2022 ACEEE
Summer Study

Making Naturally Occurring Affordable Housing More Efficient: Outreach to Upgrade

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.

THIS IS MANIFESTED IN OUR CORE WORK TO:

- Research, test and implement new approaches to sustainability, resiliency, healthy environments and energy efficiency;
- Monitor, test, diagnose and solve operational and building performance issues on existing buildings;
- Help design, build, certify and operate new high performance buildings;
- Share our learnings with building professionals, contractors, government, financiers, owners and managers through education and training.

NEW ECOLOGY

Community-Based Sustainable Development

Elevate is a mission driven national non-profit that seeks to create a just and equitable world in which everyone has clean and affordable heat, power, and water in their homes and communities — no matter who they are or where they live.

This is exemplified by our impact statement

- By 2024 Elevate will have improved the lives of over a million people and made the properties they use healthier and more efficient. In the process we will have saved 250,000 metric tons of CO_2 and reinvest over $100M back into the communities where we live, work and play.

- We will be innovative partners in a just transition to more resilient cities, communities and households. We will support a transition which delivers environmental justice, increases health, and builds equity and intergenerational wealth while combating climate change and preparing
for its effects.

ELEVATE

Equity through climate action

Presentation Outline

1. What is NOAH?
2. Need for Upgrade and Preservation
3. Program Design and Delivery
4. Program Costs to Upgrade
5. Recommendations and Conclusions

NEW ECOLOGY
Community-Based Sustainable Development

ELEVATE

What is NOAH?

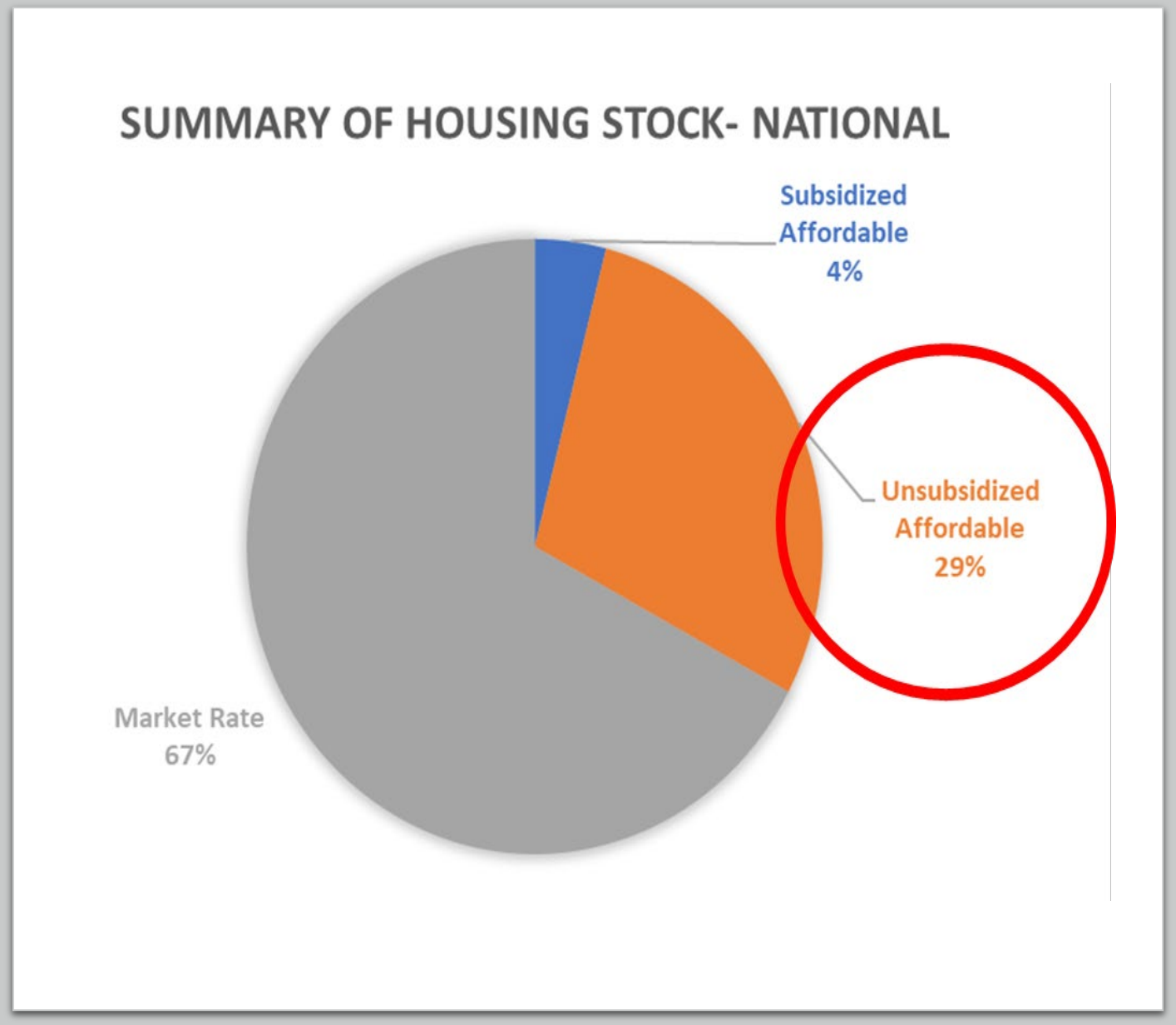
- Non-rent restricted or unsubsidized affordable housing often referred to a workforce housing
- Occupied by residents at or below 80% of area median income although this can vary by location
- Includes both single family and multifamily

