

HOT ZONES, COOL HOMES: RETHINKING BUILDING EFFICIENCY IN A WARMING CLIMATE

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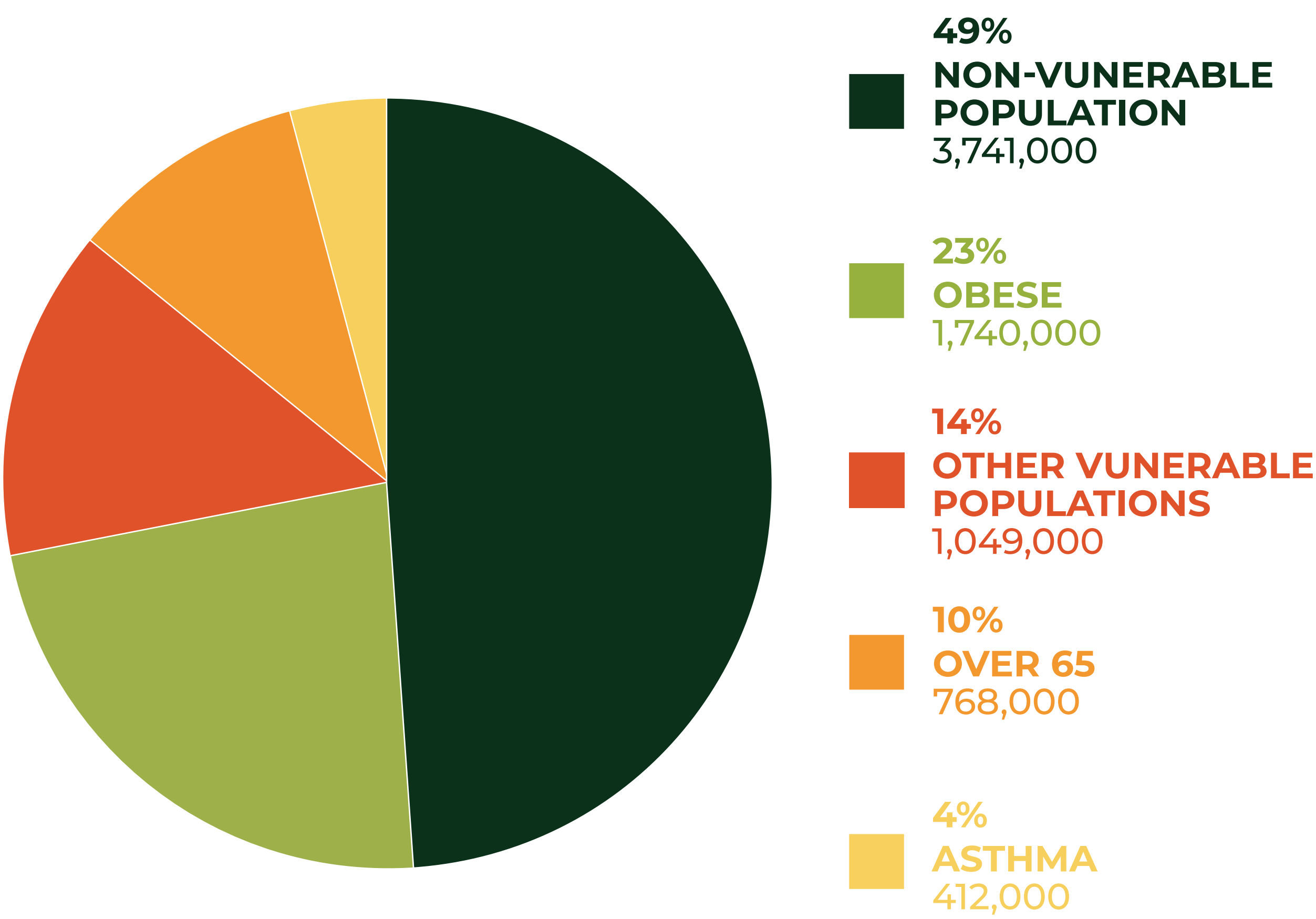
BACKGROUND

The Bay Area Regional Energy Network (BayREN) is an organization made up of the nine counties in the San Francisco Bay Area.

