Deep and Continuous Savings: Engaging the Multifamily Market throughout the Building Lifecycle

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ABSTRACT

Objective:
The paper aims to:

- Outline various multifamily energy efficiency programs that foster continuous customer engagement and savings beyond construction (new or retrofit).
- Present the concept of continuous customer engagement through various phases of the building lifecycle.
- Discuss strategies to drive continuous improvement in multifamily buildings and emerging best practices in operations, monitoring and behavior modification.

Results/Achievements/Accomplishments

Traditionally, a regulatory body governs program designs and implementation timeframes (cycles). Regulatory bodies and climate change policies are establishing aggressive energy and greenhouse gas reduction goals. Program implementers are charged with designing and implementing programs to achieve these goals, cost effectively. As the incremental cost of energy efficiency increases with program goals moving toward the next zero continuum, programs must incorporate alternate strategies. While efficiency measure installation provides the majority of savings, expanding existing customer engagement to address operations, energy consumption tracking, and behavior modification can help to yield additional and continuous savings. Program design trends lean toward comprehensive, pay for performance, and single-point-of-contact models to encourage deeper participation, shifting away from a one-size-fits-all or an install or nothing approach.

This paper will:

- Catalogue multifamily programs that are designed to achieve deep energy savings, facilitate incremental action, and harness continuous energy savings after construction or retrofit
- Define customer engagement points through the multifamily building lifecycle
- Propose a framework for new program concepts to foster deep and continuous savings

Approach

We will examine the concept of expanding upon existing multifamily program channels to encourage deeper and ongoing energy savings by incrementally expanding post-construction program offerings.
State of the Multifamily Market

Of the more than approximately 112 million homes in the United States, 25 million (23%) are part of multifamily housing. Of those, about 86% are rental units, and 68% of multifamily units are in buildings composed of five units or more. Over 70% of multifamily units were built prior to 1980, prior to the adoption of building energy codes\(^1\). The national median age of multifamily rental buildings is 38 years old\(^2\). The multifamily building stock is complex with varying physical characteristics. The type of building, construction method, vintage, rigor, metering configurations, and applicability of the energy code to the year of construction all contribute to this complexity as summarized below by building characteristics, ownership structure, and tenant profiles.

Building Characteristics

- **Building Type:** Building characteristics, such as number of stories, type of dwelling unit, and tenant population, vary across multiple building types. Ranges include everything from low- to mid- to high-rises; four-plexes to apartments to condominiums; and dormitories to assisted-living facilities. Multifamily properties often include spaces and energy end-uses other than residential dwelling units, such as hallways, lobbies, parking garages, swimming pools, laundry rooms, and clubhouses. Furthermore, a multifamily property can represent a portion of a larger, mixed-use property composed of both residential and commercial spaces.

- **Architectural Type:** Architecture type may include wood, concrete, steel, brick, or steel. Building configurations, floor plans, and architectural features also vary widely.

- **Energy Efficiency:** Multifamily buildings have varying systems, such as domestic hot water (central, individual, storage, heat pump, tankless, combined hydronic), and heating and cooling (boiler, central split systems, packaged, heat pump, and chillers). Programs often categorize energy improvements as either in-unit equipment upgrades, or common area measures, which may include outdoor lighting, garage ventilation, pool pumps, etc.

- **Metering Configurations:** Properties can be master-metered, individually-metered, or some combination, or sub-metered for electricity and gas. In many cases, occupants pay part of the cost and owners pay the rest.

Ownership and Tenants

Multifamily buildings have complex ownership structures and varied resident profiles. The priorities of those owning, managing, and renting apartments in multifamily buildings may differ, but all directly impact decisions related to energy performance and affect how multifamily programs must operate.

- **Ownership and Management Structures:** Common multifamily property ownership structures include individuals, mom and pop businesses, nonprofit housing sponsors, Real Estate Investment Trusts, investor-owned entities, Limited Liability Partnerships/Corporations (LLP or LLC), and large corporations. Owners or third parties may serve as property managers.

\(^1\) United States Census Bureau, American Fact Finder, 2011 American Housing Survey General Housing Data - Renter-Occupied Units (NATIONAL)

factfinder2.census.gov/faces/tablesservices/jsf/pages/productview.xhtml?pid=AHS_2011_C01RO&prodType=table

\(^2\) United State Census Bureau, America’s Rental Housing, 2011, American Housing Survey, Table C-12-RO.
• **Rental Type:** The industry typically classifies rental units as affordable, market-rate, or luxury, and may build units for specific uses, such as transitional, military, senior, housing, assisted living, or student housing.

