Cash is King: Assessing the Financial Performance of Green Buildings

AUTHORS

Alex Herceg, P. Eng., Analyst (Lux Research)

Aditya Ranade Ph.D., Senior Analyst (Lux Research)

ABSTRACT

A STEADY RISE IN GREEN BUILDING CONSTRUCTION OVER A DECADE HAS BROUGHT THE SECTOR FIRMLY IN MAINSTREAM OF THE CONSTRUCTION INDUSTRY. HENCE, NOT SURPRISINGLY, DESIGNERS, DEVELOPERS, BUYERS, AND OCCUPANTS ALL ARE CLOSELY MONITORING THE PROMISED BENEFITS OF GREEN BUILDINGS; PARTICULARLY WHETHER THESE CAN BE MONETIZED. OUR ANALYSIS OF ONE BUILDING STANDARD-SEGMENT COMBINATION, NAMELY A LEED RETAIL BUILDING IN THE U.S., SHOWS THAT UTILITY SAVINGS BY THEMSELVES DON'T JUSTIFY THE GREEN CONSTRUCTION PREMIUM. FACTORS LIKE A RENTAL AND/OR RESALE PREMIUM WILL MAKE OR BREAK THE FINANCIAL CASE FOR GREEN BUILDINGS. WHERE SUCH FACTORS EXIST, THE INTERNAL RATES OF RETURN (IRRS) ARE STEADY, PREDICTABLE, AND NORTH OF 5%, MAKING GREEN BUILDINGS AN ATTRACTIVE, BANKABLE ASSET CLASS.

Landscape

As Green Construction Becomes Mainstream, Economic Motivations Are Overtaking the Environmental

Rapid urbanization across the globe has been a marked change during the past five decades, with 2010 being the watershed year in which more than 50% of the planet started living in urban areas for the first time in history. Urbanization when unchecked and unplanned can be an environmental and infrastructural disaster. However, if Green Buildings are a key part of the planning, cities will be significantly less carbon intense on a per capita or per unit GDP. Thanks to a slew of supportive policy measures, a strong core of early adopters among corporate and institutional buildings, and rising capabilities of the design community, Green Buildings is a significant part of the mainstream construction market, as we had predicted in "Diamonds in the Rough." According to our estimates, Green Construction now commands a 20% share of the overall new construction in the U.S.

Globally speaking, Green Buildings certified by 19 major standards such as LEED in 95 countries, amounted to 325 million m^2 of floor space in 2013, translating to approximately a $260 billion market, somewhat ahead of our predictions from "Diamonds in the Rough." As seen in Figure 1, from 2011 to 2013, floor space under these 19 Green Building standards has increased from 256 million m^2 to 325 million m^2 (see the Green Buildings Tracker H1 2014).

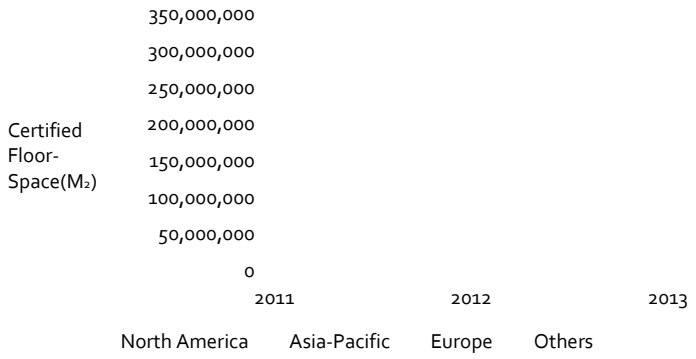

Figure 1: Floor space under 19 major green building standards now amounts to 325 Million m2

As large as the market opportunity for Green Building Standards is, a significantly larger one is enabled by building energy efficiency codes such as ASHRAE 90.1 and IECC. ASHRAE 90.1 is the most widely adopted building code for energy efficiency with subsequent ones such as IECC and ECBC India having been based on similar set of requirements. Of the 50 U.S. states, 42 now mandate some version of ASHRAE 90.1, with 11 now adopting the 2007 version or higher. In Germany, we estimate that floor space compliant with EnEV 2009 is 50 million m^2 in 2013, approximately 36% of the overall new construction.(see Getting to Nearly Zero Energy Buildings: Ambitious Targets, Modest Progress).

