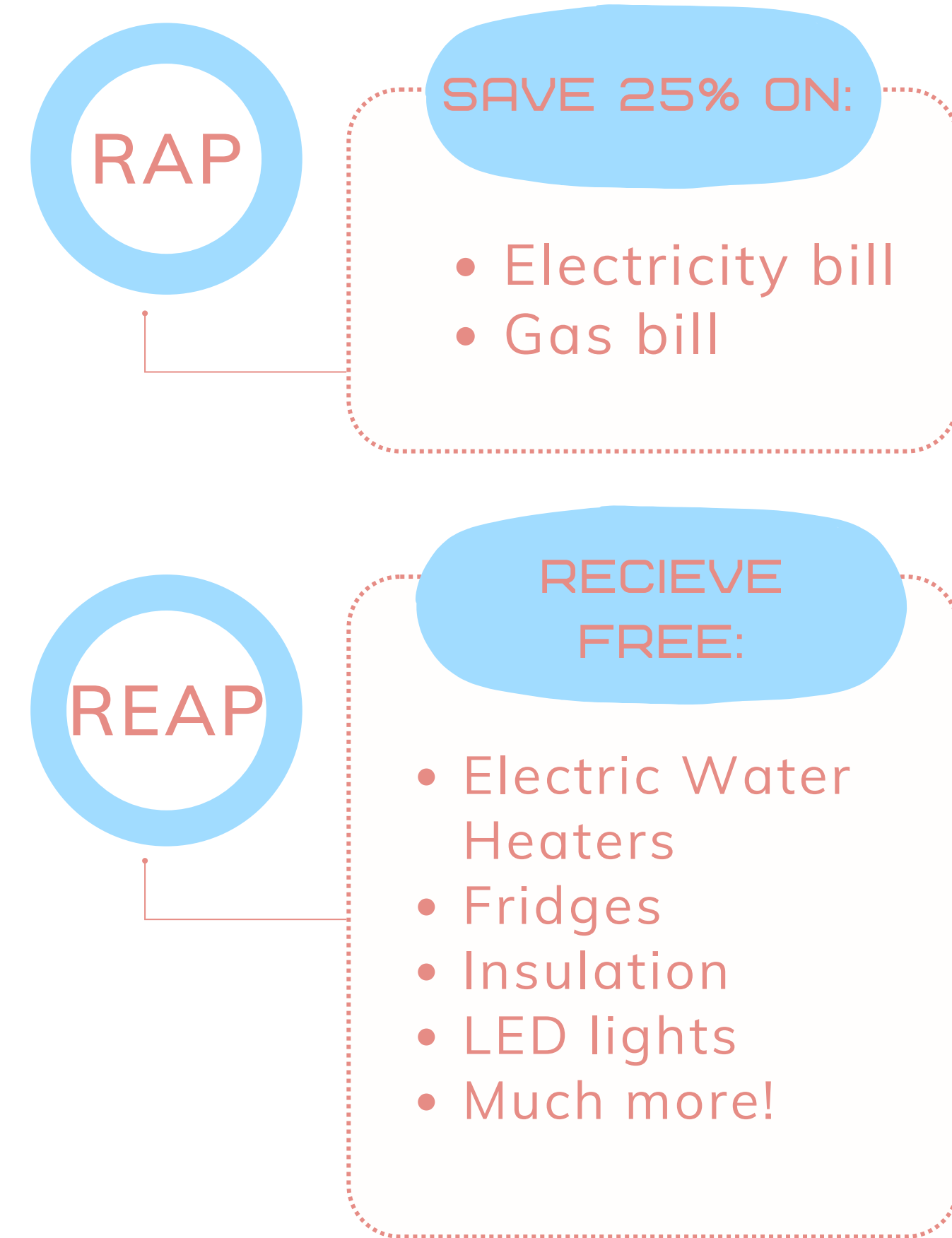


Overcoming Challenges to Improving Energy Efficiency in Low-income Residential Buildings

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INTRODUCTION

- Buildings are the cause of 36% of global energy use annually (Budds, 2019), and low-income residential buildings are especially inefficient due to older, more inefficient technology (Blumberg, 2020)
- Installing electric heat pumps and other technology increases efficiency to save money and reduce carbon emissions (Montilla, 2021)
- Many rebates and programs make efficiency upgrades free or low cost, especially for income-qualifying people (Dong, 2022)
- Palo Alto Utilities has the income-qualified Rate Assistance Program (RAP) and Residential Energy Assistance Program (REAP) (see graphics)
- They recently launched a "full-service solution" for all residents to have a new electric heat pump water heater installed for \$2,700 (HPWH program)



RESEARCH METHODOLOGIES

BACKGROUND RESEARCH

Identified that lack of technology is not the issue through an interview with Dr. Bing Dong.

