



Pennsylvania IRA Bootcamp

Assessing Portfolio Energy Use & Opportunities to Reduce GHG Emissions

July 30, 2024

AGENDA

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Bootcamp Updates

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**Assessing Portfolio Energy Use &
Prioritizing Properties**

3

**Key Components in Reducing GHG
Emissions**

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**Energy Efficiency & Electrification
in Practice**



BOOTCAMP UPDATES

- Meeting invites for all upcoming Bootcamp webinars have been sent to participants.
- Email Madeleine at mmccullough@nhtinc.org to add staff to the participant list.
- PHFA has released the [Draft 2025-2026 QAP](#). Public comments will be accepted through August 22nd.
- Don't forget to complete the post-session survey!

BOOTCAMP WEBPAGE



Housing Alliance
of Pennsylvania

ABOUTGET HELP

ABOUTOUR WORKRESOURCESEVENTSLATEST NEWSGET INVOLVED

Become a member



Pennsylvania IRA Bootcamp

Resources Archive

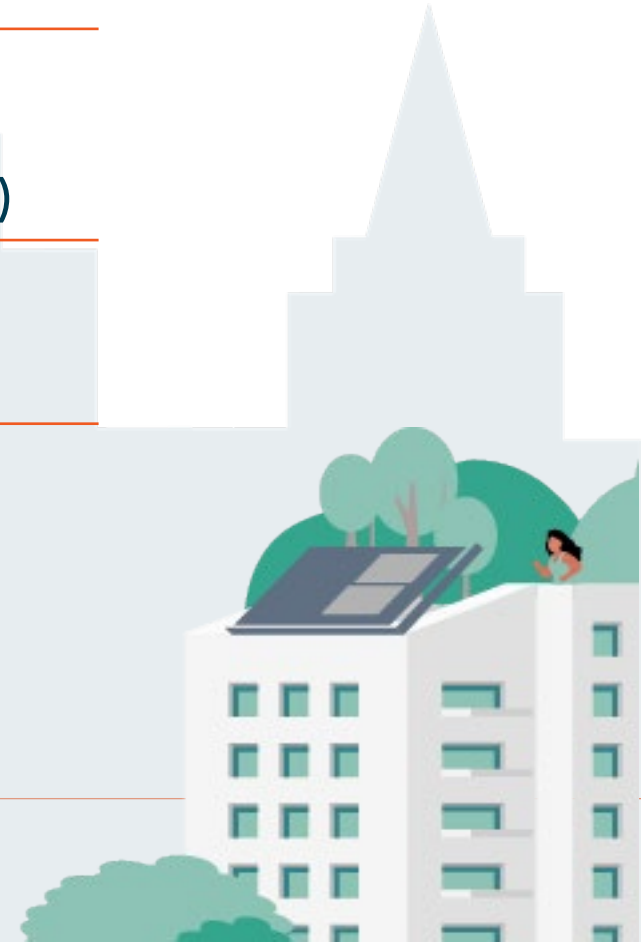
This is the resources archive for the Pennsylvania Inflation Reduction Act (IRA) Bootcamp. Here, you can access recordings, slide decks, and other materials relevant to the bootcamp meetings. The resources on this page are grouped by meeting date. For more information about this page and its resources, contact christina@housingalliancepa.org.

<https://housingalliancepa.org/pennsylvania-ira-bootcamp/>



UPCOMING SESSIONS

August 13th 10-11am	Deep Dive into Pennsylvania IRA Programs: DOE Rebates & Solar for All
August 15th 10-11am	Role of Financing in Advancing Affordable Housing Decarbonization (GGRF's National Clean Investment Fund and Clean Communities Investment Accelerator)
August 27th 10-11am	Putting it All Together
September TBD	In-person Gathering



ASSESSING YOUR PORTFOLIO'S ENERGY USE

Joy Ward

Senior Associate, Energy &
Sustainability

Stewards of Affordable Housing
for the Future (SAHF)





SAHF Carbon Tools

Free Tools to Support Decarbonization in Multifamily Affordable Housing
Stewards of Affordable Housing for the Future



