

Electrifying SB: Santa Barbara Equitable Residential Electrification

Client: City of Santa Barbara

Committee in Charge: Matt Potoski & Ranjit Deshmukh

Supporters: Dennis Allen, Diane Boss, Rincon Consultants
& Dipalooa Foundation



DIPAOLA
Foundation

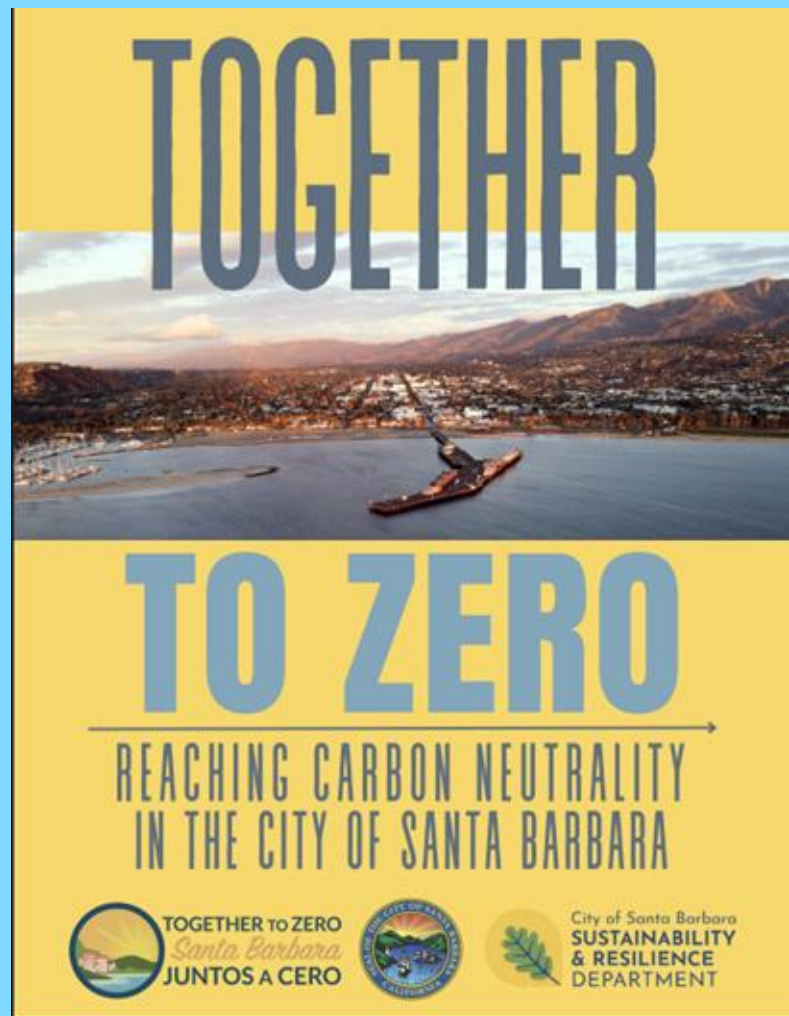


Input:

Project Objectives to equitably electrify all Santa Barbara homes

Output:

- 1. Client Deliverables Through Final Products
- 2. Equitable Residential Electrification Roadmap
- 3. Cost and Greenhouse Gas Modeling Tools for City of Santa Barbara's Sustainability and Resilience Department