PALO ALTO UTILITIES

Focused on Palo Alto Utilities RAP and REAP programs for income-qualified residents and Heat Pump Water Heater (HPWH) program for all residents. Spoke to Ms. Carrol, a participant in REAP, to get a testimonial.

CANVAS

Went door-to-door to talk to residents, encouraging them to switch to an electric water heater via the HPWH program. Half-page flyer about REAP and RAP was included in the materials handed to people or left under the doormat, but not talked about at the door to residents.

INTERVIEWS

Conducted nine Zoom interviews with local experts on topics including: successful outreach, low-income housing, rebates for efficiency upgrades, and Palo Alto rebate programs.

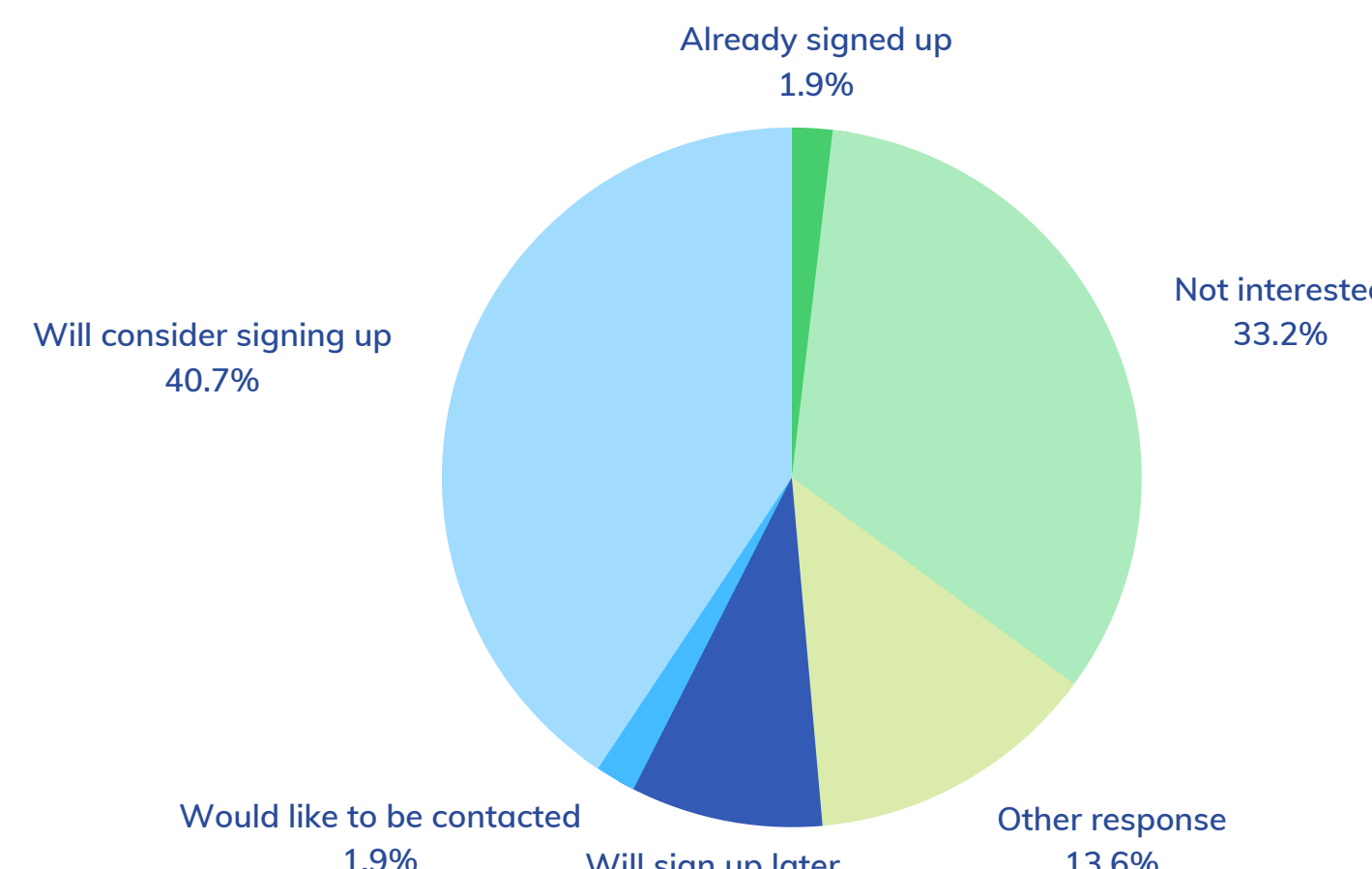
FLYER

Designed a half-page flyer to educate residents about RAP and REAP and encourage them to sign up. Included a testimonial from Ms. Carroll and a trackable QR code that tracked scans. Also listed the benefits of REAP and RAP. See flyer above.

