



*Better Buildings Residential Network
Peer Exchange Call Series*

*How Does Energy Efficiency Relate to Housing Affordability
for Americans*

March 28, 2024

Agenda and Ground Rules

- Moderator
 - **Jonathan Cohen**, Better Buildings Residential Network, U.S. DOE Residential Buildings Integration Program (RBI)
- Agenda Review and Ground Rules
- Residential Network Overview and Upcoming Call Schedule
- Opening Poll
- Featured Speakers
 - **Jackie Berger**, Apprise Inc.
 - **Sarah Hill**, Association for Energy Affordability
 - **Jennifer Gremmert**, Energy Outreach Colorado (EOC)
- Open Discussion
- Closing Poll and Announcements

Ground Rules:

1. **Sales of services and commercial messages are not appropriate** during Peer Exchange Calls.
2. Calls are a safe place for discussion; **please do not attribute information to individuals** on the call.

The views expressed by speakers are their own, and do not reflect those of the Dept. of Energy.

Join the Network

Member Benefits:

- Recognition in media, social media and publications
- Speaking opportunities
- Updates on latest trends
- Voluntary member initiatives
- One-on-One brainstorming conversations

Commitment:

- Members only need to provide *one number*: their organization's number of residential energy upgrades per year, or equivalent.

Upcoming Calls (2nd & 4th Thursdays):

- *4/11: No Peer Exchange Call due to 2024 National Home Performance Conference*
- *4/25: Demand Response Programs and Their Impact on Peak Load Energy Usage and Comfort*

Peer Exchange Call summaries are posted on the Better Buildings [website](#) a few weeks after the call



Jackie Berger
Apprise Inc.



How Does Energy Efficiency Relate to Housing Affordability for Americans

Jackie Berger
March 28, 2024

Presentation Overview

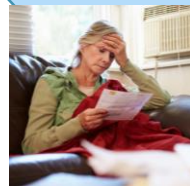
Introduction



Energy Efficiency



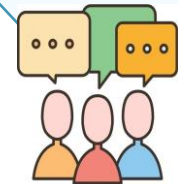
Energy Bill Assistance



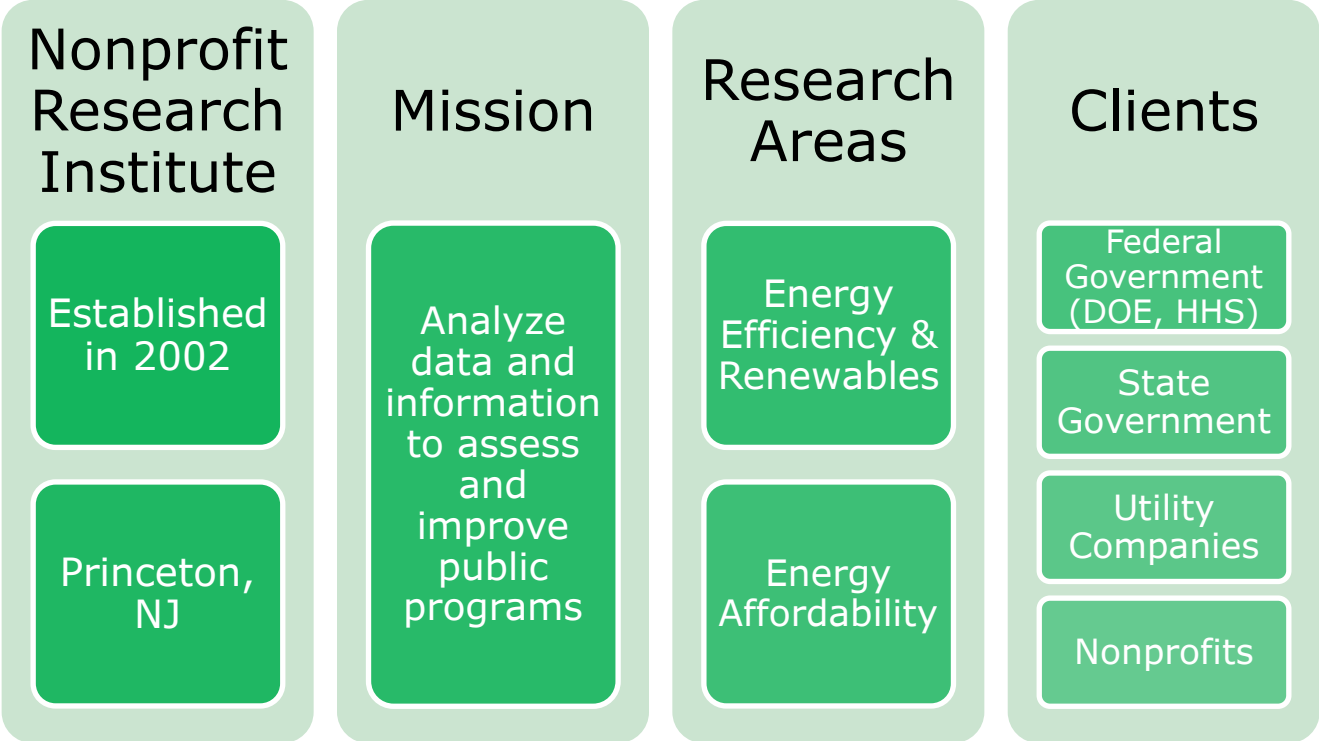
Recommendations



Discussion



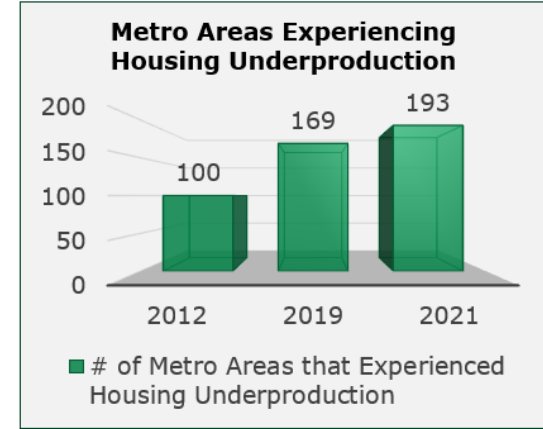
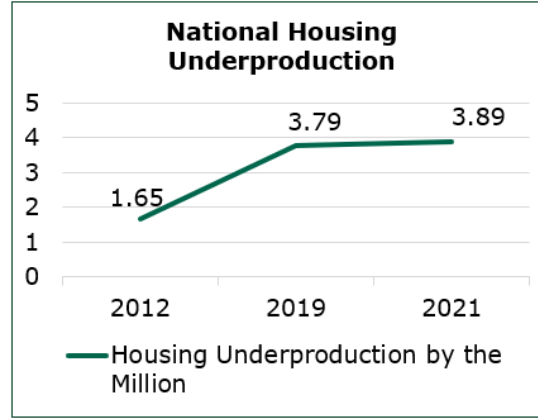
Applied Public Policy Research
APPRISE
Institute for Study and Evaluation



Housing Affordability Challenges

Housing Underproduction, as defined by Up For Growth, occurs when communities fall short of meeting housing needs.

