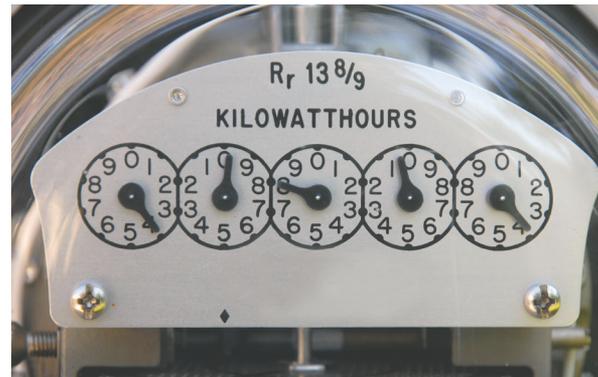


The Impact of Energy Efficient Design and Construction on LIHTC Housing in Virginia

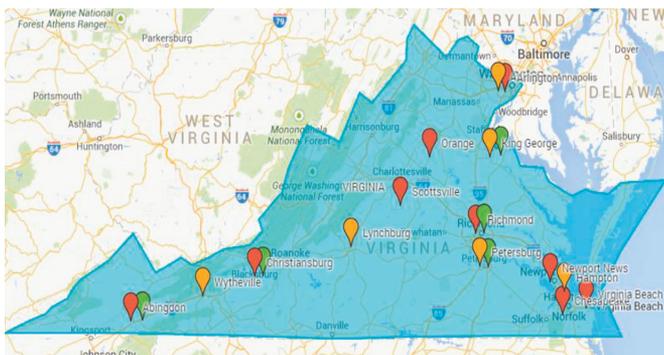
*A Research Brief
April 2015*

In February 2015, Housing Virginia released a study conducted in partnership with the Virginia Tech Center for Housing Research that explores the impact of energy efficient design and construction on affordable multifamily rental housing in Virginia. This study, conducted over the course of a year, used actual utility usage data from 15 Low-Income Housing Tax Credit (LIHTC) properties all over the state of Virginia to compare to savings projections developed by the state's leading energy efficiency features certifying organization, EarthCraft Virginia.

The target communities covered a variety of LIHTC properties, including senior, family, new construction, rehabilitated, and adaptive re-use. The behavioral surveys filled out by residents and consumption data were correlated to the apartment's original energy usage estimate that was calculated when the unit was built or rehabilitated. The results showed significant savings for residents, as well as room for improvement tied to changes in resident energy use behavior and thus increased affordability.



Why is this study unique?



Data was collected across the state

This study was the first in Virginia and one of the first in the U.S. to gather actual utility consumption data and correlating behavior surveys.

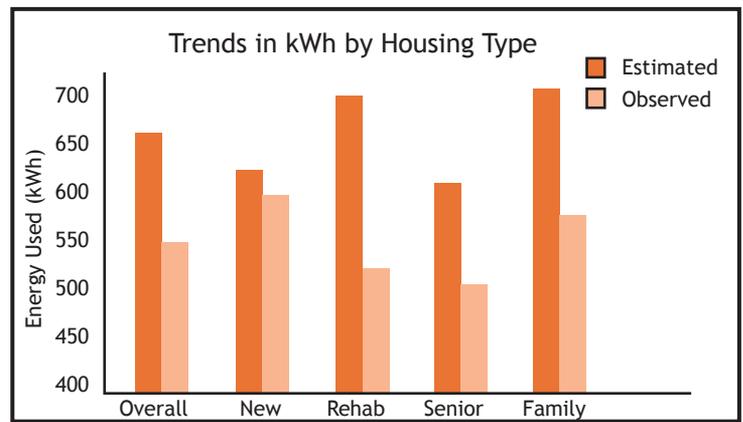
Beginning in 2007, VHDA started to implement a set of incentives in the LIHTC program that encouraged developers and builders to use a recognized third party standard in design and construction in order to reduce long term energy usage. Virginia was one of the first states to provide these types of incentives in the LIHTC program and has been a national leader in this regard.