• **Renter Profiles:** Occupants can be low-income families, senior citizens, military personnel, immigrant populations, or downsizing baby-boomers. Those coming of age, including young professionals, young families, and adults transitioning out of foster or rehab care, also represent a significant portion of multifamily households. The rental market tends to be a more mobile population than those living in single family homes.

Multifamily rental units house many families that are not only unable to purchase a home, but also qualify as low-income. Affordability remains critical for multifamily renters as almost 75% of multifamily renters fall below the median household income level. High unemployment has resulted in less income to meet the demands of rising rents, increasing the number of households struggling to afford housing. Further, low income households spend nearly 20 percent of their income on their energy bills, compared to approximately four percent for the average household.

The vast complexities of multifamily building characteristics and stakeholder dynamics result in different energy efficiency needs. Program designs and strategies must adapt to these varying needs to create targeted and innovative approaches to effectively serve each segment of the market; a one size program design does not fit all.

**Why so Important to Get it Right for this Market?**

Traditional energy efficiency programs may face challenges when trying to adequately serve the complex and varied multifamily market. However, this market contains multiple opportunities for achieving unrealized energy savings through economies of scale by reaching many households in one program transaction. Multifamily building owners and managers can also achieve ongoing energy savings by improving building management practices and encouraging tenants as captive and receptive audiences for education and behavior programs. Non-energy benefits of building upgrades include increased home affordability, increased comfort, improved tenant satisfaction, and better indoor air quality, all of which represent critical issues for multifamily residents. The following characteristics lay the foundation for investing in multi-faceted strategies to adequately serve the market.

• **Underserved Market** - In a recent study of 50 metropolitan areas containing the largest number of multifamily dwelling units, the American Council for an Energy Efficiency Economy found that 40 percent of these areas do not offer multifamily programs. The level of investment in energy efficiency programs for multifamily housing does not keep pace with its relative portion of the housing market. The result is that nationally, about 34 percent of energy efficiency measures are present in multifamily rentals compared to other housing types. The multifamily sector often struggles with where they fit within programs because central systems or high-rise buildings fall under commercial code, while low-rise buildings fall under residential code.

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4 Energy Efficiency and its Relationship to Household Income in Multifamily Rental Housing, 2012, Gary Pivo, PhD, U of A Summerford, Lorentzen, TRC Energy Services  Page 3  2/10/2014
284914 - Deep and Continuous Energy Savings
• **Lower Transaction Costs and Economies of Scale** - Programs that target multifamily buildings benefit from economies of scale, as they can multiply energy savings and serve multiple dwelling units through transaction.

• **Potential Savings** - The potential for energy savings by the year 2020 consists of more than 51,000 gigawatt-hours of electricity and over 2,800 Million therms of natural gas, representing a value of nearly $9 Billion annually for property owners and tenants compared to the current estimated energy cost savings is $31 Billion. Energy savings potential savings can extend beyond new construction and existing building upgrades through building operations and maintenance, benchmarking and monitoring, and tenant behavior adjustments.

• **Household Benefits** – Energy expenditure per square foot in rental multifamily apartments is 38% higher than energy expenditure in owner-occupied apartments. Apartment renters typically cannot afford to purchase a home, and a substantial number qualify as low-income. These groups also tend to spend a higher proportion of their income on energy bills as compared to average-income households. Therefore, as energy cost increases affect renters more than homeowners, renters may also be more receptive to education and behavioral programs. Utility costs represent the largest operating expense for master-metered, public housing buildings. The comfort, affordability, and health impacts, or non-energy benefits, of an efficient and properly maintained building make addressing this market even more critical.

**How is the Multifamily Market Currently Being Served?**

Although still more limited than residential and commercial programs, multifamily programs have been expanding in the past several years. As part of a study of the multifamily energy efficiency marketplace conducted on behalf of NYSERDA, TRC Energy Services catalogued programs specifically designed to serve multifamily buildings through rebates, direct install of low-cost measures, and whole building approaches. Currently, rebates for individual measures represent the most common energy efficiency incentive program offering in the multifamily market. Many program administrators offer several options for participation in their multifamily programs, with the combined offering of rebates and direct install used most often. Some of the long-existing weatherization and basic prescriptive utility programs have saturated their markets, and generally do not drive deep or continuous energy savings.