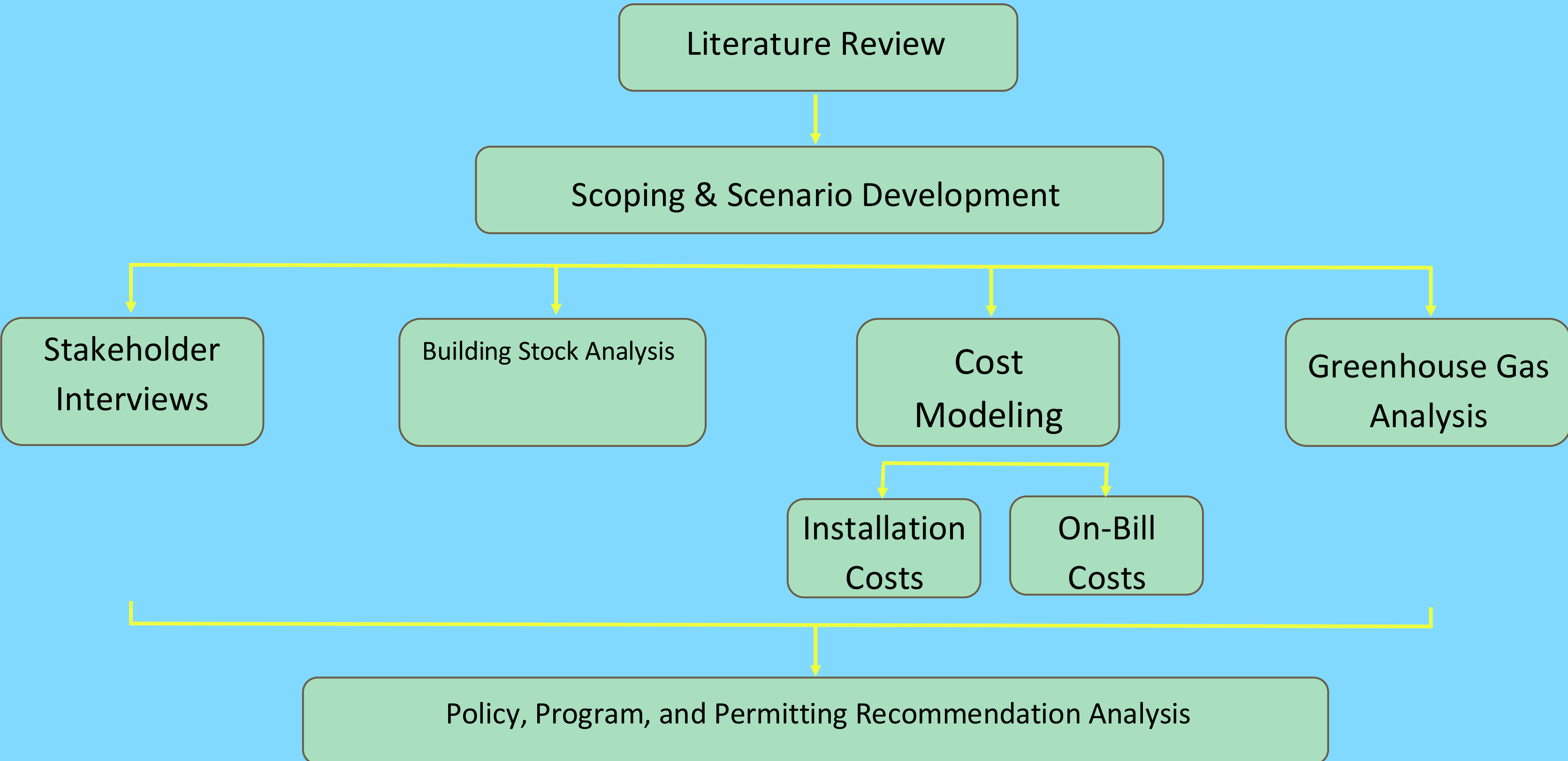


Throughput:

- 1. Objective 1 -> Analytical Approaches 1,2... -> Deliverable 1,2..
- 2. Objective 2 -> Analytical Approaches 1,2... -> Deliverable 1,2..
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- 7. Objective 7 -> Analytical Approaches 1,2... -> Deliverable 1,2..



The methodology we used to create a Santa Barbara Residential Electrification Plan



