FEATURE

Best Practices in High-Performance Office Development: The Duke Energy Center in Charlotte, North Carolina

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INTRODUCTION

LEED CERTIFICATION HAS EMERGED AS THE STANDARD OF excellence in many office markets across the country because the principles of sustainable development are closely aligned with the requirements for Class A assets.[1] These high-performance buildings are often the most prestigious in their markets and compete for prospective tenants by not only offering operational efficiencies and an attractive work environment, but also by providing tenants with a means of demonstrating their commitment to environmental conservation.[2] The latter of these objectives has become increasingly important as a result of the corporate social responsibility movement and the resulting pressure placed on companies to evaluate their performance using economic, social and environmental measures of success.[3]

Notwithstanding the aforementioned benefits, real estate investors must evaluate the financial viability of LEED-certified projects using traditional valuation methodologies. Any construction cost premium required to complete these buildings must therefore be offset by a cost of capital advantage or an increase in net operating income generated by higher rental rates, lower vacancy levels or a reduction in operating expenses. The analysis presented in this article addresses these issues by briefly reviewing existing sustainable development research and evaluating the results within the context of the Duke Energy Center in Charlotte, North Carolina.

The Duke Energy Center serves as a noteworthy case study because it was the first office tower in the country to earn the LEED Platinum Core and Shell certification under the Version 2.0 criteria. Completed in 2010, the building includes 48 floors and nearly 1.5 million square feet of multi-tenant office space. The owner, Wells Fargo and Company, used the project to demonstrate its commitment to sustainable development, while also taking steps to increase net operating income and maximize return on investment. The results to date have been very promising and the property serves as an excellent example of best practices in high-performance office development.

EVALUATING THE COSTS AND BENEFITS OF HIGH-PERFORMANCE OFFICE DEVELOPMENT

Before discussing the Duke Energy Center in detail, it is useful to consider the potential effects of LEED certification

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on upfront construction costs and future revenues. These economic factors have become easier to evaluate over time as the number of buildings carrying the certification has grown. For example, research conducted over the last decade indicates that LEED certification can increase the cost of constructing an office building by as little as 0.6 percent or as much as 6.8 percent depending upon a variety of factors.[4] Results such as these have led some cost estimating experts to conclude that LEED certification need not significantly increase upfront costs when design and building professionals work together with product manufacturers to seek out sources of savings.[5] At the very least, certification is unlikely to increase construction costs by 15–20 percent, as predicted in some investor surveys.[6]

One of the most effective ways to limit any cost premiums associated with LEED certification is to bring together an experienced team of professionals in the initial stages of a project. The earlier these professionals are engaged, the more likely it is that the owner will have a high-performance building, rather than one made up of individual systems that do not leverage each other to the highest advantage. The team should include architects, engineers, contractors, property managers, and appraisers, among others. All of these professionals should be tasked with the responsibility of identifying potential upfront cost savings, while being mindful of lifecycle benefits that may result from sustainable building technologies, systems and materials.

In the event pursuing LEED certification is anticipated to increase upfront construction costs for a given project, it is not necessarily fatal to the transaction. The question becomes whether or not sustainable design features will increase revenues or reduce costs in an amount sufficient to offset the initial capital outlay. Several recent studies address these questions directly. On the revenue side, studies examining over 7,000 office buildings have found rent premiums of approximately 2.5–3 percent in LEED-certified properties after controlling for differences in quality and location.[7] Earlier research relying on smaller datasets and limited control variables have found higher rent premiums, but the results must be interpreted cautiously due to these data limitations.[8] Lower vacancy rates have additionally been observed in high-performance buildings. LEED-certified properties appear to enjoy occupancy levels 1.5–7 percent higher than their non-certified peers.[9] These benefits, along with faster absorption of space and higher tenant retention, may generate an increase in net operating income sufficient in size to offset any cost premium required to construct a high-performance building.

All of the benefits discussed above contribute to another source of revenue from LEED-certified buildings—an increase in the asset's value at the time of sale. Recent empirical studies suggest certified properties sell for premiums of 16 percent or higher when compared to non-certified alternatives.[10] While these statistical analyses have their limitations, the sales price premium is logical based on evidence of higher net operating income and/or a cost of capital advantage associated with LEED certification. The latter is likely if investors perceive certified buildings to be less risky investments because they are insulated to a degree from physical and functional obsolescence. These types of obsolescence occur as systems age and as market expectations evolve. Arguably, buildings constructed to the most advanced standards will have longer obsolescence curves (e.g., longer periods in which they have a competitive advantage). Intelligent building systems that simultaneously minimize water and energy consumption are one feature of high-performance buildings that may elongate their obsolescence curves.