contact@sahfnet.org

SAHF by the Numbers



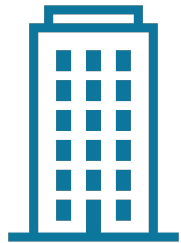
230,000+

People Served by SAHF Members



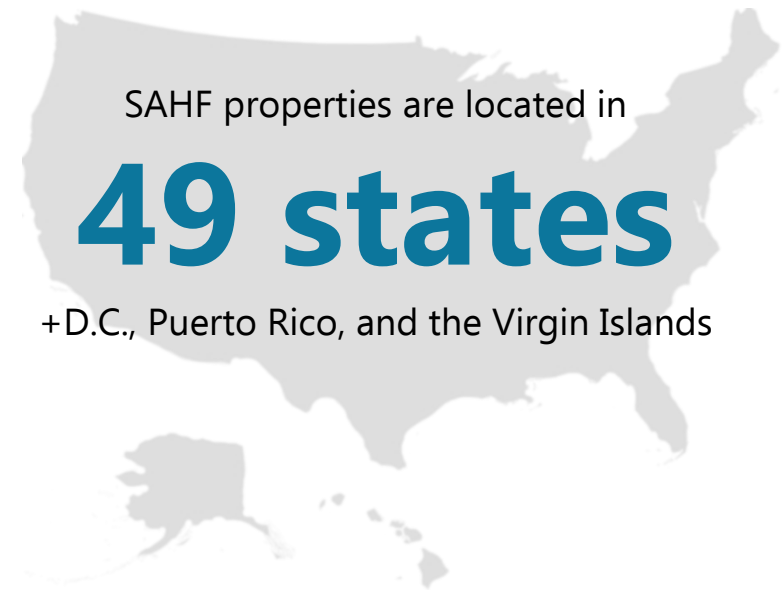
12

Non-Profit
Housing Providers



150,000+

Rental Homes for Families, Seniors,
and Special Needs Populations



SAHF properties are located in

49 states

+D.C., Puerto Rico, and the Virgin Islands



2,000+

Multifamily Properties
Across the U.S.

SAHF Initiative: The Big Reach

- SAHF members demonstrated that portfolio-wide energy and water reductions can be achieved and measured.
- We are now looking towards including carbon measurement and reduction.



Building Performance Standards

- First comes **energy & water benchmarking**, then comes **building performance standards**
- Federal Definition: *A Building Performance Standard (BPS) is an outcome-based policy and law aimed at reducing the carbon impact of the built environment by requiring existing buildings to meet energy- or GHG emissions-based performance targets.*
- National Building Performance Standards Coalition: launched by the Biden administration, this nationwide group of **state and local governments** are committed to inclusively design and **implement building performance policies and programs**

The State of Building Performance Standards (BPS) in the U.S.
Members of the National BPS Coalition as of November 2023





SAHF Carbon Tools

SAHF Carbon Calculator: What We're Calculating

- Quantifies annual Scope 1 Direct and Scope 2 Indirect carbon emissions from property-level energy and water data
- Provides annual carbon emissions for 2016 through 2022
- Allows for the import of ENERGY STAR Portfolio Manager data
- Aligns with the [DOE Better Climate Challenge](#) baseline calculation protocols

Typical Tool User

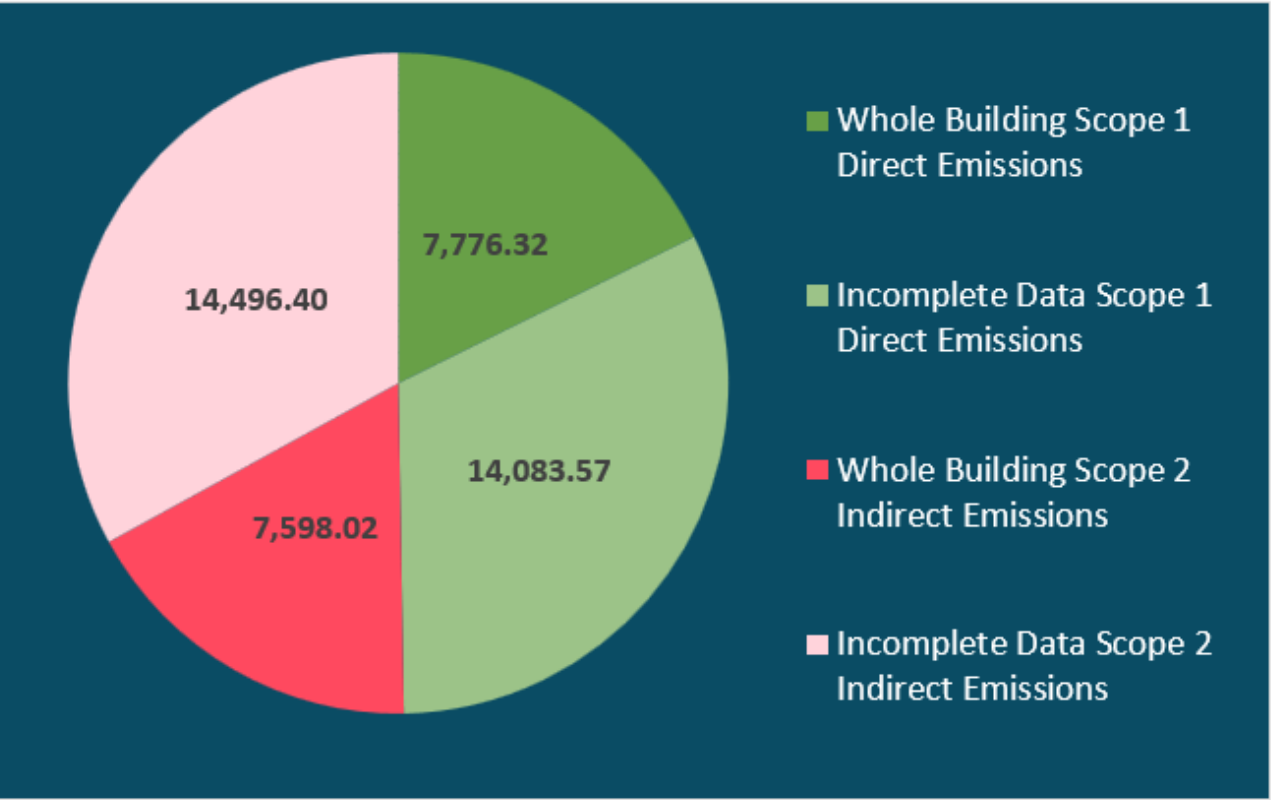
- Large, diverse portfolios
 - 20+ Properties
- Some properties are missing energy data
 - Resident utilities
 - Renewable energy assets
- Fuels and renewable energy recorded separately
 - Rooftop solar
 - Fleet vehicles
 - Fuel for generators, landscaping, etc.



