Case Study of an ENERGY STAR® and LEED Certified Apartment Building

Wright Builders, Inc., Village Hill, Northampton, MA

Summary:
The Center for EcoTechnology’s (CET’s) New Construction team provided home energy ratings and inspection services for Wright Builders’ Village Hill Development in Northampton, Massachusetts. This case study will focus on CET’s involvement in the planning and construction of Flats West, a building with two 2 & 3-bedroom homes per floor. The project is expected to receive nearly $25,000 in utility-sponsored rebates, and to earn ENERGY STAR® v3 certification and LEED Gold (or Silver) certification.

Development Profile:
Village Hill is currently comprised of 200 homes, with more under construction. The Wright Builders’ products are fully accessible buildings and are LEED and ENERGY STAR® certified, which makes them comfortable to live in and inexpensive to maintain.

Village Hill is a mixed use and mixed income community, including offices and studios, apartments, single family homes, and multi-family homes. Fifty percent of the homes qualify as affordable housing. The development has a high density of housing, which allows for maximum use of infrastructure, such as for water and electricity. Other attractive features of Village Hill include its location near Northampton community gardens and within walking distance of the historic downtown. CET has been involved in certifying 28 homes that comprise the “Upper Ridge,” section of the development, in addition to many other homes at Village Hill.

Decision to Build Green:
Wright Builders prioritizes sustainable building strategies. Jonathan Wright, founder and Co-Principal, stated that they feel they should “do whatever [they] can to contribute to resilience.” Jonathan explained that creating energy efficient buildings results in both primary and secondary benefits. Primary benefits include low heating and electricity costs, and secondary benefits include high durability and comfort, coupled with “a sense of well-being and housing security.” This feeling of well-being comes from the fact that the buildings are constructed with quality

At a glance:
• Flats West, apartment building in Village Hill development, Northampton MA
• Expected to receive nearly $25,000 in utility-sponsored rebates
• On target to receive ENERGY STAR® v3 certification and LEED Gold or Silver certification
• Average HERS rating/unit = 52
• Average MMBtu reduction/unit = 22
• Average energy cost/year = $1,283
• Average savings on energy cost/year = $795
materials and have high R-value insulation and a well-sealed building envelope, which results in reliable comfort. Jonathan is motivated by the idea that “Not getting wet or cold has a palpable effect on humans. There is a social context for doing this work.” Therefore, all Wright Builders’ new development projects are either LEED or ENERGY STAR® certified, or both.

**Construction Plan and Process:**
The CET Home Energy Rater was involved in the process from the beginning, including design commentary, building science expertise and coaching throughout, and energy modeling for performance. Thinking ahead and planning accordingly were keys to the success of this project. During the construction process, the CET Home Energy Rater performed inspections and testing at various stages of construction. Though getting the building certified as ENERGY STAR® is an expensive part of the building process, Jonathan explained, it is important to Wright Builders because “you can’t fake it. Either it is ENERGY STAR® or it’s not.” Meeting ENERGY STAR® requirements is an external stamp of approval that ensures Wright Builders’ projects are constructed to high standards. Measures taken to meet these high standards include installing excellent insulation (which leads to a more weather-tight house), utilizing efficient heating systems and sealed ductwork to reduce air leakage, and installing high efficiency light bulbs to reduce lighting costs by 75%.

**Special Building Features:**
The Flats West building includes many cutting edge green building techniques that save energy, such as:

- Above-grade walls are insulated with a combination of insulated sheathing, a flash coat of high-density spray foam, and dense-packed cellulose (R-32)
- Attic is insulated with a flash coat of spray foam and loose fill cellulose (R-80)
- Windows are triple-glazed (U-value 0.21)
- Heating and air conditioning is provided by Mitsubishi ductless mini-split air conditioners (11.3 HSPF, 19.1 SEER)
- Water heating by on-demand gas water heater (0.94 Energy Factor)
- 95% LED lighting
- ENERGY STAR® appliances
- Ventilation is provided by an Energy Recovery Ventilator (ERV) in the homes and in the garage. Ventilation system is in the garage for better air quality
- Kitchen range hood is exhausted directly to the outdoors
- All ductwork is located inside the conditioned space
- Water-efficient irrigation system and drought-tolerant landscape design
- Water-efficient bathroom faucets, showerheads, and toilets
- Efficient framing, including floor and roof trusses
- Over 65% of construction waste is recycled

CET has maintained a successful partnership by being flexible and by adapting to Wright Builders’ changing needs over time. Part of what has been changing are regulations. CET has assisted Wright Builders with understanding, and complying with, the shifting landscape of Massachusetts building codes, as well as requirements for ENERGY STAR® and LEED certification. Jonathan described CET’s role as that of an “outside watchdog” and “coach,” keeping his team informed and on track.

**Evaluation:**
If the project meets its targeted goals, it is expected to earn ENERGY STAR v3 and LEED Gold (or Silver) certification and receive almost $25,000 in rebates.

Wright Builders believes that brand recognition for ENERGY STAR® and LEED is increasing, and customers are recognizing the long-term value of these certifications. From a home-buyer’s perspective, these certifications are seen as “an added level of insurance” because they are a verifiable guarantee of quality materials and building practices that will lead to lower maintenance costs and greater performance. Jonathan encourages builders and home-buyers alike to “think big—we now can make buildings that are sustainable, and it is economical.”

