

Integrating Sustainability and Green Building into the Appraisal Process

Authors Timothy P. Runde and Stacey Thoyre

Abstract Sustainability's key concepts and impacts on real estate valuation have been largely sidestepped to date. Sustainability and green building require the appraiser to recognize the influence of a new market force (sustainability) and understand a new set of property characteristics (green features). These elements are market-specific and change rapidly. This article discusses sustainability and its relevance in real estate valuation. In addition, green building criteria are offered so that green features can be analyzed. The concept of sustainability and the relative "greenness" of a property are then brought together into a three-step Sustainability Valuation Model that can be used to guide the appraiser in valuing real property—green and brown—now and as market conditions with respect to sustainability change.

The green building trend in real estate has been well documented in the media and academic literature. What has received less attention is the potential impact of the underlying principle of sustainability on properties both green and not green (brown). Sustainability, an emerging megatrend according to the *Harvard Business Review* (Lubin and Esty, 2010) is an oft-used but ill-defined principle that is rapidly being adopted worldwide, from the individual consumer opting increasingly for organic foods and hybrid cars to large corporations such as Walmart, which has incorporated sustainability into its business model and is developing a sustainability product rating system.

As society's values shift to include sustainability, so, too, will the way real estate decisions are made. The 2009 CoreNet Global and Jones Lang LaSalle annual sustainability survey reported that 70% of commercial real estate executives cite sustainability as a critical business issue and 89% consider it in their real estate decisions (CoreNet, JLL, 2009). Increasingly, Socially Responsible Investing (SRI), Corporate Social Responsibility (CSR), and climate change related risk are factors investors must consider. In real estate, Responsible Property Investing (RPI) is gaining ground as well, emphasizing transit-oriented development, energy efficiency, and urban regeneration, among other values.

On the tenant/occupant side, quality of life, productivity, and interior environmental quality are emerging with a new role in office leasing decisions. Green credentials evidenced by LEED certification and proximity to public transit are becoming important considerations for office employers seeking to attract a bright, young workforce.

The questions relevant to appraisers and those concerned with valuation are: In what ways does sustainability impact market value? And how does one identify

it, measure it, and price the impact? It may be years before paired-sales analysis or definitive comparable data are available in many markets, to empirically prove or disprove the value impact. In the meantime, with change underway, appraisers need to know how to address sustainability impacts within the confines of the most probable price market value definition.

This article begins by reviewing the current valuation dilemma faced by practicing appraisers. The principle of sustainability is then explained in terms relevant to real estate and valuation professions. A discussion of what constitutes a green building and the potential value impact of commonly accepted green building features follows. Finally, the authors present a Sustainability Valuation Model that incorporates the concepts of sustainability and green building into appraisal and can be used to address sustainability impacts on any property—green or brown—no matter the level of the market’s sustainability orientation, and no matter how the market’s or the property’s sustainability orientation change over time.

Current Dilemma Facing Appraisers

Lack of Standardized, Conceptual Approach to Valuing Green Buildings

The rise of green building and sustainability has ushered in a new and formidable set of challenges to practicing appraisers. How do you incorporate a vague concept like sustainability into the concrete world of appraisal? And how do you translate the non-economic impacts that sustainability identifies into the most probable price definition of market value, which requires that all impacts, including social and environmental impacts, be measured in economic terms? The solution to this dilemma requires the valuation professional to overcome two significant hurdles that are stalling the evolution of current appraisal practice: (1) lack of systematic, conceptual approach to valuing green buildings and (2) lack of well-defined terminology. Without a systematic, conceptual approach to the problem, appraisers are at a loss for which valuation tool to use to solve the problem. And without standardized terminology, the appraisal problem itself cannot be defined.

Green Premium Data of Limited Use to Appraisers. To date, the academic literature addressing the value effects of green building and sustainability has been dominated by statistical analyses of large data sets. Some of the topics addressed include the effect of green building characteristics on assessed values and assessor-estimated market values by Dermisi (2009), office occupancy (Fuerst and McAllister, 2009), occupant productivity (Miller, Pogue, Gough, and Davis, 2009), and economic impacts of certification (Eichholtz, Kok, and Quigley, 2010), among others. The impact of green building features on valuation has been addressed in the appraisal literature (Guidry, 2004; Price-Robinson, 2009), and more recently in case studies by Wright-Chappell and Smith (2009), and statistical analyses of institutionally owned office properties (Pivo and Fisher, 2009). The energy efficiency premium in residential properties has also been addressed (Nevin, 1998, 1999).

Most of the literature to date seeks to identify the “green premium” or “business case” for properties that possess green features. While these studies are useful in

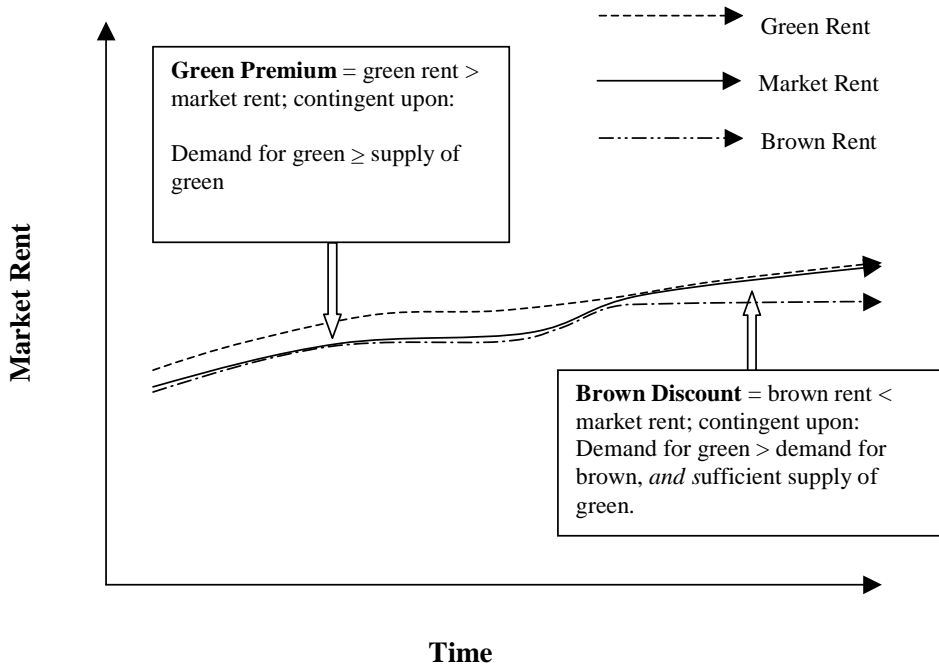
developing policy and for portfolio-level decisions about whether or where to invest, they lack the specificity and market sensitivity necessary to be useful in supporting adjustments to the comparables or the yield rates in a typical appraisal assignment. Statistical studies based on large-scale data sets like national CoStar data fail to capture the nuances of local markets, nuances that are at the core of professional valuation. Green features that add value in one market might not be recognized in another, due to geographical differences like water scarcity, or variation in market uptake of sustainability. Studies that drill down to the granular level typical of appraisal assignments often cannot be generalized to areas outside the study area. For example, the incremental value of solar panels on single-family homes depends in some degree on the price of electricity, so the study that purports a 10% premium for homes with solar panels in Sacramento has limited applicability for homes in neighboring San Francisco. Despite the geographical proximity, the utility jurisdictions differ, and so the price of electricity is much different.

In addition, sample size limitations and other problems have often resulted in large unexplained variation (low coefficient of determination) within the models, which weakens the reliability and limits their applicability.

Brown Discount Unaddressed. The question of how green building and sustainability affect the vast majority of the existing building stock that is not in any way sustainable, green, or high performance has been largely unaddressed. Currently, brown properties are far more prevalent than green properties. For owners of existing brown real estate, the concern centers as much on how their portfolio is at risk of losing its competitive position, as it is on what kind of rent premium LEED might confer. In many markets, the brown discount may quickly become a more significant issue than any green premium—both now and as market conditions change over time. Andrew Nelson of RREEF notes: “...many major markets will reach the critical mass where green buildings account for enough of the building stock that tenants have a choice. At this point, the performance premiums for green buildings will flip to a discount for older, less efficient, conventional buildings. We are already at or near this point in the mature economies of Europe and developed Asia, and getting closer in the major money centers of the United States,” (Nelson, 2009).