How we systematized our Building Stock Analysis

BUILDING TYPOLOGIES

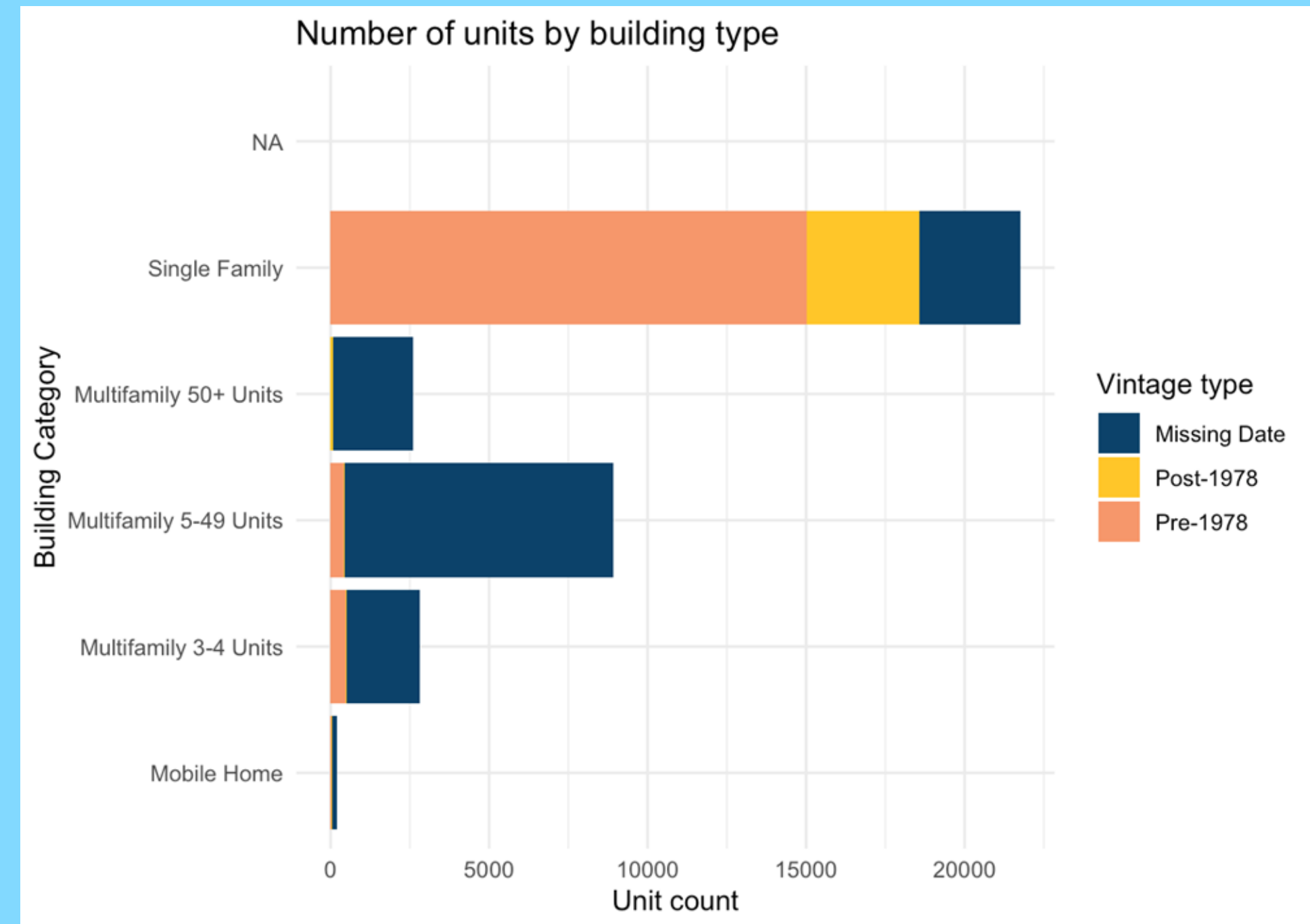
Age Dimension

- Pre-1978
- Post-1978

Building Type Dimension

- Single Family Home 1-2 (SFH)
- Multi Family Home 3-4 (MFH 3-4)
- MFH 5-49
- MFH 50+*

*note: we will consider mobile homes as a subcategory of MF



Our steps to developing installation cost estimates

First Step: Look at a single appliance and housing typology to develop an initial installation cost analysis and modelling methodology for upfront and operational costs

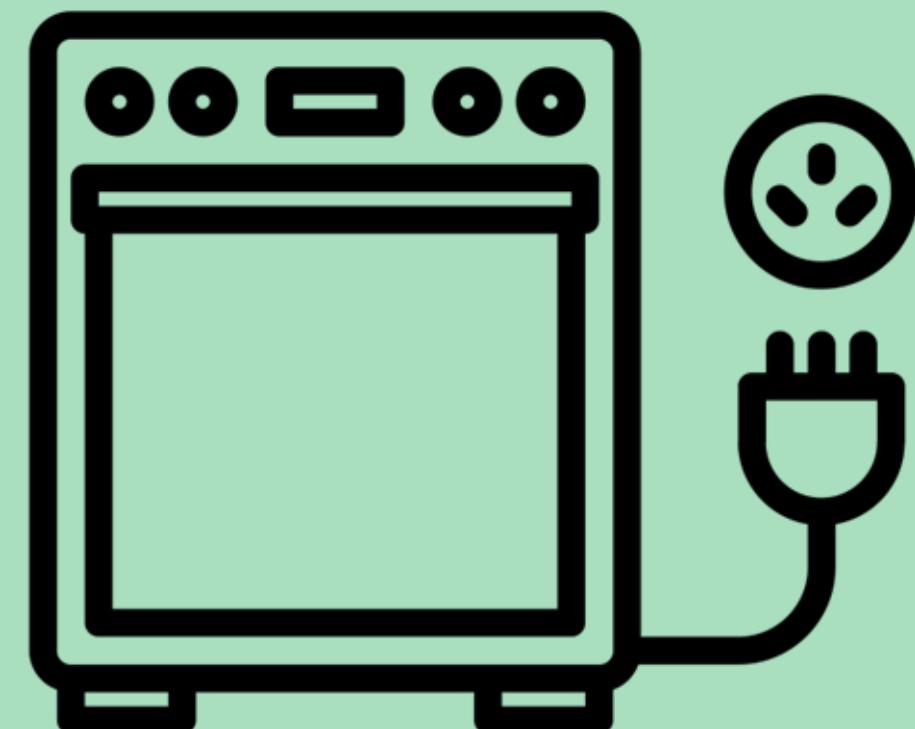
Plan: Use cost benefit analysis to conduct initial analysis & modeling for a single appliance type and housing typology. from this, we will base all installation cost estimates on this methodology