DATA & FINDINGS

87 OUT OF **214**
WILL CONSIDER SIGNING UP FOR HPWH PROGRAM RESIDENTS SPOKE TO DURING CANVAS

Fig 1. Of the 567 homes targeted during the 350 canvas on March 11th and 12th, volunteers spoke to a resident at 214 homes. Their responses to the program were recorded in a Google Form, and the majority were positive.



FREE* ELECTRIC WATER HEATER



"It's really easy to get into these programs if you qualify, and the people who run them are very nice... I'm so grateful that they exist and that I can be part of them."

M. C. Carroll

Palo Alto resident who received a free water heater, furnace, and weather stripping, and saves 25% on electricity and gas.

LEARN MORE ABOUT PALO ALTO UTILITIES INCOME-QUALIFIED PROGRAMS

RAP- Rate Assistance Program
REAP- Residential Energy Assistance Program

*SCAN HERE TO SEE IF YOU QUALIFY:



IF YOU QUALIFY YOU COULD ALSO RECEIVE:

- 25% off electricity and gas bills
- Free home improvements such as: insulation, new appliances, programmable thermostats, and more
- An all-electric heat pump water heater

9 OUT OF **567**
QR CODE SCANS FLYERS DISTRIBUTED*

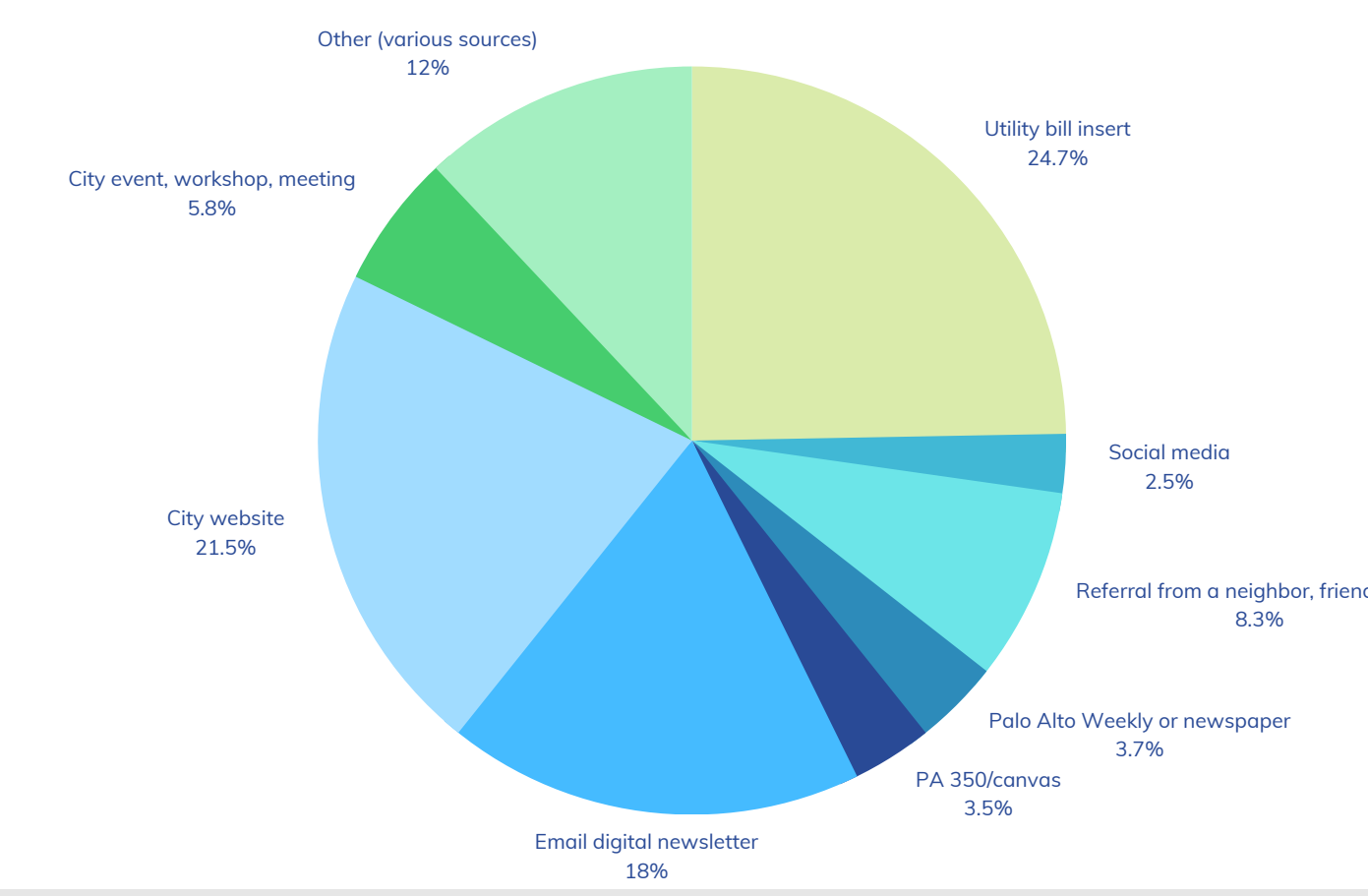


Fig 2. 433 people have filled out the interest form for the HPWH program so far. This shows their response to how they found out about the program. While only 15 can definitively be linked to the canvas, this data is likely understated. On the interest form question that asked residents how they heard about the program, residents had to select "Other" and then type in something related to the 350 canvas to be counted.

SUMMARY OF INTERVIEWS:

The issues:

- Deferred maintenance (repair work that has been delayed due to financial constraints)
- Lack of financial incentive
- Lack of awareness
- Split incentive issue (when the party paying for the upgrade won't benefit from it)
- Disturbance to resident
- Concerns about raised rent prices
- Concerns about power outages (for electrification)

Other takeaways:

- Keep the flyer visual-heavy and highlight a "success story" from a participant
- Target homeowners to avoid the split-incentive issue
 - Alta housing (PA's subsidized housing) residents do not pay for their own utilities and are not the decision makers on upgrades
- Best practice is to send income-qualified program information to everyone and let people self-filter
- There is a large gap between the estimated need of approx. 5,000 residents and the implementation of the solution as only ~500 residents are signed up for RAP

CONCLUSIONS & ANALYSIS

FLYER QR CODE DATA

~16%
INTEREST GENERATION AMONG QUALIFYING RESIDENTS*

