



Local Governments Empowering Our Communities

# Systems Mapping Project

## Decarbonization of Existing Single-family Homes

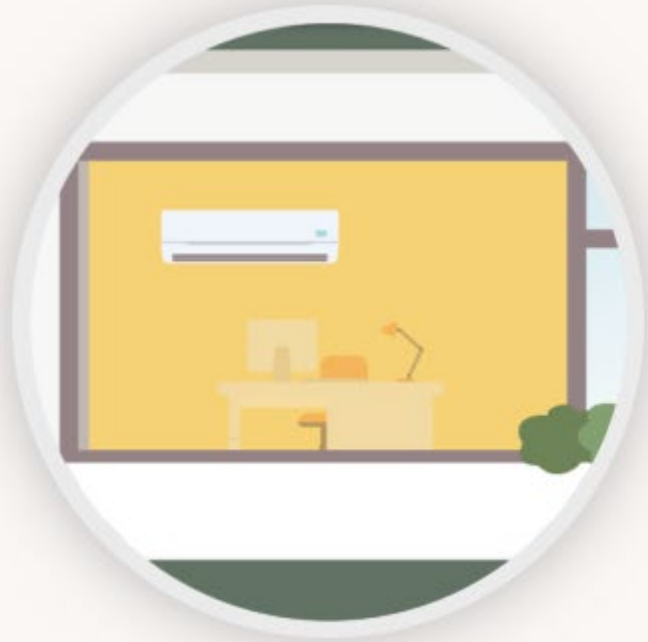
BayREN Forum  
September 1, 2021

# Why electrify?

- Methane: Global warming impact 84 times higher than CO<sub>2</sub> over a 20-year period
- Strong, rapid reduction in methane emissions would curb global warming and improve air quality



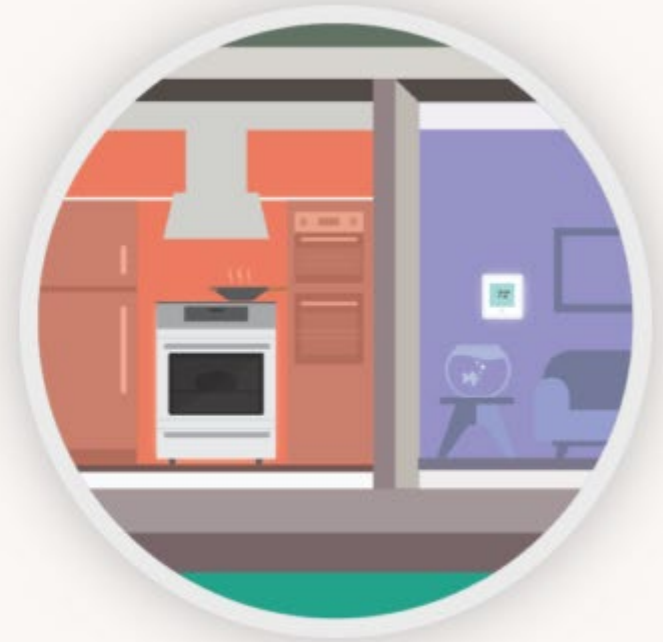
# 3 Main Opportunities to Electrify



HEATING AND AIR CONDITIONING

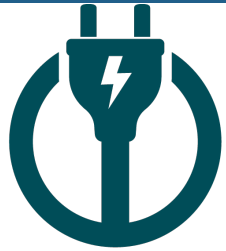


WATER HEATING



APPLIANCES AND EFFICIENCY

# Many Organizations Working on Electrification



THE SWITCH IS ON



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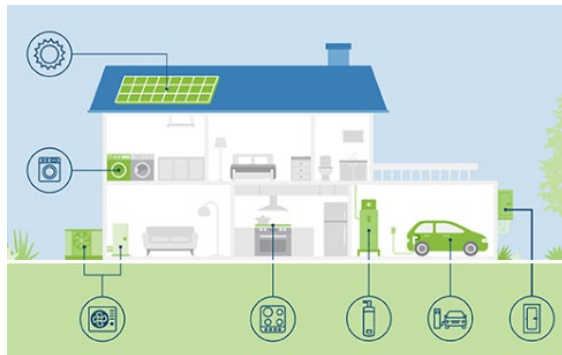
YellowTin