Example

Baseline: 50 gal gas water heater

Intervention: 65 Gallon Heat Pump Water Heater

Housing Typology: SF - Pre 1978 Home



How we aim to approach Stakeholder Interviews

APPROACH & ANALYSIS

Stakeholder Groups

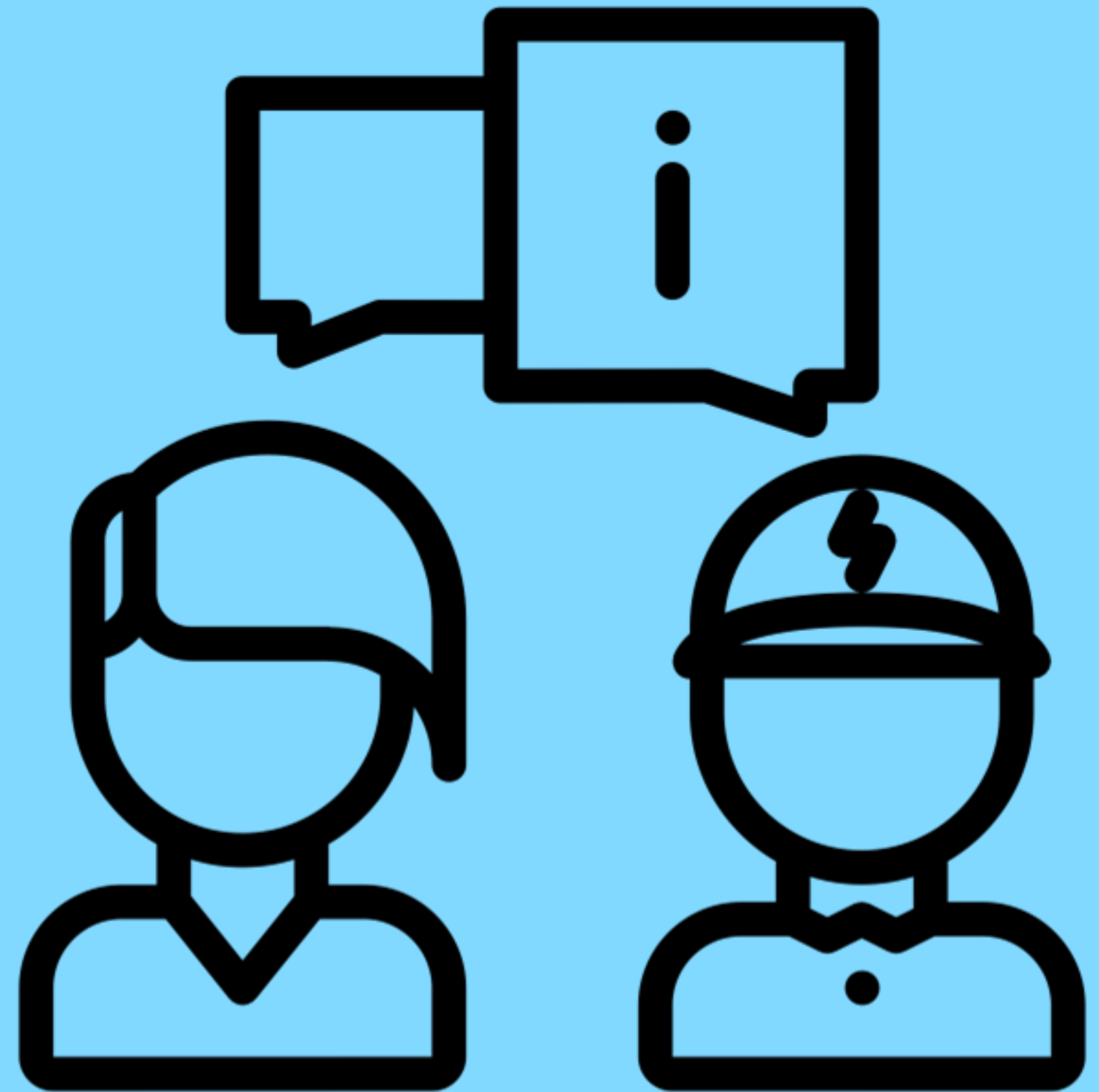
- Local building experts,, City and County Staff, Contractors, Property Management, City Building & Safety, Policy & Electrification Experts, Equity Groups, Community-based Organizations, Tenant Unions

Interviews Approach



- Structured 15 or 30 minute interviews
- Virtual (Teams/Zoom), or in-person when feasible
- No recordings