NEW ECOLOGY
Community-Based Sustainable Development

ELEVATE

Why NOAH?

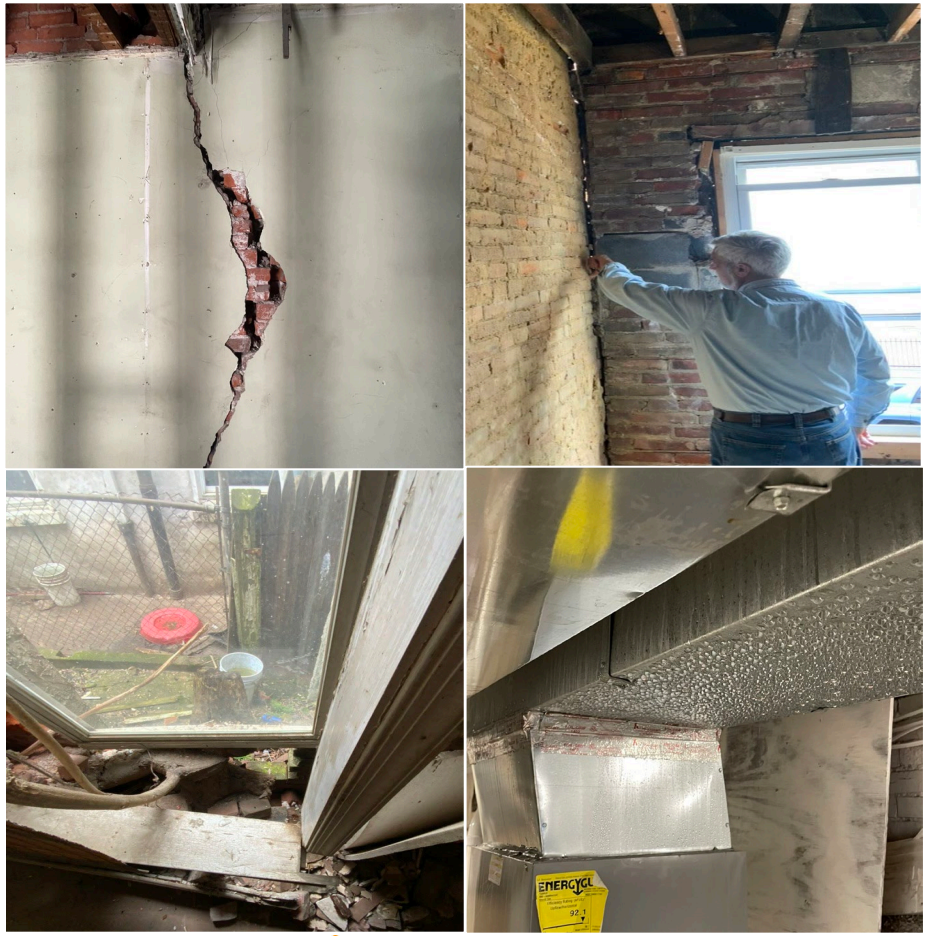
- Housing Resilience
  - 40% of rental properties need upgrades
- Equity
  - 46% of renters pay more than 30% of their income for housing and utilities
- Climate change
  - Affordable housing consumes 39% more energy per square foot than market rate housing
- Access
  - NOAH stock is mainly owned and managed by small businesses with little time, capital, or support