As the Green Buildings segment has moved to mainstream, a distinct change in motivations for Green Construction has occurred. According to an annual survey of construction firms by McGraw Hill, the % of respondents stating "right thing to do" as the motivation for green construction dropped from 42% in 2008 to 26% in 2012. On the other hand, the percentage of respondents stating "lowering operational costs" increased from 17% in 2008 to 30% in 2012. The anecdotal evidence from our conversations with several leading architects firms is in support of this change, e.g. Ilana Judah from FxFowle states that "For virtually every green building project that we do, cost and benefit considerations are increasingly becoming important, even for large expensive projects such as the Javits Center in New York."

Lux Research originally defined Green Buildings as: *"Buildings incorporating materials, equipment or software technologies to reduce the building's energy and resource footprint over that of a standard building,"* However, in our recent research we are finding that this definition in practice, is expanding in two fashions, both with implications on financial valuation. One is the concern about occupant health and productivity, particularly in standards, such as LEED v4 and Living Building Challenge, that put severe restrictions on materials such as VOC-emitting adhesives and coatings. The other one is making the buildings more efficient, and not only from an environmental resource efficiency point of view, but actually improving the efficiency of operations for the building occupant. Key examples include building automation solutions from Cimetrics (see the August 11, 2014 LREBJ) which have resulted in process improvement for pharmaceutical manufacturing operations, and Microsoft's initiative to use technology to improve its energy efficiency as well as operational activities such as generating work orders (see the August 25, 2014 LREBJ). Owing to these changes, a new definition may be in order. So now we define Green Buildings as: *"Buildings that use technology to improve its energy and resource efficiency, workplace productivity and occupant health."* Buildings that meet this new definition can improve the bottom line for the occupant in several different ways:

The obvious economic benefit of Green Buildings is reduction in utility costs like electricity, water, and gas bills. In the U.S., utility costs currently comprise of 19% of the commercial building operational costs (see Figure 2) and second only to fixed costs like rent. However, utility expenditure in the U.S. commercial sector has been falling for the past three years, as indicated by the BOMA and Kingsley Survey. So the building sector's recent success in energy, gas, and water use efficiency in the developed world, may prove to be its limitation for green building retrofits going forward. Also, limiting the appeal of this motivation is the dependence on utility pricing, often subsidized by the government. However, in the developing world, the gap between energy supply and demand will mean that energy efficiency is a major contributor to energy security. This means that retail stores employing enhanced daylighting systems can continue operations during blackouts and brownouts, and negating, at least partially, the need for diesel generators.

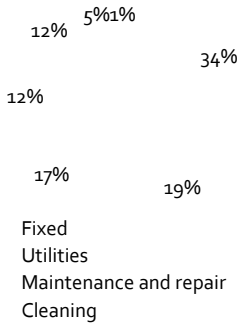

Figure 2: U.S. Commercial Real Estate Cost Breakdown 2012

Increased energy efficiency can lead to downsizing of the building equipment systems. This benefit is especially key for new construction. A more efficient thermal envelope consisting of air barrier membranes and high R value glazing can lead to downsizing of HVAC) units, sometimes by as much as 30%. According to Stepahnie Horowitz, Managing Director at Boston based Zero Energy Design, "Our design process starts with identifying the inefficiencies in thermal envelope and then fixing them, as this activity has a cascading effect in reducing size of HVAC and lighting systems."

The concept of digital fabrication involves designing a building with its components first; then, specifications are given to fabricators who use advanced CAD/CAM manufacturing, and using the same fabrication software to give deployment guidelines. A poster child for such an approach is the Hill Group, a design, construction, and maintenance company from Chicago that is using the Autodesk Fabrication software along with its own proprietary software. According to David Pikey, director for building integrated modeling (BIM) at the Hill Group, this approach has increased efficiency and safety and reduced labor for deployment. Large construction contractors from abroad have taken notice. Samsung Construction & Trading (C&T) has engaged with the Hill Group in a work-exchange program to explore the best practices for the use of technology in construction, especially the use of software for estimating, fabricating, and designing mechanical and plumbing systems. As a first step, Samsung has sent its nine-year veteran, senior manager Munyeon (JJ) Jung, to spend six months with the Hill Group. We anticipate a greater commercial relationship between the Hill Group and Samsung C&T is only a matter of time, once Samsung C&T has figured out how to use the digital fabrication approach in the Korean construction sector.

While it has been known for some time that the design of buildings affects occupant well-being, little has been done to quantify this benefit. Later in the Landscape section we outline the factors of a green building related to occupants, company, and tenants.

