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New Mexico's LEED Standards for School Construction: Not Green, not Cost-effective

**By Todd Myers
August 3, 2016**

Introduction

Georgia O’Keeffe and Helen Cordero elementary schools in Albuquerque, New Mexico were designed as models of energy efficiency.

Built in 2009 and 2010, the schools received certification from the U.S. Green Building Council’s (USGBC) Leadership in Energy and Environment Design (LEED) system. O’Keeffe Elementary is certified LEED Silver¹ and Cordero achieved the second-highest certification level possible, LEED Gold.²

Despite achieving that lofty status, utility figures show they are two of the three *least* efficient elementary schools in Albuquerque, spending tens of thousands of dollars more each year for energy than new schools built in Albuquerque without the green design elements.

Utility data from 2015 shows that when compared to other elementary schools in Albuquerque, green elementary schools on average are slightly more energy efficient but are unlikely to save enough money over the lifespan of the buildings to make the “green”

¹ U.S. Green Building Council, “Georgia O’Keeffe Elementary School,” <http://www.usgbc.org/projects/georgia-okeeffe-elementary-school> (Accessed April 12, 2016).

² U.S. Green Building Council, “Helen Cordero Primary School,” <http://www.usgbc.org/projects/helen-cordero-primary-school> (Accessed April 12, 2016).

investments and certification worthwhile. Worse, the performances of O’Keeffe and Cordero elementary schools are so poor, they negate all savings from all the other green schools in the district.

These schools are not unique. Across the United States, so-called “green” buildings often use more energy than their non-green counterparts in the same school districts. For example:

- In Spokane, Washington, none of the new green elementary schools are as energy efficient as the traditionally built Browne Elementary School. One of the alleged green schools uses 30 percent more energy than Browne.
- Officials at the Iredell-Statesville school district in North Carolina claim they have the nation’s first school certified as Gold by the USGBC, but it actually ranks 11th out of 14 schools for energy efficiency in the district.³
- *USA Today* found in 2012 that green schools in Houston perform poorly. The newspaper reported, “Thompson Elementary ranked 205th out of 239 Houston schools in a report last year for the district that showed each school’s energy cost per student. [Green school] Walnut Bend Elementary ranked 155th.”⁴

The situation is similar in New Mexico, where a number of schools built to save energy actually use more energy per square foot than other schools.

Of course not every green school performs poorly. Some green schools are more efficient than their counterparts in the same district. In fact, Santa Fe stands out in our analysis of schools across the country in building LEED-certified buildings that offer significant energy savings. Officials in Santa Fe have achieved success that we have not seen elsewhere in the country. Even there, however, they have built extremely efficient schools without the “green” certification, showing that efficiency is about more than a press release and a plaque on the wall.

In this report we examine green schools in two New Mexico school districts – Albuquerque and Santa Fe – to compare the energy performance of those schools to similar schools in the same districts. Schools provide a good opportunity to assess the claims about green building standards in general, because schools tend to be about the same size; have the same building elements; are located in the same climate; and a number of similar buildings are located nearby. These factors make valid comparisons possible.

This analysis also calls into question the state of New Mexico’s requirement that public buildings “achieve a minimum rating of ‘LEED Silver.’”⁵ Executive Order 2006-001, signed by

3 Myers, Todd, “Certified ‘Green’ Schools: Savings & Benefits Fail To Materialize In North Carolina,” <http://www.johnlocke.org/research/show/policy%20reports/269>, February 23, 2016.

4 Frank, Thomas, “Green schools: long on promise, short on delivery,” *USA Today*, December 11, 2012 <http://www.usatoday.com/story/news/nation/2012/12/10/green-schools-construction-leed/1753823/> (Accessed August 8, 2013).

5 State of New Mexico, “Executive Order 2006-001: State of New Mexico Energy Efficient Green Buildings Standards for State Buildings,” January 16, 2006, http://www.emnrd.state.nm.us/ecmd/Documents/EO_2006_001.pdf (Accessed April 25, 2016).

Governor Bill Richardson, claims LEED standards deliver “utility bill savings,” arguing “emphasis should be placed on the ‘life cycle costs’ of a public building rather than solely on its initial capital costs.”⁶ New Mexico schools are not required to receive LEED certification, but districts are encouraged to meet the standard.