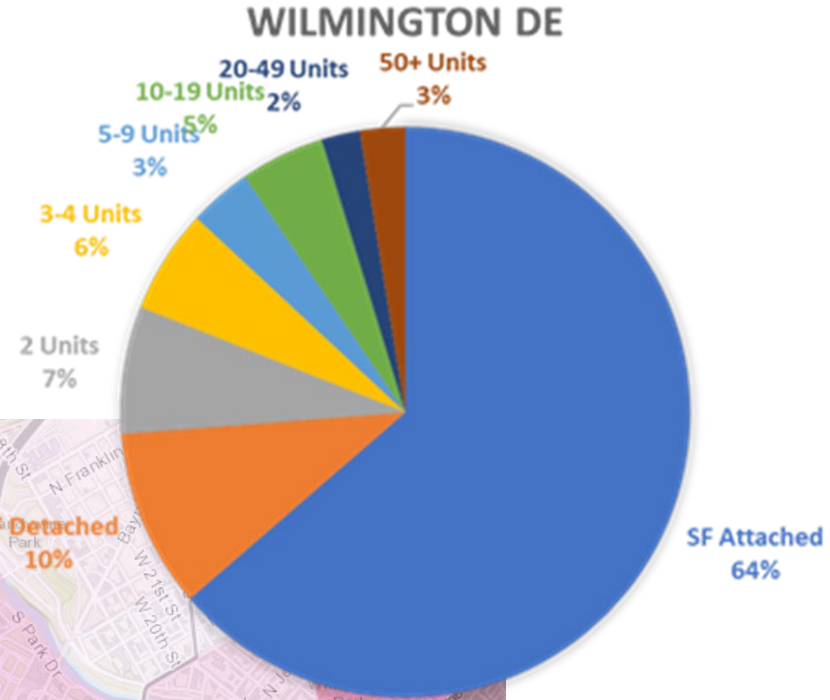


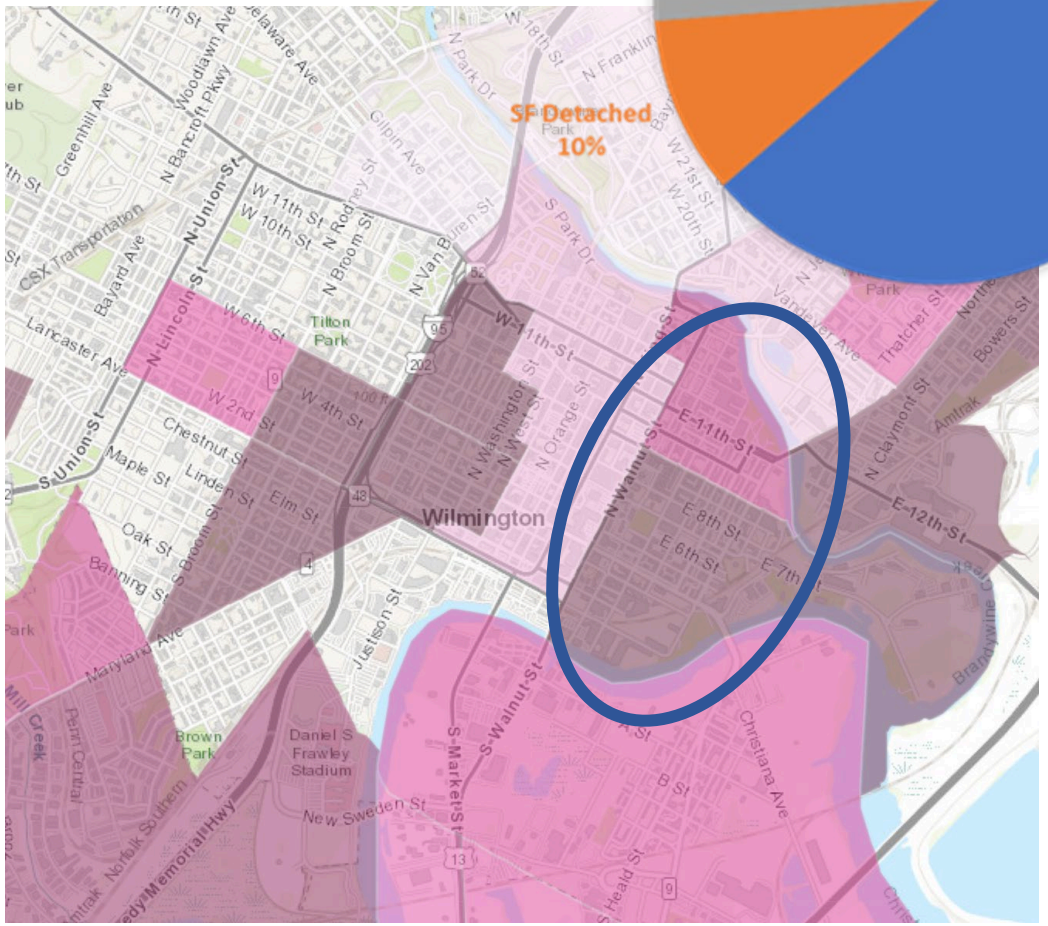
NEW ECOLOGY
Community-Based Sustainable Development