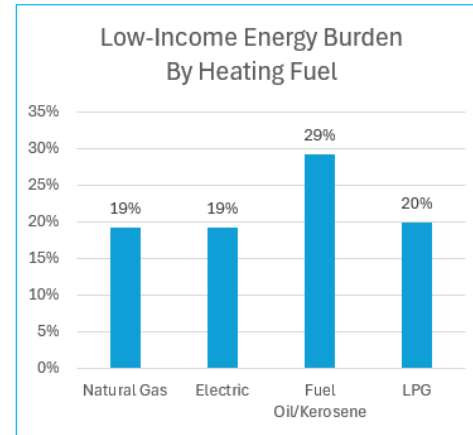
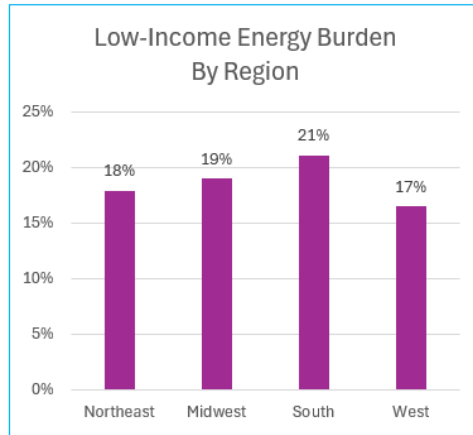
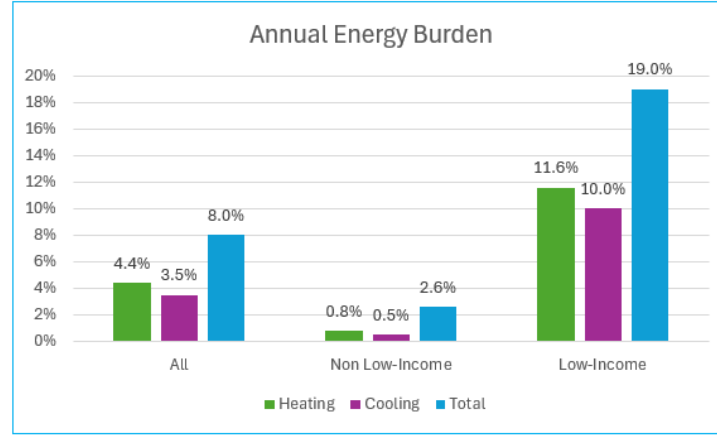
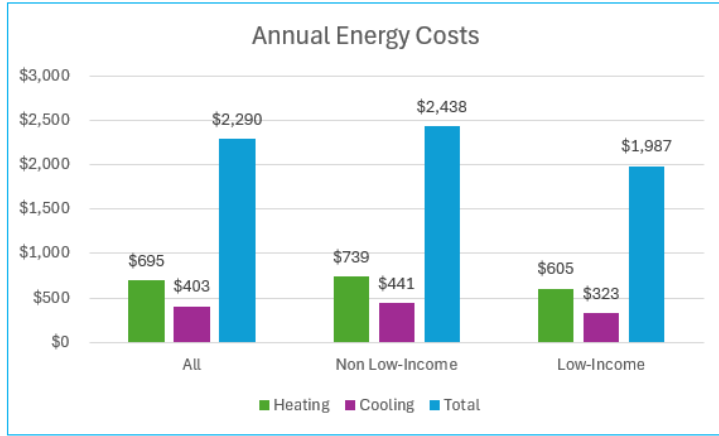
- High Housing Costs
- High Interest Rates
- Constrained Labor Supply
- Restrictive Zoning
- Inflation
- Uncertain Economy



“2023: The Year You Didn’t Buy a House”
 New York Times,
 January 4, 2024

- Redfin Study
- Less than 16% of homes for sale in 2023 affordable to local median earners.
- Defined as housing that costs no more than 30% of income.

Energy Costs and Burden

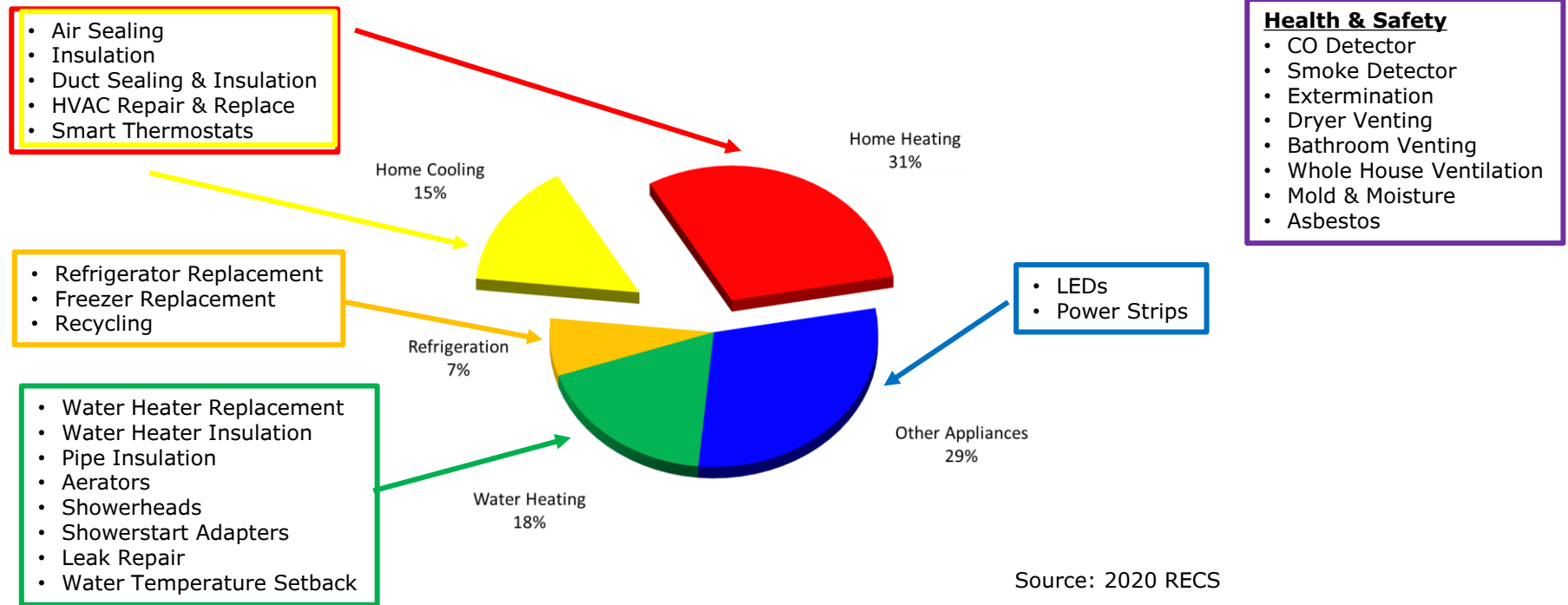


Energy Efficiency



Energy Efficiency Opportunities

Percent of U.S. Residential Energy Expenditures
 Low Income Households, by End Use, FY 2022



Source: 2020 RECS

Energy Efficiency Bill Reduction Evidence from APPRISE Evaluations

Evaluation Population

- Low-Income Customers
- Utility Energy Efficiency Program Participants
- Northeastern U.S.

Evaluation Methodology

- Pre/Post Energy Usage
- Billing Analysis
- Weather-Normalized
- Comparison Group in Some

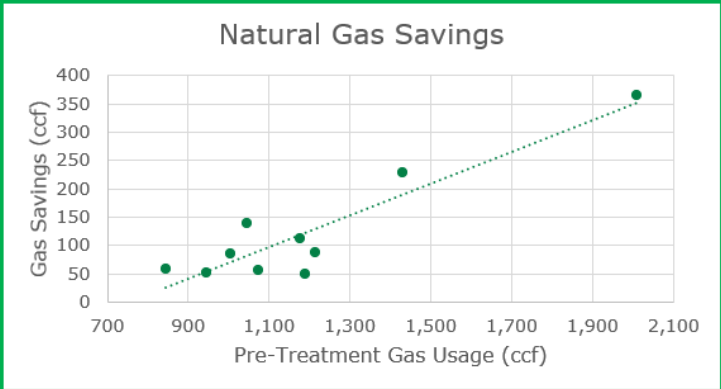
Results

- Bill impact may not be enough to achieve affordability

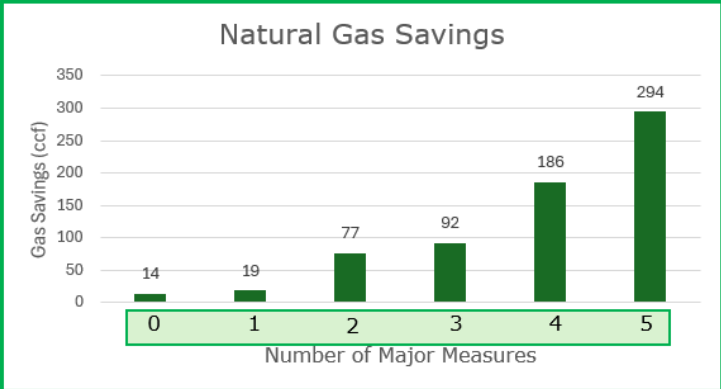
Type	# Evals	Time Period	Mean Pre-Usage	Mean Savings	Savings	
					Mean %	% Range
Gas Heating	10	2017-2022 (No 2020 Included)	1,193 ccf	123 ccf	9.4%	3.9% - 18.2%
Electric Heating	8		17,614 kWh	1,194 kWh	6.3%	3.2% - 10.5%
Electric Baseload	10		11,829 kWh	714 kWh	6.0%	3.6% - 10.5%

