THE ENERGY SAVINGS IMPACT OF TCAC'S SUSTAINABLE BUILDING MEASURES SCORING CRITERIA

2011 Through 2013 Projects

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Purpose

The California Tax Credit Allocation Committee (TCAC) typically receives significantly more applications for Low Income Housing Tax Credits (LIHTCs) than are available, creating a highly competitive market among developers. TCAC scores applications for LIHTCs across a range of public purpose goals including sustainable building methods (SBMs). During the period from 2011 through 2013, an important criterion for gaining competitive points for SBMs was increased energy efficiency. For new construction, that has meant verified percentage better than the minimum required by the State's Building Energy Efficiency Standards (Title 24, Part 6). For rehabilitation projects, it has meant verified improvement over the existing (prior) energy efficiency of those projects. Additionally, TCAC's minimum construction standards require new construction projects to be at least 15% better than Title 24, and rehabilitation projects must reduce energy use by at least 10%.

The estimates in this report summarize the amount of energy savings that TCAC's minimum construction standards and competitive point scoring have fostered during the three year period 2011-2013.

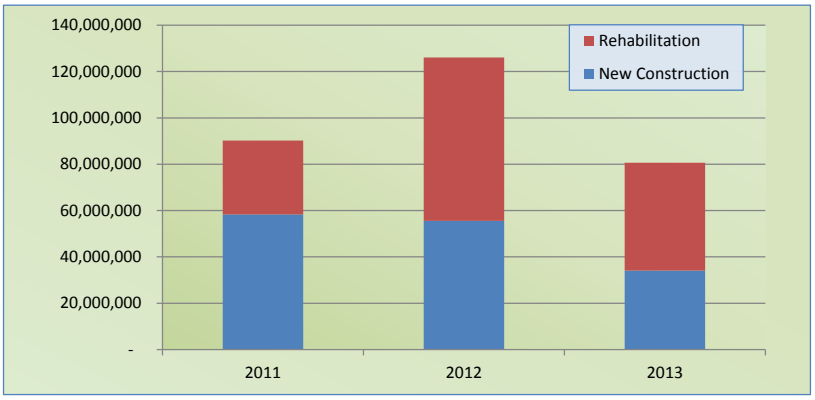
Direct Impacts

The estimated impact of TCAC's scoring criteria for competitive LIHTCs across the recent three years is shown in Table 1. Savings shown are kBtu, or thousands of British thermal units. For perspective, one cubic foot of natural gas contains roughly 1 kBtu of energy. According to the U.S. Energy Information Administration, a typical 960 square foot multifamily dwelling on the west coast uses approximately 78,400 kBtu annually.[1] Given those rough numbers, the three year savings from TCAC's minimum construction standards and competitive scoring for energy efficiency is equivalent to the total annual energy use of nearly 3,800 apartments.

Table 1: Estimated Energy Savings (kBtu)

Year	New Construction	Rehabilitation	Total
2011	58,346,386	31,822,767	90,169,153
2012	55,596,183	70,475,761	126,071,943
2013	34,140,664	46,465,689	80,606,353
3-Yr Total	148,083,233	148,764,217	296,847,449

Figure 1: Savings by Year (kBtu)



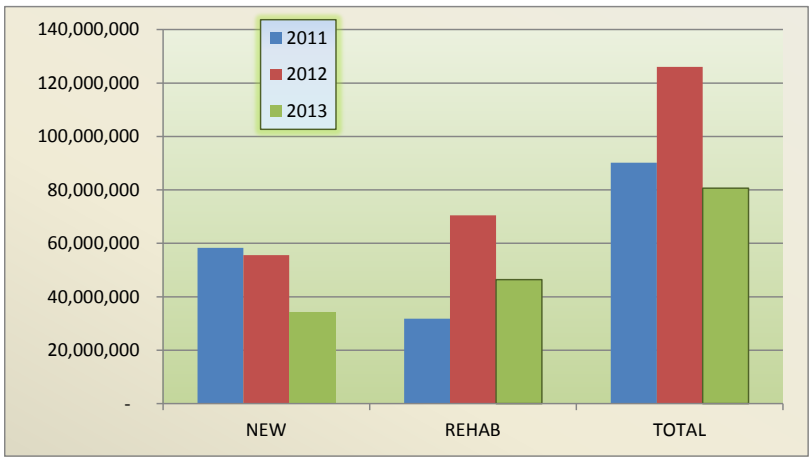
The ratio of savings from new construction projects to savings from rehabilitation projects has varied over the three year period. The chart in Figure 1 shows this graphically. Developers appear to have placed a higher emphasis on other "green" measures in 2013, since energy efficiency is not the only path to gaining maximum SBM points. Developers could maximize their points for

