

# Quantifying the Financial Benefits of Multifamily Retrofits

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## Quantifying the Financial Benefits of Multifamily Retrofits

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The laboratory and/or field sites used for this work are not certified rating test facilities. The conditions and methods under which products were characterized for this work differ from standard rating conditions, as described.

Because the methods and conditions differ, the reported results are not comparable to rated product performance and should only be used to estimate performance under the measured conditions.

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## Definitions

Cap Rate	Capitalization Rate
CIC	Community Investment Corporation
NAA	National Apartment Association
NOI	Net Operating Income
PARR	Partnership for Advanced Residential Retrofit
RHFS	Rental Housing Finance Survey

## Executive Summary

Increasing the adoption of energy-efficient building practices will require the energy sector to increase its understanding of the ways that retrofits affect multifamily financial performance and how the lending and appraisal industries interpret those indicators.

The U.S. Department of Energy's Building America research team Partnership for Advanced Residential Retrofit analyzed building, energy, and financial program data as well as other public and private data to examine the relationship between energy-efficiency retrofits and financial performance on three levels: building, city, and community.

The project goals were to increase the data and analysis in the growing body of multifamily financial benefits work and to provide a framework for other geographies to produce similar characterization. The goals are accomplished through three tasks:

- **Task 1:** A pre- and post-retrofit analysis of 13 Chicago multifamily buildings
- **Task 2:** A comparison of Chicago income and expenses to two national data sets
- **Task 3:** An in-depth look at multifamily market sales data and the subsequent impacts of buildings that undergo retrofits.

Key findings include:

- The net operating income of buildings that had energy-efficiency improvements increased by 2.95% (\$55.96/unit) by 1 year post-improvement.
- Rental incomes increased by almost 2.39% (\$227.48/unit) annually in the year after energy-efficiency improvements were completed.
- Utility costs are one of the largest multifamily building operating expenses in Chicago and nationally.
- National data sets of income and expenses should be used cautiously as a benchmark for city data.
- A retrofit that costs the same in two similar buildings within two different communities could increase a building's value by \$335,000 in one neighborhood and by only \$12,000 in the other neighborhood.
- The capitalization rates for a neighborhood are one of the most important factors in whether an energy-efficiency retrofit is feasible for building owners.
- Refinancing presents a significant opportunity for building owners to realize the value of the energy-efficiency improvements and for programs to increase building owner participation.

## 1 Introduction

Building science research conducted over the past few decades has proven that energy-efficiency measures decrease energy consumption in residential buildings. Eighteen percent of the existing housing units in the United States are in multifamily buildings (five or more units) (ACS 2013); this group presents unique challenges and factors. For example, one of the greatest strengths of the multifamily building sector can also be a limitation: In a residential building, a single retrofit can benefit hundreds of tenants; however, this may also discourage a building owner from investing in energy-efficiency measures, because the construction could disrupt tenants' lives. Building America and others are committed to understanding the energy savings potential in the multifamily sector (Choi, Ludwig, and Brand 2012).

Further, multifamily building stock is extremely varied. Building age, number of units, energy consumption, fuel type and delivery, and heating and cooling systems all vary with regional geography. However, when quantifying the financial benefits, a more granular geographic analysis is needed due to micromarkets in real estate. For instance, two similar buildings in Chicago may have comparable building characteristics and energy use, but rental income and market value vary with location. This diversity creates additional barriers when energy-efficiency programs are implemented at scale.

Despite this, a focus on multifamily energy efficiency has substantial advantages. The unsubsidized affordable multifamily rental housing stock comprises a significant fraction of the affordable housing market across the nation (HUD 2013). Targeting affordable multifamily housing also provides additional financial benefits for building owners who are often working in rent-stagnant environments. For this project, affordable housing is defined as the unsubsidized units that have naturally occurring market rents in low-income neighborhoods.

Reports estimate an untapped \$16 billion energy cost savings in multifamily housing retrofits nationwide (ACEEE 2012). In addition, the positive consequences of energy efficiency outside of energy savings include the potential to create jobs (Bell 2012) and save families hundreds of millions of dollars per year on energy bills. Multifamily retrofits, when done properly, also help preserve affordable housing and result in safer, more comfortable homes for tenants.

In this project, the U.S. Department of Energy's Building America Research team Partnership for Advanced Residential Retrofit (PARR) focused on yet another positive impact of multifamily energy efficiency measures—the financial benefits it brings to building owners and investors.

To increase the adoption of multifamily energy-efficiency measures, which are necessary to realize the aforementioned benefits, the energy sector must understand and include qualified lenders and appraisers in the program process, because these stakeholders act as gatekeepers to capital and have a strong knowledge of real estate conditions. To date, the unique needs and requirements of these industries have not always been included in this process, especially when these programs rely heavily on utility rebates and government subsidies. Exploring the effect of energy efficiency on the financial performance of buildings is important because it integrates these currently disparate energy, lending, and appraisal sectors.

Others agree that these financial benefits are important, including those in the private sector. Already, members from the lending and appraisal fields recognize that quantifying these benefits (Deutsche Bank 2012) is vital to decreasing energy consumption in buildings and fairly valuing improvements. The U.S. Department of Energy-sponsored State and Local Energy Efficiency Action Network Financing Solutions Working Group provides cross-industry participation. The Appraisal Institute offers multiple courses on how to appraise buildings with green features and has recently released a multifamily-specific green addendum that can be attached to a general appraisal (Appraisal Institute 2015). Efforts are being made to demonstrate that energy efficiency can improve the bottom line for businesses that own and manage multifamily buildings by reducing their energy bills, lowering maintenance and equipment costs, and lowering tenant turnover rates.

Historically, bringing these lending and appraisal industries into the energy-efficiency life cycle has presented challenges. Lenders tend to prefer predictable energy savings that come from consistently structured deals, but a recent State and Local Energy Efficiency Action Network paper notes, in reference to an energy-efficiency secondary market that, “as basic data needed to assess the risk and performance characteristics of energy efficiency loans accumulates, investor and program administrators’ perspectives may come more into alignment” (SEE Action 2015). Further, a building’s appraisal is based on the comparison of comparable buildings in close geographic proximity, which can be a challenge given the inherent diversity of the multifamily building stock and the improvements that are made.

The positive impact of energy efficiency on financial indicators (such as net operating income and market value) has been demonstrated in other sectors such as non-multifamily commercial buildings. This project attempts to provide more data about how these same indicators impact the multifamily market by exploring if, and to what extent, a building owner benefits financially from energy-efficiency improvements.

