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APB VALUATION ADVISORY 6: VALUATION OF GREEN AND HIGH PERFORMANCE PROPERTY: BACKGROUND AND CORE COMPETENCY

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APB Valuation Advisory #6

Valuation of Green and High Performance Property: Background and Core Competency

This document is intended to offer voluntary guidance on recognized valuation methods and techniques.

Date Issued: **June 2, 2015**

Application: **Residential and Commercial, Multifamily and Institutional Real Property**

Issue: As part of its ongoing responsibilities, the Appraisal Practices Board (APB) is tasked with identifying where appraisers and appraisal users believe additional voluntary guidance is required. One such issue identified by the APB is *Valuation of Green and High Performance Property: Background and Core Competency*.

What is a "green" building? A significant challenge of this voluntary guidance has been to address this very broad reference and specifically focus on the knowledge and skills necessary to apply recognized valuation methods and techniques. "Green" and "sustainability" have been defined by so many, applied for such different purposes and nuanced for varied property types that just using the word invites confusion. Every effort is made in this Valuation Advisory to narrow the discussion to what are currently the most prevalent characteristics associated with green buildings. In this context, a "high performance property" might use fewer resources, be more efficient, be more healthy and productive to its occupants and/or provide lower operational cost and ownership risk. Measuring "greenness" and performance relative to "conventional construction" (another challenging reference) is the ongoing focus of many groups discussed herein. As building operations become more precisely monitored and reported, it should become easier to define "green" within a specific assignment scope.

The purpose of this document is to provide voluntary guidance to appraisers concerning the necessary background and core competency that is needed to value green, high performance or sustainable commercial and residential buildings (henceforth referred to as green buildings) as well as existing or new building stock that is not green (henceforth referred to as conventional buildings) yet may have green features or exist in a (local) market that values high performance and/or green buildings.

This Valuation Advisory is the first in a series of three to be issued by the APB on green and high performance property. The APB intends to issue additional advisories on the *Valuation of Green and High Performance Property: Residential Properties*, and the *Valuation of Green and High Performance Property: Commercial, Multifamily and Institutional Properties*.

In that context, this advisory is to provide voluntary guidance as to the background and core competency issues from which the next two advisories will build upon. For purposes of this document, the terms "green" and "conventional" will be used, **although other terms may be used interchangeably.** It is important for the appraiser to determine the specific terms that will be applicable in an assignment.

Subject Matter Experts: The APB established a Subject Matter Expert Panel to assist it on this topic and addresses the rapidly evolving influence of green and sustainable building practices in the property valuation profession. The Appraisal Practices Board and The Appraisal Foundation wish to express our sincere gratitude to the U.S. Department of Energy and each of the following Subject Matter Experts for volunteering their time and expertise in contributing to this document:

Mel Black	Raleigh, NC
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APB Liaisons: Alan Hummel and John Willey; APB Chair Rick O. Baumgardner; APB Vice-Chair Jay E. Fishman; and Director of Appraisal Issues John S. Brenan.

In addition, the Appraisal Practices Board and The Appraisal Foundation wish to thank the following individuals who volunteered their time and expertise in contributing to this document prior to April 30, 2013:

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Valuation of Green and High Performance Property: Background and Core Competency

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Introduction

The real estate market is continuing to change as green and high performance technologies and regulations re-shape the construction and operation of commercial and residential real estate.

What is a "green" building? A significant challenge of this voluntary guidance has been to address this very broad reference and specifically focus on the knowledge and skills necessary to apply recognized valuation methods and techniques.

In the midst of these changes, real estate appraisers are facing challenges as they research and analyze appraisal assignments involving these properties. To keep up with this rapidly-changing field and with changes in the residential and commercial market, appraisers are encouraged to expand their knowledge base and skill set.

The Advisory makes references and citations that are not intended to be all-inclusive, serving as examples only, and acknowledges that other credible resources exist.

Under the *Uniform Standards of Professional Appraisal Practice* (USPAP), appraisers are required to:

- Be competent to perform the assignment;
- Acquire the necessary competency to perform the assignment; or
- Decline or withdraw from the assignment.

Paths to competency include, but are not limited to, coursework and self-study, as well as attending professional seminars and presentations (in person and online). In addition, appraisers may also seek out general construction and/or building inspection and building system courses. Determining the threshold for core competency will depend to some degree on property type, geography, time, and the intended use of the appraisal opinions and conclusions.