Increasing Energy Efficiency Savings

Higher Pre-Treatment Usage

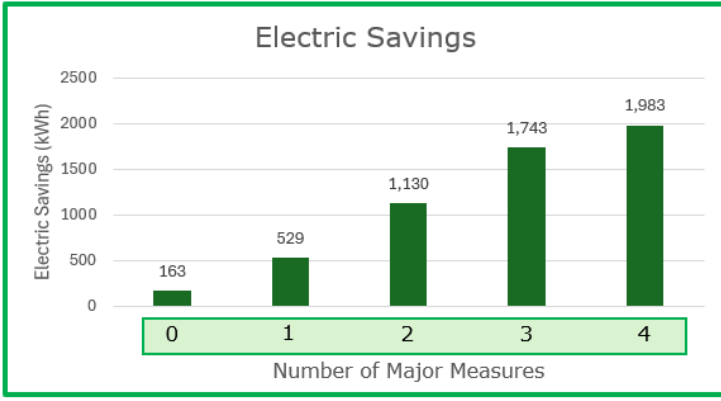
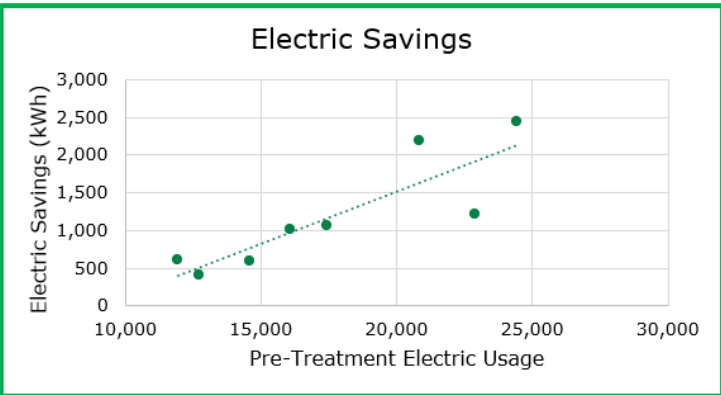


More Major Measures



Major Measures

- Gas
- Air Sealing
 - Insulation
 - HVAC
 - Duct Sealing
 - Hot Water



- Electric
- Air Sealing
 - Insulation
 - Duct Sealing
 - Refrigerator Replacement

Energy Efficiency Benefits

Home Comfort

Drafts



Humidity



Cold/Hot Rooms



Noise



Health & Safety



Mold



Air Quality



Carbon Monoxide



Asbestos



Pests

Feedback on Energy Efficiency From High Savers

Usage & Bills



He estimates his usage decreased by 15-20%. He considers that a substantial decrease and his bills are much better than before.

He has changed some of his behaviors. Now he understands how much air comes in through the door when it is open and when it is closed. This means that he makes an effort to close the door and not leave it open in the colder months.

The program taught her how to work with the thermostat to conserve energy. Before, she did not know that she could program the thermostat instead of changing it as need be.

Comfort



There are not as many drafts because of fixes to the doors and windows, the floors feel warmer, and the pipes were wrapped. These all resulted in vastly improved heating. Overall, her comfort level increased, especially in the wintertime.

Her home is much warmer and more comfortable. There used to be a cold draft throughout the home, but there no longer is. She believes this is because they added insulation to her attic.

