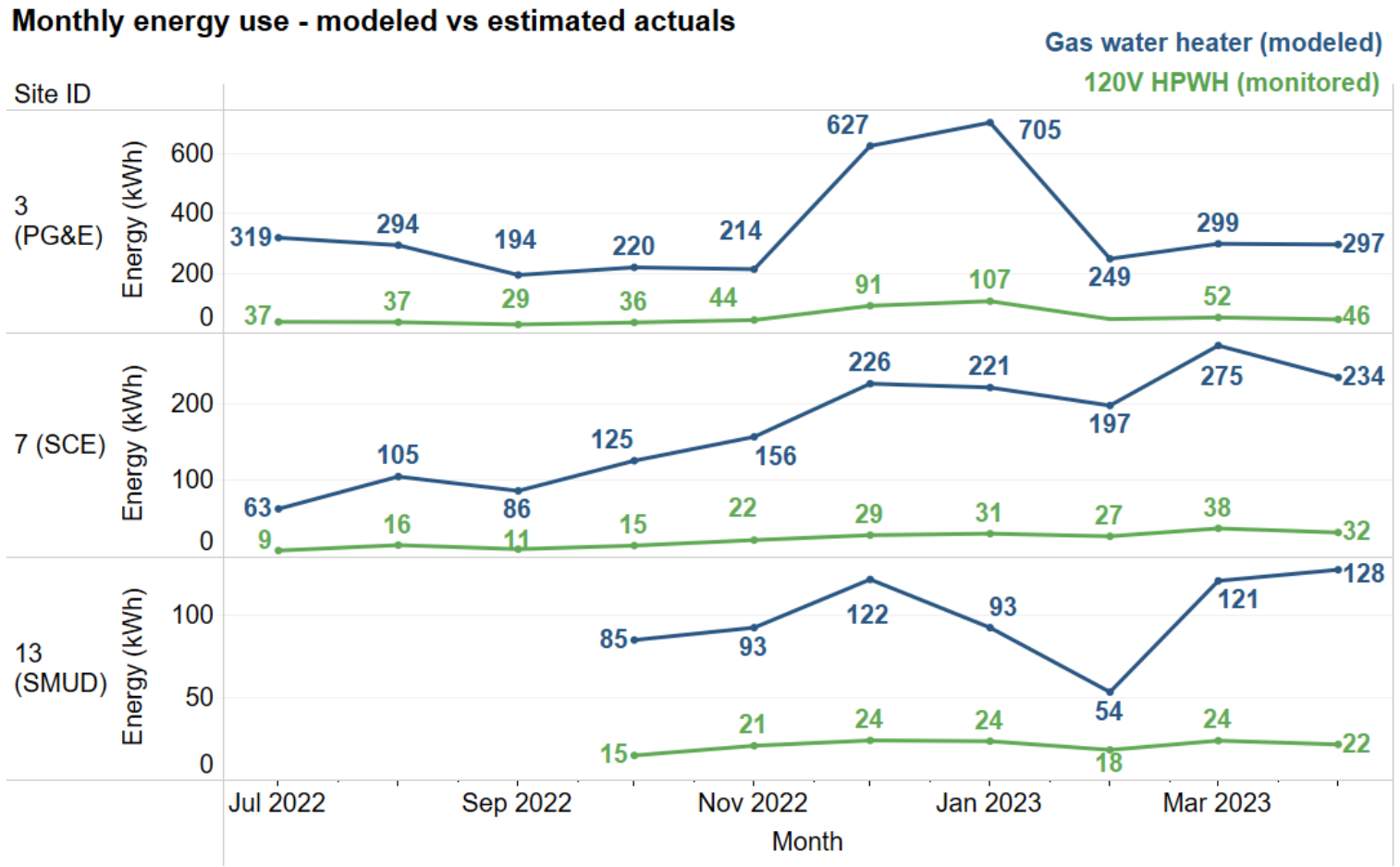
Installation time varied

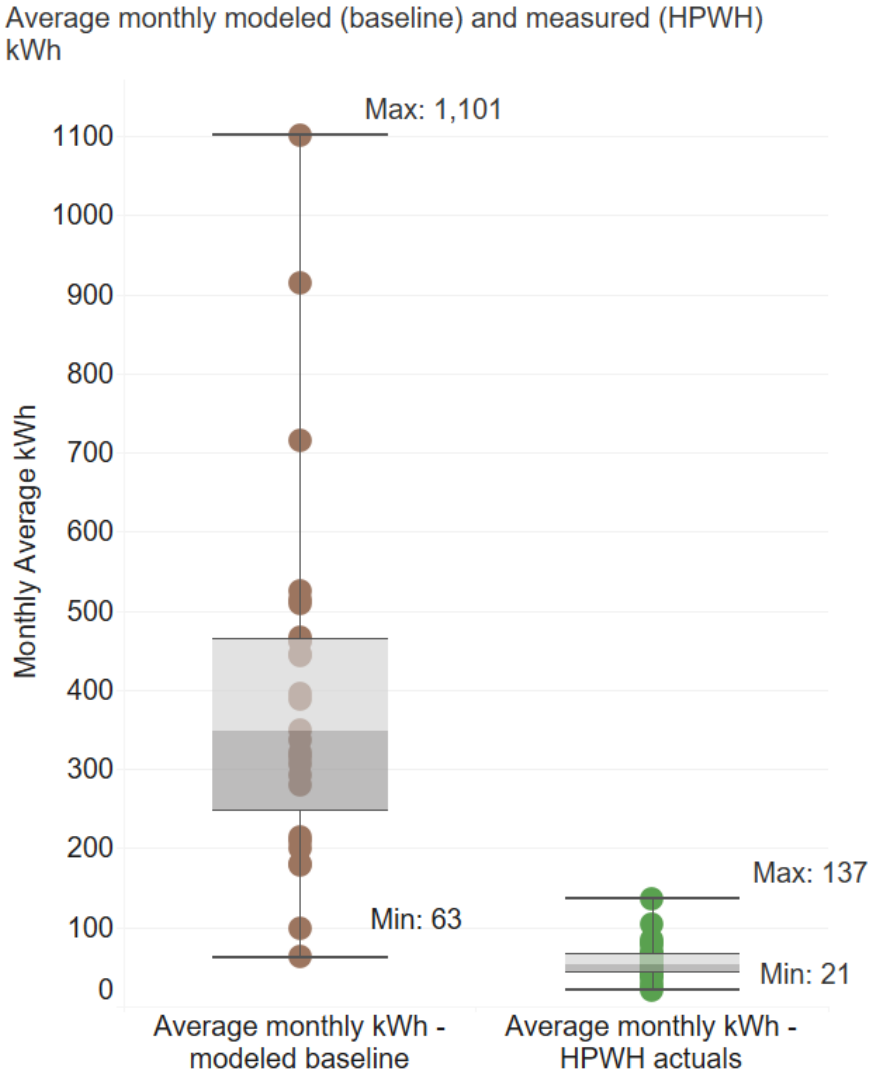


Note: All installs in this study had at least 2 installers onsite. Total