Do Green Schools Live Up to The Promises Made by Advocates?

Advocates claim green schools produce many environmental benefits. The USGBC defines a green school as “a school building or facility that creates a healthy environment that is conducive to learning while saving energy, resources and money.”⁷ Many of these points involve subjective judgments that are difficult to measure. Efforts to link the supposed health benefits of green buildings and the learning progress of students are vague and subject to many other influences.⁸

Energy use and energy costs, however, are useful and objective metrics that can be easily measured and compared. Since a reduction in energy use is at the center of what it means for a building to be green, it is the most useful way to compare the actual environmental results of these schools to traditionally-built schools. Additionally, we try to compare schools built recently.

The question is not whether new green schools are superior to old, traditionally- built schools. The important question is whether spending more for a new, green school will yield cost and energy savings compared to building a new, traditionally built school. Stated another way: Does the energy use of green buildings justify their significantly higher construction and operating cost?

Using this metric, the green schools in New Mexico we studied have, at best, a mixed record.

At a time when public resources for education and for protecting the environment are scarce, state legislators and policymakers should look closely at green schools and question whether policies that promote or require those costly standards actually yield the promised benefits.

What are Green Buildings?

Before examining the performance of green schools in New Mexico, it is important to know what the term means. Although definitions vary, the most common standard for green

6 *Ibid.*

7 See, for example: Colorado Chapter USGBC, “Colorado – USGBC,” <http://www.usgbccolorado.org/green-buildings/GreenSchoolsColorado.html> (Accessed August 8, 2013).

8 For example, test scores vary widely from school to school and measuring the impact of the school building as opposed to socioeconomic or other factors is virtually impossible.

schools is the Leadership in Energy and Environmental Design (LEED) system created and promoted by the USGBC.

To meet the LEED standard, building designers must achieve points in a number of categories. The LEED checklist for schools includes categories for:⁹

- Sustainable Sites
- Water Efficiency
- Energy and Atmosphere
- Materials and Resources
- Indoor Environmental Quality
- Innovation and Design Process
- Regional Priority Credits

Points are awarded in each category and if a school design receives 40 out of a possible 110 points, it is certified as green. At 50 points a building achieves LEED Silver status; at 60, LEED Gold; and at 80 or above, Platinum, the highest rating. Our study covers a variety of certification levels, including some at the lowest end of the scale, like Silver-rated Georgia O’Keeffe Elementary School in Albuquerque, as well as some that meet the LEED Gold standard, like Amy Biehl Elementary School in the Santa Fe School District.

Some rating categories are specifically designed to save energy, such as points for energy savings in a computer simulation of the building. Others are unrelated to energy, like the four points awarded for “Public Transportation Access.”

Advocates of LEED argue this system of flexibility allows schools to meet the standard at a relatively low cost. As districts move up the ladder of certification toward Platinum, the flexibility is reduced and the cost can increase significantly.

As we shall see, even at the low end of the green building spectrum, the additional design, construction and operating costs more than outweigh the energy savings achieved by the buildings.

Santa Fe School District

Santa Fe School district has one green school, Amy Biehl Community School, which serves children from kindergarten through the sixth grade.¹⁰ In total the district has 18 schools that serve children beginning at kindergarten, some through the sixth grade and some through the eighth. To ensure our comparisons are accurate, we compared the green elementary schools to

