Title

Valuation of Green and High-performance Property: Commecial, Multi-family, and Institutional Properties

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VALUATION ADVISORY 9: VALUATION OF GREEN AND HIGH-PERFORMANCE PROPERTY: COMMERCIAL, MULTI-FAMILY, AND INSTITUTIONAL PROPERTIES

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Voluntary Guidance on Recognized Valuation Methods and Techniques:

Valuation of Green and High-Performance Property: Commercial, Multi-family, and Institutional Properties

This communication is for the purpose of issuing voluntary guidance on recognized valuation methods and techniques.

Date Issued: **March 7, 2018**

Application: **Real Property**

Issue: Recognizing the rising importance of green asset valuation to appraisers and market participants, Subject Matter Experts (SMEs) convened to address three specific topics for Advisory development in the Valuation of Green and High-Performance Property:

1. Background and Core Competency
2. 1-4 Unit Residential
3. Commercial, Multi-family and Institutional Properties

Basic appraiser core competency is addressed in *APB Valuation Advisory #6: Valuation of Green and High-Performance Property: Background and Core Competency* (adopted on June 2, 2015). Advisory #6 contains basic ideas relevant to high-performance buildings and professional best practices and provides several resources that may be relevant to appraisers when completing a green building appraisal assignment.

Concurrent with Advisory #6, two additional SME panels were formed to develop Advisories for the residential and non-residential real estate sectors; this Advisory addresses the latter. *Valuation of Green and High-Performance Property: Commercial, Multi-family, and Institutional Properties* addresses specific issues related to such properties with the intent of identifying the actions, skills, and knowledge necessary for developing and communicating such appraisal assignments.

SMEs were charged with gathering resources pertinent to a green building assignment including owner documentation, expert reports, building rating systems, prevailing codes and standards, educational publications, and other information. This Advisory identifies areas where green building features and market conditions impact the valuation assignment process, such as in the development of a scope of work, information gathering, analysis techniques, and measuring impacts on market value.

To be both succinct and thorough with this topic is challenging given the broad-based target audience and the large and complex commercial property sector. While this Advisory aims to be comprehensive, the topic and application of green concepts is broad and continues to evolve, resulting in practical limitations to the Advisory's length and depth. This Advisory provides short "how to" sections, and focuses on areas in a green appraisal assignment that require a different perspective or focus than a conventional assignment.

Relevant research and publications concerning green buildings are published at a rapid rate. For this reason, the SMEs compiled a set of initial resources via a Resource Library URL rather than including an extensive static bibliography as an appendix. This body of knowledge (*Information Atlas*) is expected to evolve in line with professional experience. The link is:

https://sites.google.com/site/appraisinghpbuildings/useful-publications

Subject Matter Experts: This panel addressed the evolving influence and applicability of green and sustainable building practices on the commercial real estate valuation process. The Foundation expresses its sincere gratitude to each of the following SMEs and to the US Department of Energy for volunteering time and expertise in contributing to this document:

James F. Finlay	SoundView Risk Advisors, Venice, CA
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Valuation of Green and High-Performance Property: Commercial, Multi-family and Institutional Properties

Executive Summary

In response to market demands as propelled by public policies and voluntary rating programs and economic interest, commercial and multi-family buildings increasingly incorporate high-performance (aka "green") attributes that are beyond base code requirements. The primary goal of pursuing green building strategies is to reduce operating costs, increase net income, improve indoor environmental quality, and/or achieve a reduction in life-cycle environmental impacts. Indeed, the marketplace is gradually moving towards a "new normal" in which non-green buildings will be regarded as obsolescent, and undervalued in that regard.

Green attributes reflect a wide continuum ranging from modest individual upgrades of otherwise conventional buildings to comprehensive integrated design and operational strategies that are driving buildings towards zero net energy/water/waste capabilities. Maintaining competency in this rapidly evolving market segment is essential—competent appraisers are required to: 1) access and comprehend new information either directly or via third-party experts; 2) use refined market segmentation when evaluating the subject property's market position, financial prospects, and risk profile; and 3) incorporate this analysis into the valuation assignment.

Appraisers should note that assigning zero value or otherwise "ignoring" green and high-performance attributes requires the same level of market validation and support as assigning value to such attributes.

This Advisory is intended for commercial real estate professionals including valuation professionals, property owners and developers, mortgage originators, underwriters, equity investors, attorneys, expert witnesses, the broader legal system, accountants, public sector officials, and policymakers. Six case studies are provided at the end to illustrate the concepts.

Green and high-performance attributes merit consideration and inclusion in each aspect of the existing appraisal process; fundamentally new methods are not required. The appraiser must objectively analyze all relevant information that differentiates buildings with green features in the subject's real estate market, and then, if appropriate, adjust financial and investment risk factors accordingly.

In this Advisory, "green," "high-performance," and/or "sustainable" buildings are typically referred to as green buildings. This is in some ways a convenience for general discussion as relevant individual standards and certifications that might measure one or all of building energy and water use, interior air/health, construction and materials, site impact, or other features. A green building is typically more energy/resource efficient than conventional design, but not necessarily. Existing or new buildings without such attributes (not green) are referred to as conventional buildings.

Local conditions apply as the market value distinction between older conventional buildings, new code-compliant design (that may contain some high-performance features), and truly high-performance property varies by market and is a rapidly evolving standard.

Primary risk considerations include the ability to attract and retain high-credit grade tenants, absolute and relative building operating efficiency, exposure to future energy and water price volatility, obsolescence risk, financing risk stemming from future capital preferences and pricing, and liquidity risk due to evolving inves-

tor preferences. Secondary impact factors include grid reliance, water supply availability, and location-based factors (including access to multiple transit options and natural disaster probability and severity alongside asset resiliency).

This advisory addresses core principles underlying green real estate as well as design and operational attributes. For the convenience of the practicing valuation professional, the topics are presented in the general sequence of a typical commercial appraisal assignment.

Appraisers should initially seek to define the assignment problem. As part of this, they should identify the client and any other intended users, and the intended use. In order to appropriately determine the scope of work, appraisers often communicate with the client(s) both initially and throughout the assignment, although ultimate responsibility for this process rests with appraisers. Once the assignment is complete, the scope of work that was undertaken is communicated in the appraisal report. It is essential that green property attributes are not overlooked within the scope.

It is important to engage early and often with the owner's representative to obtain robust information that best characterizes the subject property. A comprehensive property description enables appraisers to identify features that warrant inclusion within the scope of work and to acquire market data that appropriately differentiates green buildings within the broader market. This initial scoping and information gathering process is the most important step in accurately evaluating the assignment. This evaluation allows appraisers to appropriately determine their competency when accepting and undertaking a green building valuation assignment.

The valuation of green properties uses established valuation practices with additional (often extensive) supporting documentation specifically related to green building features. Operating system details, active and passive building features, and overall performance characteristics are important to the valuation assignment. This Advisory identifies a range of relevant documentation including, but not limited to, energy design standards or guidelines like American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) 90.1,[1] energy use disclosures, annual ENERGY STAR® scores, and green building certifications and/or third-party energy and water consumption audits to support income and expense projections.

Building performance scores and certifications have varying degrees of usefulness in the valuation process. For example, ENERGY STAR® is very widely used, but because it relies on whole building energy use, leased commercial and multi-family properties often have difficulty obtaining tenant data. Privacy concerns, utility data access and the cost/challenges involved can hinder participation in ENERGY STAR® programs. Like many other building performance tools, ENERGY STAR® is evolving to address these hindrances and gain wider adoption. Even without whole building performance data, an appraiser may discover highly efficient designs for common areas that could impact value through lower operating expenses. Each situation needs careful analysis.

The market embrace of third-party green building certifications as a market differentiator has become part of the broader trend in the overall trend towards disclosure and transparency. This is required for markets to

appropriately differentiate buildings by the presence (or absence) of high-performance attributes. Multiple green building certification schemes exist in national and local real estate markets. Appraisers should note that green building ratings/certifications vary in complexity, scope, applicable property type, and rigor.

When assigning value to a building with one or more ratings, appraisers should become knowledgeable of the broad contours of the respective building rating and certification framework including: 1) specific requirements to achieve the rating; 2) the third-party validation process that supports the rating;[2] and 3) the level of disclosure available to leasing brokers and capital market participants. Additional information on building rating programs is available in Appendix I.

Advances in data availability and access enable the appraiser to obtain contextual information useful to the green building appraisal assignment. Examples of such data are market penetration rates, comparative energy and water consumption metrics, and credit achievement patterns of buildings with a third-party rating. Appraisers can use applicable data platforms to better comprehend market dynamics, select appropriate comparable buildings, and make informed value interpretations based on quantitative and qualitative data.

When analyzing highest and best use, appraisers should evaluate the extent to which high-performance attributes may contribute to net income, expense reduction, and/or impact marketability and investment risk profile. A building with green attributes may be considered to exhibit "market leadership" in one location, while it may be deemed "over-engineered obsolescence" in another. This Advisory reviews the three traditional approaches to value and identifies how, when, and where each approach may be applied to the assessment of green attributes.

In particular, the **cost approach** considers the different cost/value analyses inherent to the owner/investor decision process. Appraisers may wish to consider the effect of any financial incentives for green features offered by third parties such as energy or water utilities, and the probability that past or proposed investments made in pursuit of higher building performance can be recovered through operating cost reductions that create additional net operating income.

Limits on available transaction data in some markets may be a challenge for appraisers performing a **sales comparison approach**. Many primary markets have experienced a notable shift in market preferences, adopting a "new normal" inclusive of green design and operating characteristics required for consideration as a "Class A" property. In markets with above-average adoption rates, the green value premium is sometimes overtaken by the inverse: a discount for property characterized as underperforming. Market dynamics continue to evolve. Accelerated obsolescence may not currently be discernible or supportable in secondary or tertiary markets.

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[1] ASHRAE, American Society of Heating, Refrigerating and Air-Conditioning Engineers, Energy Standard 90.1 is an international standard that provides minimum requirements for energy-efficient designs for buildings (except for low-rise residential buildings).

[2] For a more complete listing of rating and analysis tools by type, scope, and creator, see energy analysis, rating, and benchmarking tools listed in the *Information Atlas*, https://sites.google.com/site/appraisinghpbuildings/key-topics/rating-systems

Determining the financial impact of green attributes and systems using the **income approach** requires identifying collective financial impacts along each of the four *pro forma* subcategories: income, vacancy, expenses, and risk. Where available, appraisers can gather differentiated rental rate and operating expense information separated between green and conventional buildings that support appropriate modifications and capitalization rate adjustments.

After exploring the three approaches to value, the Advisory concludes by describing the appraisal reporting format, the role of the appraisal report reconciliation, and issues that may arise. Given established market trends and major market forces, the frequency of green building assignments is expected to increase in the foreseeable future. Building code changes are driving high-performance design, with some requiring Zero Net Energy (ZNE) construction by 2020. Additionally, there are drastic disruptions to utility energy markets and increasing recognition that resiliency to extreme weather is necessary for a building to be truly "sustainable." This will produce an increasing number of energy efficient and green high-performance buildings, and valuing those properties will be the task of appraisers. This Advisory intends to provide an outline, seen from current market conditions, of the relevant fundamentals, to help prepare appraisers for the day when green, high-performance buildings will be the norm.

Section I: Principles and Advisory Purpose

Introduction

High-performance or "green" property valuation is a popular topic in many markets and presents a challenging array of considerations for an appraiser accepting such assignments.

This Advisory uses the shorthand "green" when referring to a property's economic performance in lieu of other widely used industry references such as "green building," "sustainable property," or other similar terms that may include non-economic features (social, political, and otherwise).

The Energy Independence and Security Act of 2007 (EISA 2007) defines a "high-performance building" as "a building that integrates and optimizes on a life cycle basis all major high-performance attributes, including energy conservation, environment, safety, security, durability, accessibility, cost-benefit, productivity, sustainability, functionality, and operational considerations."[3]

Principles

Further definitions and terms from EISA 2007 are found in the Glossary.[4] The six most commonly referenced areas for green building attributes are:

1) environmentally preferable site and development location
2) increased water efficiency
3) clean energy sources and increased energy efficiency
4) environmentally preferable building materials and resources
5) improved indoor environmental quality, health, and safety
6) reduced operational and maintenance costs

High-performance or green buildings attributes include energy-efficiency features such as efficient heating and cooling equipment; building envelope improvements including windows and insulation; efficient interior and exterior lighting; building control systems; and on-site power generation, among others. Relevant water-efficiency attributes include low-flow water fixtures, rainwater catchment for stormwater reduction, drought-tolerant landscaping, "smart" irrigation design and controls, and similar systems. Green buildings may have superior indoor environmental conditions (comfort, moisture, lighting), and can be designed for greater durability and disaster resiliency when compared to conventional structures.

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[3] Energy Independence and Security Act of 2007, 42 U.S.C. §401 (2007).

[4] See *Information Atlas*, https://sites.google.com/site/appraisinghpbuildings/resources/glossary.

Figure 1: High-performance attributes of Mosler Loft (12-stories; 150 residential units plus 6000 square feet of retail space), Seattle, WA. Source: Adapted from Mithun http://mithun.com/project/mosler-lofts/

Key

1) Readied for Future Photovoltaic Panels and Off-Site Renewable Power Offsets (35 percent of total)
2) Natural Daylighting and Views in All Units
3) High-Performance Window Wall and Glazing System: Super-insulated, Maximal Solar Gains, Energy Efficient Glass, Daylighting and Shading, Operable Windows for Natural Ventilation, Views
4) Water-Conserving Fixtures
5) Regional Material Use
6) High-Efficiency Chiller Unit No CFCs (each rental unit has own controls)
7) High-Efficiency Elevator System
8) High-Efficiency Boilers (in-unit controls)
9) Rooftop Recreation Areas (18 percent vegetated)
10) Green Roof (reduces air-conditioning costs)
11) Energy Star® Equipment and Appliances and LED Exterior Lighting
12) Use of FSC® Certified Wood, Local Materials, and Low-Emissions Carpets
13) Systems Commissioned to Ensure Performance and Savings Persistence
14) Underground Parking (43 percent of site is green space) and Alternative-Fuel Charging
15) Parking for Flex Car and Ride-Sharing Vehicles
16) Bicycle Storage and Changing Area
17) Storm Water Management
18) CO2 Monitoring for Improved Ventilation and Air Quality
19) Recycling Collection and Storage Area
20) Pedestrian Friendly Landscape; High-Efficiency Irrigation; Shading and Evapotranspiration to Reduce Air-Conditioning Costs; Regionally Appropriate Vegetation
21) Swale/Water Infiltration for Reduced Runoff and 25 percent of Construction Waste Diverted from Landfills

The traditional appraisal problem as applied to green buildings is addressed in this Advisory: opinion of the market value (in exchange) of a specified interest in a subject property as of a given date, assuming the property is put to its highest and best use by its most probable buyer. Other assignments, such as estimation of compensation for a taking, economic damages arising from a property event, or valuation for property taxation purposes are not explicitly addressed; however, if green buildings are involved with these assignments, appraisers should consider the recommendations in this Advisory. This is also designed as a resource for required research and analysis through the inclusion of technical references, legislative requirements, and educational sources. The most germane green property valuation topics that impact the greatest number of cases and property types are discussed. *This Advisory is not intended to be all inclusive, nor cover every methodology, technique, term, client requirement, governmental policy, regulation, or appraisal issue. It is limited to general guidance and cannot cover all scenarios.*

An extensive online "Information Atlas" that contains additional information, supporting documentation, and other resources to delve more deeply into topics introduced in this Advisory is included.[5]

Intended Users of the Advisory

The intended audience of this Advisory includes:

1. Real property appraisers
2. Intermediaries such as appraisal management companies, real estate agents, and appraisal reviewers
3. Lending professionals, including mortgage brokers, loan underwriters, credit committees, risk and compliance, and loan portfolio managers
4. Users of appraisals, including:
    a. Acquisition due diligence professionals
    b. Other professionals within the financial, legal, tax, accounting, and insurance fields whose activities require an understanding of real estate valuation and/or economic attributes impacting financial collateral
    c. Property developers, owners, managers, and investors
    d. Investment advisors, bond rating agencies, and other financial services professionals
5. Policy makers and government officials evaluating the role and applicability of appraisals of green buildings, including:
    a. Federal and state banking, insurance, securities, and tax regulatory commissioners
    b. Utilities and utility regulators
    c. Environmental, zoning, city planners, real estate authorities, and regulators
6. Building owners who would like high-performance attributes of their buildings to be recognized in appraisals

Note: As stated previously, the primary intent of this Advisory is educational, and compliance with the guidance is voluntary.

[5] https://sites.google.com/site/appraisinghpbuildings

Commercial Property Types

This document addresses commercial properties typically thought of as income-producing investment properties or properties used in the course of an owner's business (an owner-user). These include the five major property categories: office, retail, industrial, multi-family, and special purpose. It also covers institutional and public sector properties, sometimes referred to as the MUSH market (Municipal, University, School [K-12], Hospital). Mixed-use properties, with a combination of uses including retail, multi-family residential and/or hotel uses, are also addressed.

Residential property (single-unit and 1-4 unit apartment buildings) is not covered, but is included in a separate Advisory titled *Valuation of Green and High-Performance Property: 1-4 Unit Residential*.[6]

Green Property Characteristics and Benefits

Appraisers should identify and evaluate green attributes that can contribute to the productivity, competitiveness, and utility of the subject property in the context of an appraisal assignment. These usually comprise characteristics recognized by a probable buyer as those that may affect the property's market value and associated economic risk metrics. Separating the specific factor and benefit types into the following categories provides a framework for analyzing the green characteristics:

Category	Direct benefits that have a higher probability to influence market value:	Indirect benefits that have no or limited probability to influence market value:
User	Those realized by the investor, owner or user,	Those realized by the community,
Economic	are monetary, and	are non-monetary, and
Applicability	accrue directly to the property.	indirectly accrue to various stakeholders.

Thus, appraisers should consider the following questions:

- Which attributes and systems create a direct monetary benefit to an investor, owner, and/or user (lower operating expenses and/or higher income)?
- Which characteristics have an indirect monetary benefit to the owner or user (e.g., lower risk, shorter marketing time, future-proofing, overall asset quality, and/or meeting stakeholder sustainability targets)?
- Which attributes have an indirect, non-monetary benefit to an investor, owner, or user (by green attributes having a positive impact on property owner's business), but may also result in broader market recognition and/or business goodwill?

[6] http://www.appraisalfoundation.org/imis/TAF/Valuation_Advisories.aspx

- How will the buyers and sellers of income property in this marketplace react to the specific green/high-performance attributes?
- Does a specific attribute represent an element of value, a standard market requirement, or functional and/or external obsolescence in this property type and in this marketplace?

Most green features have direct as well as indirect attributes. For example:

- Attributes that reduce solid waste production or water use may result in *direct monetary benefits* to the owner/occupant **and** *indirectly benefit* the community through less waste disposal or need for water infrastructure.
- Attributes that lower energy consumption may result in *direct and indirect monetary* benefits to the owner (superior marketability), **and** *direct monetary benefits* to the occupant (NNN lease), **and** *non-monetary benefits* to the community (greenhouse-gas CO_2 reductions).

Features that encourage resource conservation may have additional non-monetary community benefits by promoting broader awareness among building occupants, which may lead to energy conservation elsewhere in their community.

Section II: Scope of Work

Assignment Initiation and Appraiser Engagement

When accepting a high-performance building assignment, it is important to be aware that appraisal clients (lenders, attorneys, investors, and their authorized representatives) are intermediaries. They may be unfamiliar with the added complexity and data associated with a green building analysis. Property owners may be kept isolated during the engagement process and RFP drafting, unaware of their key role in supplying documentation and information about the building attributes. Lack of client communication or their familiarity with the property's green attributes may result in incomplete collateral information and deficiencies in describing the assignment's scope. These data inaccuracies may add costs and delay to the appraisal process when revealed. In such cases, an intermediary may unwittingly accept a low-bid appraisal from a professional without competency in green valuation, while the knowledgeable client would insist upon a competent valuation of the green asset, even if the fee were higher.