However, while the level of rigor expected of an appraiser may vary, the basic criteria to judge competency for a green or high performance property follows the same basic steps that apply to any appraisal assignment:

- Problem definition and identification;
- Research and analysis; and
- Development and reporting of the value.

The Advisory lists and provides an extensive review of the following key terms and concepts:

- Sustainability
- Green Building
- Integration
- Rating Systems, Scores and Certifications
- Energy Modeling, Benchmarking and Auditing

- Policy Initiatives and Regulations
- Financing Incentives
- Green Leases

Each key term and concept is followed by a description along with its relevance to appraisers. For each of these key terms and concepts, the overriding concern is for appraisers to accurately identify the specific features and attributes of a given property and properly gauge their effect on market value.

Appraisers need to recognize green and high performance buildings and building features in order to perform the appropriate scope of work, conduct relevant market research, and use appropriate valuation methodologies. Value recognition of property features can vary widely within markets. This can be true for an unusual improvement that does not clearly create positive income, operational cost savings or lower risk impacts and may therefore be a superadequacy (i.e., a cause of functional obsolescence).

The Advisory contains suggested minimum thresholds of competence for residential and commercial appraisers. It illustrates the specific types of knowledge and skills required of those appraisers who seek to value green and high performance property.

NOTE: *This Advisory is the first in a series of three to address green and high performance property. The next two advisories will focus on residential and commercial, multifamily and institutional properties, respectively.*

Section I: Background

Green building awareness, knowledge and expertise is an area where appraisers may need a higher level of sensitivity as to possible impact on market value. In some markets, what was once an esoteric niche is becoming ingrained in mainstream building practices, building codes, and market behaviors. As market participants increasingly consider green and sustainable practices and expectations in their buy/lease decisions, it is important for appraisers to consider the perspective of the relevant market participants, in markets where such change impacts value.

This Valuation Advisory is intended to offer voluntary guidance to appraisers and users of valuation services seeking to determine the necessary knowledge and skills required to competently value green and high performance buildings.

In some markets, the growing adoption of numerous green principles and the changing regulatory environment are creating a new normal against which properties are to be judged. Consequently, some properties are now being compared to others based on performance. To measure performance, a variety of metrics are being used:

- Sustainability (sustainable sites with lower environmental impact, proximity to transit and services, etc.)
- Water use (indoor water efficiency, landscaping, storm water management, etc.)
- Energy and atmosphere (optimal energy performance, renewable energy, green power, etc.)
- Building materials and resources (rapidly renewable resources, low environmental impact materials, etc.)
- Indoor air quality (air circulation, fresh air returns, etc.)
- Operations and maintenance (longevity of materials, maintenance costs, etc.)

As property performance increases in relevance, the potential for obsolescence increases for lower performing properties. Class A office space in certain urban areas may require LEED certification. New buyers can choose among multiple buildings with ENERGY STAR or various green labels in a growing number of areas across the United States, and various energy upgrade options are available to owners of existing buildings.

NEW CHALLENGES

This evolution in some real estate markets may present new challenges that appraisers must research and analyze as part of their assignment, such as:

1. ***Market share of green buildings:*** In a response to tenant demand and the increasing number of green building codes, landlords in the commercial sector are increasingly incorporating green features and pursuing green certification in new construction and major renovations.

2. ***Green building codes, benchmarking and mandates for green space:*** An increasing number of jurisdictions are instituting or expanding green building codes and ordinances, and/or requiring periodic benchmarking of certain classes of commercial buildings. The U.S. General Services Administration is requiring that federal buildings conform to green standards. It is important for appraisers to have an understanding of new building technologies and the value implications of new building code standards. These new standards affect not only new buildings and retrofits but also conventional buildings that do not comply with current building codes.

3. ***Prevalence of conventional buildings upgraded with green features such as energy-efficient Heating, Ventilating, and Air Conditioning (HVAC) systems, solar photovoltaic (PV) systems, or water-efficient fixtures:*** These types of upgrades, even in conventional buildings, could yield value impacts. Appraisers performing this type of work must identify and value such features with market-supported adjustments.

4. ***Potential for obsolescence, also known as the brown discount, for existing buildings that don't "green up":*** Just as green buildings that outperform the market may show a value premium, conventional buildings that underperform relative to their market may show a discount.