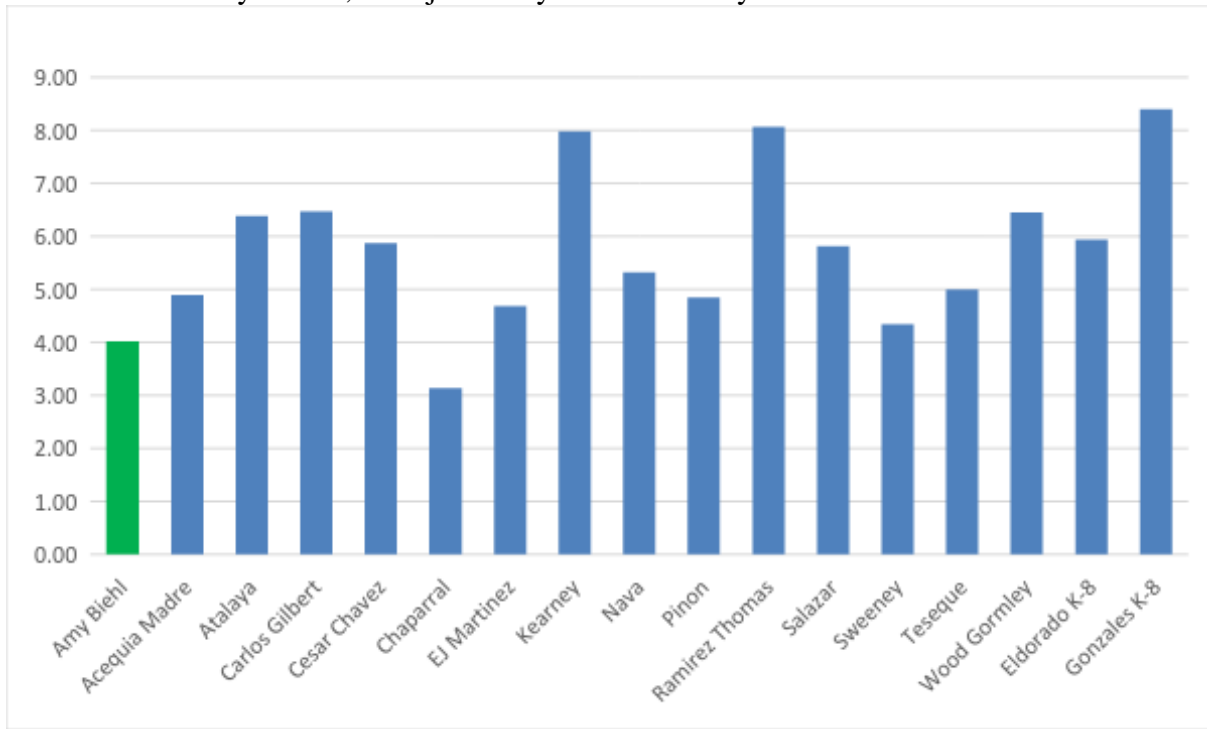
9 U.S. Green Building Council, “Schools v2009 Checklist,” <http://www.usgbc.org/resources/schools-v2009-checklist.xls> (Accessed August 31, 2013).

10 Santa Fe School District, “Amy Biehl Awarded LEED Gold Certification and Solar Array Project,” January 29, 2013, <http://www.sfps.info/DocumentCenter/View/7400> (Accessed January 18, 2016).

the performance of other schools of similar size and type in the same district. Below are our findings.