The real estate sector in the past has been largely focused on earning third-party sustainability certifications, such as LEED and ENERGY STAR. Unfortunately, these good intentions have delivered a host of buildings who have sacrificed energy performance through poor building envelopes, for example. This trend is changing however, as asset managers are getting smarter about their portfolios, and the real estate (RE) industry has formed a number of

groups whose mandate is to deliver green reporting frameworks, such as GRESB and GRI. The former is an industry-sponsored organization which has developed a benchmark assessing the sustainability of RE portfolios. The GRESB benchmark criteria vary depending on region, investment vehicle, and building type. It is used by RE investors, who have increased use of GRESB dramatically; presently, some 56,000 buildings globally (with an aggregate value of $2.1 trillion) use this framework. Certifications are important because they provide a metric for comparison between properties, but do not offer direct financial insights. No one rating system yet stretches across the globe, so investors and property managers must consider local rating systems.

When bankers raise debt and equity to underwrite commercial properties, they typically don't consider details such as energy performance or sustainable features. Standard items, such as environmental and engineering condition reports are carried out, but more as a matter of formality. The idea of sustainable features or performance (e.g. third-party certification) may be pitched by RE bankers, although this is a softer issue, and not quantitatively driven, according to one New York underwriter with whom Lux interviewed. Typically, bankers consider net operating income (NOI) when valuing a property, and stretch it out to perpetuity. This annual NOI, along with the risk-adjusted return (capitalization rate) will drive the value of the property. This method is essentially a discounted cash flow (DCF) analysis applied to a property to determine its value; the equation is shown in Figure 3.

$$Capitalization\ rate = \frac{Annual\ income\ (NOI)}{Total\ value}$$

Figure 3: Capitalization rate Equation Commonly Used for Commercial Real Estate Valuation

What drives the cap rate is a bit more complex. Risk is a key driver in cap rate, which factors in the premium over the "risk-free rate" (taken as the rate paid by the U.S. Treasury on three-month bills). Cap rate therefore fluctuates by geography, but also by asset class. For example, a Class A office building in a central business district (CBD) location will carry a lower risk (of maintaining occupancy and generating income) than a Class B building in a suburb, generally speaking. The relationship, then, is that higher-quality assets (e.g. well-situated, desirable office space) command lower cap rates than more speculative commercial building space. Along with this trend, green buildings generally command lower cap rates than their standard counterparts. LEED-certified buildings can have cap rates 40-55 basis points lower than comparable buildings.

Just as cap rates vary by asset (and asset type), and as a result, investors vary widely in their choice of assets. RE assets are similar to other financial instruments, with different risk profiles and returns, which investors chose to fit specific criteria of their investors. A large pension fund or life insurance company may only invest in high-quality commercial buildings, with stable, long-term cash flows, a low capital expenditure requirement, and a low-cap rate to match. Opportunistic investors may question the "best use of space"; for example, the revenue stream of parking garage might be predictable, but because risk is low, it may only have cap rate of 5%. On the other hand, if that space was to be re-purposed as high-density residential housing, that would carry an overall higher return on investment (ROI) at project completion, but carries a much higher risk.

Building upgrades, such as an energy retrofit, may have concrete effects, such as lower energy use. One leading sustainability manager shared an anecdote of a commercial property acquired for $270 million that underwent a deep retrofit and was later sold for a premium of over 250%. However, green building certification costs are treated differently by asset managers. Because of its ubiquity, ENERGY STAR benchmarking costs are viewed by most RE managers as an operating expense, a normal cost associated with doing business. LEED certifications, on the other hand, are a bit more complex. In fact, as one executive at a leading sustainability consultancy told us, there is a lot of reluctance among building owners to pay for third-party building certifications. While the application fees are minimal, the soft costs associated with documenting a building's features can reach as high as 2% of the total project budget, according to some sources, such as Davis Langdon's "The Cost of Green: Revisited" (produced by AECOM).

A siloed approach to green building features, such as the ROI or payback related to an energy efficiency measure (e.g. LED lighting), works in isolation. However, the more complex interactions related to a combination of features, or enhanced indoor environmental quality (IEQ) and system commissioning, for example, are more difficult to measure. In this case, RE professionals should use a more detailed discounted cash-flow analysis to capture the potential benefit and risk associated with a more holistic approach. This view was reinforced when Lux interviewed an executive at a leading sustainability consultancy, who told us that financial analyses do not capture the full effect of interacted measures, which may have productivity or health gains beyond energy savings.