ELEVATE

Wilmington, DE



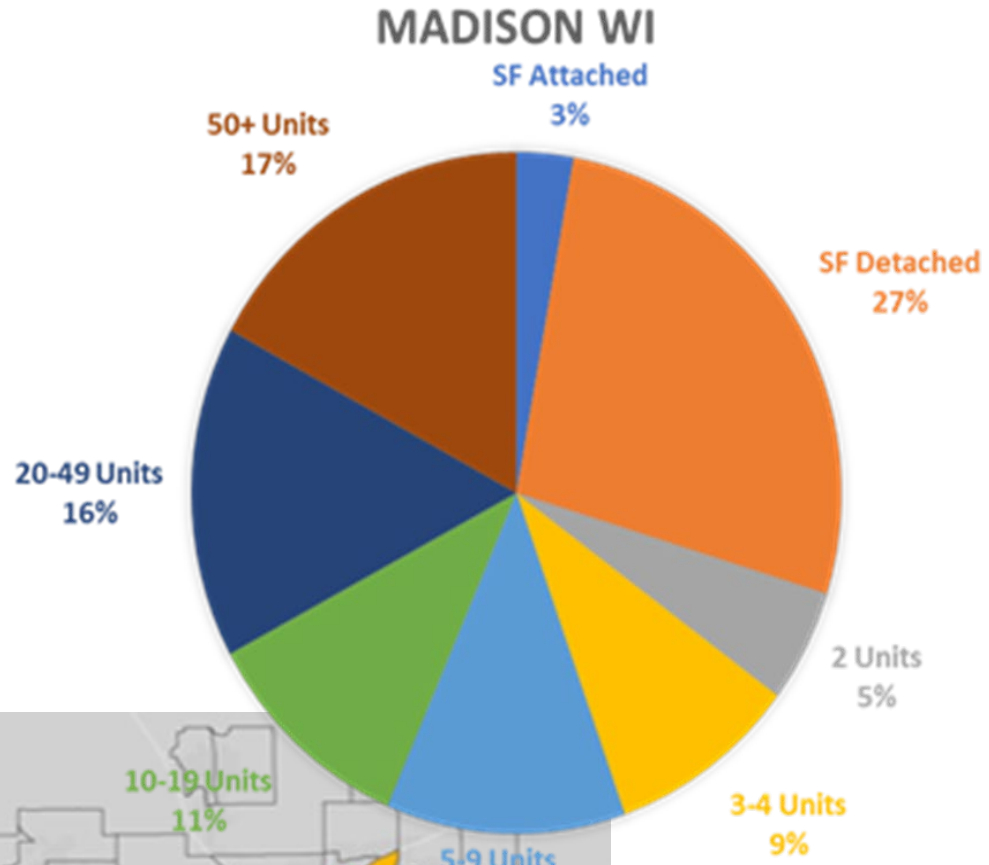


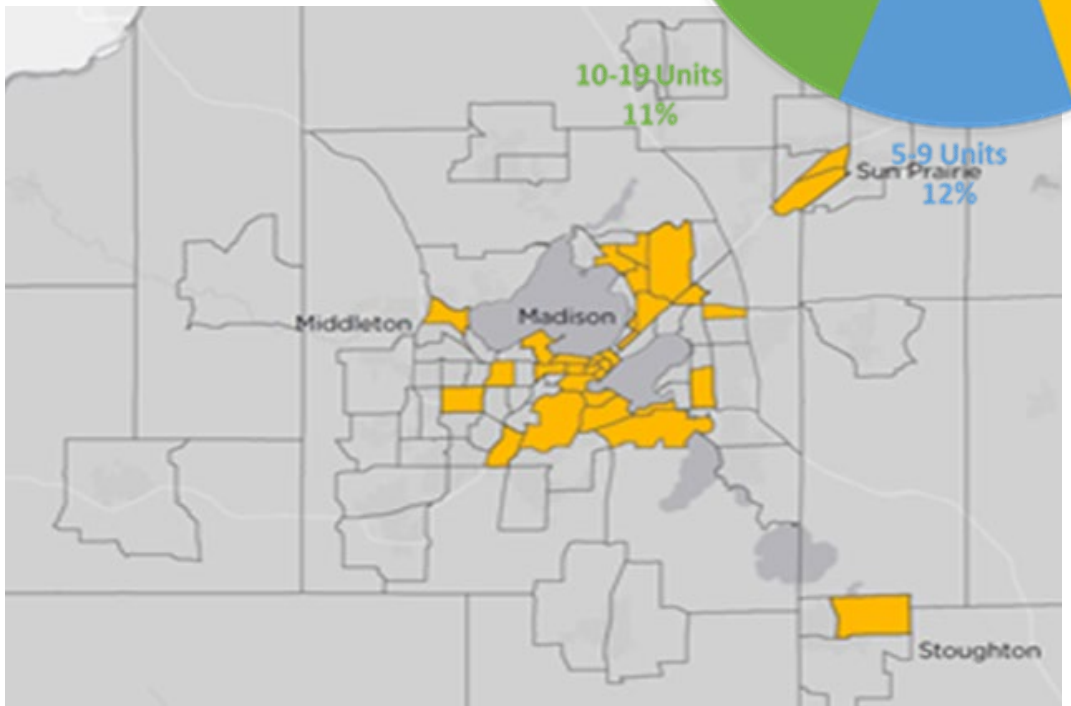


NEW ECOLOGY
Community-Based Sustainable Development

ELEVATE

Madison, WI





NEW ECOLOGY
Community-Based Sustainable Development

ELEVATE

Wilmington DE, Program Design

- Market research, project visits, interviews with owners / developers, contractors, architects, city and state housing agencies
- Join and align efforts with community-based coalitions
- Complement on-going housing stabilization and neighborhood revitalization
- Homes to be all-electric with operating cost ≤ those with gas
- 36 rowhomes: 17 new const; 19 rehabs; 12 rental; 24 ownership
- Support from early design through construction completion
- Secure additional grants to leverage public and private investment

Climate Smart Homes

cinnaire SOLUTIONS

ENERGIZE DELAWARE EMPOWERMENT GRANT