Interestingly, the magnitude of operating cost savings in LEED-certified buildings continues to be a subject of debate. Single-observation case studies examining assets before and after LEED "retrofits" report significant reductions in both water and energy usage. However, studies relying on much larger datasets have failed to observe measurable reductions in aggregate operating costs.[11] More research is needed in this area to quantify the magnitude and source of operating cost savings in high-performance assets. Property owners with an understanding of these operational efficiencies are likely to be in a better position to attract tenants in the ever competitive Class A office market.

LEED CERTIFICATION AS A MARKETING TOOL

Class A office buildings tend to include many advanced design features and technologies consistent with high-performance office development, regardless of whether or not they are LEED-certified. The decision to pursue independent third-party ratings and assessments is therefore driven by the developer or owner's desire to label an asset in a way that sets it apart from competitors. By providing a differentiated product, real estate investors hope to obtain rent premiums. The aforementioned empirical studies confirm the existence of such a premium for certified space, but it is difficult to determine whether it should be attributed to the physical characteristics of high-performance buildings or the desire for tenants to present a "green" corporate image. Both explanations are plausible.

Some of the physical attributes of high-performance buildings likely to increase rents, occupancy, tenant retention, and absorption include conservation features, amenities and location. Since the LEED certification process focuses on resource conservation, particularly water and electricity, these properties have the potential to affect the tenant's bottom line under most lease structures. Anticipated operating cost savings may therefore be capitalized into rental rates. As for amenities, high-performance buildings often include green roofs, open areas, preferred parking for fuel efficient vehicles, bicycle storage, exposure to natural light, and many other features that tenants are willing to pay for to some degree. Finally, buildings carrying a LEED certification are often located on redevelopment sites in close proximity to public transportation and other urban services. These locational attributes are generally attractive to prospective tenants and may produce rent premiums.

Less visible, but still important, benefits generated by the physical attributes of high-performance buildings include greater workplace satisfaction among occupants. LEED-certified buildings are believed to provide a more enjoyable work environment, which may in turn increase productivity and reduce absenteeism. At least two recent studies provide empirical support for this hypothesis. In a 2007 survey of corporate executive, 75 percent of the respondents cited "greater workforce productivity" as a motive for retrofits involving sustainable design features, while 69 percent believed these retrofits would be a factor in attracting and retaining a quality workforce.[12] More than 40 percent of the respondents participating in a similar survey reported an increase in productivity and reduced absenteeism after relocating to a LEED-certified building.[13]

Despite the benefits high-performance buildings can offer all of their occupants, these properties have proven to be more attractive to some tenants than others. A recent study of more than 11,000 office tenants found a strong preference for LEED-certified buildings amongst construction, energy, finance and non-profit firms, as well as public sector organizations and those employing highly skilled labor.[14] The results are attributed, in part, to the need for these organizations to demonstrate their commitment to sustainability. Survey data confirms this motivation, where as many as 88 percent of respondents have cited "corporate environmental commitment" as a factor encouraging sustainable design retrofits.[15] The findings suggest real estate developers interested in obtaining rent premiums for LEED-certified buildings should focus their marketing efforts on tenant groups with a demonstrated preference for sustainable assets or those that have the most to gain by presenting an environmentally-conscious corporate image.

THE DUKE ENERGY CENTER

The Duke Energy Center serves as an example of best practices in office development because it is a high-performance asset. The LEED Platinum-certified property includes intelligent building systems that reduce operating costs, as well as amenities that are consistent with the principles of sustainability. Many of the tenants in the building have explicit corporate commitments to environmental conservation and all have agreed to lease provisions requiring LEED-certified up-fits. Approximately 34 percent of the building's materials originate from within 500 miles of Charlotte and 25 percent of all materials were derived from recycled content. The net result is a win for the owner, the occupants and the community.

In response to the shortage of green space in the urban environment, the building provides two open areas. One is a traditional ground-level plaza, complete with shaded seating and potted landscaping. The other is a 10th floor rooftop landscaped with small trees and shrubs, where occupants can sit and interact. Both open spaces are irrigated exclusively with captured and recycled storm water. The green roof is a particularly beneficial amenity for the owner because it serves as a location for special events, while also providing a higher insulation value than a conventional roof, with a projected life expectancy twice as long.