The relative complexity of any green property valuation assignment can impact the scope of work, report fee, and delivery timing. If certain green-building-related documents or attributes are not revealed in the initial engagement contract (e.g., one or more green building certifications, solar PV/distributed energy resource installation, specialized high-efficiency systems, utility demand response contract, etc.), the appraisal scope of work, report fee, and delivery timing may require modification. For example, evaluating a sophisticated building certified at a high-rating level that features on-site energy generation may require additional time and analysis over a similar building with fewer performance features or a conventional property lacking these attributes.

Property Owner/Contact Interview

To mitigate the aforementioned risks, appraisers are advised to double check the assignment scope and collateral details with the property contact early in the engagement as well as ask for any technical documentation, market or performance studies, and due diligence reports. Starting the property contact interview with an open-ended request like, "Tell me about any special building features that impact energy or resource use" engages the property contact, who can often quickly provide valuable information and documentation. It is up to the appraiser to then verify and interpret how building features impact property value. The property contact might also provide the names of others who might be building system experts such as the building operator, solar PV installer, utility customer representative, or energy auditor. Occasionally, property contacts need to be reminded that in complex assignments, the information they can provide is critical for the appraiser to reach an accurate valuation.

Matching Building Complexity and Appraiser Competency

An important issue when preparing a scope of work and fee estimate for accepting a green property valuation assignment is assessing the appraiser's knowledge and training in relation to the subject property's green attributes. The appraiser's knowledge level may impact assignment scope, report fees, and delivery

timing. The Appraisal Foundation's Advisory #6 on core competency for green property valuations is a good reference document for identifying competency considerations.[7]

Appraisers should become familiar with background and core competency topics when pursuing and accepting a green building valuation assignment. Additional research may be required in order to meet *Uniform Standards of Professional Appraisal Practice* (USPAP) competency requirements, including familiarity with:

1. ***Building Design Attributes –*** High-performance attributes and physical equipment installations designed to achieve higher energy/water efficiency; generate on-site power; reduce peak load energy demand; minimize interior/exterior potable water consumption; and maintain technologically sophisticated building monitoring and controls. Attributes may also result in higher occupant satisfaction.[8]
2. ***Economic Cost and Benefit Analysis –*** Analysis tools and financial methodologies used to estimate incremental investments and economic impacts including minimizing operating cost increases, positioning within market supply/demand dynamics, and mitigating certain investment risks.
3. ***Market Prevalence and Adoption –*** Analyzing the level of market penetration of green buildings within the subject property's local market, and how this relates to comparable sales and adjustments to same.
4. ***Interviews with Local Subject Matter Experts –*** Local networks of high-performance building brokers, energy audit professionals, due diligence consultants, professionals with green building performance design designations, or similar groups with specialized knowledge of the green real estate market dynamics.

[7] http://www.appraisalfoundation.org/imis/TAF/Valuation_Advisories.aspx

[8] DTZ, "DTZ Research Confirms Link Between Sustainability and Tenant Satisfaction," news release, February 17, 2015, https://www.prnewswire.com/news-releases/tenant-satisfaction-sustainability-link-revealed-in-dtz-research-300037064.html.

Section III: Identifying Green Features—Documentation

Appraisers should seek to acquire documents that help them identify green building attributes.

Green Documentation

Assessment Tools and Rating Systems

The engineering and resource analysis communities have developed an array of tools for analyzing the resource consumption profiles of buildings as well as quantitative or qualitative rating systems.[9] No one tool or system provides all forms of useful information. For example, some tools such as the US Department of Energy (DOE) *Building Energy Asset Score* identifies multiple asset improvement attributes (often termed "retrofits" or "upgrades") and their associated economic benefits. Other tools such as ENERGY STAR® Portfolio Manager assess a single attribute, in this case "as-is" energy performance. Resources such as the National Renewable Energy Lab's *PVWatts*® Calculator estimates energy production and cost of energy for grid-connected photovoltaic (PV) systems, a highly specialized tool for a single high-performance feature. ASHRAE has published numerous guides and reporting standards including *Building EQ* (Scorecard noted previously) and *Procedures for Commercial Building Energy Audits*, which includes additional commercial building energy audit standards. Appraisers should be aware that some analysis tools utilize actual consumption data from utility bills while others are based on energy modeling and are thus performance simulations. Each approach has strengths and weaknesses and can contribute to analyzing performance impacts on value.

Performance can be communicated to the broader market in terms of economic impacts that provide context on attributes present at a building. Strategies that may reflect performance can take the form of one or more green building certifications and/or energy performance labels.[10] Assets achieving one or more green building rating(s) or ENERGY STAR® score(s) communicate asset quality attributes and relative operational efficiency to market participants. Rating systems provide standardized green frameworks for categories such as energy, water, site attributes, construction materials and furnishings, and indoor environmental quality. These frameworks can be complementary, and green assets are often characterized by multiple performance ratings.

Building owners must compile and submit significant amounts of data to obtain a third-party, verified green building rating standard certification. These green building certifications are an important step to ensure correct execution. and inspections may vary in rigor and requirements. Appraisers should be aware not all ratings are equal in a market context. Credible certifications are comprised of five key components:

1. **Specificity:** Detailed criteria describing performance requirements.
2. **Transparency:** Requirements published and available for inspection.
3. **Validation:** Objective and robust third-party review process.
4. **Disclosure:** Outcomes published and transparent to market participants.
5. **Governance:** Standard developed via comprehensive public comment and/or ballot.

Multiple rating systems can exist within the same brand family covering property life cycle, project scope, and property type. Rating systems can have specific variations covering: 1) new construction vs. existing buildings; 2) whole buildings vs. tenant fit outs; 3) specific versions tailored to one or more property types; and 4) energy conservation/efficiency and energy generation. Most building rating systems are designed to advance the market beyond minimum code compliance, thus are subject to change and improvement over time. Newer versions of a rating system typically consist of different, and often higher, thresholds required for achieving a similar rating when compared to the prior version.

Appraisers are advised to be aware of differences between and within rating systems. Links to the major rating, standards, and certification programs can be found listed in the Information Atlas website link.[11] When completing an assignment, appraisers should acquire specific information on the applicable green building rating(s) system being utilized, including, but not limited to, rating sheets/score cards such as the examples presented previously.

[9] Many tools addressing energy can be found at http://www.buildingenergysoftwaretools.com

[10] A number of energy analysis, rating, and benchmarking tools are listed in the *Information Atlas*, https://sites.google.com/site/appraisinghp-buildings/key-topics/rating-systems

[11] https://sites.google.com/site/appraisinghpbuildings/useful-publications

Figure 2: Example of a LEED® Certification Scorecard

1094819376500, Anycity, Anystate USA

100 First Street

LEED BD+C: New Construction (v4) — **GOLD, AWARDED AUG 2015**

INTEGRATIVE PROCESS CREDITS		AWARDED 1/1
Credit	Integrative process	1/1

LOCATION & TRANSPORTATION		AWARDED 7/16
Credit	LEED for Neighborhood Development location	0/16
Credit	Sensitive land protection	0/1
Credit	High priority site	0/2
Credit	Surrounding density and diverse uses	5/5
Credit	Access to quality transit	0/5
Credit	Bicycle facilities	1/1
Credit	Reduced parking footprint	0/1
Credit	Green vehicles	1/1

SUSTAINABLE SITES		AWARDED 6/10
Prerequisite	Construction activity pollution prevention	-
Credit	Site assessment	1/1
Credit	Site development - protect or restore habitat	0/2
Credit	Open space	0/1
Credit	Rainwater management	3/3
Credit	Heat island reduction	2/2
Credit	Light pollution reduction	0/1

WATER EFFICIENCY		AWARDED 8/11
Prerequisite	Outdoor water use reduction	-
Prerequisite	Indoor water use reduction	-
Prerequisite	Prerequisite Building-level water metering	-
Credit	Cooling tower water use	2/2
Credit	Water metering	1/1
Credit	Outdoor water use reduction	2/2
Credit	Indoor water use reduction	3/6

ENERGY & ATMOSPHERE		AWARDED 27/33
Prerequisite	Fundamental commissioning and verification	-
Prerequisite	Minimum energy performance	-
Prerequisite	Building-Level energy metering	-
Prerequisite	Fundamental refrigerant management	-
Credit	Enhanced commissioning	6/6
Credit	Advanced energy metering	1/1
Credit	Demand response	2/2
Credit	Renewable energy production	3/3
Credit	Enhanced refrigerant management	1/1
Credit	Green power and carbon offsets	0/2
Credit	Optimize energy performance	14/18

MATERIALS & RESOURCES		AWARDED 9/13
Prerequisite	Storage and collection of recyclable	-
Prerequisite	Construction and demolition waste management planning	-
Credit	Building life-cycle impact reduction	5/5
Credit	Building product disclosure and optimization - environmental product declarations	2/2
Credit	Building product disclosure and optimization - sourcing of raw materials	0/2
Credit	Building product disclosure and optimization - material ingredients	2/2
Credit	Construction and demolition waste management	0/2

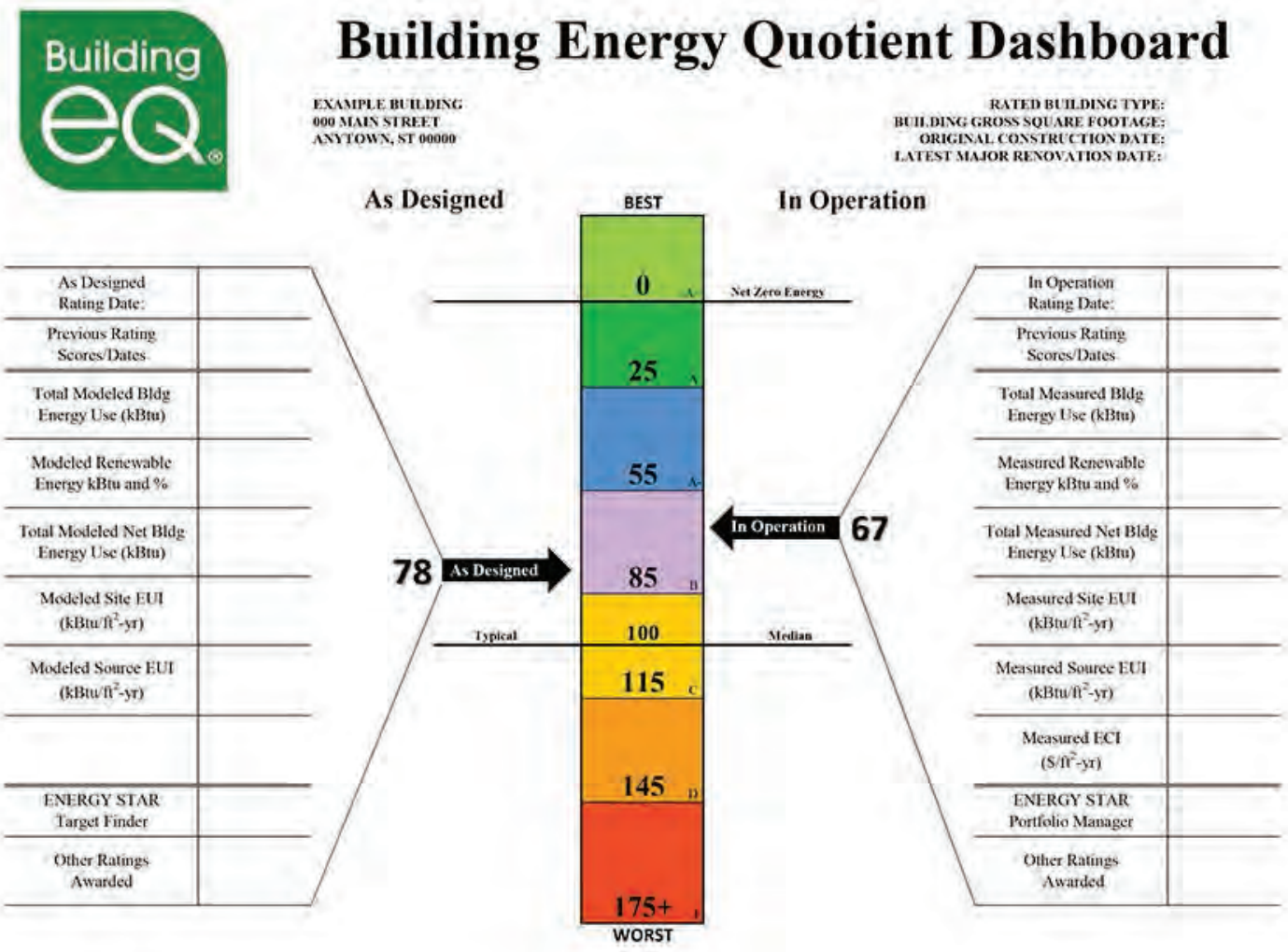
INDOOR ENVIRONMENTAL QUALITY		AWARDED 13/16
Prerequisite	Minimum indoor air quality performance	-
Prerequisite	Environmental tobacco smoke control	-
Credit	Enhanced IAQ strategies	0/2
Credit	Low-emitting materials	3/3
Credit	Construction IAQ management plan	1/1
Credit	IAQ assesment	2/2
Credit	Thermal comfort	1/1
Credit	Interior Lighting	2/2
Credit	Daylight	3/3
Credit	Quality views	0/1
Credit	Acoustic performance	1/1

INNOVATION		AWARDED 3/6
Credit	Innovation	2/5
Credit	LEED Accredited Professional	1/1

REGIONAL PRIORITY		AWARDED 2/4
Credit	Regional Priority	1
Credit	Regional Priority	1

TOTAL	76/110

Figure 3: Example of ASHRAE Building Energy Quotient Dashboard



GBI Project Checklist for Green Globes for New Construction

GREEN GLOBES

Date: _____

Project Name: _____

Important Note: This document is intended to provide information regarding the areas assessed and associated **maximum** points available under the Green Globes for New Construction program. Each of the areas presented here contain more specific criteria which are scored within the online Construction Documents Survey. Please refer to the Technical Reference Manual to view all assessed criteria, associated maximum points possible, ToolTips and references. **Please purchase and complete the online Construction Documents Survey for the most accurate self-evaluation of a project. Final Green Globes certification is based upon third-party assessor verified points at the conclusion of an assessment.**

PROJECT MANAGEMENT			Maximum Points: 50	Y	N	?
1.1	**Integrated Design Process (IDP)**		**9**			
1.1.1	Pre-Design Meetings	3				
1.1.2	IDP Performance Goals	3				
1.1.3	IDP Progress Meeting for Design	3				
1.1.4	Capital Asset Plan & Business Case Summary (Federal only)	0				
1.2	**Environmental Management During Construction**		**12**			
1.2.1	Environmental Management Systems (EMS)	3				
1.2.2	Clean Diesel Practices	2				
1.2.3	Building Materials and Building Envelope	2				
1.2.4	IAQ During Construction	5				
1.3	**Commissioning**		**29**			
1.3.1	Pre-Commissioning	3				
1.3.2	Whole Building Commissioning	19				
1.3.3	Training	1				
1.3.4	Operations and Maintenance Manual	6				

SITE			Maximum Points: 115	Y	N	?
2.1	**Development Area**		**30**			
2.1.1	Urban Infill and Urban Sprawl	10				
2.1.2	Greenfields, Brownfields and Floodplains	20				
2.2	**Ecological Impacts**		**32**			
2.2.1	Site Disturbance and Erosion	8				
2.2.2	Tree Integration	5				
2.2.3	Tree Preservation	4				
2.2.4	Heat Island Effect	13				
2.2.5	Bird Collisions	2				
2.3	**Stormwater Management**		**18**			
2.4	**Landscaping**		**28**			
2.5	**Exterior Light Pollution**		**7**			

ENERGY			Maximum Points: 390	Y	N	?
3.1	**Energy Performance**		**100**			
3.2	**Energy Demand**		**35**			
3.2.1	Passive Demand Reduction	19				
3.2.2	Power Demand Reduction	16				

ENERGY (cont'd)			Maximum Points: 390	Y	N	?
3.3	**Metering, Measurement, and Verification**		**12**			
3.3.1	Metering	8				
3.3.2	Measurement and Verification	4				
3.4	**Building Opaque Envelope**		**31**			
3.4.1	Thermal Resistance and Transmittance	10				
3.4.2	Orientation	5				
3.4.3	Fenestration Systems	16				
3.5	**Lighting**		**36**			
3.5.1	Lighting Power Density	10				
3.5.2	Interior Automatic Light Shut-off Controls	3				
3.5.3	Light Reduction Controls	4				
3.5.4	Daylighting	8				
3.5.5	Controls for Daylighted Zones	6				
3.5.6	Exterior Luminaires and Controls	5				
3.6	**HVAC Systems and Controls**		**59**			
3.6.1	Building Automation System	10				
3.6.2	Cooling Equipment	13				
3.6.3	Cooling Towers	8				
3.6.4	Heat Pumps	6				
3.6.5	Heating Equipment	8				
3.6.6	Condensate Recovery	3				
3.6.7	Steam Traps	2				
3.6.8	Domestic Hot Water Heaters	3				
3.6.9	Variable Speed Control of Pumps	6				
3.7	**Other HVAC Systems and Controls**		**32**			
3.7.1	Minimizing Re-heat and Re-cool	6				
3.7.2	Air Economizers	3				
3.7.3	Fans and Ductwork	7				
3.7.4	Demand Controlled Ventilation	10				
3.7.5	Variable Refrigerant Flow Systems	6				
3.8	**Other Energy Efficient Equipment and Measures**		**11**			
3.8.1	Elevators and Escalators	5				
3.8.2	Other Energy Efficient Equipment	6				
3.9	**Renewable Energy**		**50**			
3.9.1	On-site Renewable Energy	32				
3.9.2	Off-site Renewable Energy	18				
3.10	**Energy Efficient Transportation**		**24**			

WATER			Maximum Points: 110	Y	N	?
4.1	**Water Consumption**		**42**			
4.2	**Cooling Towers**		**9**			
4.3	**Boilers and Water Heaters**		**4**			
4.4	**Water Intensive Applications**		**18**			
4.4.1	Commercial Food Service Equipment	6				
4.4.2	Laboratory and Medical Equipment	5				
4.4.3	Laundry Equipment	4				
4.4.4	Special Water Features	3				
4.5	**Water Treatment**		**3**			
4.6	**Alternate Sources of Water**		**5**			
4.7	**Metering**		**11**			
4.8	**Irrigation**		**18**			

MATERIALS & RESOURCES			Maximum Points: 125	Y	N	?
5.1	**Building Assembly (Core & Shell including Envelope)**		**33**			
5.2	**Interior Fit-Out (including Finishes and Furnishings)**		**16**			
5.3	**Reuse of Existing Structures**		**26**			
5.3.1	Facades	6				
5.3.2	Structural Systems	6				
5.3.3	Non-Structural Elements	14				
5.4	**Waste**		**9**			
5.4.1	Construction Waste	7				
5.4.2	Operational Waste	2				
5.5	**Building Service Life Plan**		**7**			
5.6	**Resource Conservation**		**6**			
5.6.1	Minimized Use of Raw Materials	3				
5.6.2	Multi-Functional Assemblies	1				
5.6.3	Deconstruction and Disassembly	2				
5.7	**Building Envelope - Roofing/Openings**		**10**			
5.7.1	Roofing Membrane Assemblies and Systems	3				
5.7.2	Flashings	3				
5.7.3	Roof and Wall Openings	4				
5.8	**Envelope - Foundation, Waterproofing**		**6**			
5.8.1	Foundation Systems	4				
5.8.2	Below Grade Wall Slabs and Above Grade Horizontal	2				
5.9	**Envelope - Cladding**		**5**			
5.9.1	Exterior Wall Cladding Systems	3				
5.9.2	Rainscreen Wall Cladding	2				
5.1	**Envelope - Barriers**		**7**			
5.10.1	Air Barriers	4				
5.10.2	Vapor Retarders	3				