Numerous secondary research sources demonstrate that green buildings have a higher inherent value than their standard peers. For example, one study of 1.6 million residential housing transactions in California by Nils Kok shows a clear price premium of 9% for green-labelled (e.g. LEED, ENERGY STAR, etc.) homes. It should be noted, however, that this value fluctuates with climatic and even regional "environmental ideology." Interestingly, the premium rises 1.3% with every 1,000 cooling-degree-day increases, which implies buyers realize energy performance matters in more extreme climates; the study did not find any link between electricity price and sales premium, however. The California study is in line with European studies, two of which have found residential housing premiums for green stock to be 12% and 16%, respectively.

A similar willingness to pay exists in the commercial market, which is well-documented in the U.S., and less so in Europe. For example, a joint survey between large real estate advisory and facilities management company Jones Lang LaSalle and CoreNet Global shows that more than 80% of tenants are willing to pay a rental premium – if this is reflected in real benefits. Tenants' concern – that of demonstrable benefits – is allayed by third-party green building certification schemes. These standards have grown tremendously in the past several years, with the most important 19 standards touching projects that span 95 countries; this equates to 3.5 billion ft^2 of space certified in 2013. Interestingly, the distribution across these rating systems is not equitable; the top five standards account for 90% of this space (see Figure 2). Similarly, the geographic distribution of projects is heavily biased, with five countries accounting for 89% of certified green floor space (see the Green Buildings Tracker H1 2014).

As Figure 4 shows, ENERGY STAR is the most widely adopted standard, as it is also a benchmarking tool among commercial building owners. Buildings which are assessed using this metric receive a score (from 1 to 100), and can thus be segmented or compared across similar buildings, either at a portfolio level or competitively. While ENERGY STAR dominates in floor space, LEED certification is the market leader in terms of the most influential among property investors in U.S., and increasingly abroad. However, the dominant rating systems that building owners choose to certify projects varies regionally. As shown in Figure 4, there is little consistency globally, with the exception of LEED and BREEAM, and some are country specific, such as Minergie and China 3 Star.

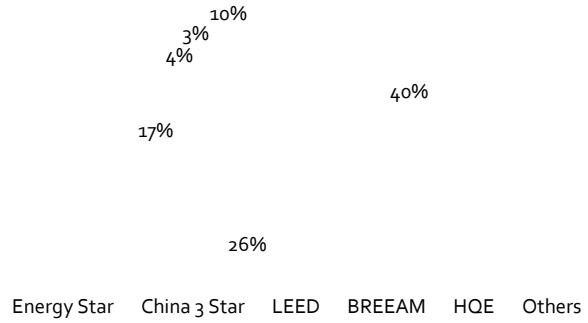

Figure 4: U.S. Standards Holds the Top Rank for Green Building Certified Floor Space

Green certified is becoming the new normal in some building segments.
Across all of the rating systems, and all regions, the floor area certified has grown at a CAGR of 14% from 2011 to 2013. This growth in certified floor space has effectively created value in the real estate marketplace, due to rent and sale price premiums that green buildings command. To quantify this premium, we conducted a survey of secondary research sources, validated with primary research with senior executives at a broad cross-section of the real estate industry. The condensed findings of this research are found in Figure 5 (commercial market, U.S.), Figure 6 (commercial market, Australia), and Figure 7. We chose LEED and ENERGY STAR as the focus of this analysis, because of their high adoption (ENERGY STAR in the U.S., and LEED globally), and because the most comprehensive financial performance data is available for them.

Region	Predominant Rating Systems (2013)
North America	ENERGY STAR, LEED
South America	BREEAM, LEED
Europe	Minergie, DGNB, Passive House

Middle East	LEED, BREEAM
Africa	Green Star South Africa, LEED
APAC	China 3 Star, LEED

Figure 5: LEED and ENERGY STAR certifications have significant traction, but China 3-star rising

	Rental premium - range (Lux Analysis)	Rental premium - average (Lux Analysis)	Rental premium (DOE survey)	Sale premium (DOE survey)
LEED certified	2%-14%	7%	15%-17%	10%-31%
ENERGY STAR	6%-27%	13%	7%-9%	6%-10%

Figure 6: LEED-certified and ENERGY STAR buildings strongly correlated with price premium in the U.S.