hours are shown, not per-person hours.

How **energy efficient** were the HPWHs?

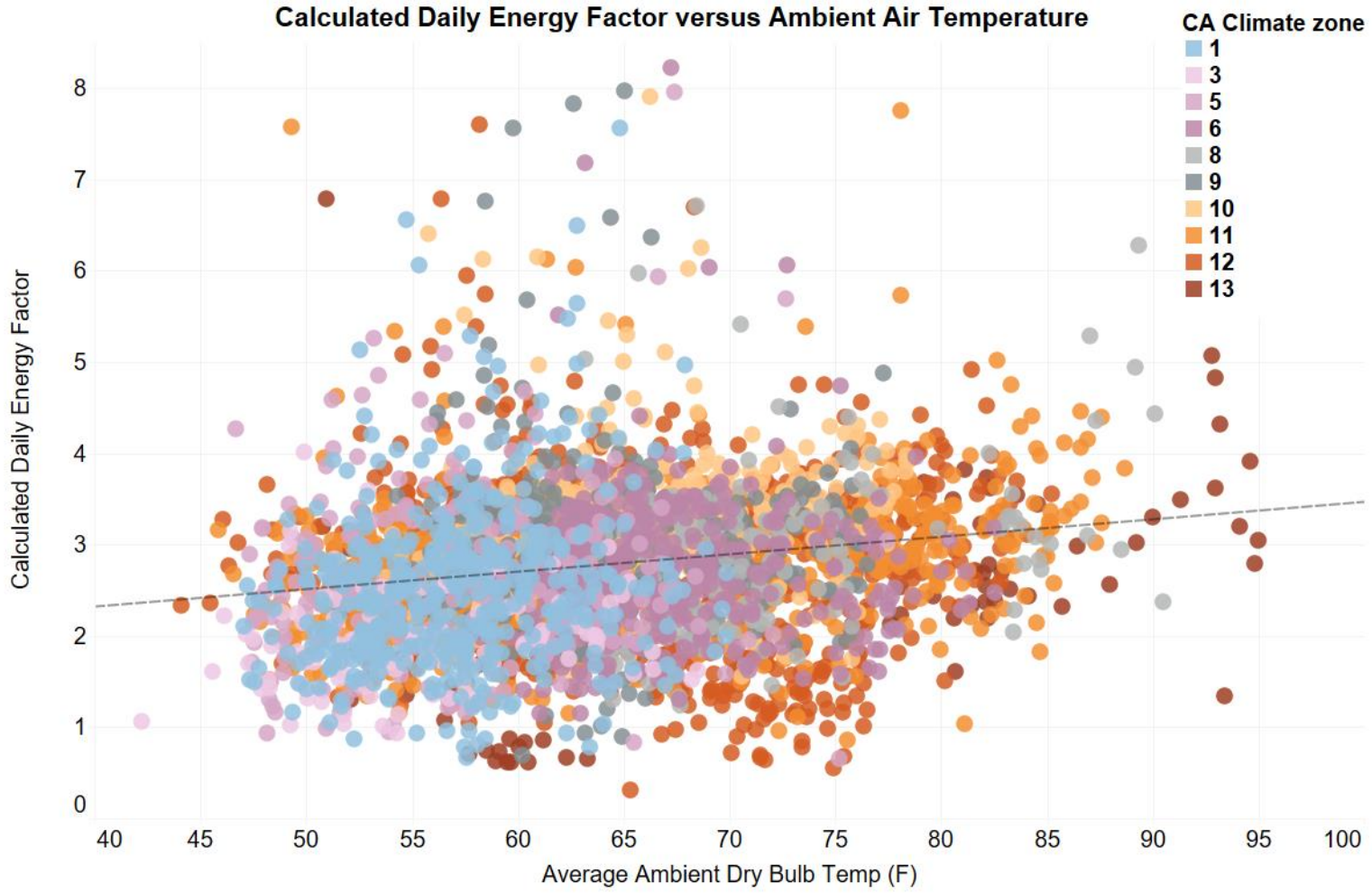
Switching to a HPWH slashed energy use by 85%*