EMISSIONS			Maximum Points: 50	Y	N	?
6.1	**Heating**		**18**			
6.2	**Cooling**		**29**			
6.2.1	Use of New or Existing Cooling Equipment (informational only)	0				
6.2.2	Ozone-Depleting Potential	10				
6.2.3	Global Warming Potential	10				
6.2.4	Leak Detection	9				
6.3	**Janitorial Equipment**		**3**			

INDOOR ENVIRONMENT			Maximum Points: 160	Y	N	?
7.1	**Ventilation**		**37**			
7.1.1	Ventilation Air Quantity	11				
7.1.2	Air Exchange	8				
7.1.3	Ventilation Intakes and Exhausts	8				
7.1.4	CO2 Sensing and Ventilation Control Equipment	5				
7.1.5	Air Handling Equipment	5				
7.2	**Source Control and Measurement of Indoor Pollutants**		**46**			
7.2.1	Volatile Organic Compounds	10				
7.2.2	Leakage, Condensation and Humidity	8				
7.2.3	Access for HVAC Maintenance	4				
7.2.4	Carbon Monoxide Monitoring	4				
7.2.5	Wet Cooling Towers	2				
7.2.6	Domestic Hot Water Systems	2				
7.2.7	Humidification and Dehumidification Systems	3				
7.2.8	Pest and Contamination Control	3				
7.2.9	Other Indoor Pollutants (Tobacco, Radon)	8				
7.2.10	Ventilation and Physical Isolation for Specialized Activities	2				
7.3	**Lighting Design and Systems**		**30**			
7.3.1	Daylighting	17				
7.3.2	Lighting Design	13				
7.4	**Thermal Comfort**		**18**			
7.4.1	Thermal Comfort Strategies	12				
7.4.2	Thermal Comfort Design	6				
7.5	**Acoustic Comfort**		**29**			
7.5.1	Acoustic Comfort Design	18				
7.5.2	Mechanical, Plumbing, and Electrical	11				
	TOTAL:		**1000**			

Valuation of Green and High-Performance Property: Commercial, Multi-family, and Institutional Properties

Home Innovation RESEARCH LABS

NGBS Scoring for New Construction
ICC 700-2012 National Green Building Standard™

2012 Revised August 25, 2015 **This project has met all the SILVER requirements**

Project Name: Sample Project
Location: Dallas, TX

Bronze

Chapter	Required Points	Claimed Points	Additional Claimed Points Above Bronze	Point Shortfall	Mandatory Status
Chapter 5: Lot Design, Preparation, & Development	50	114	64		N/A
Chapter 6: Resource Efficiency	43	73	30		Met
Chapter 7: Energy Efficiency	30	62	32		Met
Chapter 8: Water Efficiency	25	62	37		N/A
Chapter 9: Indoor Environmental Quality	25	50	25		Met
Chapter 10: Operation, Maintenance, & Building Owner Education	8	17	9		Met
Section Totals	181	378	197	0	
Additional Points Above Bronze	50		197	0	
Total Points	231	378		0	

To achieve Bronze:

* Reach required Bronze score for each chapter	*This requirement has been met.*
* Reach required Additional Points for this project	*This requirement has been met.*
* Meet all mandatory items	*This requirement has been met.*
* For Chapter 7: Energy Efficiency:	
~ Claim at least 30 points from Section 702 (Performance Path) or Section 703 (Prescriptive Path) and select a minimum of 2 items from Section 704,	
OR	*You have met the Performance Path minimum points requirement.*
~ Choose the Alternative Bronze Compliance Path	*You have met the minimum 2 required items from Section 704.*

Silver

Chapter	Required Points	Claimed Points	Additional Claimed Points Above Silver	Point Shortfall	Mandatory Status
Chapter 5: Lot Design, Preparation, & Development	64	114	50		N/A
Chapter 6: Resource Efficiency	59	73	14		Met
Chapter 7: Energy Efficiency	60	62	2		Met
Chapter 8: Water Efficiency	39	62	23		N/A
Chapter 9: Indoor Environmental Quality	42	50	8		Met
Chapter 10: Operation, Maintenance, & Building Owner Education	10	17	7		Met
Section Totals	274	378	104	0	
Additional Points Above Silver	75		104	0	
Total Points	349	378		0	

To achieve Silver:

* Reach required Silver score for each chapter	*This requirement has been met.*
* Reach required Additional Points for this project	*This requirement has been met.*
* Meet all mandatory items	*This requirement has been met.*
* For Chapter 7: Energy Efficiency:	
~ Claim at least 30 points from Section 702 (Performance Path) or Section 703 (Prescriptive Path)	*You have met the Performance Path minimum points requirement.*
~ Select a minimum of 2 items from Section 704	*You have met the minimum 2 required items from Section 704.*

Gold

Chapter	Required Points	Claimed Points	Additional Claimed Points Above Gold	Point Shortfall	Mandatory Status
Chapter 5: Lot Design, Preparation, & Development	93	114	21		N/A
Chapter 6: Resource Efficiency	89	73		(16)	Met
Chapter 7: Energy Efficiency	80	62		(18)	Met
Chapter 8: Water Efficiency	67	62		(5)	N/A
Chapter 9: Indoor Environmental Quality	69	50		(19)	Met
Chapter 10: Operation, Maintenance, & Building Owner Education	11	17	6		Met
Section Totals	409	378	27	(58)	
Additional Points Above Gold	100		27	(73)	
Total Points	509	378		(131)	

To achieve Gold:

* Reach required Gold score for each chapter	*This requirement has not been met yet.*
* Reach required Additional Points for this project	*This requirement has not been met yet.*
* Meet all mandatory items	*This requirement has been met.*
* Meet the requirements of 801.5(1): High Efficiency or Waterless Toilets	*This requirement has been met.*
* For Chapter 7: Energy Efficiency:	
~ Claim at least 30 points from Section 702 (Performance Path) or Section 703 (Prescriptive Path)	*You have met the Performance Path minimum points requirement.*
~ Select a minimum of 2 items from Section 704	*You have met the minimum 2 required items from Section 704.*

Emerald

Chapter	Required Points	Claimed Points	Additional Claimed Points Above Emerald	Point Shortfall	Mandatory Status
Chapter 5: Lot Design, Preparation, & Development	121	114		(7)	N/A
Chapter 6: Resource Efficiency	119	73		(46)	Met
Chapter 7: Energy Efficiency	100	62		(38)	Met
Chapter 8: Water Efficiency	92	62		(30)	N/A
Chapter 9: Indoor Environmental Quality	97	50		(47)	Met
Chapter 10: Operation, Maintenance, & Building Owner Education	12	17	5		Met
Section Totals	541	378	5	(168)	
Additional Points Above Emerald	100		5	(95)	
Total Points	641	378		(263)	

To achieve Emerald:

* Reach required Emerald score for each chapter	*This requirement has not been met yet.*
* Reach required Additional Points for this project	*This requirement has not been met yet.*
* Meet all mandatory items	*This requirement has been met.*
* Meet the requirements of 801.5(1): High Efficiency or Waterless Toilets	*This requirement has been met.*
* For Chapter 7: Energy Efficiency:	
~ Claim at least 30 points from Section 702 (Performance Path)	*You have met the Performance Path minimum points requirement.*
~ Select a minimum of 2 items from Section 704	*You have met the minimum 2 required items from Section 704.*

Considerations with rating, standards, and certification programs include:

- Rating system name and version
- Date rating was initially completed and any subsequent follow-up dates
- Rating type
- Rating level
- Final scorecard, including credits achieved and total points

Appraisers should recognize that current green building rating programs are now typically voluntary, but the trend is to have buildings report performance, even if that reporting is not via an established rating system. Buildings may have one or more green attributes and an owner may still choose not to participate in any voluntary rating programs. Appraisers should recognize that some states, jurisdictions, and financing programs have effectively mandated building performance attributes via changes to their building codes or building safety laws and regulations. As previously stated, appraisers must gather the specifics on the subject property and consider appropriately as there are many levels of performance enhancement and no definitive rules of their value impact.

Therefore, the appraiser should determine and note whether a building attribute or system is included:

- Voluntarily in a building that does not participate in a rating system
- In a building that participates in a rating system
- Because it is required by law or regulation

The presence or absence in any combination of these circumstances may impact market value.

Ratings may not always reflect actual performance, as performance is influenced by factors not always considered by rating, and can change once the rating is determined. Direct performance metrics, such as recent energy per square foot, indoor air quality measurements, or water used per landscaped area are valuable to the appraiser irrespective of the presence or absence of a particular rating. Moreover, buildings may be highly green and have excellent performance metrics irrespective of whether or not they obtain an official rating.

In sum, appraisers must understand:

- The motivations of owners and the most probable buyers relative to these factors
- How green features impact the property's marketability
- How building performance impacts the market value of the property being appraised, regardless of the manner or mode in which it was incorporated into the subject property
- That buildings may be constructed and operated in a fashion consistent with a formal rating system, but not seek actual certification

Integrated Systems

Buildings with integrated design balance an array of systems to achieve enhanced bottom-line performance goals.[12] Integrated systems recognize the interconnection of the building water, energy, and other resources and balances them for efficiency. Building resource monitoring and control are a key parts of the building operation. Appraisers should confirm the presence of in-house data tracking and diagnostic systems that use sensors and information technologies to optimize historic and current performance.[13]

Recent commissioning indicates a building should be performing per its design intent; construction defects have been identified and potentially remedied, and on-site personnel have received supporting guidance and/

or training on proper system operations and maintenance. Conversely, a history of problems as evidenced by the building operator's tenant complaint logs or litigation filings serves to identify risk factors.

Successful green systems require a series of integrated design and operational decisions. These include upfront architectural and building siting decisions, appropriate glazing choices, and ongoing operational communication with lighting controls. Performance benefits are also integrated as exemplified by daylight harvesting and water-efficiency attributes. Harvested daylight reduces the need for powering electric lights and reduces air-conditioning requirements because of reduced heat generated by interior lighting equipment. Water demand is driven by building services, the efficiency of water fixtures, end-use heating and cooling equipment, and the extent to which water is either captured and/or reused on-site. Other factors include landscape design, irrigation techniques, and water controls.

With more integrated measures, assessments may be complicated and require the examination of utility billing histories, operating expense statements, or a whole building performance analysis. Appraisers should recognize that contribution of on-site energy generation to defraying energy expenditures is directly related to the overall building efficiency.

Indoor Environmental Quality

Green buildings often have attributes that positively impact indoor environmental quality (IEQ) and may also have a bearing on market value as health and wellness play larger roles in high-performance design.[14] Key considerations for an appraisal assignment will require the appraiser to:

- *Identify Relevant Factors:* Establish the applicability of moisture, thermal comfort, illumination, access to daylight, indoor air pollution, acoustics, and similar factors.[15]
- *Acquire Resources:* Request, as relevant to the assignment, indoor and outdoor pollution maps, blower-door tests, luminance levels, and duct-leakage tests. These and other relevant factors may be components of third-party reports.
- *Apply to Subject Property:* Investigate property characteristics, incorporating consideration of third-party reports, property records, and initial impressions of air quality, comfort, moisture, lighting adequacy, and ambient noise levels.[16] Certain attributes indicate the presence of likely benefits and include carbon dioxide sensors, low-emission building materials, and duct sealing. Lack of window shading, poor ventilation or improper venting of combustion-based appliances may indicate substandard IEQ conditions.

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[12] See APB Advisory #6: *Valuation of Green and High Performance Property: Background and Core Competency*, pages 13-14. Located at https://www.appraisalfoundation.org/imis/docs/Valuation_Advisory-6-Valuation_of_Green_and_High_Performance_Property-Background_and_Core_Competency_060215.pdf.

[13] Accenture, "Energy Smart Buildings: Demonstrating How Information Technology Can Cut Energy Use and Costs of Real Estate Portfolio," (2011): 44pp.

[14] Supporting information and checklists are available in the *Information Atlas*, located at https://sites.google.com/site/appraisinghpbuildings/key-topics/indoor-environmental-quality

[15] For further information, review the Indoor Air Quality Scientific Findings Resource Bank located at http://iaqscience.lbl.gov.

[16] A survey of 101 California buildings (including offices, public buildings, educational buildings, hospital, etc.) found the lowest satisfaction ratings for noise level (37 percent dissatisfied) and sound privacy (60 percent dissatisfied), indicating that acoustic conditions are very important for occupant satisfaction. See Moezzi, M., C. Hammer, J. Goins, and A. Meier. 2014. "Behavior strategies to reduce the gap between potential and actual savings in commercial buildings." Contract Number: 09-327. Sacramento, California Air Resources Board.

Monitoring Systems: Building Operations and Management

Building management systems are important for tracking energy and water consumption and supporting efficient building operations. System sophistication can vary from simple meters and more advanced smart meters, to intelligent system controls enabled by state-of-the-art data analytics. Appraisers are advised to ask about system monitoring and controls, particularly in the case of on-site power generation. If presented with building documents projecting energy savings, appraisers should request information on how savings are measured, tracked, and realized.

Sophisticated green buildings may employ web-based advanced real-time commissioning of building operations using sensors, software, and control devices, commonly referred to as the "Internet of Things" (IoT). The IoT refers to the evolving network of physical objects and devices with internet connectivity, which allows data communication and interaction indirectly between devices and systems and often without human intervention.

Utilizing this type of technology can result in lower energy, water, and risk as well as resource reduction, and even behavior changes because of the feedback loop created. Appraisers should investigate operational monitoring gaps to assess the risk that realized or projected efficiencies may not be recognized over time.

Historic or Modeled Energy Use? Consider Both

A property's energy use may be based on actual energy consumption or modeled energy use, and each approach brings advantages and drawbacks. There are advantages to using both, within their respective limitations.

Actual use might be above, below, or at the typical market level based on use, occupancy, building design, and the weather. Its accuracy could be impacted by access (or lack of it) to accurate utility/consumption records.

Modeled energy use for an existing installation or one that is proposed can provide a preferred middle-of-the-road hypothetical user energy level based on stipulated operating conditions. Modeling software is sophisticated but needs valid inputs and skilled software operators to be accurate for appraisal use, particularly with complex and multi-use property. With energy modeling, the appraiser must understand the model assumptions and also consider, as appropriate, historic subject data based on the subject's actual use.

Whole building energy ratings can be particularly complex to interpret in leased buildings where tenant data is not readily available. The appraisal report should discuss the basis (historic, modeled, projected, whole building, or combination) for the energy/resource consumption estimates used in the valuation analysis.

Benchmarking and Transparency Policies

Many building owners in the United States and Canada commonly use the EPA ENERGY STAR Portfolio Manager® online assessment tool to benchmark energy and water consumption. The tool is applicable to most, but not all, property types. Many jurisdictions have benchmarking and transparency policies (see Figure 4) that require certain buildings to track and report their energy and water use annually or at time of sale or lease, and are often tied to EPA ENERGY STAR Portfolio Manager®.[17]

Buildings with ENERGY STAR® certifications or public disclosures will have a Statement of Energy Performance (SEP) report. It is best practice to request a SEP report or similar documentation from the property owner.

The DOE Building Technology Office supports development (and evolution) of the Standard Energy Efficiency Data (SEED) Platform, a software application that helps public agencies and other organizations easily manage standardized energy performance data on large groups of buildings.[18] Users can combine data from multiple sources, clean and validate it, and share the information with others. The software application provides an easy, flexible, and cost-effective method to improve the quality and availability of data to help demonstrate the economic and environmental benefits of energy efficiency, implement programs, and target investment activity.

One challenge historically facing appraisers is lack of standardized definitions. This challenge is being addressed by the US DOE via the Building Energy Data Exchange Specification (BEDES), which is a dictionary of terms and definitions commonly used in tools and activities that help stakeholders make energy investment decisions, track building performance, and implement energy-efficient policies and programs.[19] An ecosystem of BEDES-compliant software is facilitating the exchange of information on building characteristics and energy use, acting as a key between dissimilar platforms. BEDES is also the basis of the Building Performance Database (BPD), a benchmarking tool containing nearly one million commercial, multi-family, and single-family residential buildings.[20]

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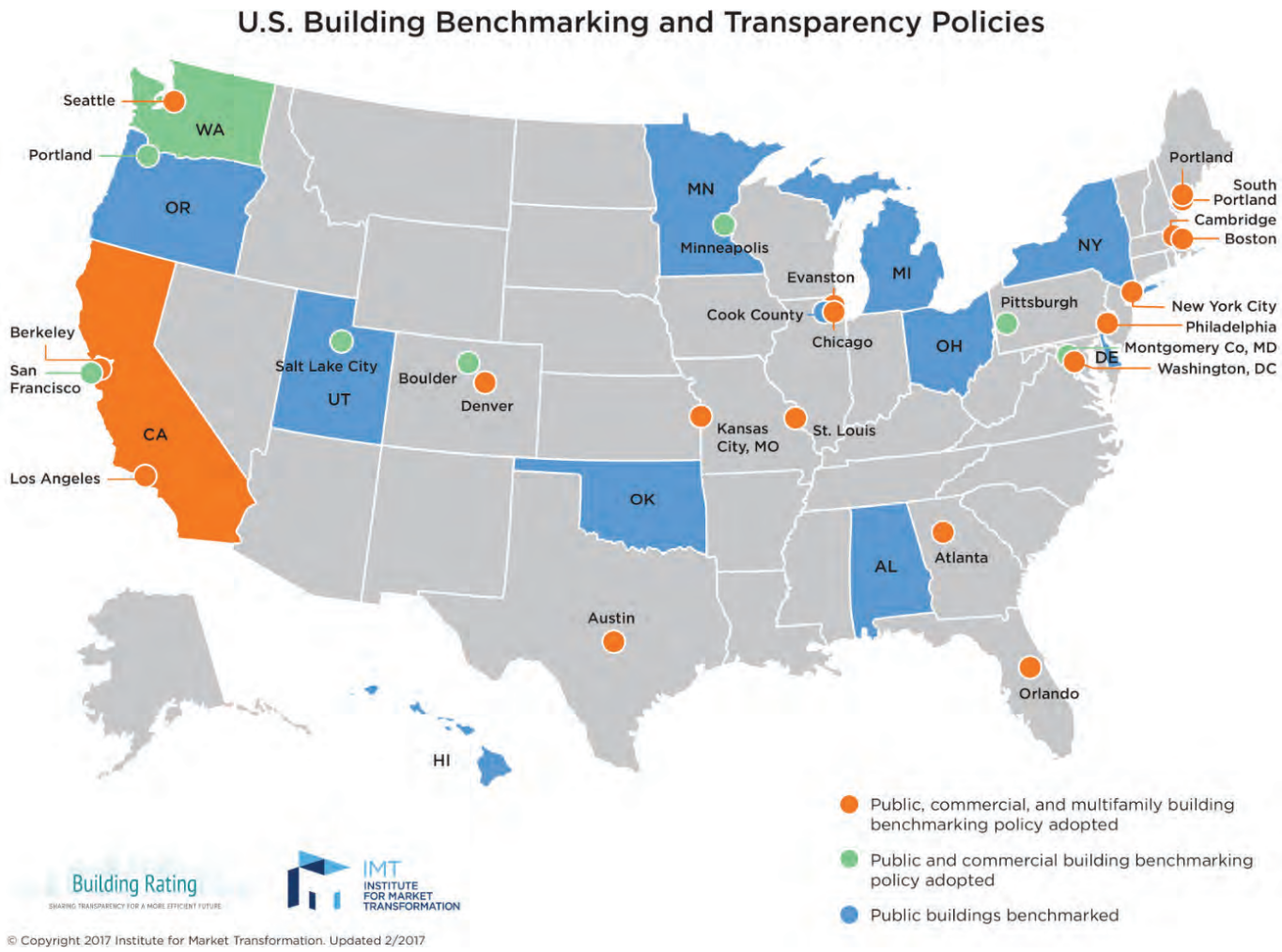
17 Current maps and other supporting information are available in the *Information Atlas*, https://sites.google.com/site/appraisinghpbuildings/key-topics/disclosure-1

18 See https://www.energy.gov/eere/buildings/standard-energy-efficiency-data-seed-platform-homepage-screenshot

19 See https://bedes.lbl.gov

20 See https://bpd.lbl.gov

Figure 4: US Building Benchmarking and Transparency Policies as of February 2017[21]



By the end of 2016, nineteen cities, one county, the District of Columbia, and eleven states enacted benchmarking laws, which cover approximately seven billion square feet of floor space in the private sector.