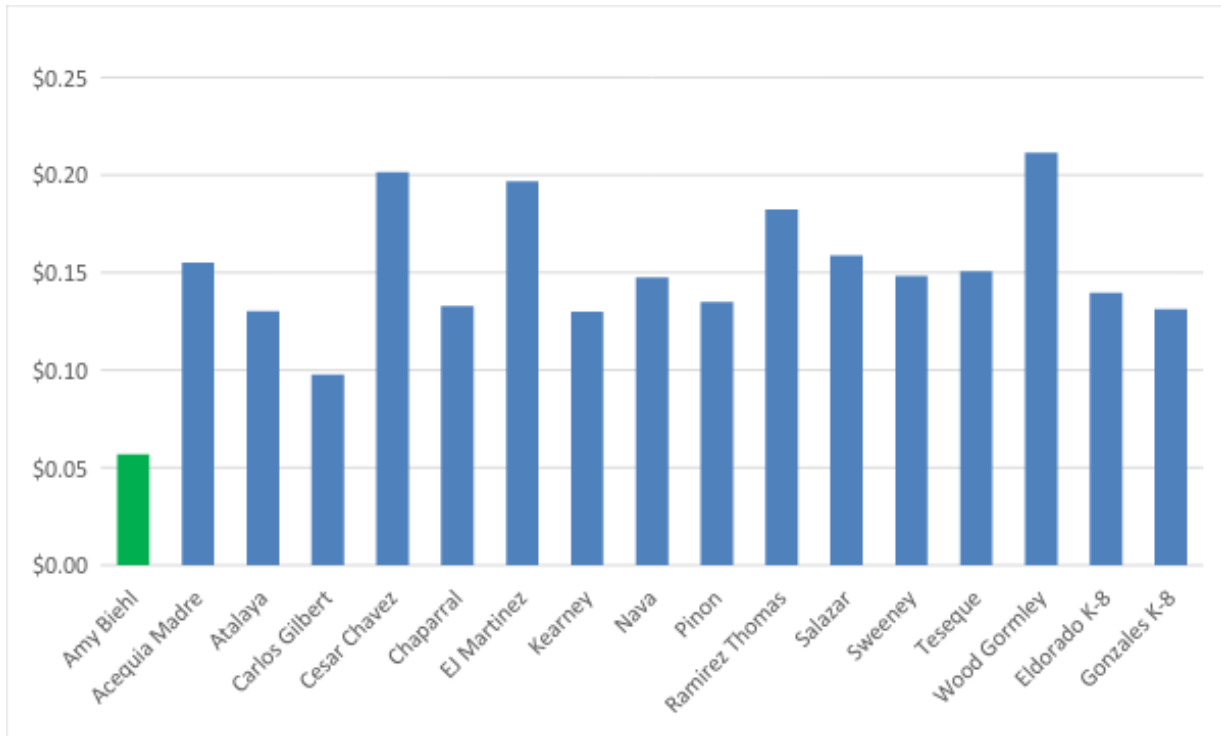
Amy Biehl Community School (K-6)

During the 2014-15 school year, green-designed Biehl Community school used four kilowatt hours (kWh) per square foot and one million BTUs (MMBTU) of natural gas per square foot. For the building’s size, both numbers are extremely low. Biehl ranks second in electricity use per square foot and first overall in natural gas per square foot. The school ranks first overall in energy cost per square foot, a full 42 percent more energy efficient than second-place Carlos Gilbert Elementary school, built just one year before Amy Biehl in 2009.



Compared to the average of schools built since 2009, Amy Biehl stands out even more. It uses 36 percent less electricity than the average of those newer schools, uses 57 percent less natural gas, and has energy costs 56 percent lower than these newer schools.

After examining “green” schools across the country, this is the best performance of any of the green certified schools we have examined.



Why is Amy Biehl so different than the national trend? It is hard to pinpoint the exact reason.

In 2013 we did a quick analysis of the Santa Fe schools and asked for the energy data from the schools. Not only did the district have the information, they had already analyzed the energy efficiency of the various buildings to determine which design features work and which do not, producing an energy benchmarking report that compared schools in the district.¹¹ This was the first time we had seen such a report by school officials, and we have not seen a similar one since. In fact, we have used that report as a model when we ask for data from other districts.

When analyzing schools across the country, it is apparent that facilities directors' attention to energy efficiency in general is more important than the particular green certification of a building. Santa Fe officials obviously pay close attention to energy use in all their buildings.

That is shown by the fact that Amy Biehl's efficiency has improved over time. In the 2012 energy benchmark report, Amy Biehl paid more than the average school in energy costs. Since that time the situation changed, and the school now performs significantly better. The district learned from problems at the school and made necessary adjustments, resulting in higher energy savings.

¹¹ Santa Fe School District, "Santa Fe Public Schools Energy Benchmarking Report," October 8, 2012, <http://www.sfps.info/DocumentCenter/View/7049> (Accessed August 8, 2013)

This experience is also a reason Santa Fe officials decided against LEED certification for their latest school, Nina Otero Community School. The district looked at what works and what does not and applied the lessons to new construction. Lisa Randall, the Energy and Water Conservation Program Coordinator for Santa Fe Public Schools, noted, “You can do all of that without having the LEED plaque on their building.”¹²

She noted that a critical part of the building is how it is “commissioned” – that is, how the building is operated after it opened, to find the best approach. That helps explain the dramatic improvement in Amy Biehl’s energy numbers over time and why the newest school is doing so well.

