



**WEBINAR
SERIES**

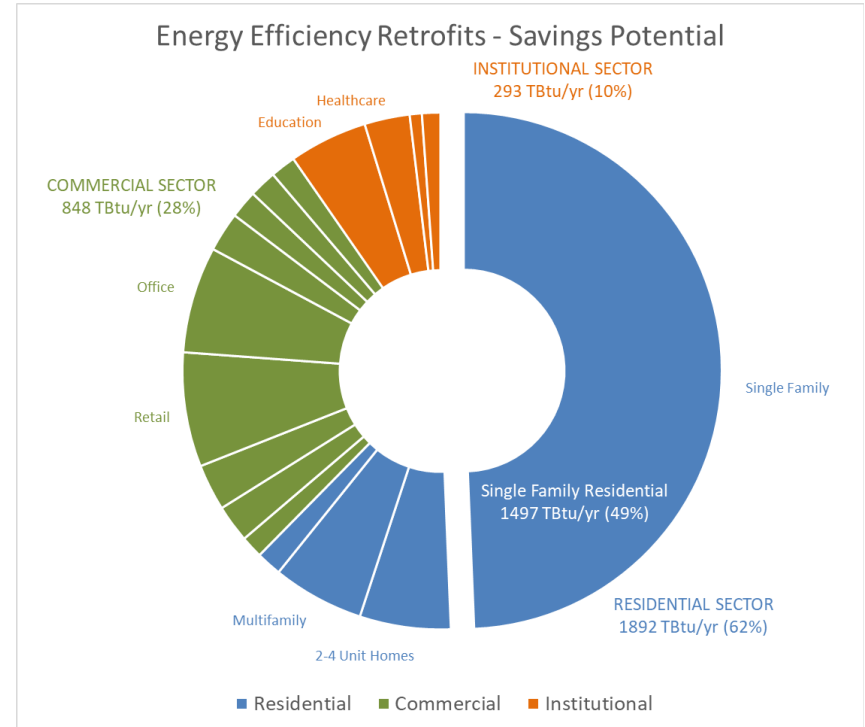
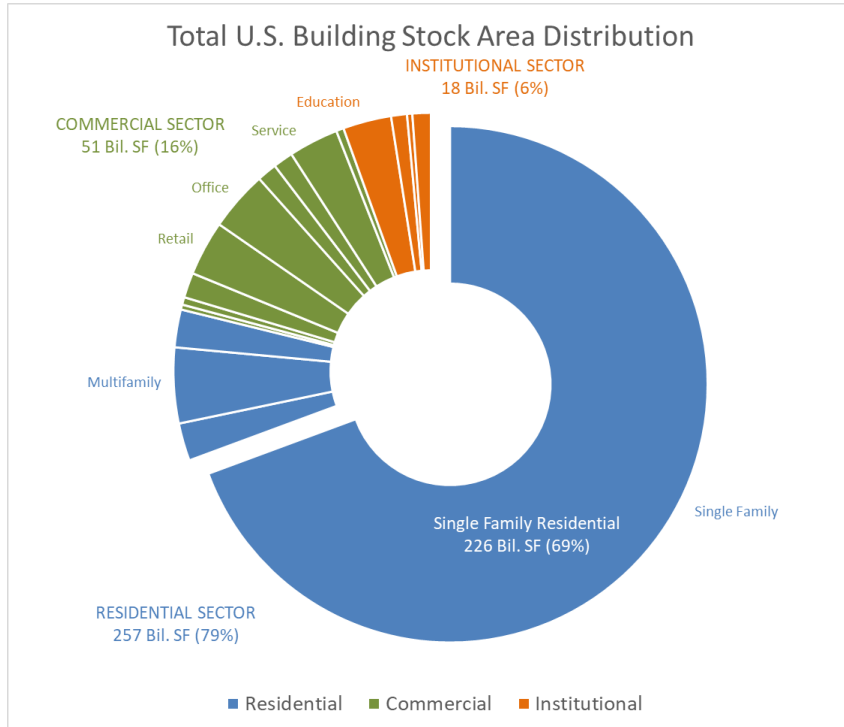
Clean Energy Residential Retrofits at Scale

Using XeroHome's Rapid Energy Modeling Approach

Andres Fergadiotti
Engineer | Engg. Review & Analysis
Southern California Edison

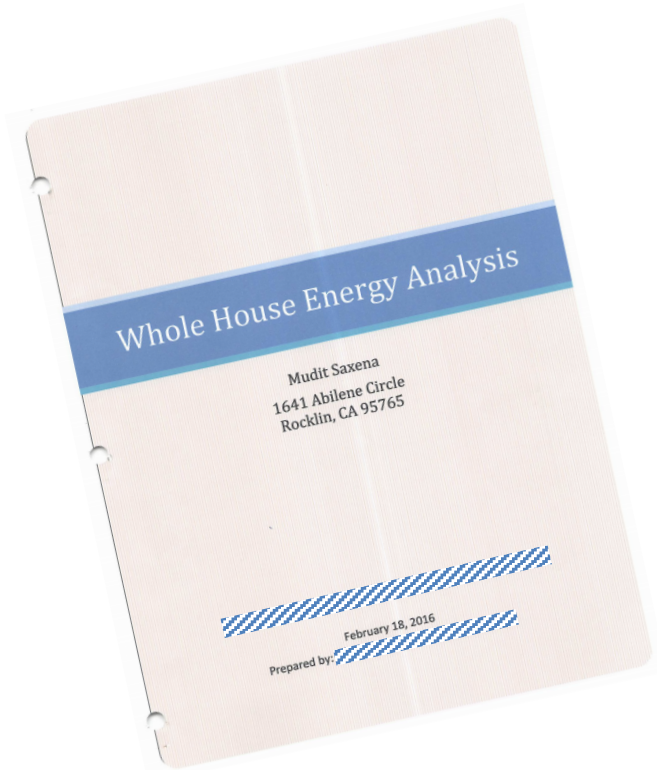
Mudit Saxena
CEO | Co-Founder
XeroHome / Vistar Energy