BAY AREA  
AIR QUALITY  
MANAGEMENT  
DISTRICT



BUILDING  
DECARBONIZATION  
COALITION



City of Palo Alto  
Home Electrification  
Readiness Assessment



ecoblock



A Zero Emissions All-Electric Single-Family Construction Guide

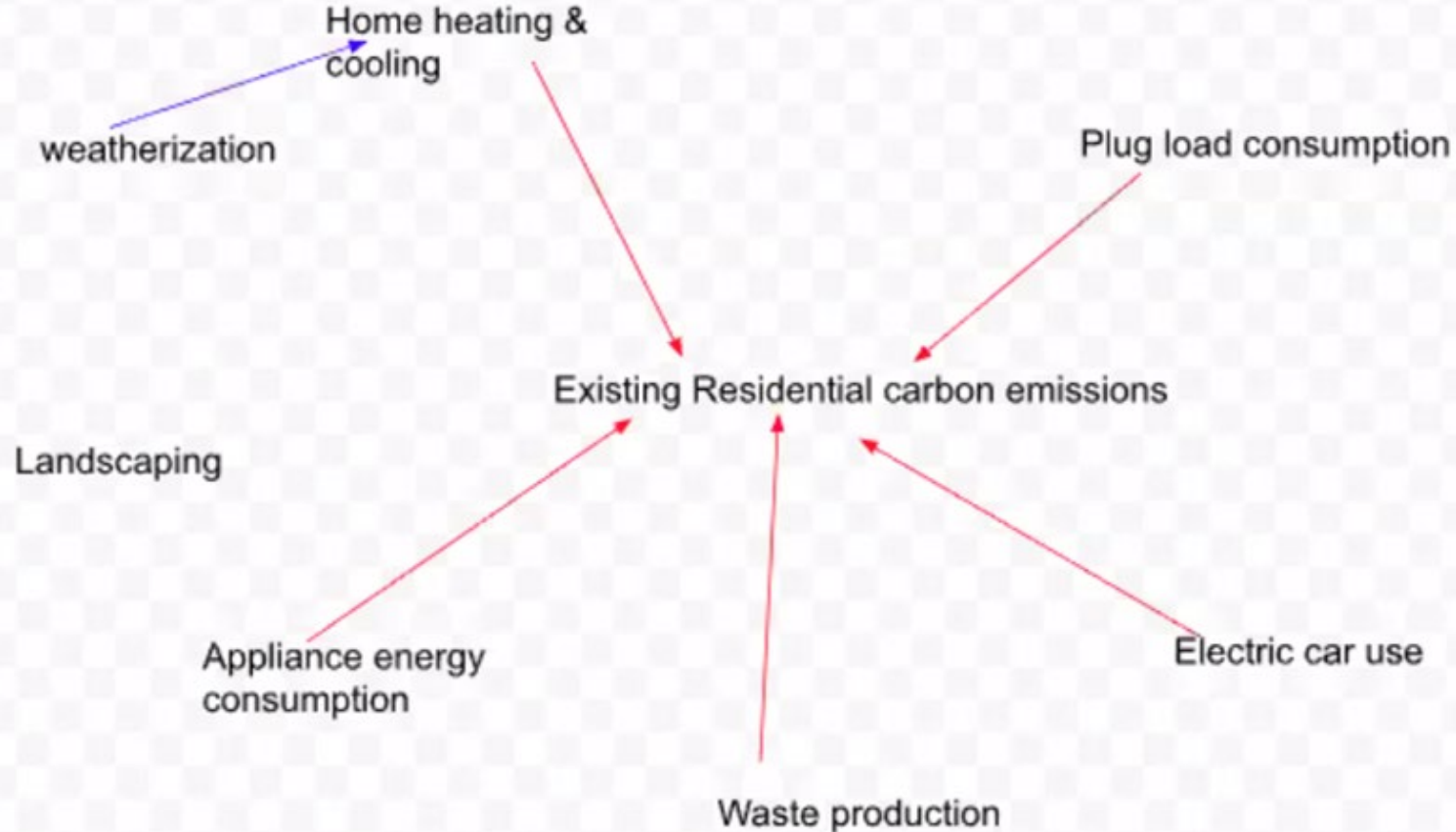


REDWOOD ENERGY

April 2020

# Systems Mapping

**Sample framing question:**  
**What are the variables that impact the level of residential carbon emissions**



# The Process

Stakeholder  
Workshop #1



Oct. 28

Focus Group:  
Contractors



Dec. 1

Focus Group:  
Homeowners



Dec. 2

Stakeholder  
Workshop #2



Dec. 9

# Stakeholder Workshop #1



**GOAL:** Look at primary parts of the system. Identify key players, opportunities, and barriers.

## 1. Energy appliances

- HVAC
- Water heating
- Kitchen appliances
- Electrical appliances

## 2. Funding and finance

- Access to capital
- Rebates
- Tax credits

## 3. Energy generation & storage

- Solar
- Battery
- Resilience during power shut-offs

## 4. Market forces

- Building trends
- Contractor and supplier behavior
- Price signals
- Real estate trends

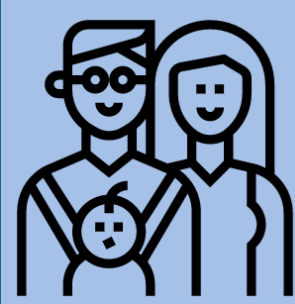
## 5. Policy and regulations

- Permitting
- Building codes
- Restrictions
- State law
- Ordinances

## 6. Consumer behavior

- Purchasing preferences
- Biases
- Overall knowledge
- Health concerns
- Attitudes about comfort & convenience

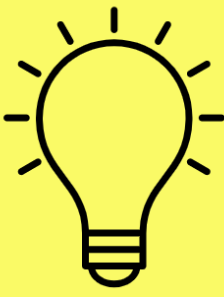
# Focus Groups



**GOAL:** Discover barriers and opportunities to converting single-family homes from natural gas to electricity, especially heat pump water heaters

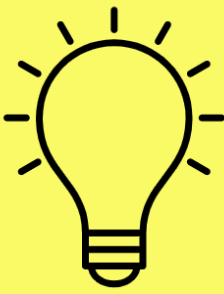


# Focus Group Ideas – Program Design



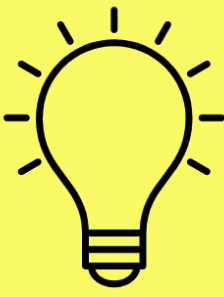
- Revamp rebate programs
  - They are currently inconsistent and uncoordinated
  - Consider product incentives AND outcome incentives