This study confirms that these policies are achieving their intended goals. This study was the first to verify the actual performance of EarthCraft's rigorous testing model for these energy efficiency features. The results of the study show that, on average, the apartments perform 17% better than their forecast consumption.

What are the energy savings?

The study found that apartments built to higher energy efficiency standards, including third-party testing and inspection, outperform new standard construction housing by more than 40% with respect to energy consumption.

On average, residents participating in the study saved 464 kWh a month, which translates to **\$54 at current energy prices**. This means that over the course of a year, residents save an **average of \$648 on their electricity bill**. Between 2007 and 2014, EarthCraft certified 13,238 LIHTC units in Virginia. If each of these households saves the average amount on energy bills, the total savings per year amount to over \$8 million.



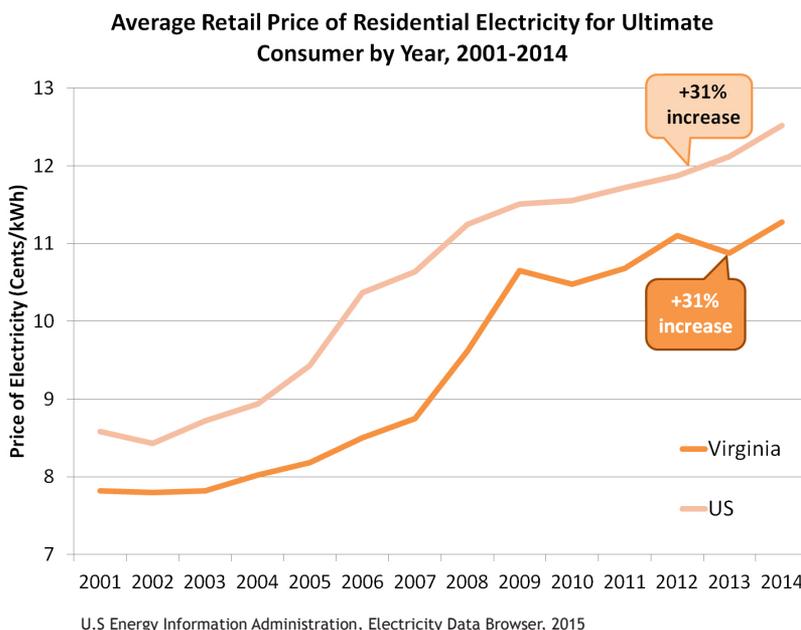
Actual savings exceeded predictions

EarthCraft Certified LIHTC Units, 2007-14		
Year	# of Units	# of Projects
2007	348 units	5 projects
2008	641 units	12 projects
2009	965 units	14 projects
2010	1,616 units	36 projects
2011	2,576 units	26 projects
2012	2,870 units	37 projects
2013	1,936 units	26 projects
2014	2,286 units	38 projects

EarthCraft Virginia, 2015

Over 13,000 units certified since 2007

What does this mean for housing affordability?



Whether it is a rental payment or a mortgage payment, housing costs make up the largest share of low and moderate income Americans' monthly spending. The U.S. Department of Housing and Urban Development (HUD) uses residents' levels of monthly income spent on housing to determine low-income classifications for housing assistance and affordable housing creation.

It is generally accepted that a household should not spend more than 30% of their monthly income on housing costs, which includes rent, mortgage, insurance, and utilities.