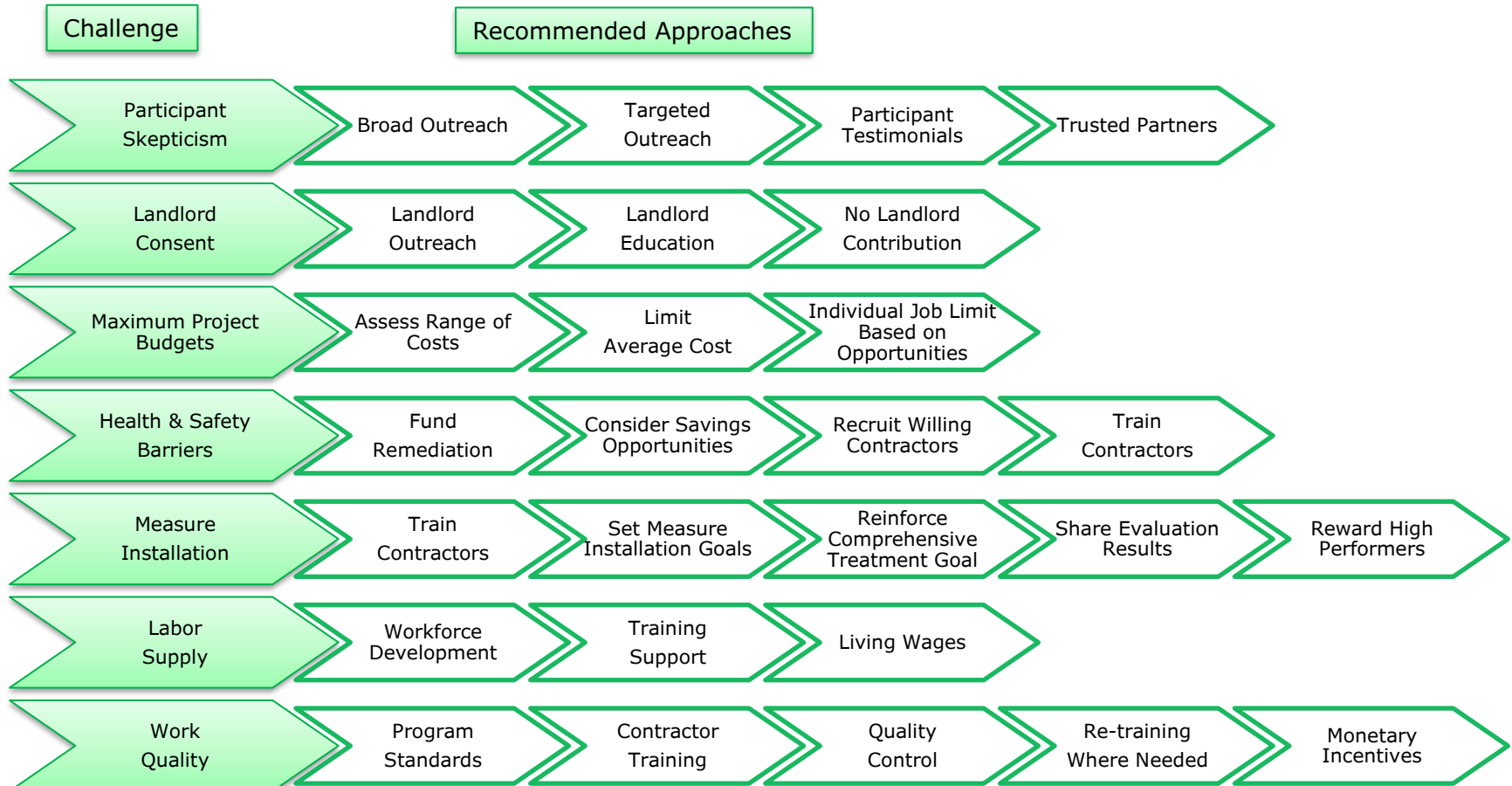
Health



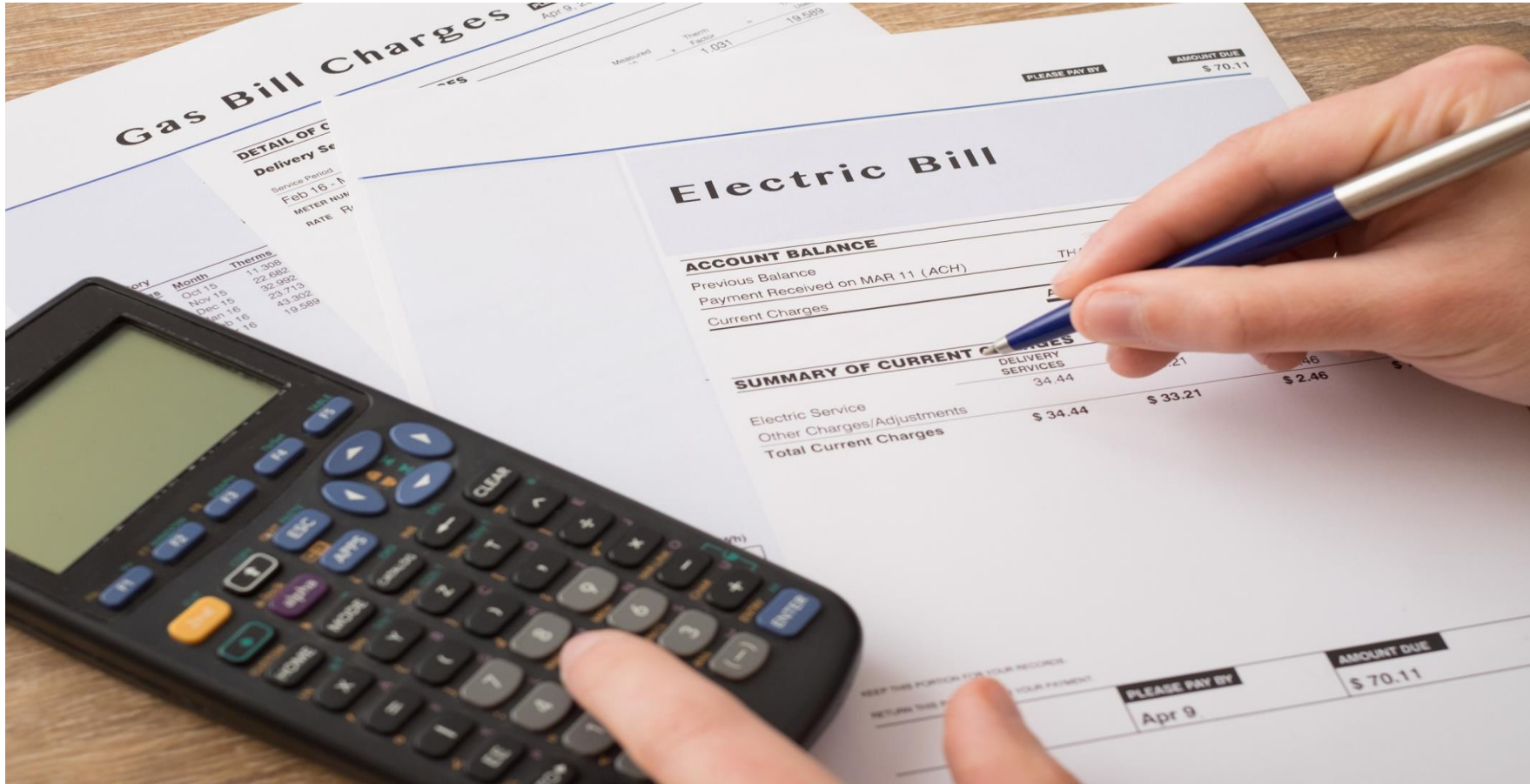
Her daughter used a machine for her asthma before the program services, and that machine used a considerable amount of energy. Since the program services improved the atmosphere of the home, her daughter used the machine much less.

Her old refrigerator didn't work and didn't keep things cold. The new one is nice, works well, and keeps things cold. Overall, it seemed that the refrigerator had the biggest impact on her day-to-day life.

Energy Efficiency Challenges



Energy Bill Assistance



Energy Bill Assistance

LIHEAP

- Federal Block Grant
- State & Tribal Grantees
- Heating Assistance
- Cooling Assistance
- Crisis Assistance
- Emergency Furnace Repair & Replacement

Bill Payment Assistance

- State Programs
- Utility Programs
- Bill Subsidy
- Rate Discount
- Percentage of Income Payment

Arrearage Forgiveness

- State Programs
- Utility Programs
- Arrearages Forgiven Over 1-3 Years

Hardship Funds

- Nonprofits
- Utility Programs
- Grants to Customers Disconnected or in Danger of Disconnection

Feedback on Energy Bill Assistance

Please continue this program - it is life changing to be able to afford my bill and keep my house at a comfortable temperature. The physical and mental stress it has relieved is beyond measure.

I want say thank you for the utility to keep us warm in winter and cold in summer and help us use our medication device we need and hope they are able help more people who are low income to stay safe.

It helps with bills and I can control it. I can save money and buy more groceries. Helps out so I can save money for health insurance for the kids.

I love the program, it is a life saver. I would have been homeless. I called the utility crying. I am so grateful.

Recommendations

Maximize Energy Savings

- Treat high users
- Remediate H&S issues
- Install major measures where cost-effective opportunities exist
- Provide training and quality control to ensure high quality work

Assess Effectiveness

- Estimate savings using billing data
- Weather normalize energy usage
- Use comparison group if possible
- Re-assess frequently

Other Assistance

- Energy bill payment assistance
- Refer from assistance programs to wx and from wx to assistance programs

Jackie Berger

APPRISE

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www.appraiseinc.org





Sarah Hill

Association for Energy Affordability



ASSOCIATION FOR
ENERGY AFFORDABILITY INC.

Equitable Electrification:

Program Models that Work for Existing Low
Income Multifamily Buildings

Sarah Hill
3/28/2024



ASSOCIATION FOR
ENERGY AFFORDABILITY INC.



Sarah Hill

Director, Low Income Programs

Not-for-profit technical services & training organization dedicated to bringing the benefits of clean energy and energy efficiency to under-served communities



Overview

- Explore the challenges and opportunities that building electrification presents for frontline communities, particularly low-income multifamily renters
- Explore program design elements of the Low Income Weatherization Program that help to level the playing field and remove barriers to access clean energy benefits for low-income renters

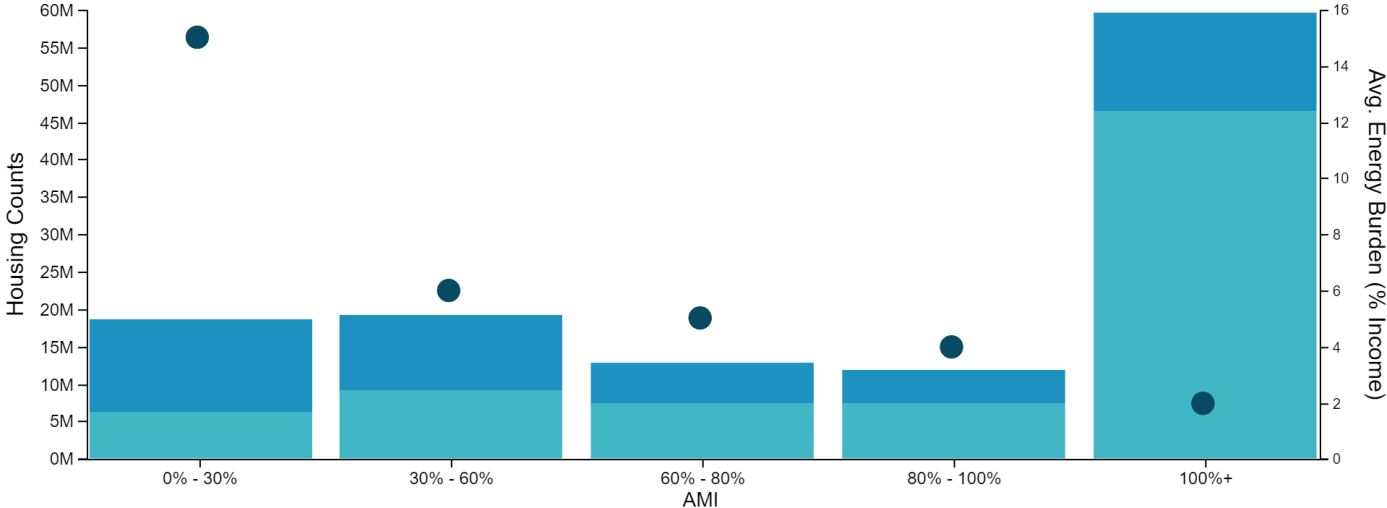


Challenges and Barriers:

