Case Study of an Energy Efficient Multifamily Development

Introduction

Historically, multifamily residential housing developments had few incentives or disincentives to incorporate high efficiency design features and appliances into their projects. The ability to qualify for additional tax credit funding basis boosts and the cash incentives provided by multifamily utility programs, however, have transformed the traditional process multifamily developers have followed. Energy efficiency is now standard in many projects because of not only these direct financial benefits, but also the indirect effects it has on the development’s bottom line, such as increased tenant and homeowner comfort, reduced maintenance costs, and decreased utility bills.

BRIDGE Housing has always been dedicated to providing their residents with high-quality affordable housing. Over time, their definition of high-quality has come to also mean developing housing that is sustainable and environmentally sound. To highlight the importance of green building, BRIDGE established an internal committee whose purpose is to study current and emerging green practices in all areas of development and management as well as to increase the energy efficiency of their buildings, the sustainability of their methods, and the health of their residents and employees. They now include energy efficient and green measures as a critical piece of their development process because it enables their residents to have a higher standard of living and lower utility expenses.
Cottonwood Creek Apartments is a 94-unit affordable housing complex in Suisun City, California, the first in Solano County with photovoltaic panels. In addition to energy efficiency, this project incorporates high-efficiency water systems, sustainable building materials, a solar-powered community building, ENERGY STAR® appliances, pedestrian-friendly walkways, and a bio-retention basin to treat stormwater runoff, amongst many other green measures.

Cottonwood Creek's four three-story buildings are comprised of one-, two-, and three-bedroom units, each equipped with electric kitchens, wall-to-wall carpeting, and on-site covered parking. Additionally, on-site laundry facilities and two large open spaces in the interior of the property, one for a pool and small lawn and the other for a children's play area, picnic spots, play field, and basketball court, add to the complex's comfort and livability.

While real estate developers in general face a large number of obstacles, affordable projects in particular have a unique set of challenges. Because of the restricted rent rates to which they are subject and the long-term operating costs they are often responsible for, the ongoing operation costs for affordable housing developments poses a significant risk. For BRIDGE, incorporating energy efficient and green building technologies into Cottonwood Creek helped reduce these operating costs, thus making the project financially sustainable throughout the 55-year term of its permanent financing. As an added benefit, these measures also provided a healthier community for their residents and minimized their impact on the environment.

Although these measures can increase first cost, there is often additional funding assistance in the form of incentives and tax credits that help offset costs. PG&E’s California Multifamily New Homes (CMFNH) program, for example, provided an additional financial incentive for BRIDGE to integrate energy efficiency into the project. Some affordable housing projects applying for tax credit allocations can also increase their score and make their applications more competitive by incorporating sustainable measures into their projects, which BRIDGE also took advantage of.

**Energy Efficiency**

Every project BRIDGE develops is different; each designed to best integrate itself into the community it will become a vital part of. Most projects exceed Title 24 by 15% because it qualifies them for a larger basis boost with the California Tax Credit Allocation Committee (CTCAC) program, allowing them to apply for larger funding amounts. Furthermore, BRIDGE maintains green standards for all of their developments, which are updated annually, in order to ensure that all projects adhere to their strong green criteria.
Cottonwood Creek’s initial design simply met California’s Title 24 energy code. Reaching 15% above Title 24 was a critical goal for BRIDGE and one that took a significant amount of coordination with and cooperation from their consultants. Through the combined efforts of all parties involved, they were not only able to exceed code, but also their 15% goal, by creating a project that is, on average, 17.6% more energy efficient than 2005 Title 24.

**Energy Efficiency Upgrades**

Cottonwood Creek Apartments received design assistance, cash incentives, and training opportunities through their participation in the CMFNH program, funded by Pacific Gas & Electric¹. It also served as a tool to help push their consultants and designers to meet the benchmark they set of 15% above code. Through the assistance of Heschong Mahone Group, Inc. and the rest of the design team, BRIDGE was able to upgrade to a high efficiency design. The overall site layout and design increased the energy efficiency of the buildings by maximizing daylighting. They also strategically selected and placed landscaping in order to minimize solar gain in the summers and encourage it in the winter. On the building materials and building strategy side of the design concept, BRIDGE used:

- Radiant barrier roof sheathing
- Low E² thermally efficient windows
- Third-party HERS-rated HVAC equipment to ensure maximum performance of the system
- Raised heel trusses for increased insulation
- A high-performing building envelope complete with Quality Insulation Installation
- Ducts in conditioned spaces tested and verified for leakage

In addition, BRIDGE also incorporated high efficiency ENERGY STAR® appliances, including refrigerators, dishwashers, and front-loading washers and dryers. They also installed efficient fluorescent lighting, light-emitting diode (LED) exit signs, and motion sensor lights in the community building. These upgrades significantly improved energy efficiency for the entire project, allowing Cottonwood Creek to qualify for the CMFNH program and the financial incentives it provides as well as additional basis boosts in the various tax credit programs.