5. ***New sources of revenue and new encumbrances to the property:*** On-site generation assets may actually produce revenue streams, not just energy savings associated with lower energy consumption. Certain types of financing for energy efficiency and renewable energy (Property Assessed Clean Energy (PACE) or On-Bill Repayment) also stay with the property in the event of a transfer of ownership.

Section II: Core Competency

The transition toward green buildings, green building codes and technologies, and the growing awareness of the relevance of sustainability to the marketplace can be viewed as part of the natural evolution of the real estate industry as it adapts to environmental, societal, and economic changes.

Just as the building sector evolves, so too must the appraiser's skill set in order to accurately see the property through the eyes of the market, and thus render a competent valuation based on market-supported conclusions.

Key Terms and Concepts

It is important for appraisers to familiarize themselves with the following list of key terms and concepts, which is intended to be illustrative and not exhaustive:

- Sustainability
- Green Building
- Integration
- Rating Systems, Scores and Certifications
- Energy Modeling, Benchmarking and Auditing
- Policy Initiatives and Regulations
- Financing Incentives
- Green Leases

SUSTAINABILITY

Sustainability is a very broad concept that lacks a single definition. It is most often defined with reference to the 1987 United Nations Brundtland Commission Report[1] which defines sustainable development as that which "meets the needs of the present without compromising the ability of future generations to meet their own needs." When considering the application of this concept to a business setting, Elkington's "triple bottom line" (TBL) is commonly cited, which states that one must balance the economic, social and environmental objectives across current and future generations.[2] The TBL concept is also sometimes framed as "People, Planet, Profit" in the same work.

While neither of these definitions speak specifically to the built environment, the Royal Institution of Chartered Surveyors (RICS) Global Property Sustainability Survey strongly echoes the TBL concept by ''...equat[ing] sustainability with the goal of balancing economic,

[1] United Nations General Assembly, *Report of the World Commission on Environment and Development*, General Assembly Resolution 42/187, 11 December 1987.

[2] Elkington, J, *Cannibals with Forks: The Triple Bottom Line of 21st Century Business* (Stony Creek, CT: New Society Publishers, 1998), 20.

environmental and social objectives at global, national and local levels in order to meet the needs of today without compromising the ability of future generations to meet their needs."[3]

Relevance to Appraisers

Sustainability's influence on real estate purchase and lease decisions is clear and growing. As evidenced by a survey by CoreNet Global/JLL, 92% of real estate executives consider sustainability criteria in their location decisions.[4] Most notably, sustainability has been a driving force behind the construction of green and high performance property. As will be discussed in a subsequent section, the key aspects of the major green building rating systems, scores and certifications derive from the principles of sustainability.

In addition, the concept of sustainability presents a set of risks to the market value of real estate. These risks can be categorized as follows:[5]

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

The following exhibit illustrates examples of each of the above risks and the potential for impact on value. Note that the exhibit includes up and down arrows, which are abbreviations. The arrows pointing up should be read as "increasing," and the arrows pointing down should be read as "decreasing."

[3] Royal Institution of Chartered Surveyors (RICS) Global Property Sustainability Survey (Q4 2009).

[4] CoreNet Global and Jones Lang LaSalle, "Perspectives on Sustainability: Results of the 2010 CoreNet Global and Jones Lang Lasalle Global Survey on Corporate Real Estate and Sustainability," Jones Lang LaSalle (March 2011).

[5] Runde, T.P. and S. Thoyre, "Integrating Sustainability and Green Building into the Appraisal Process," Journal of Sustainable Real Estate (2010, 2): 221–48.

RISK CATEGORY	EXAMPLES OF SUSTAINABILITY RISKS	POTENTIAL PROPERTY VALUE IMPACTS	
		Direct	Indirect
RESOURCE USE	▪ ↑ global demand for materials vs. fixed supply ▪ ↑ energy cost, volatility; ↑ water cost, rationing	▪ ↑ replacement cost; ↑ TI & future renovation costs ▪ ↑ operating expenses, ↓ NOI; Energy efficiency becomes paramount	▪ ↑ replacement cost may ↑ market barriers to entry; Renovate preferred over new construction; Life cycle costing
OBSOLESCENCE	▪ Consumption rate ↓, or patterns shift ▪ ↑ need for properties to adapt to future uses and users (not yet identified) ▪ Increased rate of change expected in future	▪ ↓ demand for retail; change in type/location ▪ ↑ rate of depreciation; ↑ TI, cap ex cost for less adaptable properties	▪ ↓ economic growth due to ripple effect of consumer (70% GDP) ▪ ↑ risk for special-purpose improvements
TRANSPARENCY & STAKEHOLDER INFLUENCE	▪ ↑disclosure of energy efficiency ▪ Non-financial stakeholders influence investor decisions	▪ GRI reporting that triggers green-up of REIT portfolio; carbon reporting	▪ Stigma for poor performers ▪ Supply chain reporting requirements
EXTERNALITIES	▪ Greenhouse gas (GHG) and climate change legislation ▪ Community charges back project externalities ▪ Poor indoor air quality	▪ Carbon taxes, cap & trade; Project GHG emissions used as reason not to allow development ▪ Impact fees; assessments ▪ Health risk liability	▪ Stigma: ↓ marketability