- Split Incentive
- Building Age and Condition
- Empowerment
- Energy Burden/Financial Resources
- Fuel cost
- Solar Credit Allocation Mechanisms



Housing Counts for the United States



- The United States**
- Renter-occupied
 - Owner-occupied
 - Avg. Energy Burden (% Income)

Low-Income Energy Affordability Data Tool Chart Export (<https://www.energy.gov/eere/slsc/maps/lead-tool>)
 Exported On: 5/26/2020
 AMI: 0% - 30%, 30% - 60%, 60% - 80%, 80% - 100%, 100%+
 Building Age: Before 1940, 1940 - 59, 1960 - 79, 1980 - 99, 2000 - 09, 2010+
 Fuel Type: Utility Gas, Bottled Gas, Electricity, Fuel Oil, Coal, Wood, Solar, Other, None
 Building Type: 1 unit detached, 1 unit attached, 2 units, 3 - 4 units, 5 - 9 units, 10 - 19 units, 20 - 49 units, 50+ units, Other
 Rent/Own: Renter-occupied, Owner-occupied



Electrification Project Challenges

- Electrical Upgrades and Building modifications
- Upfront cost (existing buildings)
- Consumer and Contractor Knowledge
- System sizing (especially larger central systems)
- Range of options (many pros and cons)
- Programmatic measure eligibility



Low Income Weatherization Program for Multifamily Properties



<https://camultifamilyenergyefficiency.org/>



Program Overview

Low-Income Households Served	12,311
Projects Completed	122
Annual GHG Emission Reduction	12,693 MTCO ₂ e
Annual MWh Savings	19,535
Annual Therm Savings	1,228,196
Solar PV Capacity Installed	6.7 MW-DC
Program Incentives Provided	\$49M

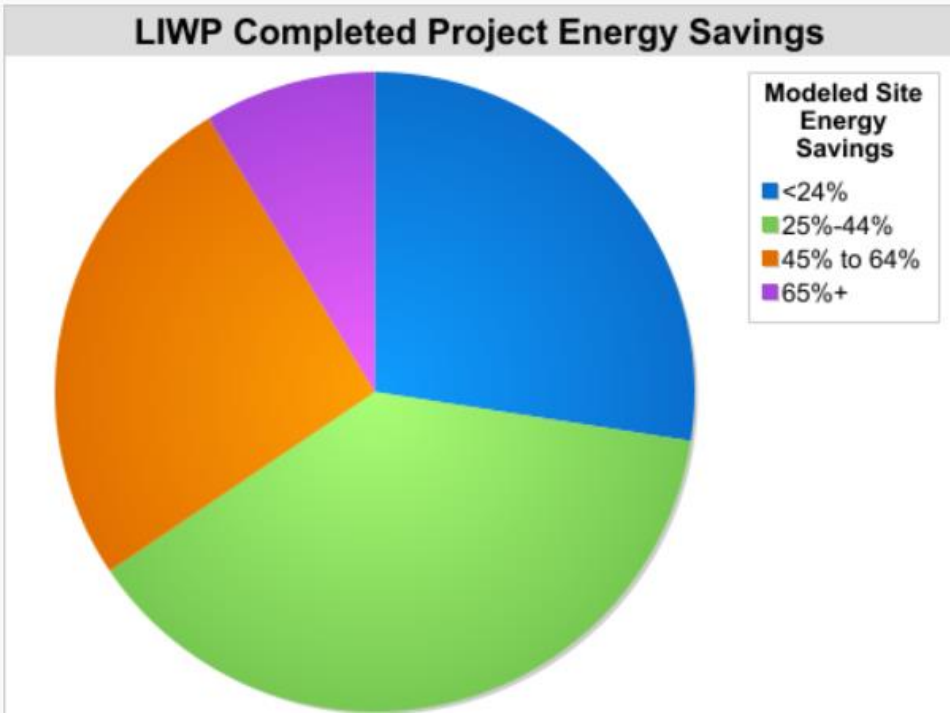


Program Design Elements

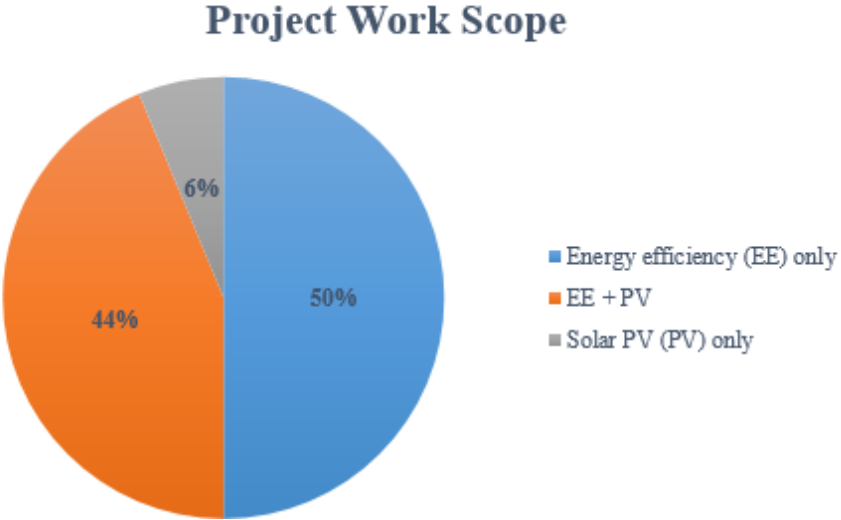
- Whole Building Framework
- Eligibility Criteria
- Incentive Structure
- Technical Assistance
- Co-leveraging
- Benchmarking



Whole Building Framework



Whole Building Framework



Percent of completed LIWP-MF projects that pursue energy efficiency, solar PV, and/or both scopes of work.