Preliminary findings from the TRC Energy Services study show that programs serving existing multifamily buildings make up the majority of the multifamily energy efficiency marketplace; 60 percent of program administrators only serve retrofit projects. About 34 percent of program administrators offer options for both existing buildings and new construction multifamily projects, with the remainder exclusively serving new construction. Retrofit programs are the most common. Retrofit programs often attempt to identify additional savings opportunities for customers through free initial building audit. However, only a small number of programs mandate minimum levels of achieved savings for incentive payment; an approach in which participants may pick and choose which measures to install proves more common.

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6 Partnering for Success: An Action Guide for Advancing Utility Energy Efficiency Funding for Multifamily Rental Housing, 2013, National Housing Trust
majority of the programs that implement a whole building approach with a mandated minimum savings threshold are new construction programs.

Retrofit programs present substantial opportunities for encouraging deeper savings. However, nearly a third of the multifamily energy efficiency programs included in the study serve only one fuel — either electricity or gas—but not both. This limitation reduces the impact of those programs at a basic structural level.

**Program Barriers to Facilitating Deep Savings**

Many programs succeed in incentivizing some level of savings. However, if we need to drive properties toward deep and continuous savings, we need to understand which barriers may deter deeper participation, and the potential intervention points through which to propose deeper energy efficiency investments. A one-size-fits-all approach is not realistic. The following paragraphs summarize the main barriers prohibiting greater participation.

**Program Silos** - Ratepayer funding pools often drive program design to serve just one component of the deep energy savings potential, such as weatherization, low-income, direct install, prescriptive, non-residential, whole-building, renewables, or other energy-saving components like demand response, or education or behavioral programs. These silos deter property owners from engaging in more than one program due to the transaction cost of applying to and meeting the differing requirements of multiple programs. While well intentioned, programs that target the same customer directly compete for property owner time and investment to meet program goals; participation in these programs may result in multiple property visits or assessment, increasing tenant disruption and driving up related labor and costs.

**Market Confusion and Competing Programs** - Several years ago, we received consistent feedback from property owners requesting assistance to navigate through multiple programs to determine which one best matches their property needs. Since then, multiple new programs targeting the multifamily property owner have entered the market, resulting in multiple recruiters competing for property participation. Multiple program inquiries and requests not only overwhelm owners, but may also result in duplicative transactions and market confusion.

**Cost Effectiveness Requirements** - Some programs have cost-effective requirements for each measure, or for the entire package of measures. Cost effectiveness caps at the project or measure level prohibit property owners from investments in energy efficiency measures (e.g. windows, solar thermal) based on the need. If a property owner needs to replace windows, programs can simply pay for the marginal savings, without eliminating a measure based on customer cost.

**Split Incentive** - As mentioned above, properties can be master metered, individually metered, or some combination, or sub metered for electricity and gas. An estimated 90 percent of multifamily properties are individually metered. In many cases, occupants pay part of the cost and owners pay the rest. This split incentive presents a special challenge in the multifamily market, where property owners have little incentive to invest in energy efficiency measures from which they will not see any cost savings, as the tenant reaps...
most, if not all, of the benefit. Further, tenants do not have the motive or authority to invest in energy efficiency within their units.

**Lack of Available Data** - Before making energy efficiency investment decisions, the property owner needs to feel confident in the feasibility of achieving the predicted energy savings. Property owners need to track property energy use to identify problems, and to track the impact of energy efficiency investments for both new construction and retrofit projects. Owners with properties containing individually-metered units (for electric or gas or both) typically do not have access to tenant energy use. Currently, there are three primary ways to obtain billing data for an individually metered multifamily property:

1) Collect utility account data and authorization from each dwelling unit or from a group of representative units, extrapolate to the whole building and combine the results with any central and common-area consumption.
2) Obtain billing information from each tenant and combine with common area bills.
3) Request aggregated energy consumption and billing data at the property level, which is a challenge for most utilities because of customer confidentiality issues.

These cumbersome options severely limit the property owner’s ability to track pre- and post-investment energy use consumption. They also limit the ability to calibrate building simulation models with billing data. A lack of overall multifamily program performance data hinders the comparison and quantifying of the performance of various program types. Inconsistent reporting structures, multifamily data that is not separated out from commercial/residential program results, and various calculation methods all contribute to challenges in gathering program benchmarking data, in turn prohibiting the property owner from effective measuring return on investment.