For appraisers, the distinction between a green premium and a brown discount can prove meaningful. While they both describe the delta in rent between a subject property’s rent/value and market rent/value, each of them require different circumstances in order to exist. Exhibit 1 illustrates this point, showing a hypothetical market where the supply of and demand for green space grows over time.

As seen in Exhibit 1, potentials for variance from market value based on relative greenness or brownness comes down to the degree to which the subject is in sync with the market. A green premium requires that demand for green space is greater than or equal to the supply of green space. Brown discounts exist at a different point in a market’s evolution and rely on demand for green space being greater than demand for brown space (i.e., tenants prefer green space) *and* that there exists

Exhibit 1 | Green Premium vs. Brown Discount

Graph assumes that both the supply of, and the demand for, green building space are increasing over time.

sufficient green space that tenants have a choice between green and brown. As Nelson (2007) explained, “At present, there is not enough green product available to force discounts for brown buildings, but that dynamic will flip once there is a critical mass of green buildings.”

The timing of the inflection point will vary by market, but because valuation occurs at a specific point in time, it’s critical for valuation professionals to understand where the specific market lies on the continuum. Is the market defined by green space and green demand or brown space and brown demand? Even if a subject is currently showing a green rent premium, the graph shows how the premium is likely to evaporate once green becomes the new market standard. If DCF modeling or direct capitalization is used, this point is especially relevant as the current (premium) rent will last only as long as the subject outperforms the general market.

Limitations of a DCF-Based Valuation Approach. Others, such as Muldavin (2010) have suggested that the discounted cash flow (DCF) is the ideal tool for green building valuation, primarily because there are numerous inputs that can be adjusted for green building features. The DCF is a powerful tool that can be useful for valuing both green and brown buildings. However, as with any financial model, the quality of the output is contingent upon the quality of the inputs and the skill

and experience of the valuer. Used without market-based support for the inputs or without proper benchmarking with direct capitalization or comparables, the result can be misleading.

Additionally, using a DCF approach to value green buildings lacks reliability in cases where the typical buyer and seller would not ordinarily use the technique, such as small commercial, industrial, or residential properties. In these cases, market support for the DCF inputs becomes particularly difficult to obtain (or may not exist).

Finally, suggesting that the DCF is the best method of valuing green building bypasses the critical question of whether sustainability matters to the market, and thus, to what degree green features should (or should not) be valued. As yet, not every market believes green features increase market value. No matter which valuation technique is used, it's critical that the appraiser first understand whether the market values the green feature for which the appraiser is adjusting.

While in some cases, it may be relatively easy to see what adjustments need to be made, in cases where the subject's greenness is not aligned with its market or its peers, knowing whether or not to make adjustments to either the subject or the comparables can become difficult. The Sustainability Valuation Model, presented below, provides the appraiser with a systematic methodology for approaching the valuation process, which considers the market's sustainability orientation relative to the subject, using whichever techniques are appropriate for that market and property type.

Lack of Well-Defined Terms Relevant to Valuation Professionals

In addition to the lack of a standardized conceptual framework, the valuation profession lacks a set of key definitions. What, exactly, is a green building? Is it a process or a product? Or just hype? What does sustainability have to do with green building and real estate? What is the green premium, exactly? Is it good or bad?

Even among green building professionals there is confusion. Most appraisers think of a premium as a good thing—a premium to the base market value. But in the Spring 2010 Commercial Real Estate Update from the United States Green Building Council (USGBC), the lead article entitled *Addressing the Green Building Premium* (USGBC, 2010) stated: "...there has been enough research and observation to dispel the notion of a 'green premium.'" The article was speaking of the cost premium for building green, which elucidates the communication gap between those who create and rate green buildings, and those who deal with what gets built—the owners, managers, and appraisers. Even a cost premium is not always a negative in the world of appraisal. In the cost approach, higher costs can add to value, to the degree the market recognizes the costs as added value.

Need for Systematic Methodology

Sustainability uptake varies from market to market and is evolving quickly. As yet, there is no systematic, conceptual framework that links a property's specific

characteristics to its specific market's sustainability uptake. Such an approach must be flexible enough to apply to all property—green and brown—and allow for changes over time as the market influence matures and market conditions change.

The Sustainability Valuation Model, presented below, provides the valuation professional with just such an approach by allowing a property to be analyzed based on its specific green features (or lack thereof) relative to its market's sustainability orientation at any given point in time.

The Principle of Sustainability

What is Sustainability?

A fair question to ask is: Why do appraisers need to understand sustainability if all they are concerned with is market value of real estate? Would it not make more sense to focus on quantifying the green premium, or the brown discount, so that green building valuation could be reduced to a mechanical adjustment anyone could understand?

The flaw in this line of thinking is that green building is not a monolithic feature or single set of characteristics and neither is sustainability. Sustainability connects current actions to all of their impacts, both current and future, and is therefore a fundamental departure from the “in the long run we are all dead” mentality that has been pervasive for the last 50 years or more. Sustainability uptake varies from market to market and is evolving over time. The most effective way to deal with an evolving market influence, especially one that is changing rapidly, is to understand the concepts that drive it. Valuation that takes into account sustainability and green features does not require the appraiser to develop a new set of tools, but it does require the appraiser to have a methodology for knowing which tools to use, and when and how to use them.

There's More to Sustainability Than Green Building

Green building and sustainability are often used interchangeably, but the terms are far from synonymous. Sustainability, a very broad and far-reaching concept, is the underlying principle of green building. Sustainability encompasses much more than green building, however; the slow/organic food movement, conservation, and corporate social responsibility (CSR) are other examples of sustainability's influence.

Sustainability's broad and complex nature makes precise definitions difficult to obtain. Further, it is often spoken of in theoretical terms, complicating the picture even more for those interested in business applications like real property valuation. Definitions with relevance to business or to real estate valuation are therefore limited.

One of the earliest definitions cited for sustainability is the one offered in 1987 by the Brundtland Commission (WCED, 1987): “Humanity has the ability to

make development sustainable—to ensure that it meets the needs of the present without compromising the ability of future generations to meet their own needs.” While it captures the intentions of the concept, its lack of specificity limits applicability in business and practical use.

On the other hand, Elkington’s (1998) Triple Bottom Line (TBL) concept is widely used in business: “Sustainability is the principle of ensuring that our actions today do not limit the range of economic, social and environmental options open to future generations.”

This idea that one must balance economic, social and environmental concerns is at the heart of many definitions of sustainability. The RICS Global Property Sustainability Survey (2009) strongly echoes this TBL concept by “...equat[ing] sustainability with the goal of balancing economic, environmental and social objectives at global, national and local levels in order to meet the needs of today without compromising the ability of future generations to meet their needs.”

The TBL approach gives clarity to the range of impacts, but raises its own set of problems when attempting to quantify these impacts. How does one account across three bottom lines?

Meyer (2008) proposes a definition of sustainability based on economic externalities—those impacts, positive or negative, not anticipated or paid for at the time of the event—that can be useful when indentifying off-site impacts of real estate activities, and the risks posed to property value. He explains, “If you bought a car battery and paid nothing to sequester its toxic materials upon disposal, the cost to society of dealing with it—whether counted as health care for people getting heavy metal poisoning or their harder-to-measure suffering—were deemed externalities because neither the customer nor the battery maker paid this cost.” Meyer goes on to define activities as sustainable “...when all costs are internalized, because if the costs are too high, the activities stop.”

Defining Sustainability for Applied Real Estate Valuation

Drawing upon the TBL and externality definitions results in the following definition of sustainability for applied real estate valuation: *Sustainability is the principal of seeking to avoid, minimize, and/or mitigate adverse current and future social, environmental and economic impacts (externalities).*

In theory, a sustainable land use would avoid any current and future adverse social, environmental, and economic impacts (externalities), including those that extend beyond the property line. In practice, a land use moving toward sustainability status would first seek to avoid adverse externalities, then minimize, and finally mitigate what could not be avoided or minimized. Land uses that do not are at greater risk that sooner or later the cost will be internalized, and that they will obsolesce faster.

From a real estate valuation perspective, understanding and defining a sustainable activity or land use may be more difficult, and less useful, than understanding what it means for a building or land use to be unsustainable. A site with a leaking

underground diesel storage tank and an office building with unremediated/unencapsulated asbestos are examples of unsustainable land uses. These cases are fairly obvious and familiar to most real estate professionals.