	Sale Premium - Average
NABERS	9%
Australian Green Star	12%

Figure 7: NABERS and Green Star Buildings carry premium in the Australian market

As Figure 6 shows, there is a significant increase in rents as well as sale price for both LEED and ENERGY STAR properties in the U.S. Lux conducted a review of secondary sources, and compared these against a Department of Energy (DOE) study which was released in 2014, and compared the results of 41 studies across 44 organizations (the DOE data is also presented in Figure 5). Interestingly, ENERGY STAR buildings command a higher average rental and sales price premiums in certain markets, but this effect is diminished in the DOE data sample. This is in line with intelligence gathered from one senior RE advisor, who told us that there is a smaller premium in higher market tiers. For example, the rental premium of a LEED-certified class A office space is often small compared with other similar (non-LEED) class A properties; the reasoning is that "good buildings are operated well." This likely reflects the high range in premiums gained from ENERGY STAR, which focuses on energy performance – something that affects all tiers of office. The rental and sales price premium effect exists in other countries as well e.g. Australia (see Figure 7), and average increases are consistent with the LEED and ENERGY STAR premiums in the U.S.

	Occupancy Rate Increase	Utility Cost Reduction
LEED-certified	16%-18%	18%
ENERGY STAR	10%-11%	13%

Figure 8: Operational savings from green buildings are well documented

RE professionals lack the tools to convey and value the benefits of green.
To move sustainability forward, underwriters and valuation professionals need to get savvy and accurately value properties with sustainable features or certifications. A key communication breakdown occurs between asset managers and RE brokers; the latter don't speak the technical language. The industry needs more tools, according to one corporate sustainability manager with whom we spoke, who represents a number of asset managers with international portfolios. Initiatives like Honest Buildings (see March 11, 2013 LREBJ) aim to get performance out into the open, in a comprehensible and digestible format. Similarly, the U.S. Green Building Council (USGBC) is launching LEED dynamic plaques in the very near future, which will show a live feed of building performance to occupants. Other start-ups, such as Lucid, (see September 23, 2013 LREBJ) have tried this approach, but the USGBC's move is an important one, as it demonstrates a static certification is not satisfactory for some stakeholders.

Green Buildings Have Ancillary Benefits that Are Difficult to Quantify

Surveys conducted by Jones Lang LaSalle and CoreNet have found that over 80% of commercial tenants are willing to pay a premium for sustainable space if concrete benefits can be demonstrated. The key is in proving the benefits of green features; while energy consumption (e.g. kWh/ft2) is easily quantifiable, other benefits often are not. One Australian study lists numerous ancillary benefits, which we have classified into three bins (See Figure 9).

Category	Benefit
Space-related	Increased tenant retention
	Improved marketability
Company-related	Brand differentiation and improved marketability
	Reduced risk
Occupant-related	Improved productivity
	Enhanced occupant comfort
	Improved occupant safety

Figure 9: Ancillary benefit classifications relate to space, company, and occupants

Space- and company-related benefits easily monetize.
The first two groups, space-related and company-related measures, manifest themselves financially, through increased rental rates or occupancy rates, as we described above. However, the occupant-related factors are more difficult to quantify and monetize. These effects (see Figure 6) are related to the indoor environmental quality (IEQ), and depend on several interconnected variables related to space configuration and conditioning. There is a link between these parameters and various occupant conditions, and also links each IEQ attribute, such as humidity, to a design or operational strategy. The USGBC developed the LEED rating system to provide merit to design decisions that employ these strategies, because of their link to occupant well-being.

To come back to the idea of quantifying the occupant-related effects, multiple industry sources have told us that while some data exists in the market, there is no comprehensive study which links green buildings to increased worker output in quantitative and financial terms.

According to one executive at a renowned international sustainability consultancy, RE developers and landlords are often keen to have a discussion about the merits of green features, but remain skeptical about the integrity of the limited data available. One survey cites 56% of human resources (HR) executives have a challenge estimating the ROI of building features based on their effect on health and productivity. Companies like Microsoft place a high value not only on building energy performance, but also on the "employee experience"; however, to date, no decisive study has conclusively measured these gains. One effort, via researchers at Michigan State University attempted to prove this link, using two commercial office case studies. Bank of America is in the process of completing a similar study with its One Bryant Park building (LEED Platinum certified) using occupant productivity data pre-move and post-move to the new space. The company has explained that energy savings amount to $3 million per year, but a productivity increase of just one percent would equate to over $10 million.