The Scale of the Problem



Sources: Residential Energy Consumption Survey (RECS) 2009, "United States Building Energy Efficiency Retrofits - Market Sizing and Financing Models". Deutsche Bank Climate Change Advisors & Rockefeller Foundation. (March 2012)

Here's how we are currently solving the problem



- A Whole House Energy Analysis report
 - \$500 (range \$500-\$2000)
 - 2 days to complete home assessment
 - 12 days to complete report

California Home Energy Rating Certificate

WFO PV		YOUR HOME	
100 Best Energy Performance		49 Mid-June Energy Value	
250	200	150	100
Range for typical existing home 101-250			
Poor Energy Performance		Best Energy Performance	

2006 Standards for Water High Energy Efficiency Water Meter Mid-June Energy Value

Information on Compliance With Other Programs

Qualifying Information:
CPC NOT AUTHORIZED
 Software estimates are based on typical occupancy patterns which may be different from your household use patterns. As a result, these software estimates may not reflect the homeowner's actual annual consumption. Occupant's energy use patterns may change after energy efficiency upgrades.

Energy Impact

N/A	Greenhouse Gas Emissions CO ₂ e = 5.42 tons/year
Energy Consumption (kBtu/year)	1,880
Heating	1,558
Cooling	1,480
Water Heating	1,558
Lighting	1,558
Appliances	1,558
Total	1,558

Natural Gas (therms/year)

Heating	410
Cooling	216
Water Heating	216
Lights	216
Appliances	216
Total	684

Operating Cost (\$/year)

Electricity	\$ 17.78
Gas	\$ 7.78
Total	\$ 25.56

Notable Energy Production

Electricity	\$ 77.32
Auxiliary Energy	\$ 0
Electricity	\$ 0

Site Information

Address:
 31 Neander St Suite 120
 Rockville, CA 95065

Climate Information:
 Conditioned: 2,380 sq ft
 Floor Area: 2,380 sq ft
 Bedrooms: 3
 Bathrooms: 2
 Single Family Home

Energy Efficiency Features

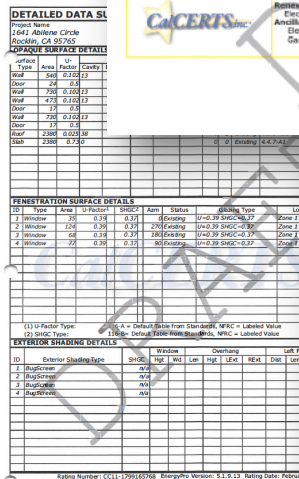
Insulation	Foundation Type	Grade
R-13	Slab	B-38
Attic	Basement	B-13
Walls	Floor Over Crawlspace	None
Windows	Single Edge	0.21
Doors	Double Edge	0.39
M-Factor	Unrated	0.39
Geothermal	Geothermal	0.93 A/F
Gas Furnace	Split A/C	14 SEER
Water Heating System		
0 - Gas (Efficiency 0.82 EF)		

Official Home Energy Rating
 In conformance with the requirements of the California Energy Commission
www.energy.ca.gov

HERS Provider:
 CACTERTS, Inc.
 31 Neander St Suite 120
 Rockville, CA 95065
 916-895-3000
www.cacterts.com

Rating Information
 Rating Number: CC1-1799165758
 Expiration Version: S1.9.1.3
 Certified Rater: Dan Gelatison
 CC2006059

Rating Date:
 18 February, 2016
 Officially Signed by:
 Dan Gelatison
 CACTERTS, Inc.
 Rater Signature: [Signature] Date: 2/16/16



- EnergyPro simulation outputs
- HERS Score (250 – 0 scale)
- Energy usage bar graphs!
- CalCERTS Certificates!

Key to crack this is DATA and SCALE



ep·i·de·mi·ol·o·gy

/ˌepəˌdēmēˈäləjē/

noun

Is the study and analysis of the distribution and pattern of health conditions in populations



There's a lot of GREAT DATA Out There!