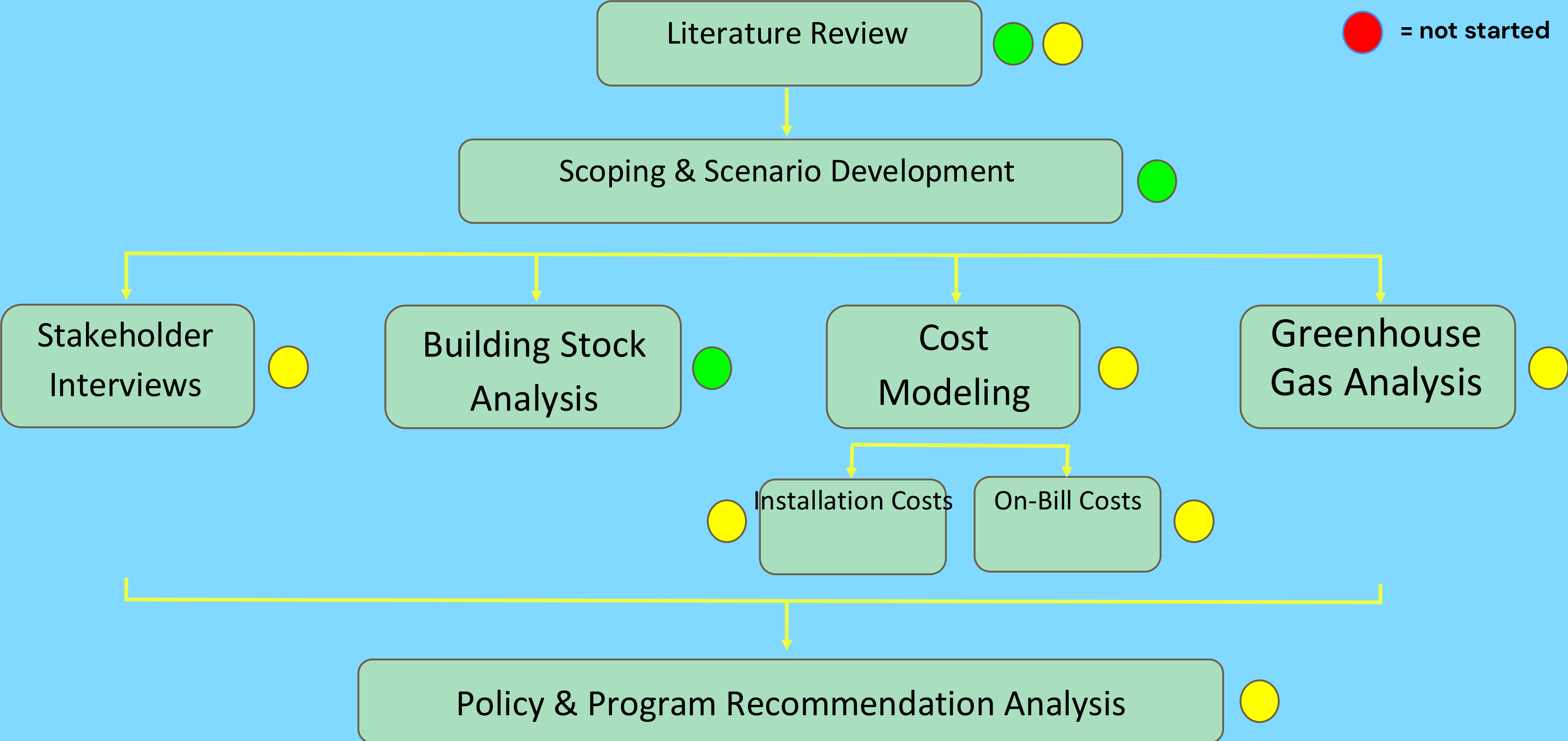
Key Outputs

- Summary of stakeholder interview findings
- Thematic analysis, including barriers, opportunities, and recommendations
- Evidence-based insights informing suggestions for the electrification roadmap



Current analysis progress

-  = completed
-  = in progress
-  = not started



Building a tool for city cost & ghg modelling for the city to utilize



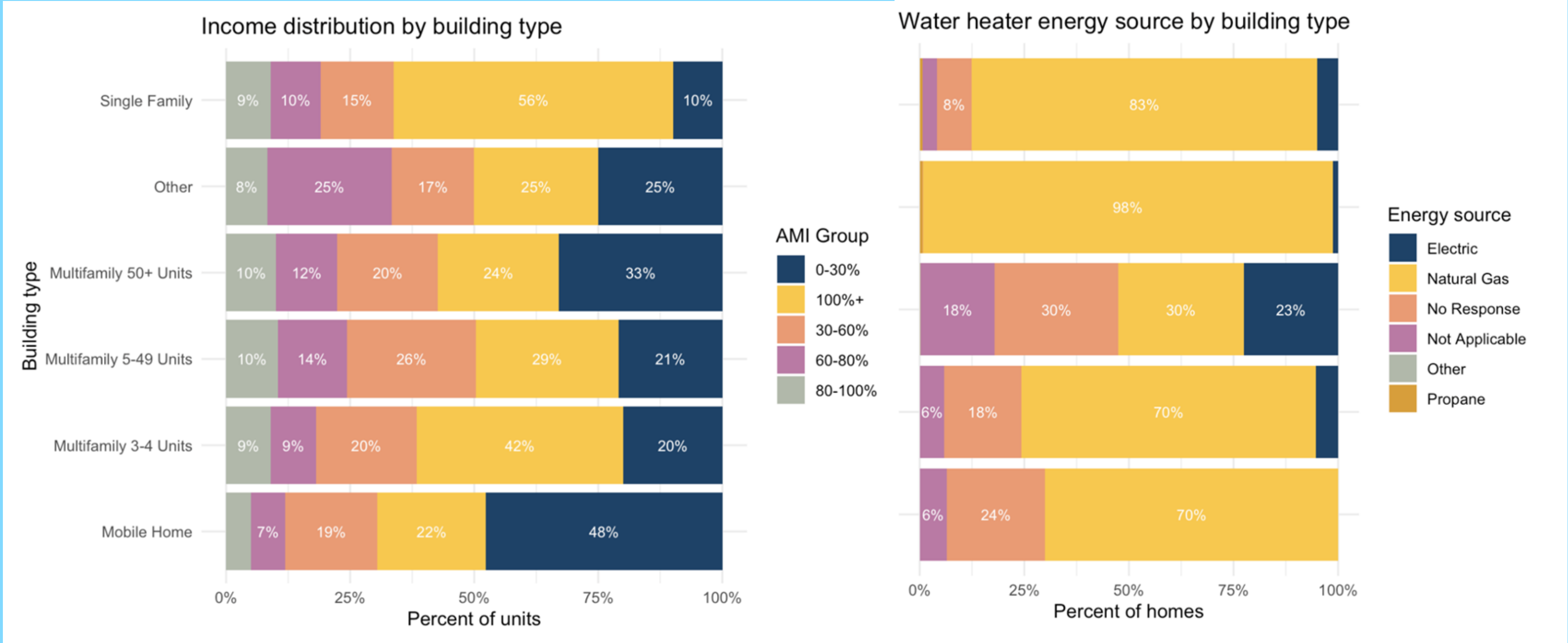
ADAPTABLE EXCEL TOOL WITH SCENARIO MODELING

Baseline Info Inputs		Outputs			
(Select from Drop down)		<i>Total Costs - Electrifying</i>	Costs - On Bill	Costs - Installation	<i>Emissions - Electrifying</i>
Building Type	Condo	Most Expensive			
Detached or Standalone		Most Likely			
Home Age	Pre-1978	Least Expensive			
Home square footage	1000-1500 Sqft	<i>Total Costs- Staying with Gas</i>	Costs - On Bill	Costs - Installation	<i>Emisisions - Staying with Gas</i>
# Residents?		3 Most Expensive			
		Most Likely			
		Least Expensive			
What Changes do you want to make?					
Water Heater					
HVAC					
Stove/cooking					
Pool Heater					

DATASET CATEGORIES FOR MODELING (ADJUSTABLE)

Resident Tool	Calculations	Building stock	Appliance Options	Installation Costs	Energy Use	Utility Prices	Incentives	GHGs
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Our initial results from building stock analysis combining income and home energy use



