

An aerial photograph of a suburban neighborhood, showing a grid of streets with houses, lawns, and trees. The houses have various roof colors, mostly dark grey or brown. The trees are mostly green, with some showing autumn colors. The overall scene is a typical suburban residential area.

# Single-Family Decarbonization: Managing Electric Service



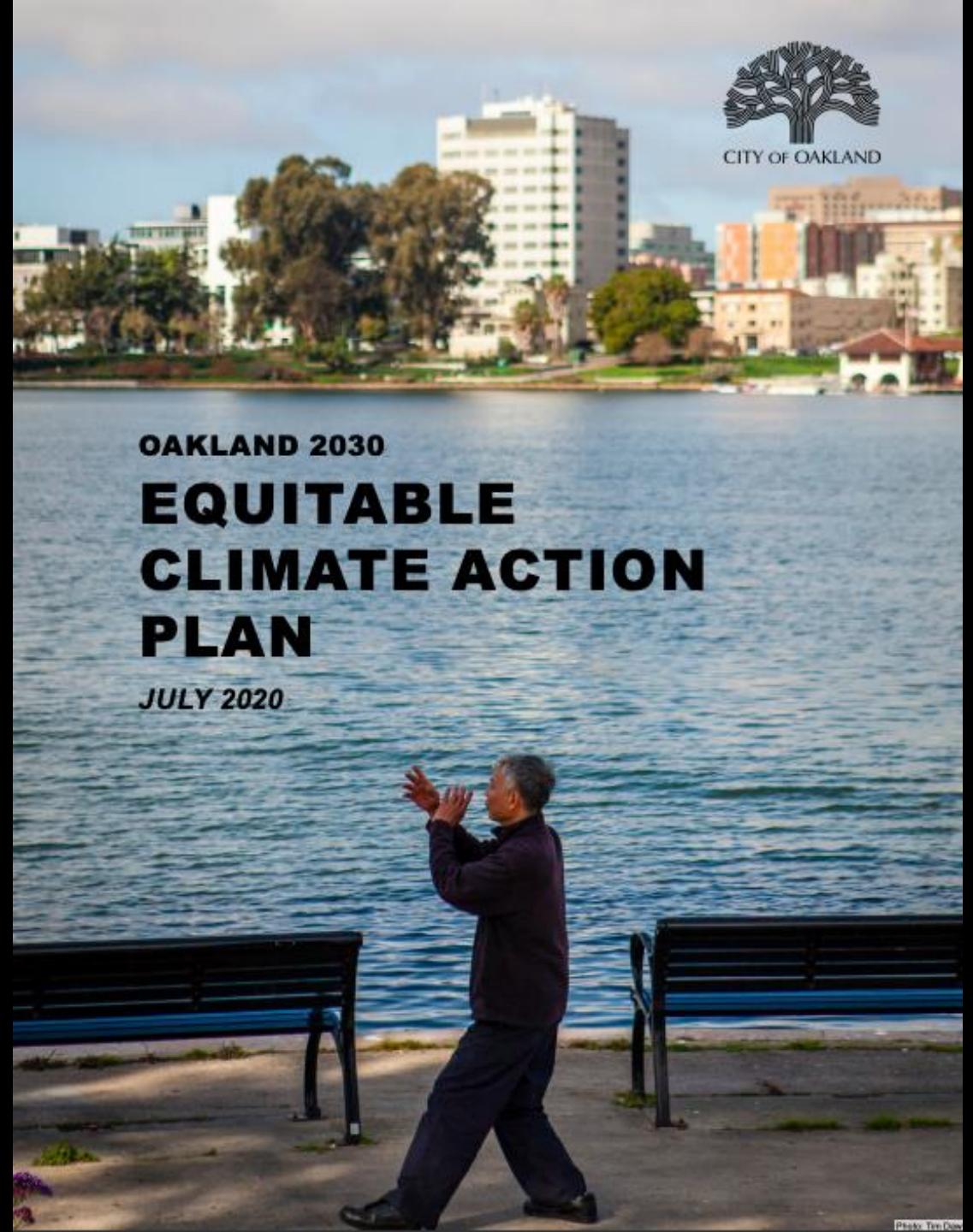
# Electrifying Existing Buildings for Health & Equity

---

Shayna Hirshfield-Gold  
*Climate Program Manager, City of Oakland*



OAKLAND 2030  
**EQUITABLE  
CLIMATE ACTION  
PLAN**  
JULY 2020



# Equitable Electrification

- *Replacing gas appliances with efficient electric alternatives = health + safety + justice*
- Gas = toxic, flammable, explosive
- Justice = Affordability, energy reliability (solar + storage), related upgrades, JOBS
- Efficiency reduces energy bills, upgrade costs, & grid stress





# Key Challenges

- Housing costs
- Utility costs
- Education & awareness
- Old infrastructure
- Ensuring access
- Critical sectors:
  - Restaurants
  - Affordable housing



# Major Opportunities

- Clean grid... & getting cleaner!
- EBCE, BayREN, Switch is On, IRA (Rebates, Incentives, Info)
- Workforce development efforts
- Electrification + Resilience
- Ripe technologies and Statewide momentum





# Oakland Timeline

- All-electric new construction (Dec. 2020... the first step)
- Workforce Focus (2021-23)
- Continued Engagement (ongoing)
- Existing Building Electrification Roadmap (Summer 2023)
- Major Renovations (2023?)
- **All buildings all electric: 2040**







**SF Environment**

**Our home. Our city. Our planet.**

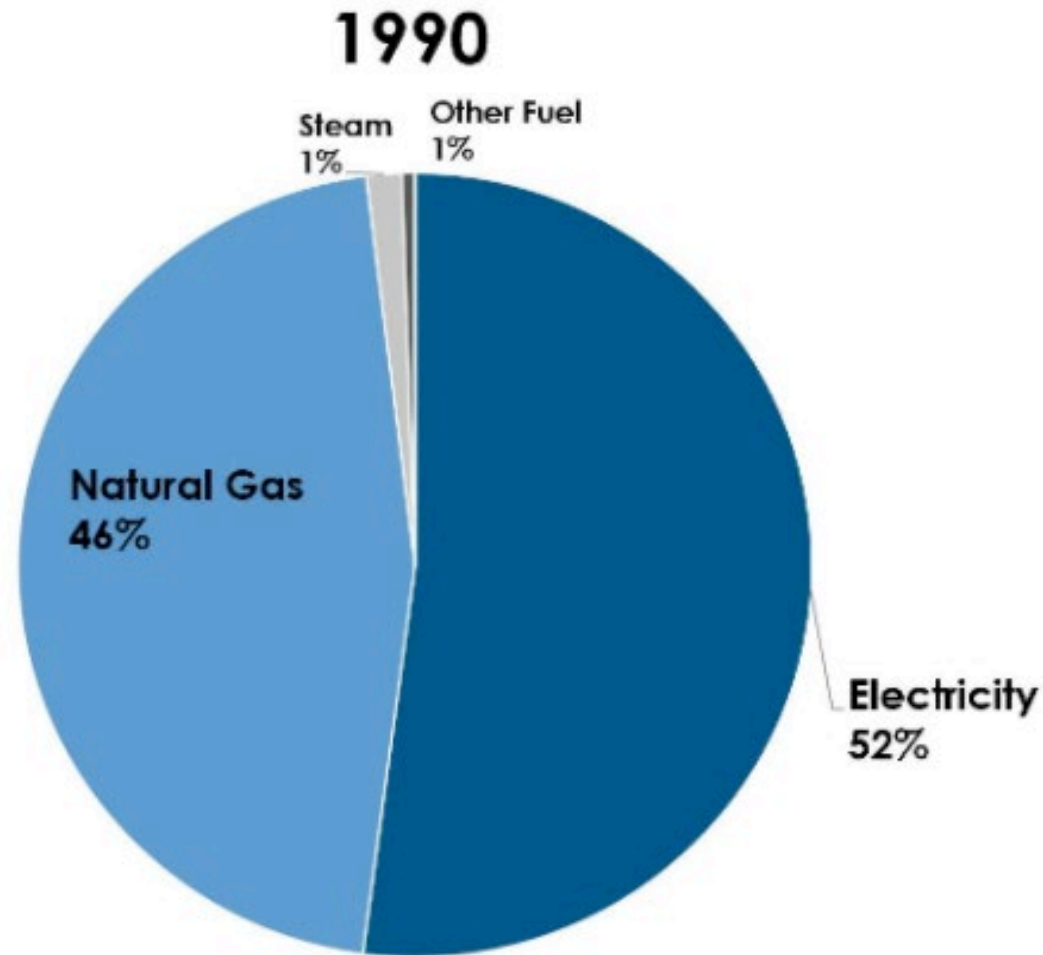
A Department of the City and County of San Francisco

