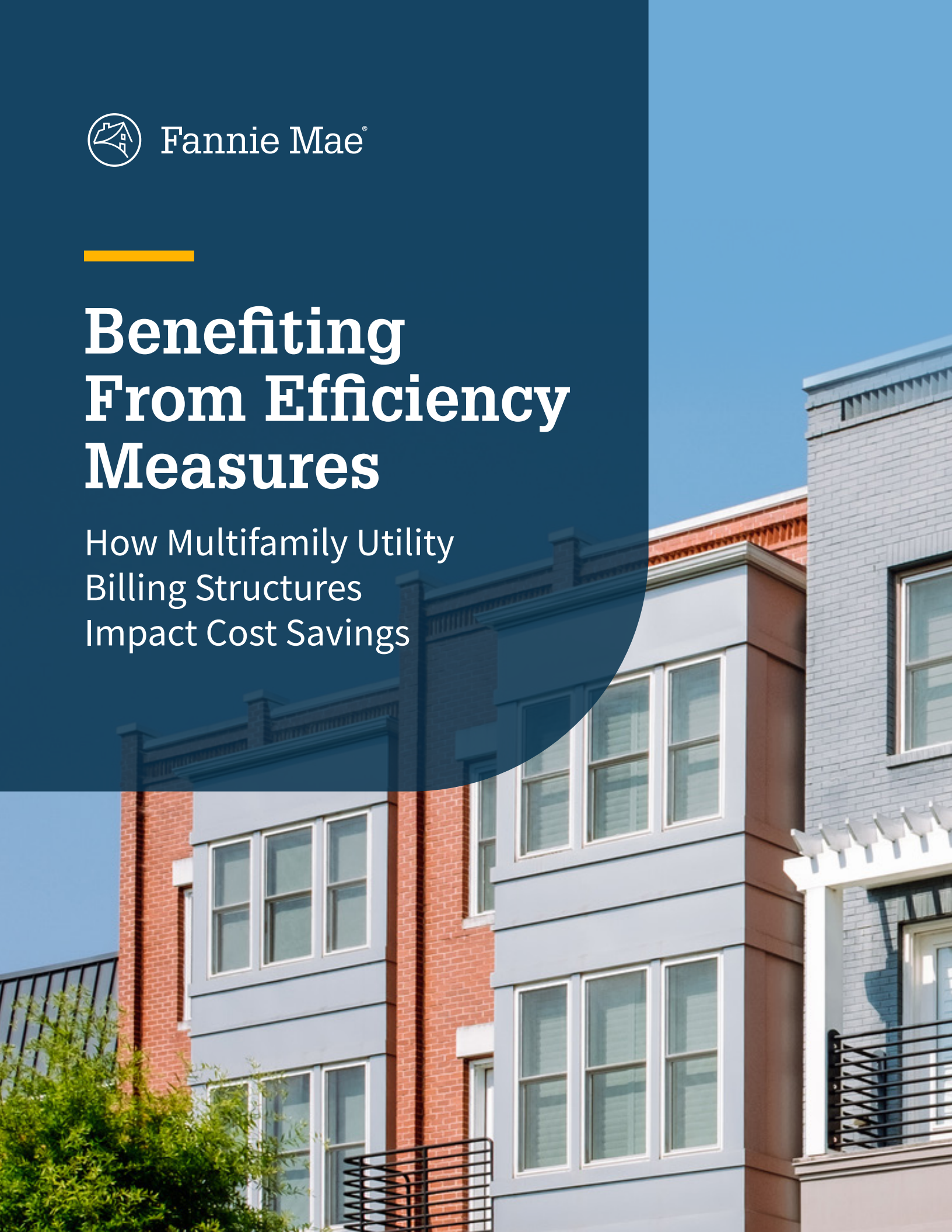
Fannie Mae®

Benefiting From Efficiency Measures

How Multifamily Utility Billing Structures Impact Cost Savings



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Introduction

Housing costs, including rent and utilities, are typically the single largest monthly expense for individuals and families. While rent is the major component of housing expense, energy and water costs also have significant impact on household finances. The 2022 Residential Energy Consumption Survey found that 27% of households reported some form of energy insecurity, defined as the inability to adequately meet basic energy needs (e.g., heating, cooling, and lighting), due to cost.[1] This issue was more severe for renters, with 40% of renter households experiencing energy insecurity.

Energy burden, defined as the percentage of household income that goes toward paying energy costs, is another important metric for understanding how utility affordability disproportionately affects low-income renters. Data from the U.S. Department of Energy reveals that renter households in multifamily buildings spend on average about 2% of their income on energy costs.[2] However, this energy burden doubles for low-income multifamily renter households (those at 80% or less of area median income), as they spend roughly 4% of their income on energy costs.[3]

While rents generally remain fixed for a given lease term, utility expenses can fluctuate. In multifamily buildings, factors impacting utility expenses include:

- the efficiency of the systems and appliances installed;
- how utility billing at a property is structured;
- the energy and water consumption patterns of households;
- weather; and
- changes in the price of the energy and water.[4]

As buildings move towards decarbonization and owners seek to recoup costs of electrification differences in utility billing structures may have an even more significant impact .