[1] U.S. EIA publishes data on energy used per household by region and housing type. Their most recent data for the West (including California), indicates that apartments use a little over 81 kBtu per square foot annually. The average existing apartment is roughly 960 square feet, giving an average use of 78,400 kBtu per apartment per year.

Sustainable Building Methods by achieving either LEED Gold or Green Point Rated's 125 point level. Roughly 20% of projects did so in 2012, increasing to 32% of projects in 2013.

Below are two other ways to look at this data graphically. The chart in Figure 2 below illustrates the relationship between energy savings from new construction versus from rehabilitation in each year. In both graphs, the y-axis is kBtus that will be saved every year by projects that received reservations in the noted year.

Figure 2: SBM Energy Impacts by Type of Project and Year (kBtu)



This graph shows that in 2011 more savings came from new construction projects, while in 2012 and 2013 more savings came from rehabilitation projects. As noted on page 6 below, in 2012 and 2013 rehabilitation projects comprised a larger proportion of the total. The 2013 projects, both new construction and rehabilitation, may have delivered significantly less savings than in 2012, and combined they delivered roughly 10% less than in 2011. This was likely the result of more projects choosing alternative sustainable building measures.

In the chart below illustrates the change in relationship between new construction impacts and rehabilitation impacts from year to year. The units on the Y-axis are kBtu.

Figure 3: SBM Energy Impacts by Type of Project over Time (kBtu)

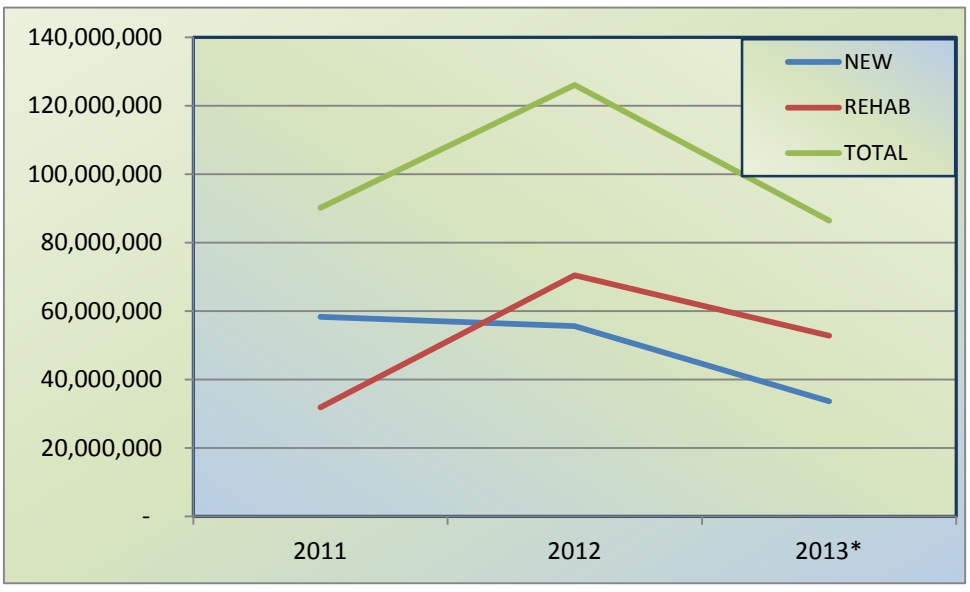


Table 2 shows the trend in savings from rehabilitation versus savings from new construction. The second column shows the percentage of the total savings attributable to rehabilitation projects. While on average over the three years, half of the savings come from rehabilitation projects, the percentage of savings attributable to rehabilitation has grown year over year. Analysis of the data shows that rehabilitation projects have been a growing portion of LIHTC projects. Table 3 supports that explanation; the increase in percentage of projects that are rehabilitations (22% to 36% to 37%) is roughly proportional to the percentage of total energy savings attributable to rehabilitation shown in Table 2 (35% to 56% to 58%).