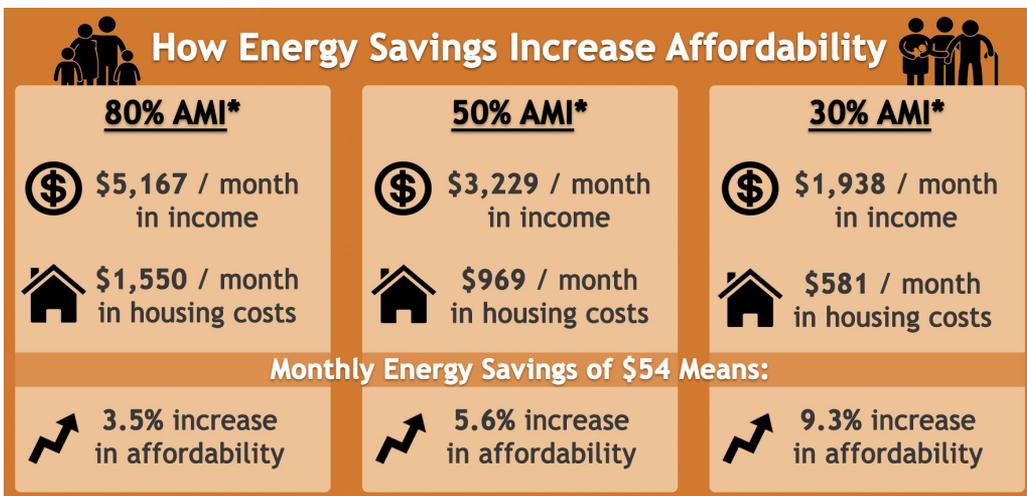
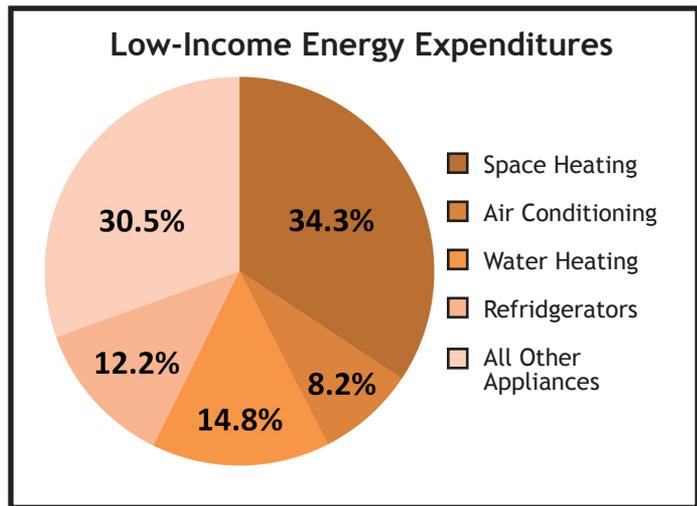
When looking at housing affordability, higher operating cost is a major factor. Households on the threshold of affordability can see their energy costs push housing expenditures beyond the normally accepted 30% of income. Additional hardships are realized because month-to-month and year-to-year energy costs are not constant.

As household energy demands fluctuate, dependent on climate conditions, so do monthly energy costs. This erratic monthly variance in the percentage of income allotted for housing can put stress on family finances.

All households are affected by energy expenditures and the rising cost of energy. However, not all households have the financial means to simply pay more for their required energy expenditures. Therefore, those households with low incomes will be burdened the most by future inflation.

The average household above the low-income threshold carries an energy cost burden of about 13%, but for low-income families, that burden becomes 25% or more of their housing cost. Of the energy consumed, over 40% of the cost goes to space heating and air conditioning.

Not only do lower income groups tend to spend more of their income on energy, but they also tend to consume more than those in higher income groups.



*Income is for State of Virginia / family of four

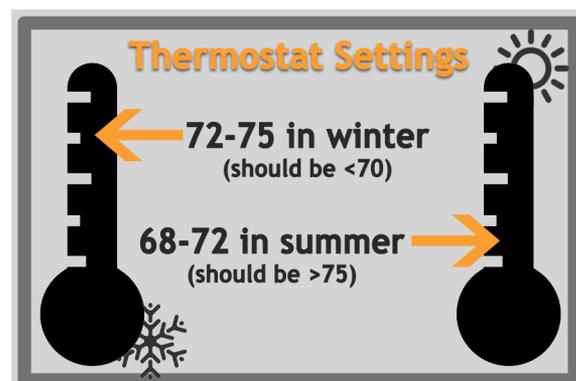
One of the key findings of the study is that energy efficient construction standards have a significant impact on the affordability of apartments for lower income families and seniors.