This project takes a three-pronged approach to analyzing the financial benefits of energy efficiency in multifamily buildings:

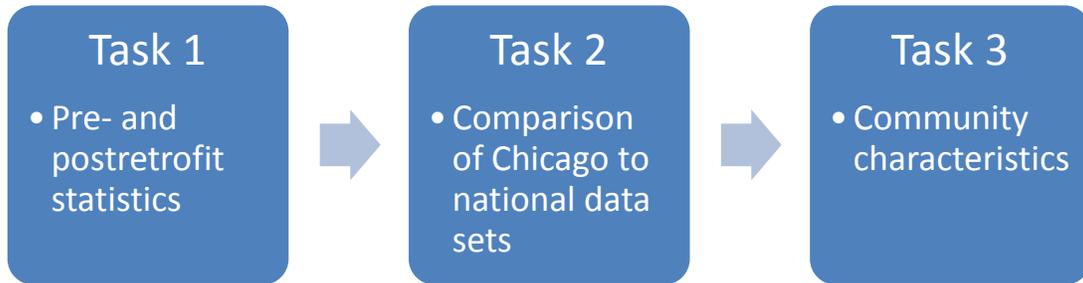
- Task 1 is a pre- and post-retrofit characterization. It looks at the building, energy, and financial characteristics of a subset of 13 Chicago multifamily buildings that were improved through Elevate Energy’s buildings program. This task establishes the savings impacts and potential benefits for these multifamily building owners and resulted in key findings that could encourage owners to invest in energy efficiency. The buildings in this task will be referred to as “Task 1” buildings, or the “sample.”

But to advance energy efficiency market penetration, we must understand how this local Chicago market compares to national samples.

- Task 2 is a comparison of Chicago multifamily building stock to two national financial data sets. This task shows that utility costs comprise a significant yet controllable expense for building owners. This reinforces the value of energy efficiency for owners and for the lenders and appraisers who can take this controllability into account when determining investment risk and building value. The sample of buildings used to represent Chicago will be referred to as the “Chicago data set.”

However, because multifamily building stock is varied down to the community level, the sector must better understand how location affects this valuation within the market.

- Task 3 is a local analysis of nine communities in the Chicago area and is accomplished by merging public and private data. Due to the city’s volume of building stock and the wide variation in economic and real estate conditions within these communities, Chicago is an excellent environment in which to explore the effects of energy efficiency on buildings’ financial performance.

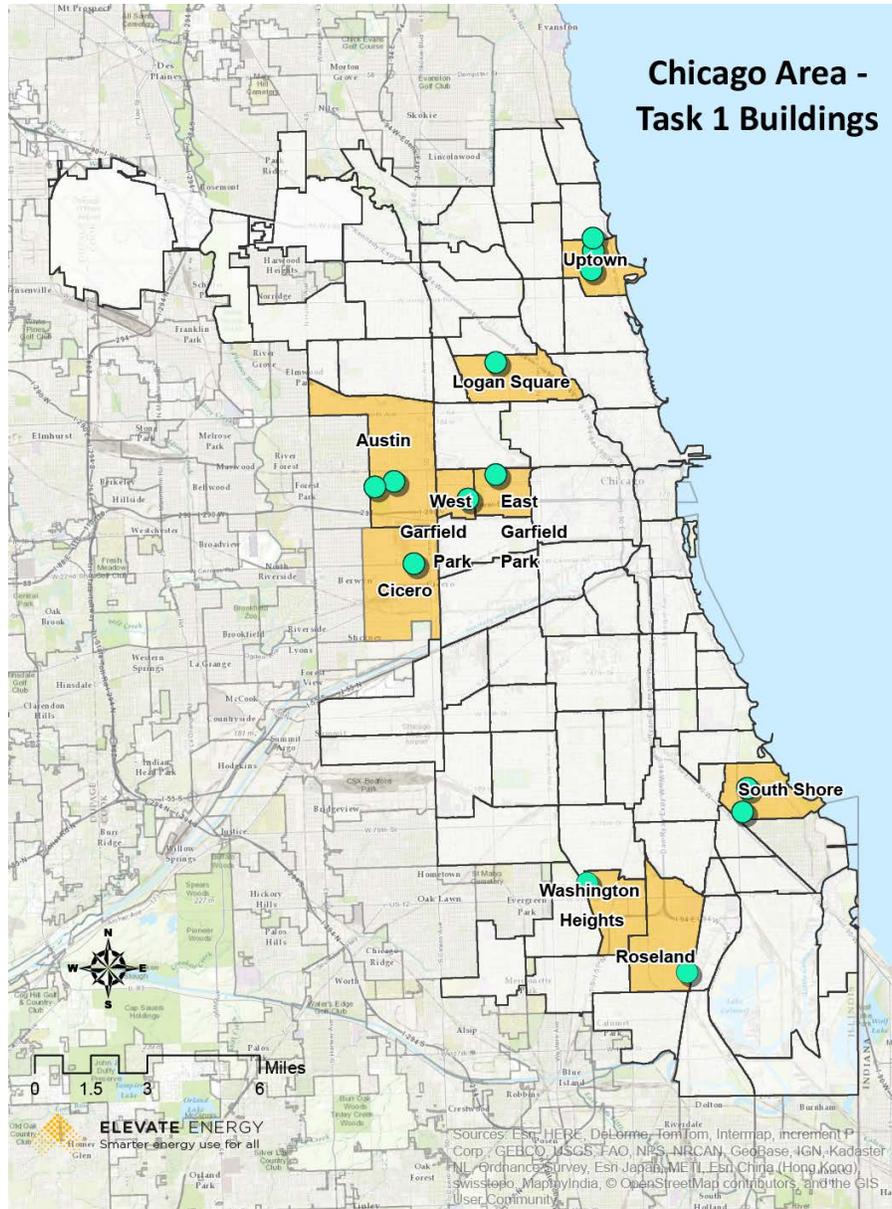


Taken together, these three tasks confirm a financial benefit to multifamily energy-efficiency improvements. They also highlight a key limitation that these financial benefits might not be realized without a combined effort from the energy, lending and appraising industries. This project works to mitigate this limitation by creating a replicable methodology for other local communities. This analysis needs to be completed in other geographies, and especially other climates, to understand how these findings vary across the United States’ multifamily building stock.

This project supports Building America’s commitment to decrease existing residential building energy consumption by 30% by 2020 as well as the goal to ensure that energy-efficiency investments are fairly valued at transaction points. This project is also relevant to U.S. Department of Energy data standardization and cross-industry data transfer initiatives such as Building Energy Data Exchange Specification and Better Buildings accelerators.

## 2 Pre- and Post-Retrofit Characterization (Task 1)

Task 1 provided pre- and post-retrofit descriptive statistics of the income and expense, building, and energy characteristics of 13 multifamily buildings in Chicago that received energy-efficiency improvements through Elevate Energy’s buildings program (Figure 1). Multifamily housing stock is an integral part of the Chicago landscape; more than 480,000 of the total 1.2 million housing units are in multifamily buildings with five or more units. Since 2008, Elevate Energy’s buildings program has retrofitted more than 21,000 primarily rental, multifamily units in Illinois. The program provides a streamlined process in which the building owner receives an energy audit from an Elevate Energy analyst. The analyst manages the entire energy-efficiency process from contractor bidding through construction to a post-retrofit analysis. Merging this trio of data types—building, energy, and financial—is essential to demonstrating the effect of energy-efficiency investment to sectors that all have unique motivations. Community Investment Corporation (CIC), which provides cost-effective financing for energy-efficiency improvements to buildings, provided the income and expense data and holds the first mortgages on all the buildings in the study. Another criterion for this sample is that the buildings all had at least one major heating, ventilating, and air-conditioning or envelope measure completed. The Elevate Energy buildings program does not require that any of the suggested measures be implemented, so retrofits often vary from project to project.