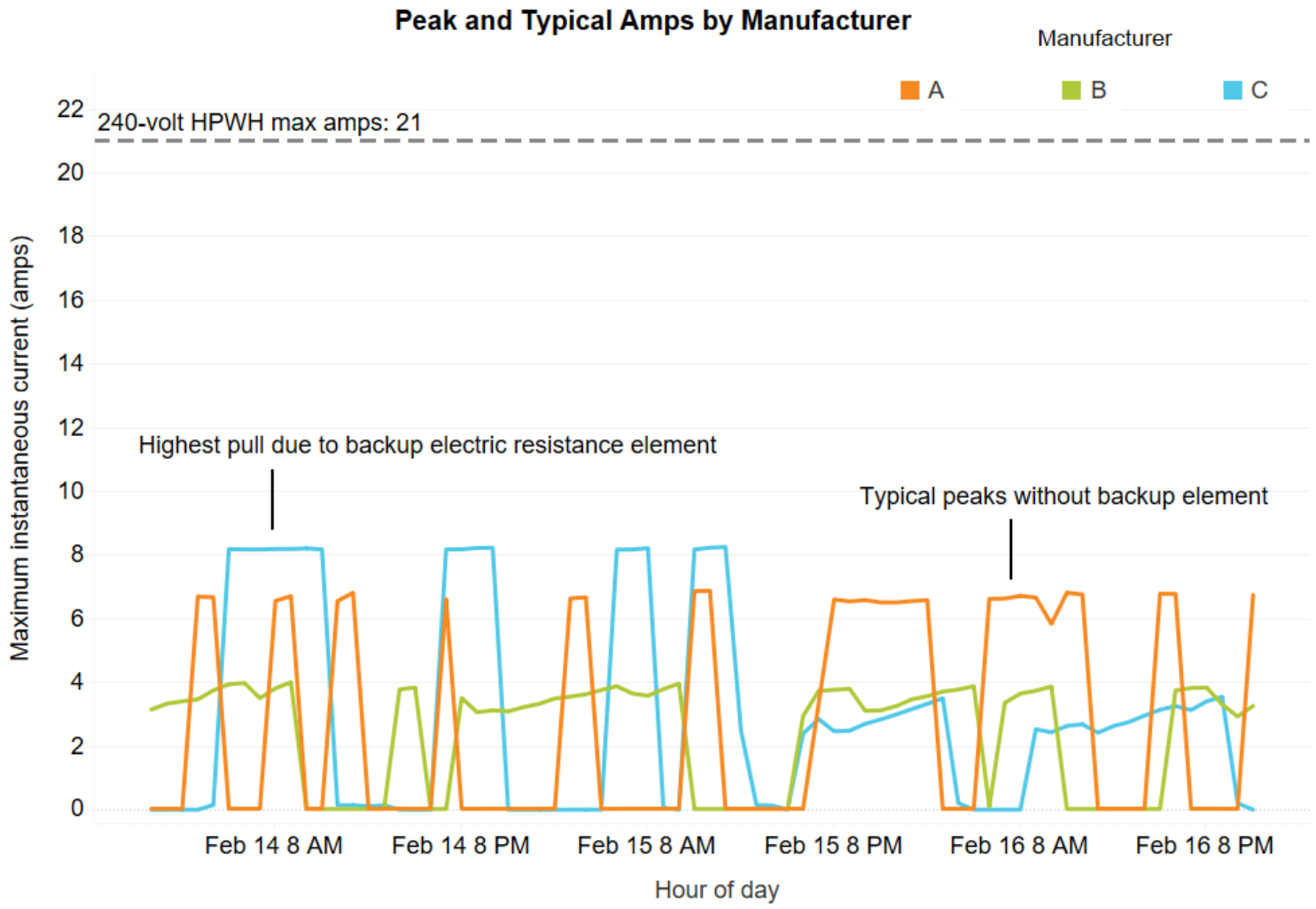


*Straight average of all months and sites.

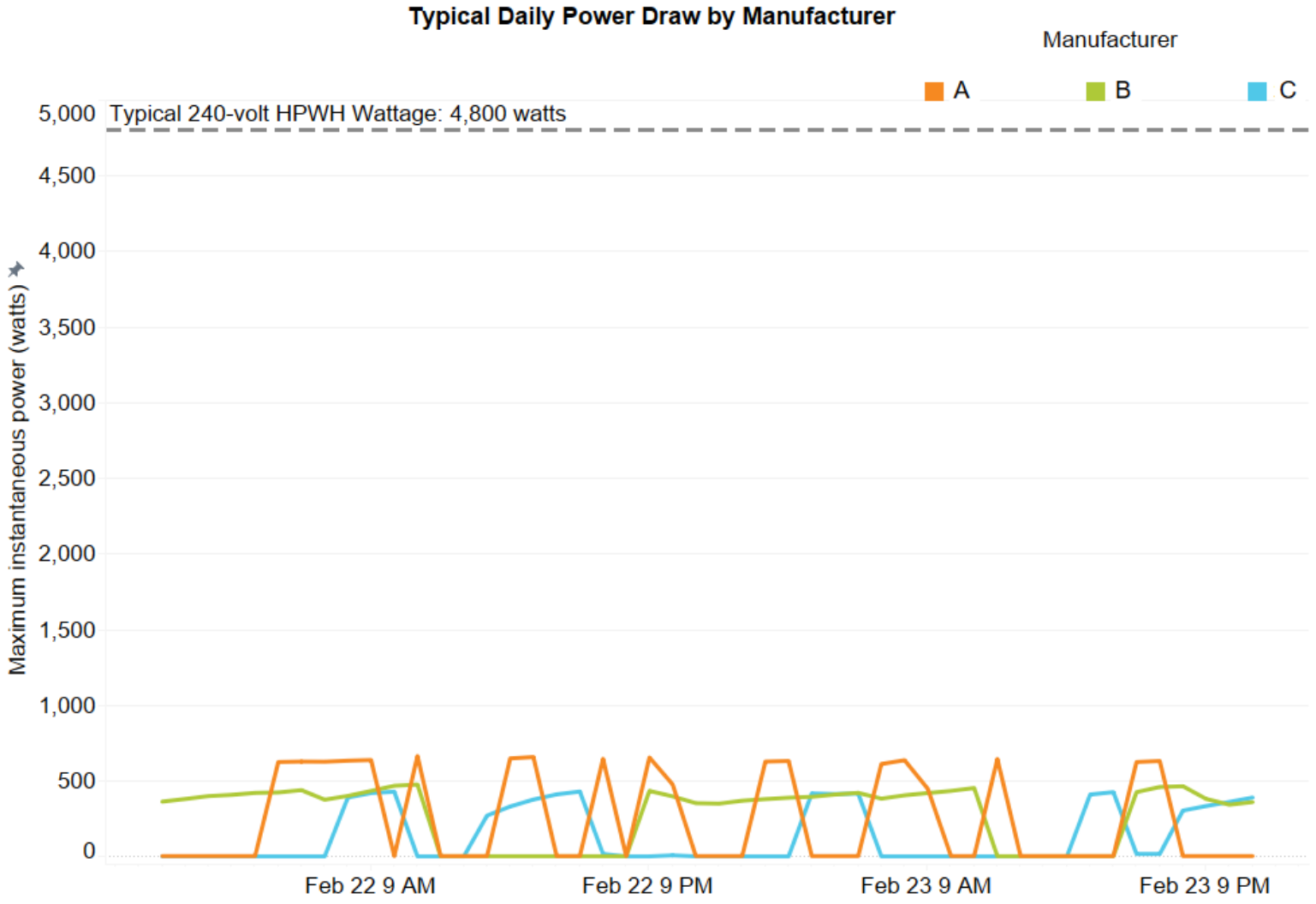
120V HPWHs perform better in warm weather



120-volt HPWHs are truly low amperage units!