In a report in early 2013, we pointed out that that the energy expenditure associated with a building is a small fraction of the total value delivered by that floor space. One study by Bill Browning pegs this estimate at a value of 112 times that of the energy costs for a given building. In a similar vein, in Figure 12 we compare the "transactional value" across building types, which attempts to quantify the production value; e.g. for a retail site, this would be dollars in sales per ft^2 annually. A very small handful of startups has realized the importance of protecting this "human element." For example, Building Robotics has launched its "Comfy" platform, which engages tenants by allowing them to adjust space conditioning (airflow, temperature, etc.) via a smartphone, largely using existing infrastructure. This idea is important because it acknowledges that optimizing energy use does directly result in energy cost savings; however, protecting the output of your building asset, whether knowledge work or retail sales, has been largely overlooked.

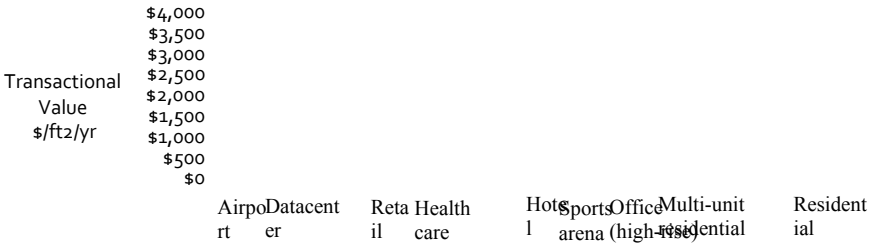

Figure 12: Transactional value comparison across building types

Beyond productivity, occupant health and safety is another area often addressed by green buildings. According to a 2014 McGraw-Hill survey, both residential and non-residential construction industry stakeholders disclosed the top drivers for increased attention toward health impacts of buildings. Among the findings for residential are that 38% of respondents cited "better access to credible information about the health impact of building products and processes," and 31% "better tools for measuring health impacts" as top drivers. In the non-residential segment, 38% of respondents viewed "more data on design and construction that

positively impact health" as a top driver, and 33% of those surveyed listed "better data on the productivity impacts of healthier buildings." There is awareness in the medical community that hazards like mold and mildew exposure, use of toxic cleaning products, and lack of access to fresh air all threaten building occupants – both in residential and commercial buildings.

To close this gap, some organizations are taking the lead. CBRE, for example, has enrolled its Los Angeles headquarters as a pilot project in the WELL Standard, a performance-based rating system focused on verifying the health and well-being impacts of a space on its occupants. Similarly, the WorldGBC is acting as an advocate for the business case of designing with health and well-being in mind. It will act as an industry hub of resources, share best practices, and prove common metrics for health and well-being that can be translated into financial terms. WorldGBC has announced Jones Lang Lasalle, Skanska, and a number of regional green building councils as among its partners for this initiative.

Landscape Conclusions

From our review of the green buildings market, we conclude that: Green building certifications are on the rise, and show no signs of waning adoption; ENERGY STAR, China 3 Star, and LEED have the highest adoption to date. It is well established that there are premiums associated with third-party certified green buildings, in terms of income potential. The market lacks tools to correctly assess the total value of green commercial buildings, particularly the benefits to occupants including productivity gains.

Analysis

To capture most of the key variables, we choose to do one case study, that of a LEED Gold certified retail building in California that is leased.

Leased Building Case Study: LEED Gold Retail in California

In the Landscape section, we outlined the measurable benefits associated with third-party certified green buildings. Some of these are monetary, as we showed in Figures 6, 7, and 8, and others are ancillary benefits (see Figure 9), for which no party has produced compelling evidence. Often, industry participants misguidedly cite the "agency issue" of misaligned incentives between stakeholders – building owners and their tenants.

Design and certification costs typically borne by the owner/landlord.
The variables grouped under "Construction" involve the additional effort required to produce a building that will stand up to scrutiny by a third-party certification organization. This often involves additional consultants, alternative designs and specifications, etc. These costs are often assumed by the landlord or building owner. As described in the landscape section, there are different types of leases on a sliding scale between a gross lease (all-inclusive) and one that is net. Referring to the typical building management expenses in Figure 2, we can see that many of these can be easily pro-rated on a tenant basis (such as property tax, insurance, etc.); utilities, however, are a bit different. Most existing commercial buildings will have poor metering infrastructure, and often lack tenant-specific utility metering (see the report "Proof in Performance – Improving BEMS through M&V"). The LEED rating system actually awards credit for sub-metering infrastructure, and for lease arrangements that pass utility costs on to tenants. For this reason, we have assumed the utility cost impact as split between tenant and

landlord. The reality is that the majority of new commercial space (especially LEED-certified space) will bill tenants for utility usage.