Less clear are land uses like a suburban office building in an isolated location without access to public transit that relies solely on automobile commuting. Tract housing in an isolated rural area (leap-frog development) with poor access to services, employment centers, or public transit falls into the same category. As environmental legislation increases, so will the likelihood that these properties' negative externalities—greenhouse gas emissions, traffic burden on infrastructure—will be internalized in the form of direct or indirect carbon taxes, special assessments, or impact fees.

Sustainability as a Risk to Market Value

Sustainability's influence on real estate, particularly to the existing brown building stock, can be viewed as a risk to market value. From the perspective of a typical market participant, a new and evolving market influence like sustainability likely presents more risks than opportunities. How many brown properties do you want in your portfolio if your market demands green? Is it financially feasible to green up? Will the costs associated with going green truly pay off and over what time horizon? What is the cost of staying brown?

In the United Kingdom, researchers Ellison, Sayce, and Smith (2007) have proposed a risk-based approach to calculate sustainable value based on the calculation of worth definition (RICS, 1997). While their use of the investment value premise renders it of limited utility for an appraiser interested in calculating market value as defined as most probable price (value in exchange), the concept of seeing sustainability as a risk to property value is enlightening.

A risk-based approach works to appraisers' strengths, since they are accustomed to identifying existing and future property risks, and then accounting for their impact in the adjustment of the comparables, the overall capitalization or yield rate selection.

To guide the appraiser in assessing sustainability risk, a review of the various definitions of sustainability results in the following shared underlying themes:

- *Inter*-generational equity (concern for future generations)
- *Intra*-generational equity (social/political/economic, across current generations)
- Balance social/environmental costs with economic cost/benefit
- Stakeholder activism
- Disclosure and transparency
- Supply chain focus vs. end user
- Life-cycle focus vs. up-front cost
- Elimination of waste

To assess sustainability’s impact on the market value of real estate, the authors have further distilled these eight underlying themes into the following four risk categories dubbed ROTE:

- **Resource Use:** Operational and Construction/Renovation
- **Obsolescence**
- **Transparency & Stakeholder Influence**
- **Externalities**

Exhibit 2 shows some examples of sustainability-related risks in each of the ROTE categories and the potential value impacts on real estate.

ROTE risk assessment will help the appraiser identify sustainability risks that pertain to the subject and subject’s market. The intent is to capture sustainability-related risks that impact market value but may otherwise be missed in the appraisal process. Application of ROTE risks will be discussed further below with the Sustainability Valuation Model.

Exhibit 2 | ROTE Sustainability Risk Assessment

RISK CATEGORY	EXAMPLES OF SUSTAINABILITY RISKS	POTENTIAL PROPERTY VALUE IMPACTS	
		Direct	Indirect
RESOURCE USE	<ul style="list-style-type: none"> ■ ↑ global demand for materials vs. fixed supply ■ ↑ energy cost, volatility; ↑ water cost, rationing 	<ul style="list-style-type: none"> ■ ↑ replacement cost; ↑ TI & future renovation costs ■ ↑ operating expenses, ↓ NOI; Energy efficiency becomes paramount 	<ul style="list-style-type: none"> ■ ↑ replacement cost may ↑ market barriers to entry; Renovate preferred over new construction; Life cycle costing
OBSOLESCENCE	<ul style="list-style-type: none"> ■ Consumption rate ↓, or patterns shift ■ ↑ need for properties to adapt to future uses and users (not yet identified) ■ Increased rate of change expected in future 	<ul style="list-style-type: none"> ■ ↓ demand for retail; change in type/location ■ ↑ rate of depreciation; ↑ TI, cap ex cost for less adaptable properties 	<ul style="list-style-type: none"> ■ ↓ economic growth due to ripple effect of consumer (70% GDP) ■ ↑ risk for special-purpose improvements
TRANSPARENCY & STAKEHOLDER INFLUENCE	<ul style="list-style-type: none"> ■ ↑ disclosure of energy efficiency ■ Non-financial stakeholders influence investor decisions 	<ul style="list-style-type: none"> ■ GRI reporting that triggers green-up of REIT portfolio; carbon reporting 	<ul style="list-style-type: none"> ■ Stigma for poor performers ■ Supply chain reporting requirements
EXTERNALITIES	<ul style="list-style-type: none"> ■ Greenhouse gas (GHG) and climate change legislation ■ Community charges back project externalities ■ Poor indoor air quality 	<ul style="list-style-type: none"> ■ Carbon taxes, cap & trade; Project GHG emissions used as reason not to allow development ■ Impact fees; assessments ■ Health risk liability 	<ul style="list-style-type: none"> ■ Stigma: ↓ marketability

What is a Green Building?

Understanding sustainability allows one to readily see how the green building trend aligns with sustainability's intentions. But, like sustainability, definitions for green building abound and as yet, a commonly accepted definition that is relevant for real estate valuation is lacking. If valuation professionals are to address green building in any meaningful way, there needs to be an agreed-upon criteria that define a green building—even if the actual product based on those criteria differs from market to market and over time.

Green Building Criteria

For the purposes of valuation, the authors propose that a green building must meet three criteria: (1) commonly accepted set of features based on the principle of sustainability; (2) features must independently verifiable; and (3) modeled performance must be verifiable by actual results.

Commonly Accepted Features based on the Principle of Sustainability. No matter how green building is defined, it must be based on features that are commonly accepted by the relevant market participants so that valuation professionals are able to assess the possible impact on market value. The rating system most prevalent in the local market may be the best guide for whether a building is considered green. In the United States, the Leadership in Energy and Environmental Design (LEED) rating system provides the most widespread example of a set of commonly accepted green building features for commercial buildings. In the United Kingdom, the Building Research Establishment Environmental Assessment Method (BREEAM) is more prevalent, while Japan uses the Comprehensive Assessment System for Building Environmental Efficiency (CASBEE). In the U.S. residential sector, there is as yet no single, dominant rating system. A review of the major rating systems currently in use throughout the world (Reed, Bilos, Wilkinson, and Schulte, 2009) shows that the most commonly occurring categories of green building features are the following:

- **Energy Efficiency:** Reduce use of energy, especially non-renewable;
- **Resource Use Efficiency:** Water, materials, and waste stream reduction;
- **Site Efficiency:** Location specific characteristics such as proximity to transit and infill development; and
- **Quality of the Interior Environment:** Such as daylighting, low VOC-emitting materials, and green cleaning.

Independently Verifiable. Part of due diligence in appraisal is third-party verification. Among other things, appraisers confirm comparables, review historical operating statements and tax returns, compare line item expenses to similar expenses in similar buildings, read leases, and CC&Rs. Auditors sign off on corporate accounting to insure fair representation of a company's financial condition. Green building features must submit to the same rigor in order to be considered in valuation.

Modeled Performance Must Be Verifiable. Most commercial appraisers are aware of the limitations of valuation models like a DCF. Actual results almost never match forecast, and the results of the model are highly vulnerable to fairly minor tweaks in the assumptions. As the late and venerable James Graaskamp was fond of quipping, “You’re not just buying real estate, you’re buying a set of assumptions: if you don’t buy the assumptions, don’t buy the real estate.” In appraisal practice, modeled performance is verified by supplementing a DCF with direct capitalization and the sales comparison approach. Modeled performance of green building features like daylighting, building energy management systems, and low-flow fixtures needs to be verifiable—through year-over-year utility bill comparisons, for example, if they are going to matter to appraisal.