# Decarbonizing Existing Single Family

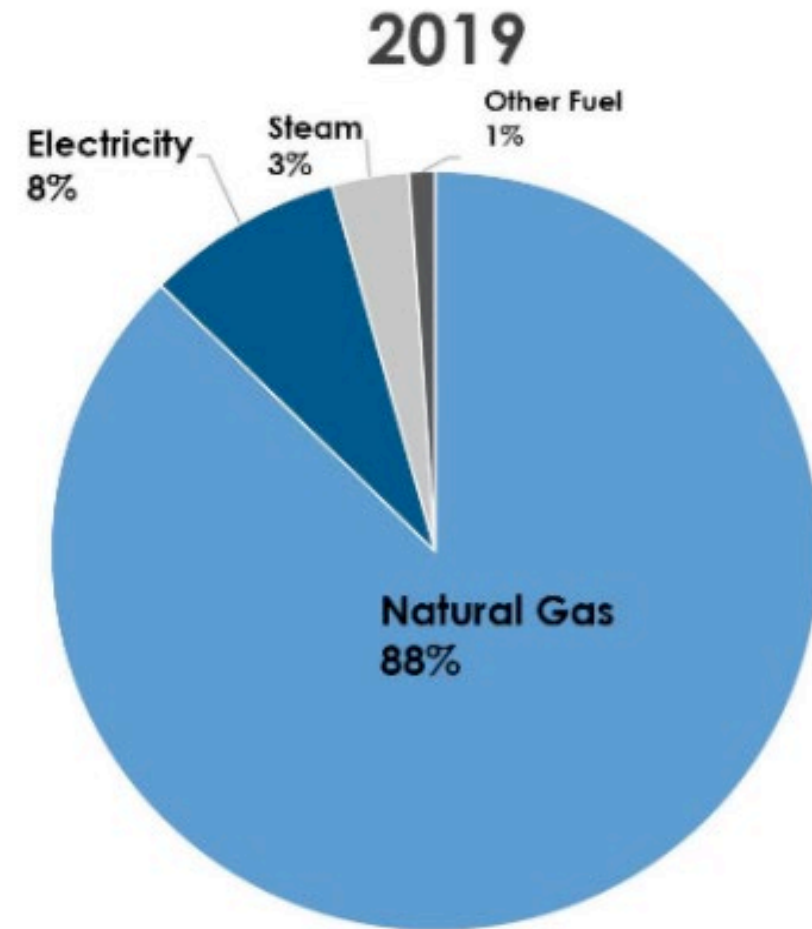
Barry Hooper | September 7, 2022



# Emissions from San Francisco Buildings



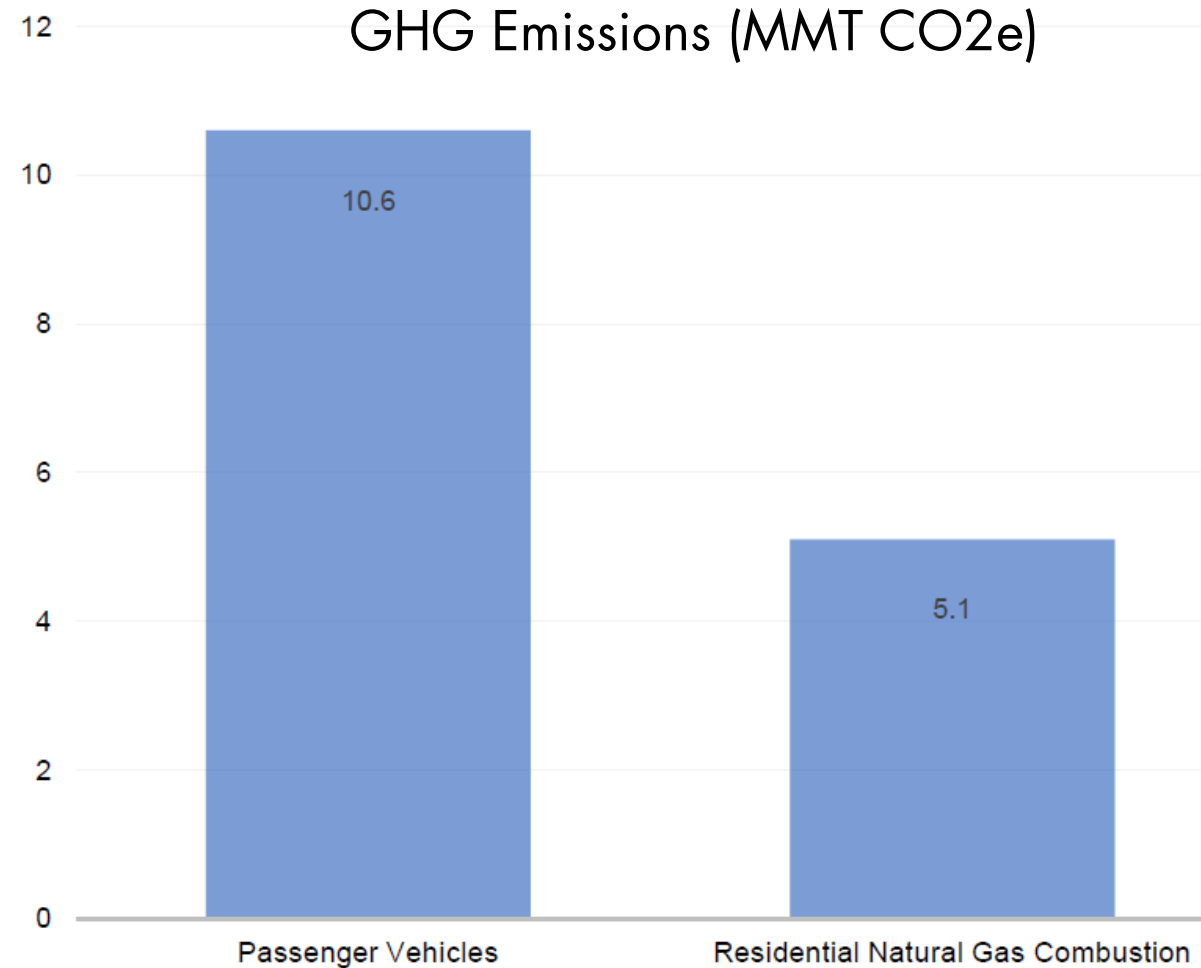
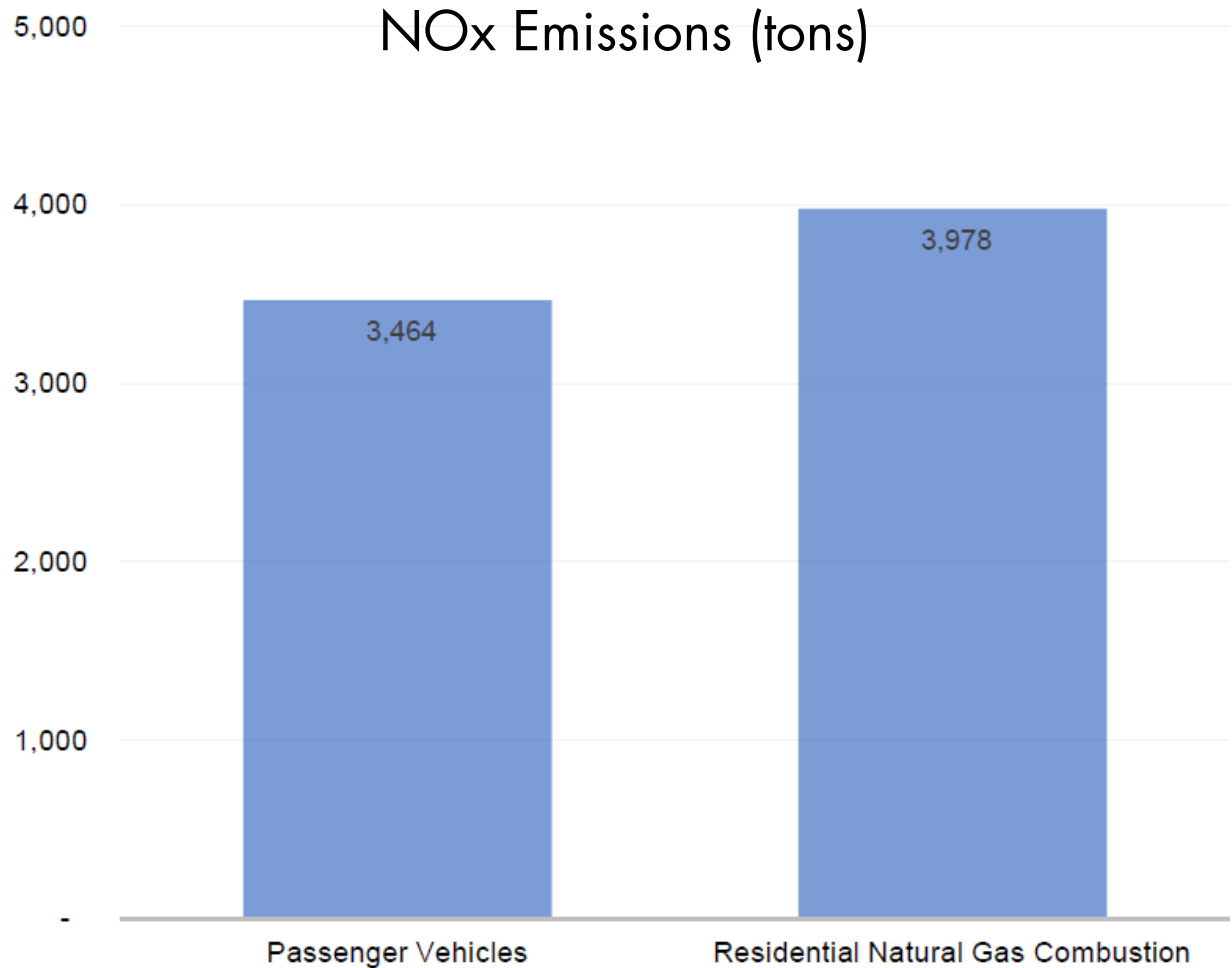
Total Building Emissions:  
**4.4 Million mtCO<sub>2</sub>e**



Total Building Emissions:  
**1.9 Million mtCO<sub>2</sub>e**



# How Gas Stacks Up in the Bay Area



Source: Bay Area Air Quality Management District



# Natural gas impacts . . .



Health



Safety



Resilience



Equity



# SAN FRANCISCO CLIMATE ACTION PLAN 2021



[sfenvironment.org/climateplan](https://sfenvironment.org/climateplan)





# Today's Focus: Existing Single-Family



- Electrification = opportunity
- Smart use of existing electric service can mean
  - Faster, Simpler Projects
  - Lower Cost
  - Comfort and Performance
- When upgrading electric service
  - Process
  - Timing
  - Cost



# Direct to Contractor Incentive: \$1,000



## HEAT PUMP WATER HEATERS

### List of Incentive Programs



All of these incentive programs support the installation of Heat Pump Water Heaters (electric) to replace gas water heaters in existing buildings. They apply to single family homes, and some may also apply to single units in multifamily buildings. Please visit the program websites for more details and contact information. Some websites maintain lists of enrolled contractors/installers as a resource to you. Projects that meet the eligibility requirements for multiple BayREN/CCA-funded program can be layered for a larger incentive unless marked otherwise.

Program	Incentive Amount	Who Applies	Eligible Customers	Qualifying Equipment	Website
BayREN Home+	\$1,000	Customer or Contractor	Residents of all 9 Bay Area counties (excluding Palo Alto, Healdsburg, City of Alameda and SVP customers)	UEF ≥3.1	<a href="https://www.bayren.org/how-get-started/single-family-homeowners">https://www.bayren.org/how-get-started/single-family-homeowners</a>
BayREN HPWH Contractor Incentives	\$1,000	Contractor*	MCE, EBCE, CPSF and SVP customers (Administered by BayREN)	UEF ≥3.1 & NEEA Tier 3 or above compliant	<a href="http://bayren.org/hpwh">bayren.org/hpwh</a>
City of Alameda	\$1,500	Customer	Alameda Municipal Power residential customers	ENERGY STAR® Certified	<a href="http://www.alamedamp.com/371/Heat-Pump-Water-Heater-Rebates-Commercial">www.alamedamp.com/371/Heat-Pump-Water-Heater-Rebates-Commercial</a>
Electrify Marin	\$1,000 +\$1,000 if income qualified	Customer	Residents of Marin County	UEF ≥3.0 & NEEA Tier 3 or above compliant	<a href="http://marincounty.org/depts/cd/divisions/sustainability/energy-programs/electrify">marincounty.org/depts/cd/divisions/sustainability/energy-programs/electrify</a>
Future Fit	\$1,000 (replacing electric resistance); or \$2,000 (replacing natural gas) + \$1,500 if panel upgrade needed +\$1,500 for CARE/FERA customers <i>Total amount of layered incentives may not exceed \$3,500 or total project cost</i>	Customer	SVCE customers	UEF ≥2.9	<a href="http://svcleanenergy.org/water-heating">svcleanenergy.org/water-heating</a>
GridSavvy	\$700 (+\$300 for CARE/FERA customers) \$5/month bill credit for participating in demand response	Customer or Contractor*	Sonoma Clean Power customers	Rheem & AO Smith models (80 gal. & 50 gal. versions). See website. <i>Thermostatic Mixing Valve required with installation.</i>	<a href="http://sonomacleanpower.org/programs/gridsavvy">sonomacleanpower.org/programs/gridsavvy</a>
Palo Alto HPWH Program**	\$1,500 for gas to ≥80 gal HPWH \$1,200 for gas to < 80 gal HPWH \$500 for electric to HPWH	Customer	Palo Alto Utility customers	UEF ≥2.87 and/or ENERGY STAR® certified	<a href="https://www.cityofpaloalto.org/Departments/Utilities/Residential/Save-Energy-Water/Heat-Pump-Water-Heaters">https://www.cityofpaloalto.org/Departments/Utilities/Residential/Save-Energy-Water/Heat-Pump-Water-Heaters</a>
PCE HPWH and Panel Upgrade Incentive Program	\$1,000 (replacing NGWH) \$500 (replacing resistance water heater >60 gal) \$1,000 CARE Customers \$1,500 between 1/21-9/21 \$1,500 for electrical panel update up to 100A \$750 for electrical panel update up to 200A	Contractor*	Peninsula Clean Energy customers	UEF ≥3.1	<a href="http://peninsulacleanenergy.com/heat-pump-water-heater">peninsulacleanenergy.com/heat-pump-water-heater</a>
TECH Clean California HPWH Contractor Incentive Program	\$2,100	Contractor*	Residents of all 9 Bay Area counties (excluding Palo Alto)	NEEA Tier 3 and/or ENERGY STAR® certified <i>Thermostatic Mixing Valve required with installation.</i>	<a href="http://energy-solution.com/tech-incentives">energy-solution.com/tech-incentives</a>