CET is excited to continue working with Wright Builders as they complete their work on the Village Hill development.
Case Study: ENERGY STAR® Housing Development
Olympia Oaks, Amherst, MA

Summary:
Olympia Oaks, a 42 unit affordable housing development, was built by HAPHousing, a nonprofit developer of affordable housing based in Springfield, in partnership with Valley Community Development Corporation, with funding from the Town of Amherst and others. The development, completed in 2014, is ENERGY STAR® certified, meaning it meets strict guidelines for energy efficiency set by the U.S. Environmental Protection Agency (EPA). A Home Energy Rater from the Center for EcoTechnology’s New Construction team assisted Kuhn Riddle Architects and Keith Construction Contractors throughout the process. This process included analyzing building plans, conducting periodic assessments, and eventually granting the development ENERGY STAR® certification. Olympia Oaks’ energy saving measures enable it to both conserve energy and save money on operation costs.

Development Profile:
The Olympia Oaks complex features a community building, a green space with a garden and play area, and access to town conservation woodland and nature trails. It includes one, two, and three-bedroom apartments in townhouses and triplexes around a common green. Amherst has adopted the Massachusetts Stretch Energy Code, which provides a more energy efficient alternative to the standard energy provisions of the state base energy code required of all MA buildings. Olympia Oaks was built to comply with ENERGY STAR® regulations, which exceed Stretch Code regulations. The energy saving features lower operation costs, making it more affordable both to live in and to maintain.

Decision to Build Green:
There were many benefits to constructing Olympia Oaks in an energy efficient way. The HAPHousing project manager and Kuhn Riddle architect report that the energy rebates they would receive from Mass Save®, an initiative sponsored by Massachusetts’ gas and electric utilities that supports energy efficiency, were budgeted into their funding model. These rebates helped make the project financially feasible. Meeting this standard of efficiency also enables Olympia Oaks to provide high quality, comfortable housing at a low operating cost because heating bills are minimal. Tenants pay their own electricity bills, and having energy efficient lighting and appliances enable these to be low as well.

In order to comply with the Stretch Energy Code, Olympia Oaks needed a Home Energy Rating System (HERS) index of 70 or less. A HERS index is calculated by comparing the energy efficiency of a building to that of a similarly sized building that complies with the minimum state code. A lower index signifies higher efficiency. A CET Home Energy Rater conducted a HERS rating for each of Olympia Oaks’ 42 units and found them to have an average HERS rating of 49. This score means the units are approximately 50% more energy efficient.
efficient than comparable units that meet minimum requirements.

Construction Plan:
Energy efficiency was factored into every stage of planning and construction. In early stages of the planning process, the CET Home Energy Rater analyzed construction plans by running them through a computer program to estimate the energy efficiency of the development. This development was also designed to qualify for incentives and rebates through Mass Save®. Olympia Oaks received rebates for energy efficiency measures including mechanical equipment and airtightness.

One unique way that the developers were able to conserve energy was by using double stud wall assemblies that were 12” thick. The gap between the studs creates a thermal break between the exterior and interior wall studs reducing thermal transmission from inside to outside or vice versa. The cavity between the exterior sheathing and the interior sheetrock is filled with open cell foam, providing an average R-value of 45 and a tight air seal. The roof/ attic spaces are filled with cellulose insulation providing an R-60 value. Below grade walls have an R-20 value and slabs have an R-10 value. The airtightness and insulation values of the entire building envelope are key in achieving an energy efficient building.

Another special design feature was fresh air mechanical ventilation systems using ERV’s, or Energy Recovery Ventilators. In addition to using bath fans for ventilation, these mechanical ERVs provide a continuous stream of fresh air to each unit while also recovering some heat from the air as it leaves the building.

Construction Process:
The HERS and ENERGY STAR® rating processes spanned the length of the project, beginning with analyzing plans, field inspections of framing, and insulation assemblies throughout the construction process, ending with a final inspection. The final inspection included verification of energy efficient lighting and appliances, blower door tests to measure the airtightness of the home, and whole house mechanical ventilation testing.

Education:
The Olympia Oaks Building Managers are in the process of creating a guide for tenants on best practices for living in an energy efficient home, such as closing windows during hot days and opening them at night. The architect and building manager agree that this is an important step in reaching the full energy saving potential of any energy efficient building.

When advertising, Olympia Oaks emphasizes its energy saving attributes, which are an attractive feature to potential tenants.

Evaluation:
The project manager of Olympia Oaks believes that the rebates received for the project helped offset the higher initial cost of making the development energy efficient. He feels that energy efficiency will continue to be a trend in affordable housing construction in the future. He also reports that many contractors he works with learn new techniques, such as better methods for air sealing, during the ENERGY STAR® construction process. Contractors tell him that they “learned things on these jobs [they] will take to other work.”

The development’s energy efficiency measures result in significant energy and cost savings, demonstrated by the numbers listed in the “At a Glance” sidebar on page 1.

Tips for Replication:
• Engage CET’s Home Energy Rater with design/build team throughout entire process to ensure clear expectations and communication.
• Educate all responsible parties (contractor, subcontractors, technicians, etc.) about ENERGY STAR® requirements and establish who is responsible for completing each specific requirement.
• Coordinate blower door tests with CET Home Energy Rater at various stages of the process to check airtightness.
• Optimize mechanical equipment with regard to the performance of the buildings, including sizing equipment appropriately for the space.