Source: Runde, T.P. and S. Thoyre. Integrating Sustainability and Green Building into the Appraisal Process. *Journal of Sustainable Real Estate*, 2010, 2.

For core competency, an appraiser should understand general sustainability concepts related to real estate. The appraiser next determines how the local market is applying these various ideas in the buy/sell/lease decision process regarding value and risk.

GREEN BUILDING

There are wide-ranging definitions for the term "green building" and to date, no single agreed-upon definition. The term can be used to mean a structure with sustainability-related features (noun) and/or the process of constructing or remodeling of a structure with sustainability-related features (verb).

An important feature of green buildings is that the essential attributes are based in the principles of sustainability, and therefore encompass more than just energy-efficiency features. This distinction is important to the appraiser and, despite the fact that the terms "green" and "energy efficient" are often incorrectly used as synonyms, they reflect different building attributes. In

practice, a green building will incorporate features that address more than just energy use, such as: water efficiency, sustainable site selection, indoor environmental quality, material selection, and operations and maintenance. A building that is said to be "energy efficient" may not be a green building if the only distinguishing characteristic of the building is that it uses less energy than a comparable building does. Likewise, one cannot assume that a green building will necessarily be more energy efficient than a conventional building.

Relevance to Appraisers

Green buildings, or conventional buildings with green features, can contain special materials or equipment, can have design advantages and can be less (or more) expensive to operate. Such buildings may have high performance technologies or characteristics that may have additional value. Solar panels, high-efficiency HVAC, and Building Management Systems or Building Automation Systems (BMS or BAS) are examples of green technologies, while siting, passive heating and cooling, or a green certification are examples of green qualities. These characteristics may affect a property's value due to the initial cost of construction as well as the potential impact on operating costs, lower/higher risk, improved/diminished marketability or change in rental income.

As green building codes continue to proliferate, and as existing (conventional) buildings incorporate green technologies, the distinction between what is a green building and what is not will likely become more difficult to pinpoint. This is not to say that a given market may not value a green label, but the overriding concern to the appraiser should be to accurately identify the specific features and attributes of a given property and properly gauge the effect on market value.

By focusing too much on the potential value impacts of green building labels/certifications, appraisers may miss the value impacts of straightforward building performance improvements to an otherwise conventional existing building, such as efficiency upgrades to an HVAC system or water-saving plumbing modifications. The upgraded property may lack a certification or label, and may not technically be considered a "green building," but the green upgrades could have a discernible effect on market value and, as such, need to be noted and appropriately valued. As with any property characteristic, appraisers should remain focused on the characteristics, performance and risk profile of a given property, and the degree to which those characteristics impact value.

Appraisers should also be aware that the terms green and energy efficient are not synonymous. Energy-efficient buildings are not necessarily green. While green buildings are typically expected to be more energy efficient than their conventional counterparts, it is important for the appraiser to ascertain to the extent possible whether or not a green building is more energy efficient than its peers, and appropriately consider the implications of modeled versus actual energy performance.

INTEGRATION

The concept of integration is central to green building. It encompasses building design and construction (commonly referred to as the Integrated Design Process (IDP)), as well as the concept of creating synergies that improves the buildings function on a variety of levels.

IDP is a departure from the conventional "Design-Bid-Build" model. IDP incorporates key stakeholders from various disciplines working collaboratively from the outset of the design process through the completion phase. Rather than thinking about a building as discrete parts, an integrated design approach encourages consideration of a building as a whole system. IDP is sometimes referred to as "whole building design" or "whole house approach."