Better Climate Challenge Report

Portfolio Owner	
Annual Carbon Emissions Year	2019
Date of Carbon Emissions Calculation	6/4/2024
Total carbon emissions (Metric Tons CO ₂ ,eq)	43,954.3
Scope 1 Direct carbon emissions (Metric Tons CO ₂ ,eq)	21,859.9
Scope 2 carbon emissions (Metric Tons CO ₂ ,eq)	22,094.4
GHG Emissions Intensity (kg CO ₂ ,eq/ft ²)	4.8
Total Square Footage Used In Calculation (ft ²)	9,222,185.0

Scope 1 & 2 Emissions: Building Data



Whole Building Scope 1 Direct Emissions	7,776.32
Incomplete Data Scope 1 Direct Emissions	14,083.57
Whole Building Scope 2 Indirect Emissions	7,598.02
Incomplete Data Scope 2 Indirect Emissions	14,496.40

Property Level Information

The information below provides property-level information for properties that have whole building data. The properties are listed from lowest carbon intensity (kg CO₂ per square foot) to highest.

Whole Building Property Name	ZIP	State	CO2 Emissions Intensity
	60653,	IL	9.418038572
	02130,		2.923765348
	20011,	DC	1.81228884
	02113,		4.204021857
	01930,	MA	3.242655606
	02111,		3.207176787
	02132,		4.653198658
	02132,		2.350080035
	60615,	IL	5.361951661
	01085,	MA	2.077959002
	02038,		2.632375751
	01775,	MA	2.579080222
	20020,	DC	4.035236727

An aerial photograph of a modern, multi-story apartment building. The building features a mix of dark brown, white, and light green exterior panels. The roof is covered with a large array of solar panels, and a section of the roof is landscaped with a variety of colorful plants. In the background, there is a parking lot with a few cars, a street with a white car, and a building under construction with visible steel framing. The overall scene depicts a sustainable and modern urban housing development.

SAHF Roadmap – Overview

SAHF Roadmap



GOAL: Free tool for the affordable multifamily housing sector to create high-level plans to achieve a time-bound measurable goal, like the DOE Better Climate Challenge.

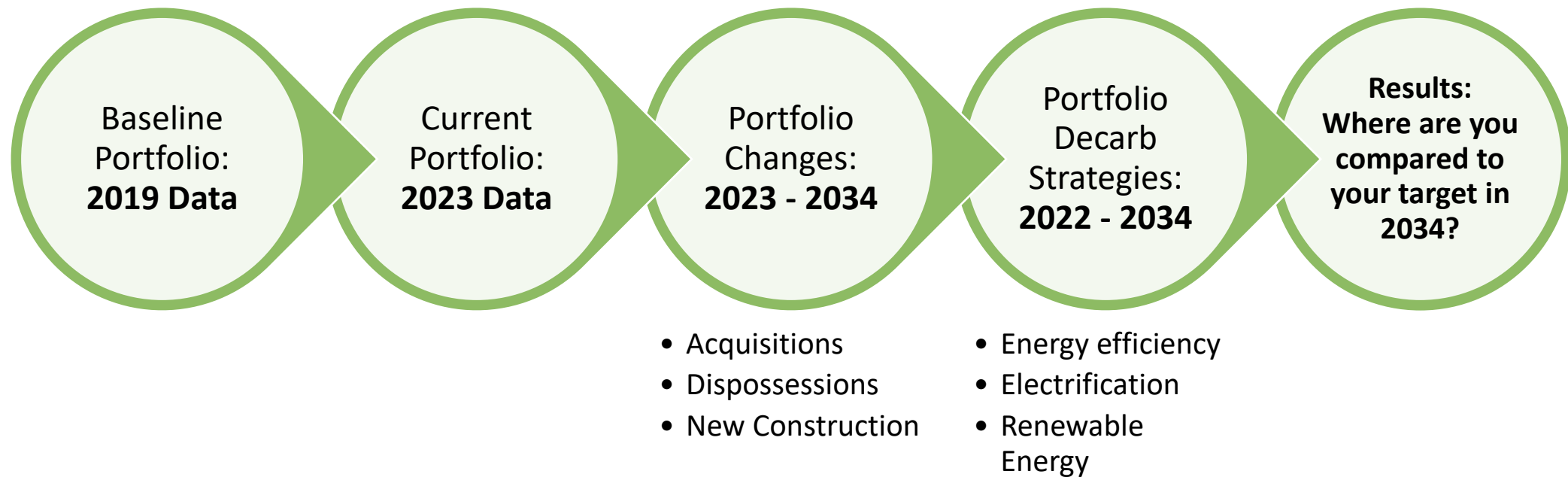
What it is:

- Scenario planning
- Tool to understand progress
- User friendly for those familiar with carbon emissions

What it is not:

- GHG Protocol reporting tool
- Property-level planning tool
- Substitution for technical experts

SAHF Roadmap: What we're Calculating



Ideas for Prioritization



- Where to comply with building performance standards (and not)?
- Where going through recapitalization (and not)?
- Rehab in the last ten years (more than 10+ or less than 10+)
- Year Built
- Location (State)
- From a financial lens
- HUD assistance

Decarbonization Strategy + New Construction Work Plan

#	Decarbonization Strategy	Strategy Savings Adjustment (Optional)	Portfolio Segment	% of Segment
1	Deep efficiency retrofits			
2	Moderate efficiency retrofits			
3	Light efficiency retrofits			
4	Moderate efficiency retrofits			
5	Deep efficiency retrofits			
6	Hybrid heat pump DHW			
7	Heat pump DHW			
8	Hybrid heat pump space heating			
9	Heat pump space heating			
10	On-site solar			
11	Offsite emissions reductions (RECs, solar)			
12				

New Construction Work Plan

Baseline Energy Code	2018 IECC/ASHRAE 90.1-2016	
# of New Construction Units	8330.44	
Average New Unit Size (sf)	750	
Average Unit Size of Existing Portfolio (sf)	1101	

Energy Standard	All Electric	% of Expected New Construction Units
1 Baseline Code		
2 Baseline Code w/ Solar		
3 15% better than code	No	100%
4 15% better than code w/ Solar		
5 50% better than code		
6 50% better than code w/ Solar		
Total		100%

Property lists by segment and decarbonization strategy

PROPERTY LIST 1

Segment: Yes CEJST/Low-Rise (up to 4 stories with hallways)

Strategy: Deep efficiency retrofits [Roadmap #1]

	Percent of Segment Targeted: 50%								
	Total of Selected Properties →				Total units: 6%				
Select	Property Name	State	Zip	Number of Units	% of Units in Segment	Estimated Annual Energy Cost	Annual Site Energy Use Intensity (kBtu/sf)	% of Segment Energy Use	Annual Carbon Emissions Intensity (kgCO2e/sf)
YES		IL	60612	81	2%	\$87,270	44.7	2%	5.97
YES		MA	02121	38	1%	\$44,202	72.9	1%	4.19
YES		IL	60653	96	3%	\$286,600	66.5	7%	7.19
		IL	60653	163	4%	\$61,388	42.5	4%	2.51
		MA	02118	146	4%				0.00
		MA	01841	35	1%	\$92,492	50.4	1%	3.62
		RI	02920	51	1%	\$129,665	50.4	1%	3.62
		MA	01030	70	2%	\$96,681	55.5	2%	3.34

Thank you!

Joy Ward

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KEY COMPONENTS IN REDUCING GHG EMISSIONS

Joshua Galloway

Director of Green Building
Services

New Ecology, Inc.





July 30, 2024

Pennsylvania IRA Bootcamp





New Ecology works nationally to bring the benefits of sustainable development to the community level, with a concerted emphasis on underserved populations.

A mission-driven non-profit, we seek to make the built environment more efficient, healthy, durable, and resilient.