\*Application may be submitted through BayREN Home+ \*\*Cannot be layered with other BayREN/CCA-funded programs

For Contractors 05/10/2022



# Incentives are Evolving Quickly



## Rough Estimate of Impact of Electrification

Estimated Installed Cost		Higher	Lower
	Induction Range	\$ 2,295	\$ 1,500
	Heat pump Dryer	\$ 2,994	\$ 1,200
	HVAC	\$ 20,633	\$ 8,560
	Heat Pump Water Heater	\$ 4,662	\$ 4,662
	Electric Panel Upgrade	\$ 4,256	
<b>Total</b>		<b>\$ 34,840</b>	<b>\$ 15,922</b>
<b>Incentives</b>	<b>BayREN Residential</b>	\$ (3,050)	\$ (3,050)
	<b>Direct to Contractor HPWH incentive (CleanPowerSF or EBCE)</b>	\$ (1,000)	\$ (1,000)
	<b>Federal IRA (install after Jan 1, 2023)</b>	\$ (3,200)	\$ (3,200)
	<b>Net Cost</b>	<b>\$ 27,590</b>	<b>\$ 8,672</b>
	<b>Gas Equivalents</b>	<b>\$ 22,706</b>	<b>\$ 11,689</b>
	<b>Incremental Cost Compared to Gas Replacement</b>	<b>\$ 4,884</b>	<b>\$ (3,017)</b>

**Source of costs:** E3 "Residential Building Electrification in California", 2019.

Exceptions: Lower cost was upgraded to 120v heat pump dryer and induction range rather than cooktop.

# Thank You



Barry Hooper, Senior Green Building Coordinator  
[barry.hooper@sfgov.org](mailto:barry.hooper@sfgov.org)

September 28 –  
Navigating Electric Service Upgrades for Existing Commercial and Multifamily:  
[bit.ly/sept28existingbuildings](http://bit.ly/sept28existingbuildings)



**SF Environment**

**Our home. Our city. Our planet.**

A Department of the City and County of San Francisco

## **SF Environment All Rights Reserved**

The author of this document has secured the necessary permission to use all the images depicted in this presentation. Permission to reuse or repurpose the graphics in this document should not be assumed nor is it transferable for any other use. Please do not reproduce or broadcast any content from this document without written permission from the holder of copyright.