The average resident of an energy efficient apartment saves **\$54 per month** on their

electricity bill, which amounts to **\$648 annually**; however, the impact is greater as incomes are lower. Every dollar not spent on these energy costs can potentially go towards food, clothing, health care, education, and other important budget priorities.

What does the behavioral survey show?

The energy use behavior survey revealed a number of findings that point to opportunities to achieve even greater savings. Residents reported setting thermostats at levels that exceed typical comfort temperatures, causing higher than necessary utility bills.



This indicates a need for better education about the potential savings and strategies for adjusting resident behavior. These findings also suggest that there could be an impact on dew point for units, increasing the potential for moisture problems, which could also affect long-term durability and resident health.

The majority of residents reported that they wash dishes by hand, despite having a dishwasher in their unit. This was observed in both senior and non-senior housing, contrary to what researchers predicted. This finding suggests that respondents use more hot water in washing their dishes - an area in which further savings could be achieved with education about energy efficiency best practices.

Resident responses also indicated a need for more education about the equipment in their apartments in order to take full advantage of efficiency technologies. When researchers talked with managers, they explained that they had educated residents on the features of their units. This gap between perceived education and actual resident understanding is a potential area to be addressed to further improve savings.

What are the next steps?



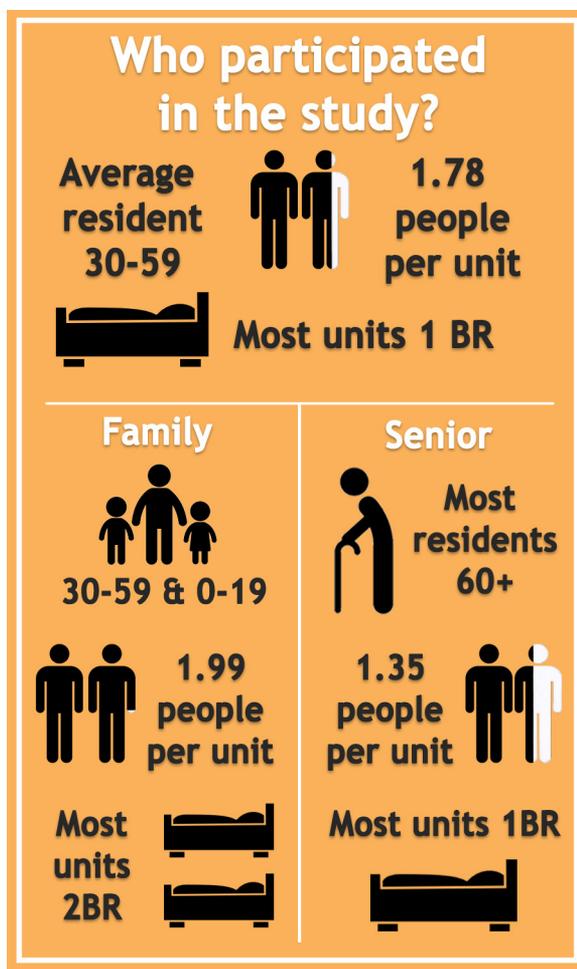
Better Housing Coalition, Somanoth Seniors

Based upon the interviews with residents and management, we learned that there are significant opportunities to further reduce utility bills through more effective education.

Currently, most residents get a basic introduction to their apartment's energy features on the day they move in. With so much happening on "moving day", this is not an ideal time for retaining important information.



Residents filling out behavioral surveys



Both residents and management / maintenance can benefit from improved energy efficiency knowledge. A next stage of research in this area is to explore and identify the most effective ways to communicate critical information about better energy saving habits as well as best practices in equipment care and maintenance to ensure peak operating efficiency.



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