¹ Visit [www.h-m-g.com/multifamily/CMFNH](http://www.h-m-g.com/multifamily/CMFNH) for more information.
Green Elements

As Solano County’s first affordable housing complex with photovoltaic panels, BRIDGE successfully incorporated many sustainable design elements into Cottonwood Creek Apartments. Amongst others, they invested in high-efficiency water systems, sustainable building materials, powered their activity buildings and all common areas using a 65-kilowatt photovoltaic system, created a bio-retention basin to treat storm water runoff, and designed pedestrian-friendly walkways throughout the complex.

Perhaps the most aggressive green measure BRIDGE incorporated into Cottonwood Creek Apartments is their photovoltaic system, which they were able to fund through a combination of rebates from the California Energy Commission and tax credits. The system is designed to offset the entire electric load required by their common areas, estimated to be about $20,000 per year.

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<thead>
<tr>
<th>65 Kilowatt Photovoltaic System</th>
<th>$555,000</th>
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<tr>
<td>California Energy Commission Rebates</td>
<td>(-) $177,000</td>
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<tr>
<td>Tax Credits</td>
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<tr>
<td><strong>Total System Price</strong></td>
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**PHOTOVOLTAIC SYSTEM TOTAL COST**

Energy and Cost Savings

As is the case with most affordable housing projects, BRIDGE utilized multiple funding sources to finance this $26 million project, many of which required energy efficiency as part of their criteria. These funding sources were chosen to raise enough capital to cover the upgrade costs they knew the project would incur in meeting their sustainability goals. Although they did not have exact costs for each measure needed to meet their intended energy efficiency objectives from the onset of the project, they were prepared to spend a little more in their first costs in order to reap the long-term rewards.

By determining they would exceed Title 24 by at least 15% from the beginning, BRIDGE was able to not only allocate their funds appropriately, but also work with their design team to meet those goals in a cost-effective manner. Because the measures were initially stated as goals for the development team and built into the project’s design, they were able to work towards their energy efficiency goals from the beginning of the design process, thus saving BRIDGE from incurring additional costs for the team to return to their drawings and modify their plans.

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1 For a complete list of the specific green measures BRIDGE incorporated, please visit their website at: http://www.bridgehousing.com/Cottonwood-Green-Features.
As a result of the advanced planning and clear goals that BRIDGE initially established, exceeding Title 24 by over 17% did not have a significant impact on the cost of the project. The site plan, building materials, and building systems were laid out to be as energy efficient as possible from the start. Subsequent upgrades, such as increased R-values in the insulation, had minimal cost impacts. We estimate, based upon figures from the DEER Database\(^1\), that BRIDGE should have spent an additional $85,000 on incremental energy efficiency upgrades, or $0.71 per square foot. The CMFNH program provided $38,540 in financial incentives and rebates to assist in offsetting any cost implications of installing the energy efficient measures and the required HERS rater to inspect and verify those measures. When compared to their total hard costs for the project, which were about $143/square foot, the incremental first costs for the added energy efficiency measures—taking into account the CMFNH incentives—were about $0.39 per square foot, a minimal 0.27% of hard costs.

Projected savings from the efforts BRIDGE made to reduce their energy impact are some of the greatest the CMFNH program has experienced to date. Cottonwood Creek Apartments is expected to save 27,426.83 kWh every year. When combined with the additional 12,445.60 kWh savings from appliances, this one project will be saving enough energy every year to power roughly six California single-family homes\(^1\).

**Lessons Learned**

Energy efficiency is always a matter of finding the right package of measures. While some packages wouldn’t necessarily work for this project in particular, it does not mean that it could not work for others. The key is to work through various scenarios, keeping in mind the certain criteria specific to each project, and determine the most effective and efficient combination of measures to fit the requirements of the individual development.

Cottonwood Creek has only been fully operational for a few months, yet both the onsite management staff and residents are already seeing results. Several families have told the property’s staff how pleased they are that their utility bills are so small and the onsite resident manager has noticed her statements are very low as well. Even in the middle of the summer, when temperatures often reach 100ºF, the apartments remain cool. Management reported that they “… had many residents walk into an apartment for the first time asking if the air conditioner was on and when [they] tell them ‘no,’ they’re surprised by how cool it was.”

In addition to the reduced energy bills and increased tenant comfort, BRIDGE has been able to highlight the sustainable design and energy efficient features of Cottonwood

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\(^1\) DEER Database website: http://cega.cpuc.ca.gov/deer/
Creek when showing the project to the City, the community, and the press. As Jon Yolles, the Project Manager responsible for Cottonwood Creek, remarked, “People are very interested in green design and we are pleased that Cottonwood Creek showcases what can be done to green affordable housing.”

Through this and other projects, BRIDGE has come to realize the value of including energy efficiency as part of their initial project planning and budgeting. As a corporate entity, they recognize the importance energy efficiency has not only on their bottom line, but also on their standing within the community and amongst their customers. In response, they have established an internal policy that accounts for energy efficiency and reserves funds dedicated to the inclusion of energy efficiency into their building budgeting process. In doing so, they are able to ensure their projects consistently achieve the energy efficiency and sustainability goals they instituted.

**Additional Information**

For questions or additional information about energy efficient multifamily housing or the California Multifamily New Homes (CMFNH) program, please contact:

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