The Central Baptist COMMUNITY DEVELOPMENT CORPORATION

New Construction

- ENERGY STAR and ZERH certification
- Envelope:
  - *Continuous exterior wall insulation*
  - *Above the deck & roof cavity insulation*
  - *Above-code air tightness*
  - *ENERGY STAR Windows U = 0.25; SHGC = 0.23-0.36*
- HVAC:
  - *ASHP: ≥18 SEER; 10.5 HSPF; prefer ducted*
  - *Heat Pump Hot Water Heater: UEF ≥ 3.5*
  - *Energy Recovery Ventilation*
- Slab on grade (wherever possible)

ENERGY STAR

ZERO ENERGY READY HOME U.S. DEPARTMENT OF ENERGY

Gut Rehabilitations

- ENERGY STAR and ZERH protocols to extent practical
- Envelope:
  - *Continuous wall insulation*
  - *Above the deck & roof cavity insulation*
  - *Above-code air tightness*
  - *ENERGY STAR Windows U = 0.25; SHGC = 0.23-0.36*
- HVAC:
  - *ASHP: ≥18 SEER; 10.5 HSPF; prefer ducted*
  - *Heat Pump Hot Water Heater: UEF ≥ 3.5*
  - *Energy Recovery Ventilation*
- Foundation water proofing

