



ELECTRIFY **MY HOME**

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LESSONS FROM THE FIELD

ADVENTURES IN ELECTRIFICATION



ELECTRIFY
MY HOME



OUTLINE

1. BACKGROUND
2. WHAT WE'VE BEEN UP TO
3. CHALLENGES
4. PATH FORWARD
5. QUESTIONS?



BACKGROUND

MY ELECTRIFICATION-OBSESSION



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MY STORY

- 1982: HVAC tech school; started as a commercial, industrial service technician
- 1994: Entered residential HVAC-sector
- 2009: Started quest to become Building Performance Institute Certified Building Analyst
- 2010: Designed first project with system performance as the primary measure of success
- 2015: Installed first net-zero comfort system with heat pump + solar and became obsessed
- 2015-Present: Designed and installed 200+ heat pump systems in the greater Bay Area



RETIRE OR START-OVER?

- Great employer for a dozen years changed operations and leadership
- Became obvious company is destined to re-learn old lessons
- Set a retirement date, but could not wrap my head around being retired
- Realized I have a voice and could help push electrification forward better with my own electrification-focused business
- Identified need for focused training and peer support; changing industry needs specialists
- Created a business plan to do more than just contracting work

BOOTSTRAPS AND ATTICS

- Started in February 2020
- Pandemic accelerated technology changes previously underway in HVAC industry; traditional mode of operation no longer possible
- Visit-less, virtual approach for site-surveys and energy audits became appealing to all
- Home-health, comfort, and safety became essential to all homeowners
- After initial dip, customer interest has picked up substantially
- Business going well, but not without hurdles and barriers

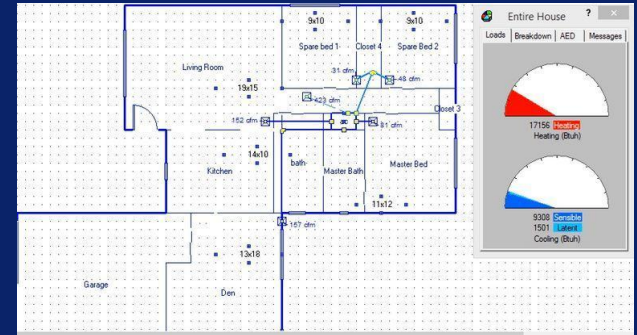


WHAT WE'VE BEEN UP TO

ELECTRIFY MY HOME IS BORN!



ELECTRIFY
MY HOME



PROJECT APPROACH

- ONLY ultra-efficient electric inverter heat pumps; we never do gas! We strive to be a “good steward” of the electrical panel
- Our systems of choice only need 2 breaker spaces to operate the entire system vs. up to 6 with older-style heat pump system
- Projects include Manual J load calculations using WrightSoft software to properly size systems
- Many require new ducts and properly sized registers for optimal efficiency
- About 25% of projects include a heat pump water heater; 10% combine with solar-PV system



OUR CUSTOMERS

- Savvy homeowners that understand the future is all-electric
- Majority of customers 2-3 years ago were replacing their gas furnace and were convinced to switch to heat pump technology; today, most are early-adopters seeking 100% all-electric homes
- More are long-term planners, not reacting to failed appliances; understand lower lifetime-cost of ownership, can afford upfront costs
- They want comfort, quiet operation, and efficiency
- Builders looking for a green edge or building in a gas-ban zone
- Homeowners in cities affected by gas-bans in new codes
- Many work in the clean energy or clean-air sector



EXAMPLE PROJECT - I

First project during COVID-19: 2018 Napa fire rebuild

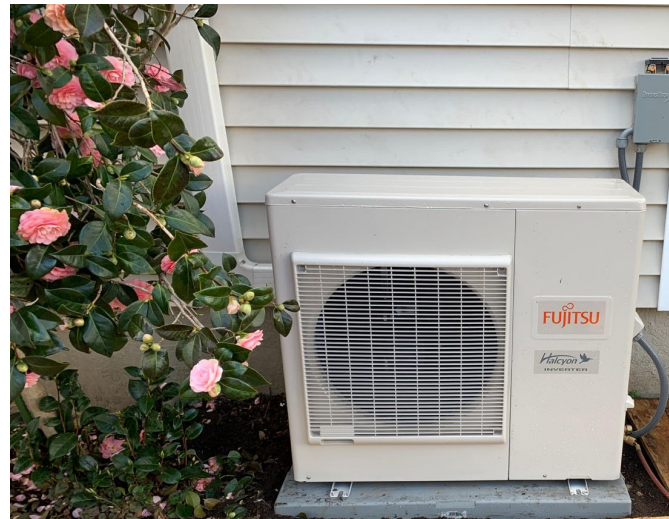
- 1,300 sq ft house with 2x6 framing
- Load calculations called for 15,500 BTUs of heating, 10,162 BTUs of cooling
- Competitor quoted gas furnace 3x - 5x larger than necessary
- Sadly, this is typical of traditional HVAC contractors
- Lesson learned: Old HVAC rules of thumb don't apply to heat pumps; unlearning is needed for consumers as well as contractors



EXAMPLE PROJECT - 2

Second project during pandemic: Napa retrofit

- Existing wall furnaces; no air-conditioning
- Installed a 24k BTU Fujitsu inverter modulating system in attic space
- Learned a lot on this project
- Trained my new team members
- Barely made profit; only \$700
- Lesson learned: Training and labor is time-consuming for profitability; costs need to be managed more tightly with heat pump system installations



CHALLENGES



SKILLED LABOR SHORTAGE - NATIONWIDE

- Nationwide, there are lower enrollments in HVAC trade schools resulting in a large projected and observed deficit of skilled labor
- HVAC technicians and related trades will have a shortage of over 2 million skilled workers nationwide; number of jobs are expected to increase by 15% through 2026¹
- HVAC installing is hard work, it's dirty, and complicated
- Did I mention it's hard work and dirty?