CORE WORK in Buildings:

- Research & Test
- Monitor & Diagnose
- Implement & Solve
- Certify & Verify
- Train & Share

“Energy Efficiency” vs “Decarbonization”

“Energy Efficiency”

- Responds to slow, incremental improvements in building codes
- Piecemeal
- Repairs dated building components
- Upgrades dated equipment with 1:1 replacement

“Decarbonization”

- Responds to need to rapidly change the way buildings use energy
- Systematic
- Re-engineers the design intent of the building and its systems
- Enables electrification of equipment and elimination of on-site emissions

	“Energy Efficiency”	“Decarbonization”
Roof	Insulate to current code	Insulate to ‘net zero energy’ levels; make solar ready (if applicable)
Walls	Within existing cavity	Considers continuous interior or exterior insulation
Basement	Rarely addressed	Rim joists, first floor framing, foundation walls, interior or exterior, moisture management is required
Windows	Double-paned	High-performance (low-e), double or triple-paned
Air Sealing	Plumbing, mechanical and electrical penetrations, door & window seals	Integration of Continuous Air Barrier; Rim joists – floors to walls on every level

	“Energy Efficiency”	“Decarbonization”
Heating	Replace with like – often retains gas system with efficiency gains	Electrify or plan for electrification – e.g., retain hydronics and replace boiler with heat pumps later; <u>avoid</u> distributed refrigerant systems
Air Conditioning	Meets minimum requirements or tenant choice; often least cost, inefficient window units	High-efficiency, Inverter-based heat pump systems; ENERGY STAR certified; possible incorporation into central systems
Ventilation	Exhaust only (if any)	Balanced, energy recovery ventilators
Domestic Hot Water	Replace with like – often retains gas	Electrify or plan for electrification - Heat Pump Water Heaters (central systems)
Water	Can be overlooked, poorly specified	Water Sense Standards, MAP tested toilets
Resiliency	Rarely addressed	Evaluate threats using existing tools; incorporate into recommendations, e.g., equipment placement, solar + storage, dehumidification systems
Operations	Facility staff training rarely addressed, or addressed by installing contractor, once	Initial, recorded training for facility staff on new equipment by manufacturer; integrate new equipment into Preventative Maintenance activities