WOODLAWN TRUSTEES

WILMINGTON Neighborhood Conservancy LAND BANK

Habitat for Humanity® of New Castle County

CSH Modeled Utility Cost and Performance

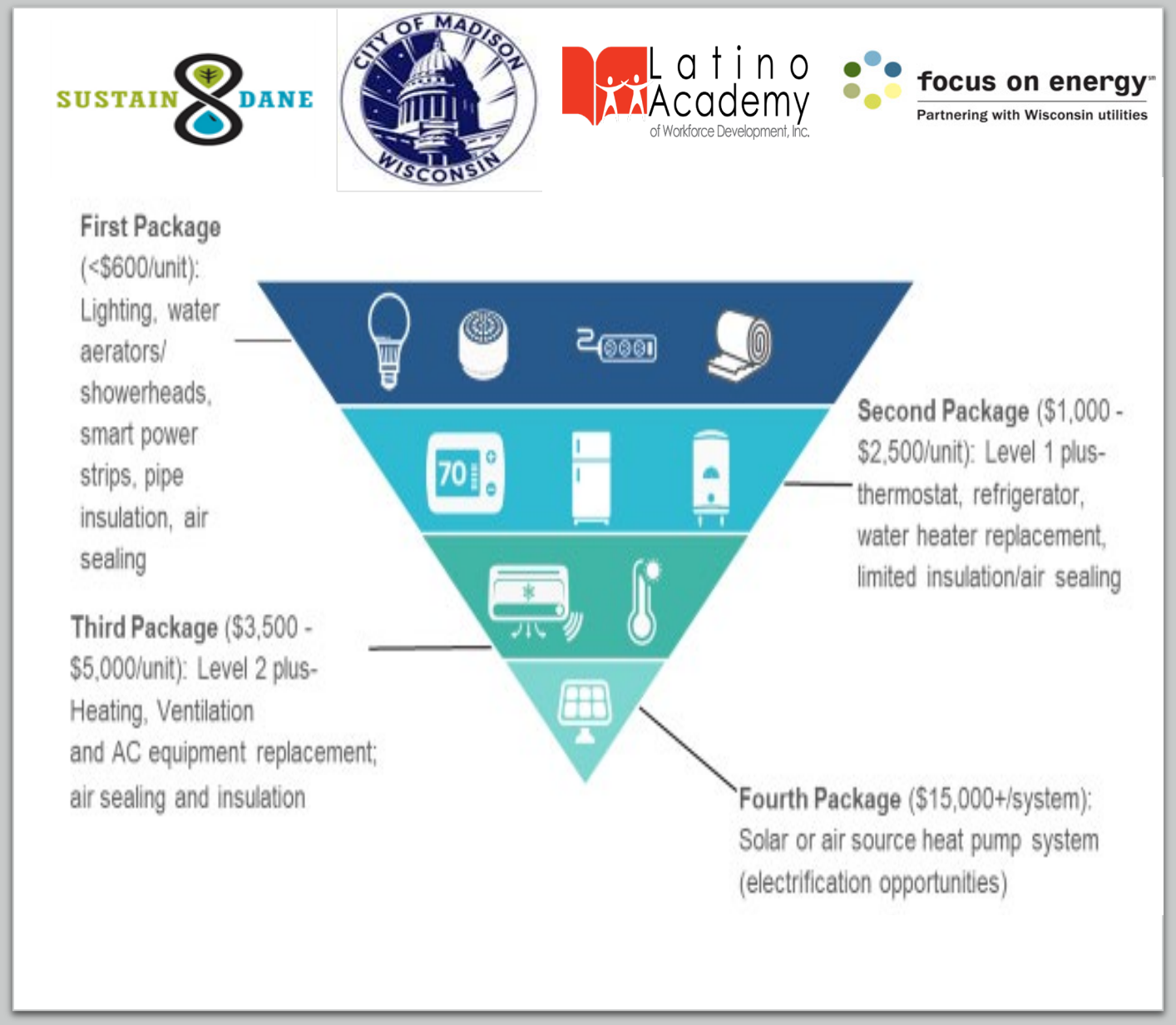
	Climate Smart Homes*	Code-Built Home w/ gas heat, DHW*
Annual Utility Costs	$1,500	
EUI (kBTU / SF / year)	25	62
Carbon emissions (kg of CO_2)	3,513	5,803