Rating Systems

Rating systems can be a reasonable guide for the appraiser in determining whether the subject (or comparable) is green, especially if the subject’s green features can be verified and performance audited as discussed above. There are a few caveats concerning rating systems that bear mention:

- **A green label is not enough.** The LEED system, while considered the standard for green properties in the U.S. commercial market, has faced some criticism revolving around whether a LEED-certified building will continue to perform as promised by its initial certification. Some of these long-term performance issues are addressed via building commissioning and via performance auditing measures, such as those inherent in the Energy Star Portfolio Manager system.
- **Closely analyze green features...even in brown buildings.** The appraiser needs to familiarize him/herself with the specifics of the prevalent local system and be prepared to closely analyze green features. The categories in which a subject received credit can make a substantive difference as to whether a green feature has an impact on value, as illustrated in Exhibit 3. Some of the green features may have a larger potential impact than the appraiser may expect, such as the cost savings associated with triple waste stream programs or water efficiency upgrades. For example, repairs and upgrades to plumbing fixtures in a 1920s 15-unit San Francisco apartment building reduced the annual water/sewer bill almost 40%, which resulted in a 4% increase in the market value as indicated by the income approach. What’s particularly notable in this case is that the building owner was not intending to “green up” the property yet the upgrades resulted in considerable savings. Appraisers should make a practice of breaking down historical utility costs into energy, water/sewer, and waste for all buildings (green and brown) so that any cost savings can be noted and acknowledged. In the apartment building example, this savings would have been missed without disaggregating the utility costs.
- **Not all rating systems are equal.** Rating systems limited only to energy efficiency, such as ENERGY STAR and Home Energy Rating System (HERS) are not sufficient to deem a building green as they do not take

Exhibit 3 | Potential Value Impacts of Green Building Features

CATEGORY	EXAMPLES OF GREEN BUILDING FEATURES	POTENTIAL VALUE IMPACTS	
		Direct	Indirect
ENERGY EFFICIENCY	<ul style="list-style-type: none"> ▪ Motion sensor lighting controls; Building Mgmt System; High-efficiency HVAC/lighting ▪ On-site cogeneration ▪ On-site renewable energy ▪ Building commissioning (initial and ongoing) 	<ul style="list-style-type: none"> ▪ ↓ energy costs = ↑ NOI; Insurance ↓ for green buildings ▪ No transmission loss, so ↓ effective cost ▪ ↑ energy efficiency; Government incentives ▪ ↑ efficiency ↓ energy costs & ↑ systems lives; Ongoing comm. ↑ operating expenses 	<ul style="list-style-type: none"> ▪ ↓ exposure to future energy price increases and volatility ▪ ↓ exposure to grid risks (blackouts/price ↑) ▪ ↓ exposure to grid risks; Green “halo” effect
RESOURCE USE	<ul style="list-style-type: none"> ▪ Under floor HVAC/mechanical ▪ Renovate instead of build new; Recycle, use fast renewables ▪ Triple Waste Stream (recycle/compost/landfill) ▪ Low-flow plumbing fixtures 	<ul style="list-style-type: none"> ▪ ↓ future TI cost; ↓ energy use due to more efficient HVAC ▪ Cost may ↑ or ↓ ▪ ↓ trash expense; ↑ cost of staff/tenant education/cooperation ▪ ↓ water/sewer cost 	<ul style="list-style-type: none"> ▪ ↑ tenant comfort due to diffuser control; ↑ satisfaction → retention ▪ Renovate may result in functional inefficiencies vs. new build
SITE	<ul style="list-style-type: none"> ▪ Mass transit access; Alternatives to auto commuting; Re-use of infill/brownfield sites 	<ul style="list-style-type: none"> ▪ ↑ cost/SF for site; Density bonus may offset higher site cost; Incentives for infill sites ↓ infrastructure costs; ↓ on-site parking needs 	<ul style="list-style-type: none"> ▪ Core, CBD and transit-oriented assets tend to reflect ↓ risk, thus ↓ OAR & IRR, & ↑ values; ↓ impact land uses = ↓ risk over holding period
INTERIOR ENVIRONMENT QUALITY	<ul style="list-style-type: none"> ▪ Daylighting/views to entire floor ▪ Low VOC paint, carpet, furniture; ↑ ventilation (↓CO₂); High-particulate air filtering ▪ Green cleaning 	<ul style="list-style-type: none"> ▪ ↑ light/views may ↑ rent but ↓ perimeter offices ▪ ↑ cost of materials; May ↑ cost of HVAC operation, maintenance ▪ ↑ cost of green products and training 	<ul style="list-style-type: none"> ▪ ↑ marketability may ↓ vacancy & turnover ▪ ↓ toxic exposure may ↓ health-related liability ▪ Green “halo” effect

into account any other features beyond energy efficiency. Rating systems based on TBL (i.e., sustainability) concepts, such as LEED, will meet the standard of criterion 1.

Greenwashing

This above set of criteria can be used to readily distinguish green buildings from non-green (brown) buildings. But what about buildings that claim to be green but where it is not readily evident if the claims are being made solely for marketing purposes? In other words, how can you tell green building from greenwashing?

Greenwashing is any green or environmental claim that is unsubstantiated, unverifiable, or inconsistent with the principle of sustainability.

A property or feature that claims to be green or sustainable, but fails any one of these three tests, is not truly green or sustainable. For example, if the LEED rating system is manipulated to earn a high LEED rating by garnering credits in categories unrelated to energy efficiency, energy efficiency performance may be below modeled levels or worse yet, below conventional non-green efficiency levels. In this situation, the manipulation of the LEED system would fail the sustainability test and thus would be considered greenwashing. An example of this very phenomenon was reported in a *New York Times* article in August 2009, citing the Federal Building in Youngstown, OH (Navarro, 2009). A leasing broker advertising a property as “registered for LEED certification,” but where certification is not being actively pursued, is another clear example of greenwashing.

The Sustainability Valuation Model

At this point, the relevance and role of sustainability in real estate have been established, and definitions for both sustainability and green building in a real estate valuation context have been established. The next step is to integrate sustainability into the process of real estate valuation—for both green and non-green buildings.

The Sustainability Valuation Model, developed by the authors, is a systematic, three-step approach to valuation, designed specifically for appraisers and other valuation professionals, which can be applied to any property type, in any market, and is not temporally sensitive. That is, the model allows for variations over time in a particular subject property, as well as variations within the specific market both in terms of building features (green or brown) and the context (to what degree the market values sustainability).

Step 1: Assess Market Uptake of Sustainability

Whether sustainability influences market value depends on the degree to which the specific market values sustainability. Is this a cutting-edge market that can't wait for the next clean technology, or a wait-and-see market that views green as a fad that will pass? Getting this part right is essential to avoid introducing an unintended green or brown bias into the valuation process. The appraiser who views green as good in a market that isn't yet convinced is introducing bias to the valuation process. But the risk of brown bias by appraisers and other valuation professionals who are unaware of sustainability influences is at least as great and potentially more pervasive.

But precisely how does one assess a market's uptake of sustainability? How do practicing appraisers determine where a market falls on the sustainability continuum? Appraisers can utilize the same tools used to assess any other market influence—examine the behaviors of relevant stakeholders and use collected market survey data and studies where available.

The relevant stakeholders fall into three categories: policy makers (government and non-government organizations, or NGOs), property owners (landlords), and end users (tenants and owner-users). Key points to consider when evaluating the actions and behavior of each stakeholder group follow.

Policy makers

- **Check for regulations and incentives at local, state, and federal levels.** Local green building codes, state-mandated renewable energy standards (such as renewable portfolio standards, RPS), and the various federal mandates requiring federal agencies to be in green space are examples of policy decisions that affect real estate at each of these levels. Generally, the more localized the sustainability and green building policy, the more sustainability oriented a market is likely to be. For example, San Francisco is at the leading edge of sustainability orientation in the state, and adopted a green building component to its building code well ahead of the recent CALGreen statewide green building code that goes into effect in January 2011.
- **New construction or all existing?** A market with a green building code that mandates all new construction be LEED-certified may at first seem quite sustainability oriented. But the effect of such a policy on the overall market is really more symbolic, since in any given year, new construction compromises, on average, only 2%–3% of the building stock in the U.S. (Brown, Southworth, and Stovall, 2005). Requiring both new construction and all renovations over a certain size to meet LEED requirements, as is the case in San Francisco, is likely to have a far greater effect on the market, and indicates a more significant commitment to sustainability, at least by policy makers. In addition, attention should be paid to whether landlords are pursuing certification under LEED Existing Buildings Operations and Maintenance (EBOM) since that is a voluntary action not mandated by policy and therefore indicates that the market has moved beyond compliance to internalizing sustainability.
- **Consider influence from Non-governmental Organizations (NGOs).** NGOs from national organizations down to neighborhood Not In My Backyard (NIMBY) groups are included here, because they typically act through the creation and enforcement of policy. Powerful NGOs such as Ceres, a nonprofit organization that aims to incorporate sustainability into capital markets, can directly influence real estate. For example, the Global Reporting Initiative (GRI), an organization originated through Ceres, recently announced the addition of real estate-specific guidelines for their GRI Sustainability Reporting Framework, designed to address “...specific sustainability issues that are unique to the Construction and Real Estate industry such as product and service labeling including building and materials certification, building energy intensity, water intensity and CO₂ emissions related to buildings in use, management and remediation of contaminated land, labor health and safety issues when operating in insecure environments, and contractor/subcontractor labor supply chain issues,” (GRI, 2010).

While policy and regulations can be a leading indicator of sustainability orientation, alone they are not reliable indicators of market uptake because policies are almost always created outside of the market by non-market participants.