# Home Electrification Without Panel Upsizing

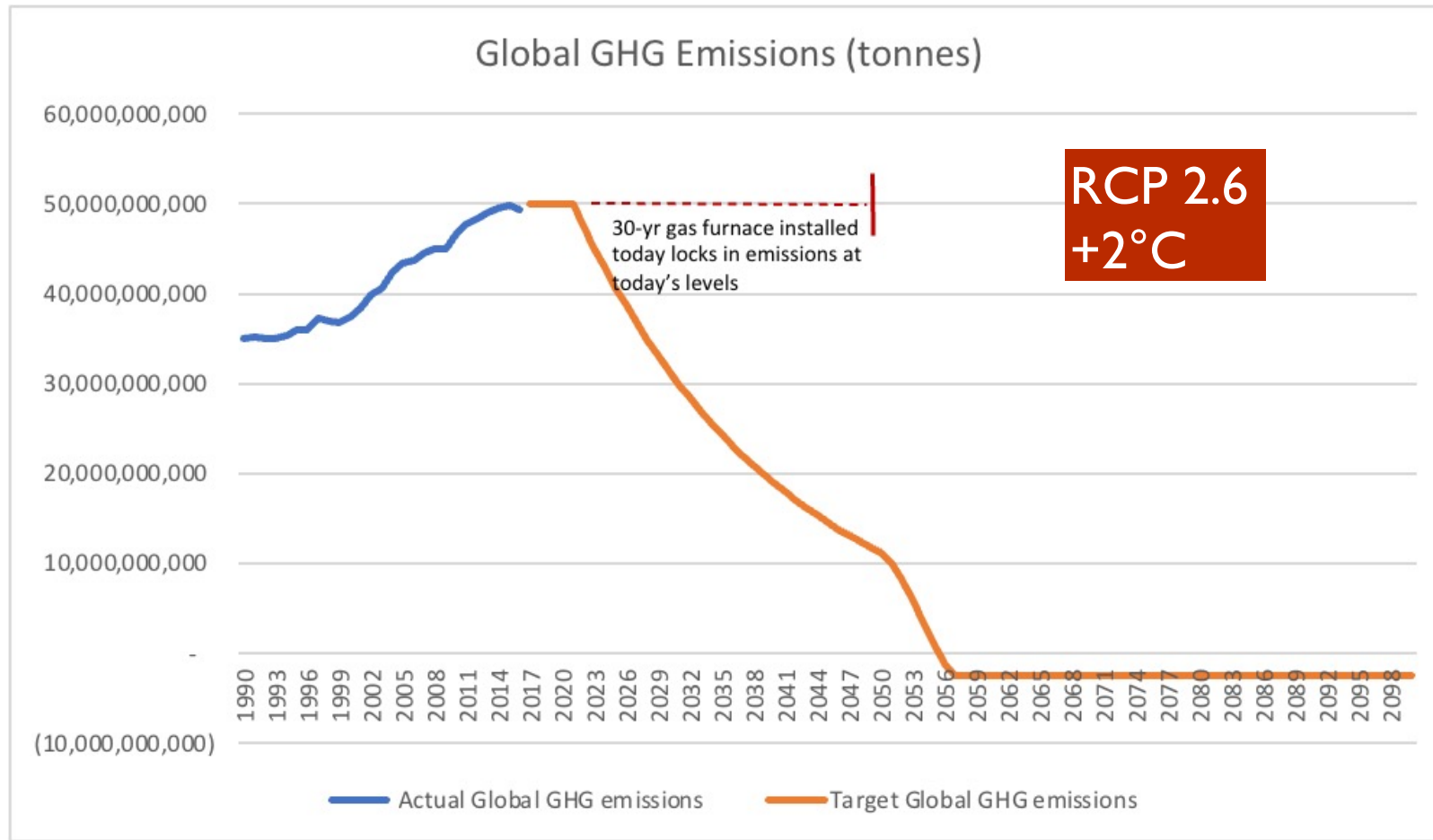
Sept 7, 2022

Tom Kabat

Slide credits

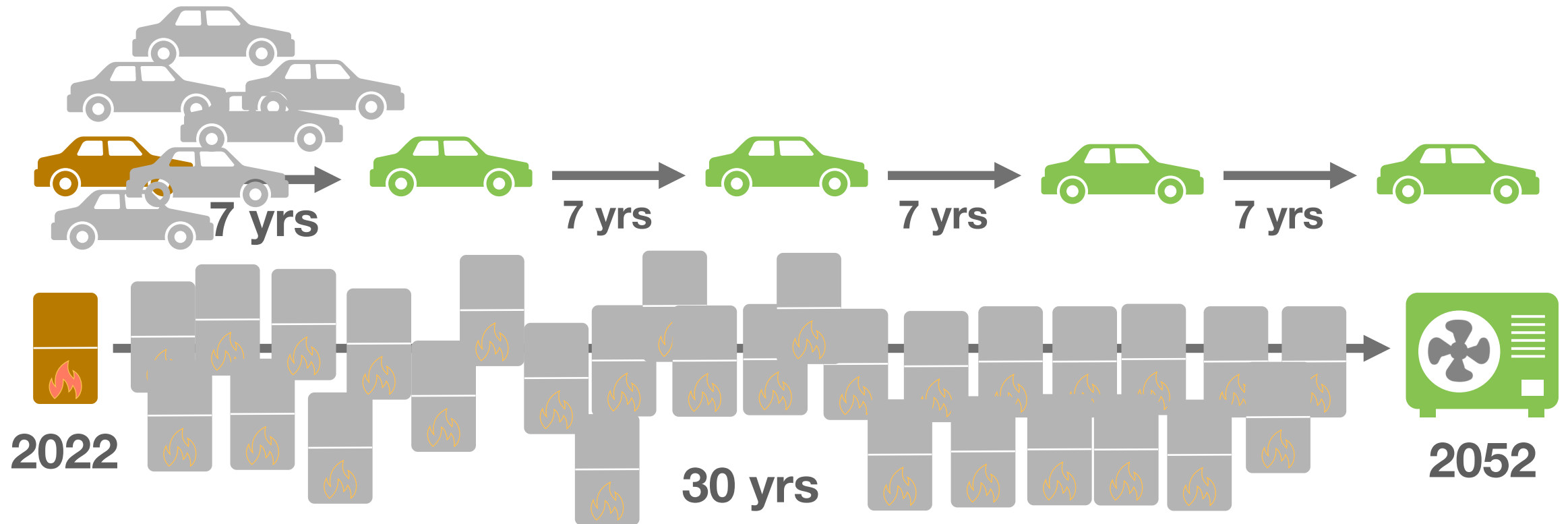
Josie Gaillard & Tom

# OUR ONLY PATH REMAINING TO 2°C



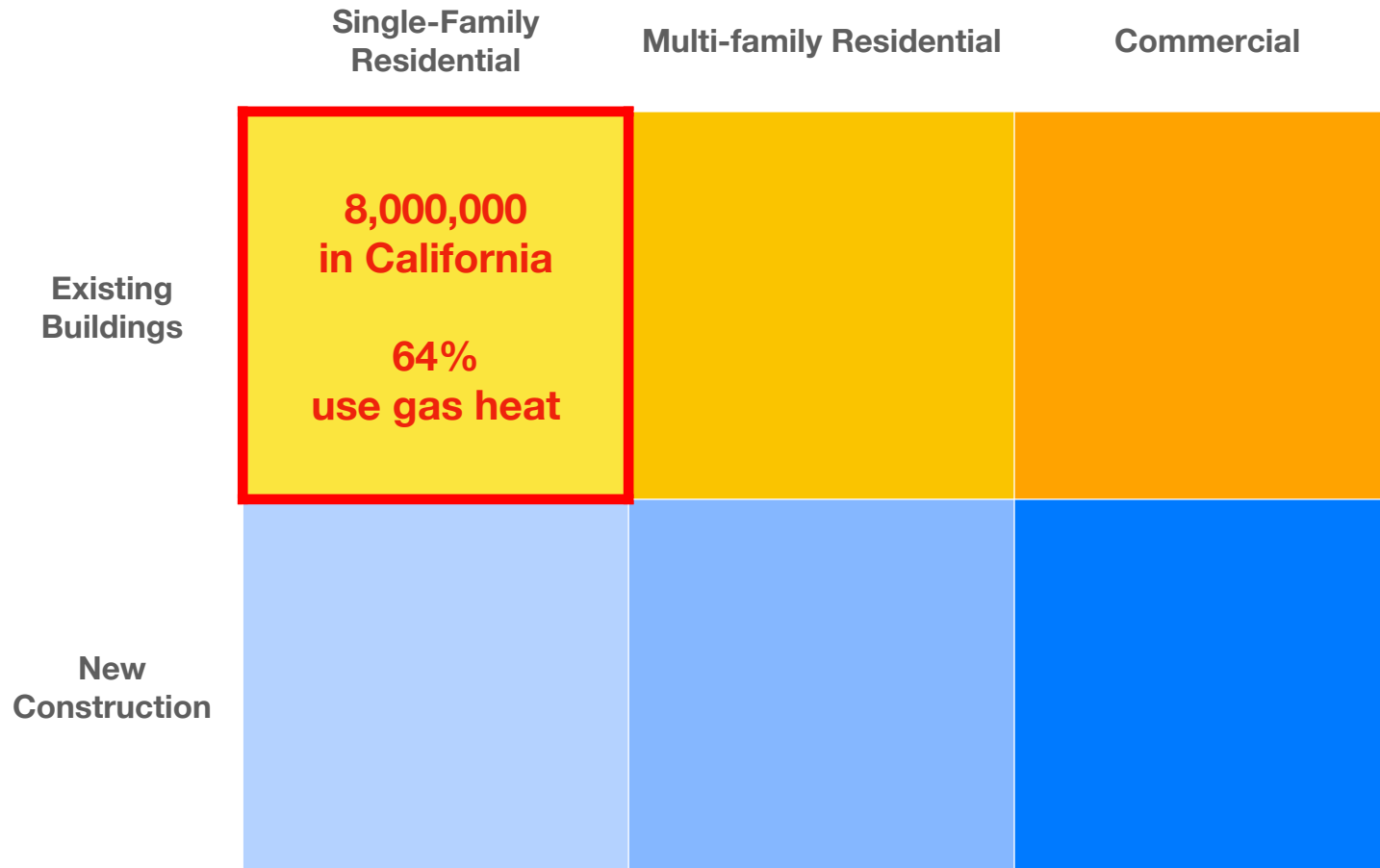


# EQUIPMENT TURNOVER RATES



- ~167,000 gas furnaces will be replaced this year in **California** alone
- **Every furnace we fail to convert this year locks in emissions until 2052,** absent govt intervention

# OUR FOCUS



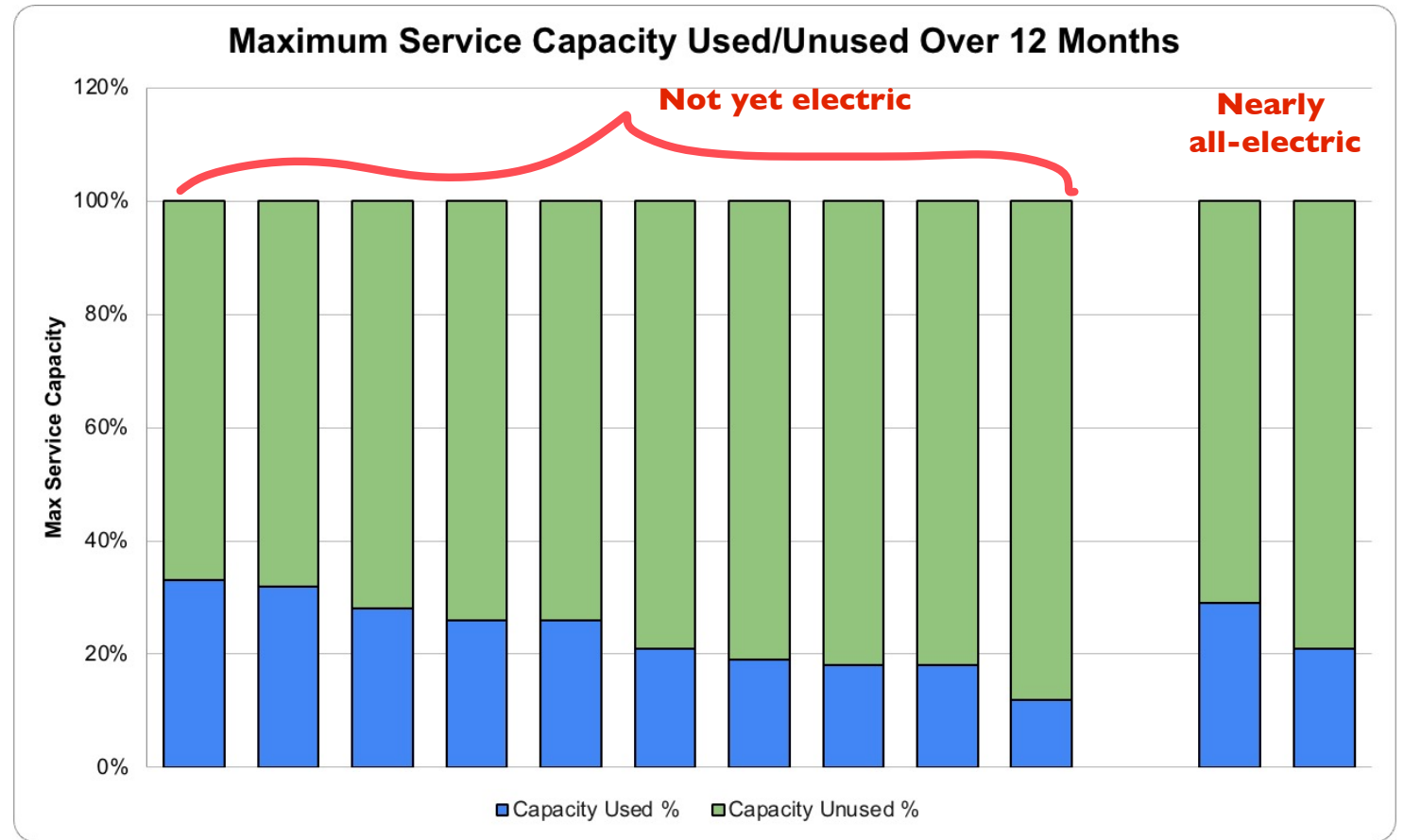


# THE CHALLENGE

- Status quo annual HVAC replacements in CA: 167,000 furnaces / year
- Accelerated replacements (10 vs. 30 yrs): 500,000 furnaces / year
- Therefore, we need 3x the HVAC workforce: who will do this work?
- Cost to upsize all 8 million service lines and main panels: \$24 billion
- That's \$24 billion not spent on appliance replacement
- Need ?x the electrician workforce: who will do this work?

# THE GOOD NEWS

- We don't need to increase service lines to homes, in the vast majority of cases
- In our experience, 90% of homes with 100A panels or greater can be fully electrified (including EV charger) without a service line increase





# WHOLE HOME ELECTRIFICATION










# Electrification Plans w/ NEC Load Calcs

## Always Useful

10





# All Electric 100 Amp Home (2,000 square feet)

Ducted heat pump, medium power heat pump water heater, hybrid heat pump dryer

Device Volts	Device Amps	100 Amp Panel	Device Volts	Device Amps
120	8	 Lights/Plug	15	15
120	8	 Lights/Plug	15	15
120	8	 Lights/Plug	15	15
120	10	 Garbage Disposal	20	20
120	7	 Refrigerator	20	20
240	3	 Forced Air Unit	20	20
			20	20
			20	20
240	20	 Heat Pump HVAC	20	20
240	20	 EV Charger	50	50
240	16	 Solar Input	20	20
			20	20
			20	20
			20	20
			20	20
			20	20
			20	20
			20	20
			20	20
			20	20
			20	20
			20	20
			20	20
			20	20
			20	20
			20	20
			20	20
			20	20
			20	20
			20	20
			20	20
			20	20
			20	20
			20	20
			20	20
			20	20
			20	20
			20	20
			20	20
			20	20
			20	20
			20	20
			20	20
			20	20
			20	20
			20	20
			20	20
			20	20
			20	20
			20	20
			20	20
			20	20
			20	20
			20	20
			20	20
			20	20
			20	20
			20	20
			20	20
			20	20
			20	20
			20	20
			20	20
			20	20
			20	20
			20	20
			20	20
			20	20
			20	20
			20	20
			20	20
			20	20
			20	20
			20	20
			20	20
			20	20
			20	20
			20	20
			20	20
			20	20
			20	20
			20	20
			20	20
			20	20
			20	20
			20	20
			20	20
			20	20
			20	20
			20	20
			20	20
			20	20
			20	20
			20	20
			20	20
			20	20
			20	20
			20	20
			20	20
			20	20
			20	20
			20	20
			20	20
			20	20
			20	20
			20	20
			20	20
			20	20
			20	20
			20	20
			20	20
			20	20
			20	20
			20	20
			20	20
			20	20
			20	20
			20	20
			20	20
			20	20
			20	20
			20	20
			20	20
			20	20
			20	20
			20	20
			20	20
			20	20
			20	20
			20	20
			20	20
			20	20
			20	20
			20	20
			20	20
			20	20
			20	20
			20	20
			20	20
			20	20
			20	20
			20	20
			20	20
			20	20
			20	20
			20	20
			20	20
			20	20
			20	20
			20	20
			20	20
			20	20
			20	20
			20	20
			20	20
			20	20
			20	20
			20	20
			20	20
			20	20
			20	20
			20	20
			20	20
			20	20
			20	20
			20	20
			20	20
			20	20
			20	20
			20	20
			20	20
			20	20
			20	20
			20	20
			20	20
			20	20
			20	20
			20	20
			20	20
			20	20
			20	20
			20	20
			20	20
			20	20
			20	20
			20	20
			20	20
			20	20
			20	20
			20	20
			20	20
			20	20
			20	20
			20	20
			20	20
			20	20
			20	20
			20	20
			20	20
			20	20
			20	20
			20</	

## Power-Efficient Equipment Choices

## Saves Energy & Money

Home			
Equipment List			
Appliance	Image	Model Number	Retail Price
Frigidaire gallery 30" freestanding induction range		GCRI3058AF	\$1098
Mitsubishi 3-ton centrally ducted heat pump HVAC system		SVZ-KP36NA/SUZ-KA36NA2	\$4800
Rheem 15-amp 65-gallon heat pump water heater		PROPH65 T2 RH375-15	\$2215
Wallbox Pulsar EV charger w/ adjustable current		Pulsar	\$700