The table below summarizes some of the key differences between IDP and the conventional Design-Bid-Build model:

Integrated Design Process		Conventional Design Process
Inclusive from the outset	vs	Involves team members only when essential
Front-loaded — time and energy invested early	vs	Less time, energy, and collaboration exhibited in early stages
Decisions influenced by broad team	vs	More decisions made by fewer people
Iterative process	vs	Linear process
Whole-systems thinking	vs	Systems often considered in isolation
Allows for full optimization	vs	Limited to constrained optimization
Seeks synergies	vs	Diminished opportunity for synergies
Life-cycle costing	vs	Emphasis on up-front costs
Process continues through post-occupancy	vs	Typically finished when construction is complete

Source: Developed for the British Columbia Green Building Roundtable 2007 by Busby, Perkins & Will.

By viewing the building as a system and by involving a wide range of viewpoints and skills on the design team, integrated design can achieve synergies between the building components. For example, installing water-efficient plumbing fixtures not only saves water, but saves energy because as less water is used, less energy is needed to heat and move the water throughout the building. A vegetative (green) roof can both reduce storm water runoff and decrease a building's heat island effect, which can optimize heating/cooling requirements. In a commercial building, window designs utilizing overhang or specialty glazing enable passive solar heating while also reducing unwanted solar heat gain, and possibly reducing artificial lighting requirements. Done properly, this design element can reduce energy used for heating, cooling and lighting. Further, reduced lighting, or changing to a light source that generates less heat, can further reduce cooling

needs. These elements have measurable initial cost impacts, as well as ongoing operational cost impacts.

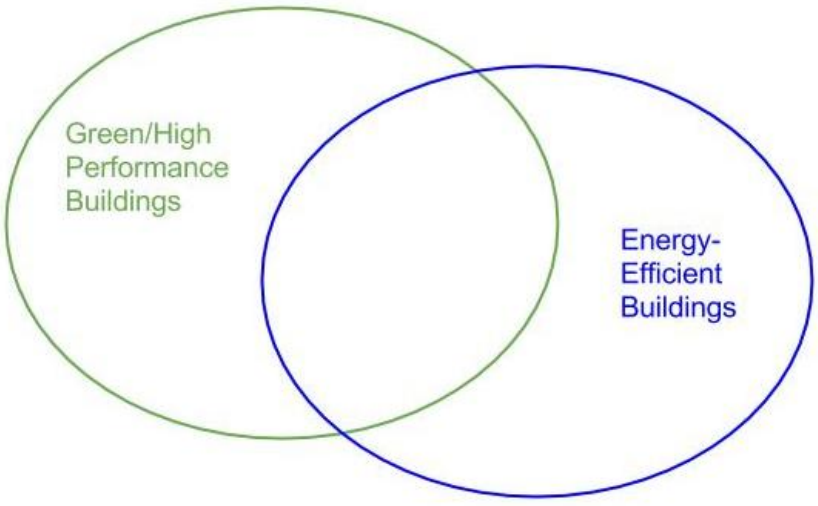
Relevance to Appraisers

These types of design and operational synergies may generate measurable construction and/or operating cost savings -- yet may be virtually invisible even to those familiar with sustainable building practices. Appraisers may need assistance from the design team in identifying and describing integrated design strategies and the resulting synergies. In some cases, the cost savings can be substantial. For example, in the proposed renovation of a 45,000 square foot office/flex building to net-zero status (reduce energy use to only that which can be produced on-site by renewable means), the integration of a ground-source heat pump system with passive ventilation and BMS-controlled mechanical windows may eliminate the need for $600,000 of duct work. Additional operational savings will likely accrue by eliminating the need for fans to move the air through the building for heating, cooling and ventilation. In this case, the integrated design had implications in the Cost, Sales Comparison, and Income Approaches.

RATING SYSTEMS, SCORES AND CERTIFICATIONS

There are several widely acknowledged green building rating standards/systems for commercial buildings in the United States, and a larger number for residential properties. The residential standards are more plentiful and, with few exceptions, tend to be more regionally specific.