**Dwindling Cost Effectiveness** - Increasingly stringent standards and baselines further contribute to dwindling cost effective measures, reducing the ability for owners to make larger investments. Increasingly stringent new construction codes push measures out of the cost effectiveness realm. Retrofit programs that had previously relied on direct install to earn quick and easy savings now face diminishing returns on those measures as evaluation criteria evolves. Even more sophisticated programs face challenges of limited opportunity for incentivizing cost effective measures over increasingly aggressive code baselines.

**Short Program Cycles** - Major investments in energy efficiency require careful capital planning that, in the case of affordable housing, could take a couple of years depending on whether a project wins competitive funding. Developers and owners often plan, obtain funding for, and complete rehabilitation of buildings over the course of multiple program years, resulting in the need for a long lead and construction time frame, more similar to new construction projects. Similar to new construction, major whole-building or deep savings investment projects need to span program cycles, whereby they can enroll in one cycle and complete and receive incentives in another. The California Public Utilities Commission is considering a ten-year rolling funding cycle with incremental review.

**A Framework for Deep and Continuous Energy Savings**

While programs successfully serve the multifamily market, many are prescriptive and basic in nature, and some are reaching stages of diminishing effectiveness. Trending whole-building programs that achieve deeper savings offer encouragement, yet implementers still face uncertainty about the effective approach to deep savings. Further, few programs have begun to address the post installation
opportunities to encourage further savings and ongoing engagement. To effectively consider how to best integrate programs into the market and evaluate program design from a customer or market standpoint require a shift in how policy makers regulate and how implementers design programs.

First, we need to dismantle the individual program silos and rebuild the offerings as one, full-service program. To do so, we will need authority from governing bodies to provide programs the flexibility to incorporate previously segmented focus areas. Then, we need to define the intervention points most suitable for influencing energy efficiency investments. Lastly, we need to look at how we can engage property owners beyond construction and installation to impact behavior change. A framework to shift program design approaches includes using 1) an integrated multi-faceted installation program, 2) incentives to encourage deeper savings, 3) program options to easily combine multiple measures in a transparent, customer-friendly format, and 4) strategies to ensure the savings from energy efficiency upgrades continue through post-construction efforts and on-going customer engagement. Summary of each approach and subsequent program examples follows.

Strategies for Achieving Deep Energy Savings

**Full Service (Installation) Program** - To overcome the program silos barrier, program designs can provide an integrated, full suite of program options aimed at serving the property owner through a single point of contact. These options can include weatherization or low income program installation, direct install, prescriptive, custom, whole-building, renewables, post construction engagement, and other utility offerings. Programs that provide an array of solutions, along with customer support staff to assist in identifying options best-suited for an individual customer, will allow the property owner to engage in more than one approach to upgrades. We list examples of programs that offer multiple options, from direct install to whole-building, below.

- **Consumers Energy Multifamily Energy Solutions** offers multiple approaches through one program: direct install, prescriptive, custom, and whole-building. An energy advisor assigned to the property conducts a site visit to identify property owner needs, budget, and energy efficiency goals. The energy advisor provides solutions to the owner and, if warranted, schedules an in-house engineer (BPI Multifamily Analyst) to conduct a free whole-building audit and analysis, and provides a report outlining two upgrade scenarios. This service includes benchmarking solutions for utility analysis and portfolio comparison.

- **San Diego Gas & Electric (SDG&E®)** is moving in the direction of program integration by offering a single point of contact for both their prescriptive Multifamily Energy Efficiency Rebate Program and their whole-building Energy Upgrade California - Multifamily program. In this approach, the single point of contact pre-screens the owner and property to determine the best approach to their energy efficiency upgrade needs. The single point of contact also coordinates with the low-income Energy Savings Assistance Program (ESAP), a pre-requisite for affordable housing prior to participating in prescriptive or whole-building programs, to allow for the installation of free measures first, enabling the property owner to shift resources to higher cost measures. Ideally, these programs would operate with one application, one audit, and one process. SDG&E continues making strides in breaking down the program silos.

- **Puget Sound Energy Comprehensive Multifamily Retrofit Program** offers one-stop shopping for direct install and in-unit and common area comercial incentives. The direct install element serves to also gather in-unit information and provide tenant education.
• **Mass Save Multi-Family Buildings Program** offers market rate (audit and prescriptive measures) and affordable (audit, prescriptive, funding and benchmarking tools) paths.