It is important to reiterate that building a green school – especially one to the LEED Gold level – costs far more than building a traditional-design school. Randall notes that part of spending more up front on a school is a reaction to budget restraints. “We tend to have more capital than operation funding,” she said. “So, if we can spend capital to save operation funding, that matters to us.”

Even so, it does not make sense to spend significantly more up front if the savings are small later on.

In our experience, after looking at schools across the country, LEED Gold – the second-highest rating – costs about 10 percent more in construction costs than traditional schools. According to the district, Amy Biehl Elementary cost about \$19.8 million to build. Using that baseline, we can estimate that it cost an additional \$1.9 million to meet the very high standards of LEED Gold.

The claim made by advocates is that those additional upfront costs will be made up later in energy savings. Carlos Gilbert Elementary, built just one year before Amy Biehl Elementary, uses 40 percent more energy per square foot. If Amy Biehl used the same amount of energy as Carlos Gilbert, it would add \$1,464.77 to the building’s natural gas bill annually.

Further, using the highest average rate for electricity in Santa Fe¹³ (12.3 cents per kWh), the school would pay an additional estimated \$12,776 per year. Thus total annual savings for the school, compared to the most-recent comparable school, are about \$14,241. Over the 20-year lifespan of the school, that is \$284,820 in savings, much less than the estimated additional cost to build the school in the first place.

Indeed, if construction cost only two percent more, which is more typical of LEED Silver rather than LEED Gold,¹⁴ adding \$396,000 to construction costs, projected energy savings over the life of the building would still not cover the additional cost.

12 Interview with the author, January 14, 2016

13 Electricity Local, <http://www.electricitylocal.com/states/new-mexico/santa-fe/> (Accessed January 24, 2016).

14 Joint Legislative Audit Review Committee, “High Performance Public Buildings: Impact on Energy Use is Mixed,” May 18, 2011,

Even assuming it makes sense to trade high capital costs today for operating savings tomorrow, this is a fairly steep price to pay.

Santa Fe provides an excellent metric by which to judge the success of cookie-cutter green building standards. In many ways, Amy Biehl Elementary lives up to the promises of LEED Gold, saving a significant amount of energy compared to its non-green counterparts. Of the many schools we have examined across the country, it is the best example of an efficient green school. Quite simply, it would be difficult to extract any additional energy savings from the school without sacrificing other amenities.

Despite all that, however, the additional costs to build to that LEED standard are almost certainly more than the savings the school offers. It is the best example of how difficult it is for green building standards to produce cost savings.

To be clear, this is not a critique of the district or the management of Amy Biehl Elementary. It simply demonstrates that even with the best outcomes, cost-effective green construction does not conform to a pre-conceived standard, and falls well short of what LEED advocates promise.

Indeed, Santa Fe School District officials seem to understand this lesson. Their newest school, Nina Otero Elementary School, was not built to LEED standards and performs very well – better even than Amy Biehl, according to Randall.¹⁵ But she does note that their experience with the LEED system helped at first.

“When it was first being built, we wanted that recipe,” she said. “We didn’t know how to build a green building.” That experience helped them learn and she said, “The buildings we’ve built since then would qualify for LEED.”¹⁶

Going forward, however, Santa Fe has concluded that costly LEED certification is not necessary. Based on the high initial cost versus meager delayed savings, we can understand why.

Albuquerque Public Schools

There are 85 elementary schools in the Albuquerque school district; eight of which have some LEED-certified element included. We have excluded Wherry Elementary, which is LEED-certified, since it is located on the Kirtland Air Force Base and its utility data is not available.

<http://www.leg.wa.gov/JLARC/AuditAndStudyReports/2011/Documents/HighPerfPublicBuildingsPreliminary.pdf>
(Accessed 8/25/2013)

¹⁵ Interview with the author.

¹⁶ *Ibid.*

Many of the LEED-certified schools have only one portion of the school certified. For example, Montoya and Collett Park both have kindergarten additions that are certified LEED silver. Other schools, like Georgia O’Keeffe, are entirely LEED certified.

Albuquerque also has green-certified middle and high schools, but the high number of elementary schools – traditional and green – offers the best test of the effectiveness of green building standards.