Using data collected from properties within the Green Rewards program, Fannie Mae aims to understand and address these factors to drive greener and more affordable multifamily housing. This paper reviews tenant utility costs and savings in the Green Rewards program by evaluating the:

1. Potential accrual of savings to tenants through different property utility billing structures; and
2. Impact on utility savings by region and the efficiency measures selected at the property.

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[1] "Residential Energy Consumption Survey (RECS)," U.S. Energy Information Administration, accessed August 29, 2023, https://www.eia.gov/consumption/residential/data/2020/index.php?view=characteristics.
[2] "Low-income Energy Affordability Data Tool," U.S. Department of Energy, accessed August 29, 2023, https://www.energy.gov/scep/slsc/lead-tool.
[3] Drehobl, Ariel et al. "How High are Household Energy Burdens?", American Council for and Energy-Efficiency Economy, September 2020, https://www.aceee.org/sites/default/files/pdfs/u2006.pdf.
[4] Other factors that influence monthly utility costs include seasonality, property operations, and maintenance practices.

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The Green Rewards Portfolio

Fannie Mae's Green Rewards program, launched in 2015, incentivizes building owners to install energy and water efficiency measures (EWEMs) at their multifamily properties. Over 4,000 properties and over 856,000 units have been financed through Green Rewards loans since the start of the program. Because many older properties were built without a focus on energy-saving design and construction, these buildings lack many of the essential components that make today's newly constructed buildings more efficient, such as effective building insulation, double- or triple-paned windows, air sealing, and ENERGY STAR® certified systems and appliances. This highlights the vast market of existing, aging buildings in need of repair, renovation, or rehabilitation that are suited for a Green Rewards Mortgage Loan.

To qualify for Green Rewards financing, property owners must commit to installing efficiency measures that are projected to reduce energy and water consumption by a minimum of 30% combined, with at least 15% of savings derived from energy efficiency or on-site renewable energy generation.[5] These projected savings are based on a trailing 12-month baseline using whole-property (owner and tenant) utility data collected or estimated through the High Performance Building (HPB) Assessment – a property-level energy and water audit required for all Green Rewards loans.

[5] Eligibility requirements for Green Rewards have been raised over time. Loans acquired before January 1, 2019 were eligible if the owner committed to efficiency measures projected to reduce whole-property energy or water consumption by a minimum of 25%. Loans acquired before January 1, 2018 were eligible if the owner committed to efficiency measures that were projected to reduce whole-property energy or water consumption by a minimum of 20%.

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Analysis

Understanding Utility Billing Structure

The utility billing structure at a multifamily property determines who is responsible for utility costs and whether utility cost savings accrue to tenants and/or owners. The 2012 Fannie Mae Multifamily Energy and Water Market Research Survey found that a property's utility billing structure may also impact consumption, as median annual energy use at properties where owners paid for all energy costs was 26% higher than at properties where tenants paid for all energy costs.[6] This has substantial implications for the cost and consumption savings that can be achieved through installing efficiency improvements.

There are various methods for measuring and allocating utility costs in multifamily properties based on the metering configuration of a building. Each utility can be owner paid, tenant paid, or "billback", where the cost is paid by owners and wholly or partially billed back to tenants. Billback methods include:

- Flat Fee: residents are charged the same utility fee regardless of use;
- Submetering: residents are charged for their consumption with each unit having its own meter; and
- Ratio Utility Billing System (RUBS): utility costs are attributed to individual units based on a mathematical formula rather than a specific unit's actual usage.

Many properties have different billing structures for different utility types. For example, water may be owner-metered and billed back to tenants, while electricity is individually metered and paid for by tenants.

[6] Fannie Mae completed the 2023 Multifamily Energy and Water Survey in September 2023. Updated research and findings are anticipated to be released in Q1 2025.