Other amenities include a 2,100-space subterranean parking deck that serves both the building and the adjacent cultural arts campus. Office tenants, visitors and patrons of three museums and an adjoining theatre benefit from preferential parking for low-emission vehicles. Locating the parking underground required 120 feet of excavation but also created a much less dense above-ground experience and enabled the treatment of millions of gallons of contaminated groundwater. Nearby light rail and bus services, in addition to onsite showers and bicycle storage, offer viable alternatives to those interested in accessing the site without a car.

Efforts to enhance the tenant experience through improved lighting and air quality can also be observed throughout the Duke Energy Center. Most of the interior up-fits include glass-walled conference rooms and open work areas that allow natural light to travel through the space. With few exceptions, private offices tend to be located away from the windows. These features reduce the need for overhead lighting to illuminate the interior of the building's large floor plates. Overhead lights that are in place automatically dim in response to natural light and turn off in areas that are not occupied. Heat gain through the windows is managed with lower blinds that are adjusted by the occupant and computer-operated upper blinds that adjust automatically with the movement of the sun to harvest daylight. All of these features serve to increase workplace satisfaction among tenants while simultaneously reducing energy consumption by limiting the building's cooling load and need for artificial light.

Air quality in the building is maximized through stringent performance standards. Ducts are sealed, equipment is protected, and low VOC products are used during construction and operations. VOC is the acronym for volatile organic compounds often found in carpet, wood, sealants, adhesives, and cleaning products. Whether noticeable or not, these products can continually put off gas for years after the original installation or application. The fumes can trigger allergic reactions and negatively affect the health of building occupants, thereby contributing to absenteeism and reduced productivity. Low VOC products address these problems and can dramatically improve the work environment for many individuals.

Energy consumption in the Duke Energy Center is reduced through the use of 17 separate intelligent building systems that converge into a single network supported by IT-grade fiber.[16] Building managers can use the network to support a wide variety of controls, capture real-time data and produce meaningful reports that contribute to operational efficiencies. Measuring and controlling performance in this manner provides an opportunity to identify and realize energy savings each and every day. According to Cisco and Intelligent Buildings, LLC, combining these systems saved more than $700,000 in up-front expense.

Another one of the building's interesting features is an elevator tower served by a system known as "Destination Dispatch™." Passengers choose their destination using touch-pads in the lobbies and receive an immediate response directing them to a specific elevator cab. There are no floor buttons in the cabs themselves. The design uses operations research and proprietary algorithms to route persons who have the same or nearby destinations to a single cab. Generally, this results in less crowded cabs and fewer stops. Depending on the time of day and volume of activity, the trip time can be reduced by as much as 25 percent. At the same time, the cabs are up to 30 percent more efficient. They have a higher handling capacity, meaning fewer elevators are required to produce an acceptable level of service. Reducing the number of elevator shafts results in additional rentable area on all 48 floors of the building.

Each floor of the building is also sub-metered so that tenants can identify and directly influence the amount of electrical energy required to support their occupancy. Since tenants bear the cost of electricity, there is an incentive to manage HVAC, lighting and equipment needs. Tenants tend to view this as a positive, knowing that they do not subsidize other large energy users in the building.

In addition to energy savings, the integrated approach to building design found throughout the Duke Energy Center contributes to a significant reduction in water consumption. Today, the facility purchases 30 million fewer gallons of water per year than assets of similar size, resulting in annual cost savings of approximately $125,000. Substantial water savings are realized in three areas. First, the building uses nearly 25 million gallons of groundwater captured from the underground parking decks to operate the heating and cooling system. Second, the building captures and deploys 1.6 million gallons of stormwater every year for irrigation. Third, dual-flush technology and waterless urinals in the restroom facilities reduce water consumption by over 4.3 million gallons per year. Rainwater, groundwater and condensate capture are made possible by three underground storage tanks with aggregate capacity of 310,000 gallons.[17] At full occupancy, the building's water usage is anticipated to be 75 percent more efficient than assets of similar size. These efficiencies, as well as those related to energy consumption, are measureable, and the information can be conveyed to prospective tenants evaluating the value proposition of the building as a potential home for their operations.