**Figure 1. Locations of Task 1 buildings and corresponding communities**

In brief, these buildings are small in size and operating budget and their age makes them good candidates for energy savings. Nearly all the energy-efficiency measures installed focus on decreasing natural gas therm use, because Chicago is in a cold climate that relies primarily on natural gas for space heating.

## 2.1 Building Characteristics

The 13 buildings in this sample are brick, three-story walk-ups that are typical in Chicago. They are often in a U or block shape with a courtyard and are representative examples of the Chicago multifamily rental housing stock (Figure 2). The majority of the buildings in this study are master-metered.



**Figure 2. Example of a Chicago multifamily building**

Source: Elevate Energy

The buildings had a median built age of 95 years. They were built around 1920, long before modern energy codes. Most were master-metered and had a median of 30 units (Table 1).

**Table 1. Descriptive Building Characteristic Statistics**

Building	Year Built	Units	Master-Metered	Conditioned Square Feet	Construction Type	Community
<b>Median</b>	1920	30	92%	21,372	Brick	–
<b>1</b>	1917	12	Yes	13,200	Brick	Roseland
<b>2</b>	1920	220	Yes	30,580	Brick	Uptown
<b>3</b>	1920	19	Yes	20,250	Brick	Austin
<b>4</b>	1920	30	Yes	23,800	Brick	South Shore
<b>5</b>	1929	6	Yes	6,650	Brick	Cicero
<b>6</b>	1921	73	Yes	36,680	Brick	West Garfield Park
<b>7</b>	1926	51	Yes	42,230	Brick	Logan Square
<b>8</b>	1918	7	No	9,600	Brick	East Garfield Park
<b>9</b>	1934	100	Yes	44,428	Brick	Uptown
<b>10</b>	1929	88	Yes	21,372	Brick	Uptown
<b>11</b>	1920	12	Yes	16,854	Brick	Austin
<b>12</b>	1920	13	Yes	12,324	Brick	South Shore
<b>13</b>	1927	31	Yes	30,464	Brick	Washington Heights

## 2.2 Energy Use Characteristics

The buildings in this sample are typical of Chicago multifamily buildings in that the majority of their energy use is natural gas for space heating. In fact, multifamily buildings in the Elevate Energy portfolio use substantially more natural gas (1.027 therms/ft<sup>2</sup>, weather normalized) than the multifamily buildings surveyed by Fannie Mae to develop the ENERGY STAR<sup>®</sup> Score for Multifamily buildings (0.23 therms/ft<sup>2</sup>) (Fannie Mae 2014).

## 2.3 Income and Expense Characteristics

Income and expense data were provided by CIC, a Chicago-based Community Development Financial Institution. CIC requires that all building owners self-report these data for all buildings for which they hold the first mortgage. The median total expenses for these buildings were \$99,766, and the average retrofit cost was \$59,247. Table 2 outlines the data fields provided by CIC. The pre-upgrade data were from a median of 11 months before construction (2009) and at least 6 months and a heating season after the upgrade was finished (2012). The PARR team had to augment a few data fields to calculate the average post-retrofit percent saved and per-unit change. On eight occasions expenses either pre- or post-retrofit appeared to reflect an accounting error or an anomaly year. For example, the average percent of total expenses for repair costs might be 25%, but for one building it appeared to be 70%. For these extreme cases, the PARR team multiplied the building's total expenses by the average percentage of total expenses across all buildings for a given category. For example, if all buildings' post-retrofit management costs were 15% of their total expenses, the PARR team replaced the extreme value with 15% of that building's expenses. This allowed for a more even comparison of a small data set and replaced the outlier values with one more proportionally representative of the sample.

**Table 2. Income and Expense Variables**

<b>Variable Name</b>	<b>Description</b>
<b>Net Operating Income (NOI)</b>	Total income minus total expenses
<i>Income</i>	
<b>Rent</b>	Income produced by unit rentals
<i>Expenses</i>	
<b>Gas</b>	Cost for owner-paid natural gas (weather normalized)
<b>Electricity</b>	Cost for owner-paid electricity in common spaces
<b>Water and Sewer</b>	Cost for water and sewer
<b>Management</b>	Cost for property manager or management company
<b>Real Estate Tax</b>	Cost of real estate tax
<b>Janitor</b>	Cost of janitor
<b>Repairs</b>	Operations and maintenance costs
<b>Insurance</b>	Cost of building insurance
<b>Exterminator</b>	Cost of pest management
<b>Security</b>	Cost of security system or personnel
<b>Elevator</b>	Cost of elevator maintenance
<b>Other Expenses</b>	Any other expenses (should not include capital improvements)

The pre- and post-retrofit analyses revealed an encouraging picture of how energy-efficiency improvements impacted financial performance (Table 3). Results included the average decrease of almost \$200/ft<sup>2</sup> (more than 25%) in natural gas expenditures. This was an expected outcome because the efficiency measures installed primarily targeted natural gas use. The savings related to natural gas are the equivalent of receiving nearly 2 months of additional rental income. This could prove particularly valuable if rent payments are late, or vacant units take an extra month to fill. Electricity costs increased 8.3%, although they had very low cost per square foot. This is likely a product of the fluctuating cost of electricity, the small sample size, and data reporting error. The most encouraging change is a 2.95% average increase in NOI, or \$55.96/unit/year.

**Table 3. Pre-and Post-Retrofit Annual Income and Expenses,  
Mean of Reported Data from 13 Study Buildings<sup>12</sup>**

	Pre-Retrofit (\$/unit)	Post-Retrofit (\$/unit)	% Change	\$/Unit Change
	Mean	Mean	Mean	Mean
<b>Rental Income</b>	\$6,443.30	\$6,654.53	2.39%	\$227.48
<b>Gas</b>	\$578.49	\$393.82	-26.14%	\$(198.87)
<b>Electricity</b>	\$84.00	\$84.05	8.33%	\$0.06
<b>Water</b>	\$153.42	\$237.43	43.94%	\$90.47
<b>Management Fees</b>	\$145.12	\$115.67	501.54%	\$(31.71)
<b>Real Estate Taxes</b>	\$642.24	\$635.73	9.18%	\$(7.01)
<b>Operations and Maintenance (repair)</b>	\$759.50	\$840.82	32.20%	\$87.57
<b>Insurance</b>	\$335.58	\$328.39	14.33%	\$(7.75)
<b>Pest Control</b>	\$103.16	\$118.01	71.60%	\$15.99
<b>Security</b>	\$33.56	\$25.40	N/A	N/A
<b>Elevator</b>	\$9.42	\$11.56	N/A	N/A
<b>Other Expenses</b>	\$154.25	\$135.44	5.46%	\$(20.26)
<b>Total Expenses</b>	\$2,998.74	\$2,926.31	-2.33%	\$(78.00)
<b>NOI</b>	\$3,706.0	\$3,757.97	2.95%	\$55.96

Repair costs increased by 32%, or \$87/unit. A possible explanation is that an increase in occupancy caused a spike in repairs. Because occupancy data were not available, the PARR team could not test this theory. The increase might also have been the result of a building owner reporting a capital expense such as installation of new appliances under “repairs,” which should include only true repair items such as repainting. Interviews with buildings owners in previous research suggest that this is very likely (Elevate Energy 2014) and especially true of deferred maintenance. Another potential cause of the increased repair costs was that an investment in energy-efficiency upgrades might have motivated owners to continue making building upgrades in the immediate years after construction was complete.