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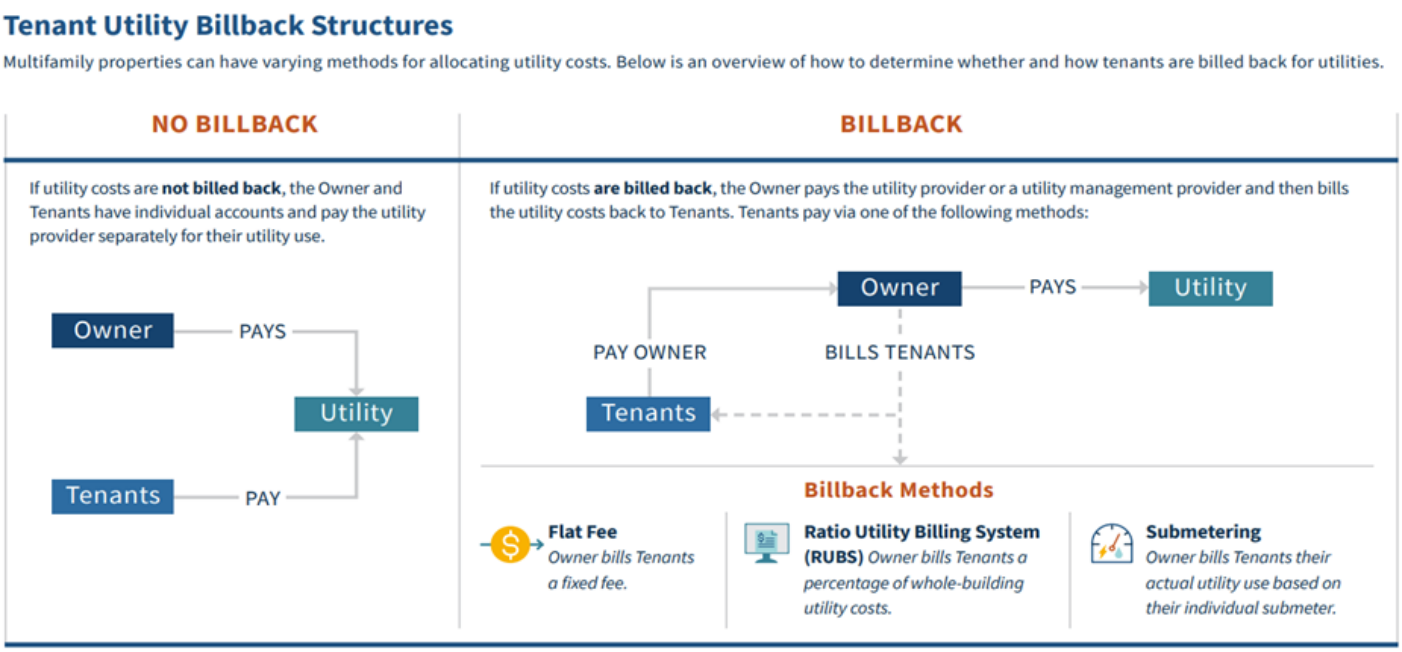

Figure 1: Tenant Utility Billback Structures

Utility Billing Structure Analysis

Understanding the correct utility billing configuration is important to determine the portion of utility cost savings that accrue to owners and tenants.

To understand how utility billing structures impact energy and water cost savings, properties within the Green Rewards portfolio that had billing data available for reporting year 2021, a subset of 3,236 properties, were analyzed. The breakdown in utility billing structures by utility type is shown in Figure 2.[7] Natural gas is evenly split between owner paid and tenant paid (50%), while electricity is predominantly tenant paid (90%). Water is most often billed back to the tenants (58%). Tenants are ultimately responsible for the majority of utility costs.

[7] About 4% of properties in the portfolio have other utility types (district steam, fuel oil, or propane), which are overwhelmingly owner paid. Those are not included in this table.

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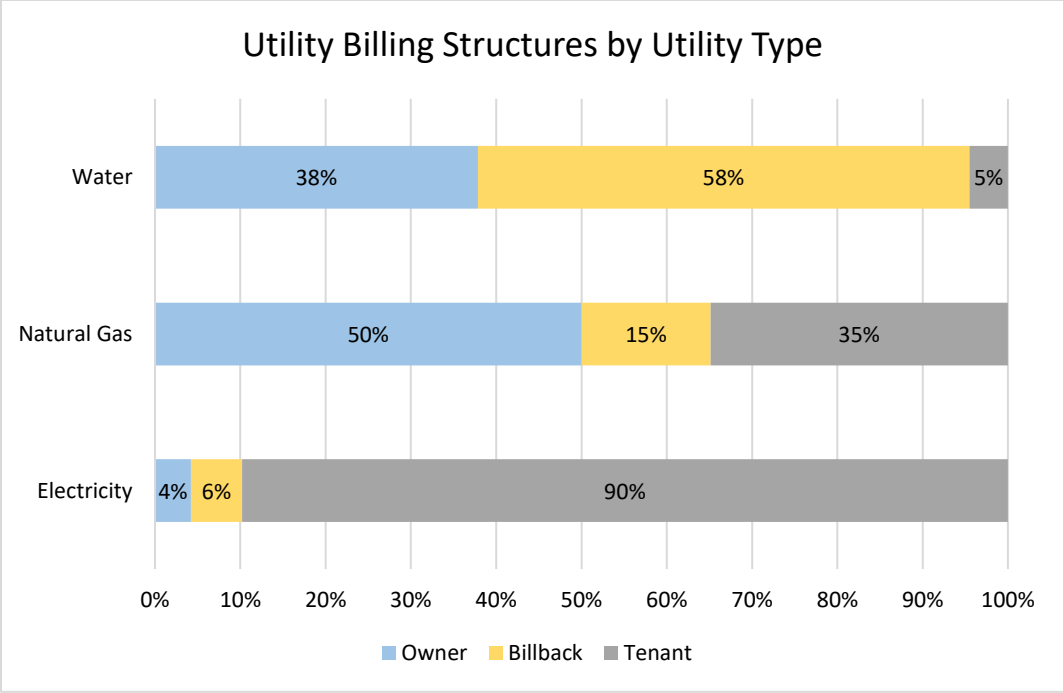

Figure 2: Utility Billing Structures by Utility Type

For properties with a billback utility structure, Figure 3 shows the proportion of the billback method by utility type. RUBS is by far the most common billback practice used across all utility types due to the simplicity of implementation as it does not require the installation of any additional equipment and enables the owner to allocate costs more fairly.