Green building rating systems are intended to set a baseline for new construction, retrofitting and operational requirements and to distinguish buildings that have received certification from those that have not. Green building rating systems are distinguished from energy-efficiency scores and certifications -- such as ENERGY STAR or Home Energy Rating System (HERS) -- in that the latter focus solely on energy efficiency, while green building rating systems are intended to rate a building's design and/or performance across a broader spectrum of sustainability criteria (i.e., the triple bottom line). In addition, there are some rating systems that address both green and high performance buildings, as well as energy-efficient buildings, as illustrated below:



Green and high performance rating systems award cumulative points across a range of common sustainability metrics that include the following core categories:

- Energy Efficiency
- Materials and Resources
- Water Efficiency
- Indoor Environmental Quality (IEQ) and Indoor Air Quality (IAQ)
- Site Efficiency/Community
- Operations and Maintenance

Some green building rating systems include additional categories. Points are typically awarded in a cumulative fashion across all categories. Most green building rating systems incorporate energy efficiency as a minimum threshold for certification. For example, in some green building programs, the energy-efficiency category may provide performance thresholds such as ENERGY STAR benchmarking or obtaining a minimum HERS rating for homes (the lower the HERS rating number, the more energy efficient the home).

The charts below summarize a selection of rating systems, scores and certifications, differentiating between those which are considered to be green or high performance, and those which are related only to energy efficiency:

GREEN/HIGH PERFORMANCE *Measures overall spectrum of sustainability*
LEED
Green Globes
National Green Building Standard
Passive House Institute US
Living Building Challenge

ENERGY-EFFICIENT RATINGS *Measures energy efficiency only*
ENERGY STAR
HERS
Building Energy Asset Score
Home Energy Score

The various rating systems, scores and certifications can also differ from each other based upon the types of property that are eligible for the respective programs. Certain programs apply only to residential property, some only to commercial property, and some apply to both. ENERGY STAR includes programs for both residential and commercial buildings. The HERS rating system applies only to single-family residential property. These differences are illustrated with a selection of rating systems, scores and certifications in the chart below:

Commercial / MultiFamily Only	Residential Only	Both Commercial and Residential
LEED	LEED for Homes	ENERGY STAR
Green Globes	HERS	National Green Building Standard
Building Energy Asset Score	Home Energy Score	Passive House Institute
	WaterSense	Living Building Challenge

The following green building rating systems, scores and certifications summarize some of the characteristics of the various standards:

LEED

The Leadership in Energy and Environmental Design (LEED) rating system is, at the time of this writing, the most widely utilized comprehensive commercial green building rating system in the United States. It is a voluntary rating system provided by the Green Building Certification Institute (GBCI) that requires third-party verification for certification. Version 1.0 of the standard was launched by the U.S. Green Building Council (USGBC) at its Membership Summit in 1998. After extensive modifications, Version 2.0 was released in 2000. LEED Version 3.0 was released in 2009. LEED Version 4.0 was released in late 2013. The rigor required to achieve certification increases with each version, as does the focus on energy efficiency and, by extension, minimization of carbon pollution.

Certification is based on a point system and is awarded for basic LEED certification, as well as LEED Silver, LEED Gold and LEED Platinum -- with each ascending level of certification requiring a higher number of points. Points can be earned in the following five core categories:

- Sustainable Sites
- Water Efficiency
- Energy and Atmosphere
- Materials and Resources
- Indoor Environmental Quality

There are two additional categories: Innovation and Design Process and Regional Priority Credits.

LEED offers a variety of tracks for certification of various property types, including New Construction, Core and Shell, Healthcare, Homes, and Existing Buildings Operations & Maintenance (EBOM), among others. In LEED versions prior to Version 4.0, only the EBOM

track measured actual building performance. In LEED Version 4.0, certified buildings are required to have energy meters and building owners must commit to sharing the resulting data with the USGBC for a period of five years. Each track has both common and unique credit categories, which makes direct comparisons between them difficult. Further, since each track offers alternate paths to achieve credits, and the credit totals are cumulative, properties that achieve similar points and certification levels may be difficult to compare in a meaningful way for valuation purposes.

For more information, visit: www.usgbc.org

Green Globes

Green Globes is a recognized comprehensive green rating system for commercial buildings in the United States. It has gained momentum in recent years due to its adoption by several federal agencies, including the Department of Veterans Affairs and the State Department. Growth in the rating's level of adoption has been credited to Green Globes becoming the first green building program to achieve accreditation as a Standards Developing Organization by the American National Standards Institute (ANSI).

It was originally designed as a self-certifying standard, but moved to third-party certification to enhance credibility and gain wider market acceptance. Green Globes awards cumulative points in categories including:

- Energy
- Water
- Resources
- Indoor Environment
- Emissions
- Project/Environmental Management
- Site

Green Globes offers multiple tracks and standards, including New Construction and Existing Buildings. For more information, visit: www.greenglobes.com

ENERGY STAR

This system is designed to rate buildings solely on energy efficiency. ENERGY STAR is the Environmental Protection Agency's (EPA) voluntary rating system created to promote energy efficiency and reduce greenhouse gas emissions. Unlike LEED and Green Globes, which focus on multiple aspects of building construction and performance, the ENERGY STAR program

focuses on a property's energy performance characteristics and how efficiency can be improved and maximized.