A similar strategy to encourage comprehensive rather than competing programs would include qualifying properties for low-income programs at the property level, rather than the tenant level. This facilitates whole-property upgrades, reduces transaction costs, allows for potential integration with other upgrades, and reduced tenant disruption.

**Progressive Incentive Structure** - Decision-makers seem more interested and receptive to basic energy-saving measures, often considered the low-hanging fruit; more advanced measures and comprehensive retrofits often require additional financial reward. To overcome the split incentive and encourage deeper savings, programs can use incentives to reward greater investments. Escalating incentives according to incremental performance (building, trade ally), bonuses for multiple measures, pay for performance methods, or bulk-savings or multiple property portfolio incentives can all drive customers to make more significant energy efficiency investments.

• **New York State Energy Research & Development Authority’s (NYSERDA) Multifamily Performance Program** employs tiered performance payments that escalate in accordance with the savings achieved through building retrofits. The program pays a baseline incentive on a per-unit basis to projects achieving the minimum 15 percent energy savings. Following the post-retrofit analysis of one year’s worth of utility bills, projects can earn additional incentives for reaching incremental tiers of savings levels beyond the minimum threshold. This encourages customers to design projects to achieve higher savings and also encourages conscientious building operations following the retrofit.

• **Pacific Gas & Electric’s California Multifamily New Homes (CMFNH) Program** requires buildings to exceed Title 24 by at least 15 percent. The program calculates the performance incentive on a dollar-per-energy-unit basis (kW, kWh, therms); incentives begin at 15 percent above the 2008 Standards, and plateau at 45 percent above Standards. The energy consultant ($50/unit) and HERS verification ($60/unit) incentives cap at 200 dwelling units. The maximum energy consultant incentive per project is $10,000. The maximum HERS verification incentive per project is $12,000. In addition to incentives, the program offers building simulation training, energy design assistance, an educational webinar series, and program coordination with other green and renewable programs. On average, projects have exceeded Title 24 by 26 percent, and the program benefit-cost ratio has increased to 1.53, making CMFNH the most cost-effective residential program in PG&E’s portfolio.

**Bundling or Multi-Measure Path to Deep Savings** - In many cases, property owners want concrete information about measure cost and savings prior to investing in a full whole-building audit or retrofit project. Bundling or multi-measure options can offer property owners the upfront transparency of the measures and incentives to inform their energy upgrade investment decisions. These options encourage deep savings with a streamlined property assessment and reduction in required technical support, and reduce the cost of program participation for building owners while creating a simple and transparent program participation path. These options can also push prescriptive projects to deeper savings.

In addition to custom and whole-building, implementers could consider multi-measure incentive kickers for properties that fall between the prescriptive and whole-building approaches.
Multi-measure packages can provide an alternate path to prescriptive and whole-building offerings in several ways:

1) **Performance-Based Packages** - Develop packages by identifying the top common prototype buildings, measures, and systems, and modeling them to determine baseline and a set of measures to achieve a performance target, for example 20 improvement or a certain HERS score. Incentives under this approach are based on pre-calculated savings for packages of upgrade measures commonly used for properties that match the prototypes.

2) **Measure Bundling** - To avoid an all-or-nothing approach to whole-building, offer an alternative path that bundles measures based on one of the following criteria:
   - *Savings integrity* - For example, only allow incentives for insulation if scope includes air sealing
   - *Cost effectiveness* - For example, if a single measure proves marginally cost effective, bundle it with one or more cost effective measures and then offer them as a package

3) **Multi-Measure Kicker** - Develop packages that combine measures by commodity and loading order, and provide incentive kickers. For example, for electric only, one package could include lighting measures, sensors/controls, and one or more appliances. Another package could build upon the previous, by adding envelope measures, on so on. The table below illustrates an example of a multi-measure prescriptive path by commodity.