Zero-Over-Time

A systematic, phased approach to Decarbonization

- *Short-term*

Weatherization

Lighting Upgrades

- *Mid-term*

Heat Pumps for Domestic Hot Water

Add or improve ventilation with Energy Recovery

Ventilation

Renewable Energy

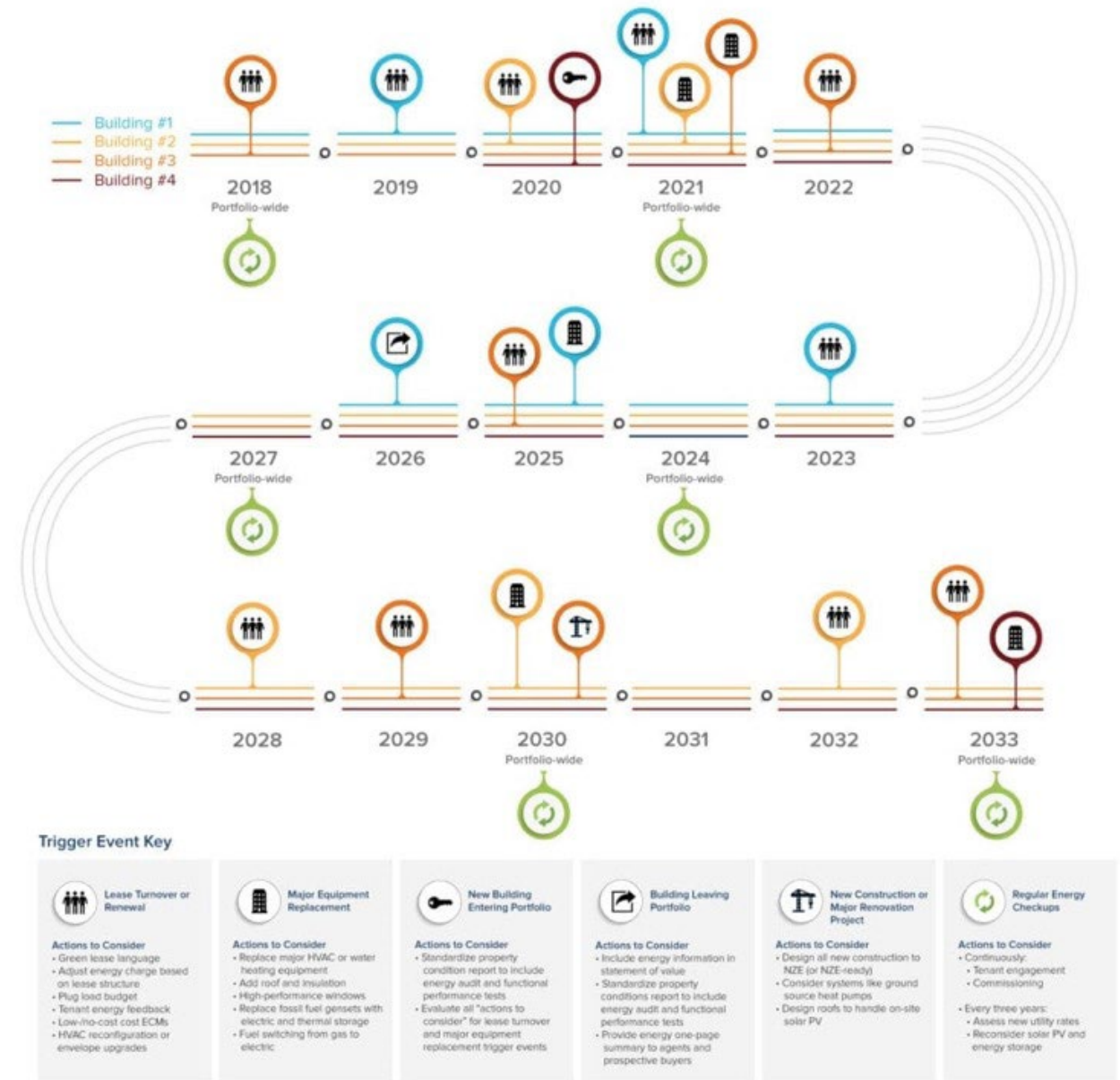
- *Long-term*

Replace Windows

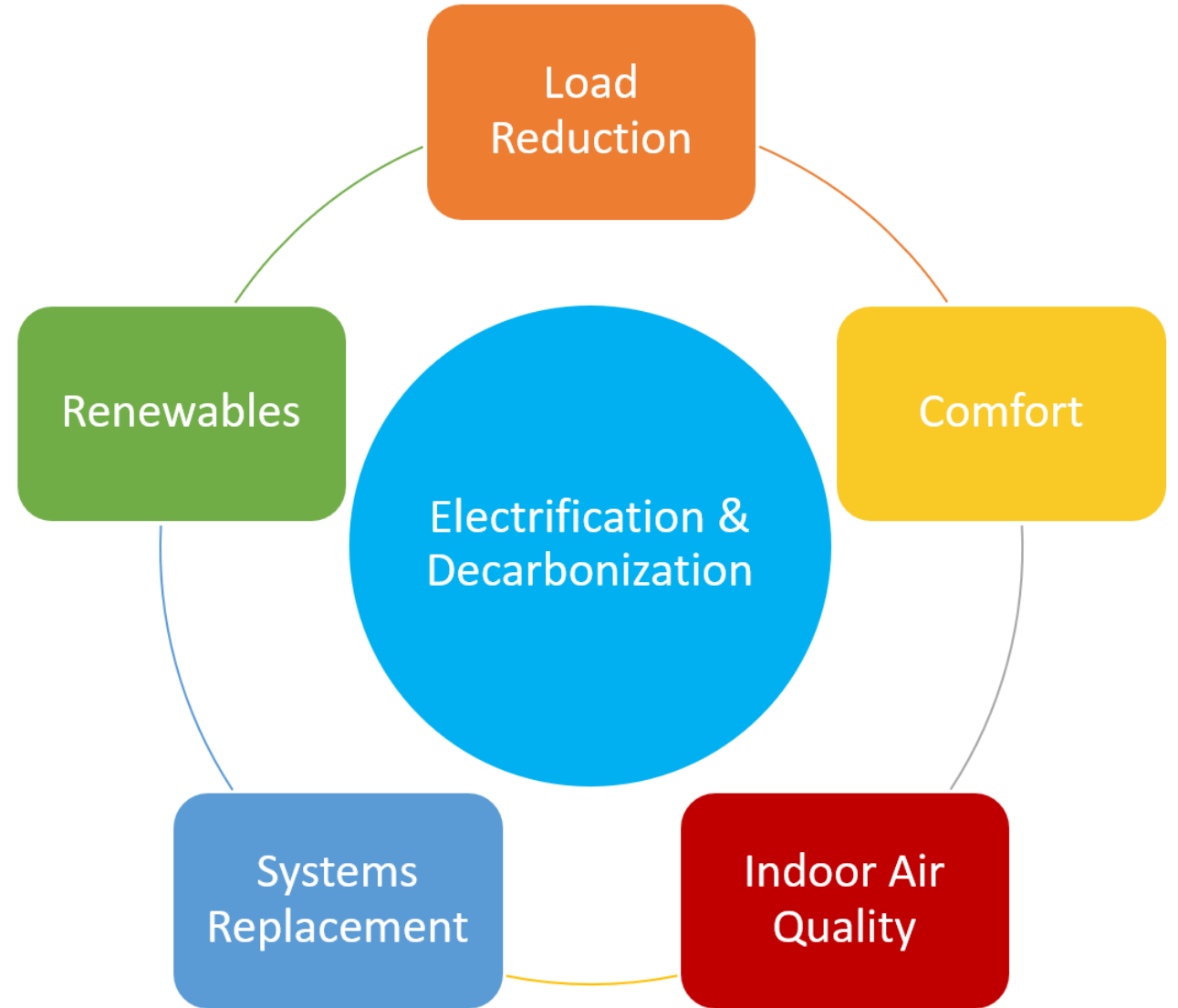
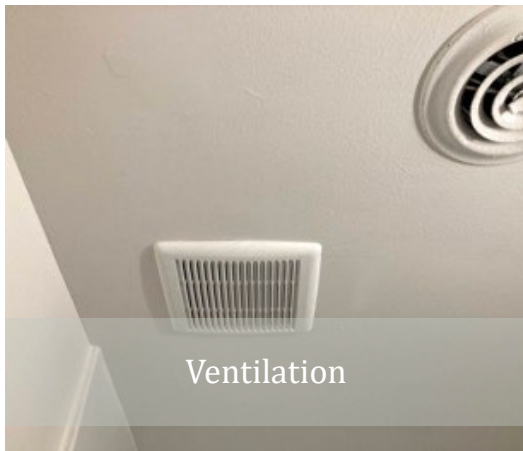
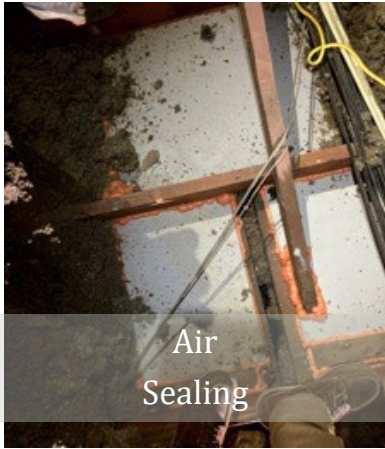
Overhaul Envelope