ENERGY STAR has been widely adopted across both the commercial and residential sectors in the United States and extends well beyond real estate into a variety of other products (such as residential and office equipment, heating and cooling systems). LEED utilizes the ENERGY STAR rating and the Portfolio Manager software to award points in the EBOM track.

It is important to note that an ENERGY STAR score for a commercial building differs from the ENERGY STAR rating for a home.

ENERGY STAR for commercial properties rates actual energy usage relative to a building's peers -- adjusted for climate and occupancy use.

ENERGY STAR for homes uses an energy modeling program that produces a Home Energy Rating System Index Rating and estimates projected energy use.

ENERGY STAR for commercial properties applies only to existing buildings, while ENERGY STAR for homes is only applicable to new construction.

For more information, visit: www.energystar.gov

The Building Energy Asset Score

The U.S. Department of Energy's Building Energy Asset Score is a national standardized tool for assessing the physical and structural energy efficiency of commercial and multifamily residential buildings. The Asset Score generates a simple energy-efficiency rating that enables comparison among buildings and identifies opportunities to invest in energy-efficiency upgrades. The Asset Score uses a 10-point scale to evaluate the energy efficiency of a building's physical characteristics and major energy-related systems. The point value is assigned based on a building's predicted source energy use intensity (EUI) according to the energy simulation results. Scores are rounded to the nearest half-point increment (i.e., "6", "6.5", "7", etc.). A score of 10 represents the lowest expected energy use for a building of a particular use type that is achievable using current building energy-efficiency technologies without renewables. For more information, visit: http://energy.gov.eere.buildings/building-energy-asset-score

Home Energy Rating System

Created by the Residential Energy Services Network (RESNET), the HERS rating reflects a home's energy performance through an analysis utilizing energy modeling and proprietary software. The results of the analysis are presented as a HERS score, which is an Index rating number. This Index rates the home's energy performance compared to a reference home built to standard code requirements. It should be noted that the details of the HERS rating are just as important as the HERS rating itself. The appraiser needs to understand what features of the home contribute to the HERS rating. The appraiser should also know if the HERS rating is based on projections (plans and specifications, anticipated remodeling, etc.) or on actual testing.

For example, a home that meets standard code requirements would typically receive a HERS Rating of 100. For every percentage point difference in performance from standard code requirements, the HERS Rating varies proportionately. A home that is 35% more efficient than a code-built home would have a HERS Index of 65; a home that is 35% less efficient than a code-built home would have a HERS Index of 135. A HERS Index of zero would indicate the home is Net Zero -- producing as much energy as it uses.

Certified RESNET HERS raters calculate a home's energy rating/HERS Index Score. A "reference home" is not a home that is just similar to the subject property in size and shape, rather it actually is the subject property, hypothetically designed to meet the 2004/2006 IECC energy building code.

In comparing the HERS Index to the ENERGY STAR label, a couple of factors should be considered. To receive a HERS Index score, a home doesn't need to meet any performance or prescriptive requirements. However, to qualify for an ENERGY STAR label, the home has to meet the requirements of the ENERGY STAR checklist, plus all the requirements of the program's appropriate prescriptive or performance path.

For additional information, visit: www.hersindex.com

The Home Energy Score

The U.S. Department of Energy's Home Energy Score is similar to a vehicle's miles-per-gallon rating. It helps homeowners and homebuyers understand how much energy a home is expected to use and provides suggestions for improving its energy efficiency. It also allows homeowners to compare the energy performance of their homes to other homes nationwide. The Home Energy Score is comprised of three parts including: 1) the Score itself, 2) facts about the home including data collected and energy use breakdown, and 3) recommendations to improve the Score and the home's energy efficiency. The one-hour scoring process begins with Home Energy Score Assessor collecting energy information during a brief home walk-through. Using the Home Energy Scoring Tool, developed by Lawrence Berkeley National Laboratory, the assessor scores the home on a scale of 1 to 10. A Score of 10 represents the lowest expected energy use for a home that is achievable using current building energy-efficiency technologies without renewables. A score of 1 indicates the home needs extensive energy improvements.