Eligibility Criteria for Targeted Inclusion

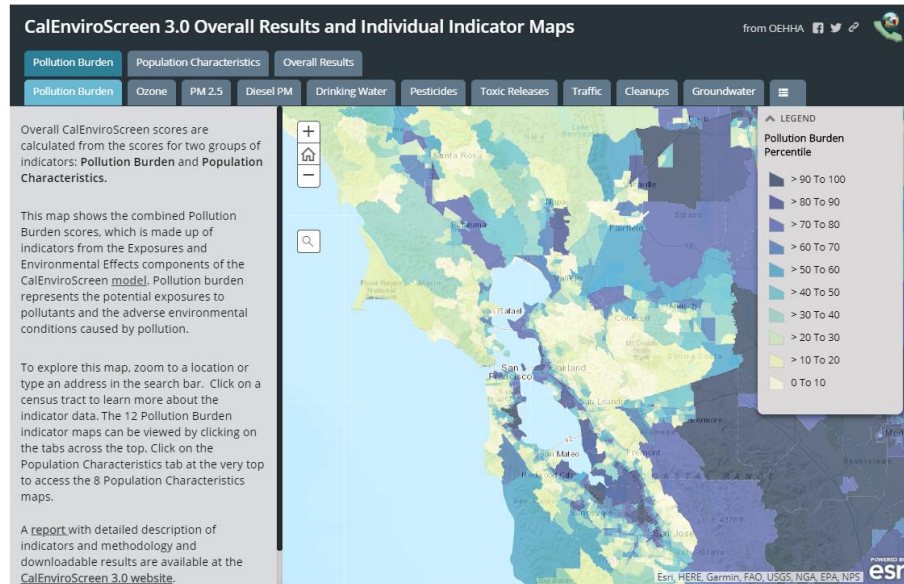


Image from : <https://oehha.ca.gov/calenviroscreen/maps-data>



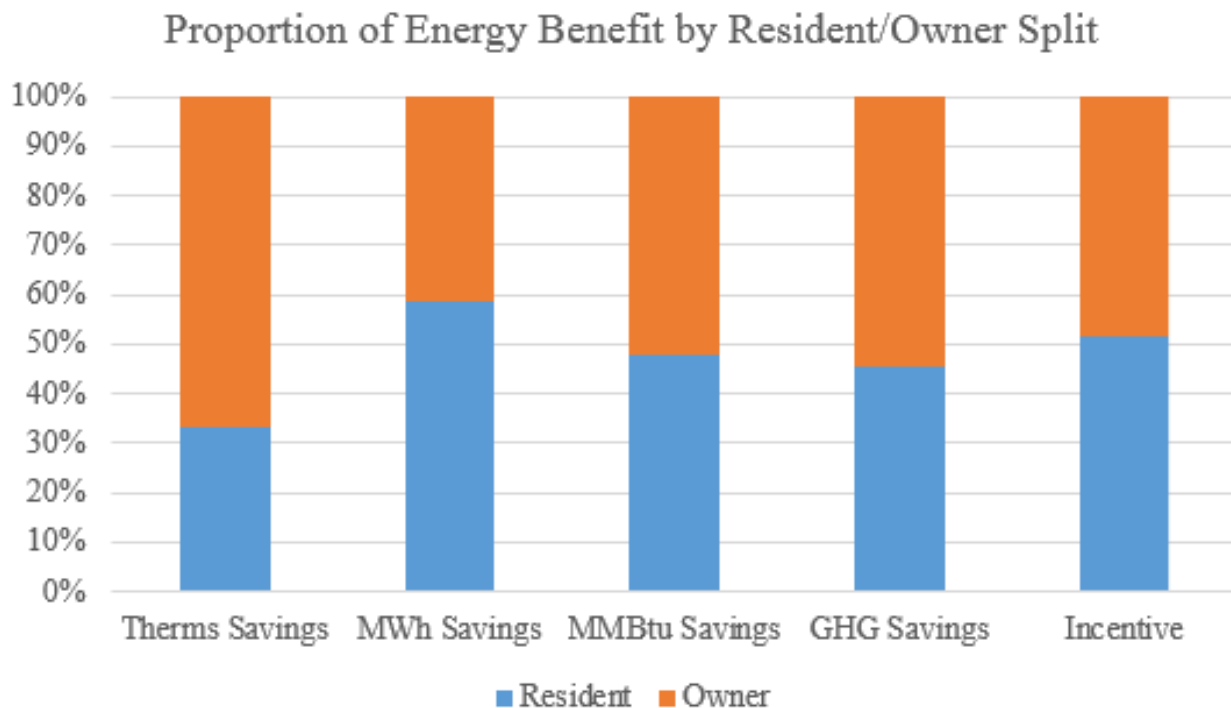
Incentive Structure

- Tiered to Overcome Split Incentives
- Encourages Electrification

Benefitting Meter	Owner Paid Meter	Tenant Paid Meter
Program Cycle 1	\$4,000/MTCO ₂ e	\$5,000/MTCO ₂ e
Program Cycle 2	\$3,500/MTCO ₂ e	\$4,500/MTCO ₂ e
Program Cycle 3	\$3,000/MTCO ₂ e	\$4,500/MTCO ₂ e
Program Cycle 4	\$3,500/MTCO ₂ e	\$5,300/MTCO ₂ e



Incentive Structure



Technical Assistance

Design/Constructability Support and Education

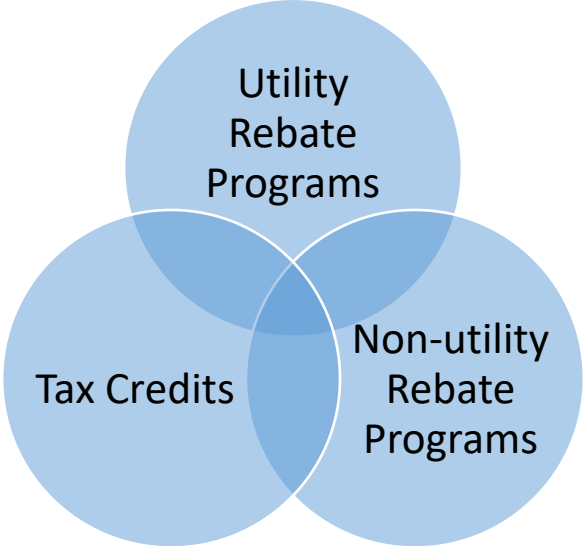
No-cost comprehensive technical assistance from enrollment through construction completion

- Pair electrification measures with existing or new Solar PV
- Bill savings analysis
- Constructability and feasibility
- Bid assistance
- Evaluate incentive layering opportunities
- Understand future regulation(s)