## Always Needed

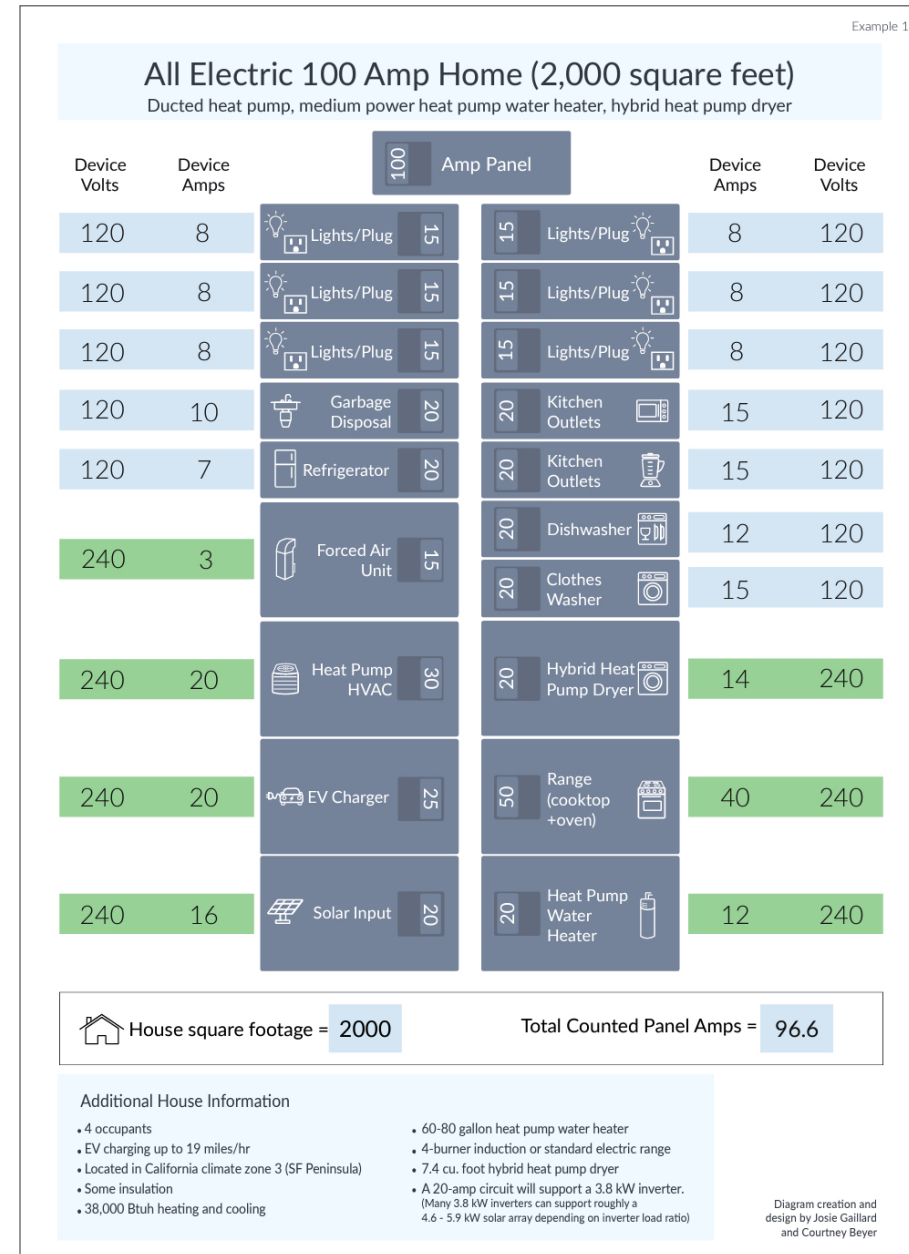
## Circuit controls

## Sometimes Needed



# “PANEL OPTIMIZATION” for 2,000 sq ft home

- For homes with 100 amp electrical panels
- Helps avoid ~\$5,000 electric panel upgrade
- Favors efficient devices w/ low rated amps
- Provides roadmap for building owner
- Helps guide tradespeople





# DO TRADES KNOW THIS?

- No, each trade thinks about their appliance, not whole home
- Must either train all trades: plumbers, HVAC, electricians or...
- Train electrification experts who understand how all of home's electric systems work together
- Building code, Bay REN, Cities and Utility incentive programs could accelerate this learning by requiring/ incenting whole-home electrification plans

**Watt Dieting = Maintaining lifestyle by choosing appliances  
and/or controls that reduce the highest power usage your  
building hits**

**= Panel Optimization**

**= Getting the most lifestyle per Amp or per Watt**

**Many times it also has the benefit of avoiding panel upsize  
costs**

## **Societal Benefits**

**Efficient electrification means more of us  
can electrify before OVERSTRESSING:**

**The Electrician Workforce**

**The Utility Workforce**

**The Neighborhood Transformers**

**The City Substations**

**The policy and program people**

## **Personal Benefits**

**Avoids Panel Upsizing**

**Avoids Moving your electric meter**

**Avoids Mast and Weather Head upsizing**

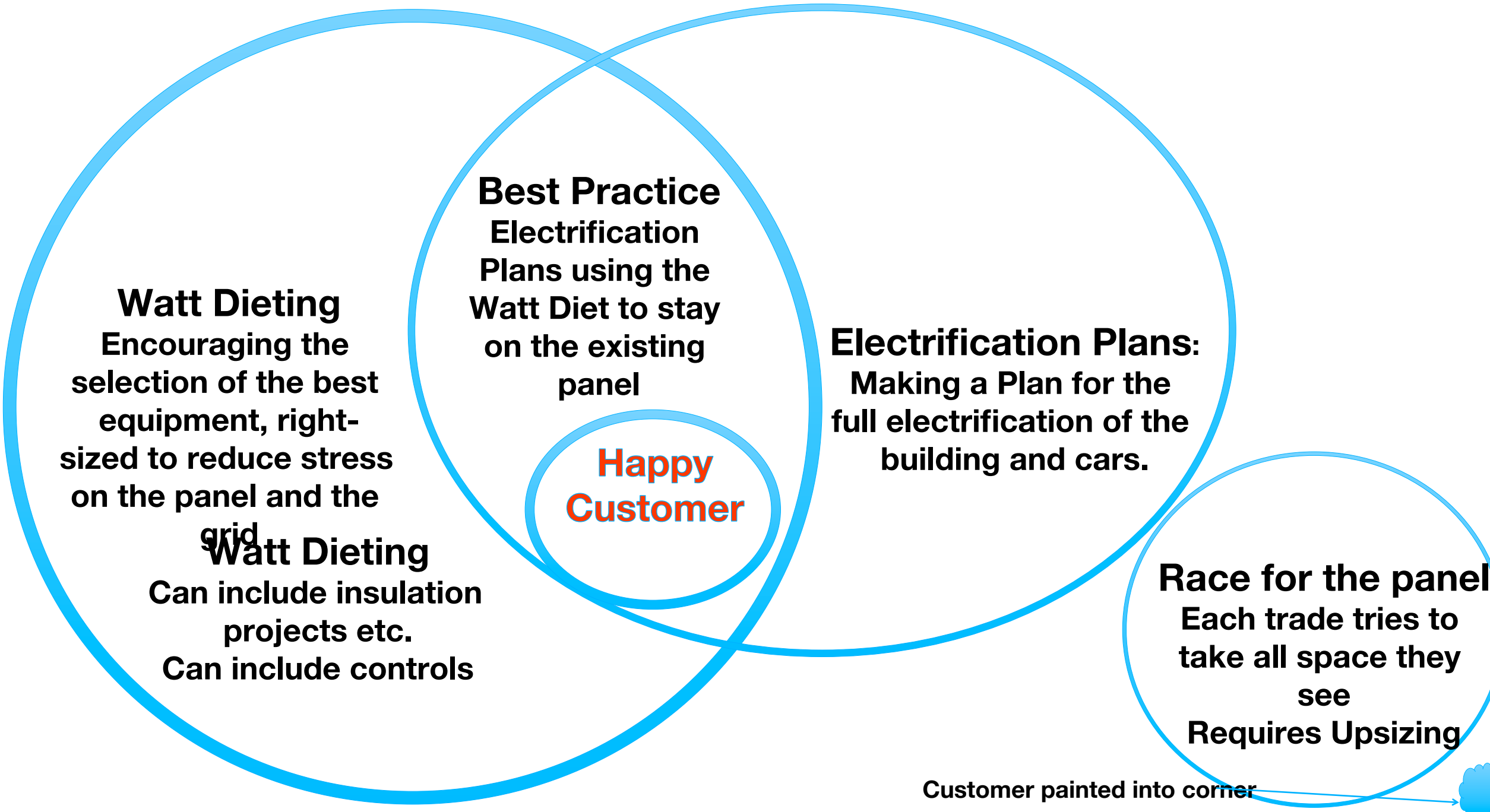
**Avoids Service Line Upsizing**

**Avoids Trenching (for underground  
service)**

**Avoids PG&E Load Studies**

**Avoids PG&E Time Requirements**

**Avoids PG&E Engineering Costs**





# DO WE HAVE TO UPSIZE PANELS?

Not if we already have a working 100 Amp panel

24 kW of power

32 Horsepower

Lots of electric energy (Up to \$7,000 per month)

# WHY STAY ON THE EXISTING PANEL?

Save Money (\$4k-\$20k upfront)

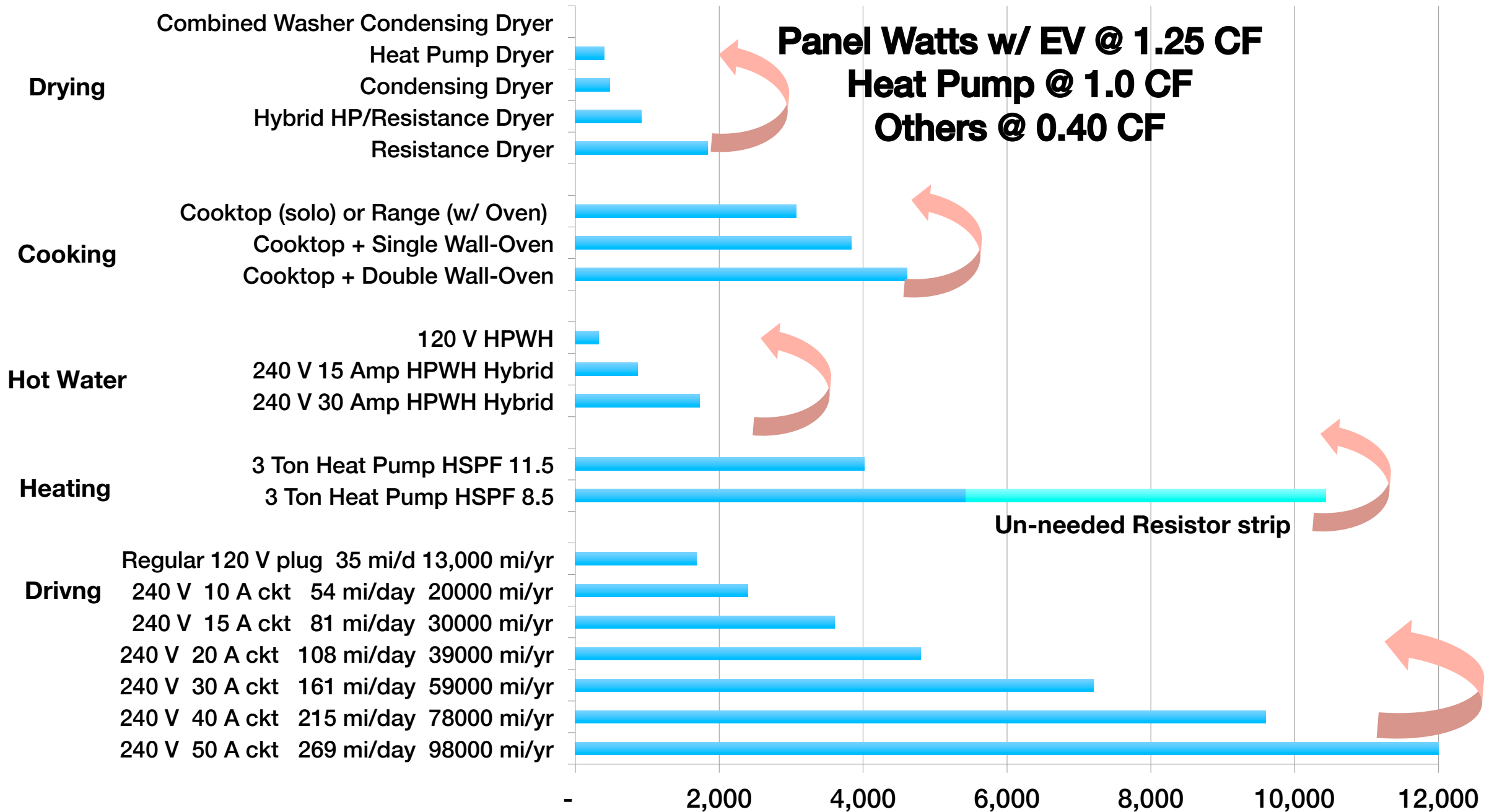
Save Time (weeks to months)