THE KEYS TO SUCCESS

The success of the Duke Energy Center can be attributed to the owner's commitment to sustainable development and a series of design features that maximize return on investment. Prospective tenants continue to be drawn to the building, and according to management, there is no doubt that sustainability serves as a marketing advantage. Major corporations recognize the value of the workplace amenities and many employees have expressed their desire to be associated with a project promoting the responsible use of resources. In a challenging market, the asset is approaching full occupancy. Substantial progress is also being made towards efficiency objectives. Post-completion forecasts suggest the building will use 22 percent less energy and 75 percent less water than similarly sized assets. Workplace productivity is projected to increase by two percent in comparison to other Class A office buildings without similar features. The estimated three percent construction cost premium required to complete the project is anticipated to be paid back within a 10-year period. These projections are in the process of being validated as the building moves towards full occupancy, but overall, the Duke Energy Center marks a notable achievement in high-performance office development and may serve as an example of the financial viability of similar projects in the future. ■

ENDNOTES

1. Leadership in Energy and Environmental Design (LEED) is the sustainability recognition program of the U.S. Green Building Council. Awards are based on performance in five areas: sustainable sites, water efficiency, energy and atmosphere, materials and resources, and indoor environmental quality

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5. RSMeans, *Green Building: Project Planning & Cost Estimating*, Second Edition, 2006.

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9. Ibid. Also Fuerst, F. and McAllister, P. "An Investigation of the Effect of Eco-Labeling on Office Occupancy Rates," *Journal of Sustainable Real Estate,* 1:1, pp. 49–64, 2009.

10. Eichholtz, P., Kok, N. and Quigley, J., "The Economics of Green Building," *The Review of Economics and Statistics*, May 2012; Wiley et al., op. cit. at 8, and Dermisi, S., "Effect of LEED Ratings and Levels on Office Property Assessed and Market Values," *Journal of Sustainable Real Estate,* 1:1, pp. 23–47, 2009.

11. Miller, N., Pogue, D., Saville, J. and Tu, C., 2010. "The Operations and Management of Green Buildings in the United States," *Journal of Sustainable Real Estate*, 2:1, pp. 51–66.

12. "The Dollars and Sense of Green Retrofits," a joint study by Deloitte and Charles Lookwood, 2008.

13. Miller, N.G., Pogue, D., Gough, Q.D., and Davis, S.M., 2009. "Green Buildings and Productivity," *Journal of Sustainable Real Estate,* 1:1, 65–90.

14. Eichholtz, P., Kok, N., and Quigley, J. M., 2010. "Doing Well by Doing Good? Green Office Buildings," *American Economic Review*, 100:5, pp. 2492–2509.

15. Deloitte and Charles Lookwood, op. cit. at 12.

16. The 17 systems supporting energy and water conservation, along with building operations, include: (1) electrical sub-metering; (2) water metering; (3) automatic blinds; (4) irrigation control; (5) audio and video conferencing; (6) VOIP (voice over Internet protocol) phones; (7) exterior lighting; (8) interior lighting; (9) digital signage; (10) elevators; (11) barrier gates; (12) VOIP emergency intercoms; (13) parking controls; (14) video surveillance; (15) access controls; (16) building automation (HVAC control system); and (17) 800 MHz life safety radio communications.

17. The system includes two 170,000-gallon tanks for cooling tower make-up water and one 140,000-gallon tank for rainwater storage. These tanks store water that is collected from a variety of sources, including a potential annual supply of: 1.6 million gallons from rainwater; 1.2 million gallons from condensate; and 26.2 million gallons from groundwater.

FEATURE

Using Historical Employment Data to Forecast Absorption Rates and Rents in the Apartment Market

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INTRODUCTION

THIS ARTICLE PRESENTS A STRAIGHTFORWARD TECHNIQUE that can be used by appraisers, consultants, asset managers and others in the field to forecast demand for needed new apartment units and trends in rental rates. The types of data required for the analysis are available in all but the smallest market areas and the techniques require only that analysts have a minimum working knowledge of Excel. The ideas and thoughts presented here can also be extended to other property types. This article, therefore, may have benefits to a wide range of constituents in the field working over almost any type of property.

A secondary benefit of using a technique similar to what is presented here is to help avoid the sometimes chaotic and destructive gyrations in demand/supply imbalances. If need for space can be more accurately forecast, then imbalances can be reduced.

HISTORICAL PERSPECTIVE

The Houston-area data provided by REVAC Inc. is used to present the historical perspective. Figure 1 reports the annual data on new apartment construction, mean monthly rents, rate of change in rents and the apartment occupancy rate during the years 1980–2011. The mean monthly rent in this area has been approximately $500, which has grown at an average of 3.35 percent per year, while almost 10,000 (average 9992 from 1980–2012) new apartments were constructed every year. Moreover, more than 90 percent of the apartments were leased during this period. However, very high standard deviations as compared to the means in the case of new apartment constructions and growth in rents suggest that the apartment market has been highly volatile in the past. The new apartment construction in 1983 was almost 35,000 units, while in 1987, it fell to only 84. Similarly, the maximum and minimum values of growth in rents were approximately 29 percent and -9 percent during 1981 and 1985 respectively.

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