OBJECTIVES SUPPORTED

BARRIERS

**NEEDS
ASSESSMENT**

COSTS PER UNIT

**COSTS PER
MEASURE**

**MEASURE
RECOMMENDATION**

**POLICY
RECOMMENDATION**

Current Findings and Conclusions

Preliminary Hypotheses

Literature Review

Existing Roadmaps' strategies can be applied locally

Most cities are **just getting started**

Costs can be lower, with financial support and **high efficiency**

Stakeholder Interviews Takeaways

Building knowledge

Contractor buy in

**Lowering non economic costs
of change**

Building Stock Analysis

Renter-Owner Split Incentive:

Split incentives and burdens

Who bears costs and benefits

Building Age:

Older building stock; has split upgrade needs

Unknowns:

Appliance details are modelled on CA data

Cost & Emissions Modeling

Programmatic opportunities to make costs lower

Prioritize envelope improvements and high efficiency appliances

High uncertainty in future gas and electric costs

Infrastructure change unsure over 10 years

Steps to Residential Electrification

Literature
Review,
Interviews,
Analysis

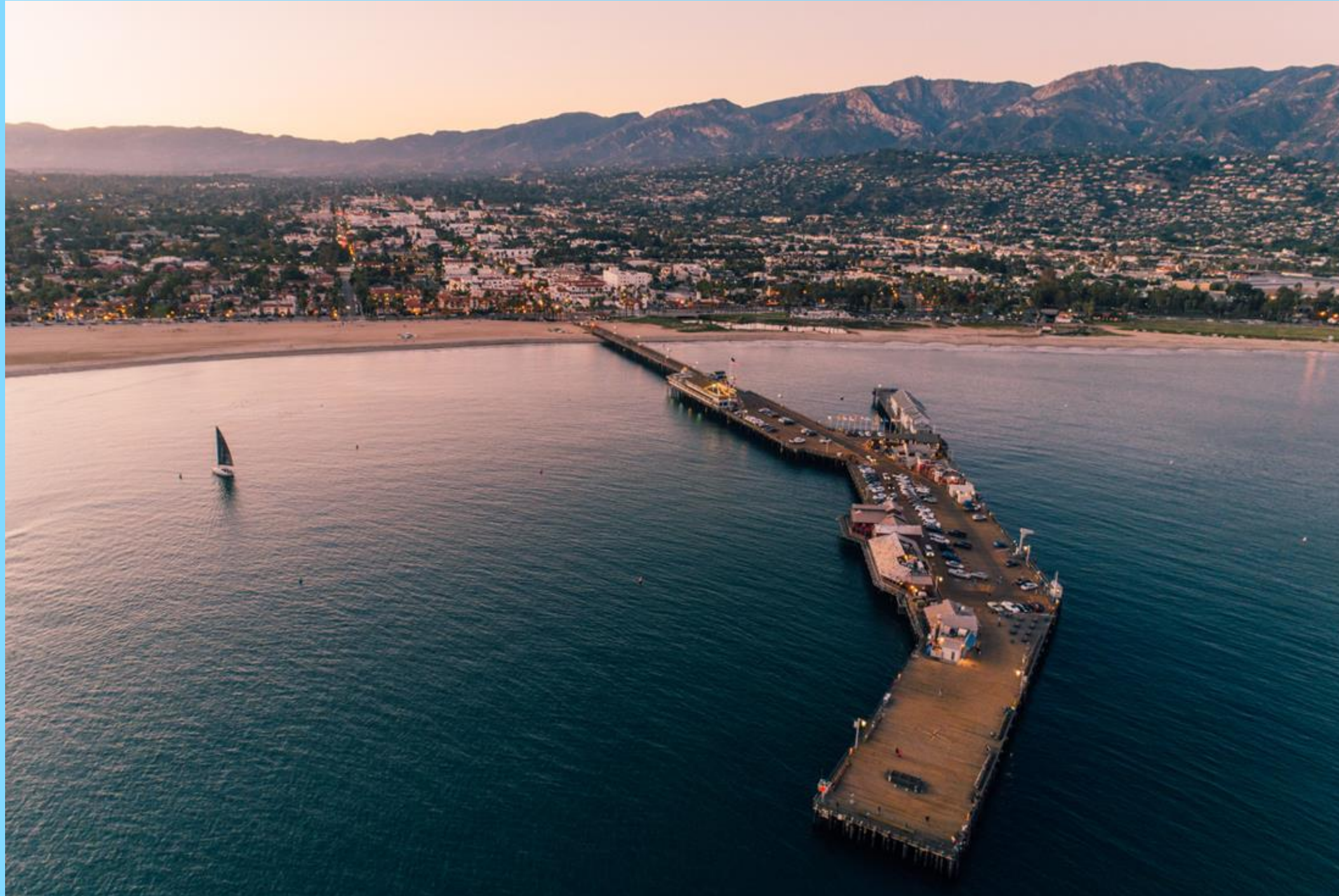
Develop
Programmatic,
Policy, and
Permitting
Recs

Finished
Products

Final
Roadmap

Final
Report

Utility
Analysis
Tool



Thank you!



Buildings are identified, but how will they be categorized?

ANALYSES

What types of buildings are in the City?

- Building type x Building and unit count
- Building type x Building vintage distribution

Who lives in these buildings?

- Building type x Renter vs owner occupied housing
- Building type x Income distribution
- % of population in disadvantaged community

What types of appliances are currently in the buildings?