NEW ECOLOGY
Community-Based Sustainable Development

ELEVATE

Madison, WI Program Design

- Program development included a local landscape analysis and convening a multi-stakeholder advisory group
- One stop shop retrofit program- eligibility based on rent and census data
- 2+ rental units
- Close coordination with community-based organizations
- Closed pool of contractors
- Requires owners to commit to at least 3 years of maintain rent at fair market
- Expansion of the program includes a contractor accelerator and micro-loan developed to fill gaps in the market
- Program is scalable and is being replicated in several municipalities in WI, MI, and IL



Madison Modeled Utility Cost and Performance

Property	Square Footage	Units	Estimated Annual Energy Savings (kWh)	Estimated Annual Energy Savings (therms)	Estimated Annual Water Savings (kgal)	Total Cost	Estimated Focus on Energy Incentives	Average Tenant Utility Cost Savings	Owner Utility Annual Savings [2,3]	Owner Utility Cost Savings
1	12,756	8	8,014	2,102	25	$ 28,467	$4,236	20%	$3,017	19%
2	6,758	7	1,979	1,338	20	$ 16,759	$972	NC [4]	$1,177	15%
3	7,794	8	6,249	777	27	$ 14,974	$1,328	25%	$3,664	[3]

1: HVAC equipment replacement, refrigerator, air sealing, thermostats, pipe insulation, lighting, water heater replacement, smart power strips, water aerators/showerheads
2: Lighting, pipe insulation, thermostat, smart power strips, HVAC equipment replacement,
water heater replace
3: Lighting, Air conditioning, air sealing, pipe insulation, thermostat, smart power
strips, water aerators

NEW ECOLOGY
Community-Based Sustainable Development

ELEVATE

Program Delivery

Madison, WI

"The offer"	Pre-dev	Project funding coord	Construction	Close out
• Grant of $25,000+ per building	• Eligibility • Assessment • Bidding • Final design	• Incentives, Grants, Owner Capital/Loans	• Contractor/ coordination • Site visits • Testing/ troubleshooting	• Resident engagement • Utility bill assessment

Wilmington, DE

"The offer"	Pre-dev	Construction	Close out
• $17,000 to $21,000 per unit	• Plan and spec reviews • Energy modeling • Bidding • Final design	• Contractor coordination/ training • Site visits/ monitoring • Testing/ troubleshooting	• Resident education/ Green Guide • Performance monitoring for 2 years • Solicit resident feedback

Program delivery cost range from $2,500 per unit to $4,500 per unit

Program Cost to Upgrade

Retrofit Activity	Dane County estimated per unit cost	Wilmington estimated per unit cost
Energy and water efficiency	$2,500 to $5,000	$6,500 to $9,500
Electrification	$10,000 to $15,000	$5,500 to $7,500
Rooftop Solar	$7,500 to $10,000	$12,000
Basements / Moisture Management	Not available	$4,000
TOTAL Estimated per Unit without rooftop solar	$12,500 to $20,000	$17,000 to $21,000
TOTAL Estimate Per unit with rooftop solar	$20,000 to $30,000	$29,000 to $33,000

Design Recommendations

Outreach & Owner Engagement

- Access to grants and subsidy
- Connecting through trust partners
- Extended warranties and support for O&M
- Prioritize decarbonization
- Link with other housing programs (e.g. lead)

Preservation

- Preservation covenants in gentrifying markets

Access to financing & funding

- Workable financial products
- Program delivery

Wealth Building

- BIPOC contractor pool
- Homeownership

Resident engagement

- Address plug load
- Education for new equipment

Conclusions

Enact enabling policies that are aligned with NOAH ownership structure and achieves desired market outcomes

- Energy program costs versus housing program costs
- Allow upgrades through tax incremental financing
- Incorporate non-energy benefits
- Preservation covenants in heavily gentrifying markets
- Eliminate cost-effectiveness test

Create a market specific mix and deployment of financial incentives to implement as scale

- Access to significant subsidies that go beyond energy
- Support comprehensive program delivery
- Coordination with local financial institutions

Thank you!

Abigail Corso, P.E.
Chief Strategy Officer

Elevate Energy

Abigail.Corso@elevatenp.org

608-807-1093

pronouns: she/her

Pat Coleman
Director of Special Projects

New Ecology

coleman@newecology.org

302-300-4321 x7028

pronouns: he/him

Co-authors

John Viner
Elevate

Claire Oleksiak
Sustain Dane