*The majority of Palo Alto residents do not meet the income threshold (less than \$60,000 a year for a one-person household) for RAP and REAP. There is no accurate data on how many of the 567 homes would qualify. However, the general estimate for Palo Alto is 10% qualify so 57 homes. Under this estimate, 9 scans mean the flyer had a 16% success rate of generating interest. This indicates that an educational flyer about an income-qualifying program is not very successful in areas where fewer people qualify such as Palo Alto, however, it is successful in the context of how many people are qualified.

TAKEAWAYS:

The canvas received better results, indicating that RAP and REAP likely would have received a better response if brought up in the conversation, instead of solely being in the handouts.

CANVAS DATA

53% INDICATED INTEREST IN SIGNING UP
45% SPOKE TO A RESIDENT AT THE HOME

Signups went from approximately 15 per year when Palo Alto Utilities offered a rebate for residents to install electric water heaters themselves, to 433 in a few months when Palo Alto launched the "full-service" option. This is likely due to increased convenience and increased promotion of the program (350 canvas, booths, bill inserts, etc.).

TAKEAWAYS:

"Full-service" energy upgrade program is much more popular than programs where residents install the upgrade themselves and get a rebate.

Canvassing door-to-door was successful in generating interest, but inconclusive if it was successful in getting signups.

Utility bill inserts and digital newsletters accounted for 43% of people's reasons for signing up, and thus are effective ways to promote these types of programs.

IMPLICATIONS & NEXT STEPS

BIGGER REBATE AND PROMOTION

Palo Alto example showed an increase in signups with a bigger rebate. Promotional efforts are key, using a combination of canvassing, booths, bill inserts, and more is likely a key factor in the increased signups.

SPLIT INCENTIVE AND DEFERRED MAINTNANCE

Interviews found that split incentive and disturbance were two big barriers, which were verified anecdotally through the canvas. These issues are very difficult to address and in the meantime, companies and municipalities are targeting the buildings without these issues.

PROVIDE MORE CONVENIENT SOLUTIONS

Municipalities and companies should look to provide more convenient, full-service solutions than the "do-it-yourself-and-get-a-rebate" model.

FUTURE TESTS

- Test canvas efficacy in future canvasses with a "350 canvas" option on the interest form to get accurate data.
- Action research to discover solutions to split incentive issues and deferred maintenance issues (REAP, BayREN, and BlocPower do not help residents with these issues).

RECCOMENDATIONS

Consider expanding more rebate programs into "full-service" programs. Palo Alto Utilities should look to launch a similar program for electric furnaces.

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