<table>
<thead>
<tr>
<th>Commodity</th>
<th>Package 1: Lighting, sensors, appliance(s)</th>
<th>Package 2: Faucet aerators, low flow shower heads, envelope plus, DHW OR Envelope plus furnace</th>
<th>Package 3: Package 2, plus HVAC or Package 2, plus furnace or Package 2, plus HVAC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electric only</td>
<td>Package 1, plus envelope</td>
<td></td>
<td>Package 2, plus HVAC</td>
</tr>
<tr>
<td>Gas only</td>
<td>Lighting, appliances, faucet aerators, low flow shower heads</td>
<td>Package 1, plus envelope AND EITHER envelope or DHW</td>
<td>Package 2, plus furnace</td>
</tr>
<tr>
<td>Gas and electric</td>
<td>Package 1, plus envelope</td>
<td></td>
<td>Package 2, plus HVAC</td>
</tr>
<tr>
<td>Incentive kickers</td>
<td>Incentives + $25 or $50/unit OR an additional 10-20%</td>
<td>Incentives + $25 - $50/unit OR an additional 10-20%</td>
<td>Incentives + $75 - $100/unit OR an additional 10-20%</td>
</tr>
</tbody>
</table>

Several utilities with whole-building program elements are considering and even conducting analysis to support the multi-measure or bundling approach. Although no utilities have adopted this approach, some programs have tested the multi-measure offering in the single family home performance market. Los Angeles County Energy Upgrade California program requires minimum installation of three qualifying measures, including at least one measure from the list of “base measures” and selections from the “upgrade measures” list for participation in the multi-measure path. Each measure receives a relative score. To qualify for incentives, upgrades must equal a minimum of 100 points. Incentives are based on the number of points which range from 100 to 250+.

**Strategies for Achieving Continuous Engagement**

Currently, the multifamily market does not widely use building performance tracking measurement, operations and maintenance, or tenant behavior to encourage post-construction or post-installation savings. Owner and manager-led efforts to improved energy management and planning by have a promising role in the next stage of program-driven energy efficiency. Although quantified results of these types of activities are less defined than direct equipment replacements, these supplementary
approaches can result in cost effective savings if properly incorporated into an installation program. We include some current examples of programs utilizing post-construction/installation incentives below.

**Operations and Maintenance** - Improving operation and maintenance (O&M) practices can significantly increase the energy efficiency of a building. Proper training for property managers plays a critical role in ensuring proper usage, maintenance, and operation of installed equipment. Some implementers may offer Building Performance Institute offers Multifamily Energy Efficient Building Operator (MFEEBO) training and certification for free, at a reduced rate, or in combination with other incentives. The certification demonstrates conceptual understanding of building science and performance, the relationship between the various building systems and its effect on occupant health, safety and comfort, energy efficiency and durability. Low-Income Housing Tax Credit funding and local or regional green building certification programs may require this certification. Examples of programs promoting multifamily building operator training include:

- *Bay Area Regional Energy Network (BayREN)* offers BPI MFEEBO training, which also counts toward the region’s Green Business Program and a $5,000 incentive to earn the Green Business Program Property Management Certification. The training counts toward the region’s green building programs as well.
- *The Pepco Operations & Maintenance Training Incentive* offers an incentive for completion or certification of approved building training courses. The program offers up to 80 percent of tuition costs up to a maximum of $1,000 of enrollment costs, per course.

**Measurement, Benchmarking, and Tracking of Energy Savings** - Building energy performance is as much a function of proper building management as the energy conservation measure incorporated into the structure. The following programs promote benchmarking.

- *Focus on Energy Multifamily Energy Savings Program* provides benchmarking incentives in addition to custom approach incentives. If the savings exceed the projected savings (after 12 months of tracking), the program offers up to $100 per additional peak kW energy saved.
- *Efficiency Maine’s Multifamily Efficiency Program* offers free benchmarking services for five to 20-unit multifamily buildings. Each building receives a report that includes a graphic representation of the building’s energy performance, and a detailed explanation of each of the indicators used to rank the building. The report also contains the building’s carbon footprint, energy efficiency recommendations, and additional funding opportunities for energy efficiency efforts.
- *ENERGY STAR Multifamily High Rise*, which is being adopted as the standard for many multifamily new construction programs, requires that developer/owner benchmark building energy use in Portfolio Manager for a period of two years.