Property Owners. On the other hand, the voluntary sustainability-related actions of property owners, particularly landlords who operate primarily for financial gain, are the strongest indicator of a market uptake of sustainability.

- **Consider type of ownership.** Institutional ownership may be pursuing LEED certification to respond to activist shareholder demands, or investment policy such as Responsible Property Investing (RPI), carbon reporting, or compliance with GRI. In these cases, considering national or international sustainability trends may be more useful than a strict focus on the local market.
- **Check the USGBC database.** The USGBC website has a searchable database of both LEED-certified and LEED-registered buildings by type and city. The registered list can be a leading indicator, particularly using the most recent registrations. However, since registration requires little more than payment of a modest fee, the older registrations are of little utility in gauging market uptake, since the owners may have simply registered as a placeholder in an early version. LEED-certified (as opposed to registered) buildings in a market serve as a far better indicator of uptake, and tend to correlate positively with increased sustainability uptake. In addition, the number of LEED APs (Accredited Professionals) in the area may also be an indicator of a market's sustainability orientation.
- **Check with the local USGBC chapter.** The local USGBC chapter may also have additional information on LEED certifications and LEED-registered buildings in the area. The presence (or lack) of a local USGBC chapter, and its activity level, can also be an indicator of the market's sustainability orientation.
- **Green leases or clauses.** The use of green leases, or green clauses in leases, is another indicator of owner uptake of sustainability.

End Users. End users include tenants, owner-occupants, and their customers and clients.

- **Interview local brokers to gauge tenant and owner-occupant demand for green space.** Exhibit 4 provides a sample list of questions. Tenant desires for green space can be a reliable indicator of market uptake, but measuring that desire can be elusive. Asking a tenant if they will pay more for green space (or anything) is likely to result in a negative response, no matter what the core values or beliefs of the tenant might be. Asking leasing brokers what percentage of tenants requested LEED-certified space in the past year, with follow-up as to the size and nature of those tenants, would be more enlightening. However, if the tenants are often Fortune 500 and government tenants—credit tenants who tend to lease larger spaces than the typical local professional services firm that

Exhibit 4 | Broker Interview Questions

Note: This list of sample questions is not meant to apply to all assignments nor is it intended to be exhaustive. While LEED is used here, the appraiser should use the most common green rating system used in his/her market for the subject.

When confirming lease comparables:

- Are tenants requesting LEED-certified space in this market?
- In the past year, what percentage of tenants would you say request LEED space?
- Is that more or less than the prior year?
- What type of tenants are they? Fortune 500? "Green" companies? Government? Non-profits? Other?
- Do they tend to be large or small tenants?
- Have you leased any space recently involving LEED space or where LEED was a tenant requirement?
- How did that impact the leasing process?
- Is there any measurable difference in rent for green or LEED space in your market? If yes, can you give me an example?
- Do you have any evidence that LEED buildings lease faster?
- Is there an example you can think of where LEED certification caused the tenant to choose the LEED building over another, non-LEED building?
- Do tenants differentiate between the different levels of LEED, such as Certified versus Silver versus Gold? Will tenants pay more for a higher LEED rating?
- Is LEED a deal maker or a deal breaker?
- How would you say LEED affects marketability of space in this market, or is there no effect?
- Are landlords using green leases? Are tenants asking for them?

When confirming sales comparables:

- In your experience, do investors consider green ratings like LEED in the purchase decision? What about ENERGY STAR? What about owner-users? If so, how is it considered?
 - Or do buyers simply view it as a "value added" feature (upside)?
 - Does it depend on the type of buyer? If so, how?
 - What is the appeal of LEED to investors: the label effect ("green" the portfolio), enhanced marketability leading to rent premium or faster absorption, cost savings due to energy efficiency, or "future proofing" (delayed obsolescence)?
-

comprise the bulk of the leasing market as measured by tenant count—then the impact is probably understated.

- **Corporate headquarters and government buildings.** Owner-users may perceive a halo effect of a LEED Platinum headquarters, which speaks more to their corporate image or guiding principles than it does about the local market. Likewise, government buildings with sustainability features may be more tied to policy goals than the sustainability orientation of the market.
- **Consider the behaviors and actions of the community.** Even if the observed behaviors are not those of the person signing the lease, they can

be relevant indicators of a market's uptake of sustainability. A community that embraces sustainability principles is more likely to support, or advocate for, local regulations and incentives for green building, and to reward (or penalize) companies that adopt (or fail to adopt) sustainability practices. Consider the presence of Whole Foods Markets or local farmers' markets; how much floor space the organic produce section takes up at the conventional grocery store; the proportion of hybrid vehicles in parking lots; bike lanes painted on the side of the street; car-share operations (like Zipcar) or priority parking for van pooling; solar panels on the roofs of the houses; compost, recycle, and trash bins in the offices, or out on the residential streets on trash day indicating a triple waste stream system, etc.

Third-Party Market Surveys

As sustainability moves more mainstream, it is being increasingly studied and tracked in the same way that other market trends such as vacancy, rents, net absorption, and anticipated investor yields. Here are some examples of market surveys that could prove useful to the appraiser.

- **Surveys of corporate real estate executives related to sustainability:** Jones Lang LaSalle (JLL) and RICS' Global Property Sustainability Survey provide information about sustainability uptake for those properties and markets that involve institutional investors, as the landlord's sustainability views are likely to be national or global.
- **National surveys that contain local market data.** Cushman and Wakefield recently released the Green Building Opportunity Index, which ranks the top 25 U.S. office markets on a variety of criteria relating to green building, such as Green Adoption and Implementation, Mandates and Incentives, State Energy Initiatives, and Green Culture.
- **Local surveys.** These types of surveys are more likely to be found in sustainability-oriented markets. In the San Francisco Bay Area, for example, Cassidy Turley BT Commercial publishes a RealGreen Index that tracks inventory and vacancy levels for LEED-certified space.

Considering the behaviors and actions of the relevant stakeholders and any pertinent market survey data is the first step of the Sustainability Valuation Model. The goal in Step 1 of the model is to determine if the local market is Sustainability Oriented (SO) or Not Sustainability Oriented (NSO). Exhibit 5 lists some typical characteristics of NSO and SO markets. Some markets may be clearly SO or NSO, but in many cases, a market will fall at some point along the continuum. The idea is not to place the subject precisely on the continuum, but rather, to gauge in a more general sense whether sustainability has little to no effect or a strong effect on the local market.

Step 2: Categorize the Subject

The Sustainability Valuation Matrix, presented in Exhibit 6, categorizes the subject in a way that allows the appraiser to take into account the sustainability orientation

Exhibit 5 | Characteristics of Not Sustainability-Oriented (NSO) and Sustainability-Oriented (SO) Markets