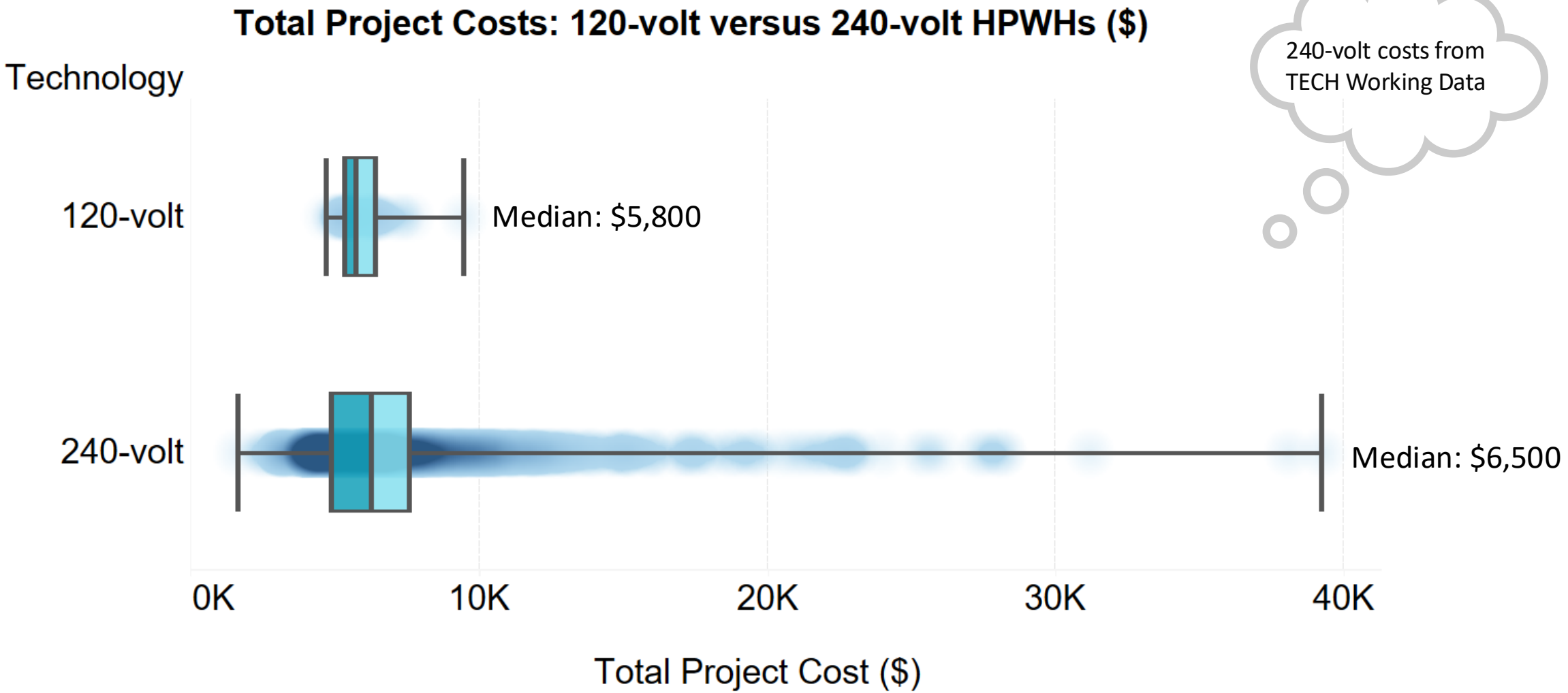


Low power draw = happy grid



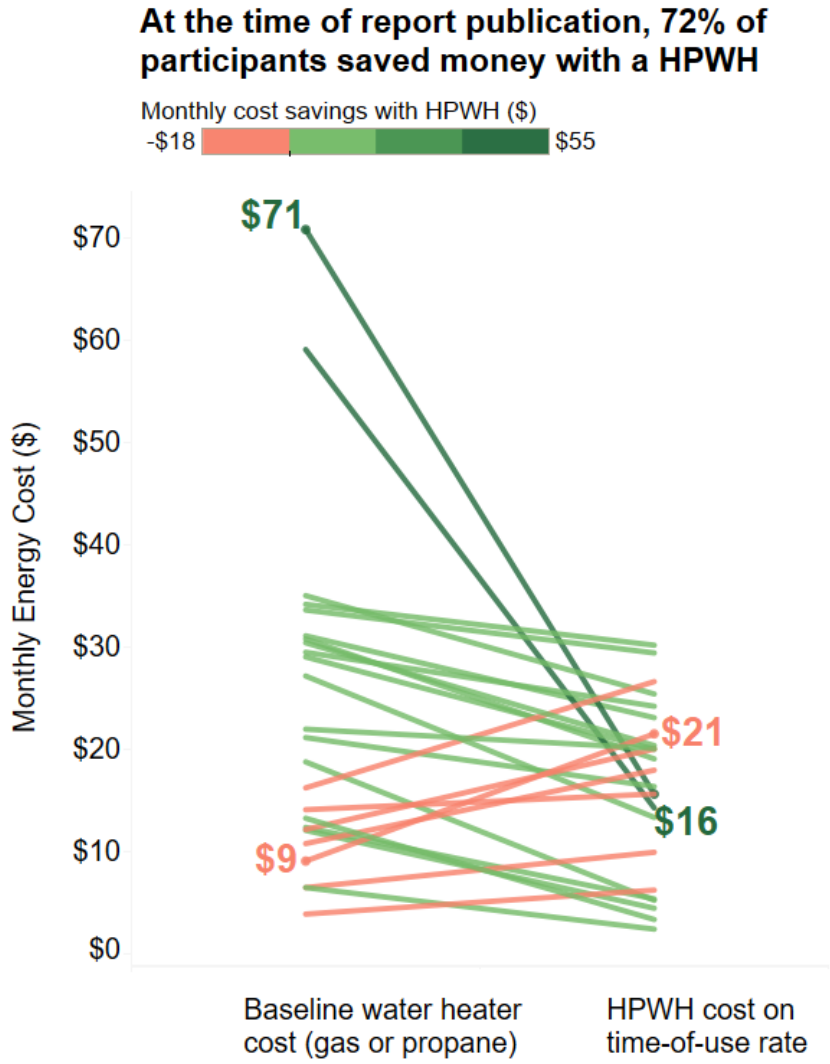
How much homeowners **save** on installation costs, and what is a typical operating cost?

There's more to cost than just purchase price…



Do plug-in HPWHs save money?

- Overall, participants saved money vs gas
- SCE customers saw least savings overall due to electric vs gas prices, however gas prices were volatile