- Warming temperatures are posing significant health risks, especially to vulnerable populations.
- Temperatures are increasing, AND heat waves are lasting longer.
- 56% of households in the Bay Area do not have air conditioning.

DANGERS OF EXTREME HEAT

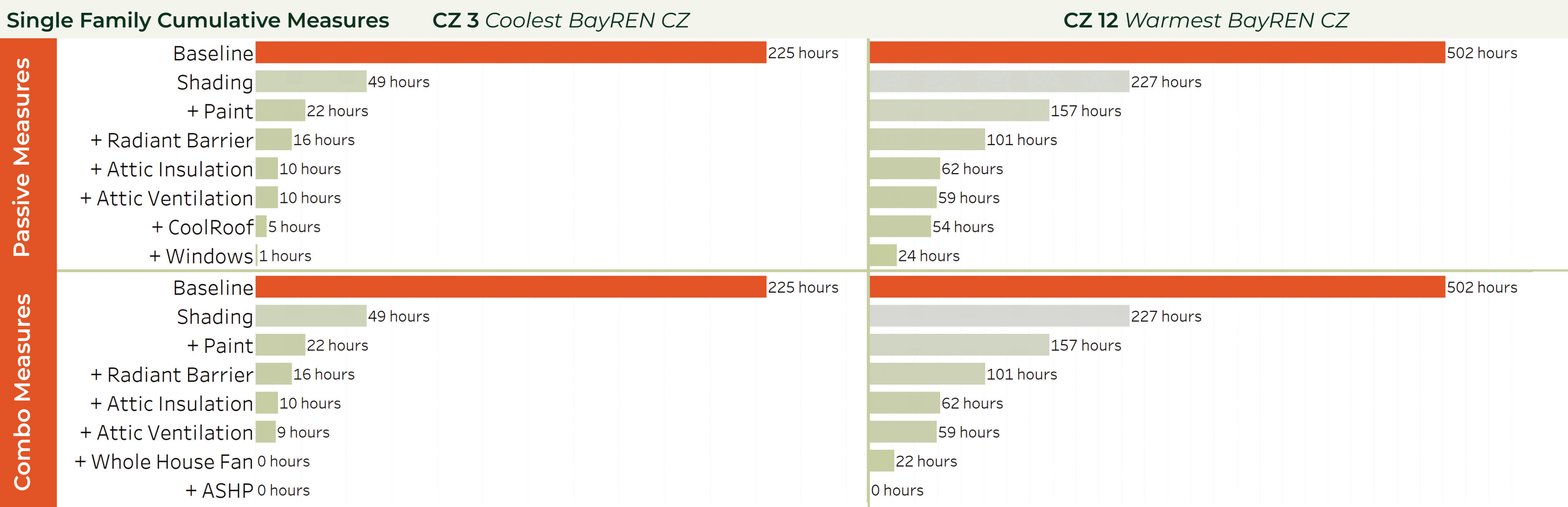
- People start experiencing physical responses to indoor temperatures above 90°F.
- Between 18% (Solano County) and 91% (San Francisco) households in the Bay Area do not have air conditioning.



Over 50% of the SF Bay Area population is considered “vulnerable.”