We have clearly established a link between a green building and the higher income potential that it brings. A green building is more marketable, and therefore commands higher rental rates and sees lower tenant churn (and corresponding lower vacancy). These buildings also help insulate their owners from future regulatory pressures, such as New York's Local Law 84, and emergent tenant tools like Honest Buildings – both of which are aimed at making poor-performing properties less desirable. For these reasons, building owners reap the full benefits of these operational impacts. The intangible – or to be more precise – presently immeasurable benefits to building tenants, are reaped entirely by the tenant. This is a point worth mentioning, since productivity gains, or increased retail sales turnover resulting from a superior indoor environment could far outpace other tenant benefits, such as utility savings. At present, due to the lack of a robust model for these effects, we have excluded their quantitative benefits in our model.

Rather than compare different sets of retail buildings (i.e. LEED and non-LEED), we established a baseline building – a typical big-box retail building in Los Angeles, California. We then dissected the capex and opex costs and benefits of a LEED-Gold certified version of that same baseline building, and compared the two. We opted to use the direct capitalization method, because it is based on the operating income of a property, and doesn't depend on comparable properties. We therefore modelled each project's typical income on an annual basis, using the assumptions laid out in Figure 13. We then compared this baseline to a LEED Gold equivalent building, and quantified the incremental benefit to both a tenant and owner.

Variable	Assumptions
Building type	Big-box retail
Geographic region	Los Angeles, California
Certification	LEED Gold
Project size	80,000 ft2
Construction cost	$62/ft2
Capitalization rate	6.25%
Vacancy rate	6%
Baseline lease rate	$27/ft2
Maintenance spend	$2/ft2
Utility spend (consumption)	$2.34/ft2

Figure 13: Baseline building variables assume a big-box retail location in California

We quantified the energy consumption (and hence utility spend) using data from the U.S. Building Energy Data Book, given that this case study is for a retail site in the Western U.S. The data book drills down into energy consumed per unit area (ft^2) for "No Mall" retail sites. Specifically, we assumed a typical "baseline" building to consume this amount of energy, sub-divided into electricity and natural gas. Natural gas is the dominant form of heating in California,

and as such we have assumed 100% of the heating load of a hypothetical building to be met by gas-fired heating. We then assumed that on-peak and off-peak consumption would be divided 56% and 44%, respectively, and applied electricity and gas pricing information from the U.S. Energy Information Administration. This analysis resulted in an annual utility spend of approximately $2.34/ft2, which was validated by other sources.

For the baseline case, rental rate is based on comparative retail properties in the LA area. Similarly, as we are using the capitalization rate valuation method, we have used comparable cap rates from Los Angeles, with data collected from CBRE's cap rate survey (data is specific to Power centers in Los Angeles). We used these key assumptions to determine the rental income associated with the property, based on the normative increases (for a comparable green building) outlined in the Landscape section.

To properly assess the impact of green certification on a given building, we looked at the incremental changes to both capital and operating expenses, as follows. For the purposes of this analysis, we captured the additional effort required by engineers and architects (and other consultants) to deliver a high-performing building. This is often referred to as "integrated design," and in this case would include fees charged by external consultants (e.g. LEED), as well as enhanced commissioning. Also included in the capex premium are LEED certification fees, which we referenced from the USGBC's current formula. Many industry stakeholders succumb to the preconception that LEED-certified buildings command hefty construction premiums, because they require expensive mechanical systems and premium architectural finishes. However, this notion is false, and we have assumed a conservative 2% premium over a conventional building, as per report produced by the Sustainable Building Task Force in California. For comparison, Davis Langdon's seminal report, "The Cost of Green Revisited" (which is due to be updated in the coming months), states "there is no significant difference in average cost for green buildings as compared to non-green buildings."

The capex costs pale in comparison to the operating changes that are delivered with green buildings. According to the Canadian National Research Council, the average energy savings associated with LEED certified buildings is 18%; however, in some cases it can rise above 30% for big-box retailers, as in the case of Kohl's outlets. LEED buildings may command higher maintenance costs (for example to earn credits associated with green cleaning); however, little data was found to support this claim, and it has not been included in this analysis.