Submetering, which requires the installation of submetering equipment in each tenant unit, is a less common billback method. For properties with a billback utility structure, electricity is submetered at 29% of properties, compared to 12% of water and 7% of natural gas.[8] The higher share of submetering electricity may be due to the existence of more standardized equipment for submetering electricity while natural gas is typically harder to submeter.

[8] 23 properties submeter natural gas out of the 330 properties that bill back natural gas, 56 properties submeter electricity of the 193 properties that bill back electricity, and 233 properties submeter water of the 1,865 properties that bill back water.

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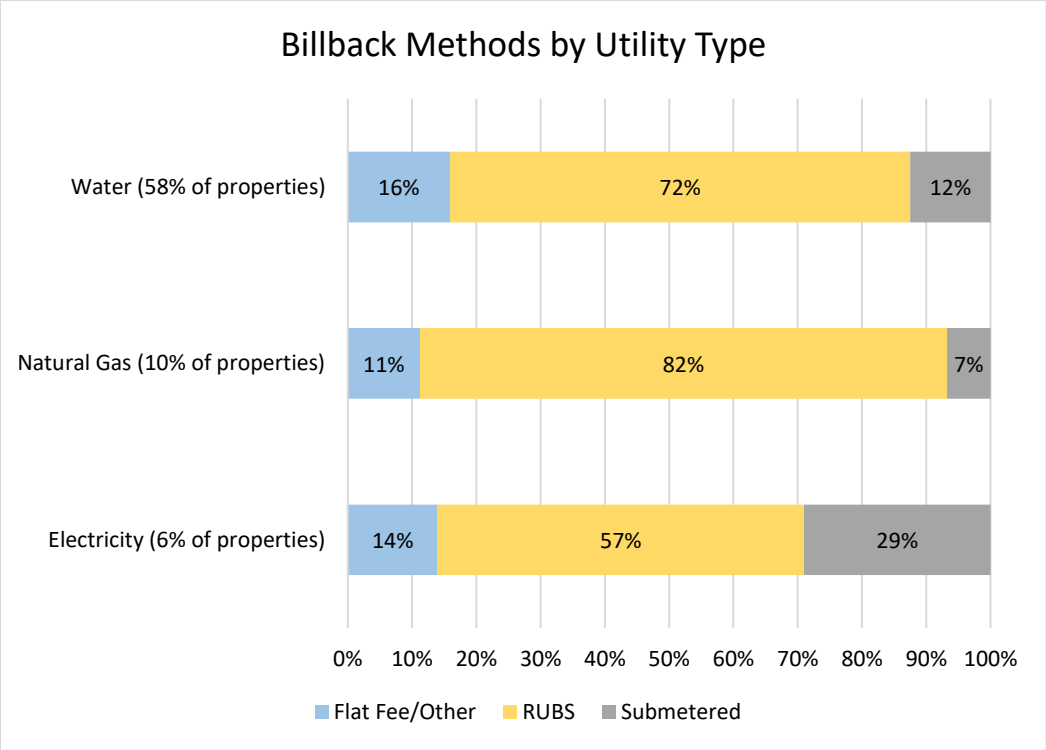

Figure 3: Billback Methods by Utility Type

Impact on Cost Savings

Utility costs can have considerable bearing on a multifamily property's operating expenses and net operating income as well as a household's monthly budget. In a no-billback or submeter structure, both the property owner and tenants are billed for their own utility use and thus each receives the direct benefit of efficiency measures. Flat fee and RUBS billback structures can impact for whether utility cost savings are realized by the property owner, tenants, or both.

Typically, properties that use RUBS will designate a certain percentage of consumption as a "common area deduction" which is paid by the owner, with the remaining utility cost divided among tenants. The mathematical formula used is typically based on criteria such as square footage, number of bedrooms, number of bathrooms, number and types of appliances, and/or number of occupants. As a result, at properties with RUBS, property-level energy or water savings measures can achieve cost savings for both owners and tenants. Additionally, at properties with RUBS, all tenants may benefit from utility cost savings in scenarios where only a portion of units receive efficiency measure upgrades or when upgrades are only made to common areas. In these scenarios, the efficiency measures reduce the total utility cost which is then divided according to the billing formula , resulting in savings whether their individual unit received efficiency upgrades or not.

In properties with a flat fee billback method, tenants may not see any utility cost savings from the efficiency improvements if an owner chooses not to lower the utility fees they charge. However, some jurisdictions, such as the state of Washington, require the utility cost billed back to tenants to be no more than the actual cost to the property.[9] Thus, some owners may be required to lower the flat fee if sufficient utility savings are realized.