Self-reported data presented obvious concerns. A \$0 on some of the variables shows that some building owners simply did not record particular expenses. PARR recognizes the limitations of self-reported data and the small sample size, and another cohort of similar buildings could likely produce different results. Furthermore, these results are not statistically significant. However, key findings might still encourage building owners to invest in energy-efficiency retrofits.

## 2.4 Key Findings

**The net operating income of buildings that had energy-efficiency improvements increased by 2.95%, or \$55.96/unit, 1 year post-improvement.** NOI is a key indicator of a building’s

<sup>1</sup> Because the “percentage change” and “dollars per unit change” are both independently calculated averages, the sign is sometimes different. This happens when the average is being driven by buildings that have a high percent change, but low true value change. For these expense categories, data often were not reported on all 13 buildings.

<sup>2</sup> The data here were self-reported from the building owner to the lender.

health, because it denotes the ability to pay the debt service and serves as a benchmark for when building owners need to manage expenses more closely.

Following the energy-efficiency improvements, gas costs decreased by 26% and gas consumption decreased by 17% for post-improvement buildings. This confirms that substantial reduction in consumption is possible through improvements that cost less than \$100,000.

**Rental incomes increased by more than \$225/unit annually in the year after energy-efficiency improvements were completed.** Occupancy and turnover cost data were lacking, so the PARR team could not be certain about whether rental income increased due to higher rents or a lower vacancy rate, potentially coupled with decreased turnover. Regardless, higher revenues allowed building owners to weather unexpected expenses and volatile energy prices and to pay into their capital reserves.

Demonstrating a financial benefit for the owners of this group of buildings is noteworthy, but to advance the market penetration of energy-efficiency improvements, the PARR team explored how the buildings' locations within a particular community are tied to and affect the realization of financial benefits.

### **3 Comparison of the Chicago Buildings to National Financial Data Sets (Task 2)**

Task 2 compared the income and expenses of Chicago multifamily buildings to two nationally representative surveys, the Rental Housing Financial Survey (RHFS) and the National Apartment Association’s (NAA’s) Survey of Operating Income and Expenses in Rental Apartment Communities. It is important to know how a local market compares to national samples so policymakers and advocates can judge the appropriateness of using national data as a benchmark.

#### **3.1 Data Sets**

This section explores the data used in three data sets provided by CIC, RHFS, and NAA.

##### **3.1.1 Chicago Data Set**

The income and expense data set for the Chicago sample is from the 2013 financial reporting of Elevate Energy’s lending partner, CIC. The original data set was 368 buildings, but t-tests showed that the difference in the mean for the “other expenses” categories was statistically significant ( $p$ -value = 0.028) at a 95% confidence level for buildings that received energy audits and those that did not. Buildings that had received an audit might have been categorizing upgrades in the “other” category, which raised concerns. Therefore, the PARR team included only buildings that had a complete audit, which provided the benefit of a data set that was as representative as possible to the buildings in Chicago that were likely to be improved through Elevate Energy’s building program.

Of the 110 buildings remaining in the data set, 43 had completed energy-efficiency improvements through Elevate Energy. All buildings have first mortgages with CIC and rental income, and expense data were self-reported by building owners.

##### **3.1.2 U.S. Department of Housing and Urban Development’s Rental Housing Finance Survey**

RHFS was commissioned by the U.S. Department of Housing and Urban Development and administered by the U.S. Census Bureau in 2012. Its purpose is to “provide current and continuous measure of financial, mortgage and property characteristics of multifamily rental housing properties in the United States” (HUD 2013). Data collected include information about the purchase, refinancing, and loan terms associated with properties as well as number of units, income and expense data, and included amenities. The RHFS data set includes 1,195 properties. The vast majority of the buildings (70%) had only two to four units and the median year of construction for all units was 1951. This survey has been administered only once.

The data are collected for use by policymakers to develop multifamily housing practices that pertain to financing deals that will benefit low-income families. An alternative use stated by the U.S. Department of Housing and Urban Development is for private enterprises involved in housing development, ownership, and management to benchmark financial data. Because of these stated intentions, individual markets must determine if the nationally representative sample is congruent with local data.

### 3.1.3 The National Apartment Association’s Survey of Operating Income and Expenses (2013)

The National Apartment Association’s Survey of Operating Income and Expenses is an annual survey that collects operating data about a nationally representative sample of multifamily buildings.

The survey presents data from 4,526 properties and 1,138,056 units. Data were reported for 4,117 market rental properties that contained 1,077,468 units and 409 subsidized properties that contained 60,588 units. Because the survey is longitudinal (2013 was the 25th year), NAA can report changes in the market that are of interest to its membership, which consists of building owners, management companies, developers, investors, and other related multifamily stakeholders. Although the survey does not have a stated purpose, the organization has “a joint legislative alliance with the National Multi Housing Council, NAA protects and represents our members’ interests with regard to legislative and regulatory issues at the federal government level” (NAA 2015).

### 3.2 Attributes of the Data Sets

Buildings in the Chicago data set had a median of 16.5 units, 66% of which were master-metered. As seen in Figure 3, the category “other” is the largest expense (\$968/unit annually). This category is a catch-all for marketing, personnel, and other costs. Unfortunately, line items in this category are separated out in the NAA data set but not in the Chicago data set; this omission prevents additional comparisons. Another notable expense in the Chicago data set includes the significant gas costs (\$698/unit), which, when combined with electricity and water, makes utilities the most expensive part of the building’s operating expenses.