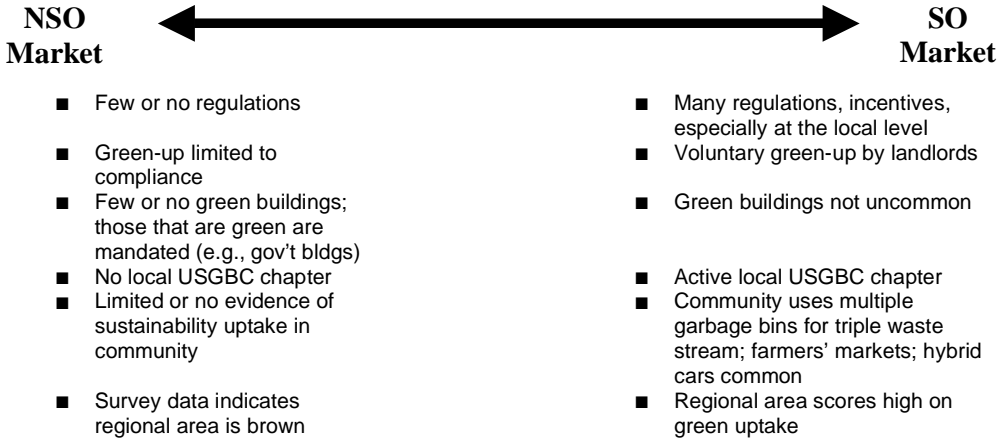
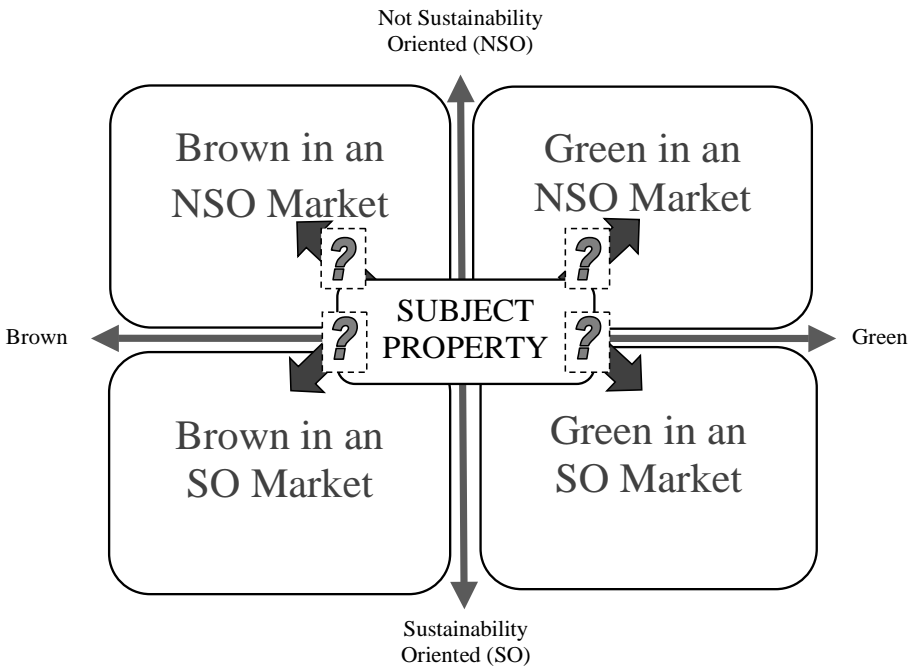


Exhibit 6 | Sustainability Valuation Matrix



of the subject property’s market relative to the subject’s specific green-brown characteristics. Step 1 of the model allows for determining where the subject’s market falls on the sustainability axis (y-axis). The prior discussion of what constitutes a green building allows for orienting the subject along the brown-green axis (x-axis). In this way, one can place the subject where it best belongs in one

of the four quadrants. Since both axes (brown-green and NSO-SO) are continuums rather than absolutes, a property may not fit perfectly into any one quadrant, and the position could change over time. The idea is to find the best fit, not the perfect fit. Once placed, the appraiser can analyze the subject based on its location in the matrix.

Relating the subject’s level of greenness to its market’s sustainability orientation is important so that the appraiser knows whether to adjust the subject and the comparables for green (or brown) features. Let’s say, for example, that the subject property is green, and the comparables include one green comparable while the rest are brown. How is the appraiser to know whether an adjustment is necessary for the green features in either the subject or the green comparable, or the lack of green features in the brown comparables, without first analyzing whether the market values green features? If the market is sustainability oriented (SO) (i.e., the market values green and the subject is green), then the brown comparables likely need to be adjusted upward. The green comparables may need to be adjusted based on the specific green features relative to the subject. If the market is not sustainability-oriented (NSO), further analysis of the green features of the green comparable (and the subject) would be needed to determine whether green features add value in a brown market. Exhibit 7, the Sustainability Valuation Impact Grid,

Exhibit 7 | Sustainability Valuation Impact Grid

SUBJECT	MARKET	Adjustments to Comps (Sale and Rent)		Potential Impacts on Subject in the:	
		Brown Comps	Green Comps	Income Approach	Cost Approach
BROWN	NSO		Analyze any specific green features of comps & adjust as needed		
GREEN	NSO	Adjust ↑ for green features that brown market values	Compare green features of comp to subject	Analyze green features for + or (-) economic impact	Market may not recognize all extra costs on \$ for \$ basis – assess green feature costs individually
BROWN	SO		Adjust ↓ for any superior green features of comp	↓ rent and/or growth rate? ↑ vacancy? ↑ absorption? ↑ energy and/or water cost? ↑ Cap Ex reserves ↑ OAR ↑ Discount rate? Cap Ex to green up	Replacement cost will likely reflect green construction so depreciation should reflect brownness of subject
GREEN	SO	Adjust ↑ for green feature deficiency	Compare specific green features of comp to subject	Assess if subject meets/exceeds the “greenness” of the market	

illustrates how the actions of the appraiser vary depending on the quadrant in which the subject has been categorized. Additional discussion of these points will follow as each of the four quadrants of the Sustainability Valuation Matrix is examined more closely.

A note of caution is appropriate when categorizing the subject on the brown-green continuum. Green buildings are surprisingly easy to miss, even for someone well versed in green building. Most green buildings look just their conventional, brown counterparts. In one recent appraisal assignment, neither the client nor the property contact informed the author that the subject was LEED certified. The giveaway was a sign touting the benefits of a waterless bathroom fixture—the LEED plaque was tucked away in a corner of the lobby. This problem is particularly pervasive in the early stages of market uptake, when the appraiser may not expect to find a green building.

Brown in an NSO Market. This category applies to a property that does not meet the three green building criteria presented earlier, and for which the appraiser determines the market is not sustainability oriented (NSO). This is a brown building in a brown (NSO) market. A 1980s suburban office building in Tulsa, Oklahoma, where there are currently no LEED-certified buildings and no local green building codes, would likely fall into this category. The appraisal response is:

- Analyze green features = N/A for subject.
- Review comparables to be sure they are not green and adjust as necessary.
- Consider ROTE risks.

While the subject in this case lacks green features, green comparables can be found even in NSO markets. Even though the overall market may not appear to be sustainability oriented, green features like energy or water efficiency improvements that result in lower-than-market utility costs will affect the NOI and thus, value. For example, if the comparable's utility costs are substantially lower than the subject due to energy efficiency improvements or on-site power generation (solar panels), then an adjustment may need to be made to the comparable. Care must also be taken not to double count green features where adjustments are already being made. For example, proximity to transit (site efficiency), might already be inherent in the appraiser's generic "location" adjustment. The appraiser may need to refine the location adjustment to reflect the components that "location" reflects for a suburban office building, such as linkages to mass transit, freeway access, proximity to workforce housing, business park setting, and others. The appraiser may also need to consider that a comparable's low parking ratio, which is below both the market standard and the subject's ratio, may not require an upward adjustment if the comparable has superior mass transit accessibility. The specific adjustments will of course vary by market, and identifying and properly adjusting for these factors is where appraisers use their local experience and expertise.

Lastly, the appraiser should consider the impact of any specific ROTE sustainability-related risks on the subject (Resource Use, Obsolescence,

Transparency, Externalities) and whether these risks have been adequately addressed in the previous adjustments. ROTE risks like escalating energy costs and materials costs respond to global market forces and will adversely affect all properties, irrespective of the local market's sustainability orientation. Obsolescence risk can arise from outside the local market as well, due to state and federal legislation (like California's new statewide green building code) and could affect the market by setting a new minimum standard for new construction, thus creating implied obsolescence to the existing building stock.

Green in an NSO Market. This category applies to a property that meets the three green building criteria presented earlier, but where the appraiser determines the market is not sustainability oriented. This is a green building in a brown (NSO) market such as a net-zero energy warehouse building with a green roof in Omaha, Nebraska. It may or may not be LEED certified. The appraisal response is:

- Analyze green features = adjust subject as necessary.
- Review comparables to be sure they are or are not green and adjust as necessary.
- Consider ROTE risks.

The Sustainability Valuation Impact Grid (Exhibit 7) shows how the appraiser should consider sustainability impacts in the appraisal process. If the green building is LEED rated, line-by-line analysis of the credits earned in each category is necessary to determine if the features add value, incur additional cost, and/or enhance marketability. Do the features add discreet value (like a super-efficient HVAC system, with solar panels and a ground source heat pump that makes the building net-zero, i.e., no net energy demand from the grid)? Are there maintenance or other costs that offset the benefits? How fast is the market moving toward sustainability? Is the subject 'future-proofed' to some degree, and if so, will the value accrue in the ownership horizon of the typical buyer? If it is, this characteristic should be considered in the overall or yield rate selection. How long will the benefits accrue, and what will be required in terms of maintenance or replacement over and above a conventional building? For example, solar panels typically require ongoing monitoring that may cost extra, and the inverter typically needs to be replaced after 10 years or so. And how far into the 25–30 year economic life are the panels?