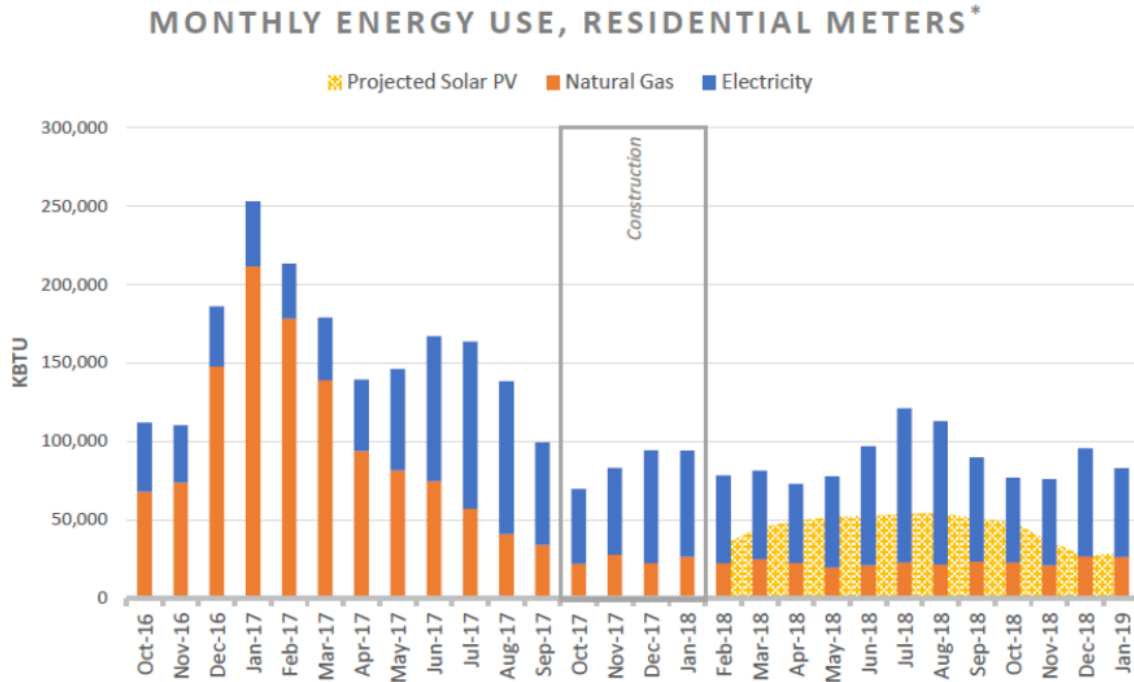
Image: Dave Sweet



Co-leveraging



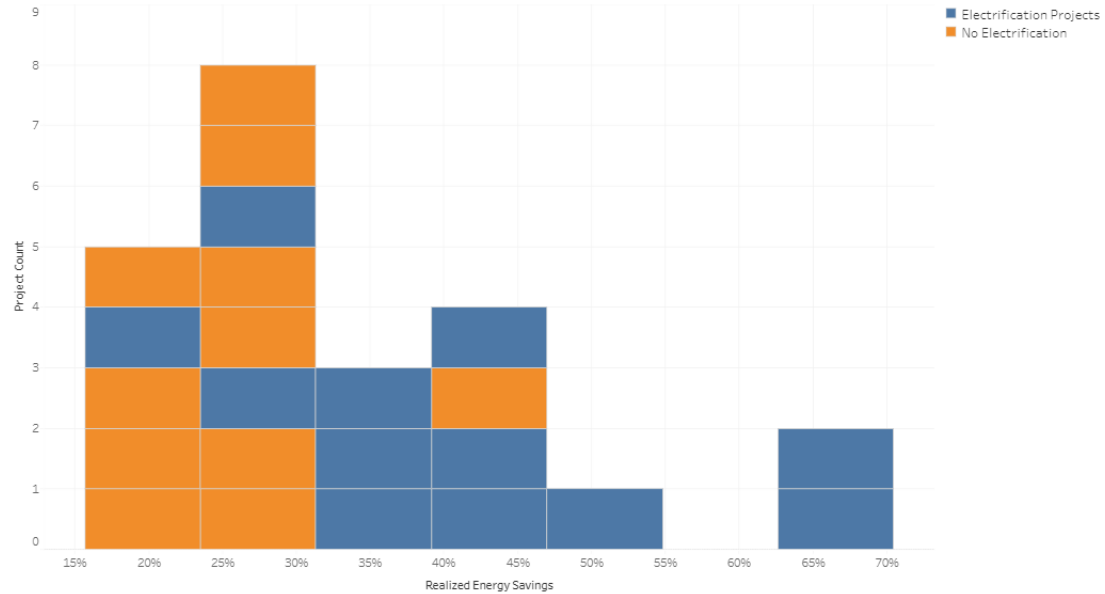
Benchmarking



Aggregated resident utility bill data and projected solar PV production for a 32 unit property in Wasco, CA.



Benchmarking



Realized Energy Savings for 23 LIWP-MF Projects, Project Comparison



Conclusions





Jennifer Gremmert
Energy Outreach Colorado



**ENERGY
OUTREACH
COLORADO**

Together We Power Stability

ENERGY OUTREACH COLORADO (EOC)

Company overview

Established 1989

Mission:

Energy Outreach Colorado leads a network of industry, state, and local partners to support, stabilize, and sustain Coloradans to afford their energy needs.

Vision:

All Coloradans can afford their energy needs.

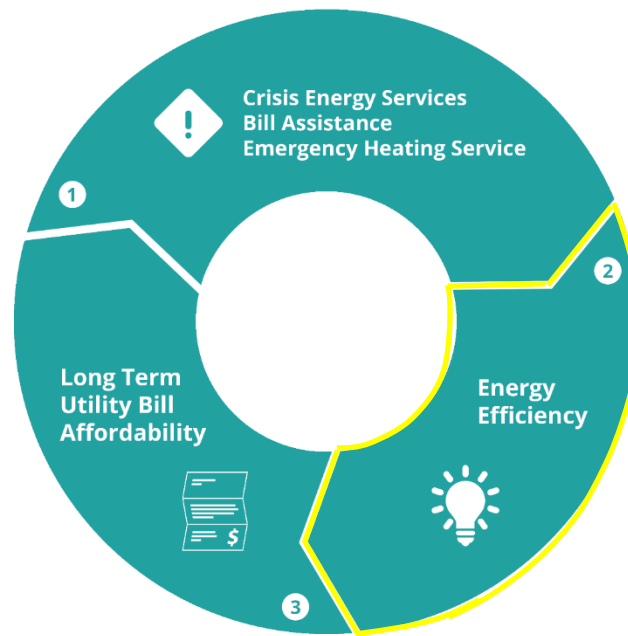


EOC & ENERGY EFFICIENCY

A comprehensive approach

Strategic Foundation

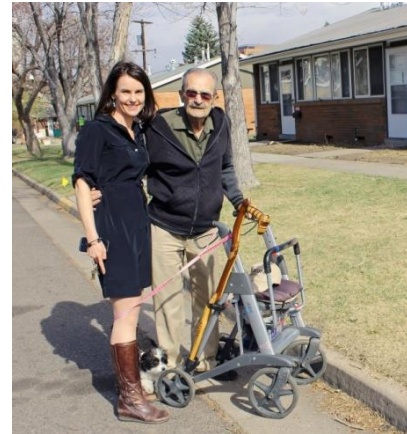
- SUPPORT** ▶ Bill Assistance, Furnace Repair - Short Term
- STABILIZE** ▶ Energy Efficiency, Behavior Change - Mid Term
- SUSTAIN** ▶ Renewable Subscriptions, Advocacy - Long Term



HOW EOC REDUCES ENERGY CONSUMPTION

Income-Qualified Energy Efficiency Programs

- Colorado Affordable Residential Energy Program (CARE)
- Healthy Homes Program
- Multifamily Affordable Housing Program
- Nonprofit Energy Efficiency Program (NEEP)
- Energy Education Programs
- Community Solar Garden (CSG) Subscriptions
- Investigating renewable energy and electrification options with partners and utilities
- Transportation Electrification engagement



WHY ARE ENERGY EFFICIENCY PROGRAMS IMPORTANT?

Benefits of Strong Income-Qualified Energy Programs

- Preserve Existing Affordable Housing
- Resiliency - Extreme Weather Events
- Energy Savings Contributing to Ability to Afford Other Needs
- Economic Stabilization
- Non-Energy Benefits
- Greater Control of Energy Costs
- GHG Reductions
- Improve Health and Stability of Families



TOTAL IMPACT 2023

All Energy Efficiency Programs

- Decatherms Saved – 34,183
- Kilowatt Hours Saved – 4,100,000
- Greenhouse Gas Emissions Saved – 12,502 Metric Tons of CO2 Avoided
- Total Dollars Saved in 2023 - \$1,200,000

- NEEP – 67 Projects Completed; leveraged \$2.9M
- CARE – 601 Homes Completed; on track for 750 in 2024; leveraged \$3M
- Multifamily – 47 properties; leveraged \$5.9M



EOC MULTIFAMILY PROGRAMS

Multifamily Utility Rebate Programs & Multifamily Weatherization Assistance Programs

Implementer for three primary funding sources:

- Statewide multifamily weatherization assistance program
- Utility funded income qualified demand-side management
- City and County of Denver, Office of Non-profit Engagement

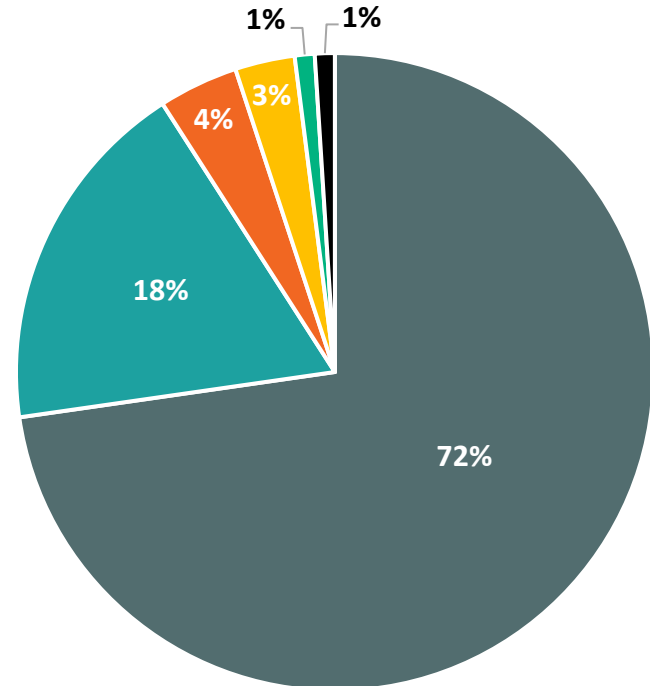
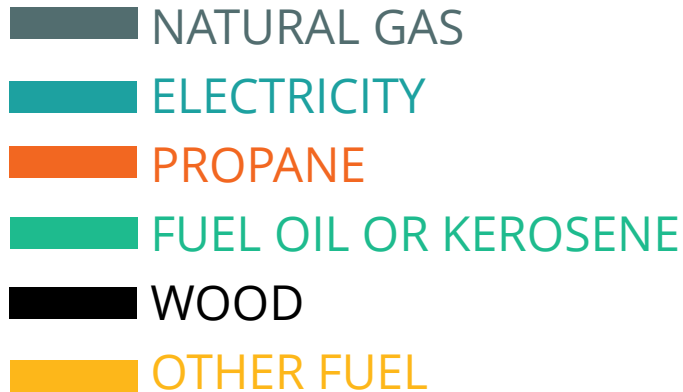
Program offerings:

- No cost ASHRAE Level 1 energy assessments
- No cost energy advising
- In-house project management
- Statewide network of contractors and consultants
- Expertise in affordable housing considerations, i.e. utility allowances, LIHTC rules



PRIMARY HEATING BY FUEL TYPE

Colorado Households

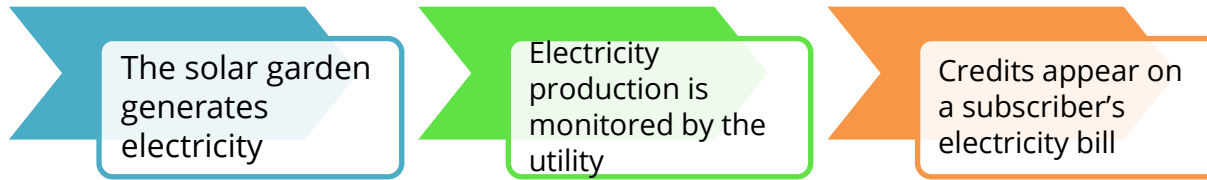


U.S. Census Bureau's American Community Survey (ACS) 2019



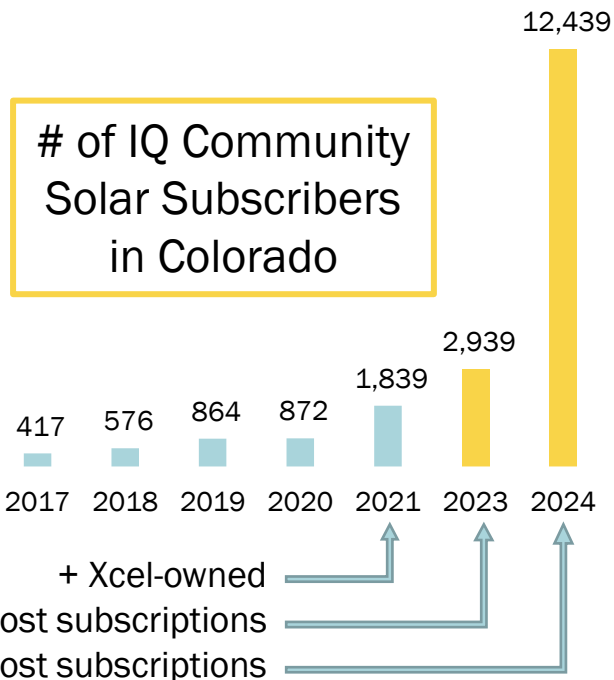
COMMUNITY SOLAR GARDENS

How do they work?



IQ SUBSCRIBER GROWTH

Record growth in 2024





**ENERGY
OUTREACH
COLORADO**
Together We Power Stability

Jennifer Gremmert
CEO

jgremmert@energyoutreach.org

Residential Buildings Integration (RBI) team sessions



NHPC
2024 | MINNEAPOLIS



Key Elements of Successful Retrofit Programs

Monday, April 8
3:30-5:00 PM

Strategies for Using Home Energy Score with other Audit Software

Tuesday, April 9
10:30-11:30 AM

Tackling the Toughest Technical Challenges to Residential Retrofits: A
Multidisciplinary Team Approach

Tuesday, April 9
10:30-11:30 AM

U.S. DOE Residential Team Update

Tuesday, April 9
1:00-2:00 PM

Home Energy Score: Providing Transparency and Empowering
Homeowners, Renters, and Buyers with Actionable Energy Information

Tuesday, April 9
2:30-3:30 PM

More, Multi, Manufactured - Home Energy Score tool enhancements
expand opportunities for efficiency upgrades

Wednesday, April 10
1:00-2:00 PM

Getting the Workforce Heat Pump Ready

Wednesday, April 10
2:30-3:30 PM

Red Calc Lives On!

Thursday, April 11
11:00 AM-12:00 PM

Smart Tools for Efficient HVAC Performance (STEP) Campaign



Scan this QR code to visit our website

Contact: christian.valoria@pnnl.gov

The STEP Campaign aims to increase adoption of **smart diagnostic tools** to streamline HVAC system performance testing and troubleshooting, **reducing energy-wasting faults** and **improving occupant comfort**.

To join the STEP Campaign, visit: bit.ly/3DFmEaE



HVAC Contractors and Technicians

- Reduce callbacks, improve consistency and quality, streamline processes
- Find out where to get training on smart diagnostic tools
- Be recognized for successful adoption of smart diagnostic tools!



Utilities and Program Implementers

- Streamline quality installation and quality maintenance programs
- Improve engagement with your contractors
- Be recognized for programs that utilize smart diagnostic tools!



HVAC Training Organizations

- Offer qualified training on System Performance with smart diagnostic tools
- Promote your training events
- Be recognized for providing training!



Weatherization Organizations

- Ensure your ASHP/CAC installations are operating at optimized efficiency
- Develop pilot with PNNL team
- Be recognized!

ORGANIZING PARTNERS

Explore the Residential Program Guide

Resources to help improve your program and reach energy efficiency targets:

- [Handbooks](#) - explain *why* and *how* to implement specific stages of a program.
- [Quick Answers](#) - provide answers and resources for common questions.
- [Proven Practices](#) posts - include lessons learned, examples, and helpful tips from successful programs.
- [Technology Solutions](#) **NEW!** - present resources on advanced technologies, **HVAC & Heat Pump Water Heaters**, including installation guidance, marketing strategies, & potential savings.
- [Health + Home Performance Infographic](#) – spark homeowner conversations.



<https://rpssc.energy.gov>

Health + Home Performance Infographic

Do You Have a “Healthy Home?”

A qualified contractor can help you assess and address indoor air quality, improve your comfort, and cut your utility bills.

Answers to a few basic questions can help you get started:

- **How old are your heating and cooling systems?**
Ensuring your system is updated and well maintained can save money and improve health and comfort.
- **Is your home insulated?**
Properly installed insulation in your walls and attic, at levels recommended for your home’s climate, will cut bills, and improve comfort.
- **Have you ever noticed mold in your home?**
Visible mold likely means humidity levels need to be better addressed or indicates a potential leak or water damage.
- **Are your windows caulked and doors weather-stripped?**
These relatively simple fixes reduce air leaks and help maintain indoor temperature levels.
- **Are your appliances ENERGY STAR® rated?**
ENERGY STAR appliances are energy efficient and help you save money.
- **Do you know if your home’s heating and cooling systems include proper levels of ventilation?**
Effective ventilation is important for both health and safety. Ventilation, along with frequently replaced air filters, can help make sure your home is bringing in fresh air as needed, and keep out pollutants when outdoor air quality is poor due to ozone, fire, or other factors.

GET started

FIND A QUALIFIED CONTRACTOR:

- Home Performance with ENERGY STAR® at ENERGYSTAR.gov/HomePerformance
- Building Performance Institute at bpi.org/locate-tool

U.S. DEPARTMENT OF ENERGY OFFICE OF ENERGY EFFICIENCY & RENEWABLE ENERGY BUILDING TECHNOLOGY OFFICE DOE/EIS-2349 ENERGY STAR

DOE’s Health + Home Performance Infographic reveals the link between efficiency and health – something everyone cares about. Efficiency programs and contractors can use the question-and-answer format to discover a homeowner’s needs.

The infographic is ideal for the “kitchen table” conversations where people decide what to do – and who they want to do it. It also has links for homeowners to find a qualified contractor if they do not already have one.

[Download](#) this infographic from DOE’s Better Buildings Residential Network.

Looking for photos to help tell your energy efficiency story? Visit our image libraries: <https://www.energy.gov/eere/better-buildings-residential-network/articles/image-libraries>

Thank You!

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[Better Buildings LinkedIn](#)



[Office of Energy Efficiency and Renewable Energy Facebook](#)

Please send any follow-up questions
or future call topic ideas to:
bbresidentialnetwork@ee.doe.gov