Two of the green schools stand out with extremely high energy costs per square foot. Georgia O’Keeffe and Helen Cordero elementary schools both have costs significantly above the average. In our interview with district officials, we asked why energy use is so high. For Helen Cordero, officials noted that the school is all electric, which drives costs up, since natural gas is inexpensive. In the case of O’Keeffe, on the other hand, officials offered no explanation, saying they were working to bring it into line.

As a result, we have selected two groups of green schools – one with the two high-cost schools and one without – to establish a range of potential outcomes on the high and low end. We broke the traditionally built schools into two groups. One group consists of all non-green schools. The other group is made up of traditionally built schools constructed since 2000. These will provide the basis for comparison.

For the 2014-15 school year, the 15 green elementary schools used an average of 6.63 kWh per square foot, 0.3 therms of natural gas per square foot, and spent an average of 99 cents per square foot on energy. Removing the two least efficient green schools, the 13 remaining green schools used an average of 5.83 kWh per square foot, 0.4 therms of natural gas per square foot, and spent an average of 91 cents per square foot on energy.

By way of comparison, the traditionally built schools constructed since 2000 used 6.56 kWh per square foot, 0.3 therms per square foot, and spent 98 cents per square foot on energy. The recently built, traditional schools spent about seven percent more per square foot than the 13 best green schools, and one percent less per square foot than the average of all green schools.

One reason the green schools might perform so poorly is new schools use more electricity on average because there are more electronics. Some older schools simply do not have the electrical capacity to accommodate the number of computers and other equipment used in newer classrooms.

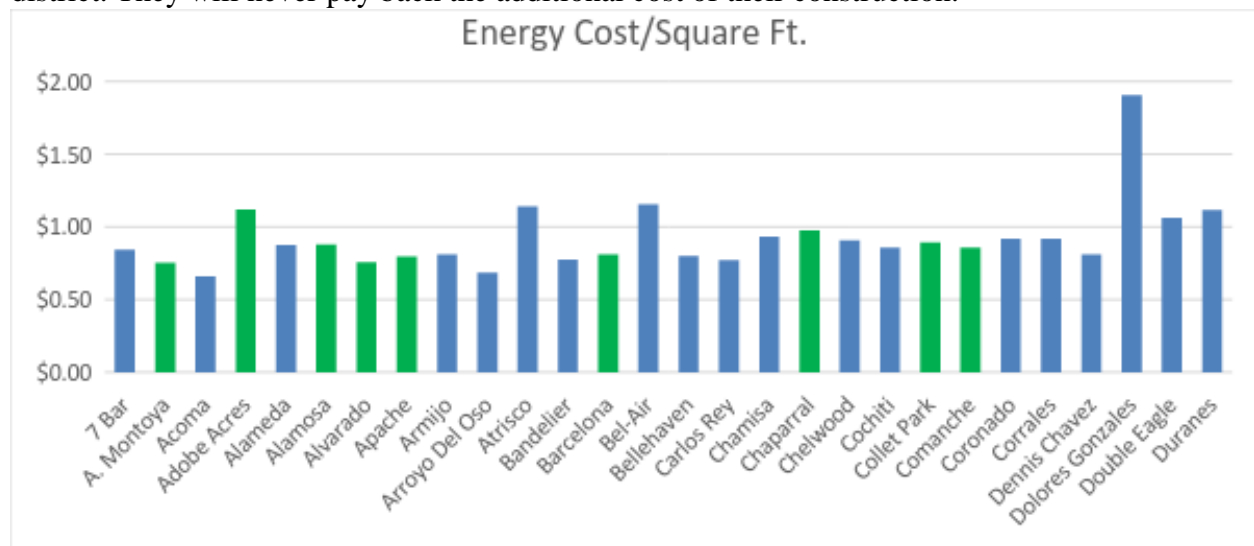
The data show there is some merit to this argument. The non-green schools built since 2000 use an average of 5.95 kWh – ten percent less than all green schools – and spend 93 cents per square foot on energy, which is about five percent less than the average of all the green schools. The best green schools are only two percent more efficient per square foot than the average of the traditionally built schools.