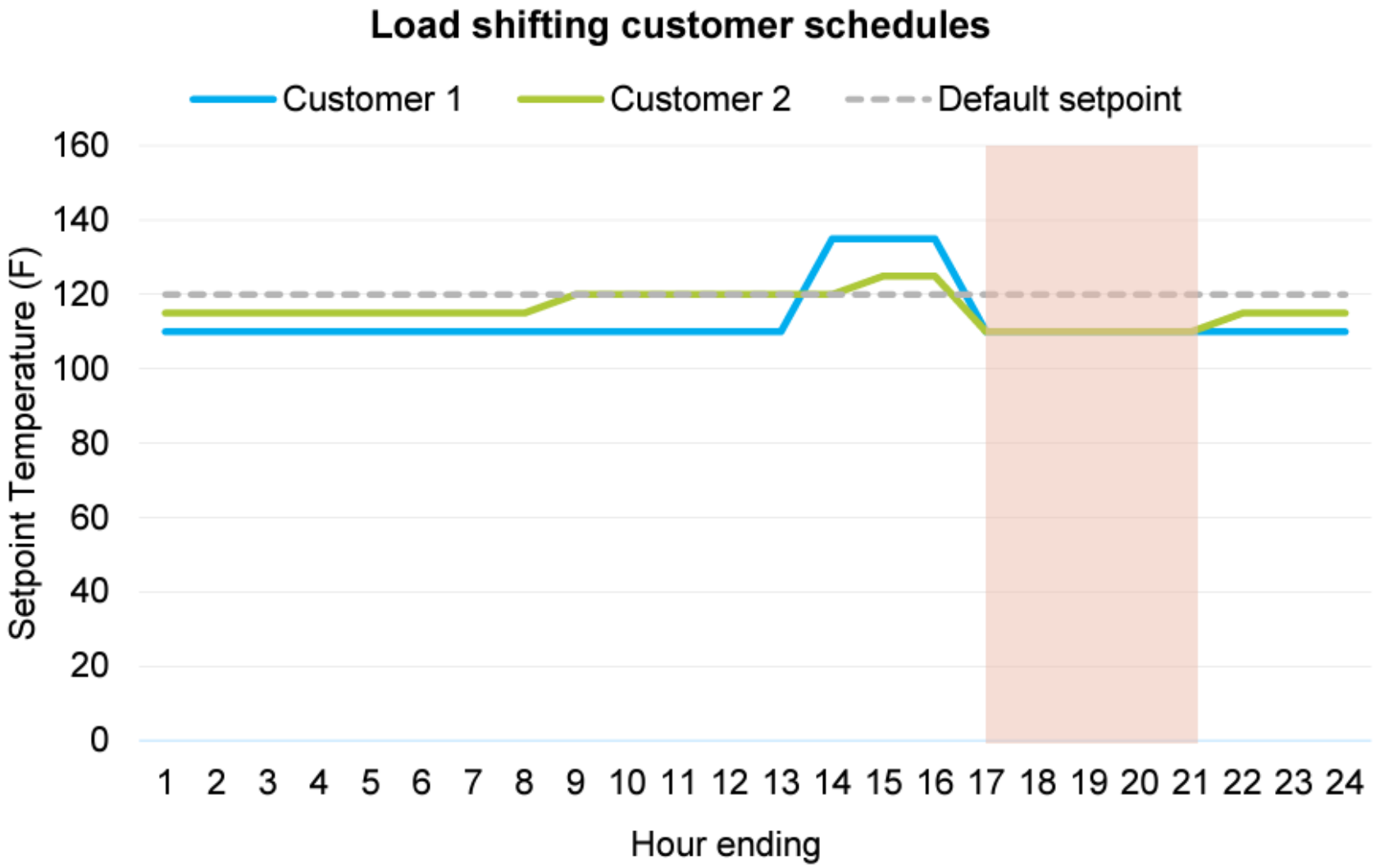


The report

https://newbuildings.org/resource/plug-in-heat-pump-water-heater-field-study-findings-market-commercialization-recommendations/