Since utility billing structure can vary based on utility type, the efficiency measures selected at the property will also impact who benefits from the consumption savings. Since electricity is predominately tenant paid (90%), tenants will most often benefit from unit-level energy efficiency measures. Property owners will more often benefit from water efficiency measures, as water is more likely to be owner paid compared to electricity.

Figure and 5 shows the top Energy and Water Efficiency Measures (EWEMs) recommended by energy and water audit consultants for properties pursuing Green Rewards Mortgage Loans from 2019 through 2023. The eight national EWEMs were the most common measures found in every region. The regional EWEMs include the top measures that differed based on the property's regional location.

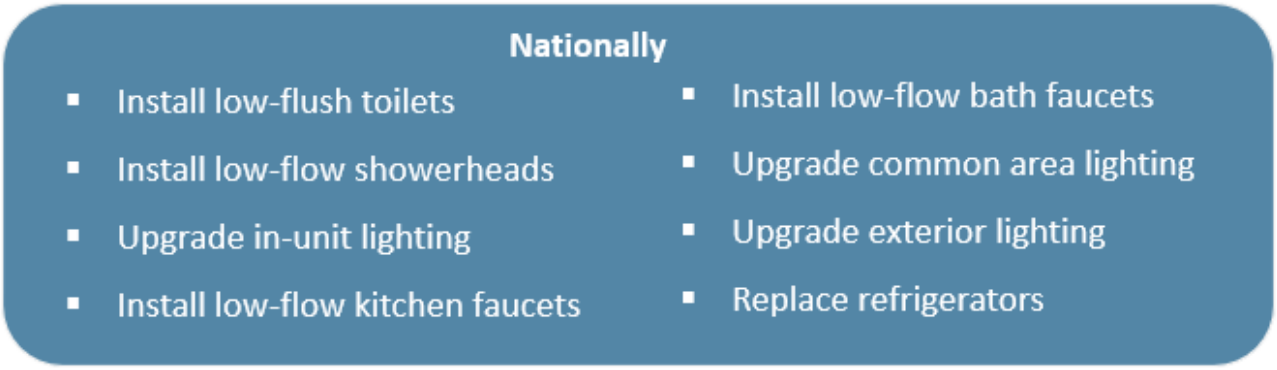

Figure 4: Top EWEMs Recommended Nationally

[9] "Washington Submetering Laws," Synergy Utility Billing, January 13, 2020, https://www.synergyutilitybilling.com/washington-submetering-laws/.

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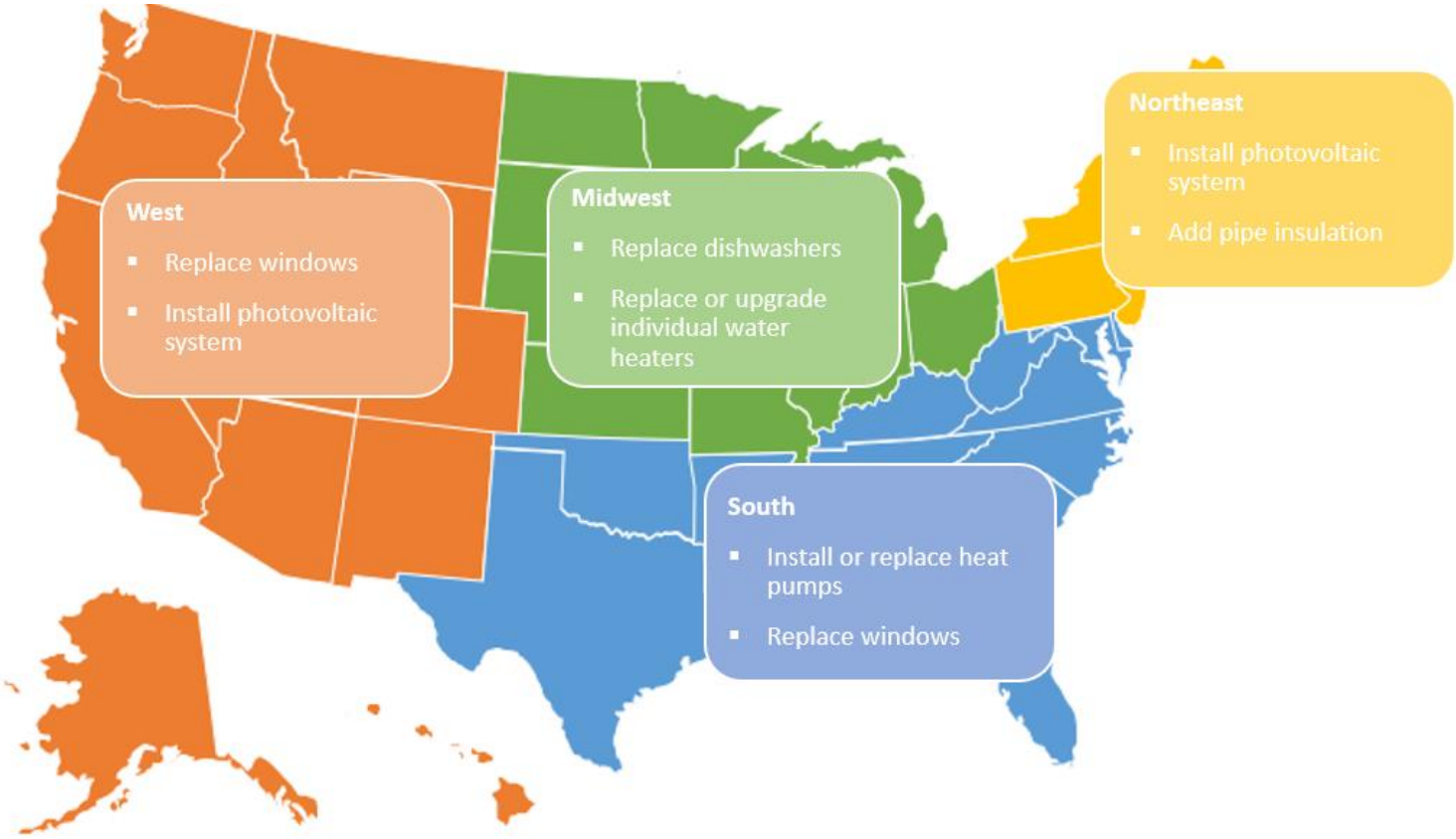