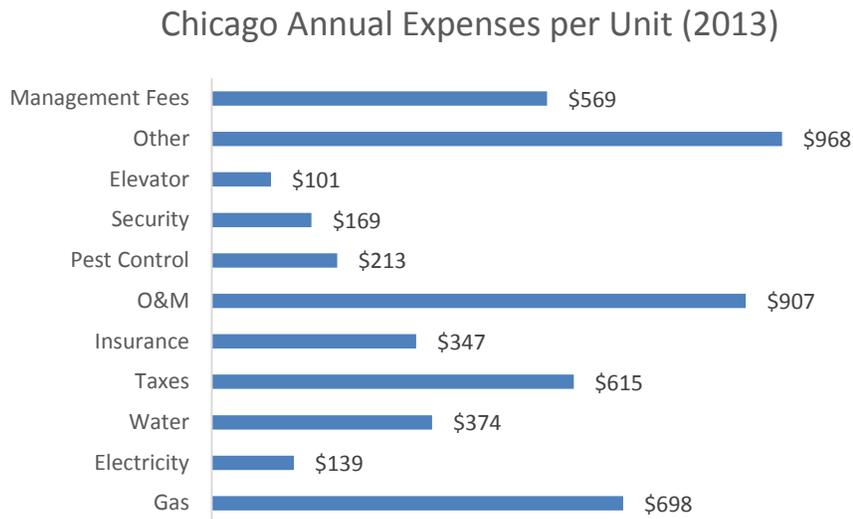


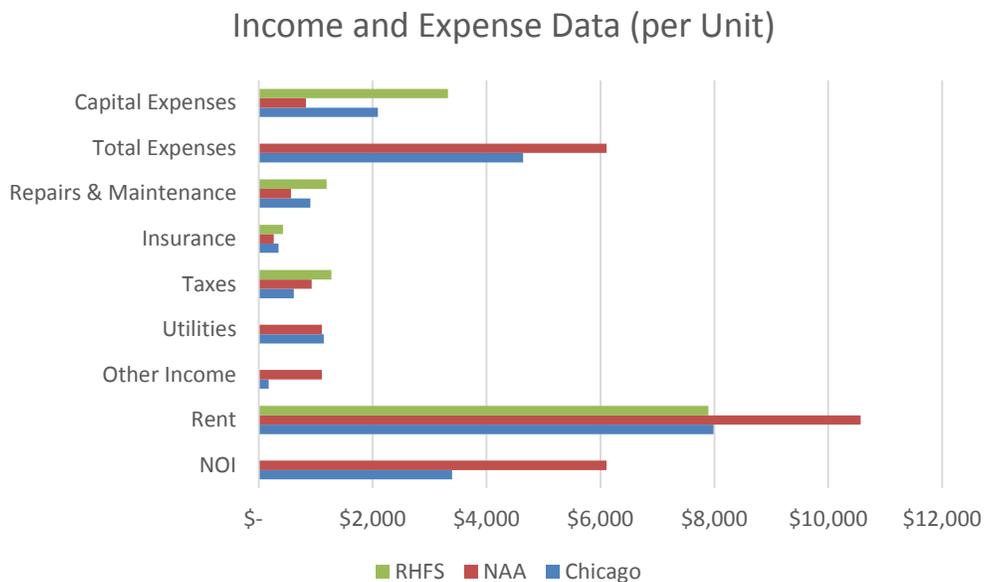
Figure 3. Annual expenses per unit for Chicago data set

For most of the comparison between Chicago and the national data sets, the PARR team used all 110 Chicago buildings.<sup>3</sup> However, for the comparison of capital funds spent, only the 43 buildings that underwent retrofits are included. This is because capital expenses are not included in the data set from CIC, but Elevate Energy has a record of the amount spent on the improvements.

The national data sets and the Chicago data have other key differences. To increase comparability, the PARR team used data from the RHFS for buildings that had fewer than 25 units. The properties are a mix of subsidized, master-metered, and individually metered buildings. The NAA data included buildings that were unsubsidized, master-metered, and garden level (five or fewer stories). Despite the height restrictions, they still had a large number of units (the mean was 244).

### 3.3 Key Findings

**Utility costs per unit are twice the property taxes in Chicago.** Although the income and expenses of Chicago buildings hold some similarities with both national data sets, key differences emerge (Figure 4). For one, Chicago property taxes are significantly lower than other metropolitan areas. In an urban property tax study, Chicago ranked 26 out of 53 urban centers (Lincoln Institute of Land Policy 2011). The comparatively low property taxes in Chicago illustrate that owners have a larger percentage of their operating costs in a category (utilities) that they can reduce, which can positively impact their bottom lines. In the NAA survey, utilities are still higher than the property taxes, but only by \$170 annually.



**Figure 4. Income and expense variables by survey**

<sup>3</sup> Due to the reporting categories of the Chicago buildings, comparisons were not made for each variable across the three data sets.

**Utility costs are one of the largest building operating expenses in Chicago and nationally.**

The comparison of the Chicago financial data set to the national financial data set shows that utility costs in Chicago and nationally are one of the highest costs for building owners and exceed taxes and insurance. This trend further reinforces the value of reducing energy costs to increase NOI. The fact that utility costs—a large, variable expense—are higher than other costs (including taxes and insurance) and are *controllable* reinforces the importance of reduced energy costs and the value of energy-efficiency improvements to an owner’s bottom line. Lenders and appraisers should absolutely consider the ability to influence energy costs as they determine the level of risk an investment poses and the building’s value.

The capital expenses in Chicago are more closely aligned with those in the RHFS than those in the NAA (Table 4). However, the Chicago capital expense per unit is likely lower than shown, because the PARR team used the retrofit cost per unit as a proxy for owner-reported data. Not all measures in a retrofit, such as replacing boiler controls, should be categorized as capital expenses, but most high-cost items such as furnace replacement and roof cavity insulation are traditionally considered capital expenses. Previous research (Elevate Energy 2014) suggests that deferred in-unit expenses such as equipment replacement can be categorized as repairs and maintenance costs instead of as capital expenses.

**Table 4. Annual Financial Indicators per Unit for Each Data Set**

	NOI	Rent	Other Income	Utilities	Taxes	Insurance	Repairs	Total Expenses	Capital Expenses	Cap Rate
<b>Chicago</b>	\$3,398	\$7,985	\$177	\$1,145	\$615	\$347	\$907	\$4,643	\$2,094	8.4%
<b>NAA</b>	\$6,105	\$10,570	\$1,108	\$1,108	\$932	\$263	\$567	\$6,105	\$830	–
<b>RHFS</b>	–	\$7,896	–	–	\$1,278	\$428	\$1,192	–	\$3,324	5.9%

Sources: RHFS (2012), NAA (2013), CoStar (2014)

**National data sets of income and expenses should be used cautiously as a benchmark for Chicago data.** The Chicago data set was comparable to only one of the two national data sets for a given variable. This has serious implications if policymakers and housing advocates expect Chicago to perform similarly. The gap in NOI between Chicago and the NAA and the capitalization (cap) rate, the ratio of NOI to property value, between Chicago and the RHFS are especially important. As will be discussed shortly, these two indicators greatly influence a buildings’ market value and performance expectations by lenders.

## 4 Characteristics of Community Areas (Task 3)

Task 3 analyzed relevant financial, housing, and building characteristics of the nine communities in which the Task 1 buildings were located to better understand how location affects the valuation of energy-efficiency improvements on a building’s market value. The PARR team aggregated public data to uncover areas of opportunities and lessons learned from Chicago neighborhoods that can be applied in other geographies.

This project focused on the nine communities where the Task 1 buildings were located (Table 5). These neighborhoods are also home to a large number of the buildings that Elevate Energy’s buildings program operates (see the Appendix). Chicago is located in Cook County, which is home to 750,000 multifamily units, more than 210,000 of which are unsubsidized affordable housing units.

**Table 5. Chicago Area Communities in This Study**

<b>Communities</b>
Uptown
Logan Square
Austin
West Garfield Park
East Garfield Park
South Shore
Washington Heights
Roseland
Cicero

### 4.1 Data

To characterize the community areas, the PARR team collected data from a variety of sources including CoStar Groups, the Home Mortgage Disclosure Act, and Elevate Energy’s affordability data set, which has inputs from the American Community Survey, the National Housing Preservation Database, and the New Markets Tax Credit database.

#### 4.1.1 CoStar

CoStar Group offers a commercial real estate database that gathers data from more than 500,000 brokers, owners, lenders, investors, asset managers, appraisers, and others. It has the largest and most comprehensive database of multifamily properties in the United States. Despite its large depository of buildings, limitations arise in low-income neighborhoods where buildings have a lower market value and relatively few transactions. The CoStar can be searched for individual buildings listed and viewed for aggregate sales statistics from the previous 12 months. For each community area, the PARR team could record the sales volume, number of properties sold, average sales price, average price per unit, and cap rate.