  - Instant rebates are popular
- Overcome emergency-driven choices and actions
  - Loaner program
  - “Cash for clunkers” rebate: extra incentive for early retirement of working appliances
- Support whole-home electrification
  - Combine technical & financing assistance through one central contractor & no extra charge to customer (e.g. supported by utility or county) (e.g. Boulder program)
  - Provide incentive for bundling/whole-house approach
- Simplify financing
  - Desire for simplified, accessible financing, including “on-bill” financing
  - One large contractor provides financing through Service Financing

# Focus Group Ideas – Information & Education



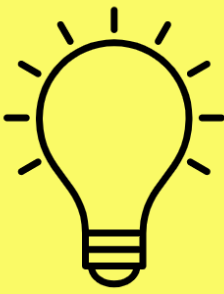
- Enhancements to home advisor service
  - Knowledgeable about technologies, financing options, how to work with contractors, costs and “ripple” effects (e.g. needing upgrades to panel, changes to roofing material, ducting or plumbing changes, permitting requirements)
  - Would like a comprehensive “road map” of the full process and considerations of electrification
- Would like a directory of qualified contractors with customer ratings
- Create education sessions to help homeowners understand the process

# Focus Group Ideas - Programs



- Group purchasing
  - Variation on Sunshares program - Maybe focus bundling on specific commodities like HPWH or electrical panel upgrades that don't vary as much across customers segments
  - Target outreach to certain types of homes that are likely ripe for appliance upgrades (new homeowners who may plan to remodel, houses that are 8 to 15 years old)
- Create support networks
  - Contractors may like a LinkedIn group, lists of other vetted contractors, occasional Zoom sessions to share learning
  - Customers talk about an ambassador program so that people could talk with others who have done the work