**Procurement Standards and Procedures** - Purchasing agents, property managers, and maintenance staff purchase products, equipment, or appliances as precautionary measures or to address failure; these purchases constitute part of new construction project plans, and often represent part of a larger bulk purchase from a supplier or distributor. Program information and templates can provide builders and property owners with procurement guidance on can ensure that they engage with the utility programs before committing to purchases. The following bullets illustrate examples of utility-funded efforts to influence procurement standards for a portfolio of properties.
- **SDG&E’s Energy Roadmaps** for San Diego Housing Commission and County of San Diego Housing and Community Development – these housing authorities adopted a procurement policy requiring all energy-related purchases meet or exceed energy specifications set by SDG&E and EPA’s ENERGY STAR® standards. The policy aims to avoid purchases without first investigating utility standards, incentives, and programs; educating vendors; and tracking progress toward achieving the standard for all purchases.

**Tenant Education and Behavior Programs** - While buildings can become more and more efficient, the theory that “people use energy, buildings don’t” is increasingly playing a role in identifying post-installation savings opportunities. Behavioral energy efficiency programs can provide cost-effective savings. They engage the customer (usually on the residential side) in a way that previous programs have not been able to. By leveraging insights from social sciences, these programs employ more than just monetary incentives to achieve energy savings. Existing efficiency programs are increasingly incorporating behavioral components into program design to improve participant enrollment, engagement, and savings.

Multifamily tenants represent a captive audience that is relatively sensitive to utility costs, and multifamily property owners have direct communication channels with tenants. Further, many affordable property owners currently hold required or optional educational and life skills training courses, some of which could form a foundation on which to implement energy efficiency behavioral programs. The programs below provide examples of tenant education and behavior program elements.

- **Energy Trust of Oregon’s MPower Oregon** program assists building owners in monitoring factors related to building performance. Monitoring begins upon completion of energy efficiency retrofits designed to achieve 20 percent savings, and includes post-retrofit commissioning, monthly performance monitoring of energy and water use, on-going tenant engagement and education programs, and support for implementing operations and maintenance best practices.

- **County of San Diego Energy Upgrade California Multifamily** launched a resident energy education initiative to motivate residents to become active stewards of their energy and water use. The initiative relied on two components:
  1) A tenant newsletter providing education and advice on lighting choices, reducing phantom loads, smart power strips, ENERGY STAR labeled televisions, a list of resources, and a call to action to conserve.
  2) An interactive energy display placed at properties at optimal time or at a special event to engage tenants. The display featured technology and behavior strategies to reduce lighting, plug load and water use.

**Multifamily Market Intervention Points**

A successful approach to serving the multifamily market relies on integrating program design into existing industry processes through appropriate intervention points. Throughout the building lifecycle, programs can influence and optimize energy efficiency investment decisions at multiple trigger points. These intervention points highlight the most convenient or cost-effective triggers for installing upgrades, and include new construction design, operations and maintenance, equipment replacement, rehabilitation/retrofit, unit turnover, time of sale, and refinancing as summarize below.
• **New Construction** – Early design phase, the design team establishes energy efficiency project goals, and is likely more receptive to integrated design and energy efficiency advice.

• **Ongoing Maintenance** - Planned, or time of sale, servicing of mechanical equipment or appliances

• **Replacement** - Failing or troublesome equipment

• **Unit Turnover** - Standards and needed improvements upon vacation.

• **Retrofit** - Limited scope retrofits, including packaged or planned energy efficiency improvements

• **Rehabilitation** - Deep property overhaul including mechanical equipment

• **Refinance/Acquisition/Time-of-Sale** - Trigger for retrofit to rehabilitations

Typically, programs that can align with these entry points and tailor their outreach and services to these opportunities will increase their likelihood of success.

**Conclusion**

The purpose of this paper is to discuss the concept of deep and continuous savings throughout the multifamily building lifecycle, identify key strategies and intervention points to achieve this concept, and provide examples of programs that are moving toward this concept - all within a very complex market.

While the multifamily market is varied and complex, the market’s untapped potential energy savings and the ability to impact many households in one transaction provide significant opportunities for deeper savings. To offer effective solutions, program implementers and policy makers should reconsider the traditional one-size-fits-all approach to serving a market. Restructuring programs to offer a full suite of customer-solution focused services and progressive incentive structures will eliminate program confusion and duplicative efforts and help to drive deeper savings. Designing programs that can be easily inserted into property owner’s key trigger points can more effectively influence property owner’s energy efficiency investment decisions. In addition to providing single-entry programs, implementers must look beyond installation to encourage strategies for continuous savings that include operations and maintenance and energy use tracking. Finally, implementers could augment their programs to leverage established communication channels between property owners and tenants to further educate and influence tenant behavior; as “buildings do not use energy, and people do.”