HVAC: Replaced 1998

Heating Fuel: Natural Gas

Year Built: 1995

Size: 1,600 sf

3 bedroom / 2 bath

Roof: Replaced 2003

Solar Potential: 4.5 kW (South roof)

Trees on the South West

XeroHome builds energy models for every home



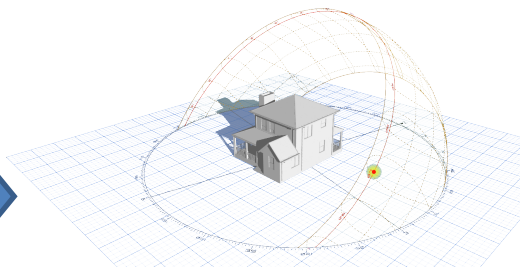
Property Assessment

Building Permits

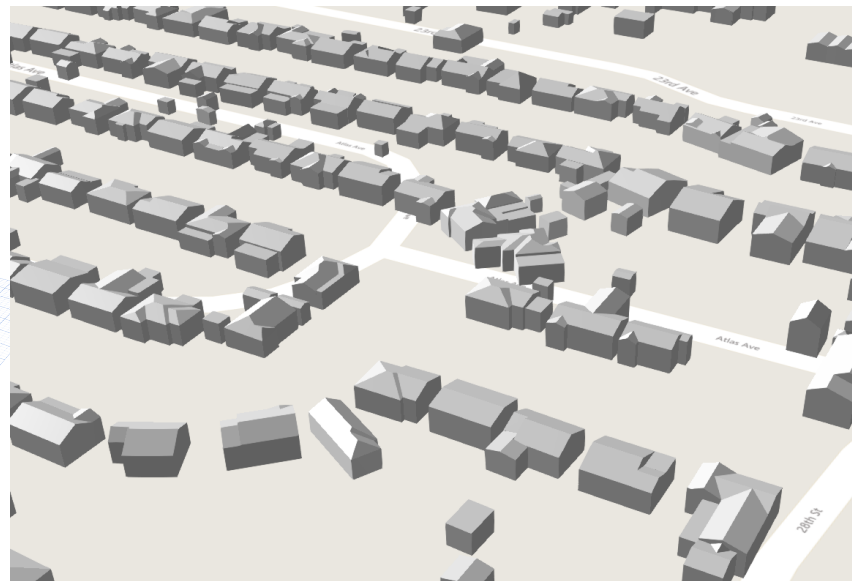
GIS 3D Geometry

Demographics

Historic Energy Use



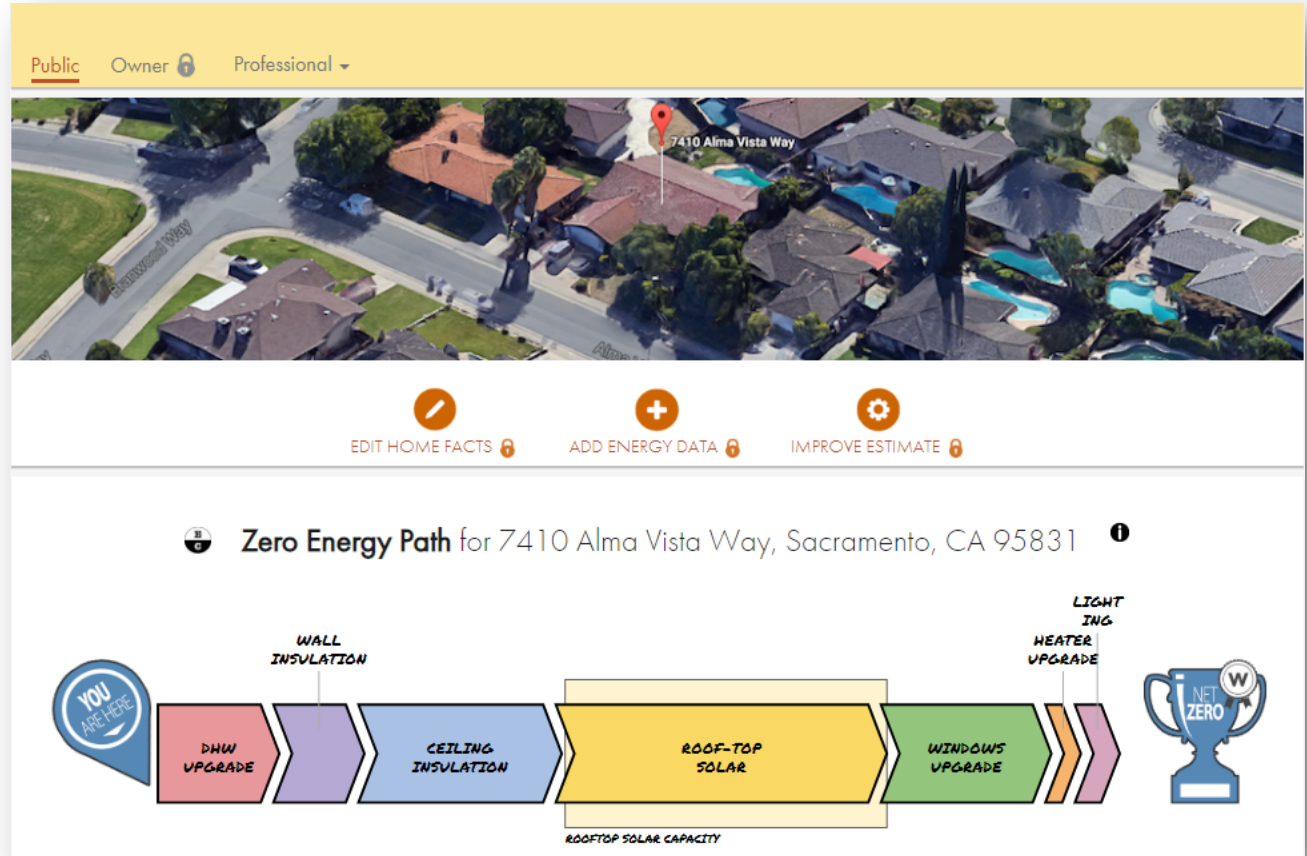
**Building
Energy
Model**



XeroHome Output

- Parametric analysis with energy model conducted on a cloud platform and provided as a