Since the subject and the market differ in sustainability orientation, special attention to the comparables is warranted. As shown in Exhibit 7, brown comparables may need to be adjusted for green features that add value, even in a brown (NSO) market. For example, in the warehouse example above, the typical lease is triple net, and the subject provides net-zero electrical power due to on-site generation. The comparables that lack this feature need to be adjusted upward to account for the fact that the occupant/tenant of the subject does not incur the typical energy expense. In addition, any green comparables will need to be carefully compared to the subject for differences in green features that impact value.

ROTE risks need to be considered for the subject, particularly in selecting the overall rate. If the subject is ahead of the curve, then its risk profile may be lower,

and this factor should be considered by lowering the overall capitalization or yield rate. For the Omaha warehouse example above, the subject's green features might make it more marketable to logistics companies that supply Walmart, which requires its suppliers to report on sustainability initiatives, or the federal government GSA, which plans to ask its 600,000 registered suppliers who provide it with \$600 billion in products and services annually to begin reporting greenhouse gas emissions. If there is evidence that these types of users are active in the market, the subject may be ahead of the comparables in meeting the future market demand. The appraiser would want to consider this in the risk analysis of the comparable overall rates, for example.

Brown in an SO Market. This category applies to a property that does not meet the three green building criteria presented earlier, but where the appraiser determines the market is sustainability oriented (SO). This is a brown building in a green (SO) market. An example of this would be an aging corporate headquarters campus in Oakland, California, which claimed the No. 2 spot in the Cushman & Wakefield Green Building Opportunity Index cited earlier. Here, the appraisal response is:

- Analyze green features = what is the subject missing?
- Review comparables to be sure they are or are not green and adjust as necessary.
- Consider ROTE risks.

For a brown building in a green market the risk is obsolescence, previously discussed as the brown discount. If the market is dominated by green/LEED-certified buildings, or there is clear evidence it is moving in that direction, what features does the subject need, in order to meet the market standard? Is it physically possible and financially feasible to “green-up?” The highest and best use analysis may need to include the financial feasibility of “greening up.” If the cost to cure renders the upgrade infeasible, then the highest and best use as improved may have to be reconsidered. Are the improvements a candidate for adaptive re-use, or is demolition and redevelopment the highest and best use?

As in the previous section, since the subject and the market differ in sustainability orientation, special attention to the comparables is warranted. If the rent comparables are located in LEED buildings and the subject is not, additional research is necessary to determine if there is a rent differential for LEED space. If so, an adjustment to the comparables is warranted.

The Sustainability Valuation Impact Grid (Exhibit 7) lists the various components of the income approach, where sustainability impact should be considered. Is there evidence of lower rents for non-green space? Should the vacancy rate be adjusted in the income statement? If a DCF is used, should down-time between leases be extended, or renewal probability reduced? If the building is vacant, should the absorption period be extended? Will the landlord have to “green-up” by getting the building LEED certified in order to land an attractive tenant, as was the case for the recent relocation of USGBC headquarters in Washington D.C.? If so, will the tenant improvement allowance be affected? Are utility costs likely to be higher

than market? Is a higher capital expense reserves allowance indicated? These factors will have a direct impact on the income stream and therefore, the value indication by the income approach.

ROTE risks rise to the fore for a brown building in a green market. While operational resource use has already been considered in the utility cost adjustment mentioned earlier, resource use risk could affect an aging building, which will require above-standard tenant improvement costs. Obsolescence risk is greatest for buildings that cannot be cost effectively greened up. All of the potential ROTE risks are best considered in the selection of the overall capitalization rate and/or discount rate. How brown is the subject relative to the comparables? If all the overall rate indicators are brown, despite the SO nature of the market, adjustment to the overall rate may not be warranted. Conversely, if the comparables are all LEED-certified, the subject would likely warrant a higher overall capitalization rate in an SO market. Paired-sale data to prove the appropriate load may not be available, and so the appraiser will have to rely on professional judgment after careful analysis of the market and the relative risks posed by the subject, at least until sufficient market data surfaces.

Finally, if a cost approach is used, the costing source will likely reflect green replacement cost for an SO market, and therefore the depreciation allowance should also consider the relative brownness of the subject.

Green in an SO Market. This category applies to a property that meets the three green building criteria presented earlier, and where the appraiser determines the market is also sustainability oriented (SO). This is a green building in a green (SO) market such as a Midtown Manhattan office building that is LEED-certified at the Platinum level. The appraisal response is:

- Analyze green features = adjust subject as necessary.
- Review comparables to be sure they are or are not green and adjust as necessary.
- Consider ROTE risks.

Here, line-by-line analysis of the LEED credits or green features is necessary to determine if the features add value, incur additional cost, and/or enhance marketability. Is there a net benefit or cost associated with the features?

Although the subject and the market are aligned in terms of sustainability orientation, the comparables still may need adjustment. Sustainability-oriented markets will still have a fair number of brown or non-LEED comparables for the foreseeable future. And even among LEED-certified buildings, it cannot be assumed that one LEED-certified building is “equal” to another even in the same market or at the same award level. The multiple versions and flexibility inherent in the LEED system means each property’s credit profile is distinctive, and has to be considered individually.

In the case of the Platinum-rated building example, the green features need to be analyzed for impacts on initial cost, operating cost, and ongoing capital costs like tenant improvements. Impacts on tenant satisfaction may affect employee

productivity, marketability of the space, and thus, tenant turnover and lease-up. For example, a raised-floor system that distributes HVAC beneath the floor typically reduces energy costs because the conditioned air is focused on the occupied portion of the space. Raised floors are also more readily reconfigured and therefore reduce future tenant improvement materials use and costs. Occupant satisfaction may be improved because the floor diffusers are individually adjustable. Happier tenants may impact renewal probability and achievable rents.

A greywater system that harvests rainwater and sink water for re-use in flushing toilets adds to construction costs initially but lowers potable water use and thus the ongoing water expense used in the income approach will be lower. Since water is currently relatively inexpensive, the cost savings may or may not justify the original cost, so in the cost approach, superadequacy may need to be addressed.

ROTE risks still need to be considered, especially in selection of the overall capitalization rates and/or discount for the subject. Since green buildings tend to have lower ROTE risk exposure, the brown comparables may need adjustment downward when developing the appropriate OAR and yield rate for the subject.

Step 3: Monitor over Time

Sustainability orientation of the market, and the “greenness” of the subject’s peers, will change over time and require monitoring, along with traditional market fundamentals like supply and demand, occupancy, net absorption, and rent levels. The important difference with sustainability is that the rate of change is rapid, and can be sudden and unexpected.

This step differs from Step 1 in that the information monitoring here is geared to the larger picture versus the primary local market and specific subject property. It is much easier to understand local changes when they can be viewed within a larger context. Examples of larger issues that should be considered are the previously mentioned new real estate sector-specific GRI reporting requirements, the pending HR 2336 that includes a provision, supported by the Appraisal Institute, requiring a higher level of competency for appraisers valuing green residential buildings, and the EPA’s recent designation of CO₂ as a pollutant that must be regulated.

Sources of sustainability and green building information are also different, and evolving. Much of the discussion occurs on blogs and through email from businesses and other organizations advocating green building. This is typical of market trends in the early stages of adoption, but care must be taken to look past the advocacy to see the information in a balanced, unbiased way. Many organizations, such as ULI, Appraisal Institute, CoStar, USGBC, and others, offer educational opportunities such as lectures and webinars, which can broaden the appraiser’s knowledge in this area.

Exhibit 8 provides some selected resources of currently available Internet-based sources of information that may prove useful to the appraiser for Steps 1 and 3 of the model.

Exhibit 8 | Monitoring Sustainability and Green Building Resources

These selected resources may be useful for monitoring trends in sustainability and green building and for assessing sustainability uptake as discussed in Steps 1 and 3 of the Sustainability Valuation Model.