Walk Score / Transit Score

Proximity to retail shopping, restaurants, schools, and other amenities may impact real estate value and loan default risk.[22] Walk Score® analyzes pedestrian friendliness by proximity and access to services. Transit Score® measures public transit availability. Appraisers can reference these measures in the location quality discussion as attractions to occupants who do not want to own a car or who want to reduce car use. These considerations could also have longer-term implications for parking ratios, as well as overall marketability.

Building Plans and Specifications

Building plans and specifications document design and equipment attributes that may impact the valuation analysis. Appraisers should note atypical attributes and ask for additional information about how these at-

tributes contribute to improved property performance and/or operating cost reductions, thus potentially impacting value. Building performance enhancements may include conservation (insulation, windows, etc.), building management sensors and software, and distributed energy generation (solar, fuel cell, batteries, etc.). It is important to consult as-built drawings, as green features are often cut from initial designs prior to construction as a cost-saving measure.

Existing Agreements

Existing agreements that influence the provisions of building performance and/or operations represent a potential source of value (as well as a contractual obligation) that may affect the subject property's projected cash flow. Typical contractual agreements include: equipment leases, service agreements (e.g., shared savings agreements through energy service companies), power purchase agreements (PPAs), financial incentives/rebates, and preferential financing agreements. In addition, demand response contracts create the opportunity for buildings to participate in electric load curtailment or shifting practices in exchange for financial incentives, or tariffs predicated on delivering electricity to the grid. Clauses may also exist within tenant "green leases" that cover expense saving allocations and equipment upgrade investment recoveries. Leases can also craft understandings between landlords and tenants to engage the building occupants' behavior about resource efficiency, consumption feedback, recycling, and other activities that benefit both the tenant and building owner. The ENERGY STAR® designation called "Tenant Star," when released, will grade highly efficient rented spaces.

PPAs are contracts involving the delivery of electricity produced by a third party to a specific property, and they often include tax credits. On-site energy production such as co-generation/combined heat and power (CHP) or solar can involve PPAs. This can increase or decrease the property value as these agreements influence cash flow, but may have lock-in provisions that limit the ability of an owner to exit the agreement.

An appraiser should examine these contracts to determine how the terms and conditions affect the amount and durability of net income for the subject property. Benefits derived from agreements often have cash flow risk different than rents, a factor that must be considered carefully. If there is a change in the agreement upon sale of the subject building, an appraiser should determine the appropriate impact on the current market value.

Third-Party Expert Reports

Reports prepared by third-party experts (such as an energy audit) can help the owner and the appraiser identify, define the impact of, and establish a framework for understanding green building attributes. These documents can facilitate data collection, data accuracy, and a more competent and thorough valuation analysis.[23] An appraiser should request a list of green project team members and firms, identify roles and specialization, and contact those who may be knowledgeable about the building attributes. Individuals with specialized building knowledge may include in-house engineers or staff, facilities managers with access to complaint and repair logs, or even specialized outside consultants like industrial hygienists or commissioning agents.

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[21] US City Building Benchmarking map: http://www.imt.org/resources/detail/map-u.s.-building-benchmarking-policies

[22] "Walk Score and Multi-Family Loan Default Risk", Gary Pivo, Univ. of AZ: https://www.walkscore.com/professional/research.php

[23] Institute for Market Transformation and the Appraisal Institute, "High-Performance Buildings and Property Value," (2015).

Qualified parties may have professional designations from a variety of professional organizations that are listed in the Information Atlas. A partial list of possible building performance specialist designations includes the Association of Energy Engineers Certified Energy Manager, NGBS Verifier (Home Innovation Research Labs), LEED AP® from the US Green Building Council Building Performance Institute (BPI) professional certification, the International Facilities Management Association (IFMA) Sustainability Facility Professional® credential, Institute of Real Estate Management (IREM), Green Building Initiative Green Globes Assessor (GGA) and the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) Building Energy Assessment Professional, among others (see Green Stakeholder Resource Guide).

Qualified parties may have professional designations that indicate expertise in design, engineering, operations and maintenance, energy audit and analysis, and/or other areas relevant to high-performance property. Each professional designation often has subcategories by property type/use or resource consumption niche (e.g., water, electricity, gas, HVAC, air quality, etc.). The appraiser should verify that the expertise required is appropriate for the assignment.

Due Diligence Documentation

Property Condition Assessment

Property Condition Assessments (PCAs) are highly technical engineering-based due diligence reports that are often completed by a trained examiner (often an engineer) during the financing process or with a change in ownership. The PCA is a general building condition document that may contain references to green/high-performance features or be a compliment to specific energy performance reports. It is often created in conjunction with another American Society of Testing and Materials (ASTM) standard, the Phase I Environmental Site Assessment.[24] A standard PCA covers ten major categories, including site-specific aspects, building envelope and structure, major operating systems, and other relevant criteria. These should ideally be completed within the twelve months prior to the valuation assignment, and should be requested and reviewed by the appraiser. The ASTM PCA E2018-15 standard references the Building Energy Performance Assessment (BEPA) Standard E2797-15, which covers energy factors. Lenders could request PCAs that can include this information.

Fannie Mae Green Financing underwriting guidelines recognize the PCA, High-Performance Building Module (HPBM), which can be used in conjunction with an ASHRAE Level II Investment audit.

Energy Audits

Appraisers should request and carefully review relevant past and current energy audits. Energy audits span a wide range of complexity and rigor.[25]

- ASHRAE Level I Audit: Typically a quick assessment identifying major system challenges and potential cost savings opportunities.
- ASHRAE Level II Audit: A comprehensive operational analysis including investment cost and energy savings expected to result from recommended operational and capital improvement measures, along with health and safety recommendations.
  [ASHRAE Standard 211P will update the ASHRAE energy audit standards]
- ASTM Building Energy Performance Assessment: Designed to identify building energy performance in connection with a commercial property involved in a real estate transaction.[26]

Commissioning Reports

Building commissioning is a quality assurance process designed to ensure that buildings are constructed and operated in-line with the design intent.[27] The practice is most typically applied to commercial and institutional buildings. A major study by Lawrence Berkeley National Laboratory shows that whole-building energy use is reduced by over 15 percent on average when energy-related defects are corrected.[28] Moreover, commissioning often also achieves ancillary benefits such as improvement of indoor environmental quality and equipment longevity.

Building commissioning reports are particularly valuable as they are typically forensic in nature and span a wide range of issues, including equipment condition and deficiencies, indoor environmental quality issues, operational recommendations, and efficiency improvement opportunities. While conventional buildings may appropriately be the subject of a commissioning study to ensure that their constructed performance equals their planned performance, commissioning has also become strongly linked to the best practices associated with green buildings. These studies can also offer valuable insight into a building's operational risk profile.

Accuracy and Quality

Appraisers should review the qualifications of the persons preparing building performance studies or reports. It is common, and in some states required, that reports be prepared by licensed professional engineers or architects. If the building is an ENERGY STAR® labeled property, a "Verifying Professional" will sign and stamp the SEP report attesting to data validity.[29] Certifications are often date-stamped and should be kept current by the owner.

Following inspection of these and other source documents, appraisers should be able to determine the scope and credibility of the report, assess the relevance to the valuation assignment, and apply the information towards understanding the capabilities of the subject property (including any specific income and/or operating expense impacts).

To meet competency requirements, appraisers need not obtain a detailed technical understanding of the complex system-specific elements underlying each report; instead they must determine relevance and applicability to the valuation assignment.

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[24] See ASTM E2018-08 *Standard Guide for Property Condition Assessments: Baseline Property Condition Assessment Process*, available for purchase at http://www.astm.org/Standards/E2018.htm; ASTM E1527-13 *Standard Practice for Environmental Site Assessments: Phase I Environmental Assessment Process*, available for purchase at http://www.astm.org/Standards/E1527.htm; and ASTM E2797 *Standard Practice for Building Energy Performance Assessment for a Building Involved in a Real Estate Transaction*, available for purchase at http://www.astm.org/Standards/E2797.htm.

[25] See *A Guide to Energy Audits* (Pacific Northwest National Laboratory and Portland Energy Conservation, Inc.: September 2011), located at http://www.pnnl.gov/main/publications/external/technical_reports/pnnl-20956.pdf, and *Procedures for Commercial Building*.

[26] See ASTM E2797-15 *Standard Practice for Building Energy Performance Assessment for a Building Involved in a Real Estate Transaction*, available for purchase at http://www.astm.org/Standards/E2797.htm.

[27] For more on quality assurance, see https://sites.google.com/site/appraisinghpbuildings/key-topics/quality-assurance.

[28] Mills, E. 2011. "Building Commissioning: A Golden Opportunity for Reducing Energy Costs and Greenhouse Gas Emissions in the United States." Energy Efficiency, 4(2):145-173
Parrish, K et al "Improving Energy Efficiency through Commissioning: Getting Started"LBNL-6495E 10/2013

[29] Sample ENERGY STAR® reports can be viewed here: https://www.energystar.gov/buildings/facility-owners-and-managers/existing-buildings/use-portfolio-manager/verify-and-document/sample. Additionally, a database of rated buildings is maintained here: https://www.energystar.gov/index.cfm?fuseaction=labeled_buildings.locator.

The final appraised value may rely on multiple third-party reports that were created as part of the high-performance design or created to document post-construction performance. These reports support the valuation analysis, and the appraisal report must include typical citations and disclosures referencing them. For assignments that require a very high degree of confidence, utilizing outside experts to review existing third-party reports may be necessary.

Information

Appraisal assignments for both conventional and green buildings usually include standard practices for gathering supporting documentation and information.[30] Examples of documents are leases, purchase contracts, and equipment warranties, whereas information may be obtained through interviews with owners, tenants, brokers, or other real estate professionals. Appraisers should clearly specify that due diligence for a green building assignment should include information and documentation about:

- The subject property's high-performance attributes, such as third-party reports on green building certifications;
- Energy performance benchmarks and existing agreements; and
- All existing leases, operating records, other property information, and equipment warranties. For example, the warranty for a solar installation generally indicates its useful life; thus it has become a best practice to request equipment warranties. In some instances, such as utilization of the PV Value® software tool, warranty details impact the installation's value calculations and conclusion. This makes warranties a critical component in the valuation process, and not merely a best practice.

Third-party reports like ASHRAE audits, Green Globes GGA Inspection Report or Distributed Energy Resource (DER) purchase contracts can be a significant information source for valuation analysis. These reports may provide insight into building energy performance, indoor environmental air quality, peak load power reduction, landscape water efficiency, on-site power generation, and other green building attributes that may impact value.

Expert reports may contain useful utility billing histories as well as financial analysis or performance projections applicable to specific elements of the valuation process. Specialized expert reports include engineering studies, design specifications, building commissioning reports, energy audits, and third-party documentation of a green building rating. Specialized assessments may have been reported by lighting designers, indoor air quality inspectors, or energy service companies. Appraisers should also note that the local utility may have evaluated the property and/or financed energy- or water-saving upgrades. Documentation of this type of utility transaction is generally on file with the owner.

Property History Summary

Owner Communication

Effective communication between the appraiser and the building owner or manager is important to ensure the preparation of a reliable valuation analysis and report. When authorizing a valuation assignment, owners typically seek a well-documented and reliable appraisal analysis and report by a competent valuation professional to appropriately interpret the subject property's characteristics and competitive profile in the context of local market conditions.

Owners should be aware that the information they are asked to provide for a green building appraisal may be more extensive than the information they are accustomed to providing for a conventional building. Building owners should provide timely delivery of detailed property information including rent rolls, lease abstracts, copies of full leases with green lease clauses, third-party reports and who prepared them, warranty information, maintenance logs, capital expenditure receipts, and other relevant documents. Property owners are often asked to summarize special building attributes, describe equipment upgrades and other attributes, and provide the appraiser with supporting documentation.

Specific examples of such documentation include monthly energy consumption data from ENERGY STAR Portfolio Manager®, the final scorecard and specific documentation underlying one or more building energy performance certifications, demand response contract terms, documentation of indoor air quality tests, improvements made during commissioning, equipment warranties, and other supporting evidence.

Owners or managers of green buildings should compile the above information and communicate it to each prospective lender and the appraiser to whom the work is assigned. The owner or manager should be encouraged to transmit this information with a cover letter that: 1) identifies the property as a green building; 2) details how specific attributes may impact building performance; and 3) states the expectation that the appraiser have competence in the valuation of green buildings.

[30] See *Information Atlas*: https://sites.google.com/site/appraisinghpbuildings/valuation/valuation-techniques.

Section IV: Identifying Green Features – The Property Description

There is no single set of attributes that defines a green building. These properties exist along a wide continuum, ranging from buildings achieving incremental improvement over standard professional practice to "zero net energy" (ZNE) or even net energy positive buildings, which are buildings that produce as much or more energy as they use during a 12-month period. Excess energy might be used for electric car charging (an economic advantage).

The appraisal should consider the potential for green buildings to create value in several broad categories including operating expense reduction, market demand enhancement, and investment risk reduction.

The Appraisal Institute's *Commercial Green and Energy-Efficient Buildings Addendum* is a tool designed to help appraisers capture descriptive green asset building attributes and performance-related information.[31] The checklist form is an excellent tool that a property owner can deliver to a banker to ensure the appraiser has a complete list of the green building features implemented. The form is only a summary and does no property valuation analysis, but it is designed to provide the requisite data for the popular solar PV Value software.

Key Attributes and Systems

Multiple physical attributes contribute to building performance, and can be best categorized by "supply-side" and "demand-side" areas. Supply considerations include resource type and the specific use within a building. Self-generated solar electricity, fuel cell or other type of distributed energy resource, water reuse or rainwater catchment, materials reuse, and waste reduction impact resource use and thereby can reduce demand for central utility generation or disposal facilities. Demand drivers include building use, resource requirements, and efficiency metrics to fulfill tenant requirements for energy, water, or other material inputs.

Attributes important to energy management include the building envelope, insulation and window efficiencies, thermal comfort and climate control systems, and specialized components particular to the use type (e.g., food preparation equipment, pools, and data centers). Each building type and tenant use may have specialized equipment operating over a wide range of efficiencies.

The Institute for Market Transformation and the Appraisal Institute published a guide that can help appraisers when making complex assessments of building systems.[32] The guide:

1. **Explains the basic categories of energy-efficiency measures** in buildings, and the specific sectors in which certain measure types are most important;
2. **Advises how to identify and compare energy-performance levels of specific building materials** and components; and
3. **Identifies specific information sources** with more detailed information on how measure types affect energy consumption and energy costs.

The appraiser should be able to differentiate between the utility and productivity of any single attribute or group of attributes in the context of *value in use* (value for a specific use and/or in combination with other assets; not necessarily the highest and best use) versus *value in exchange* (i.e., market value).

Functional Utility

Functional utility is the ability of a building to be useful and to perform the function for which it was intended. The design intent of green buildings almost invariably leads to increased functional utility and design flexibility, insofar as such buildings are intended to cost less to operate, provide more comfortable places to work, have greater adaptability, be more durable and disaster resilient, and have fewer operational problems. Given the variety of green design options, appraisers could interview the building's most pertinent related architects, engineers, owners, project managers, professionals with an applicable accreditation, green building consultants, and other related professionals to understand the anticipated benefits, realized benefits, and the spectrum of the attributes included.[33]

Obsolescence - Functional and/or External[34]

Functional

Functional obsolescence can be caused by the absence of an item that is common and expected in a building. Functional obsolescence can also be caused by a superadequacy, which is an existing property component that exceeds the current market requirements. A superadequacy represents a cost without a corresponding increment in value.

A building also qualifies as having functional obsolescence when new inventions, changes in design, or improved processes for production might render certain preceding attributes obsolete, thereby causing impairment to desirability and usefulness. There are many components of conventionally built buildings that eventually will fall into this category as green buildings become more prevalent in the market. Examples may include zonal control of lighting and thermal comfort systems, energy management and automation systems, multi-pane glazing, energy submetering, etc.

External

External obsolescence refers to a temporary or permanent impairment of a property's utility or marketability due to negative influences outside the property line. Two examples in the case of green buildings include: 1) a change in market conditions that renders traditionally constructed buildings obsolete; or (2) impairment of light, views, or solar access by an adjacent property (this example is not exclusive to green buildings). External obsolescence should always be considered in the valuation, but is infrequently the result of a property's green features alone. To the extent that green building buyers expect good indoor air quality and durability/resilience, proximity sources of air pollution or natural hazards can also contribute to external obsolescence.

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[31] See http://www.appraisalinstitute.org/assets/1/29/AI_821_Green_Commercial_Interactive.pdf

[32] Institute for Market Transformation and the Appraisal Institute, "Recognition of Energy Costs and Energy Performance in Real Property Valuation," 2nd ed. (May 2012), http://www.imt.org/resources/detail/recognition-of-energy-costs-and-energy-performance.

[33] Sandra K. Adomatis, "The Challenges of Valuing Green," The Appraisal Journal (Winter 2015): 28.

[34] Appraisal Institute, *The Appraisal of Real Estate*, 14th ed. (Chicago: Appraisal Institute, 2013): 623-638.

Curable or Incurable Obsolescence

- Curable functional obsolescence may be caused by a deficiency that can be mitigated by the addition of a new item (e.g., add insulation) or a deficiency that requires replacement of an existing item (e.g., replacing aged HVAC with high-efficiency system). Curable functional obsolescence caused by a superadequacy can only be cured if the item(s) causing the superadequacy can be removed, its costs reduced, or its contributory value increased.
- Incurable functional obsolescence is caused by a deficiency that is not economically feasible or within the power of the property owner to correct. When assessing the functional utility of a high-performance attribute, a cost/benefit analysis is required. For instance, if it costs $100,000 to incorporate the attribute, yet the analysis indicates that it only adds $25,000 to building value, the appraiser may need to address the existence of functional obsolescence. In this example, the attribute may be an over-improvement or superadequacy.

The difference between the cost and the market value contribution of a particular attribute illustrates functional obsolescence recognized in the cost approach.[35] In the sales comparison approach, adjustments are made to comparable data to account for obsolescence characteristics. The income approach will recognize an obsolescence via adjustments to capitalization of the net operating income (NOI).

Some design elements that were superadequate when they were originally constructed may become standard items as market demands evolve. Examples of market evolution may be the prevalence or increased utilization of certain elements such as on-site energy generation and storage, premium-efficient equipment, rainwater catchment, or advanced HVAC control systems. Appraisers need to know the subject's local market and understand which green elements may be considered innovative and which would be considered superadequate as of the effective date of value.

Examples of potential functional and/or external obsolescence include:

Incurable

- **Solar Degradation/Orientation:** The building rooftop is shadowed by a tower on the subject property and effective solar photovoltaic (PV) cannot be installed. The inability to reduce energy costs or sell energy back to the grid presents an opportunity cost.[36]
- **Existing Design:** The existing building design is such that it physically limits or economically inhibits a future green upgrade.
- **Obsolete Plans:** In a market that favors green properties, plans and specifications created under older technologies may be obsolete and have little to no value.