Figure 5: Top EWEMs Recommended by Region

The most common nationally recommended measures include both energy and water improvements. Water measures remain popular due to the shorter payback periods, typically less than two years (

Table 1) and the energy savings that come with reductions in usage of hot water. The regionally recommended measures focused mostly on energy efficiency, except one water efficiency measure in the Midwest. Both the Northeast and Western regions include the installation of a solar photovoltaic (PV) system as a top EWEM.

EWEM Name	Simple Payback (years)	Installed Cost per Unit
Install low-flow showerheads	1.2	$62
Install low-flush toilets	13.8	$335
Install low-flow kitchen faucets	1.3	$29
Install low-flow bath faucets	1.6	$23

Table 1: Simple Payback and Installed Cost for Selected Measures (Average)

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Cost Savings by Region

Across the United States, both tenants and property owners benefit from energy and water efficiency measures. However, the amount of utility savings achieved for each will differ based on the regional location of the property and the billing structure. **Error! Reference source not found.** shows the annual median per-unit utility savings by region for selected EWEMs for all Green Rewards properties.

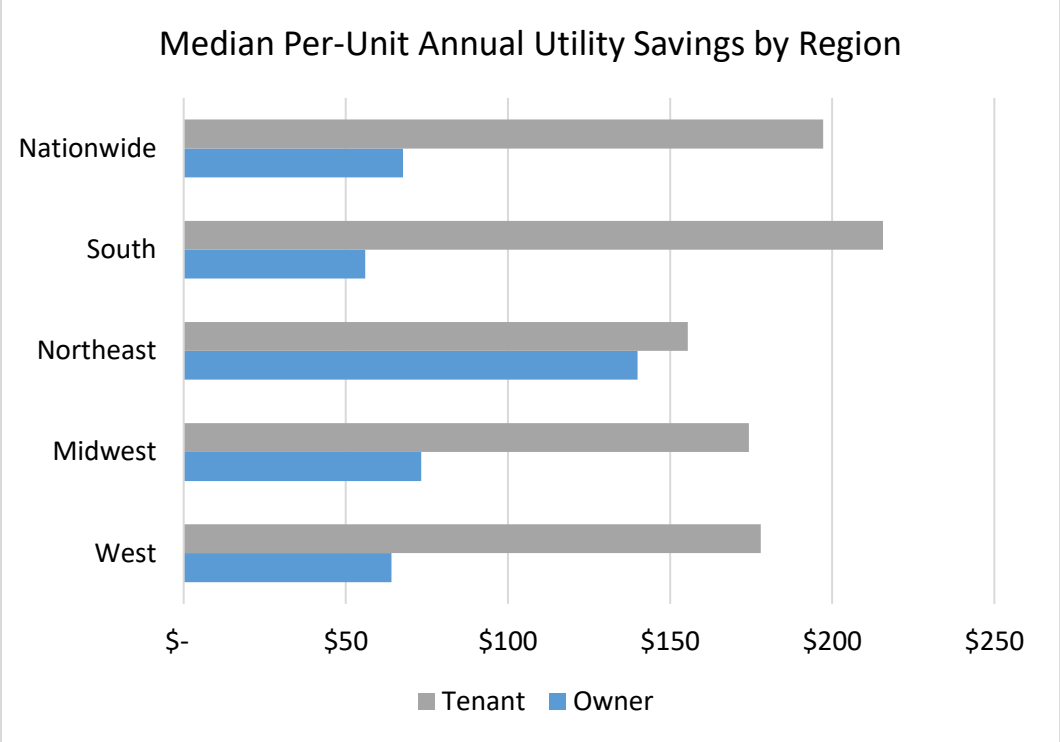

Figure 5: Median Per-Unit Owner and Tenant Utility Savings by Region

Notably, the per-unit owner savings are significantly higher in the Northeast than for other regions of the country. This is likely caused by the prevalence of natural gas for heating and hot water. In the Northeast, 70% of properties have gas heating, compared to 31% of properties across the other three regions. In the Northeast, 71% of properties use gas for hot water, compared to 45% of properties across the other three regions. Energy efficiency measures, such as adding insulation, and water efficiency measures are more likely to result in gas savings. This results in greater owner utility savings since gas is more likely to be owner paid.