- Building type x Appliance energy source (heating, water heating, dryer, oven, cooktop, solar, and battery)
- Building type x Appliance age (heating, water heating, dryer, oven, cooktop, pool heater)
- Income distribution x Energy burden

SO FAR...

Present

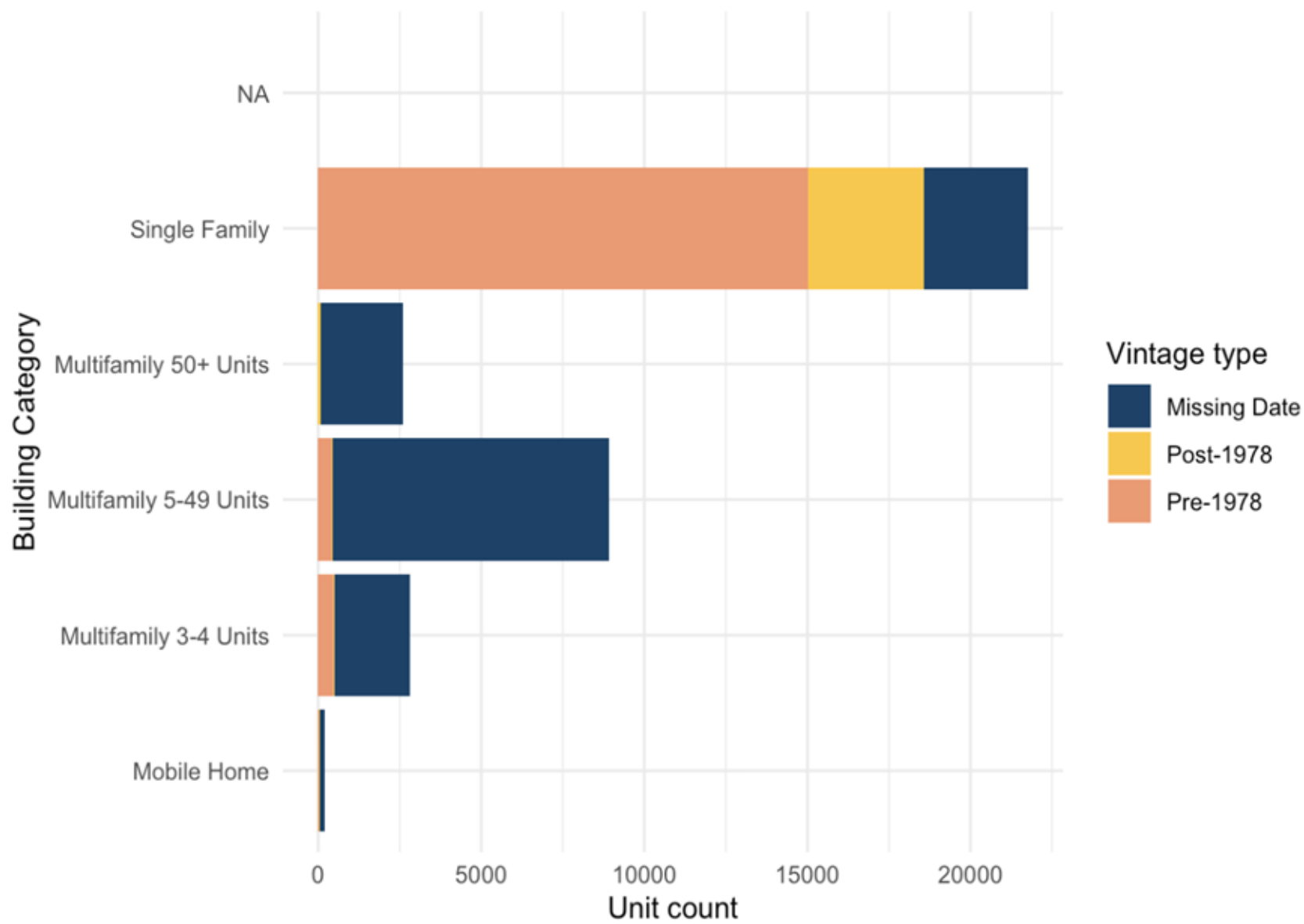
- Data sources synthesized
- Completed some initial tables

Future

- Appliance saturation analysis
- Data visualization
- Written analysis
- Comprehensive methodology write-up