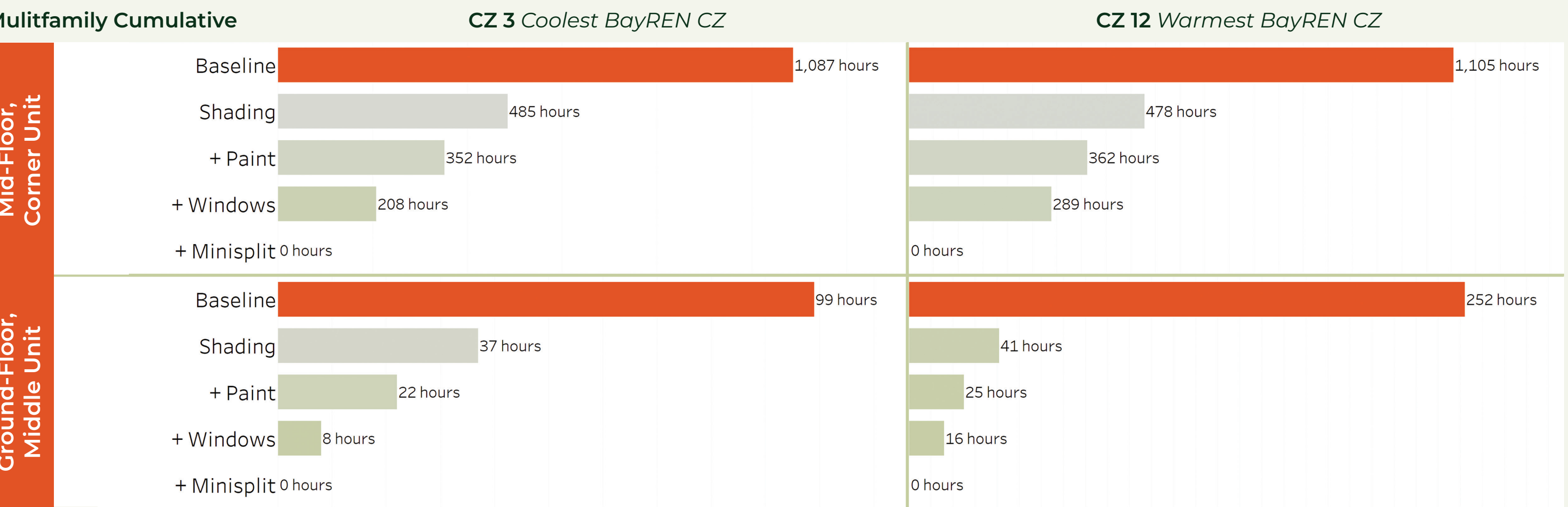
SIMULATION FINDINGS

Count of Hours where Indoor Temperature is Greater than 90°F - Single Family



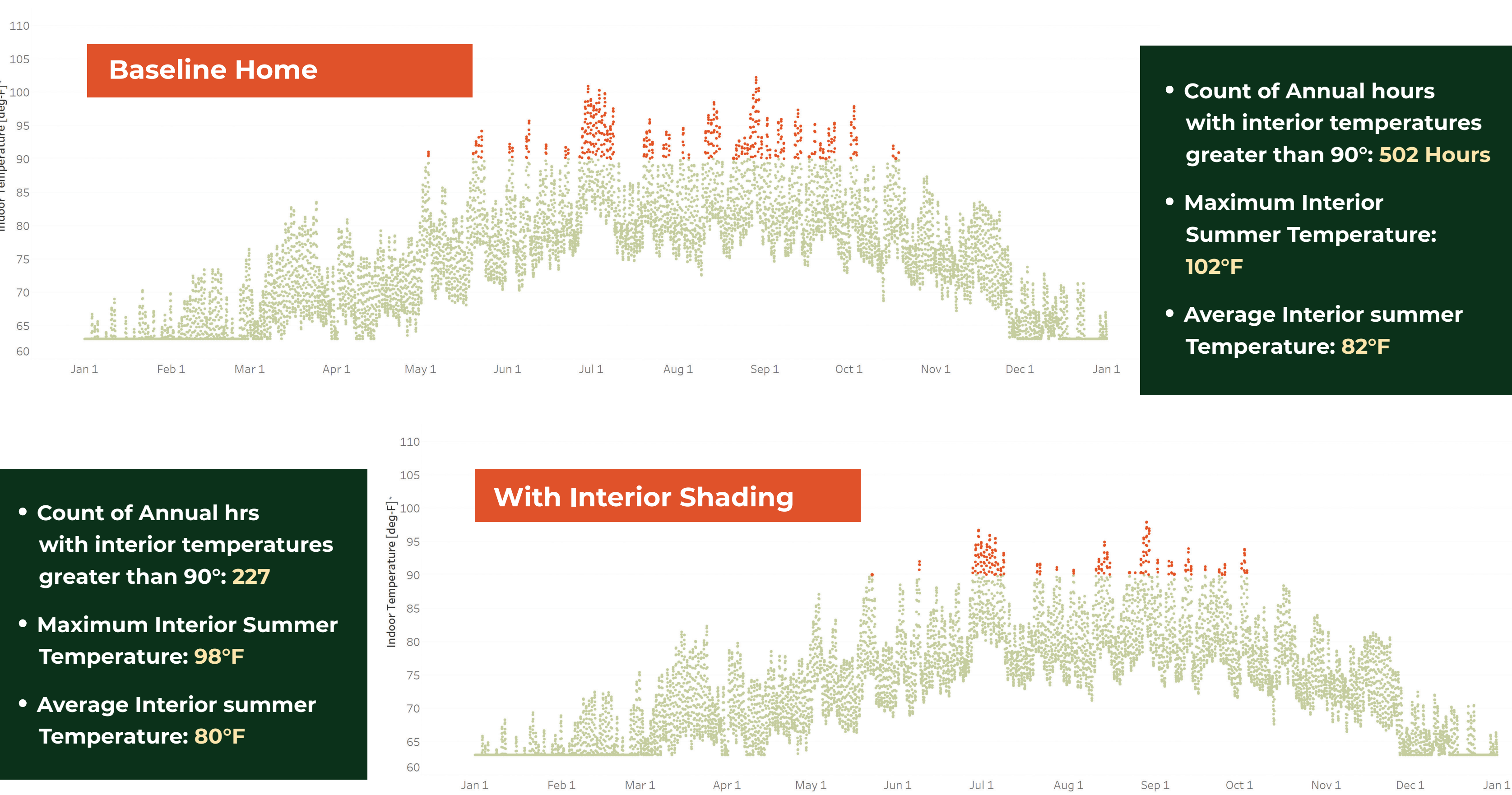
Window Shading and exterior paints with high solar reflectance ratings can provide significant heat gain reductions.

Count of Hours where Indoor Temperature is Greater than 90°F - Multifamily



Mid-Floor Corner Units see significantly higher more heat gain than Ground-Floor Middle Units
Multifamily Units have trouble getting to zero hours above 90°F without mechanical cooling.

Single Family Annual Indoor Temperature Example CZ12 - Fairfield



WARMING CLIMATE

County	Avg. Longest Heat Event		% Increase
	Baseline 1961-1990	Mid-Century 2035-2064	
Alameda	4	7	175%
Contra Costa	7	14	200%
Marin	4	6	150%
Napa	9	20	222%
San Francisco	0	1	-
San Mateo	1	2	200%
Santa Clara	4	7	175%
Solano	13	27	208%
Sonoma	4	7	175%

- FEMA defines a heat event as “a long period (2-3 days) of high heat and humidity with [outdoor] temperatures above 90°F”
- Most Bay Area Counties will experience a significant increase in the length of their heat events by the mid-century.

METHODOLOGY

NREL's BeOpt to create SF and MF building files, and simulated using NREL's OpenStudio® - HPXML

Climate Zones Simulated			
CZ2: Santa Rosa	CZ3: San Carlos	CZ4: San Jose	CZ5: Fairfield
Typical Home Prototypes Based Upon Details From RASS			
Avg. Square Footage		Number in Household	
Window Detail		Insulation Level	

HEAT MITIGATION STRATEGIES

Passive & Mechanical Measures can provide Heat Mitigation Benefits

- | | |
|----------------------------------|-------------------|
| • Window Shading | • Windows |
| • Exterior Paint | • Wall Insulation |
| • Radiant Barriers | • Air Sealing |
| • Attic Insulation & Ventilation | • Whole House Fan |
| • Cool Roofs | • HVAC Heat Pump |