Properties in the South tend to have greater tenant savings than properties in other regions, likely due to the prevalence of electric heating and water heating in the South. In the South, 68% of properties use electricity for both space heating and water heating, compared to 26% of properties across the other three regions. Since 90% of properties across all regions have tenant-paid electricity, the greater prevalence of electric heating and water heating results in greater tenant savings in the South.

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Cost Savings by Billing Structure

Median owner and tenant energy savings vary based on the billing structure for electric, gas, and water. Due to the constraints of the data, Fannie Mae was only able to analyze total utility savings, rather than fuel-specific savings for electricity, gas, or water.

Median owner savings are highest at properties with owner-paid electricity and lowest at properties with billed back electricity (**Error! Reference source not found.**). The opposite is true for tenant savings, which are highest at properties with billed back electricity and lowest at properties with owner-paid electricity. Property owners may still benefit from utility savings in a tenant-paid electric billing structure as properties likely have some owner-paid electric usage from the common area. Property owners may not benefit from utility savings with billed-back electricity as the common area electricity may be mostly billed through to tenants. Gas billing structures have less of an impact on tenant savings, although owner savings are still higher at properties with owner-paid gas and lower at properties with billed back gas (**Error! Reference source not found.**).

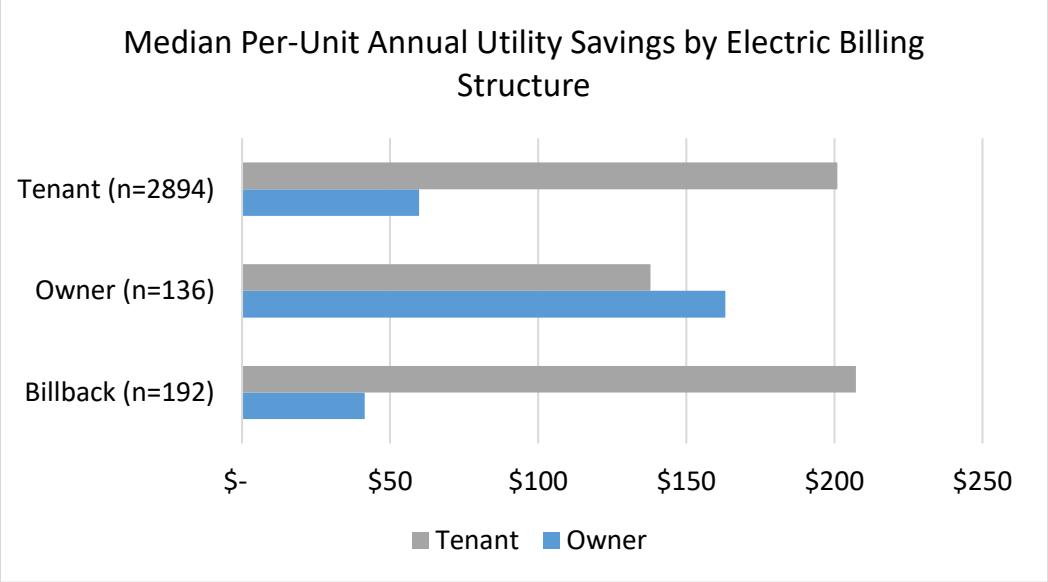

Figure 6: Median Per-Unit Owner and Tenant Utility Savings by Electric Billing Structure

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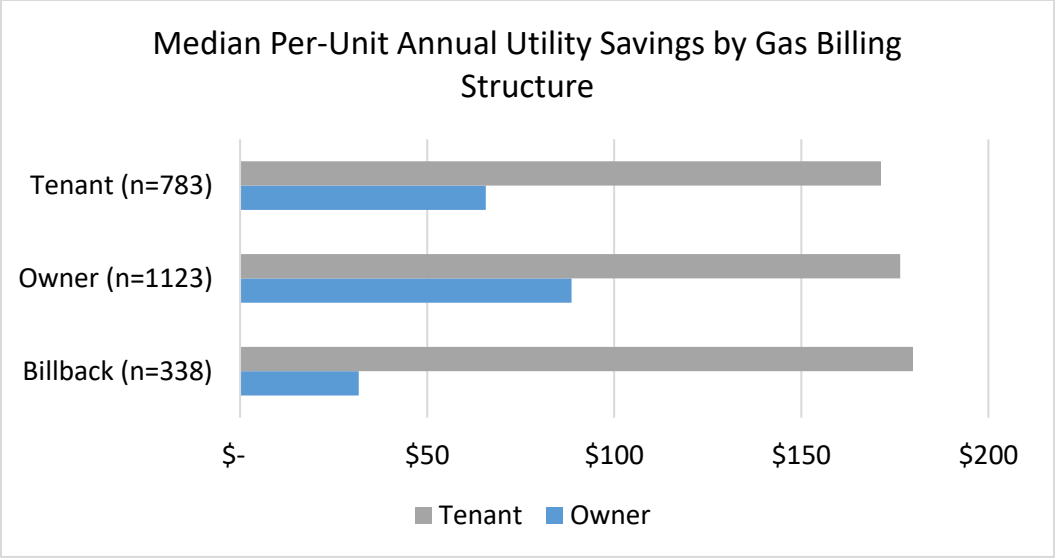