Assuming the green elements are responsible for the difference between new green schools and new schools built without green elements, the total annual savings is still small. The

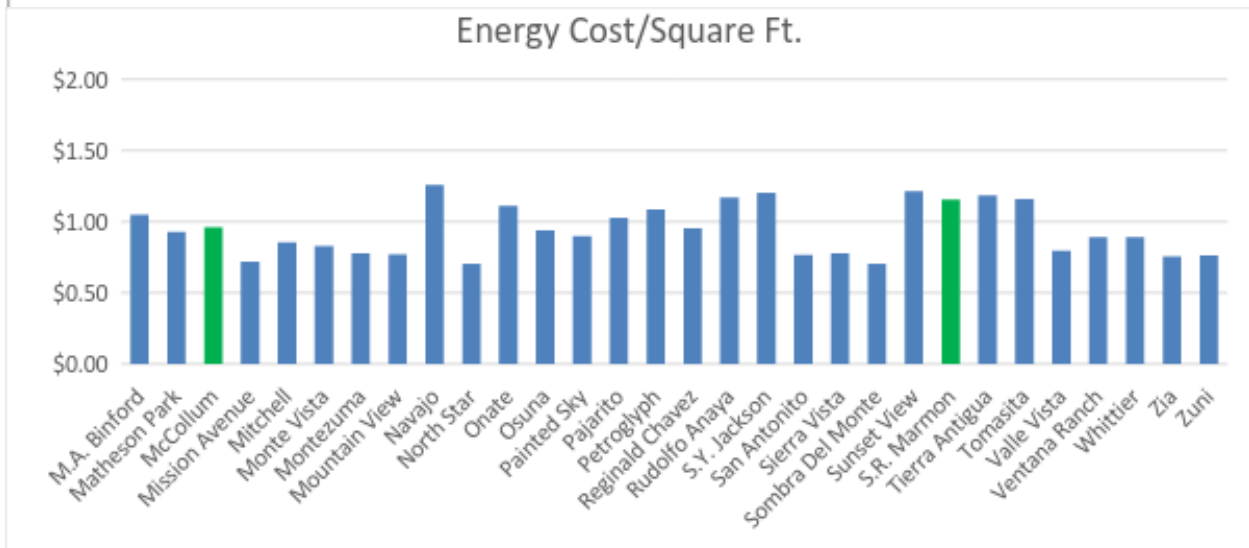
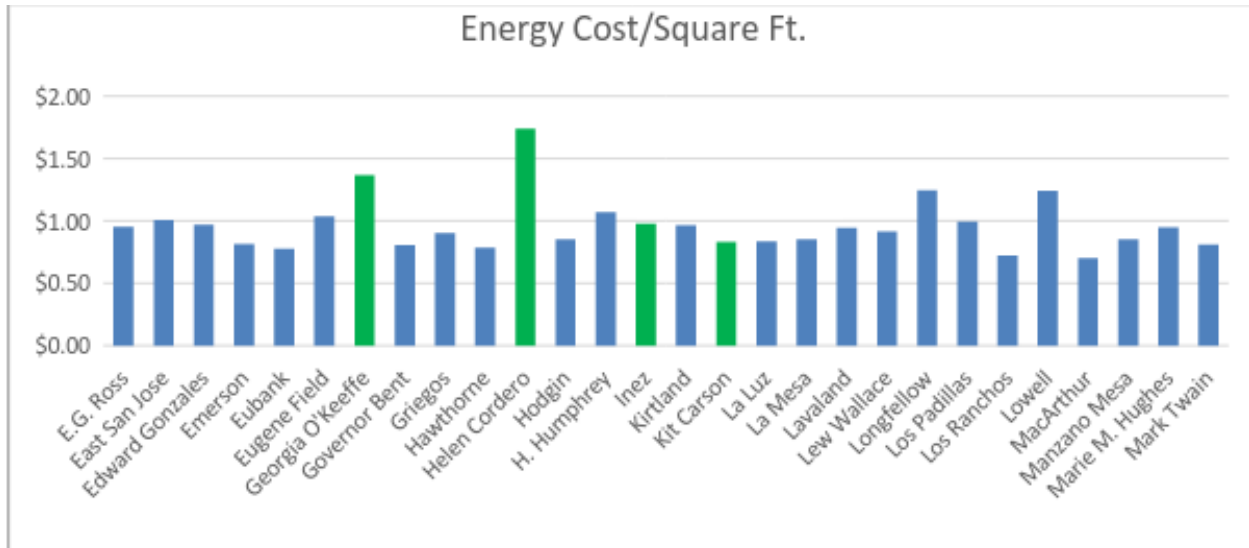
best green schools save only seven cents per square foot in energy costs over the course of the year, yielding an average of \$4,990 in annual savings. Over the twenty-year lifespan of a building, the savings would amount to less than \$100,000.