Curable

- **Market Advances:** The subject property's comparables have more green attributes than the subject. Appraisers should determine which attributes, if any, can be physically added to the subject property, and then determine if the added value exceeds the cost.
- **Opportunity Costs:** Does the local market recognize green attributes that could impact the overall design and construction costs? For example, a building in a colder climate that has single-pane windows could be located in a market where most buildings have higher performing windows (e.g., double or triple pane).
- **High-Maintenance Features:** Water-intensive landscaping that may be prohibitively costly to maintain and/or vulnerable to loss during water rationing.

Property and Ownership Types Matter

This Advisory intends to address building performance valuation for the most common building types that are not single-unit homes or 1-4 unit structures. That mission encompasses a vast universe of property types, uses, and ownerships but due to publication limits some building/ownerships issues cannot be fully addressed in this Advisory. Some property groups have unique characteristics requiring particular competency.

Multi-family (5+ unit) Property

Multi-family buildings (5+ units) are a good example of the many different property types that the appraiser must consider. A partial list of multi-family housing/apartment building types include market rate units, government and tax credit assisted projects, student housing, and medical assisted living. Resources/utilities might be individually or master metered. Ownership might be a national portfolio or a local "mom and pop."

Financing can dramatically impact value. A number of programs, including those offered by Fannie Mae and Freddie Mac for multi-family sector debt, have financing options that recognize high-performance features. In exchange for higher building performance and operational reporting, these financing programs offer lower interest rates and higher leverage. This improved monitoring and reporting documentation requirement should provide more accurate valuations for owners, buyers, and appraisers. When this operational scrutiny becomes commonplace, it has the potential to impact reporting expectations for all buildings, not just those with Fannie/Freddie financing.

One Size Does Not Fit All - Nuances of Ownership, Building Use, and Size

In addition to the nuanced valuation impacts shown above that are particular to multi-family property, variations in green design and value analysis exist within established real estate subdivisions by ownership group, building use, and building size. Recognizing already existing divisions within real estate, expertise in one area does not imply competence in others—rules are not universal. The list below shows major divisions within the real estate industry, but there are many more niches under each group shown that might impact the analysis.

Ownership Types:

Large portfolio/REIT, Local investor, Owner user, Public sector

Use Types:

Office, Retail, Mixed-use, Industrial, Special purpose, Hospitals, Municipal/public sector, Schools

Building Size (sizes are arbitrary, for reference only):

Tiny - under 5,000 SF, Very Small to Small - 5,000 to 50,000 SF, Medium - 50,000 to 100,000 SF, Large - 100,000 to 250,000 SF, Very Large - 250,000+ SF

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[35] See pages 625-26 of *The Appraisal of Real Estate*, 14th ed. for examples of how to calculate curable and incurable functional obsolescence caused by superadequacy as well as other examples of functional and external obsolescence calculations.

[36] See energy analysis, rating, and benchmarking tools listed in the *Information Atlas*, https://sites.google.com/site/appraisinghpbuildings/key-topics/rating-systems

These distinctions are relevant in the context of green buildings. For example: public-owned buildings are often subject to different energy codes than private ones; hospitals have specific types of air-management systems that require unique energy efficiency strategies; and the scale of a building often influences the costs and cost-effectiveness of various types of green strategies. In-depth analysis of use and size nuances are beyond the scope of this Advisory, although the basic concepts presented here should give the appraiser or real estate professional a better lens to focus on any high-performance building valuation analysis. This illustrates why competency is critical to achieving an acceptable assessment.

Section V: Market Research and Analysis

High-performance appraisal assignments provide unique opportunities to segment and refine market data analysis techniques by incorporating green building attributes, operating metrics performance, market trends, and tenant and investor preferences that may affect observed and projected market behavior.[37] Appraisers are advised to research local market conditions and incorporate detailed and refined market analyses into the assignment.

Market Data

General data includes information on the economic, governmental/regulatory, environmental, and social factors that affect property value. The presence of green building attributes in the subject property can impact the market analysis as an appraiser considers topics such as:

Economic Conditions: These include preferences among tenants seeking high-performance space, including the magnitude of occupancy cost differentials; energy price volatility; planned or actual utility rate increases; property tax rate differentials; prevailing range and central tendencies of energy and resource use in the building stock; availability of experienced and qualified building design and operations professionals; and the potential to realize indirect economic benefits such as improved health and wellness, productivity, and stakeholder goodwill.

Governmental and Regulatory Conditions: Relevant regulations and government activities include building code updates and advances, policy mandates for green building certification, energy benchmarking, and disclosure laws. Additional conditions that can impact value include stormwater management requirements; projected infrastructure capital spending to establish, enhance, or improve community sustainability-oriented facilities; and other regulations, incentives, or capital investment requirements affecting short- and long-term real estate market dynamics. Regulations about utility grid interconnection of on-site power, smart metering, energy and water tariff design, net metering, and control of energy use data are additional government conditions that can impact value analysis.

Environmental Conditions: Examples include aspects of weather and climate change, such as influences of prevailing weather on heating and cooling costs, increased droughts affecting potable water availability and price, increased storm severity affecting stormwater discharge rate and quantity, and local events such as heat waves or power outages. Regulations to reduce construction waste discharge, untreated stormwater discharge, and site design standards or incentives are additional examples of environmentally oriented data.

Local and Regional Social Attitudes: This encompasses practices, policies, and preferences for environmentally sensitive community objectives, green buildings (business and/or government), community stakeholder engagement patterns, and the market's apparent interest in, and preference for, environmental improvement.

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[37] Various sources of market data are available in the *Information Atlas*, https://sites.google.com/site/appraisinghpbuildings/market-data.

Green Building Market Size

Market familiarity with green buildings is localized and can vary with numerous factors, including buyer awareness, seller sophistication, tenant demand, and design and construction capabilities. The collective experience of those professions, services, and industries involved in the design, construction, and delivery of green buildings impact market valuation of green attributes. As the number of green buildings continues to grow, the expansion of this property type will become evident in more and more markets across the United States.

Table 1 presents market penetration rates for a sample of leading green building programs and market data repositories. As appraisers evaluate local and regional conditions, they should recognize and interpret market adoption and growth rates in the context of both the subject property's high-performance attributes and its highest and best use.

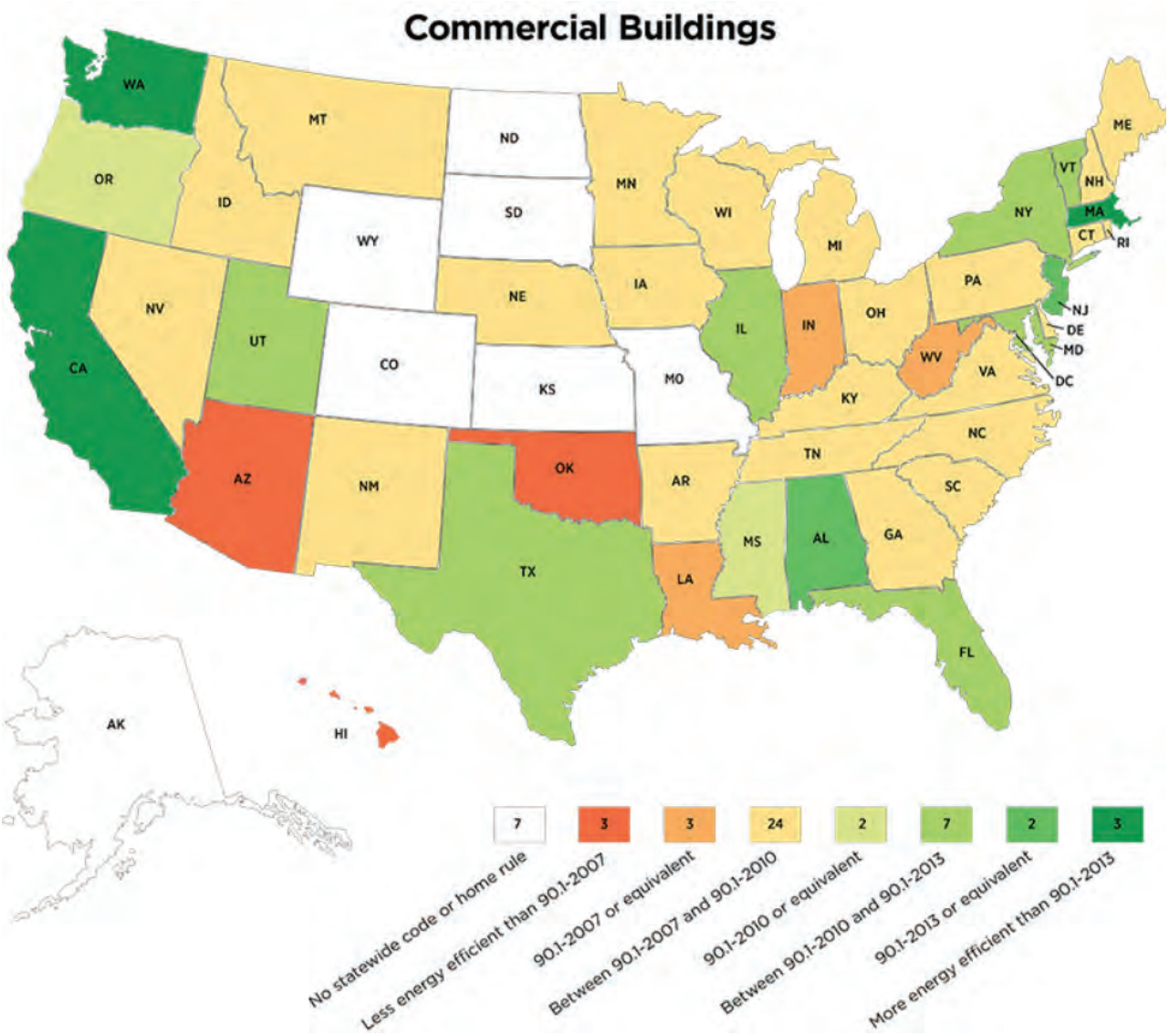
Table 1. Indicators of green and high-performance building market penetration for various voluntary programs (not an all-inclusive list and data can change over time).

Data Source	Type	Market Estimates [3Q16]
US Environmental Protection Agency	ENERGY STAR®	400,000 buildings analyzed with Portfolio Manager (40 percent of total US non-residential floor area) 33,000 buildings are certified as scoring 75 or higher (4 percent of total US floor area)
CBRE, Inc.	National Green Building Adoption Index	The National Green Building Adoption Index covers the top 30 largest US real estate markets and currently includes 34,000 office buildings
Green Business Certification Inc.	GBIG	The GBIG data platform tracks 150,000+ building certifications across dozens of worldwide rating systems
US DOE	Commercial Building Energy Asset Score	This US DOE project maintains data for 952 buildings (124 million SF)
Green Building Initiative	Green Globes / Guiding Principles Compliance	Over 1,500 projects achieved a Green Globes rating and/or Guiding Principles Compliance
US Green Building Council®	LEED®	131,400 certified housing units 38,600+ certified commercial projects
Home Innovation Lab	National Green Building Standards	Over 150,000+ residential units (homes and multi-family) certified

Appraisers should note that newly constructed green buildings may be subject to more stringent local building codes, zoning regulations, and/or green building policies. Depending on the jurisdiction (Figure 5), this may influence the economic and functional obsolescence considerations of comparable and competitive properties.

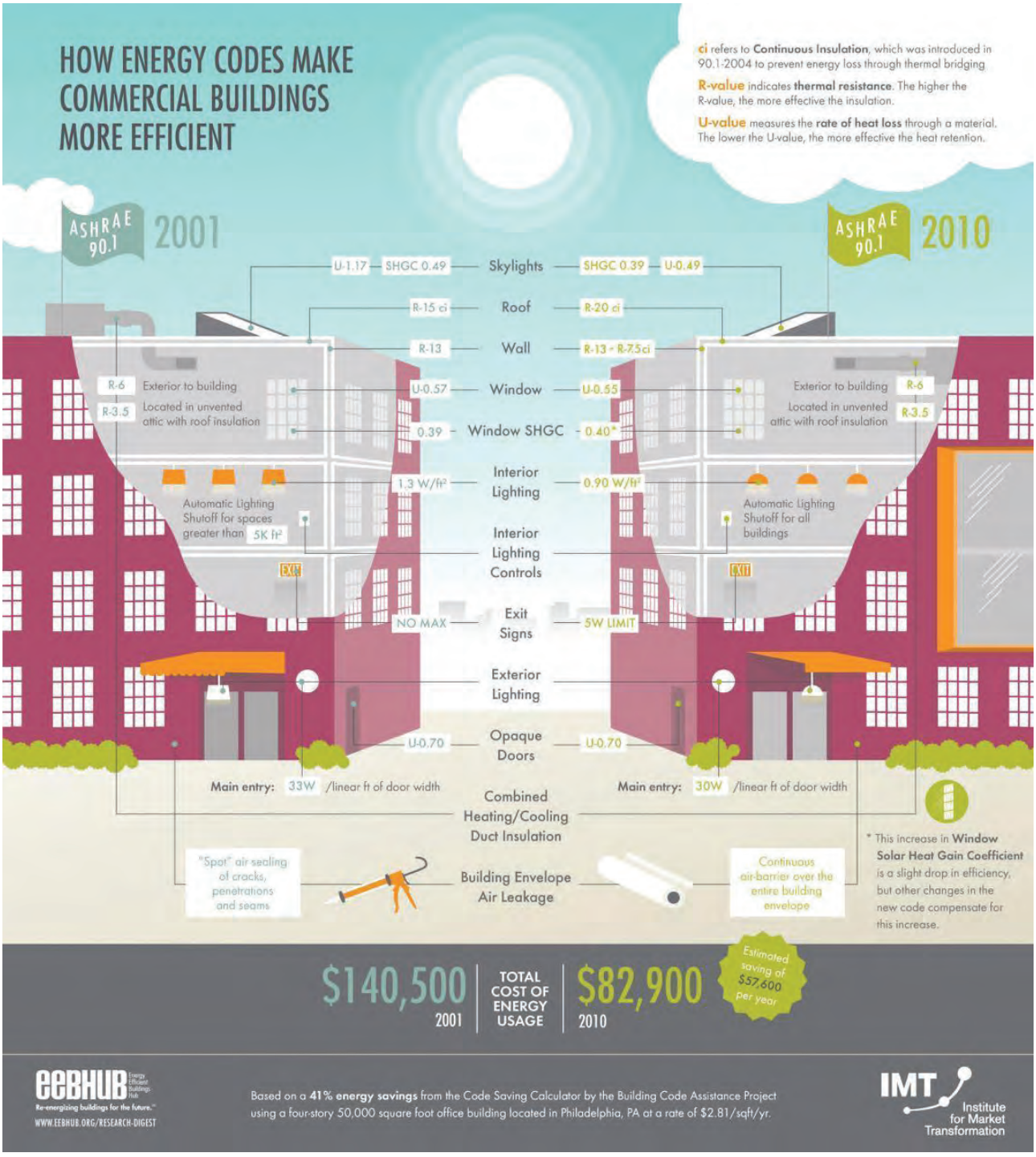
New green buildings in certain markets may enjoy economic incentives including expedited permitting, Floor Area Ratio (FAR) density bonuses, and/or property tax reductions. Green buildings may incorporate design elements, building systems, advanced technology, and/or sophisticated operating protocols that materially differ from conventional building comparables that are available for the appraiser. Appraisers should be prepared to address and adjust for these factors in the context of local market conditions.

Figure 5: Status of State Energy Code Adoption, per US Department of Energy, https://www.energycodes.gov/status-state-energy-code-adoption



Some energy code compliance pathways are articulated in terms of performance (e.g., modeled energy use per square foot per year, energy use intensity [EUI]), while others are "prescriptive" (e.g., calling for specific attributes or efficiencies). See Figure 6.

Figure 6: Example of ASHRAE Standard 90.1 prescriptive energy code compliance pathway. Note that this code was updated in 2013.[38]



Valuation of Green and High-Performance Property: Commercial, Multi-family, and Institutional Properties

Market Size Differentials

Appraisers may encounter data that indicates different market conditions can exist based on market size. Market competition in major metropolitan areas is often characterized by a combination of tenant demand, capital preferences/access, and greater competitive pressures. Green buildings can provide differentiation for a new project, giving rise to head-to-head competition among high-performance buildings. Many smaller markets, by contrast, have yet to experience market conditions with a sufficient number of green buildings to create direct competition with one another.

Large Metropolitan Markets

Many major metropolitan markets maintain business clusters attractive to large corporate tenants and institutional investors. These metro areas represent an active marketplace for green buildings, which often include tenants who prefer leasing high-performance buildings, investors who purchase these buildings, and policymakers who incentivize best professional practices. Large municipalities frequently provide an array of incentives or mandates to encourage the development of high-performance buildings, or the retrofit and renovation of older buildings with green systems and attributes. Energy benchmarking and disclosure ordinances occur primarily in these types of larger markets.

In major markets, appraisers are more likely to find sufficient green market data (such as income rates, operating expenses, construction costs, sales prices, and possibly cap rates), thereby making completion of a green appraisal assignment more similar to completion of a conventional building valuation assignment. It is incumbent on the appraiser to appropriately select comparables based on the presence/absence of similar green attributes, location attributes, and market positioning to adequately account for rental rate, space absorption, operating expenses, and sales price differentials.

Small Markets

In smaller markets, the appraiser may find the subject property among a select group of newer, more innovative green buildings. Markets lagging green building uptake are typically characterized by more modest expectations among tenants, users, owners, investors, and government officials. In those markets more research effort (including a greater number of direct interviews with market participants) is likely required for the green valuation assignment than for a standard building valuation assignment.

The appraiser must address the extent to which the subject property and its green characteristics will be considered productive and useful to building users and a probable buyer in a smaller market. Small metropolitan areas and towns may not provide a large enough buyer pool to absorb a specialized building or be able to produce enough data to support any meaningful building value premium. The value for green features must be supported with market research and if no demand is found for the building performance features, that research must be discussed and reflected in the market value conclusion.

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[38] See ANSI/ASHRAE/IES *Standard 90.1-2013—Energy Standard for Buildings Except Low-Rise Residential Buildings*, available for purchase at https://www.ashrae.org/resources--publications/bookstore/standard-90-1.

Resiliency and Disaster Preparedness: Green, Durable, and Disaster-Resilient[39]

"Resiliency" is a very broad topic and of growing importance based on an increase in highly disruptive extreme weather events. Some building professionals assert that a high-performance building cannot be deemed truly green or sustainable if it is not durable and/or functional in the face of extreme events or everyday factors that stand to degrade the facility. In certain cases, green attributes can enhance physical durability and operational resilience.[40]

Increasingly frequent natural hazard events and rising associated economic costs continue to impact property value through rising insurance premiums and building fortification costs. The private insurance industry is encouraging efforts to promote resilience through incentives for disaster resilient practices.[41] The Insurance Institute for Business and Home Safety (IBHS) offers guidelines on disaster resilient buildings, such as those comprising the FORTIFED™. Updated versions of green building standards and certifications are anticipated to have expanded sections on resiliency.

Lower insurance premiums may be granted to buildings deemed to be more resilient. Conversely, insurance premiums may be adversely impacted by subpar ratings on the ISO Building Code Effectiveness Rating Scale, which looks at communities as a whole and not as individual structures.[42] At the same time, sustainability attributes must be carefully analyzed to make sure that they do not undermine resilience to natural disasters, such as hurricanes (with coastal construction) or wildfires (development in the wildland-urban interface). These effects should be included in any cash flow-based valuation.