Figure 7: Median Per-Unit Owner and Tenant Utility Savings by Gas Billing

Water billback structure has the biggest effect on tenant and owner savings (*Figure 8*). Properties with tenant-paid water had the highest per-unit tenant utility savings and lowest per-unit owner utility savings. Properties with owner-paid water had the highest per-unit owner utility savings and lowest per-unit tenant energy savings. Given that many Green Rewards properties select significant water savings measures, it makes sense that water billing structures have an outsize impact on owner and tenant cost savings.

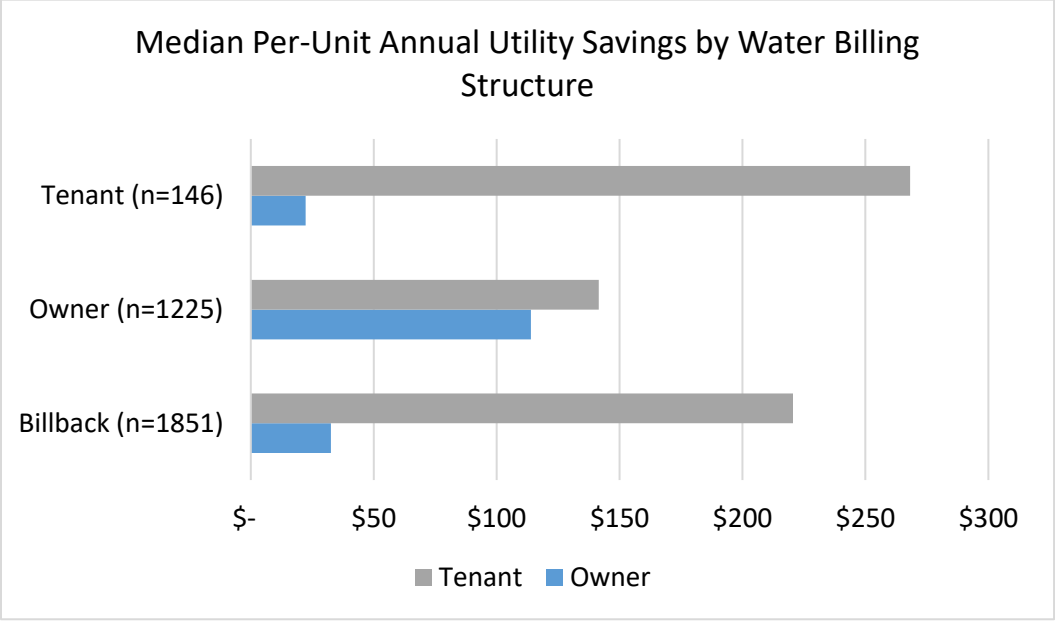

Figure 8: Median Per-Unit Owner and Tenant Utility Savings by Water Billing Structure

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Conclusion

Understanding who benefits from efficiency upgrades is not as simple as knowing whether those measures are installed in residential units or in common areas; the property's utility billing structure also plays a significant role in determining who will see cost savings from efficiency measures and by how much. While it is clear who benefits from efficiency improvements in scenarios with no billback or submetering, properties that have a flat fee or RUBS billback structure require additional information on how tenant utility bills are determined.

In-unit electric efficiency measures will most often benefit tenants, as 90% of properties have a tenant-paid electricity billing structure. In properties with a RUBS billing structure, tenants may also benefit whether their individual unit receives efficiency upgrades or not. These efficiency improvements can help address tenant energy burden by helping to reduce monthly utility costs.

In all utility billing structures, property owners will most often benefit from common area upgrades. Property owners can also benefit from in-unit water efficiency measures and efficiency measures that result in natural gas savings when these utilities are owner paid. Property owners can use these savings, along with the interest rate reductions and additional loan proceeds offered by green financing products, such as Green Rewards, to offset the cost of making the efficiency improvements.

As efficiency programs continue to evolve and the multifamily industry focuses on decarbonization, the utility billing structure will have implications on tenant affordability. Fannie Mae research shows that for decarbonization to be successful, electrification should be combined with energy efficiency improvements and, if suitable, on-site renewable energy generation. Estimates indicate that while most tenants will see a significant utility cost savings from electrification combined with efficiency, a small percentage of tenants (12%) are at risk of utility cost increases if electrification improvements cause previously owner-paid fossil fuel energy costs to shift to tenant-paid electric energy costs. A greater understanding of the significance of utility billing will enable property owners and financers to better protect tenant affordability as the market transitions to a low-carbon economy.