Avoid Utility Constraints ( no program hiccups )

Keep utility rates lower (more equitable)

Provide a faster transition (saves many lives)

Provide a better community experience





# SIMPLE REPLACEMENT LIST

Function	Replace	Get	Circuit
Water Heater	50 gal gas	65 gal 15 Amp HPWH or 120V HPWH	15
Furnace	60 kBtu gas	<=3 Ton Inverter driven Heat Pump	20A or
Air Cond	2-3 ton single sp	(freed up circuit)	Use for HP
Cooktop	36" gas	36" 40 Amp Induction Cooktop	40A
Dryer	4.5 cu ft gas dryer	4.5 cu ft Combined 120V Washer/Dryer or 14A HPD	Use for EV
Washer	4.5 cu ft Washer	(freed up floor space)	existing
40,000 miles/yr	Gas Station	240 V 10-30 Amp circuit	10-30A
		Add insulation whenever you want	

# CIRCUIT CONTROLS

- EV charger installers most knowledgeable about circuit controls today...
  - Circuit sharing devices      Plug-in or hard wired
  - Circuit pausers                Have sensors on main lines
  - Smart breakers                Have sensors built in
  - Smart panels                  Have sensors built in

# MISPERCEPTIONS

- Circuit controls are not a panacea...they alone will not solve electrification of existing buildings
- Circuit controls are a valuable tool in the toolkit to close a final gap, if needed
  - First: make a plan
  - Second: choose power-efficient equipment
  - Third: deploy circuit control(s) if needed.
    - Very effective on EV because EVSE is an energy delivery device
    - Other appliances are providing end use services (comfort, hot water...

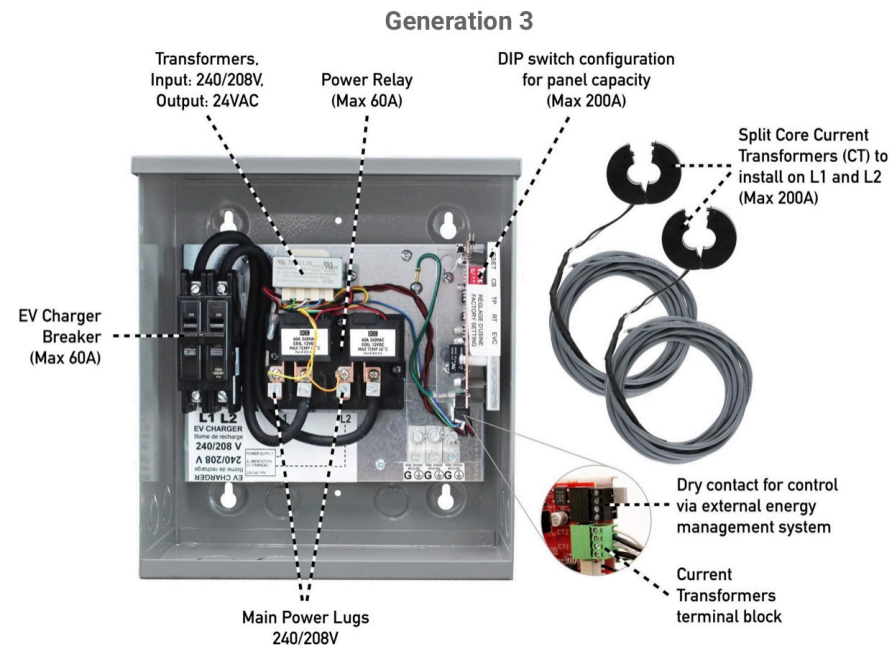


# STATE OF TECHNOLOGY

- Rapid innovation happening in circuit controls...driven primarily by EV charging
- Many start-ups... based in Europe & California
- Hard to stay on top of new offerings
- Many (not all) seek UL listing
- Easy to fully electrify a 100A home with controls available today
- Emerging solutions in this space will only make our jobs easier

# CIRCUIT PAUSERS

- Pauses circuit when load on panel exceeds 80% of capacity
- Uses CT clamps to sense power
- Can be installed on main panel or subpanel
- EV charger companies starting to integrate them into chargers
- Our most frequently used type of circuit control



# SMART BREAKERS

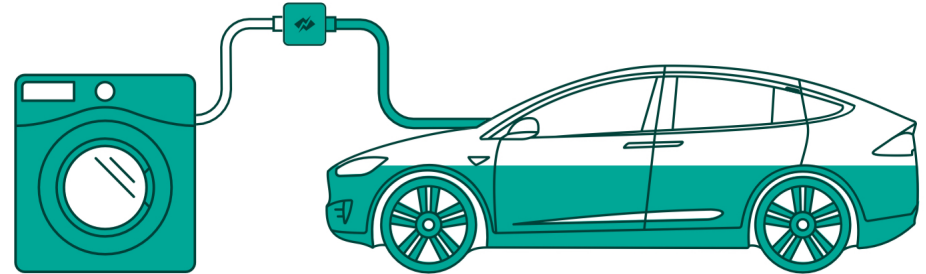
- Often compatible with conventional electrical panels
- Measure current going through themselves and can report via wifi to apps
- When paired with software, can control circuits, dynamically throttling current as needed
- First used in commercial construction applications
- Sometimes used in residential solar/battery applications
- Not currently seeing widespread use in existing homes purely for electrification





# CIRCUIT SHARING DEVICES

- Can be hardwired or plug-in
- Plug-in versions can be easy, temporary fix for sharing dryer and EV charger



# SMART PANELS

- Shed any of the circuits in the panel if load exceeds 80% of panel capacity
- Priority of circuit shedding set by homeowner
- 100A - 200A capacity
- Rated for indoor and outdoor use



# TYPICAL USE OF CIRCUIT CONTROLS

- 100A home in Burlingame, CA
- Converting 4 gas appliances + car to electric
- 1st selected elected power-efficient equipment
- Added one circuit pauser to EV circuit
- NEC 220.83(B) load calcs
- That's it!

General Light and Plug Loads				Volt-Amps
Dwelling	2,350 sq. ft.	×	3 VA/sf	= 7,050
Kitchen Small Appliance Circuits	2 (min. 2)	×	1,500 VA each	= 3,000
Laundry (Washing Machine) Circuit	1 (min. 1)	×	1,500 VA each	= 1,500
Appliance Loads (nameplate value)	Volts		Amps	Volt-Amps
Built-in Microwave (not countertop model)	120	×	10	= 1,200
Dishwasher	120	×	15	= 1,800
Garbage Disposal	120	×	9.5	= 1,140
Refrigerator (on dedicated circuit)	120	×	5	= 600
Stove hood	120	×	1	= 120
NEW: Frigidaire gallery 30" freestanding induction range	240	×	40	= 9,600
NEW: Whirlpool 7.4 cu ft hybrid heat pump dryer	240	×	14	= 3,360
NEW: Rheem 15-amp 65-gallon heat pump water heater	240	×	12	= 2,880
<b>General Loads Subtotal</b>				32,250
<b>First 8,000 VA @ 100%</b>				8,000
<b>Remaining VA @ 40%</b>				9,700
<b>General Loads Total</b>				17,700
Other Loads (nameplate value)	Volts		Amps	Volt-Amps
NEW: Electric Vehicle Charging Load @ 125% (with circuit pausing)	240	×	0	= 0
Bathroom Heater @ 100%	120	×	11	= 1,320
NEW: Mitsubishi 3-ton centrally ducted heat pump HVAC system @ 100%	240	×	17	= 4,080
<b>Other Loads Total</b>				5,400
<b>Total Load (General + Other)</b>				23,100 VA
<b>Divide Load by 240 Volts</b>				96.2 A
<b>Rating of Existing Electrical Service</b>				100 A
<b>Panel Upgrade Required?</b>				No



# GREATER CHALLENGES WE FACE

- Range anxiety causes new EV buyers to oversize home EV chargers...leaving no room on panel for more electrification
- People installing new gas tankless water heaters - BIG problem and growing
- Electric resistance dryers - need better heat pump alternatives w/ 7.4 cu ft
- Permitting authorities lack basic knowledge about heat pumps, circuit control tech and in some cases NEC load calc methods > leads to permitting problems
- Trades other than electricians (plumbers, HVAC) need easy way to do NEC load calcs so they can switch from installing fossil fuel to electric appliances

# Meeting Agenda

Date/Time:	September 7 <sup>th</sup> , 2021 at 5pm-7pm		
Location:	Teams (Virtual)	Recorder	Hannah Kaye
Desired Outcomes:	1. Webinar attendees are informed of PG&E's Added Load process.		
Number	Agenda Item(s)		
1	Introductions		
2	Building and transportation electrification		
3	Impacts of electrification on primary and secondary distribution		
4	Primary trigger of electric service upgrades		
5	Added Load process and timeline		
6	Helpful resources		
7	Wrap up		

### Transportation Electrification



100% zero emission passenger vehicle sales by 2035

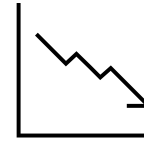


100% zero emission drayage truck operations by 2035



100% zero emission from on-road medium and heavy-duty vehicles by 2045

### Building Electrification



AB 3232 assesses feasibility of reducing emissions in buildings 40% below 1990 levels