As recognized by IBHS and the US DOE, certain sustainability attributes of many building rating systems enhance a property's everyday durability and ability to endure or adapt to natural disasters. Examples include the water damage resilience of closed-cell foam insulation or the fire-resistant properties of multi-pane windows. Sustainability attributes can shorten or even eliminate business disruptions following a power outage due to backup generators or on-site energy storage. The correction of discovered defects often translates into enhanced equipment life, improved tenant comfort, avoidance of premature equipment failure, and early detection of fire hazards.[43]

Dealing with Incomplete and Inconsistent Market Data

Because of the comparatively limited number of green buildings and the resulting limited transactions available for analysis, appraisers should anticipate that optimal comparables may be difficult to find. Interviews with local market professionals who have exposure to high-performance building transactions can provide an understanding of buyer and seller motivations. Primary research, such as gathering a consensus of market participant opinions, is a legitimate and commonly used technique when insufficient hard transaction data are available. These direct interviews can be a key part of the market due diligence process with high-performance building valuation. The assignment fee and timing should recognize the need for this "extra" research effort.

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[39] For more information, see "Insurance" and "Resilience and Durability" sections of the *Information Atlas*, https://sites.google.com/site/appraisinghpbuildings/key-topics/resilience-and-durability.

[40] See "The Link Between Hazard Mitigation and Livability: Planning for a Sustainable Future" (FEMA Publication No. 364: September 2000), located at http://www.fema.gov/media-library/assets/documents/2110.

[41] See http://disastersafety.org/fortified/commercial/.

[42] See the Building Code Effectiveness Grading Scale: https://www.isomitigation.com/.

[43] See the "Quality Assurance" section of the *Information Atlas*, https://sites.google.com/site/appraisinghpbuildings/key-topics/quality-assurance.

Section VI: Highest and Best Use

For a green building valuation assignment, the challenges of determining highest and best use commonly falls into two broad areas:

1) **As-is New Construction:** Assessing whether or not the subject property should be considered financially feasible and/or maximally profitable in the context of additional investments in green attributes.
2) **Evaluating the Potential for Value Enhancement through Renovation/Retrofit:** Determining the financial feasibility and/or profit maximization potential of adding green attributes to an existing building.

Feasibility and profitability questions arise from generalized market perceptions that green building attributes and systems may require additional investments compared to conventional buildings. Appraisers may encounter uncertainty as to whether any incremental expenditure, separately or in aggregate, provides a suitable return on investment.

The highest and best use analysis should incorporate detailed financial analysis, including: 1) a comprehensive baseline cash flow forecast; and 2) comparison with a detailed estimate of new project costs (improved performance) and associated financial benefits.

Appraisers should consider how costs and benefits attributed to certain green components or systems may indirectly impact related and/or integrated systems. This is discussed in more detail in *APB Valuation Advisory #6, Valuation of Green and High-Performance Property: Background and Core Competency*. For example, efficient lighting systems may reduce heating load, which would allow for a smaller HVAC system, thereby reducing equipment costs that can be reallocated to greater thermal insulation. Appraisers should be aware of these types of indirect costs and benefits at the systems level and how they apply to the building as a whole.

Vacant Land / Development Sites

When analyzing a vacant site for highest and best use, appraisers look to site attributes including the surrounding neighborhood and local/regional market conditions to evaluate physical suitability, legal permissibility, and financial feasibility. Conditions may reveal that a green building is a superior use for the site as opposed to a conventional building. A consideration of related risk is critical in this analysis, particularly if market factors suggest development with a green property would be considered a less risky investment longer term.

Site-specific attributes include transportation access, roof-based solar availability, passive shading, and proximity to natural disaster and/or hazard zones. Trees or other forms of shading may reduce building cooling loads. Proximity to public transportation or pedestrian accessible services serve to reduce overall vehicle miles traveled while providing enhanced walkability. Solar access has potential value (even in the absence of existing on-site solar), whereas lack of solar access may be considered a form of external obsolescence. Locational factors including drought conditions, water scarcity, water rate increases, and other aspects of climate change vulnerability will increasingly affect asset value.

Appraisers should be alert to local or regional incentives that encourage (or possibly discourage) the development of green buildings. Utility cost rebates, Floor Area Ratio (FAR) density bonuses, parking allowances, expedited permitting, and other financial incentives can provide insight into the possibility of a green highest and best use of a vacant site.

The appraiser should assess both the return on capital from operating income and return of capital from the future reversion of the subject property at the end of the investment holding period. The bifurcated nature of investment returns (return of and return on) may allow a green property with an inferior initial return on investment to exceed the return projected by a conventional property over the investment holding period. A prospective green project may thereby receive appropriate consideration among the highest and best uses of the site as vacant.

Site as Improved

Appraisers may be asked to perform the highest and best use analysis and the cost approach with the benefit of a well-developed, complete estimate of building and site improvement cost as new. This detailed estimate will assist when evaluating the green building characteristics and the extent to which they can be expected to receive a suitable return of and on investment. The optimum level of efficiency and/or the level of efficiency achieved will help determine the maximum productivity for the site "as improved." If the attributes or systems do not provide a financial benefit equal to or greater than their cost, they may be examples of functional obsolescence and considered accordingly when using the cost approach. Conversely, appraisers must also carefully consider the "whole building" approach wherein the building is treated as a single unit and the overall benefits of systems integration may outweigh the costs of individual components (per APB Valuation Advisory #6).

In areas where local and regional market conditions support a large and/or growing population of green buildings, the need for a component cost/benefit analysis may be reduced or eliminated, depending upon transactional evidence of rents and property values. More common are assignments where local and regional conditions reflect the presence of some green buildings that comprise a niche outside the mainstream market norms and/or the presence of relevant attributes is not transparent in the marketplace, necessitating a cost/benefit analysis.

Because benefits of some green building attributes may not have a direct monetary value for the building user or owner (e.g., reduction in local air, light, or noise pollution), it is possible that the appraiser (or other qualified engineer/professional) will undertake some form of cost/benefit analysis of both individual building attributes and grouped systems to separate out any direct monetary benefit for the building user or owner. This analysis is best done quantitatively, with the appraiser forming opinions of the financial and non-financial benefits of such attributes, comparing them with the cost of constructing and operating these attributes. Appraisers might encounter the emerging "carbon" or emissions trading programs associated with greenhouse gas emissions, but reliably monetizing benefits would more likely represent business value than market value.[44]

[44] "International Emissions Trading," United Nations Framework Convention on Climate Change, 2014, http://unfccc.int/kyoto_protocol/mechanisms/emissions_trading/items/2731.php

In the case of proposed construction, the goals of the standard "highest and best use" analysis within the broader appraisal process are to determine whether the project is the physically possible, legally permissible, financially feasible, and maximally productive choice (or option) among the various building/use types that might be considered. These considerations generally transcend green/high-performance considerations, but one important exception is the extent to which green attributes are consistent with applicable codes and ordinances.

Probable Buyer

Some appraisers incorporate a discussion of the "probable buyer" in their discussion of highest and best use. These discussions may be useful to describe characteristics, behaviors, and expectations of the probable buyer. Appraisers may find local or regional market evidence where some buyers find value in high-performance attributes, while other buyers are indifferent or skeptical of green building benefits. A variation in buyer motivation per building features is normal, but the appraiser should acknowledge and report evidence of demand levels for high-performance property in the probable buyer discussion.

Section VII: The Valuation Process

Introduction

According to the press release for "Green Building and Property Value: A Primer for Building Owners and Developers":

When valuing green buildings, real estate appraisers' analysis must be supported by market data on the subject property that helps explain why it stands out from its conventional peers. Because buildings with energy-efficient attributes are different from traditional ones, owners have had to change not only how they design, build and market, but also how they approach financing and construction processes. Otherwise, owners may pay for green – with certifications, capital improvements and marketing – and not fully realize the expected market benefits.[45]

To arrive at the market value of a green property, most of the steps and methodologies are the same that you would use for a conventional building. Green property considerations in the appraisal process are more nuanced with some additional complexities, and require a greater level of understanding and training.

The Three Approaches to Value

Cost Approach

As with valuing traditional real estate, cost is not necessarily a good indication of value but is a consideration in the analysis (particularly for new improvements or insurance-driven valuations). The cost to construct or refurbish a building does not necessarily equal "value in exchange." The cost approach estimates market value by considering replacement cost less depreciation plus land value. The principle of substitution is that a buyer would logically pay no more than the adjusted cost to replace the property. Because certain green attributes are often new to the market, there may be limited data to help the appraiser estimate the replacement or reproduction costs of a green subject. Other attributes, such as multi-pane windows or high-efficiency HVAC systems, have well-documented track records. RSMeans® and Marshall & Swift® (via its Marshall Valuation Service) have recently begun publishing green cost data in their building cost data publications; however, neither currently addresses the topic of integration, a significant aspect of green building design and source of increased building efficiency and savings.

This section discusses project cost and explores whether or not any premium is paid for green attributes. A key consideration in the relationship of cost versus value is determining depreciated cost and the definition of "value." "Value" may refer to "market value," or the value in exchange that is typical of appraisals for loan underwriting. Or "value" may refer to "investment value," which is driven by a decision to invest where considerations include personal and tax considerations. The cost approach is not widely used when appraising older buildings because the process of estimating total depreciation can be subjective and difficult. The cost approach is more often utilized, and is generally more reliable, when appraising new construction.

[45] http://www.appraisalinstitute.org/appraisal-institute-issues-guidance-on-valuing-green-buildings/

Cost Approach Considerations

Land value may be impacted if the location exhibits sustainability-related features like unobscured solar exposure (positive) or highway air or noise pollution (negative). Is a location that is riverside, coastal, or low lying vulnerable to extreme weather events? Will expanding mass transit links or bike trails make the site more valuable? These factors should be identified and value impacts analyzed to the degree that there is local market recognition in both the short and medium time frame.

In many jurisdictions construction codes are evolving to require more energy- and resource- (particularly water) efficient design. While energy-efficient designs may add to initial costs, they may also increase property value. These code-based investments may also yield operational savings, which are attributes that local markets often recognize. Depending on local conditions, this might create a larger than typical spread between cost to build new and cost to buy existing assets.

Studies of markets sophisticated in green construction have compared construction costs of green buildings to conventional new construction. One study found that often the "extra" cost of green was not significant (0 percent to 2 percent) in all but the highest-performing assets.[46] Appraisers should carefully examine green cost premiums over new (not renovation) code construction costs to identify what factors were responsible for the added expense(s). Poor construction management, a late decision to include performance/green features, or inexperience might result in higher than expected construction costs. The report should also clarify whether the extra funds were used for actual property upgrades (like a large on-site power system or high-performance windows).

The cost approach may be best utilized as a tool for assessing the feasibility of a project for investment purposes rather than market value in exchange. With all the variables associated with green properties, the cost approach may not yield accurate results for market value.

Cost-Benefit Analysis and Obsolescence

A cost-benefit analysis can help determine whether or not additional costs constitute "green" premiums resulting from an over-improvement or superadequacy with external and/or functional obsolescence. This analysis should include:

- Impact of incentives/rebates that reduce the "initial" costs
- Reductions to the "initial" costs of components, such as the size of HVAC systems
- Depreciation estimates and the differences between using green components versus conventional components
- Better building and performance data from modeling systems and commissioning
- Data from audits comparing measured to expected performance
- Utility expense reductions over the long term
- Component life-cycle performance analysis, durability, and costs
- Green attributes that will affect "future proofing" or delayed obsolescence
- Other long-term benefits that produce predictable and durable cash flows

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[46] Langdon, Davis, "Cost of Green Revisited: Reexamining the Feasibility and Cost Impact of Sustainable Design in the Light of Increased Market Adoption," (July 2007), located at http://sustainability.ucr.edu/docs/leed-cost-of-green.pdf.

Extra costs associated with improved indoor environmental quality may have added value, which is much more difficult to quantify than the value associated with energy or water savings. Additional discussion of utility and obsolescence is found in the Property Description section of this Advisory.

Initial Investment Cost vs. Value in Exchange

Cost may take on different meanings depending on whether short-term economic incentives exist (i.e., when third parties offset some of the cost incurred by the owner). "Replacement cost" is the appraisal yardstick, so clearly defining the cost to a new buyer will generally act as the upper value limit.

1. **Gross Cost:** Total quoted cost before applying immediate/short-term economic incentives and discounts. Use caution if this is above normal out-of-pocket net replacement cost.
2. **Net Cost:** Total cost after accounting for all short-term incentives and discounts, which may include immediate tax benefits. Net cost is most relevant to the market value analysis as it is "out–of-pocket cost." These incentives can be identified via independent research with contractors/installers or dedicated databases.[47]
3. **Depreciated Cost:** This considers accelerated tax deductions and/or other tax advantages like cost segregation.[48] It may be important to fully understand the impact and justification of an initial purchase from a CFO level—including tax considerations ("investment value")—rather than the appraisal's more limited value-in-exchange market value.

Analysis may also include the cost-payback from soft benefits like branding, reputation enhancement, or owner/tenant employee attraction and retention as part of investment recovery. Often these are business value influences that are beyond the real estate value.

The discussion of depreciation, tax advantages, and even some soft values is included to help answer a common question: "If the green features out-of-pocket cost is $1 million and the appraised value is $750,000, why would an investor spend the money?" The reason is that there are certain items not included in the appraisal (like accelerated depreciation) that may motivate a property/business owner to act that are outside of the appraiser's "market value."

Sales Comparison Approach

The sales comparison approach is most reliable when there are a number of similar high-performance properties in the subject's market that have recently sold. Given the modest market penetration of green properties in most markets and the relatively small number of property transactions, there is often limited data available. Data limitations make it difficult to determine proper adjustments between a conventional building and a green building or between buildings that used different strategies to achieve similar high-level ratings.

Organizations that have established databases to track green buildings and have published resources may be a source of transactional and operational data for comparables and adjustments.[49] When transaction data are scarce, interviews with the market participants (owner occupants, investors, tenants, realtors, and lenders) can be the best method for the appraiser to make reasonable adjustments.

Comparables Selection and Adjustment

CoStar™ as well as a number of local MLS systems may contain references to buildings with green attributes. Appraisers are advised to investigate and report on the availability of these local sales data sources (or lack of them). All of the data reported by such services must be verified and confirmed by the appraiser prior

to incorporating it into a valuation analysis. Adjustments for building attributes, designations, obsolescence, marketing time, and other valuation impacts may be discerned from discussions with the parties involved in a transaction. The US DOE and CoStar™ are collaborating to incorporate energy-efficiency information in the CoStar™ databases and conduct new research to better define the value created by green and high-performance property attributes. CoStar™ identifies and promotes the benefits of more than 33,000 buildings that have achieved ENERGY STAR® certification and the US Green Building Council's LEED certification in its online property databases as well as reference other certifications and performance features in comments.[50]

Premium for Superior Performance vs. Negative Adjustments for Underperformance

In some markets, green properties are at the top of the market participants' lists of desirable property types, thereby creating a "new normal." Thanks to more robust building energy disclosure in forward trending markets, green premiums might start to be replaced with discounts for markedly underperforming buildings. It is important to determine whether or not a property needs green attributes to stay competitive, and if so, how much that market discounts low-performing properties. In a market where green construction is standard or preferred, a new property designed as a conventional building may have embedded obsolescence.

To determine market preferences, an appraiser should allow more time and effort for market research, often via direct interviews with local professionals. Reviewing published research may also be necessary to help determine proper adjustments. Based upon the adoption cycle in a specific market, the sales comparison approach may or may not be considered a reliable indication of market value. While desirable, it is unlikely that there is a statistically relevant pool of information[51] about green properties in many markets.

Income Approach

Determining whether there is an increase in risk-adjusted net income can be the most important consideration in estimating the value impact of green building strategies. Value based on net income is influenced by income, vacancy, expenses, and risk. This approach is also important for owner-occupied properties and those that may transition to a rental property in the future.

In many cases the income approach permits the most nuanced analysis of the value impacts of green strategies, and, for that reason, is often the most relevant valuation approach.

Income

Higher rents are a typical expectation associated with high-performance buildings, but the difference between green building rent versus a similar quality but less efficient structure may be difficult to determine. Market rent determinations involve many factors, and operational efficiency/green design is only one consideration. Rental rate differences between green and non-green properties might be more qualitative, an emotional notion by the occupant that green is "better," "healthier, or a more contemporary design" Numerous

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47 See the "Database of State Incentives for Renewables & Efficiency," located at http://www.dsireusa.org/.

48 See the "IRS Cost Segregation Audit Techniques Guide," located at https://www.irs.gov/businesses/cost-segregation-audit-techniques-guide-chapter-2-legal-framework—Chapter-2—Legal-Framework.

49 See examples in the *Information Atlas* located at https://sites.google.com/site/appraisinghpbuildings/market-data.

50 See http://www.energy.gov/eere/articles/energy-department-announces-partnership-costar-group-inc-expand-visibility-energy.

51 Theddi Wright Chappell and Chris Corps, *High Performance Green Building: What's it Worth? Investigating the Market Value of High Performance Green Buildings* (May 2009), https://living-future.org/wp-content/uploads/2016/11/High_Performance_Green_Building.pdf.

national studies indicate a higher average rental rate is achieved in green office buildings, but substantiating higher rent at the local level may be difficult.[52] Any rent "premium" might be attenuated when all top-tier properties in the market are green. As mentioned previously, market participant interviews may be the best source to assess the impacts of green attributes, branding, or other green-related factors.

Green properties have been shown to generate higher tenant demand in some markets, which may result in higher average rental rates. Demand preferences for properties with green attributes often correspond with superior credit quality tenants, higher tenant retention rates, and shorter re-lease time when a vacancy occurs. Appraisers should select comparables that closely resemble the subject property and carefully analyze vacancy levels, absorption rates, and effective rents as compared to the broader market. Post-occupancy evaluations (including tenant surveys, complaint logs, etc.) may also shed light on the relative desirability of the space.

Green Leases and the Split Incentive

Whole building energy measurements might include all resource use (common area and tenant spaces), but depending on lease terms tenants are often responsible for their own utilities. This "split incentive"[53] issue is common with market rent apartment buildings, and modified gross and net commercial leases. Due to privacy issues property owners may have challenges in getting whole building data, and even when it exists, the appraiser will need to then allocate savings between the owner and the tenants. Whole building efficiency can reflect superior design quality, but in the cash flow analysis appraisers should recognize only those savings that flow to the owner's bottom line.

Green Leases

Green leases[54] work around the split incentive by trying to create more equity between owners and tenants regarding money spent on and saved by performance upgrades. Green lease clauses can be found in different structures, but is most common using a triple-net lease, where the tenant pays all their own expenses. Appraisers should inquire if a green property utilizes leases with clauses designed to align the landlord-tenant cost structure. A variant of the green lease is when a tenant wants the authority to build out a green interior to obtain a designation, but within an otherwise conventional building.

Other Income

Green properties may have on-site power generation, PPAs, demand response agreements with utilities, rooftop leases, and unique opportunities for additional income. The appraiser is advised to research how on-site power infrastructure might impact value and (for clarity) consider presenting that analysis as a separate section within the overall report.

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[52] See "Energy Efficiency & Financial Performance: A Review of Studies in the Market," US Department of Energy (March 2014), http://betterbuildingssolutioncenter.energy.gov/sites/default/files/attachments/Energy%20Efficiency%20and%20Financial%20Performance_12_2015.pdf.

[53] The "split incentive" is created when one party makes a capital investment, but the benefits of that action flow to another party. A common example is when an owner makes the investment to improve a building's energy efficiency, while the tenant, who has made no investment, benefits from a lower utility bill.

Vacancy and Collection Loss

Lower overall vacancy and turnover can have a powerful impact on NOI. Rollover risk and lag vacancy reductions are dramatic to cash flow. The National Apartment Association's 2014 survey of 3,000 market rate units indicated the average annual turnover rate was 54 percent (or about a two-year occupancy term). Generally, lower turnover results in reduced costs for tenant improvements, broker commissions, and rent loss. If an owner can show that their tenant retention is greater than the norm, there may be an impact on the vacancy and collection loss assumption. Employees who work in green buildings are often very "satisfied" with their occupancy, and this satisfaction aids in increasing tenant retention, thereby reducing turnover expenses.