“Path to Zero Net Energy”

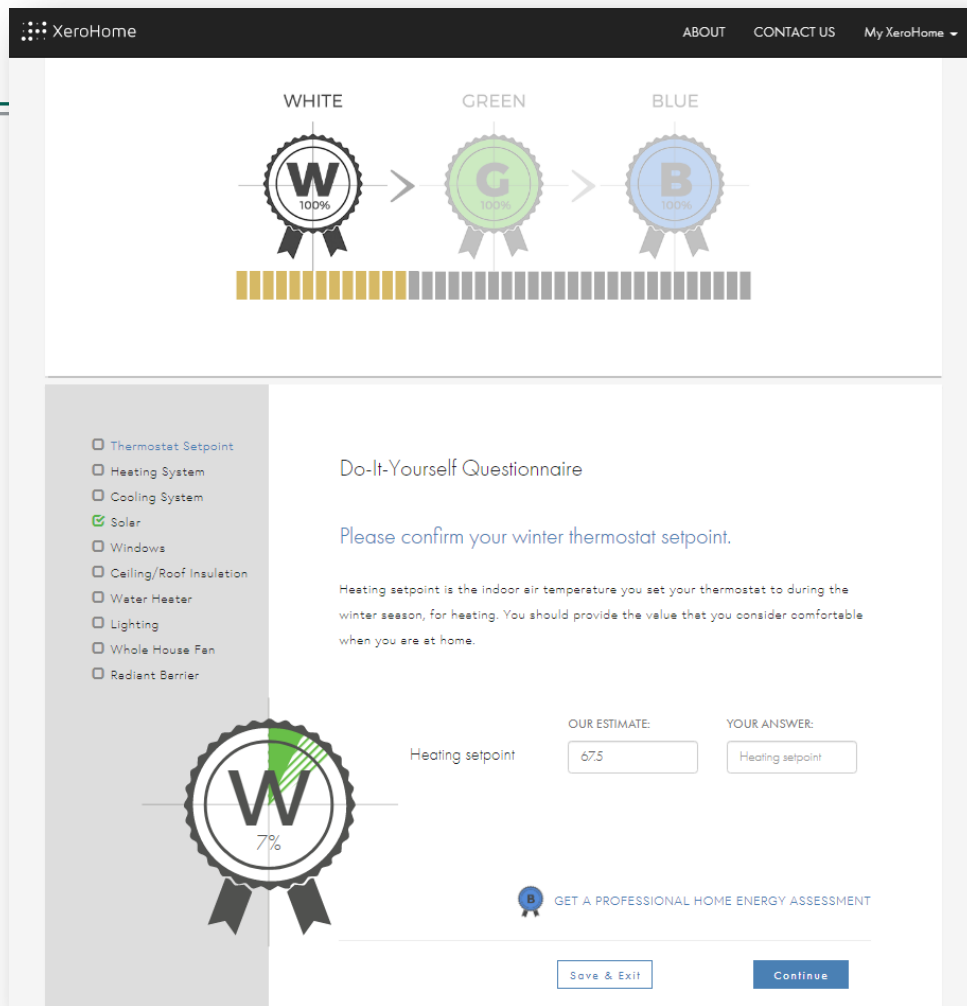


XeroHome Output

- Homeowners can interact with their home's energy analysis

They can also

- Find a contractor to do an upgrade
- Add site observations to further customize recommendations and update the energy model's accuracy



SCE ET Project – City of Santa Monica

☒ Phase 1 (completed)

