How does resident-led design fit with deep sustainability goals?

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Learning Objectives

• Identify ways that the primary development goals for multi-family affordable housing align or conflict with deep sustainability goals.

• Use layman’s terms to describe testing protocols for PHIUS certification to clients and residents with no design or construction background.

• Analyze building envelope air tightness testing strategy options for multi-family housing development that lacks connecting interior circulation or common spaces.

• Apply the case study’s lessons to other nontraditional multi-family housing types to predict potential air tightness testing challenges.
Case Study Introduction & Affordable Housing in the U.S.
Case Study: Kindlewood Redevelopment
Design Team
Resident Advisory Committee
• Elevate the health and safety of residents and the planet
• Zero displacement of existing residents
• Resident-lead design
• Community support spaces
• Ladder of affordability
• Break generational cycles of poverty
Project History
Affordable Housing in the US

RENTAL HOMES AFFORDABLE AND AVAILABLE PER 100 EXTREMELY LOW INCOME RENTER HOUSEHOLDS BY STATE

Note: Extremely low income (ELI) renter households have incomes at or below the poverty level or 30% of the area median income. Source: NLIHC tabulations of 2019 ACS PUMS Data. ©2021 National Low Income Housing Coalition

https://nlihc.org/gap
Affordable Housing & Sustainable Construction

AFFORDABLE HOUSING

? 

SUSTAINABLE CONSTRUCTION
Resident-Led Design
Confusing & Misunderstood Terms

- Mini-split
- Heat pumps
- Prescriptive vs. Performance
- Envelope
- Passive House
- ERV
- Passive vs. Active Ventilation
- DOAS
- Electrification
- Low Flow
- Air Quality
- "Smart" vs. "Dumb"
Affordability vs. Sustainability: Alignments

• Lower Utility bills
• Compact & efficient floor plans
• Ecologically advantageous planting
• Central / semi-central systems
• Thermal comfort & improved indoor air quality
• Better moisture mitigation
• Equitable design & amenities
• Design of more resilient infrastructure & communities
Affordability vs. Sustainability: Conflicts

- Resident and staff education on advanced systems & appliances
- Higher first cost for systems
- More involved maintenance
- Resident desire for privacy & identity vs. jurisdictional desire for density & efficiency
- Perception of reduced safety in multi-family housing
- Gabled roofs
What is the “Missing Middle”? 
Stacked Townhome Building
Missing Middle Resources


Missingmiddlehousing.com
Phius Testing in “Missing Middle” Housing Types
Testing Traditional Elevator Buildings

- 2 BR
- 3 BR
- 1 BR
- 1 BR
- 2 BR
- 2 BR
- 2 BR
- 1 BR
- 2 BR
- 2 BR
- 2 BR
- 2 BR
- 2 BR

Phius Envelope
Air Flow
Testing Non-Traditional Buildings

Phius Envelope
Case Study Testing – Guarded Units

- Fan procurement
- Power challenges
- Trained staffing shortage
- Air balancing guarded units
- Results 26% above target
Cast Study Testing – Aerosol Envelope Sealing

• “Hail Mary” strategy
• Significant added cost
• Implemented too late in the project
• Enduring power challenges
• Results 100% above target
Case Study Testing – Communicating Openings

- Power challenges
- Communicating openings not sealed – new leak points?
- Testing eating into construction schedule
- Most air leakage observed at ceiling/attic (where detail not constructed as designed)
- **Results 9.5% above target**
Testing Non-Traditional Buildings
Lessons Learned
Strategy #1: Design it like a traditional townhouse
Strategy #2: Create temporary “doors” to connect units

Phius Envelope

Air Flow
Takeaways

- Review testing procedures in detail **BEFORE** construction
- Include testing & prep time in construction schedule
- Include testing **IN** your building design
- Communicate with your team
Thank You!