25+ cities in PG&E's territory are considering electrification retrofit targets



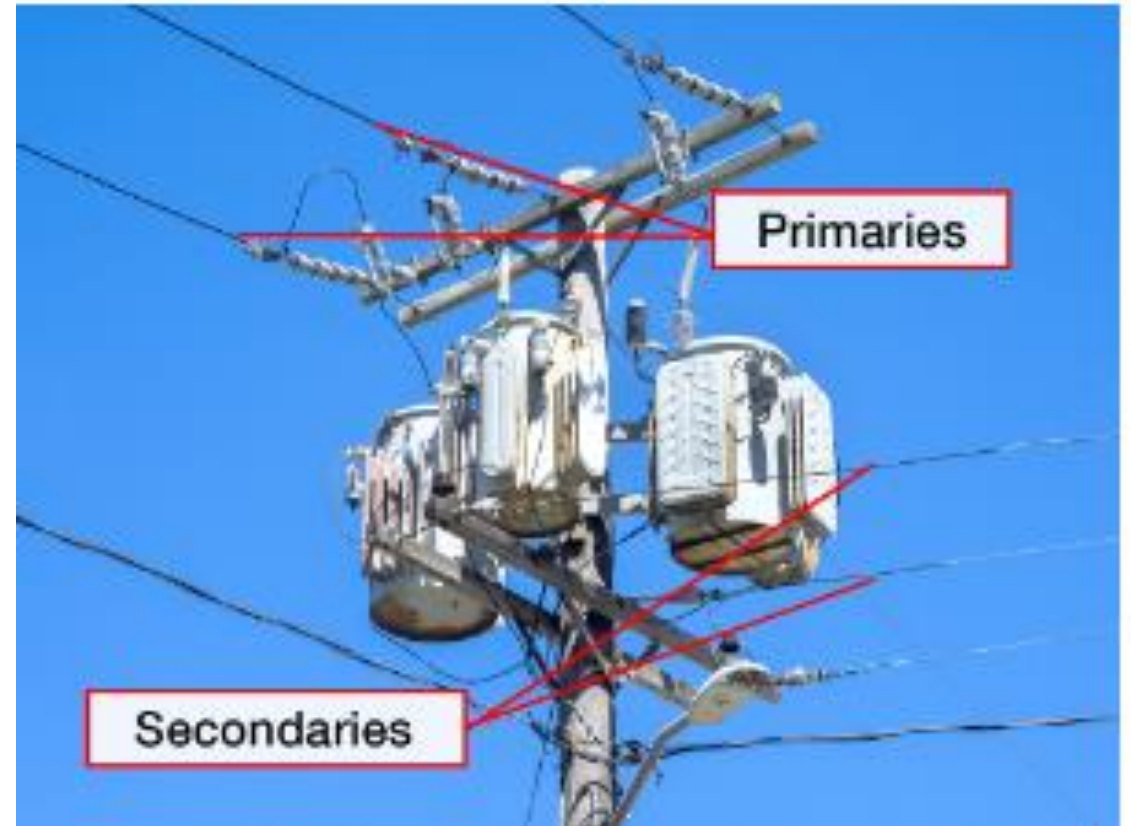
California Energy Commission announced a goal of 6 million heat pumps by 2030

# Impacts of Electrification on Primary and Secondary Distribution

Typically, non-residential transportation electrification drives upgrades on primary distribution lines and building electrification drives upgrades on secondary lines. PG&E is preparing for the anticipated impacts of electrification on the electric grid by improving grid planning.

**Primary lines:** higher-voltage lines located at the top of utility poles, above transformers. Voltages range from 4,12,21,34kV (in select areas).

**Secondary lines:** lower voltage lines are below transformers. Typical secondary voltages range between 120, to 480 volts.





Customers upsizing their main switch gear (i.e., electric panel) or termination section is the primary cause of service upgrades.



## Stages of Added Load Process

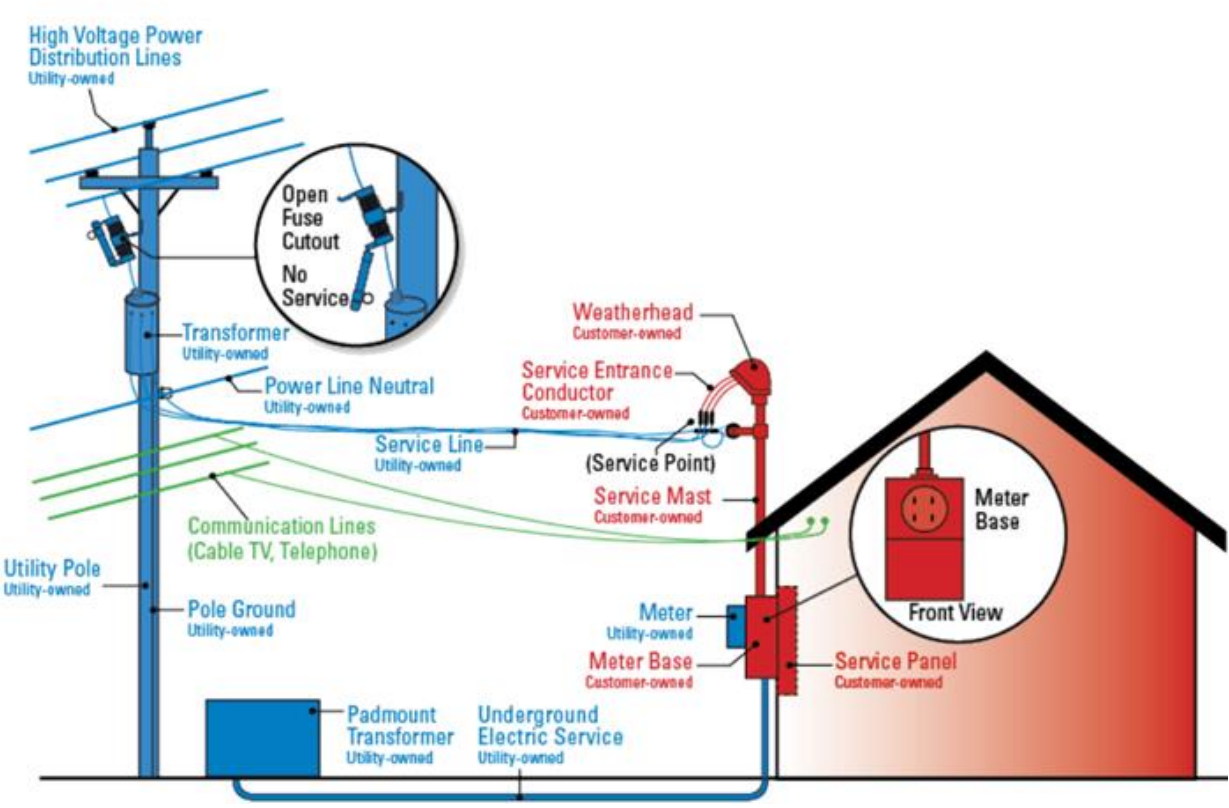
---

1. Customer planning and application
2. Load assessment and/or service design
3. Contract and payment
4. Construction and energization

# Added Load Process: Customer Planning and Application

- PG&E Responsibility: None
- Applicant Responsibility: Acquire contractor and determine electrification needs
- Timeline: Dependent on applicant

Utility-Owned and Customer-Owned Electric Equipment  
For Residential Service to Single-Family Dwellings and Duplexes



PG&E Infrastructure	Customer Infrastructure
Front-of-the-meter (FTM)	Behind-the-meter (BTM)
PG&E owns and is responsible for constructing, maintaining, and upgrading electrical infrastructure to the meter panel	Customer owns and is responsible for constructing, maintaining, and upgrading infrastructure from meter to the customer appliances

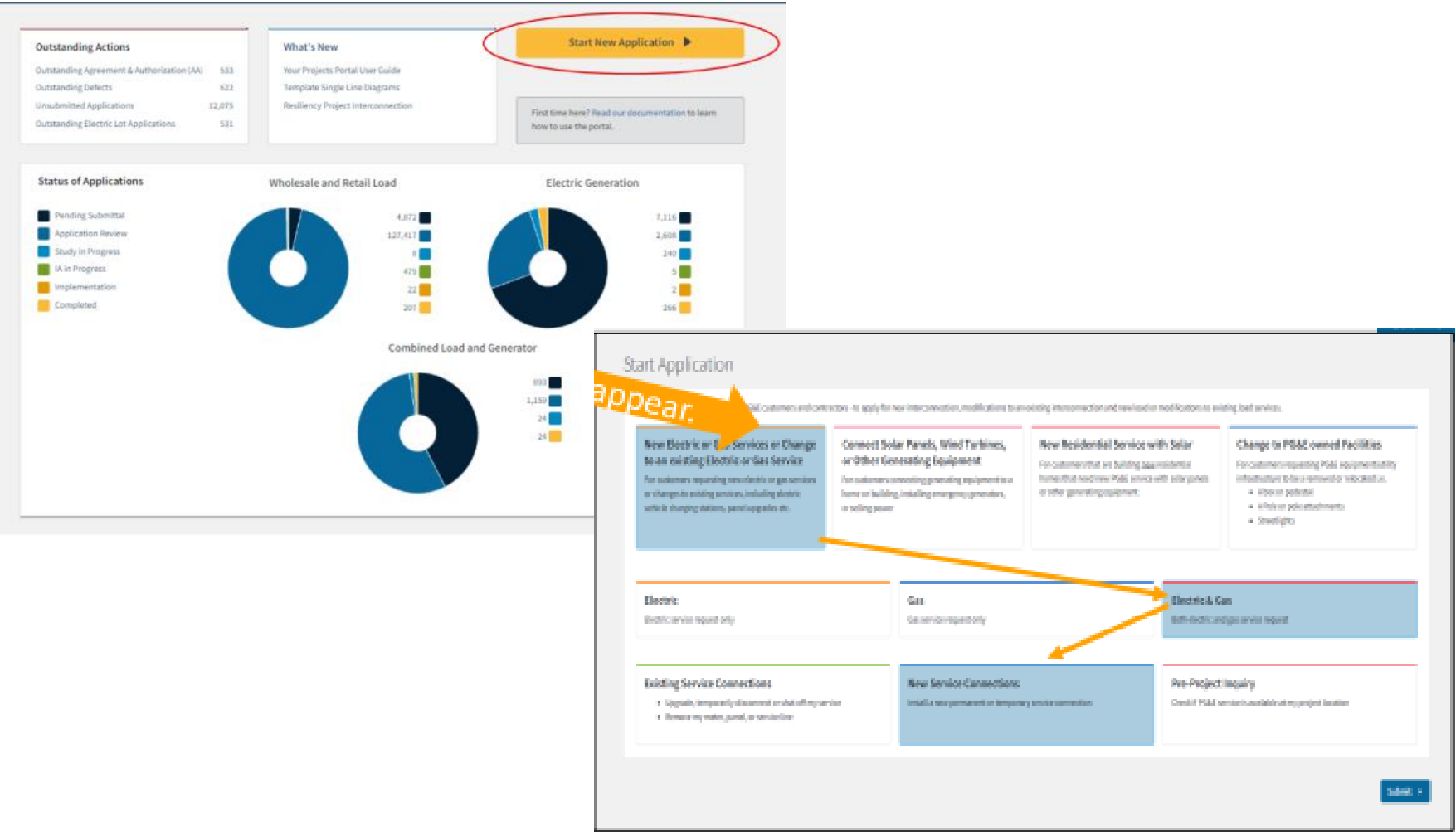
# Added Load Process: Customer Planning and Application

**PG&E Responsibility:** Contact applicant within ~ 3 days and confirm application details

**Applicant Responsibility:** Submit an Added Load application on [YourProjects.pge.com](https://YourProjects.pge.com)

**Timeline:** Applicant Dependent. PG&E will respond within ~ 3 days of application submission

**Helpful Links:** [Application User Guide](#)



Documentation/Information	Type of Documentation	Required?
Picture of electric panel label	Pictures	Required
Picture of the meter number	Pictures	Required
Picture of the main breaker	Pictures	Required
Picture of the electric panel - 6 feet on both sides - 6 feet in front - Include picture of weatherhead	Pictures	Required
Picture of area where new electric panel will be relocated if moving (mark the location on the picture)	Pictures	Required
Picture of service wire where it runs over the job site / neighboring property	Pictures	Required
Picture of where the service wire is attached to the PG&E pole / wire	Pictures	Required
List of new electric appliances and associated new loads (e.g., HVAC tons, wattage, etc.)	Spreadsheet (see next tab)	Required