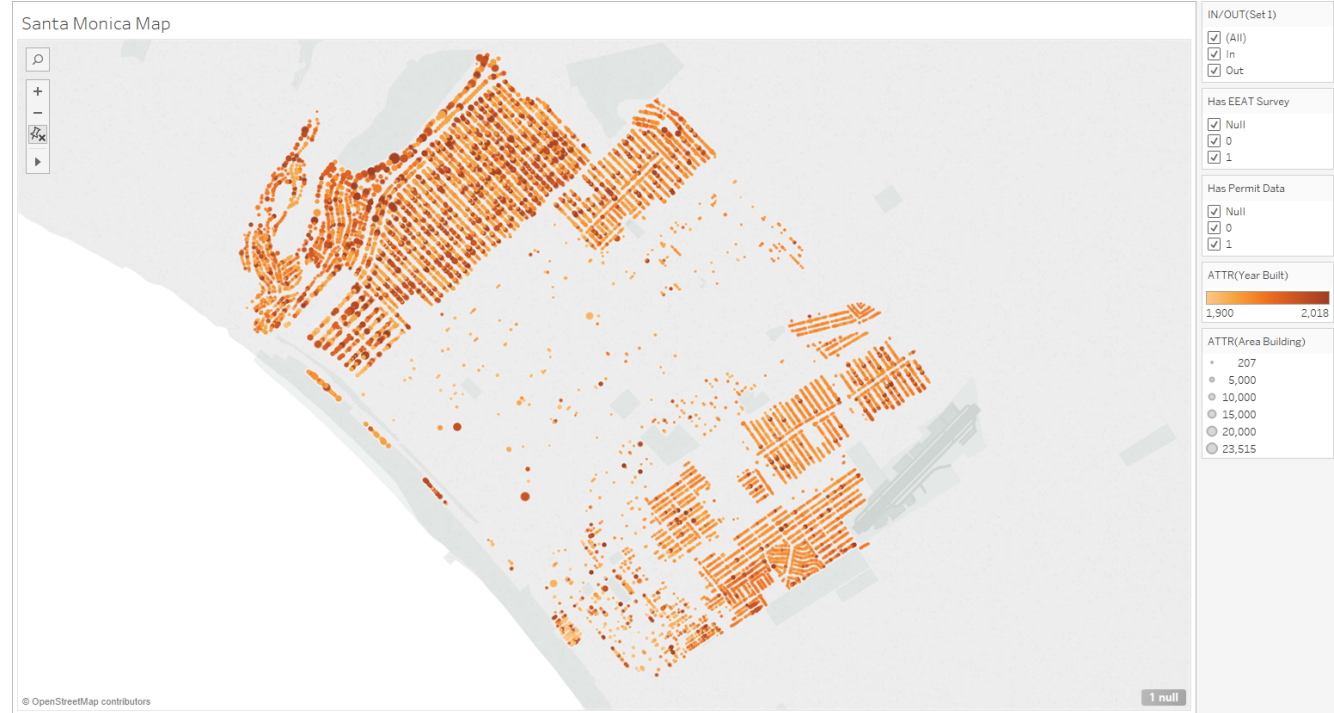
- XeroHome used to develop energy models for 1,000 homes in the city of Santa Monica.
- Provide energy upgrade recommendations

☐ Phase 2 (ongoing)

- Homeowners interact with their home's energy recommendations page (via web)
- Provide site observations that is used to update energy model

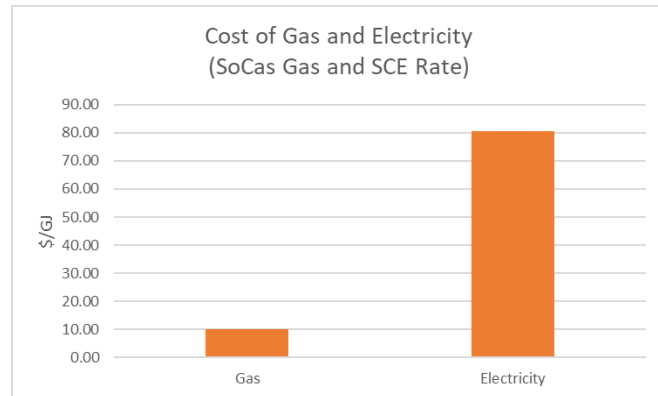
SCE ET Phase 1 Project – City of Santa Monica

- All Single-Family Homes in Santa Monica: 8,247 homes
- Color – represents age
- Dot Size – represents home area



Electrification Upgrades in Santa Monica

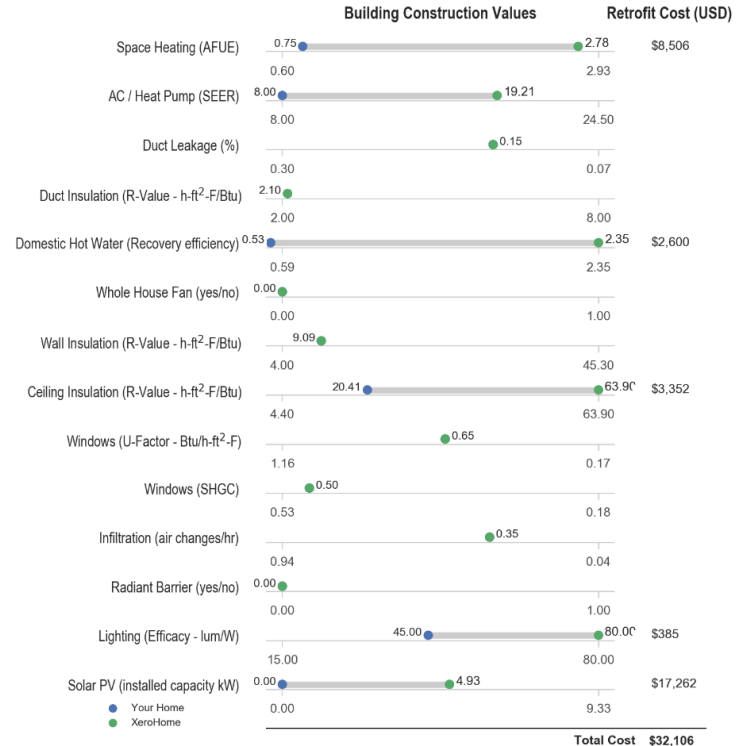
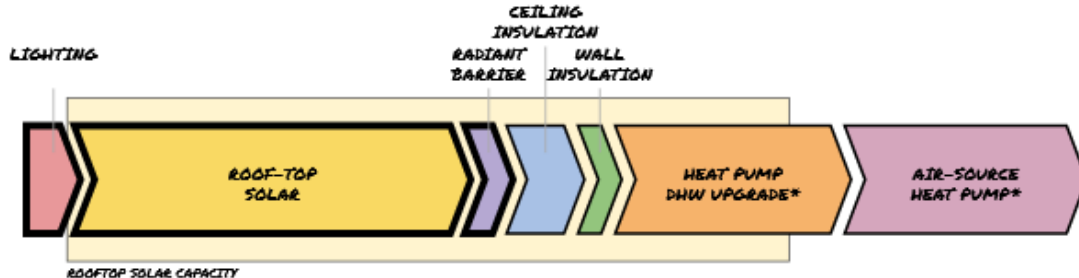
- Gas \$1.08/therm = \$10.24/GJ
 - So Cal Gas Residential Schedule GR
- Electricity \$0.29/kWh = \$80.56/GJ
 - SCE Tiered Rate Schedule D
- As a result:
 - Electrification measures that replace gas with electricity may decrease site energy use, but increase utility bills
 - Even with heat pumps that are 3-4 times more efficient than a gas water/space heater, the overall utility bill savings can be minimal