Some green building design attributes like raised floors, re-usable demising walls, and plug-and-play wiring connectors can lower re-tenanting construction time and costs and eliminate a significant amount of construction debris from the waste stream upon tenant turnover. This kind of building design may be initially more expensive, but emphasizes long-term configuration flexibility. These building design attributes may contribute to a longer economic life for the asset, and provide the ability to adapt to changing market needs. Shorter reconfiguration time frames may also permit existing tenants to more easily reconfigure their space if needed (so they do not have to move). Generally, lower turnover also results in reduced costs for tenant improvements, broker commissions, and rent loss.

New or significantly renovated green buildings may experience faster absorption rates, particularly where green design/lifestyle is already well established in the market.

When combined, this group of vacancy-related items can have a large value impact. Design elements noted above (raised floors, reusable demising walls) may not be easily visible. As mentioned previously, appraisers should interview the building owner/representative, building engineer, and/or leasing representative(s) to determine what attributes exist, any cost premium paid, and what the owner can document as an impact on the NOI.

Operating Expenses

Lower energy, water, and waste expenses are likely to be evident from a building operation tracking and reporting system, as well as from benchmarking against otherwise similar buildings. Better operations management may also improve "fault detection," and lower the risk of unanticipated repairs/capital outlays. Having historic records that show lower energy, water, and waste costs can support a lower than market standard utility expense deduction in the *pro forma*.

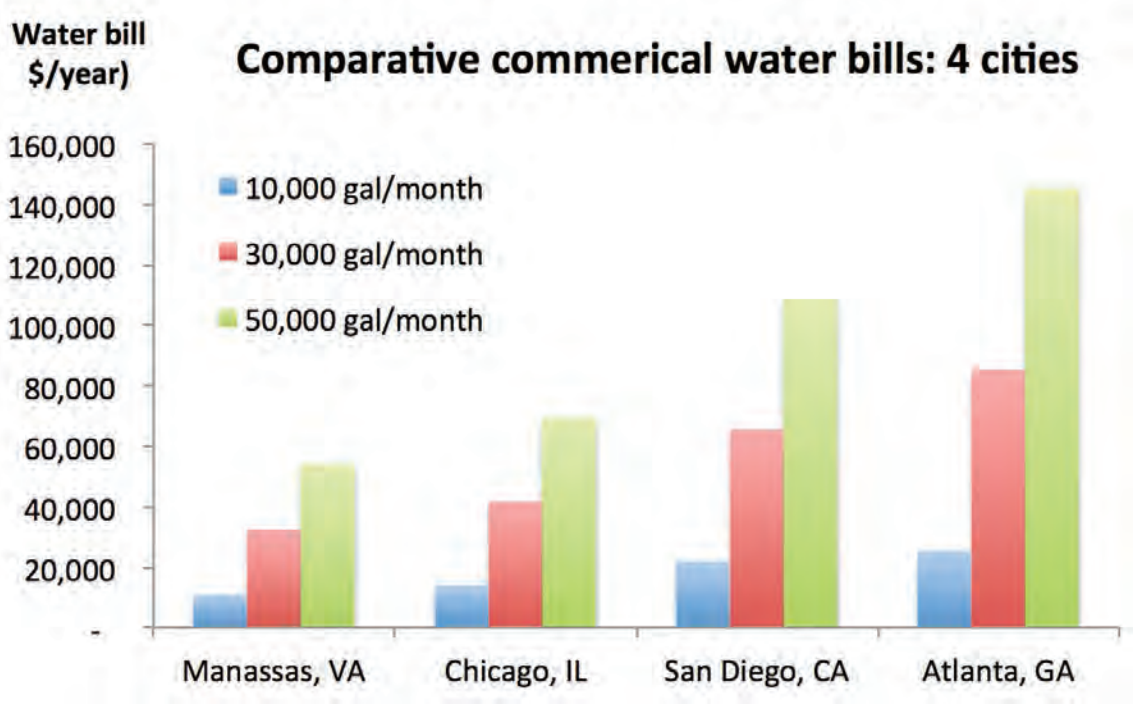
Other expense items like marketing, maintenance systems, and property management may in some cases be higher because of the needed communication, complex building systems, and new technology risk. It is desirable to obtain actual operating history with category breakdowns whenever possible. Some green technologies may have lower maintenance costs; for example, LED lighting that can provide decades of service life, thereby saving the labor and capital costs of replacing standard lighting equipment, plus extra disposal costs associated with mercury-containing fluorescent lamps.

Experienced architects and builders can often produce green buildings for zero or marginally more cost than conventional code construction, so the replacement reserves may be in-line with or significantly less than estimates for traditional construction.

Owners of green buildings typically invest in building attributes and operating protocols to achieve efficiencies, lower operating expenses, and greater effectiveness. It is important to research, analyze, and determine the impact of the following expense areas:

- **Energy:** Green buildings generally achieve 20-40 percent lower electricity and gas consumption relative to alternatives. There is a growing trend towards deeper savings, even zero net off-site energy on an annual basis. Local energy costs are arguably the single greatest influence on payback rates for investments in more efficient equipment, and these rates vary widely. As of mid-2017, electricity tariffs for commercial buildings averaged 11.0 cents per kilowatt-hour, ranging among states from 8.25 to 26.2 cents per kilowatt-hour. Appraisers should be cognizant of the basis for differences in rates, particularly in certain areas of the United States (e.g., Northeastern states) where grid constraints have resulted in significantly higher utility costs.

Figure 7: Illustration of high variability in water pricing around the United States



It is vital to support lower energy consumption levels with documentation (e.g., ENERGY STAR® rating, historic utility bills, etc.) that explains why energy use is below market comparables. The support available to justify a lower expense varies based on the assignment situation: if the data is based on pre-upgrade or new construction or if an actual operating history exists. In particular, owner-supplied documents about specific resource conservation measures or building characteristics are desirable.[55]

- **Water:** Water consumption and sewer discharge rates impact a building's water expense. Low-flow water fixtures, drip landscaping irrigation, on-site stormwater retention, and gray water use are elements of green buildings that impact water consumption and sewer discharge volume. Water costs vary considerably, impacting cost-benefit calculations (see Figure 7).[56]

- **Waste:** Tenant recycling programs may reduce waste volume and disposal costs and provide a positive income stream, depending on prevailing market conditions.
- **Repairs and Maintenance:** Appraisers should ask on-site staff about their experience with routine maintenance requirements, and the expected life of green system components.
- **Management:** Management culture can be a predictor of building performance, particularly where there is a focus on target-setting, data gathering and analysis, and a formalized processes for performance improvement. Investing in data gathering systems allows asset and portfolio managers to more predictably achieve operating expense savings and better future project capital improvement investments. Equipment sensors and building automation attributes can reduce management costs and improve tenant satisfaction.
- **Marketing and Promotion:** The positive market signal conveyed by buildings that achieve a recognized certification typically results in increased marketing and public relations value.
- I**nsurance:** Green and resilient buildings may receive different treatment (preferential or otherwise) by insurers than conventional ones. Insurers have begun to recognize the loss-prevention benefits of green buildings; benefits range from premium credits for green attributes and energy savings to renewable production revenue guarantees.[57]
- **Property Taxes:** Certain municipal property tax incentives exist, such as low or no assessment adjustment for certain building certifications, energy-efficiency upgrades, and/or on-site power generation. Property Assessed Clean Energy (PACE) property tax lien financing repaid by increasing property tax bills is another type of assumable financing targeting construction upgrades. Due to the growing popularity of PACE with many property types, appraisers are advised to be aware of basic principles of PACE and how it might impact property leverage calculations. But not all property types can take advantage of PACE. Fannie/Freddie are currently prohibited[58] from including property with PACE assessments in their loan pools, thereby impacting a large number of multi-family properties.[59] In spite of the restrictions, PACE continues to grow, with active programs in fifteen states financing over $4 billion (as of 2016) in commercial property and/or single-unit residence efficiency and renewable energy upgrades.

Water Conservation

At this time, in most jurisdictions water is still not priced sufficiently high to create positive cash flow for high-performance water conservation. That may change as water prices increase. In the top 30 US metropolitan areas, water prices rose an average of 5 percent (median increase + 3.5 percent) in 2016 over the previous year. Water prices in the 30 top cities are up 48 percent on average since 2010. Extreme weather like droughts, aquifer pollution, and increasing demand in some areas are putting communities on notice. Water

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54 See Green Lease Library, http://www.greenleaselibrary.com/.

55 For additional discussion see the Institute for Market Transformation and the Appraisal Institute, "Recognition of Energy Costs and Energy Performance in Real Property Valuation," 2nd ed. (May 2012), http://www.imt.org/resources/detail/recognition-of-energy-costs-and-energy-performance.

56 City of Atlanta, Department of Watershed Management, accessed April 5, 2016, http://billcalculator.atlantawatershed.org/.

57 See *Information Atlas*, located at https://sites.google.com/site/appraisinghpbuildings/key-topics/insurance.

58 See https://www.fhfa.gov/Media/PublicAffairs/Pages/FHFA-Statement-on-Certain-Energy-Retrofit-Loan-Programs.aspx

59 To review PACE case studies and PACE market information visit http://www.pacenow.org.

billing structures are often set up to bill higher rates based on tiers of consumption so an appraiser will need to understand local water pricing to estimate any value impact of water conservation measures. Municipal and aquifer water use can be reduced with grey-water systems. Recycled laundry, sink and bathing water, using ground water intrusion (can be found in underground parking), rainwater harvesting, and xeriscape landscaping can dramatically impact water needed from outside sources.

On-site water production might also be found in high-performance buildings. Systems can generate drinking water from salt water (reverse osmosis) or from water vapor in the air (using the dew point), but both systems also require substantial amounts of energy. Remote locations without access to potable water (e.g., eco-resorts, islands, remote mining) may have needs that economically justify on-site water production.

Net Operating Income

For most owners the motivation to invest in performance upgrades is to save money. After accounting for income, vacancy, and expenses, the net income should reflect positively relative to typical buildings. Historic operating data, proving these savings are durable and predictable over the long term, are key to supporting the value impact.

Risk Rate

Capitalization rates and adjustments to the discounted cash flow (DCF) discount rate and the terminal cap rate reflect the net cash flow predictability risk. This assessment includes many factors potentially impacted by high-performance/green design such as rental increases, tenant quality, vacancy characteristics, expense assumptions, and the long term durability of these impacts. For example, expense savings might include assumptions of lower utility costs or reductions in re-leasing expense because of enhanced tenant satisfaction/ retention.

Building management and control systems can be an important risk influence as they can prove without doubt what benefits are working (or not working). Control systems for lighting, space-conditioning, air quality, and irrigation allow building managers opportunities to maximize the value of inputs while minimizing waste, limiting downtime (fault detection), and proving/documenting rates of return. While the outcomes of specific building management/ control systems are unique to the occupant and operator, the presence of a good control system represents a significant investment designed to ensure and prove resource savings.

Engineering risk and performance predictability should also be considered. The presence of building automation and monitoring systems, the use of commissioning, and assessments based on asset versus operational modeling each tend to reduce risks and uncertainties. The presence of a robust Building Management System (BMS) where sensors listen and record building activity provides real-time feedback to occupants by detecting faults, and responds with control instructions. This in turn can enhance actual performance, reduce performance risk, and positively influence value.

Primary factors that impact the building risk profile include:

- tenant credit quality relative to market standards;
- obsolescence risk;
- financing risk from debt capital availability and preferences; and
- liquidity risk due to equity investor preferences.

Secondary risk factor impacts include:

- short- and long-term operating cost volatility;
- exposure to energy cost spikes; and
- access to water supplies.

Location-based factors are also important including:

- asset resiliency;
- resource scarcity (potential grid vulnerability or constraints); and
- reliance on a single transportation modality versus access to multiple transit options.

Green buildings create value by intrinsically reducing operating cost volatility through reducing the quantities of the commodity that must be purchased. Performance warranties or energy savings insurance, where present, can help manage these risks by effectively guaranteeing utility expenditures.

At time of sale, green attributes may impact time on market, number of interested parties, price volatility or potential range of values offered, and/or asset liquidity based on time required to conclude an arm's-length sale. These factors should be considered within the DCF analyses underlying any "value in exchange" assignment and reflected in the risk analysis, rate selection, and final price determination.

Other Valuation Considerations

Valuing On-Site Power and Energy Storage Systems

A dedicated report section containing the economic analysis of energy generation systems like solar PV, fuel cells, or energy avoidance designs is advised as these systems can have a much different economic analysis than the underlying real estate. On-site or non-utility owned energy generation systems are common parts of green design and a necessary part of net-zero building design.

Appraisers should consider isolating the power system valuation from the building valuation and then add that contribution as a line item to the final value. Document review should confirm that the power system is considered real estate. Building installed systems that are bolted down are generally considered to be part of the real estate. Equipment involving purchase agreements, leased systems, systems on leased land or PPAs have documents identifying the equipment as personal property.

Final Reconciliation and Value Conclusion

The final step in the valuation process involves reconciling the three approaches to valuation that were used (cost, sales comparison, and income), assigning relative weights to each based on the quality and quantity of available data and concluding the final value. For instance, if tenants in the subject market are demanding green properties and are willing to pay a premium for them or energy savings provided additional net income, then the income approach has greater significance. While unlikely, if a recent sale of a similar green building occurred, the sales comparison approach may carry more weight in the final analysis.[60]

Caution should be used if any adjustment is unsupported by market evidence; however, market research may reveal that using no value adjustment is also not credible. Reliance on general market research papers,[61] interviews with relevant market participants, and specific market data should indicate a

[60] Institute for Market Transformation and the Appraisal Institute, "Green Building and Property Value."

reasonable and typical investor level of risk impact due to the green design, from which reliable conclusions can be derived.

The green building appraisal reporting process requires detail in the description of property attributes, inclusion of more third-party reports and documents in the addendum, and descriptions of the additional work conducted to support value adjustments and conclusions (where empirical data is lacking).

[61] "The Value of Green Building, LEED Valuation, Phase I Report," Runstad Center for Real Estate Studies (June 2015), located at http://realestate.washington.edu/wp-content/uploads/2015/06/green-building-leed.pdf.

Section VIII: Reporting the Appraisal

The *Uniform Standards of Professional Appraisal Practice* (USPAP)[62] do not dictate a form or format for the appraisal report. Rather, it provides reporting options that offer adequate flexibility that may be needed based on the intended use and allows for the addition of extra details regarding particular property attributes and any specialized research or analysis required in the valuation process. An addendum may include third-party reports, documents, and certifications.

The appraiser should also note additional efforts made to obtain competency required by the assignment (where indicated) and document additional market research such as interviews with market participants that were needed to support adjustments where empirical data was insufficient.

Integrated building design might make it difficult or impossible to identify contributions from specific building attributes. Some attributes, like a solar PV array, might best be isolated and valued separately.

Maintaining a Dialogue with the Client During the Assignment

Depending on the property complexity (and typically a greater than average number of due diligence documents), it is advisable to conduct a status check-in with the client during the assignment. This could be to clarify scope of work issues, check on reporting format preferences, and/or discuss any particularly challenging valuation issues encountered. A check-in call with the property owner or client near the end of the assignment, when most analysis is completed, can often make the final phase more straightforward.

Report presentation preferences might also be a consideration. For example, clients with properties that have on-site power generation (solar PV, fuel cells, etc.) might prefer to have the building valued separately, with valuation of the power system in its own report section.

[62] *Uniform Standards of Professional Appraisal Practice*, The Appraisal Foundation, www.appraisalfoundation.org.

Section IX: Summary

In many parts of the country, there is significant uptake of green features in new construction as well as green retrofitting in existing buildings. This is a reflection of multiple public policy drivers combined with changing owner and occupant needs and expectations. As a result, the competent consideration of green features and building performance is an emerging specialization.

Following are key points of the Advisory. The appraiser is advised to:

- Attain core competency (see APB Valuation Advisory #6 – *Valuation of Green and High-Performance Property: Background and Core Competency*) prior to considering an assignment involving factors such as energy/water use and efficiency, green materials, indoor environmental quality, or environmental factors that potentially impact value.
- Clearly understand the valuation problem, the purpose of the appraisal, and appropriate scope of work prior to accepting the assignment. Excluding descriptive green information, assigning zero value to green and high-performance attributes or assigning a zero downward adjustment for underperforming conventional buildings when comparing them to green buildings are professional decisions that require support.
- Consider and make appropriate adjustments for primary risk factors such as tenant quality, absolute and relative building operating efficiency, exposure to future energy and water price volatility, obsolescence and superadequacy risk, financing risk that stems from future capital preferences and pricing, and liquidity risk due to evolving investor preferences. Secondary risk factors include grid reliance, water supply availability, and location-based factors such as access to multiple transit options, resource security, natural disaster probability, severity, and asset resiliency.

In addition, appraisers should consider the following:

- Highest and best use analysis should consider the extent to which existing or prospective green attributes may contribute to net income, expenses, and the investment risk profile. The appraiser needs to remain unbiased and recognize that in some instances some market participants may not ascribe value to certain green building attributes. In other situations, appraisers may conclude that certain green attributes detract from asset value.
- The three traditional valuation approaches should be applied in the standard fashion, but this may require the addition of specific sections that report, analyze, and conclude the value impact of significant green and high-performance attributes. Utility savings in the income approach are particularly important with this property type.
- Market data should be analyzed to assess the varying levels of demand among potential buyers who value green and high-performance attributes. The analyses should consider how these factors impact a property's marketability and income. The appraiser should also consider contextual factors, such as applicable building codes, financial incentives, resource prices, and market-specific conditions.
- The level of research and analysis should be appropriate for the complexity of the assignment. The level of reporting detail will likely include new types of addenda such as energy audits and benchmarking reports.

The possibility that the property owner or the client may not understand the importance of requested documents and information relating to green attributes should be recognized. Additional stakeholder engagement to confirm scope and methodology is advised.

Appraisers should note assigning zero value or otherwise "ignoring" green and high-performance attributes requires the same level of market validation and support as assigning value to such attributes.

Section X: Green Stakeholder List / Bibliography

Green Stakeholders

A large and growing number of industry, professional, and public sector organizations participate in shaping green/high-performance design. It is impossible to list all Green Stakeholders in the Advisory so a partial list with links and abbreviated notes has been compiled to create a Green Stakeholder summary website.[63] This can also serve as a bibliography of useful publications with links to efforts by Green Stakeholder groups to educate, standardize, certify, and represent the interests of industry constituents.

Numerous stakeholders provided input to this Advisory regarding green design, market adaption and standards, and the valuation of green properties. This list will be outdated the day it is published, but provides a starting point for further research:

https://sites.google.com/site/appraisinghpbuildings/useful-publications.

Bibliography

The Information Atlas link also contains links to publications that address issues around high-performance buildings and market value.

[63] High Performance Buildings Reference Links - https://sites.google.com/site/appraisinghpbuildings/useful-publications

Case Studies

Case Study Introduction

Following are a collection of valuation case studies involving different property types and features. These examples are not comprehensive; rather, they present particular components of the universe of green/high-performance attributes and how property value is impacted. While examples below are all based on actual valuations, some modifications may have been made to make them more instructive. The techniques are generally applicable, but not universal, without adaptation to local markets. There is also the consideration that technology and markets are dynamic and appraisers should recognize how the passage of time impacts valuation analysis.

Case Study #1: Cost Approach—Solar Photovoltaic System

A lender needs the property value of an industrial building with an installed solar PV array for loan collateral.

The Oakwood Road subject is a 67,470 sq. ft. industrial light manufacturing building in Pomona, CA, and was built in 1970. The proposed solar array will be roof mounted with 894 panels, rated at 250 kilowatts of peak output (according to the technical summary supplied by the installer). The manufacturer warranty is 35 years for the panels, 10 years for the inverters, and 3 years for installation parts/workmanship. All components are considered "quality" and backed by large, international companies. The vendor (XYZ Quality Solar Installer Inc.) is considered highly reputable in the regional market, has been in business for over 10 years, and has completed several similar sized projects. A copy of the solar system specifications and financial analysis was reviewed and attached to the workfile.