REGULATIONS & INCENTIVES

- **Federal, State and Local Mandates for LEED:** <http://www.usgbc.org/DisplayPage.aspx?CMSPageID=1852>
- **USGBC searchable database for public policies and incentives:** <http://www.usgbc.org/PublicPolicy/SearchPublicPolicies.aspx?PageID=1776>

BLOGS AND SITES FOR NEWS AND TRENDS

- **Building Energy Performance News (BEPN) newsletter (free but sign up is required):** <http://www.bepinfo.com/default1.aspx>
- **RREEF Research Reports:** https://www.rreef.com/cps/rde/xchg/glo_en/hs.xsl/198.html
- **Greener Buildings website and blogs:** <http://www.greenbiz.com/buildings>:
<http://www.greenbiz.com/buildings/engage/blogs>
- **NY Times Green Blog:** <http://green.blogs.nytimes.com/>
- **USGBC Monthly Commercial Real Estate Update—email newsletter:** <http://www.usgbc.org/DisplayPage.aspx?CMSPageID=1935>

USGBC (LEED) SPECIFIC INFO

- **USGBC searchable database for LEED-registered and LEED-certified properties:** <http://www.usgbc.org/LEED/Project/CertifiedProjectList.aspx>
- **To find a local USGBC chapter:** <http://www.usgbc.org/FindaChapter/ChapList.aspx>

THIRD-PARTY MARKET SURVEYS ON SUSTAINABILITY UPTAKE

- **Cushman & Wakefield Green Opportunity Index:** <http://www.cushwake.com/cwglobal/jsp/kcReportDetail.jsp?Country=US&Language=EN&catId=100001&pId=c28400020p>
- **Jones Lang LaSalle (JLL) annual survey:** <http://www.joneslanglasalle.com/pages/SustainabilityResearch.aspx>
- **RICS Global Sustainability Survey:** <http://www.ricsamericas.org/files/editor/file/Sustainability/Surveys/RICS%20Global%20Sustainability%20Survey%20Q1%202010.pdf>

Conclusion

Sustainability, the key principle underlying green building, is a global megatrend that influences consumer behaviors and business decisions across a wide range of industries. Thus, the impact of sustainability on real estate in the future will extend far beyond green building. To understand this influence on real property values—green or brown—requires a conceptual understanding of sustainability as it applies not just to real estate, but also within its broader context in society.

The current focus on the green premium, or even green building value, misses the larger picture: that sustainability is affecting everything around us, including all of the real estate that is not in any way sustainable, green, or high performance.

To miss this important connection is to come up short as valuation professionals. The challenge for appraisers, and anyone concerned with property valuation, will be to understand sustainability, and then incorporate a sustainability-oriented approach to real estate and valuation that is appropriate for the market, the property type, and the subject property under appraisal.

This article provides appraisers a methodology to meet that challenge. The definitions of sustainability, green building, and greenwashing presented above provide a foundation for understanding sustainability and the risks it poses to all real estate, green and brown. The ROTE risk categories, Exhibit 2, provide a method to identify and categorize the sustainability risks to both green and brown properties, so that the risks can be appropriately considered in adjustment of the comparables, and selection of the capitalization and/or yield rate. Finally, the Sustainability Valuation Model provides a systematic methodology that allows the sustainability orientation of the subject property to be considered in conjunction with the sustainability orientation of the market, and remains applicable as either, or both, change over time.

Sustainability may appear an entirely new and foreign valuation influence. In many ways, it is. But the solution is not that different from how appraisers approach any new market influence or appraisal problem: research, analysis, judgment. In real estate, and appraisal in particular, value is most often estimated by looking in the rear view mirror at comparables and last quarter's market statistics to read the market and predict the market's behavior. Sustainability brings an entirely new forward-looking, long-view approach that, while now unfamiliar, will influence valuation practice in the future.

References

- Brown, M., F. Southworth, and T. Stovall. Towards a Climate-Friendly Built Environment. Pew Center on Global Climate Change, June 2005.
- CoreNet Global and Jones Lang LaSalle, Q4 2009, Perspectives on Sustainability: Results of the 2009 Global Survey on Corporate Real Estate and Sustainability. Available at: <http://www.joneslanglasalle.com/pages/SustainabilityResearch.aspx>.
- Dermisi, S. Effect of LEED Ratings and Levels on Office Property Assessed and Market Values. *Journal of Sustainable Real Estate*, 2009, 1:1, 23–47.
- Eichholtz, P., N. Kok, and J. Quigley. Doing Well by Doing Good? Green Office Buildings. *American Economic Review*, 2010, Forthcoming.
- Elkington, J. *Cannibals with Forks: The Triple Bottom Line of 21st Century Business*. Stony Creek, CT: New Society Publishers, 1998, 20.
- Ellison, L., S. Sayce, and J. Smith. Socially Responsible Property Investment: Quantifying the Relationship between Sustainability and Investment Property Worth. *Journal of Property Research*, 2007, 24:3, 191–219.
- Fuerst, F. and P. McAllister. An Investigation of the Effect of Eco Labeling on Office Occupancy Rates. *Journal of Sustainable Real Estate*, 2009, 1:1, 49–64.

- Global Reporting Initiative (GRI). Press release April 29, 2010. Available at: http://www.globalreporting.org/NewsEventsPress/LatestPressReleases/2010/PressRelease_29_April_10_CRESS_And_EventOrganizersSS.htm.
- Guidry, K. How Green is Your Building? An Appraiser's Guide to Sustainable Design. *The Appraisal Journal*, 2004, Winter, 57–68.
- Lubin, D. and D. Esty. The Sustainability Imperative. *Harvard Business Review*, 2010, May. Available at: <http://hbr.org/2010/05/the-sustainability-imperative/ar/6>.
- Meyer, C. *We Need a Definition of 'Sustainability'...And Here It Is*. Harvard Business Publishing. Available at: <http://blogs.harvardbusiness.org/leadinggreen/2008/06/we-need-a-definition-of-sustai.html>. Posted June 26, 2008.
- Miller, N., D. Pogue, Q. Gough, and S. Davis. Green Buildings and Productivity. *Journal of Sustainable Real Estate*, 2009, 1:1, 65–89.
- Muldavin, S. Value Beyond Cost Savings: How to Underwrite Sustainable Properties. Green Building Financing Consortium, 2010, 98. Available at: <http://www.greenbuildingfc.com/Documents/Value%20Beyond%20Cost%20Savings--Final.pdf>.
- Navarro, M. Some Buildings Not Living Up to Green Label. *The New York Times*, August 31, 2009. Available at: <http://www.nytimes.com/2009/08/31/science/earth/31leed.html?r=1&scp=1&sq=green%20buildings%20not%20efficient&st=cse>.
- Nelson, A. The Greening of U.S. Investment Real Estate—Market Fundamentals, Prospects and Opportunities. RREEF Research No. 57, November 2007. Available at: https://www.rreef.com/cps/rde/xchg/glo_en/hs.xsl/2727.html.
- Nelson, A. How Green a Recession? Sustainability Prospects in the U.S. Real Estate Industry. RREEF Research Strategic Outlook No. 70, February 2009, 1. Available at: https://www.rreef.com/GLO_en/bin/SO_70_How_Green_a_Recession_-_final_Final.pdf.
- Nevin, R. and G. Watson. Evidence of Rational Market Valuation for Home Energy Efficiency. *The Appraisal Journal*, 1998, October, 401–09.
- Nevin, R., C. Bender, and H. Gazan. More Evidence of Rational Market Values for Home Energy Efficiency. *The Appraisal Journal*, 1999, October, 454–60.
- Pivo, G. and J. Fisher. Investment Returns from Responsible Property Investments: Energy Efficient, Transit-oriented and Urban Regeneration Office Properties in the U.S. from 1998–2008. Working Paper, Responsible Property Investing Center, Boston College and University of Arizona Benecki Center for Real Estate Studies, Indiana University. October 11, 2008, revised March 3, 2009.
- Price-Robinson, K. Finding Green in Sustainability. *Valuation*, 2009, Second Quarter, 10–7.
- Reed, R., A. Bilos, S. Wilkinson, and K-W. Schulte. International Comparison of Sustainable Rating Tools. *Journal of Sustainable Real Estate*, 2009, 1:1; 1–22.
- Royal Institute of Chartered Surveyors (RICS) Global Property Sustainability Survey, Q4 2009. Available at: www.rics.org/economics.
- . The Calculation of Worth: An Information Paper. RICS, 1997.
- USGBC Commercial Property Update. Addressing the Green Building Premium, Spring 2010. Received via email subscription from USGBC, commercialrealestate@usgc.org, April 26, 2010.
- World Commission on Environment and Development (WCED). *Our Common Future*. New York, Oxford University Press, 1987, 8.

Wright-Chappell, T. and B. Smith. High Performance Green Building: What's it Worth? Cascadia Region Green Building Council, May 2009. Available at: <http://www.cascadiagbc.org/news/index.html/GBValueStudy.pdf>.

Timothy P. Runde, Carneghi-Blum & Partners, Inc., San Francisco, CA 94105
or trunde@comcast.net.

Stacey Thoyre, San Francisco, CA 94121 or sthoire@prodigy.net.