Results for Individual Homes



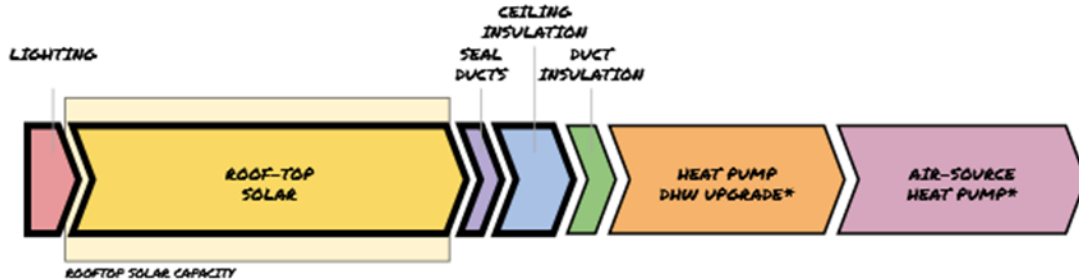
Home Area (sf)	1,744
Year Built Eff	1926
Bedroom Count	3
Stories Count	1
HVAC Heating Fuel	Gas
Building Permits	Roof (2017)



Results for Individual Homes



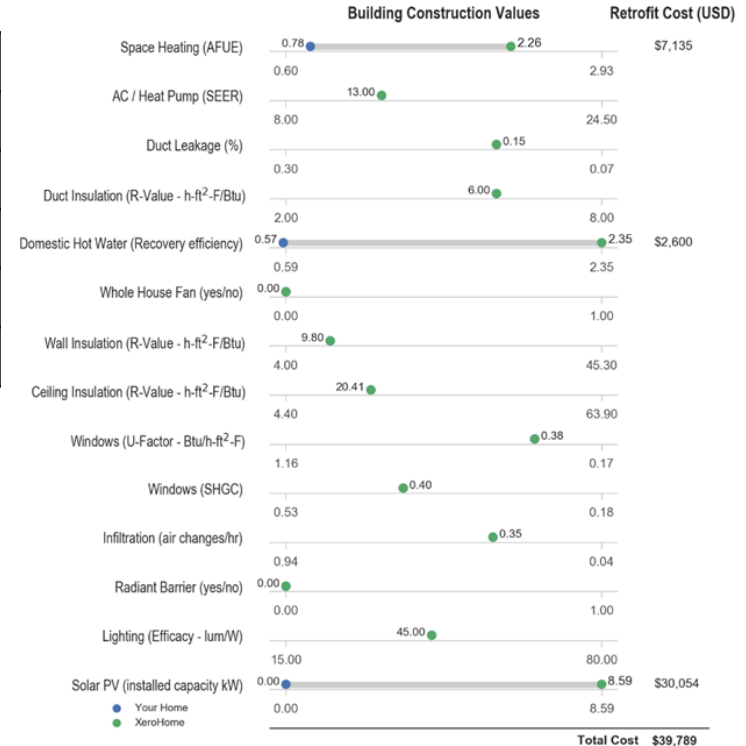
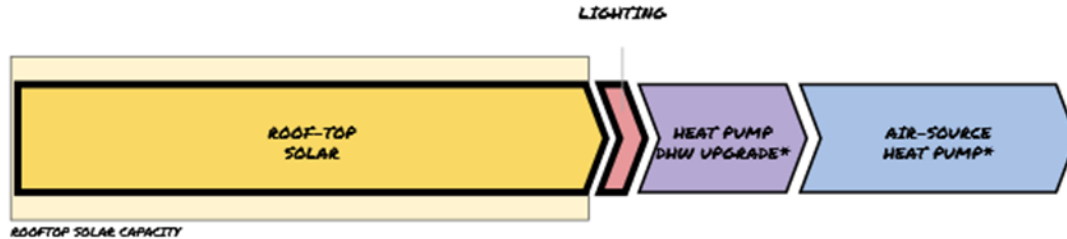
Home Area (sf)	4,526
Year Built Eff	1942
Bedroom Count	3
Stories Count	1
HVAC Heating Fuel	Gas
Building Permits	None