Table 3: Percent of Total Annual Savings from Rehabilitation Projects

Year	% From Rehabilitation
2011	35.3%
2012	55.9%
2013	57.6%
3-Yr Avg	50.1%

Table 2: Number of LIHTC Projects by Type and Dwelling Units Served

	2011		2012		2013	
	New Const	Rehab.	New Const	Rehab.	New Const	Rehab.
Projects Per Year	92	26	83	47	59	34
Apartments Per Year	5332	1823	4738	3528	3438	2269
Percent of Total Projects	78%	22%	64%	36%	63%	37%
Percent of Total Dwellings	75%	25%	57%	43%	60%	40%

However, there is another way to understand the trends. By comparing new construction and rehabilitation savings (1) per project, (2) per apartment, and (3) per square foot across the three years, it is apparent that even normalized for those criteria, rehabilitation projects still produced more energy savings.

In all these comparisons, rehabilitation projects provided significantly more savings than new construction in each of the three years. See Table 4. The primary reason is likely that California's new construction Standards already require projects to be considerably more energy efficient than the older housing stock that is now being rehabilitated. In other words, there is much more room for improvement—more potential for efficiency gains—in the existing housing stock.

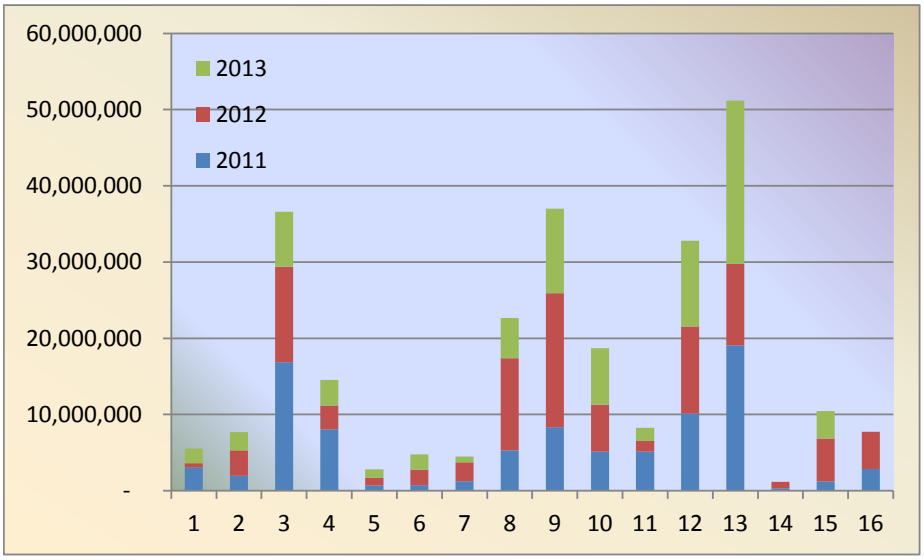
Table 4: Savings per Project, Per Dwelling, and Per Square Foot

New Construction	Rehabilitation
2011	**2011**
634,200 kBtu/Project	1,223,953 kBtu/Project
10,943 kBtu/Unit	17,456 kBtu/Unit
11.0 kBtu/SqFt	20.8 kBtu/SqFt
2012	**2012**
669,834 kBtu/Project	849,106 kBtu/Project
11,734 kBtu/Unit	19,976 kBtu/Unit
11.3 kBtu/SqFt	26.7 kBtu/SqFt
2013	**2013**
578,655 kBtu/Project	1,366,638 kBtu/Project
9,930 kBtu/Unit	20,478 kBtu/Unit
10.2 kBtu/SqFt	24.0 kBtu/SqFt

Comparison by Climate Zone

It is also interesting to see from where in the State most of the savings are coming. As shown in the chart in Figure 4, most of the savings have been generated in Climate Zones (CZs) 3, 8, 9, 12, and 13. The regions represented by these CZs are the Bay Area (CZ3), Los Angeles (CZs 8 & 9), the Sacramento region (CZ 12), and the San Joaquin Valley (CZ 13).