#### 4.1.2 Home Mortgage Disclosure Act

The Home Mortgage Disclosure Act requires that certain lending institutions report details of mortgages such as the type of loan, loan size, and census tract for the property. The PARR team compiled the loan types for each community area.

**4.1.3 Elevate Energy Multifamily Affordability Data Set**

Elevate Energy has analyzed data from the American Community Survey, the National Housing Preservation Database, and the New Market Tax Credit Database at the census tract level. Data points calculated included the number of market rate and affordable units, further broken down into naturally occurring affordable, subsidized, and public housing authority units. These data were then amassed from the census tract level to the community area.

**4.2 Trends in Housing Stock and Sales Data**

The Sections 4.2.1 through 4.2.3 discuss the trends in housing stock, sales, and mortgage data in each community.

**4.2.1 Multifamily Housing Stock**

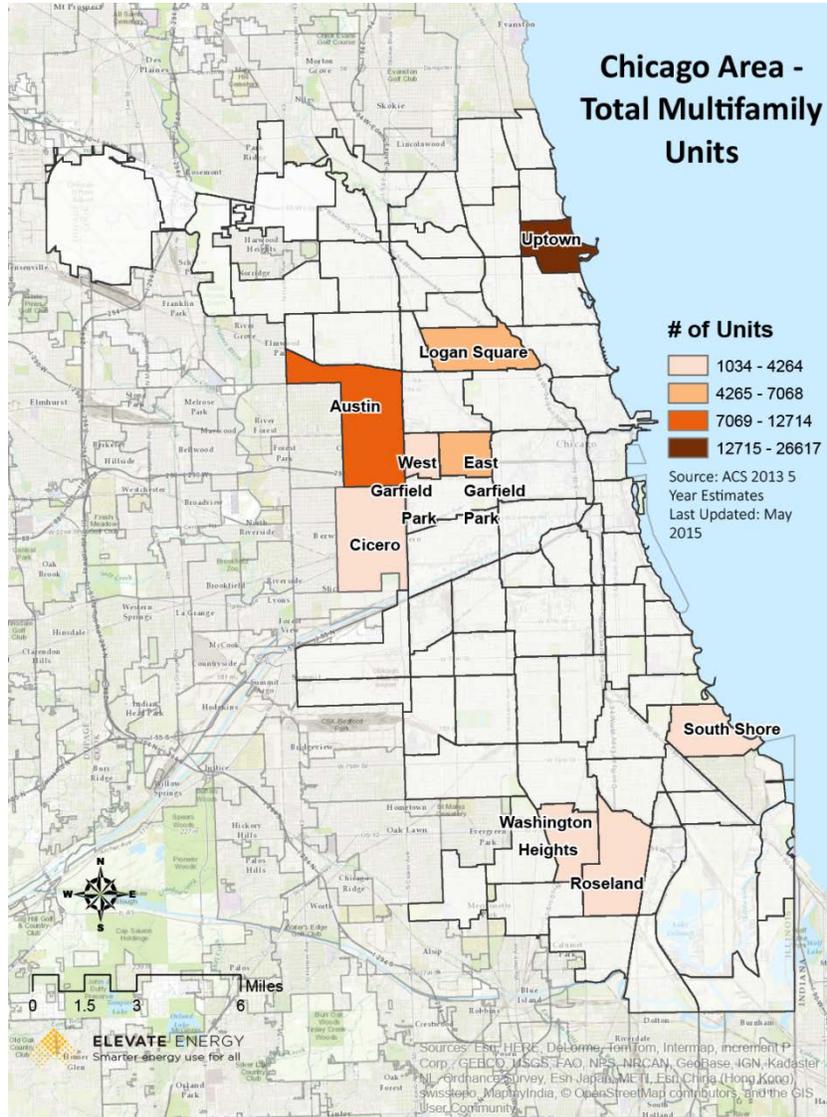
Multifamily housing stock is an integral part of the Chicago landscape; more than half the renters reside in multifamily buildings with five or more units. Of the communities included in the study, Uptown and Austin have the largest multifamily markets (26,617 and 12,714 multifamily units, respectively) (Table 6). Although almost all units are affordable (due to household incomes and the rents that those buildings can demand), some areas have more unsubsidized stock than others. Unsubsidized affordable units are important because they are representative of the buildings in Task 1, and because adoption of energy efficiency in this segment of the market will signal a milestone in market penetration. Later in this report, the financial barriers to investing in energy efficiency will be discussed.

**Table 6. Multifamily Housing Stock**

<b>Community</b>	<b>Total Multifamily Units</b>	<b>Total Affordable Units</b>	<b>Percent Unsubsidized Affordable</b>
<b>Uptown</b>	26,617	18,890	72%
<b>Logan Square</b>	7,068	5,203	75%
<b>Austin</b>	12,714	5,960	46%
<b>West Garfield Park</b>	3,710	2,451	65%
<b>East Garfield Park</b>	6,395	6,395	51%
<b>South Shore</b>	3,256	3,048	53%
<b>Washington Heights</b>	4,264	1,971	90%
<b>Roseland</b>	1,034	1,034	100%
<b>Cicero</b>	3,987	3,270	75%
<b>Chicago</b>	482,514	251,116	57%

Source: Elevate Energy analysis with inputs from ACS 2013 5-year estimates, NHPD, NMTC database

A neighborhood such as Austin has a strong concentration of affordable multifamily buildings; however, a smaller percentage of those are unsubsidized compared to other communities (Figure 5).



**Figure 5. Total multifamily units**

#### **4.2.2 Rent and Sales Data**

The rent and sales metrics (Table 7) for multifamily buildings in these communities over a recent 12-month period (March 2014 to February 2015) demonstrate the extreme variation in local markets even among neighborhoods that traditionally support low- and moderate-income families. Uptown and Logan Square are both experiencing an infusion of capital and intense gentrification. Their current attractiveness to investors is reflected in a sales price per unit rate that is three to five times that of other neighborhoods. Furthermore, the cap rate in these two communities is lower than the Chicago average, which indicates that investors are willing to move into the market.

**Table 7. Sales and Rent Data**

	Cap Rate	Asking Rent/Unit	Sales Volume (million)	Properties Sold	Sales Price/Unit	Average Sales Price
<b>Uptown</b>	6.8%	\$986	\$14	9	\$85,076	\$1,607,000
<b>Logan Square</b>	7.3%	\$980	\$28	16	\$101,229	\$1,733,562
<b>Austin</b>	13.8%	\$777	\$6	14	\$28,382	\$405,464
<b>West Garfield Park</b>	–	\$942	\$1	2	\$16,014	\$552,500
<b>East Garfield Park</b>	–	\$896	\$1	2	\$32,500	\$292,500
<b>South Shore</b>	11.8%	\$833	\$22	34	\$30,709	\$650,317
<b>Washington Heights</b>	–	\$907	\$0	0	–	–
<b>Roseland</b>	–	\$620	\$0	0	–	–
<b>Cicero</b>	10.3%	\$646	\$2.2	6	\$27,312	\$364,166
<b>Chicago</b>	8.4%	\$1,136	\$2976	711	\$120,861	\$4,185,970

Source: CoStar Group, March 2014 to February 2015

South Shore has a complicated story. Though it has the highest total sales and number of properties sold from March 2013 to February 2014, the average sales price is one-third that of Logan Square. Section 4.3 explores how the significantly larger cap rate of South Shore (11.8%) to Logan Square (7.3%) perpetuates low market rates.