1. ACHR News: [‘Addressing the Labor Shortage in the HVAC Industry’](#). May 18, 2018. Accessed Oct 2, 2020.

SKILLED LABOR SHORTAGE - CALIFORNIA

- Furthermore, statewide, high cost of living has driven many to leave state; good installers are hard to come by in California
- Additionally, appropriate heat pump and HVAC training is very time-consuming; it is not effective unless there is full company engagement
- Good productive training is a big expense for HVAC contractors, especially considering installers are out of the field for a length of time (loss of revenue)
- Oftentimes, technicians and installers are trained but sales team members are not, resulting in zero sales and no change in behavior
- It has never been more critical to get contractors all on the same page, from sales to managers to installers to service technicians

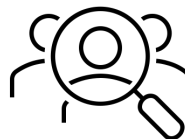
PERMITTING INCONSISTENCIES

- No uniform, standard process across cities on how permits are applied, approach in permitting, or acceptance of electrification
- Some municipalities do not understand that to electrify a gas furnace requires a unit to be outside; thus, sound ordinances create challenges and cause issues in obtaining permits
- Communicating and retrieving information is hard, once you do talk to someone in a permit office, they are frequently unfamiliar with electrification efforts
- Due to COVID-19, nearly all cities have shut down at some level, causing months of delays



PERMITTING COSTS

- Cost for permits are not standardized; some cities charge very reasonable fees, others exorbitant amounts
- For the same type of project we've seen permit costs as low as \$100 or as much as \$1,000
- From personal experience, inspectors will sometimes fail a project without understanding it
- Generally, sentiment in trade is that municipalities brag about clean-energy goals then put obstacles in the way of a contractor trying to help homeowners meet them
- We've had inspectors tell customers that they made a mistake buying a heat pump; others indicating that something was done wrong because they don't understand what they're seeing or how it is designed to work



PERMITTING / SOLAR UTILITY

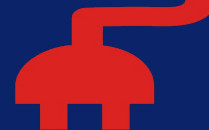
- PG&E restricts solar PV systems to 110% of homeowner's historical electricity consumption; currently, no established avenue to communicate exceptions for electrification conversion
- This is problematic as a typical electrification home conversion in the Bay Area will add roughly 4,500 kWh annually to a homeowner's electricity usage, effectively delaying solar install by a year
- Example: from 4,000 kWh annual usage to 8,500 kWh → customer would only be able to install a 2.8 kW system vs. 6.0 kW in the future:
 - Heat pump (ducted) system adds about 2,300 kWh/annually*
 - Heat pump water heater adds about 1,000 kWh/annually*
 - Induction stove and electric range adds about 700 kWh/annually*
 - Heat pump dryer adds about 500 kWh/annually*

* compared to existing gas appliance



PATH FORWARD

What is needed to accelerate the adoption of all-electric homes?



SUPPLY CHAIN CHALLENGES

- We are experiencing one of the worst supply chain breakdowns I've seen in my career:
 - Ongoing restrictions and temporary shutdowns of factories in springtime caused backlog
 - Manufacturers are still building to pre-COVID-19 quotas
 - Additional contractors have increased demand; manufacturers haven't caught up yet
- Currently, we're facing massive shortage of air handling units and coils for heat pumps
- Strangely, there's no shortage of traditional gas furnaces...yet!
- Supply chain normalcy not expected till Q1 2021
- Exploring new options with new brands is risky



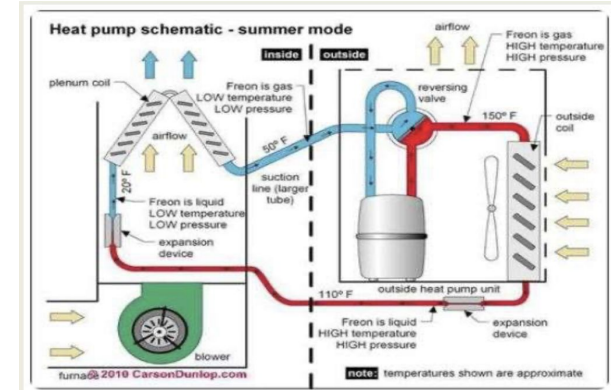
REBATES AND INCENTIVES

- Incentive and rebate programs help by not only reducing costs, but also by validating technology
- Rebate structures are not fully aligned with statewide decarbonization goals; creates gaps that delay electrification adoption. Examples:
 - No rebate for replacing gas furnace with heat pump unless pre-existing air conditioner
 - No rebate for heat pump wall mount without gas wall or floor furnace, and window or wall AC unit; this effectively makes the rebate unattainable
- We need decarbonization-centered incentives
- We need financial incentives that reduce the upfront investment to (or close to) parity with gas furnace costs



BUILDING A MENTOR MACHINE

- Regular training takes too long, and with paid hours and lost productivity, it costs too much!
- Full hands-on training for those ready to jump in
- Training at all levels of participants' needs
- Soft skills and sales communication; understand the “why” and “how”
- Management and principal engagement, sales, design and installation
- Subscription service and on-site, on-going support



QUESTIONS?



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