Figure 4: Annual Savings by CEC Climate Zone (kBtu)



Indirect Impacts

In addition to the direct impact of energy savings, TCAC's minimum construction standards and competitive scoring for sustainable building methods have supported some significant changes that help make the market more efficient and reliable. For example, TCAC has carefully aligned its thresholds for energy efficiency with those of the incentive programs operated by the investor owned utilities, the municipal utilities and others (such as the two large Regional Energy Networks, BayREN and SoCalREN). Not only has this made it easier for developers to work with both TCAC and the programs, it is likely that the coordination has increased participation in both.

Another effect is an increase in the number of Home Energy Rating System (HERS) Raters qualified to work with multifamily projects. There are areas of California where developers could comply with Title 24 Part 6 without engaging a HERS Rater, due to other performance options. However, to gain SBM competitive points for LIHTCs, verification by HERS Raters is essential. TCAC's reliance on HERS Raters has helped to grow the HERS industry. It has arguably also increased the industry's professionalism in both verification activities and reporting.

A related but somewhat different benefit is TCAC's support for the creation of clear protocols for rehabilitation project energy audits and a uniform report format for rehabilitation projects. TCAC has relied heavily on the work of the California Home Energy Retrofit Coordinating Committee (HERCC), an ad hoc group of program administrators, HERS Raters, funders, and government agencies that formed under ARRA funding to establish uniform protocols for all the energy efficiency programs in the state. Each entity operating a residential upgrade program in California references the HERCC protocols, and makes modifications specific to their programs.

Finally, an important positive impact is support for Title 24. In each code cycle (approximately 3-5 years), the California Energy Commission (CEC) advances the energy efficiency requirements of the code in ways that can be shown to be cost effective compared to the previous set of Standards. By encouraging developers to design 15%, 17.5%, 20%, and 25% better than the minimum required by the 2008 Standards (effective January 1, 2010), TCAC prepared the market for the new standards by increasing demand for energy efficiency measures that will

now appear in the 2013 Standards (effective July 1, 2014), and supporting an increase in competency with analysis, construction, and verification of high-performance measures. The result is that cost of the measures and cost of compliance with Standards that rely on those measures have been reduced.

Methodology

This analysis relied on estimates about "standard" energy use from Energy Pro analyses of several multifamily projects. The example projects that the analysis relied on used the California Utility Allowance Calculator (CUAC) for establishing utility allowances in their TCAC submittals. The Benningfield Group plan checked the CUAC submittals as part of TCAC's quality control efforts. The projects are somewhat representative of the full set of projects in each round, since they were included among the projects receiving reservations in those rounds. However, there can still be significant variance between a few sample projects and the average across the entire portfolio of a year.

From the example projects, Benningfield Group created two estimates of average energy use per square foot for each CZ; one for new construction, and one for existing multifamily buildings. We then multiplied these energy use estimates by the energy efficiency savings percentage claimed for each project, and the square footage of the project, to determine the estimated energy savings for that project.

Conclusion

To put the estimated savings in perspective, it is worthwhile to compare the estimated total savings from Table 1, or 296,847,449 kBtus, to a few elements that are easier to grasp.

- If that were all electricity, at CA rates it would be worth roughly $9,000,000 per year
- If it were all natural gas, it would be worth more than $3,000,000 per year
- It is equivalent to the total energy use of over 4,000 average California office buildings of 1 million square feet [source: LBNL]
- It is roughly 2.25 days' worth of output from a typical nuclear power plant [source: EIA]
- It is equivalent to the annual energy use of nearly 3800 average California multifamily households
- It is the equivalent of the annual electricity use of nearly 7800 typical U.S. homes

The point is that the energy savings from three years of TCAC's Sustainable Building Measures minimum construction standards and competitive scoring is quite significant. The savings continue year after year and grow as more projects are built in accordance with them. The advances in design and technology necessary to meet the SBM requirements spillover into market rate construction, creating additional savings. But perhaps the most important effect is that tenants in over 21,000 multifamily homes in California are more comfortable, healthier, and less vulnerable to utility bill shocks than they would have been without TCAC's forward thinking requirements.