In communities where more than two properties sold, the capitalization rate was available. The cap rate is a real estate metric that indicates the estimated value of an investment. Cap rate, estimated market value, and annual net operating income are related in following equation:

$$\text{Annual NOI/Capitalization Rate} = \text{Market Value}$$

Cap rates are set by an appraiser and are generally informed by the recent sales of comparable buildings in similar locations. A lower cap rate is indicative of a less risky investment. For example, if a building were located in rural Illinois and an identical building were located in downtown Chicago, the one in Chicago would have a lower cap rate because recent sales data show that properties in that area are more valuable (Table 8). However, the likelihood of two identical buildings being able to produce identical net operating incomes is low. For instance, even if the operating expenses were the same, a building in rural Illinois cannot command the same rents as one in Chicago.

**Table 8. Calculating NOI**

	<b>Austin</b>	<b>Lincoln Park</b>
<b>Cap Rate</b>	13.8%	5.3%
<b>Average Sales Price</b>	\$405,464	\$11,357,666
<b>NOI</b>	\$55,954	\$601,956

The relationship between the cap rate, NOI, and market value figures seems simple, but upon further examination it reveals deep inequities across neighborhoods and subsequently presents barriers for multifamily buildings to realize the true value of investing in energy efficiency. The ramifications of this equation also impact a building owner's ability to access capital and reinvest in affordable housing.

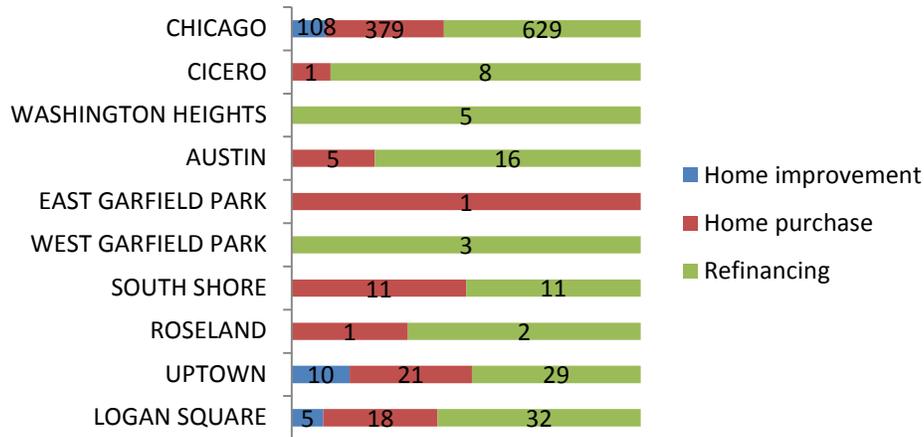
To illustrate the control this relationship has over buildings' financial standings, two community areas are compared: Austin and Lincoln Park. Lincoln Park is an affluent neighborhood on the north side of Chicago. Austin's cap rate was 13.8% during this time period; Lincoln Park's was 5.3%. Lincoln Park experienced \$68 million in multifamily sales with an average sales price per property of \$11,357,666. The average sales price per unit was more than \$235,000. Austin's average sales price per property was \$405,464, and the price per unit was a little more than \$28,000. Using the equation above, the building in Austin has an annual NOI of \$55,954, and the building in Lincoln Park has an annual NOI of \$601,956.

The typical cost of energy-efficiency improvements to a multifamily building in Chicago through Elevate Energy's buildings program is \$60,000. An owner in Austin who wants to move forward with improvements must either access the funds through capital reserves or finance the upgrades. The building in Lincoln Park has more financing options.

#### **4.2.3 Housing Mortgage Disclosure Act Data**

The types of transactions in a market must be evaluated to increase adoption of and accurately evaluate energy-efficiency improvements. According to the 2013 Housing Mortgage Disclosure Act records, 56% of mortgages issued were for refinancing (Figure 6). This is a signal to energy efficiency program administrators that buildings should be targeted at this time. It stresses the need to maintain close relationships with lenders to maintain a steady referral stream. Working with building owners during a refinance has advantages. A building owner already understands a specific building's expenses and likely has experience dealing with the complaints about aging equipment that can be addressed by energy-efficiency improvements.

## Loan Type by Community



**Figure 6. Loan type by community**

Source: Consumer Financial Protection Bureau (2013)

The CoStar data showed a greater number of building purchases than did the Home Mortgage Disclosure Act. Only certain financial institutions are required to comply with the Home Mortgage Disclosure Act. Key players in the low and moderate-income lending space, such as CDFIs, are not required to comply. The volume of home purchase mortgages may not be a function of a lack of interest, but rather a lack of access to capital. A recent report by the Institute for Housing Studies at DePaul University found that in 2005, multifamily loans of less than \$1 million originated by small banks (those with less than \$1 billion in assets) in low- and moderate-income neighborhoods comprised almost 18% of multifamily loan dollars in Cook County. However, from 2005 to 2013 the volume of these loans decreased by 72% (IHS 2014) as small banks went out of business and bigger banks refused to lend to what they perceived as riskier investments.

### 4.3 Key Findings

**A retrofit that costs the same in two similar buildings within two communities could increase the buildings' values differently.** Assuming that the 2.95% increase in NOI is realized in Lincoln Park as it was in the other community areas, the retrofit will increase the market value of that building by \$335,000. The building in Austin would see its value increase by only \$12,000. As mentioned earlier, the building in Lincoln Park had an NOI more than six times higher than that of a building in Austin. Although this substantial variance is a mathematical result of the relationship between cap rate, NOI, and market value, it nevertheless brings up meaningful and noteworthy inequities in terms of location and value.

**The cap rates for a neighborhood are one of the most important factors in whether an energy-efficiency retrofit is feasible for building owners.** As demonstrated in the above example of Austin and Lincoln Park, a high cap rate can suppress the value of a multifamily building. However, if stakeholders in the United States are going to take advantage the multifamily energy and cost savings potential, operating in areas with high cap rates is

inevitable. The program implementers, lending, and appraisal professionals need to then structure deals in a way that are attractive to building owners and their businesses.

**Refinancing presents a significant opportunity for building owners to realize the value of the energy-efficiency improvements and for programs to increase building owner participation.** Fifty-six percent of multifamily mortgages in Chicago in 2013 were for refinancing. In the neighborhoods the PARR team analyzed, the percentage of refinances was even higher at 59%. Even though this may be the result of low interest rates, energy efficiency programs and lending and appraisal professionals need to recognize this transaction point as an opportunity to work with building owners to ensure that completed improvements are fairly valued or, if they plan to make improvements later, that these future measures are also incorporated and fairly valued.

## 5 Conclusion

In this study, the metrics show that multifamily building energy-efficiency upgrades can have a measurable financial benefit in existing buildings. Depending on rent changes as a consequence to the upgrade, the net operating income of the building can increase. In the Task 1 study, for example, the NOIs of buildings that had energy-efficiency upgrades increased by 2.95% 1 year post-upgrade from utility cost reduction rent increases and other factors.