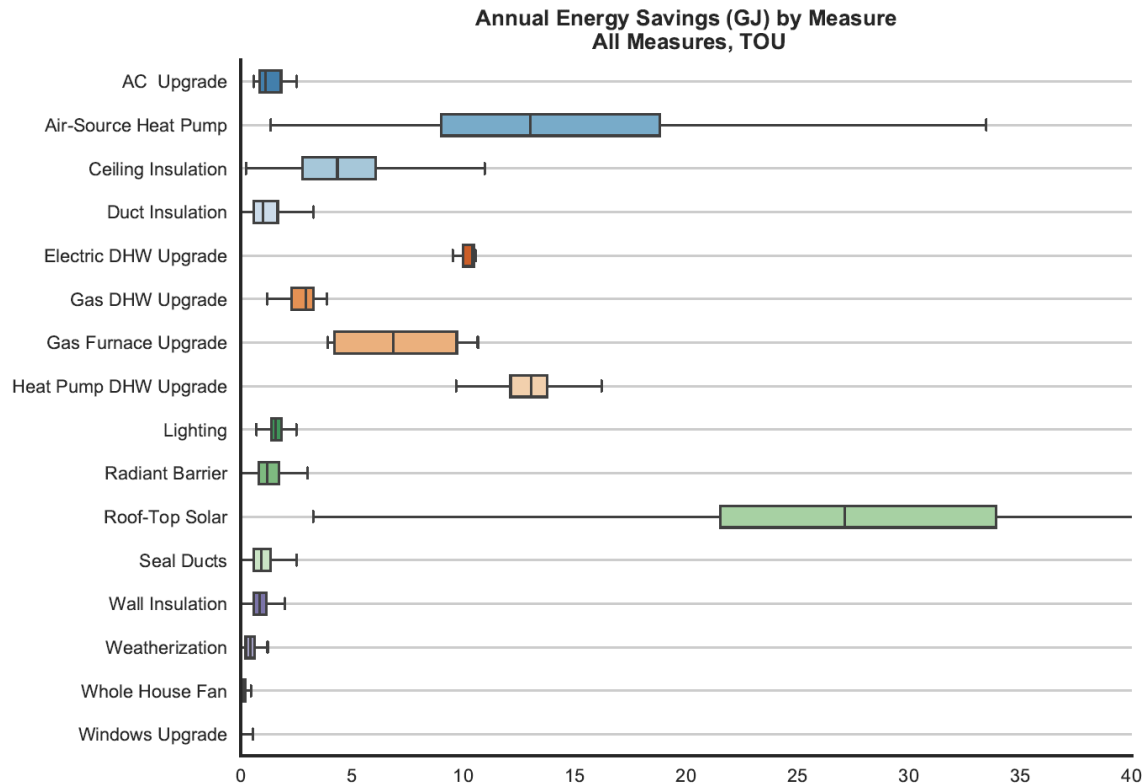
Results for Individual Homes



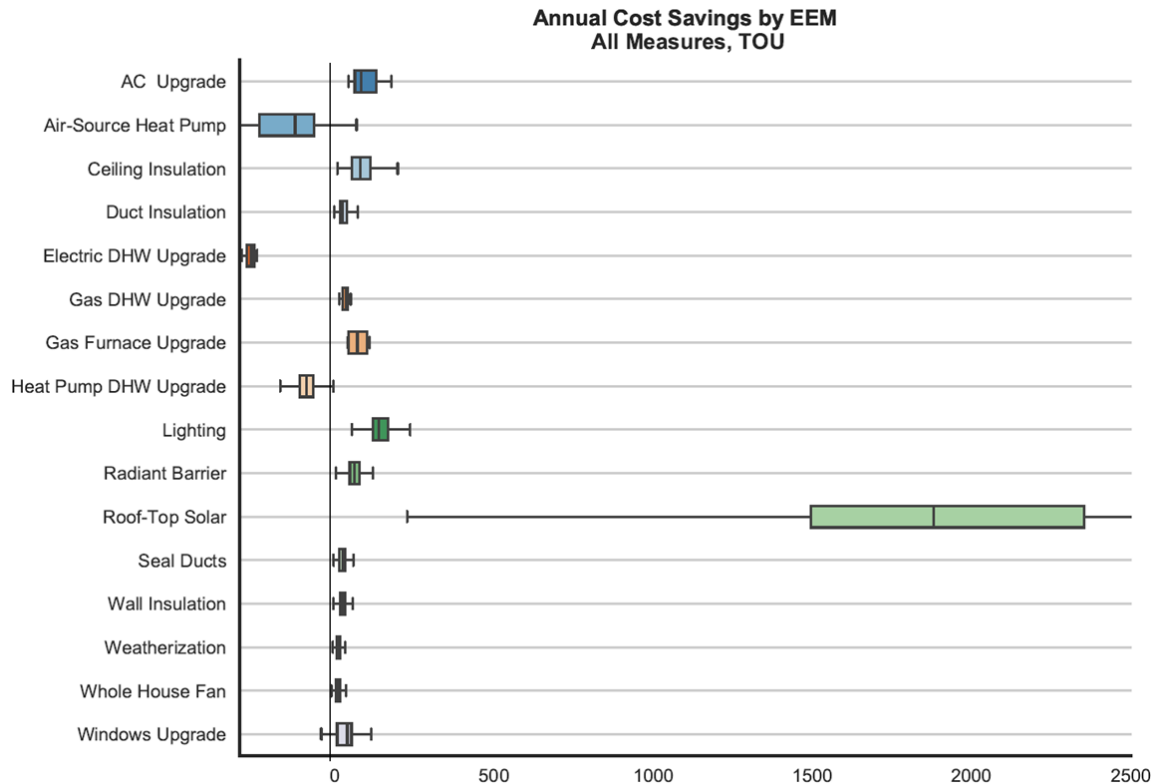
Home Area (sf)	9,753
Year Built Eff	2013
Bedroom Count	6
Stories Count	2
HVAC Heating Fuel	Gas
Building Permits	Pool/spa