Two customers implemented load shifting…

FIGURE 11. SUMMARY OF LOAD SHIFTING CUSTOMER TEMPERATURE SCHEDULES



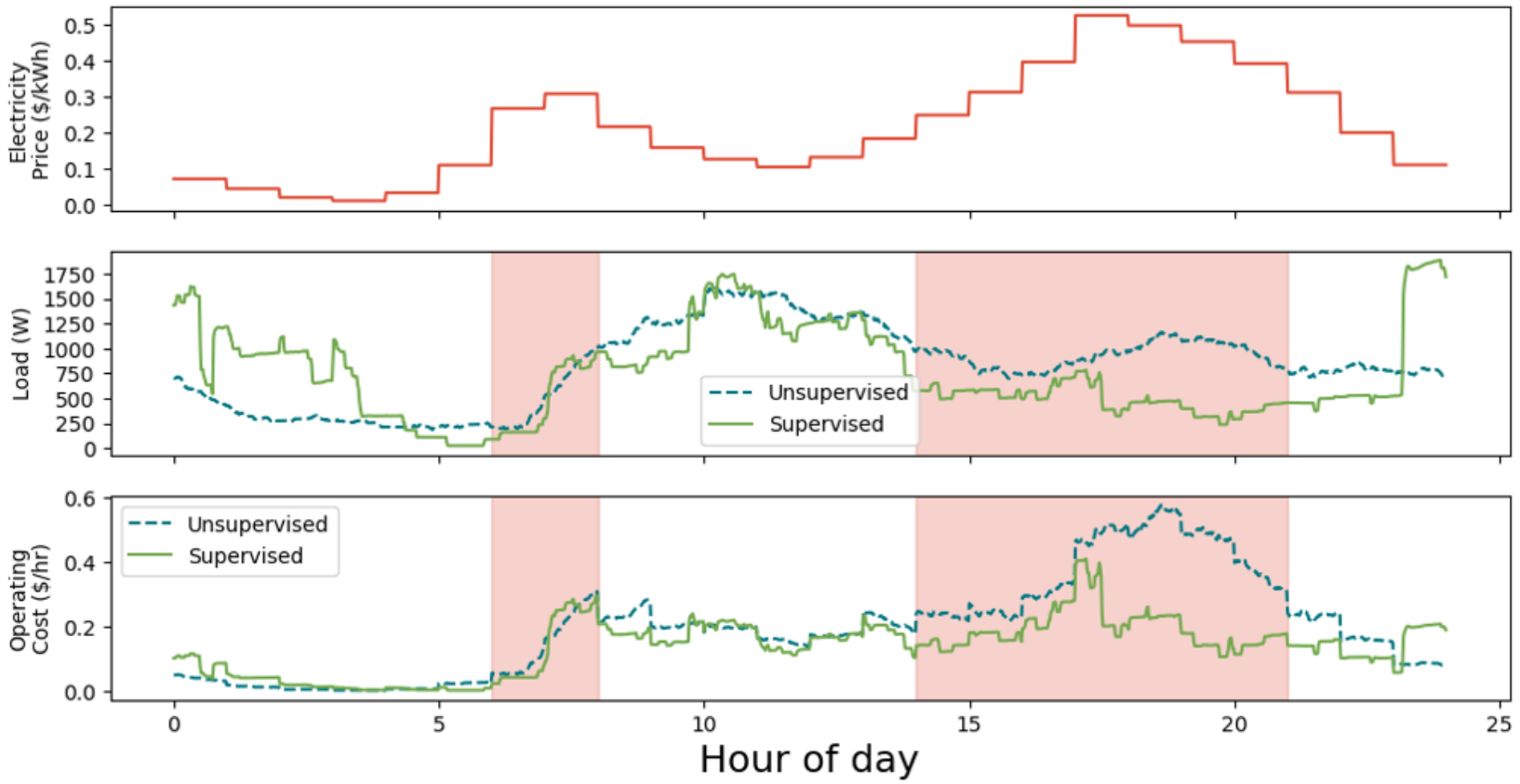
Curtailing energy use from 4-9PM

Installing the EcoPort

NBI created installation guide for participants

10/12 installed successfully

CalFlexHub: Winter Price Schedule