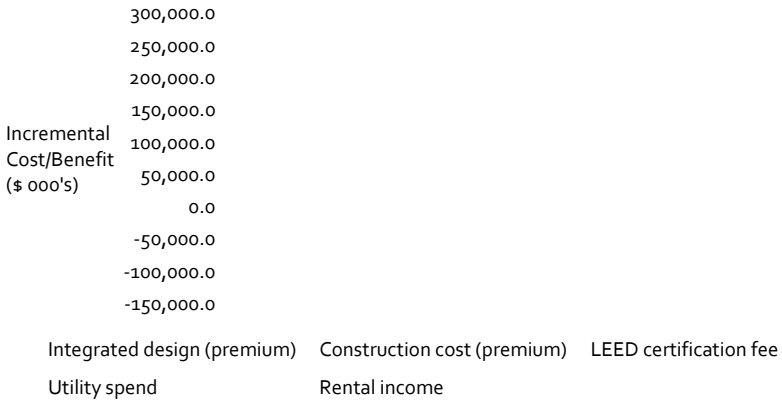

Figure 14: Opex Benefits Far Outweigh One-time Capex Costs of a LEED-certified Retail Building (Owner Perspective)

Two key use cases exist for a commercial building: conventional tenant lease, and owner-occupied. While the first case is intuitive, the owner-occupied building must be considered, because in this case green building incentives between all parties are aligned, since the owner will in the end inherit any utility savings incentives and also reap the ancillary benefits like increased productivity, retail sales, etc., because it will use the building for its own business. For each of these two use cases, we have considered the net benefit to the building owner and tenant, respectively, as shown in Figures 15 and 16.

Scenario	Valuation (Cap rate method)	Percent change
Baseline asset value	$34,560,000	-
Incremental gain – Tenant occupier	$4,105,000	12%
Incremental gain – owner occupied	$4,644,000	13%

Figure 15: Owner perspective shows utility savings dwarf rental income gains

In our analysis, the LEED Gold-certified building outperforms its baseline peer by an order of magnitude. Driven by a higher rental income, and keeping the cap rate in line with comparable properties, this increases the value by $4.1 million, or 12%. If an owner were to occupy the building and reap the benefits of the lower utility costs, this value gain would rise to $4.6 million, translating into an extra 1% in value growth. This large boost is in keeping with third-party estimates. In Figure 6, we cited data from a DOE survey, which showed green

properties have values ranging from 10%-31% higher than a typical property without a LEED certification.

Scenario	Rental cost (20-year term)	Utility cost (20-year term)	Net expense (change)
Baseline	$2,160,000	$187,100	-
LEED Gold	$2,419,900	$153,400	18%

Figure 16: Tenant perspective shows that cost is greater with green

As our summary shows (see Figure 16), tenants will pay significantly for the privilege of being in a green building. This increase is driven by higher rents and rises to 18%, even after substantial utility savings are accounted for. While it is important to realize that a higher quality, LEED-certified space will likely boost productivity and potentially retail turnover, these will need to be fairly significant to offset the hefty rental premium. This presents a gap for technology providers, particularly those based on multi-system sensing and data collection, to better track sales and productivity across retail sites. Companies like Panoramic Power (see October 21, 2013 LREBJ) and Verisae (see July 28, 2014 LREBJ), which touch a large number of retail sites through their portfolio agreements would be idea candidates to provide such a tracking service to build the case that tenants should occupy green buildings.

Outlook

As third-party certified green buildings increasingly proliferate in the market, several key impacts to real estate investors, tenants, and service providers will gain importance:

Energy savings do not tip the economic scales in favor of green buildings.
While the trend is toward increasing performance, nearly a third of LEED buildings, for example, use more energy than non-LEED buildings, according to an analysis by the National Research Council. Utility costs are a small fraction of the overall operating expense of a commercial building, and as a result the energy savings are not of the same magnitude compared with the rental income gains. Green buildings are not hindered by high construction cost premiums, and will increasingly become the “new normal” in certain classes of commercial building where tenants with a willingness to pay exist.

Novel sensors and data analytics will enable tracking of green building productivity.
Commercial buildings presently are struggling to quantify gains in productivity, creativity, and human experience that results from a high-quality indoor environment. In the near term, we expect technology developers to introduce novel sensors, and global RE companies to produce data sets to prove the case decisively that green buildings result in measureable gains in performance and occupancy well-being. This will likely be a collaborative effort, in the same way that Facebook’s Open Compute project aims to open-source the best data center possible.

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