LESSONS FROM THE FIELD

ADVENTURES IN ELECTRIFICATION
OUTLINE

1. BACKGROUND
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BACKGROUND
MY ELECTRIFICATION-OBSESSION
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!
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 - 1

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 2026

- HVAC installing is hard work, it’s dirty, and complicated

- Did I mention it’s hard work and dirty?

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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 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
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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