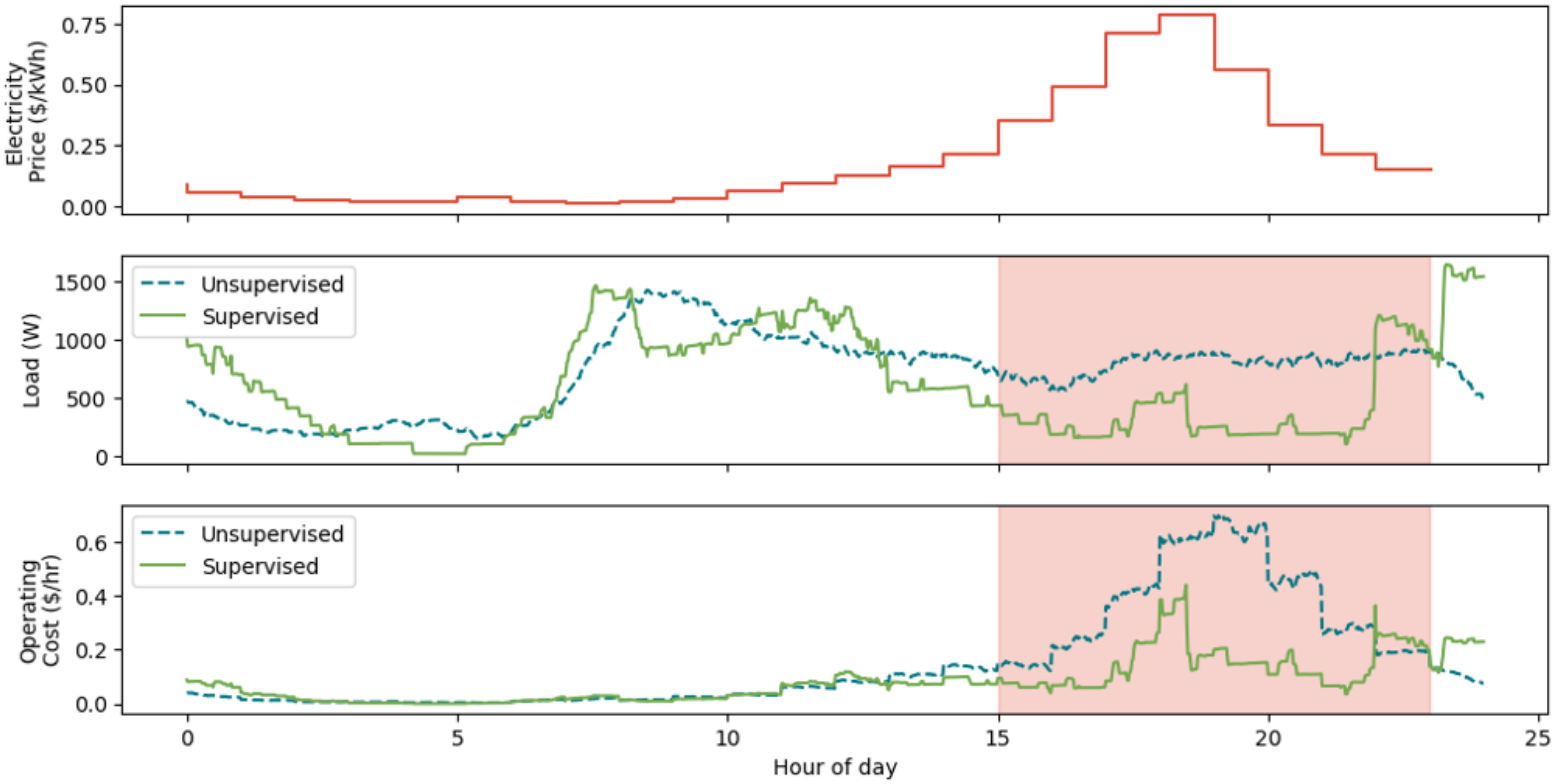


Peak kWh Reduction: 42%

Operating Cost Decrease: 30%

Fleet: 10 HPWHs

CalFlexHub: Summer Price Schedule



Peak kWh Reduction: 52%

Operating Cost Decrease: 46%

Fleet: 10 HPWHs

Noah Gabriel
Project Manager
New Buildings Institute
noah@newbuildings.org