The total gross cost for the system is $1,111,420. After the Federal Investment Tax Credit rebate of 30 percent, the net cost to the owner (before depreciation) is $777,995. The system is designed to meet 90 percent of owner-occupied building annual electricity needs. Any monthly output overage is banked by the utility for use in months that draw from the grid, but there is no purchase of excess power.

The installation price includes an output monitoring system to ensure that performance meets specifications. In case of equipment failure, email alerts are sent and repair teams are due on site no later than 48 hours after fault detection. In an interview, the installer representative stated that the company has a near 100 percent record of meeting output projections, and often exceeds them. This statement provides good assurance that the savings estimate is reliable.

The following replacement cost comparables for solar systems were identified across the Southern California market:

#	Location (CA)	Installed (Approx.)	System Size (Watts)	Total Cost (Gross)	Gross Cost / Watt	Total Cost (Net)	Net Cost / Watt
1	Los Angeles	3/2015	480,000	$2,150,000	$4.48	$1,505,000	$3.14
2	San Bernardino	6/2015	144,400	$535,000	$3.70	$374,500	$2.59
3	Claremont	12/2014	145,000	$562,340	$3.88	$393,638	$2.71
4	Culver City	6/2014	346,840	$1,571,000	$4.53	$1,099,700	$3.17
5	Los Angeles	1/2014	58,800	$340,430	$5.79	$238,301	$4.05
	Subject	12/2015	250,320	$1,111,420	$4.44	$777,994	$3.11

Gross cost to net cost differences are primarily attributed to the 30 percent Federal Investment Tax Credit. Renewable Energy Certificates (RECs) do not transact in this market and local, state, or utility incentives are not common. Comparable #5 is the oldest (prices have declined) and smallest transaction. Comparable #2 involved some ground-mounted panels but provides shade for parking. Comparable #4 was installed on a pitched roof and involved more extensive mounting systems, which drove up costs.

Subject gross costs are concluded to be within the reasonable range, particularly considering the high-quality components and three-year post-completion service contract. Entrepreneurial profit in the subject market has been found to range from 20 to 30 percent of cost. Due to the reliable nature of solar installations, a 20 percent profit is used.

Cost Approach Solar System Value Contribution $780,000 (cost conclusion) + 20 percent profit = $940,000 (rounded)

Case Study #2: Sales Comparison Approach—High-Performance Low-Rise Office Building

A lender needs the market value for loan collateral of an office building that had a substantial renovation, including features that lowered energy costs, including a solar PV array.

The subject is a 38,066 gross sq. ft., two-story general office building located at 12345 Main Street, San Jose, CA. Built in 1980, the subject was renovated in 2015 to meet LEED® EBOM Gold standards. Windows were added to provide views of upgraded gardens and a new water feature. Skylights and an interior atrium bring daylight into the building interior. A BMS monitors each circuit to allow electricity use tracking. The space was pre-leased at top of the market rents and the tenant is investing $145 per sq. ft. in tenant improvements.

The customary use of overall sales price per square foot includes all property features such as land size, location, building quality, and condition as well as use and specific features. Value impacts of specific property features can be difficult to isolate, e.g., views, architectural and historic significance, monument signs, and some high-performance features.

The immediate area and region was searched for transactions involving properties identified as having high-performance features or designations such as LEED® or Energy Star®. A building might also be high-performance design without a rating. Comparables were identified as having high-performance features, and reflect a value range that is slightly higher than the summary of more generic, traditionally constructed buildings with similar sizes and uses. Because of the relative rarity of properties with high-performance features, a geographically wider net was cast to find these transactions.

Interviews with local real estate professionals knowledgeable about high-performance building transactions

High-Performance Building Sales Table

	Name and Location	Date	Land (acs)	Yr Blt. GBA SF	Use	Sale Price	Adjusted Sale Price $/SF	Features
1	Low-rise office 2310 Zigfield Rd San Jose, CA	7/14/2016	3.5	1977 58,309	General office	$7,725,000	$132.48	LEED® EBOM Silver, 2014 renovation prior to sale. Owner user buyer
2	R&D /office 2095 Fontaine Rd Palo Alto, CA	9/15/2016	1.88	1983 27,210	R&D / office	$3,400,000	$124.95	ENERGY STAR® 90, renovation 2013, HVAC, windows. Investor buyer
3	Edison Building 3150 Oak Expressway Santa Clara, CA	1/15/2016	3.02	1978 44,380	General office	$7,700,000	$153.22	ENERGY STAR® 92, LEED® EBOM Gold renovation. Cool roof, solar PV = $900,000
4	Heller Office 5295 Heller Ave San Jose, CA	8/15/2016	3.6	2002 59,316	General office	$10,500,000	$177.02	ENERGY STAR® 89, upgrades to building controls, HVAC in 2014
5	Creative Office 570 Martin St Mountain View	8/14/2016	1.51	1955 27,824	Creative office	$4,190,000	$150.59	Total remodel in 2013, interior gardens, daylighting. Owner user buyer
	Subject Property Main Street San Jose, CA		1.75	1980 38,066	General office			Renovated to meet LEED® EBOM Gold; HVAC, window upgrades, improved landscaping for water savings, skylights

indicated that the subject's buyer pool was sophisticated and valued bona fide performance enhancements. Demand is strong in this market for buildings with certifications by both tenants and buyers, with quicker absorption noted in several conversations. In a few cases, sale prices exceeded asking prices, with several buyers competing for the recent sale of a smaller zero net energy building.

Based on the age and level of upgrades at the property, the value per square foot indication is at the upper end of the range. A table for typical adjustments like transaction date, size, location, and overall quality has been completed. All of the high-performance comparable sales have a similar level of efficiency except Comparable #3, which has a downward adjusted sale price to account for the $900,000 solar PV system.

In this condensed example, the typical per attribute adjustment grid is excluded. Depending on the market value given to high-performance features, adjustment grid rows might be allocated to the cool roof, upgraded HVAC, or attractive low water use landscaping. If the subject had a solar array, that value analysis is best done in a separate report section using the PV Value® software tool with that contribution added to the non-solar subject value as a line item.

After adjustments the value for the subject is estimated to be $160 per SF.

Sales Comparison Value Conclusion: 38,066 SF x $160/SF = $6,090,000 (rounded)

Case Study #3: Income Approach—Solar Photovoltaic System

The market value contribution of an industrial building's rooftop solar PV array is determined via the (free) DCF software program PV Value®.

The building's solar system value contribution, described above, can also be considered via the value of electricity it generates by utilizing the income approach. A widely accepted method to determine the additional net present value from the solar array is via the software program, PV Value®, available for free download. The net present value is the stream of those future benefits (electricity expenses) over the holding period, less expenses and discounted for risk. The PV Value® training manual walks the appraiser through the software, discussing the basis of the various required inputs.

There are numerous assumptions for this calculation, but a key number to use is the annual average cost of electricity (annual avg. $/kWh) at the subject location. This $/kWh value can be determined using the subject's last 12 months of electricity expense history (assuming those months are typical). This figure will also most likely be shown in the solar installer's financial analysis. The utility rate sheet reference noted on the electric utility bill was also consulted, but bottom-line costs often include additional charges.

The historic $/kWh at the subject (over the past three years) is $0.1715/kWh, but a significant and atypical one time 5 percent rate increase is pending, pushing the average electricity cost to $0.18, which is used in the calculation. This localized cost per kWh is determined to be more accurate than the estimated $0.1408/kWh assumption stipulated in the PV Value® database link. The higher current expected actual electricity

cost ($0.18/kWh) is entered into the program's input screen as the electricity cost start rate, followed by a 1.24 percent annual increase. Other PV Value® screen inputs include numerous other assumptions including subject location, system size, output degradation rate, annual utility rate increase, inverter replacement date, array tilt, and azimuth, etc.

Based on these PV Value® inputs that were adjusted for the subject's particular situation, the software provides a low, average, and high value range estimate. The subject is considered of typical risk and information used in the analysis complete. Therefore, the average value is determined as reasonable.

(See the PV Value® website and other sources for full details. This Advisory is to provide an overview, and does not discuss and support each input in detail.)

Solar PV Contribution to Value via the Income Approach - $790,000 (rounded)

Case Study #4: Income Approach—High-Performance Mid-Rise Office Building

In this case, an older mid-rise office building has an extensive and overdue renovation that includes numerous performance enhancing features.

The subject is a six-story, 86,840 SF office building built in 1970. It is occupied by a single tenant that is a long-term public agency with a nearly full-service lease, but with some tenant contribution to selected operating expenses. Worker density per floor in the building is high; elevators are in constant daytime use and the southerly building orientation creates a substantial cooling load on the HVAC. The last renovation was in 2009, but was mostly cosmetic. A new building upgrade is proposed to address the energy and maintenance costs, which are above BOMA averages (+27 percent) for this building type, age, and location.

Energy analysis was conducted by XYZ Superior Engineering LLC, who worked closely with the local electric, gas, and water utilities to create an ASHRAE Level 2 Energy Audit. The utility companies lent expertise and provided financial incentives to the owner. The vendor has experience at a national level with similar buildings and is highly experienced. An interview with the lead engineer indicates that the engineering firm is "extremely confident" that they will meet or exceed their conservative projected targets. Their historic success rate meeting or exceeding projections is nearly perfect, and even if actual results are marginally below projections, system adjustments generally achieve the planned performance. Gas, water, and electric utility partners provided additional expertise regarding upgrade options and assistance to obtain incentives.

The ASHRAE audit identifies 11 energy-efficiency measures (EEM), including lighting and lighting controls, a new HVAC cooling tower, air handling and variable load controllers, window film, a parking garage CO sensor, and exhaust controls. Additionally, there are two water control measures (WCM).

A summary spreadsheet of results using eQuest® software is attached to the energy audit and details estimated annual savings per year per measure, utility, and other incentives/rebates per EEM and WCM, net cost, and simple payback per measure. Accounting for the imminent need for HVAC replacement, the four primary efficiency measures have simple payback times of less than 10 years. The combined payback of over a dozen conservation strategies implemented at the building showed a 17.8-year payback for the project overall, based on the building's actual utility tariffs.

Relying only on simple payback ignores the reality that these are capital budget replacement items that are due (or past due), and at the end of their economic life. A capital reserve has (theoretically) been accruing to pay for these capital expenditure upgrades, so the "payback" from efficiency is really to cover the price of the premium paid for the higher-performance items versus "normal" items. Increased property value is also not reflected in a "simple ROI" analysis. These points emphasize that most deep retrofits happen when called for at a building's capital expenditure cycle point. While "simple payback" is commonly used, it is an incomplete and often inaccurate measurement of total investment payback.

To ensure and verify that installed measures achieve their savings targets, a three-year commissioning program and sophisticated BMS is included in the project fee. Also included is training for the owner's on-site maintenance staff so they will be able to properly operate the building at the end of the post-upgrade commissioning phase.

Total energy and water savings are determined to be $103,134 per year with a net up-front cost (after all rebates/incentives, but before depreciation) of $1,843,164. Based on capitalization rates on sales of older, renovated, well-located properties with good occupancy history, the appropriate real estate capitalization rate is determined to be 6.0 percent (by utilizing the income approach). Utility expenses are likely to rise more consistently over time and have lower volatility than real estate rental income. Based on the savings consistency and smaller fluctuations over time (for utility prices versus rent plus tenant rollover), applying the real estate capitalization rate to the net annual savings amount is considered reasonable, or even conservative. Based on the annual energy savings and rate of return, the resulting value contribution of the proposed upgrades would be:

$103,134 / year savings / 6 percent OAR = $1,718,900

Market Value Contribution to the "As-Is" Value = $1,700,000 (rounded)

Although this amount is less than the net construction budget (without entrepreneurial profit adjustment), certain major items (HVAC components) are at the end of their economic service lives and would need replacement anyway. Effectively, the energy savings captured with the upgrade are covering nearly all of the imminent capital expenditure. The BMS and maintenance contract create reasonable assurance the savings will be captured going forward.

Note that in this example the rent is concluded to be at a higher market level after the renovation, pro forma vacancy decreases based on higher tenant retention, and the post-upgrade OAR is lower for the more modern comfortable building. The building also has an extended economic life with no major capital expenditure outlays for some time.

Case Study #5: Income Approach—Market Rental Rate Multi-family Retrofit

2909-29 E. 78th Street apartment building courtyard and entrance (Chicago)

This multi-family example is derived from a 2015 case study on an energy-efficiency retrofit project.[64] CheckMate Realty and Development, Inc. (CheckMate), a Chicago property owner and manager, worked with Elevate Energy and Community Investment Corporation (CIC) to retrofit a 31-unit multi-family building at 2909-29 E. 78th Street that provides market-rate, unsubsidized housing at affordable rates in Chicago's South Shore neighborhood.

The four-story property, built in 1928, has an unconditioned ground floor for mechanical equipment. The remaining three stories total 27,140 square feet of conditioned space, with 25 one-bedroom apartments and

[64] The full case study is available at http://www.imt.org/uploads/resources/files/IMT_ValuingEE_CheckMate_FINAL.pdf .

6 two-bedroom apartments. The building uses a single-pipe steam heating system with a central gas-fired boiler. The owner pays for the master-metered building-wide heat and hot water as well as the common area electricity. Tenants pay for their separately-metered apartment electricity and cooking gas.[65] As of 2015, CheckMate charged $650 and $750 per month in rent for one-bedroom and two-bedroom units respectively. As Chicago's South Shore market will not support rent increases, CheckMate uses energy-efficiency measures to help offset rising operating costs and increase NOI.

In 2009, Elevate Energy performed a building assessment and recommended energy efficiency measures based on a savings-to-investment analysis.[66] They found that the steam heating system was unbalanced, each apartment was heated differently, and the attic and roof were poorly insulated and losing heat, for which the building compensated with inefficient large third-floor apartment radiators. Between February 2011 and January 2013, the project team insulated the roof cavity and attic, performed air sealing, rebalanced the floors, replaced the boiler burners, and adjusted the boiler controls. In addition, the team installed water-saving showerheads, high-efficiency faucet aerators in the kitchens and bathrooms, and compact fluorescent light bulbs in each apartment unit, through ComEd's Multi-Family Direct Install Program.[67] Finally, contractors insulated the building's domestic hot water and heating pipes.

After the efficiency retrofit, the building reduced its weather-normalized fuel source energy use intensity (EUI) by 36 percent, from 152 kBtu per sq. ft. to 98 kBtu per sq. ft. through energy-efficiency measures. The total project cost $30,200: the ComEd Direct Install measures were free, the air sealing and roof insulation cost $12,120, and the domestic hot water and heating pipe insulation cost $18,080. CheckMate financed $12,000 of the project with CIC's 7-year, 3 percent interest energy construction secondary secured loan and used replacement reserves for the balance.

The weather-normalized annual average gas savings of nearly 14,000 therms increased the annual NOI by approximately $14,000. A DCF analysis for the retrofit value yielded a net present value (NPV) of $80,952 and an internal rate of return (IRR) equal to 46 percent for the retrofit.[68] [5] The total return on investment (ROI) was 368 percent, which corresponds to an annual ROI of 37 percent.

Retrofit's Potential Effects on Property Value

Market surveys of multi-family housing throughout Chicago show cap rates of 5.1 percent to 16.5 percent. This case study uses a 10 percent cap rate because of the subject's location south of the city core for walk-up properties, the property's consistent cash flow but restricted rental income upside, and increasing expense trends caused by higher tax and operating costs. Based on the 10 percent cap rate, the potential added value from the energy measures that increased the NOI by $14,000 is $140,000, or an approximately 10 percent increase in value based on the 2010 appraised value of $1.35 million. A definitive assessment of value would require a new appraisal.

CheckMate bought the property in 2009 when the building had a 61 percent occupancy rate with 12 vacant units. The 2015 occupancy rate was 93.5 percent, with only two vacant units. CheckMate completed moderate renovations in 2010, and conducted the energy-efficiency upgrades from 2011 to 2013. It is difficult to determine to what extent the greater occupancy can be attributed to the energy-efficiency retrofits, but the increased efficiency likely led to improved tenant comfort that will help retain tenants.

Case Study #6: Income Approach—Multi-family Subsidized Rent

10 Seventh Street apartment building facade (Buffalo)

This case study is derived from a 2004 study on the impact of energy savings on the value of Pine Harbor Apartments, a 208-unit subsidized apartment complex in downtown Buffalo, New York.[69]

The property was built in 1974 and includes a seven-story, 168-apartment building with 85 one-bedroom units, 43 two-bedroom units, 40 three-bedroom units, and a common laundry facility. The property also has a set of three-story buildings with 40 four-bedroom units. Of the 208 total units, four are used by the property, and 204 are rentable.

Pine Harbor was financed and built under New York State's Division of Housing and Community Renewal Section 236 program, which provided low-cost financing and real property tax credits/exemptions in exchange for renting the units to income-qualified tenants. Many tenants also receive federal Section 8 housing assistance. Monthly rents range from $440 to $814, depending on unit size and tenant income.

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65 After acquiring the building, CheckMate installed separate meters for the cooking gas in each unit.

66 See a sample energy audit here. "Energy Audit Report," Elevate Energy, last accessed November 4, 2016, http://www.elevateenergy.org/wp/wp-content/uploads/Sample-Energy-Savers-Report.pdf.

67 Commonwealth Edison (ComEd) is the electric utility serving Chicago.

68 Assumptions include a 10-year useful life for efficiency measures, a 5 percent discount rate based on comparable sales, a $1 per therm initial gas price, and a 1 percent annual increase in local gas price.

69 The full case study is available at http://www.imt.org/uploads/resources/files/PineHarborCaseStudy2004.pdf.

The building owner pays for the electric and gas utilities. From 1999 to 2000, Pine Harbor replaced electric resistance baseboard heaters with a total of 287 direct-vented, natural gas-fired room heaters with 81 percent rated efficiency in the apartments and certain common areas. The New York State Housing Finance Agency Project Improvement Program provided an essentially zero-interest second mortgage to fund the total installation cost of $996,286.

In 2003, Pine Harbor's energy costs were $286,585 ($1.17 per square foot) or 30.5 percent of total building expenses. An energy bills analysis estimated that without the retrofits, the annual normalized energy costs would have been about $395,600 ($1.61 per square foot) or 37.8 percent of total building expenses.

Since the retrofits, tenants have found their apartments much more comfortable and tenant-management relations have greatly improved. Before the retrofits, Pine Harbor had a 15.7 percent vacancy rate. In 2004, the vacancy rate dropped to 2 percent, and the building owner created a waiting list to accommodate potential tenants. The owner attributes 90 percent of the vacancy reduction to the heating retrofits.

A 2004 appraisal valued the property at $4,650,000, of which $1,150,000 was attributed to the energy cost reductions, which is a 33 percent increase in value. The estimate does not factor in any changes in vacancy rates. A 1998-level vacancy rate at current rents would imply an annual vacancy loss of $221,679. If one were to attribute to the retrofits 90 percent of the vacancy factor reduction from the 1998 level of 15.7 percent to the current vacancy level of 2 percent, then the retrofits would account for an increase in annual gross income of $174,073. Of course, the increase in gross income was partially offset by an increase in variable costs resulting from occupancy levels, including energy costs. Given the variable costs of the building, it is reasonable to expect that $125,000 of the $174,073 increase in gross income would accrue to the bottom line as increased NOI. Capitalizing $125,000 at 9.5 percent yields an incremental property value of $1,316,000.

By calculating the vacancy reductions to the appraisal's slightly higher 4 percent vacancy rate instead of the building's current actual vacancy rate of 2 percent, the property value increment from the vacancy reduction attributable to the retrofits is about $1,150,000, which is equivalent to the value of the energy savings. Thus, total value of the retrofits, including energy savings and lower vacancy rates, would be about $2,300,000, or 49 percent of the property's value.

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