



ELEVATE

# Decarbonization Retrofits for Affordable Housing: A Chicago Case Study

August 22, 2022

ACEEE Summer Study

# About Elevate

- Elevate seeks to create a 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



# Elevate's Building Electrification Program

- Need to eliminate fossil fuel use in buildings to combat climate crisis
- People who rent, are older, and have lower incomes are more likely to:
  - Live in older buildings
  - Disproportionally experience effects of climate change
  - Be left behind in climate mitigation efforts
- Elevate's Building Electrification Program (BEP) meets this need

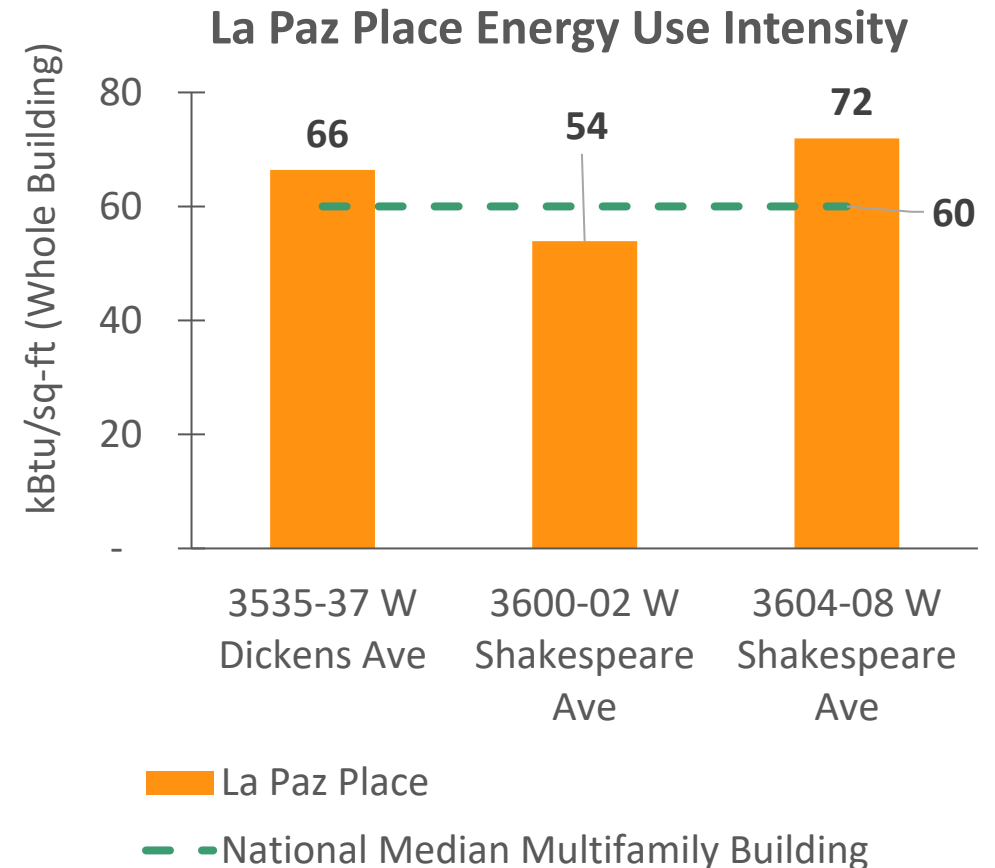


# Project Background: La Paz Place



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- 3-building property, 44 apartments
  - Primarily Latinx families
  - 31 affordable at 50% AMI (\$44,550)
  - 13 affordable at 30% AMI (\$26,730)
  - At least half using utility bill assistance programs (e.g., LIHEAP)
- Owned and operated by Bickerdike Redevelopment Corporation (BRC)
- Selected to participate in BEP



# Project Background: Project Team & Partners



# Assessment: Electrification Feasibility

- Technical/infrastructure
  - Replacement Timing
  - Equipment Options
  - Resident Impacts
- Bilingual resident engagement
  - Property-wide community meeting
  - Flyers
  - Door-knocking
  - Cash incentives



# Assessment - Retrofit Scope

End Use	Pre-Retrofit	Post-Retrofit	Resident or Owner Paid	Resident Experience Changes
Space Heating & Cooling	Individual gas furnaces & window AC units	Ducted cold-climate ASHPs	Resident	Central cooling & reduced costs
Domestic Hot Water	Central gas boiler	Heat pump water heaters	Owner	None
Cooking	Natural gas stoves	Non-induction electric stove	Resident	Gas to electric & improved IAQ
Clothes Dryers	Natural gas dryers in common area	Electric resistance dryers	Owner	None
Renewable Energy	None	70 kW solar PV array	Owner & select Residents	Select residents have solar



# Evaluation Approach

- Utility bill and carbon analysis (entire property)
  - What are the expected utility bill cost and carbon impacts of electrification without solar? And with solar?
- Pre- and post-retrofit monitoring (9 apartments)
  - What are the projected annual energy (kWh and therms) and carbon impacts for each end use (heating and cooling, water heating, and cooking)?
  - What is the utility cost impact of the electrification retrofit? What are the time-of-use impacts?
  - What are the indoor air quality implications of the electrification retrofit?

# Utility Bill and Carbon Analysis Results

## Utility Bill Annual Impacts (Modeled)

Utility Payer	<i>Pre-Retrofit Annual Energy Cost</i>	<i>Post-Retrofit Annual Energy Cost (no solar)</i>	<i>Post-Retrofit Annual Energy Cost (with solar)</i>	Percent Cost Savings
<b>Resident</b>	\$61,452	\$49,362	\$48,811	21%
<b>Common Areas</b>	\$14,253	\$21,034	\$13,692	4%
<b>Total</b>	\$75,705	\$70,396	\$62,504	17%

## Carbon Annual Impacts (Modeled)

Metric	<i>Pre-Retrofit Annual Carbon</i>	<i>Post-Retrofit Annual Carbon (no solar)</i>	<i>Post-Retrofit Annual Carbon (with solar)</i>	Percent Carbon Savings
<b>Total</b>	635,661 lbs CO <sub>2</sub>	400,977 lbs CO <sub>2</sub>	356,021 lbs CO <sub>2</sub>	44%

# Discussion: Project Status

- Completed
  - Fully electrified 22 apartments
  - Partial electrification of 44 apartments
- Next steps
  - Complete construction
  - Conduct resident interviews
  - Install post-retrofit monitoring
  - Data analysis after 1 year of post-retrofit data



# Discussion: Lessons Learned

- Successes
  - Holistic assessment approach
  - LIHEAP benefits
  - Utility cost shifts
  - Owner and resident engagement
- Challenges
  - Supply chain issues
  - New technology applications



# Discussion: Policy and Scaling

- LIHEAP benefits
  - Need for electrification LIHEAP transition assistance
- Utility rates
  - Need for electrification-specific design rates
- Cost of electrical upgrades
  - Need for federal programs bundling energy efficiency, electrification, and solar



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**ELEVATE**

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