That may sound like a significant amount, but the cost of construction for Georgia O’Keeffe school, for example, was about \$12 million.¹⁷ If the elements required to achieve LEED Silver certification added only one percent to the cost of the building, a very low estimate, the energy savings over twenty years would not cover the added expense of construction.

Indeed, O’Keeffe Elementary is the third-worst performing school for energy costs. One of the two schools that perform worse is another green school, Helen Cordero Elementary. Those schools spent more to become LEED-certified and still they add to the energy expenses of the district. They will never pay back the additional cost of their construction.



¹⁷ Arch Daily, “Georgia O’Keeffe Elementary School/Jon Anderson Architecture,” August 21, 2011, <http://www.archdaily.com/163780/georgia-okeeffe-elementary-school-jon-anderson-architecture/> (Accessed April 12, 2016)



Green elements typically cost two to three percent more during construction, as we have noted above. Even a small building addition that cost \$5 million would add \$100,000 to construction costs at a two percent premium. On average, even when we exclude the two worst-performing green schools, paying even a small premium for LEED certification has not paid off for Albuquerque elementary schools, requiring a greater-than-20-year timeline to achieve payback.

It is important to note that this does not discount the savings. We would not spend a dollar today to save a dollar twenty years from now. Our analysis, however, assumes that “investing” a dollar in LEED certification is worth gaining a dollar in savings later on. Even with that generous assumption, however, on average the green elementary schools in the Albuquerque school district will never pay for themselves.

New Mexico Green Schools – Results and Conclusions

The green schools in New Mexico's two largest school districts offer good examples of comparing the promise of green building standards with the common reality.

In Santa Fe, Amy Biehl Elementary is significantly more efficient than the other schools in the district. It is uncertain, however, whether even these impressive energy savings will ever pay for themselves. Meanwhile, district officials decided to build their newest public school *without* LEED certification, which is telling.

The LEED-certified schools in Albuquerque are more typical of what we find nationwide. The record is mixed. The best green schools are slightly more efficient, but not enough to pay back the additional cost to meet the green standards, in all likelihood. Including the two new LEED-certified schools, O'Keeffe and Cordero, the savings evaporate and actually increase energy use and costs for the district.

The consistent failure of green buildings to produce promised energy savings is not unusual, as we noted above. The performance of New Mexico's green schools, however, is a further indication that legislators and school officials should think twice before requiring schools to spend additional public education dollars to earn LEED certification.

The experience of schools across the country demonstrates that district facilities directors are often adept at finding cost-effective ways to reduce energy use, based on the particular buildings they manage. Requiring them to meet a formulaic, one-size-fits-all "green" approach, however, often leads them in the wrong direction, by increasing costs without returning savings.

The failure of green buildings to produce energy savings as promised is also an environmental failure. Many advocates who promote LEED or similar rating systems point to the supposed carbon dioxide emission reductions achieved by green schools. The failure to save energy, or even slow the increase in energy use, wastes resources on costly efforts that do nothing for climate change – which is supposedly one of the justifications for building to LEED standards – or the environment.

Instead, misguided green building rules divert scarce funding from efforts that could have a positive environmental impact, or which could be used to meet other public needs. Ultimately – for taxpayers, students and the environment – the real-world data shows that New Mexico's green schools fall well short of their energy-saving promises.

About the Author

Todd Myers is an adjunct scholar with New Mexico's Rio Grande Foundation. The Rio Grande Foundation is an independent, non-partisan, tax-exempt research and educational organization dedicated to promoting prosperity for New Mexico based on principles of limited government, economic freedom and individual responsibility.