Aggregate Results for all 1,000 homes



Aggregate Results for all 1,000 homes

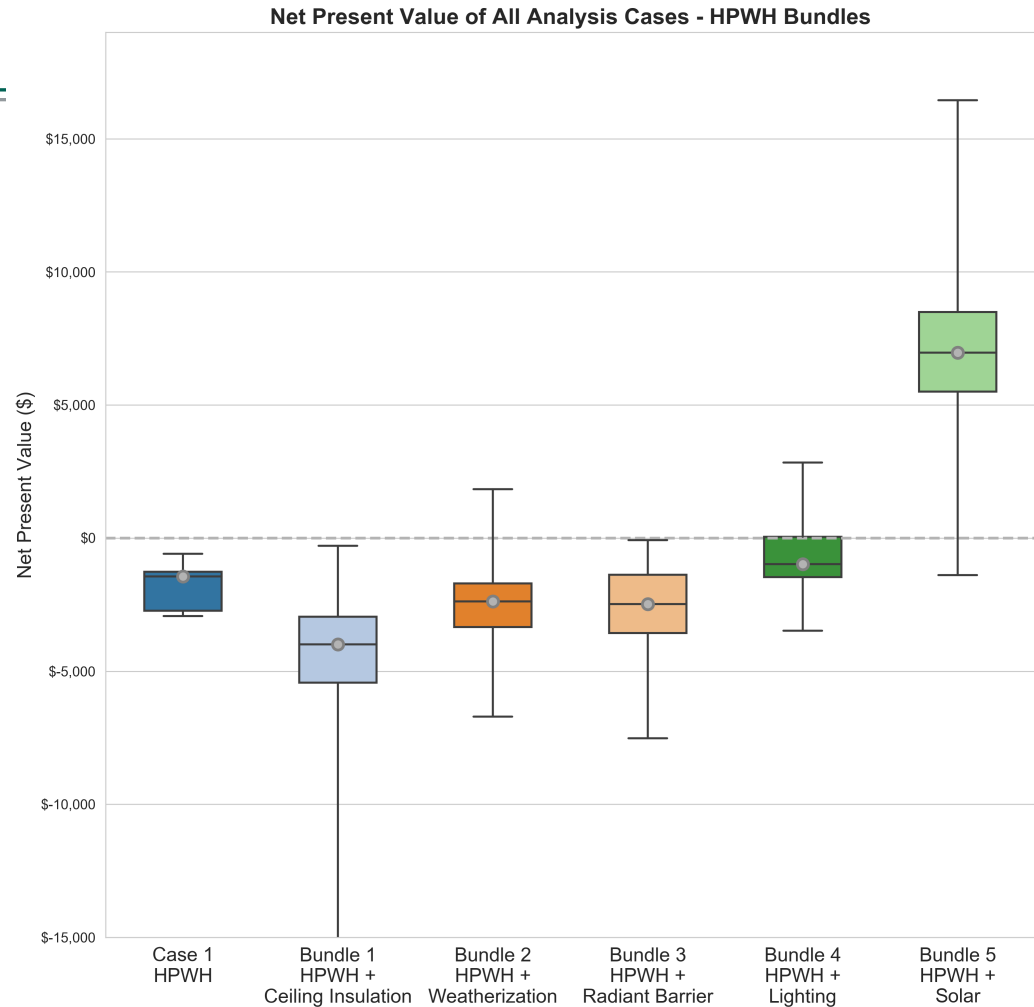


Observations & Insights from Results

- Electrification can be a hard sell in Santa Monica
 - HPs result in +ve energy savings, but –ve cost savings
- Rooftop solar provides the greatest savings
 - By a very large margin, compared to other upgrade options!
- A ‘bundle’ approach of electrification + solar can be a great option to make electrification accessible to homeowners!

Bundle HPWH + Solar

- HPWH by itself has –ve NPV
- However combining it with Solar results in a +ve NPV for the bundle
- This ‘bundle’ approach is currently being explored for a reach code opportunity for existing building by SCE’s Codes and Standards team for the city of Santa Monica



Thank you!
Questions?

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This project was funded by the California Emerging Technologies Program.
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