# Focus Group Ideas – Policy/regulatory



- Standardize permitting
  - Streamline installation and inspection process
  - Lower permitting fees, make them the same across cities
- Make permitting simpler
  - Allow copies of permit to suffice for rebates instead of waiting for final
  - Adjust CAS inspection requirements – only require in living space, not garage or not conditioned space
  - Create a special heat pump water heater permit, rather than separate plumbing and electrical permits
- Educate city councils. Foster consistency in messaging and priorities
- Offer a special, low electricity rate for all-electric homes
- Eventual or phased in ban on sale of fossil fuel appliances

# Stakeholder Workshop #2



## GOAL:

- Get to a list of prioritized “interventions” that would benefit from coordinated, collaborative action
- Identify key players that should be involved
- Designate a “first next step” for each intervention

# 4 Top “Interventions”



## 1. Instant Rebates

- Minimize paperwork with upstream rebates
- Start with heat pump water heaters, then additional aspects of electrification

## 2. “Cash for Clunkers” Rebates

- Incremental incentive for residents who replace water heaters that still work
- Market to homeowners and contractors

## 3. Public/private Financing

- Financing instrument that emphasizes leveraging public/private partnerships to make it easier for customers to access
- Use public capital to make private capital more affordable

## 4. Streamline Permitting

- Make it easier for contractors and residents to apply for building permits for electrification installations
- Goal: Statewide Electrification Program (like solar)

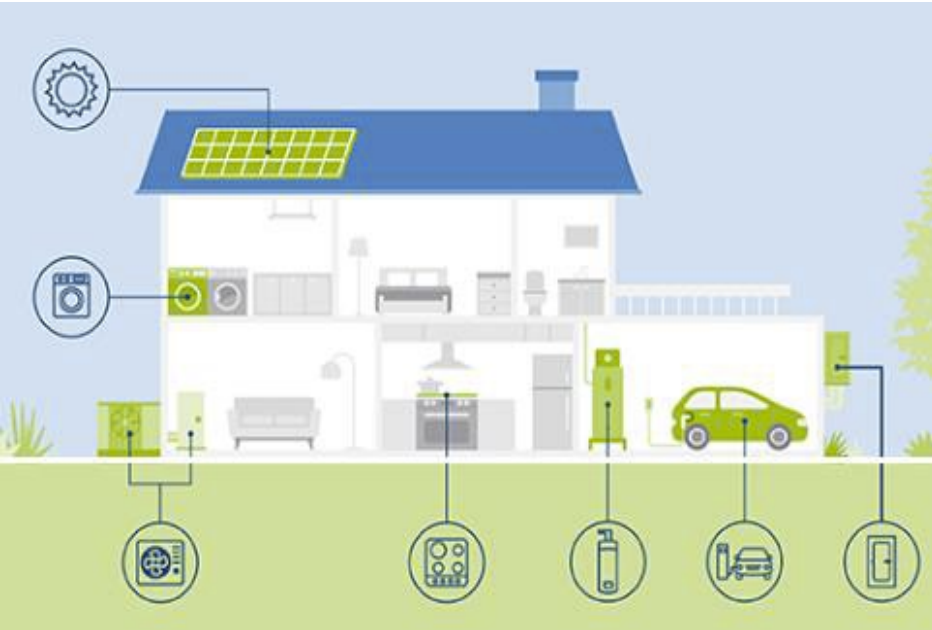
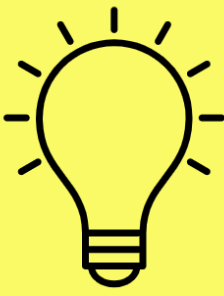
# Full Report

[www.smcsustainability.org/energy-water/home-electrification/](http://www.smcsustainability.org/energy-water/home-electrification/)



**AYREN**

# Comprehensive “road map”



**GOAL:** Provide detailed cost information to help homeowners better understand the cost of decarbonizing their existing single-family home.

## **SCOPE:**

- 10 case studies - pricing for future work
- Develop outline/template for electrification pathway document presented to homeowners
- Build on other guides, past pilots



# Variety of Single-family Homes

- Variety of construction dates (align with Energy Atlas)
- Variety of locations (north county, south county, coast)
- Existing equipment
  - A/C or not
  - 100 amp panel +/-
  - Solar or not
  - Propane vs. natural gas
- Different circumstances (low-income, HOA)

# Costs of Different Electrification Pathways

- Panel upgrade vs. not
- Solar (existing solar, add solar, add solar plus battery)
- Add EV charging
- Replace over time vs. whole-house retrofit

# Thank you!

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