# Added Load Process: Load Assessment and/or Service Design

**PG&E Responsibility:** Perform Load Assessment and inform applicant of findings

**Applicant Responsibility:** Pay Engineering advance and support PG&E representative with additional project details as needed

**Timeline:** ~ 30 days

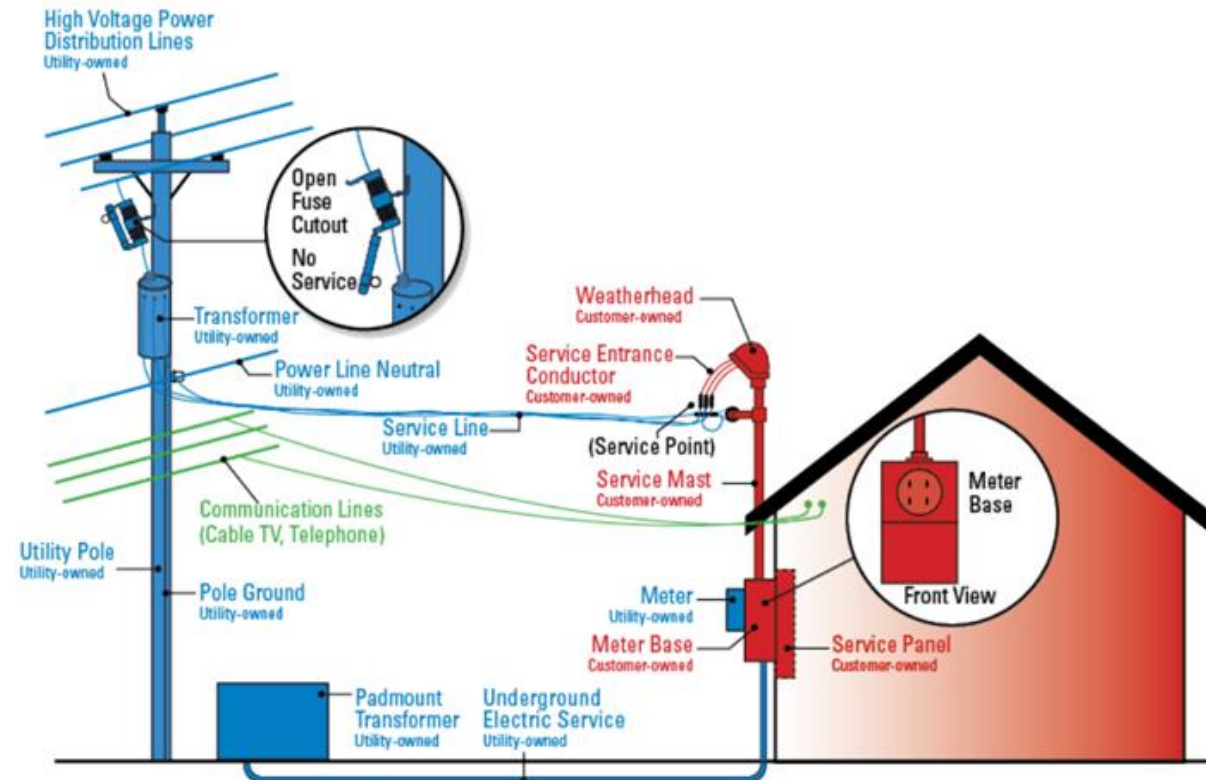
**Helpful Links:** [Make Payments Online](#)

## Engineering Advance

- Covers the cost for PG&E to perform load assessments
- \$1,500 (subject to change)
- May be refunded in like for like panel replacements

Relevant Infrastructure	Capacity
Service wire or cable (if underground)	Your PG&E representative will determine existing capacities for this infrastructure.
Secondary Conductors	
Transformers	

## Utility-Owned and Customer-Owned Electric Equipment For Residential Service to Single-Family Dwellings and Duplexes



# Added Load Process: Results of Load Assessment

**PG&E Responsibility:** Inform customer of findings

**Applicant Responsibility:** Consider findings of report and decide next steps

**Timeline:** Dependent on customer

**Helpful Links:** [Express Connections](#)



If customer is upgrading (e.g., existing service termination is 100 amps and proposed is 200 amps) their service panel, **most customers will require a service design**

# Added Load Process: Contract and Payment

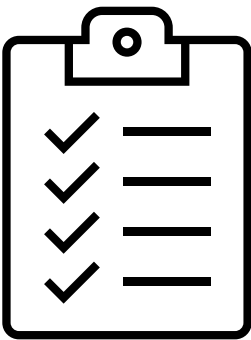
**PG&E Responsibility:** Complete estimating, design and send final contract  
**Applicant Responsibility:** Sign contract and pay for any necessary customer costs  
**Timeline:** ~70 days  
**Helpful Tip:** A detailed added load application can expedite the process

## Site Visit



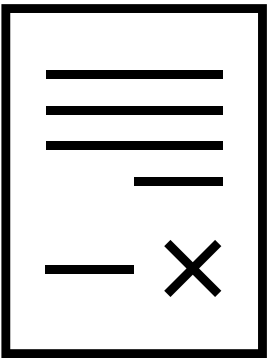
PG&E coordinates a site visit with customer to assess the scope of the project

## Job Package



PG&E designs and estimates necessary service work to send to customer

## Contract



Customer signs contract with PG&E and pays for any necessary costs  
*\* EA is applied to final contract cost*

# Added Load Process: Contract and Payment

**PG&E Responsibility:** Complete estimating, design and send final contract

**Applicant Responsibility:** Sign contract and complete payment

**Timeline:** ~ 70 days

**Helpful Tip:** If installing a residential EV charger, PG&E will cover the full costs of work in excess of residential allowances (does not apply to trenching, conduit and substructures, etc.).

## Electric Rule 15 and 16 govern the allowance for service upgrades

- Applicant is responsible to pay all upfront costs associated with service installation and an allowance of \$3,255 will be applied to the refundable portion of costs

## The top variables that impact cost

- Panel location and its distance from the nearest distribution point
- Transformer (if a single customer is on a transformer)
- If service is underground (trenching costs)

## Types of customer costs

- Customer costs include any necessary trenching, substructure/conduit installation new service conductor, and protective structure.





# Added Load Process: Construction and Energization

**PG&E Responsibility:** Complete required projects

**Applicant Responsibility:** Complete projects and required inspections

**Timeline:** ~1.5 – 3 months for PG&E work

## Preconstruction Meeting



PG&E coordinates meeting to align on customer and utility tasks and coordinate inspections

## Customer Construction



Customer completes substructure (if underground) installation and inspections (e.g., Green Tag inspection)

## Service Installation and Energization



PG&E installs new service and coordinates disconnect/reconnect while customer completes panel upgrade

Once your home has converted from dual fuel to all-electric, you can safely stop gas services and gas interconnection charges by applying to modify your existing services

Log in to the *PG&E Your Projects* portal>Start New Application>Select **New Electric or Gas Services or Change to an existing Electric or Gas Service**

Start Application

<b>New Electric or Gas Services or Change to an existing Electric or Gas Service</b> For customers requesting new electric or gas services or changes to existing services, including electric vehicle charging stations, panel upgrades etc.	<b>Connect Solar Panels, Wind Turbines, or Other Generating Equipment</b> For customers connecting generating equipment to a home or building, installing emergency generators, or selling power	<b>New Residential Service with Solar</b> For customers that are building new residential homes that need new PG&E service with solar panels or other generating equipment	<b>Change to PG&amp;E owned Facilities</b> For customers requesting PG&E equipment/utility infrastructure to be a removed or relocated i.e. <ul style="list-style-type: none"><li>• A box or pedestal</li><li>• A Pole or pole attachments</li><li>• Streetlights</li></ul>
<b>Electric</b> Electric service request only	<b>Gas</b> Gas service request only	<b>Electric &amp; Gas</b> Both electric and gas service request	
<b>Existing Service Connections</b> <ul style="list-style-type: none"><li>• Upgrade, temporarily disconnect or shut off my service</li><li>• Remove my meter, panel, or service line</li></ul>	<b>New Service Connections</b> Install a new permanent or temporary service connection	<b>Pre-Project Inquiry</b> Check if PG&E service is available at my project location	
<b>Permanent Removal</b>	<b>Service Relocation</b>	<b>Upgrade or Change</b>	<b>Tariff Conversion</b>
<b>Submit</b>			

## 1. Why stop gas services?

- Safety: eliminate safety concerns during an accidental dig-in or other damage.
- Customer cost savings: customers pay a \$0.13151/day minimum transportation charge to remain connected to the gas system.

## 2. Who pays for removing gas system?

Any gas service greater than 10 years will be removed at PG&E's expense

1. **PG&E's Single Family Electrification Guidebook**
  - Will be released at the end of 2022
2. **Pacific Energy Center Classes ([www.pge.com/energyclasses](http://www.pge.com/energyclasses))**

#	Classes
1	Heat Pump Water Heater Retrofit - Energy Cost Estimator: Overview and Demonstration (Previously Recorded)
2	Induction Cooking and Holding - Energy Efficiency and Performance for Residential Kitchens
3	Induction Cooking and Holding - Energy Efficiency and Performance for Residential Kitchens
4	Residential Heat Pump Installation and Commissioning for Installers, Raters and Commissioning Agents Part 1 (Previously Recorded)
5	Residential Heat Pump Installation and Commissioning for Installers, Raters and Commissioning Agents Part 2 (Previously Recorded)

3. **Induction Loaner program ([www.pge.com/inductionloaner](http://www.pge.com/inductionloaner))**

Thank you

Khalil Johnson: [Khalil.Johnson@pge.com](mailto:Khalil.Johnson@pge.com)

Nick Souza: [Nick.Souza@pge.com](mailto:Nick.Souza@pge.com)



# Appendix (Load Addition Worksheet)

Address					
<b>INSTRUCTIONS:</b> <b>Installing New:</b> Mark an "X" for each new appliance to be installed <b>New Electric Load:</b> Mark an "X" if the new appliance represents new load (either no existing appliance or existing is non-electric) <b>Size/Load:</b> Indicate the size or load of the new electric appliance being installed <b>Comments:</b> If the existing appliance is already electric, provide existing appliance load in the comments (especially for HVAC)					
Appliance Category	Appliance	Installing New?	New Electric Load?	Size/Load (LRA, Tons, W, kW)	Comments (if existing appl is elec, provide existing size)
HVAC	Heat Pump Packaged Unit				
	Heat Pump Split System				
	Mini-Split Ductless Heat Pump				
	Mini-Split Ducted Heat Pump				
Water Heater	Heat Pump Water Heater				
Cooking Appliance	Electric Range				
	Electric Cooktop				
	Electric Oven				
Clothes Dryer	Clothes Dryer				

		Installing New?	Existing Panel Amps	New Panel Amps	Comments (indicate if underground or overhead service)
Electrical	Electric Panel Upgrade				



An aerial photograph of a suburban neighborhood, showing a grid of streets, numerous single-family houses with varying roof colors, and many trees. The scene is captured from a high angle, looking down on the community.

# Single-Family Decarbonization: Discussion