In the Task 2 study, the team concluded that the financial benefits of energy-efficiency upgrades for Chicago may not be the same as on a national level because though utility costs are one of the largest building operating expenses in Chicago and in the nation, relatively lower property taxes mean utility costs per unit are twice the property tax cost in Chicago. National data sets of income and expenses should be used cautiously as a benchmark for Chicago data—they can differ significantly. Furthermore, this task confirms that reducing utility costs is an effective way to decrease operating expenses.

In the Task 3 study, the team concluded that location can have a significant effect on the financial benefit metrics: a retrofit that costs the same could increase one multifamily building’s value by \$335,000 and another by only \$12,000 in two neighborhoods. The retrofit pays for itself five times over in the building in the more affluent neighborhood. The cap rates for a neighborhood are one of the most important factors in whether or not an energy-efficiency retrofit is feasible for building owners. Finally, refinancing presents a substantial opportunity for building owners to realize the value of the energy-efficiency upgrades and for programs to increase building owner participation.

Overall, the low volume of sales, high cap rates, and below-market sales price per unit in underserved communities is a reminder of the barriers to lending and indicates the greater difficulty for building owners to see their investments fairly valued. A large volume of sales is important because it gives appraisers a variety of buildings to use as a benchmark, but appraisers should take care to lower the cap rate when appropriate because an increased NOI is attributed to energy-efficiency improvements. The cap rate definition above can be used to see how the cap rate would be lower for an Austin building, if NOI is assumed to increase by 2.95% and the market value increases by 50% of the cost of the improvements (Table 9).

**Table 9. Example of Cap Rate Decreasing with Energy Efficiency**

<b>Annual NOI</b>	<b>/</b>	<b>Cap Rate</b>	<b>=</b>	<b>Market Value</b>
<b>\$55,954</b>	<b>/</b>	<b>13.8%</b>	<b>=</b>	<b>\$405,464</b>
<b>\$57,625 (NOI+2.95%)</b>	<b>/</b>	<b>13.2%</b>	<b>=</b>	<b>\$435,464 (MV+\$30,000)</b>

The authors propose that lending practices should acknowledge the financial benefits of energy efficiency. Financial institutions typically use a range for loan-to-value and debt service coverage ratio. When a loan is perceived as exceptionally risky, the loan-to-value will be lower,

which means that a building owner might not be offered the full amount requested. Lenders might also require a higher debt service coverage ratio, which is the ratio of income to money needed to support the mortgage. A higher debt service coverage ratio suggests that a lender is not confident in the consistency of a property's rental income.

This project confirms a potential financial benefit to improving the energy efficiency of multifamily buildings. However, it also highlights that these financial benefits might not be fully realized without a combined and collaborative effort from the energy, lending, and appraising industries. A close partnership is critical to make energy efficiency accessible in neighborhoods where traditional financing products create barriers for owners to invest in and improve their buildings.

Furthermore, the authors have demonstrated the ability to combine building, energy, and financial data from energy-efficiency programs as well as other public and private sources to analyze the effect of energy efficiency on multiple levels. Even though this methodology is replicable, it might produce very different results in another market. Also, because real estate and some financial variables, such as energy costs and taxes, can vary greatly over time, the findings in this project might be different if replicated 5 years from now.

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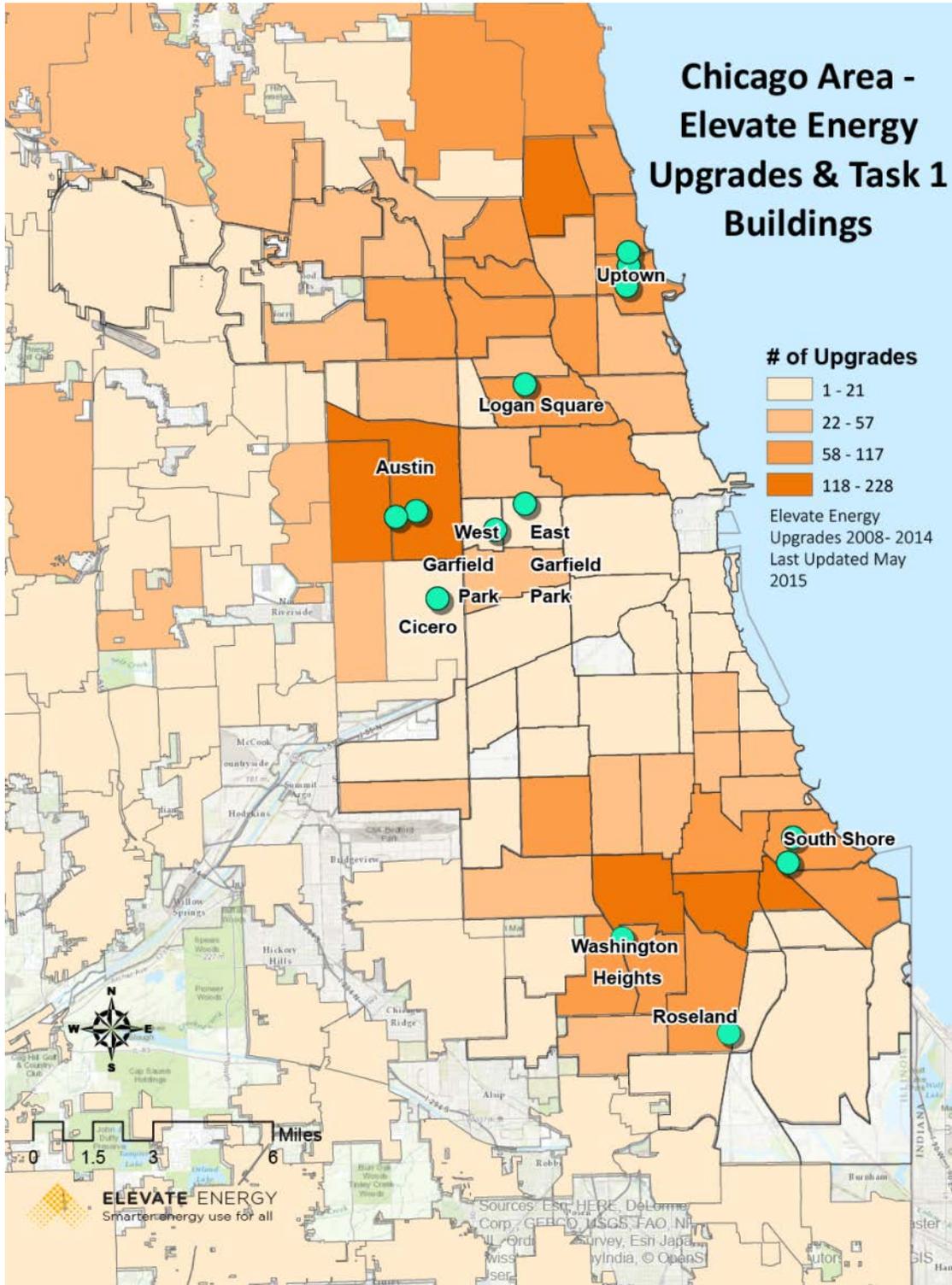
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## Appendix: Elevate Energy Multifamily Program Metrics



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