Initial Results from Building Stock Analysis

Number of units by building type

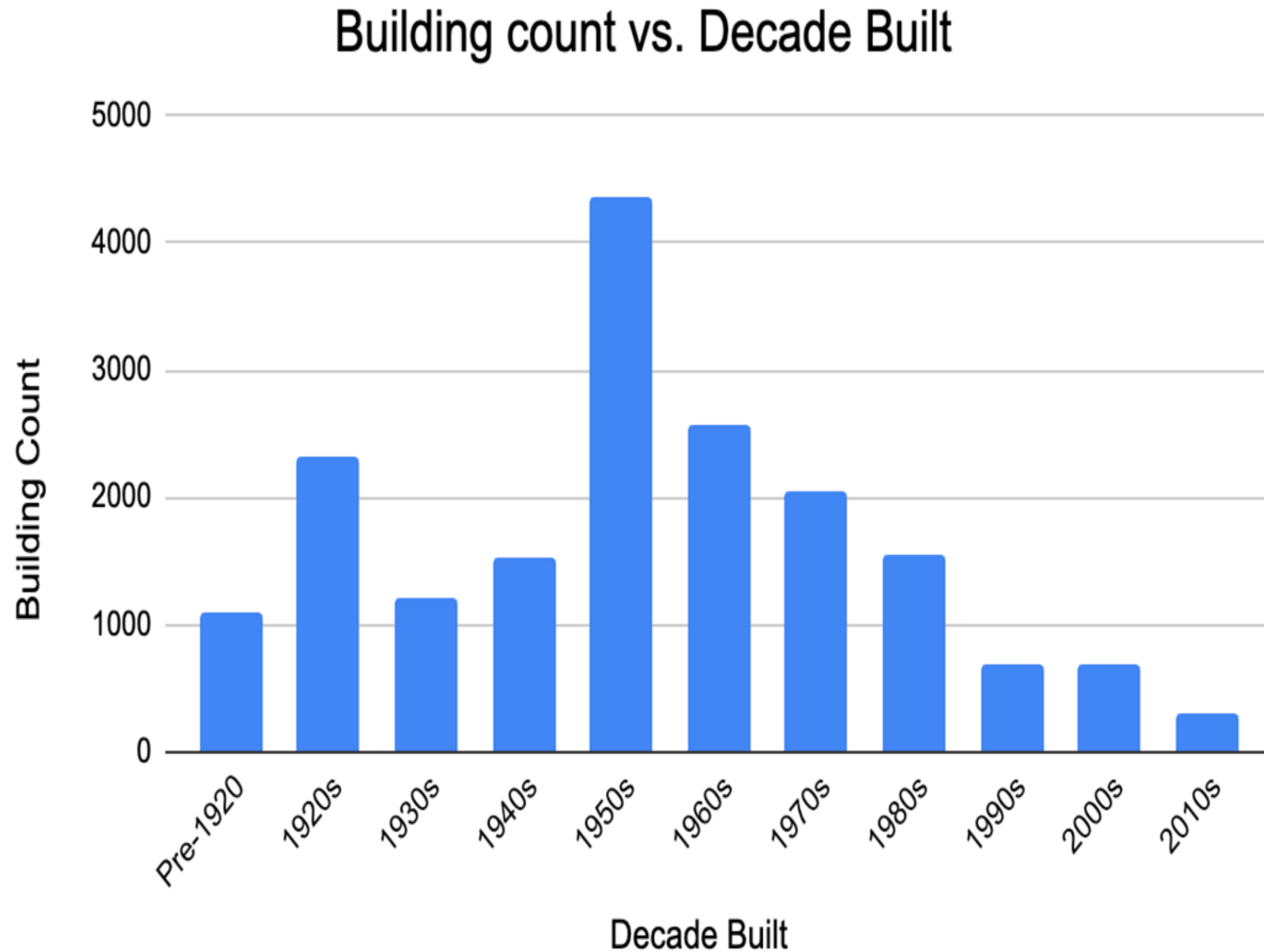


Parcel and unit count, by vintage category

Vintage Category	Parcel Count	Unit Count	Square Footage	Parcel Percent	Unit Percent	Square Footage Percent
Missing Date	3555	16671	12320	16.36%	45.91%	0.04%
Post-1978	3552	3718	6714974	16.34%	10.24%	21.76%
Pre-1978	14629	15925	24136583	67.30%	43.85%	78.20%



When were homes built and how many?



Property Type	Property Count	% of Total Properties	Household count
SF	20051	91.58%	22001
MF 3-4	844	3.85%	2849
MF 5+	805	3.68%	8991
MF 50+	36	0.16%	2881
Mobile Home	158	.72%	316
Total	21894	100.00%	33841

Installation Cost Estimates for Modelling

Data Source for Intervention: 65 Gallon Heat Pump Water Heater

Table 8 Upfront Costs for Zero-NOx HPWH in Single-family Homes by Tank Size

Tank Size	SVCE ¹			Peninsula Clean Energy			TECH Clean California (Single-family)		
	Number of Projects	Average Upfront Cost	Median Upfront Cost	Number of Projects	Average Upfront Cost	Median Upfront Cost	Number of Projects	Average Upfront Cost	Median Upfront Cost
<30 gallons*	26	\$5,292	\$4,322	0	N/A	N/A	0	N/A	N/A
31-40 gallons	16	\$7,040	\$7,211	6	\$5,683	\$6,425	14	\$6,395	\$5,786
41-50 gallons	187	\$5,480	\$4,913	161	\$6,759	\$6,322	392	\$7,258	\$7,994
51-75 gallons	77	\$5,828	\$5,158	97	\$6,866	\$6,564	627	\$7,258	\$6,813
75+ gallons	52	\$5,770	\$5,556	48	\$7,515	\$6,980	94	\$10,634	\$9,150

Notes: N/A = Not available.

¹ Costs provided by SVCE may include incentives and may therefore underestimate total costs.

Collecting and implementing stakeholder interviews effectively

PURPOSE

- Gather expert insights from key stakeholders
- Understand opportunities, barriers, and practical considerations in accelerating residential electrification

OBJECTIVES

- Learn about stakeholder perspectives on the current state of residential electrification
- Identify key barriers
- Understand opportunities to accelerate adoption
- clarify equity and access considerations
- validate assumptions and gain general electrification knowledge

Our data sources for our categories of analysis

Building Stock Analysis

- City Land Use Data
- RASS
- NLR LEAD

Installation Costs

- TECH Clean California
- E3

On-Bill and GHG Costs

- ResStock
- UCLA Cost of Electrification Study
- SBCE Customer Electric Energy Use