Heat Pumps for Space Conditioning

Renewable Energy

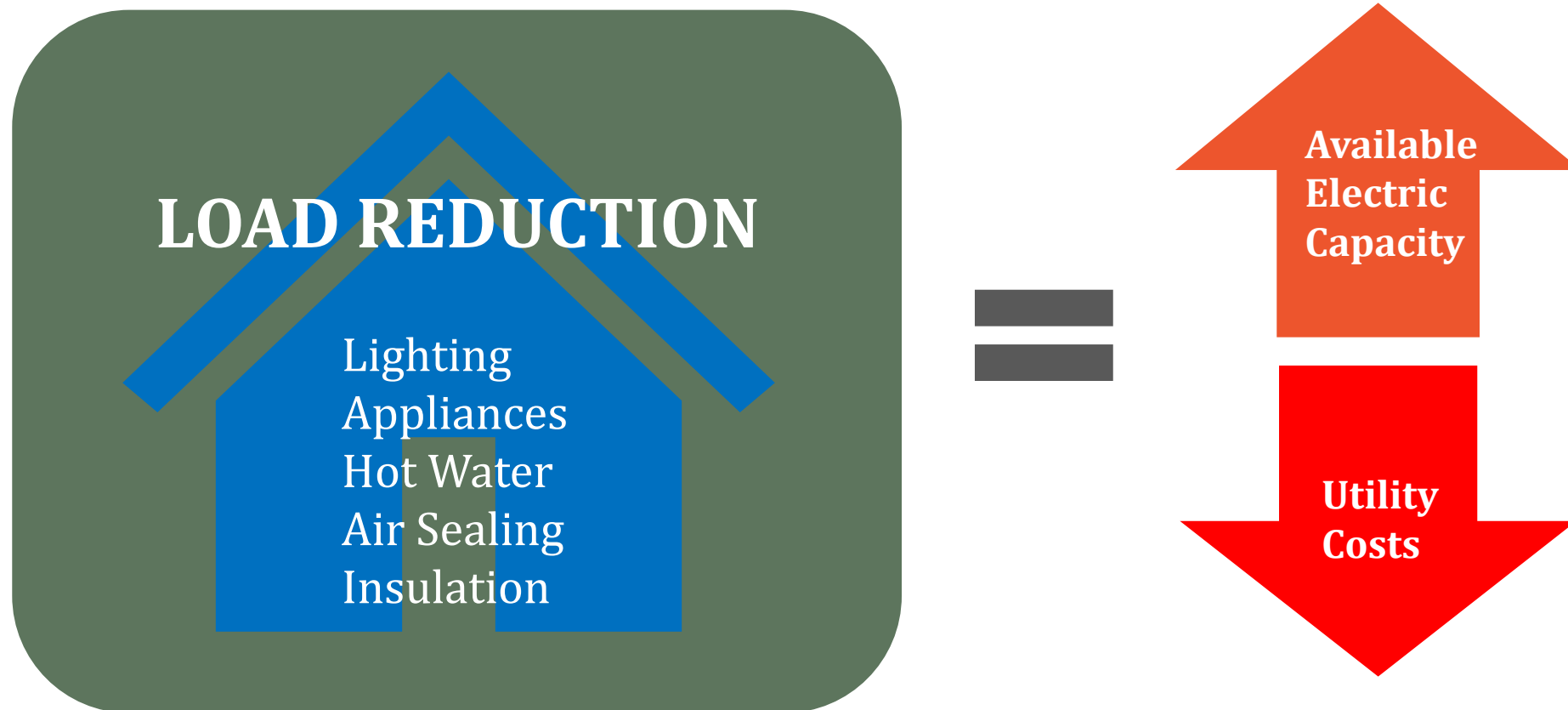


IRA Bootcamp



Load Reduction (Co-Benefit - Resident Comfort)

Reduce the building's electrical usage in order to reduce utility costs and efficiently utilize the building's current electrical capacity.





Resilience

- *Adapt to Change*
- *Durable, Comfortable Buildings*
(Passive Survivability)
- *Resilience Hub*
- *Emergency Plan and Education*



Asher Apartments, Austin, TX

ENERGY EFFICIENCY & ELECTRIFICATION IN PRACTICE

Sarah Ralich

Senior Energy and Construction Manager

ACTION-Housing, Inc.



**ACTION
HOUSING ^{INC}**

Sarah Ralich

Senior Energy & Construction Manager

ACTION-Housing is a nonprofit affordable housing developer, owner and manager in Western Pennsylvania.
We are Pennsylvania's largest weatherization provider.
We also run the Whole Home Repair program in SWPA



Uptown Lofts- North



New Construction, Passive House Certified

Building Renovation and Energy Retrofit



McKeesport Downtown Housing, McKeesport, PA

Prioritizing Buildings

Why and How

- Portfolio Analysis
 - Benchmarking
 - Asset Management Inspections
 - Interviews with Property Management
 - Failing Systems
- After you do your portfolio analysis, what comes next?
 - Understanding different levels of retrofit and their costs
 - Piecing together your capital stack
 - Smaller retrofits like lighting are commonly paid from replacement reserves
 - Larger projects are more complex and may result in a need for refinance

Case Study Examples

- Utility Lighting Replacement- (2024)
 - Replace all lighting to LED, common areas and in units.
 - Total \$26,810, \$320/ unit
 - Utility rebate \$\$12,868.81
 - Approx 5,000 kWh/3.9 tons CO2 savings per year
- Multifamily Weatherization Project (2017)
 - Clean and tune in unit furnaces, upgrade building ventilation, lighting retrofit.
 - Total \$133,751, Approx \$2,000/ unit
 - WAP program paid \$86,938
- HVAC Replacement- Gas Boilers to All Electric Heat Pumps (2024)
 - Total \$350,000, \$15,000/ unit
 - Rebates, incentives, TBD, local funding
- Full Energy Efficiency/Decarbonization Retrofit, Goal to Achieve Net Zero (2024)
 - Estimated Total (for just EE+DC scope) \$15,000,000, \$145,631/unit
 - Rebates, incentives, TBD, Refinance with LIHTC
 - Approx 333 tons CO2 savings/year

Planning for a Project- Crafton Towers

- 2nd highest EUI of the portfolio
- Once of our oldest properties- deferred maintenance issues
 - Capital needs identified- plumbing & HVAC issues, etc.
 - Good candidate for a refinance.

Energy Model ➡ Feasibility Study ➡ GRRP Application ➡ Secure Other Sources



Planning for a non-refi retrofits

- Refinancing a building is a heavy lift for property owners.
- We are eager to understand how the various IRA programs and funding sources will work together to create feasible funding sources for retrofits.
- We are optimistic about using IRA funding sources for non-refi smaller scope retrofits.
- We need to balance program savings targets and underwriting requirements with costs of the measures.
- In anticipation of GGRF loan products and State rebate programs to be released, I am focusing on working with my staff to understand the financial situation of each property and use that along with the utility analysis to select eligible properties for retrofit.
 - Can the property take on debt?
 - Replacement reserves

RESOURCE GUIDE

- [NHT's IRA Bootcamp Toolkit](#)
- [PA Department of Environmental Protection IRA Homepage](#)
- [PHFA Newsletter](#)
- [PA's Multifamily Weatherization Assistance Program](#)
- [PA Low-Income Energy Efficiency Programs](#)
 - [PPL Electric](#)
 - [FirstEnergy \(MetEd, Penelec, Penn Power, West Penn Power\)](#)
 - [Duquesne Light Company](#)
 - [PECO Electric](#)
 - [UGI Electric](#)
- [Gearing Up for the IRA Cash Influx Webinar Recording](#)