For more information, see http://energy.gov/eere/buildings/home-energy-score

National Green Building Standard

The National Green Building Standard (NGBS) is the first point-based system for rating green residential construction, remodeling, and land development to be approved by ANSI.

NGBS was developed in 2007 by the National Association of Home Builders (NAHB) and the International Code Council (ICC) and it has been widely implemented throughout the housing

industry. Home Innovation Research Labs certifies homes (new and remodeled), multi-family buildings (new and remodeled), and land developments.

The 2012 NGBS version updated energy requirements (anticipating an improvement in energy performance of approximately 15 percent above the previous version) and restructured the scoring for remodeling and renovation projects. It also increased point allowances for greener approaches to lot development and design. This Standard is expected to be updated periodically.

For more information, visit: http://www.nahb.org/page.aspx/generic/sectionID=2510 or www.homeinnovation.com/Green."

While the NAHB website features general information about the NGBS, the Home Innovation website is the best resource for information about certification requirements, certified homes, and the professionals who are currently seeking NGBS Green certification for their projects. Of particular importance is the NGBS Certification Activity webpage (http://www.homeinnovation.com/ngbsgreenstats), which includes a real-time counter of NGBS Green certified units and a downloadable spreadsheet with addresses of certified homes/buildings. The webpage could be used by an appraiser to confirm that a particular property has been certified by Home Innovation Research Labs.

Additional Rating Systems and Concepts

The following, while not an inclusive list, are examples of some other rating systems and concepts used throughout various parts of the United States. The appraiser should be aware of all rating systems and concepts used in the subject property's geographic location.

EPA also manages the WaterSense program, which measures the water efficiency of products and homes. For more information, go to http://www.epa.gov/WaterSense/index.html. EPA's Portfolio Manager tool can be used by building owners to measure resource consumption, including energy and water.

Passive House Institute US, which began in Germany as the Passivhaus-Institute, is a program that certifies buildings based on specific performance criteria including ultra-low energy use and airtight, super-insulated building envelope integrity. The intent is to design and build structures that use very little energy for heating and cooling, while maintaining a high level of interior air quality. Despite its name, non-residential buildings (office buildings, schools and other commercial buildings) in a variety of countries and climates have been certified.

The Living Building Challenge is a rigorous, performance-based green building certification sponsored by the International Living Future Institute. The program certifies the performance of a wide variety of building types across seven performance areas, called "Petals": Place, Water, Energy, Health & Happiness, Materials, Equity and Beauty. Projects can be certified in one or more of the performance areas. For more information, go to http://living-future.org/lbc

Net Zero Energy, Zero Net Energy, and Zero Energy Buildings all refer to buildings that are designed, built and operated to use fewer outside energy resources, with the balance of energy

needs provided by an on-site, renewable source of energy, such as a solar PV system. There are various terms for Net Zero Energy and no single, universally accepted definition, but it generally refers to buildings where on-site generation is equal to consumption over a one-year period. For more information, go to the National Renewal Energy Laboratory website at www.nrel.com.

Comparison of Residential Green Building Rating Systems

The rating systems for residential development are more numerous than those for commercial properties, making consistent comparisons across systems challenging. The following table gives examples of product, training and building rating systems directed primarily to residential green buildings (although some apply to both residential and commercial property):

Program	Sponsor	Brief Program Description	Where Prevalent
Home Energy Score (existing homes)	U.S. Department of Energy	Energy efficiency score compared to national averages	Nationwide
WaterSense	U.S. EPA	Water efficiency compared to peer national averages	Nationwide
Home Energy Rating System *HERS* and *HERS II*	Residential Energy Services Network (RESNET)	Energy efficiency	HERS Nationwide except CA. HERS II in CA
National Green Building Standard (NGBS)	Home Innovation Research Labs	Energy, water, resource conservation, indoor environmental quality, site	Nationwide
LEED – Homes	U.S. Green Building Council (USGBC)	Site impact, water, energy, materials, indoor environment	Nationwide, International
GreenPoint Rated	Build It Green	Energy, indoor air quality, resource conservation, water New and existing homes, multifamily	CA (primarily)
Earth Advantage	Earth Advantage Institute	Energy, water, health, materials and land	Portland, OR
Built Green	Master Builders Association	Energy, health and indoor air quality, materials, site, water	Seattle Area
Earthcraft	Greater Atlanta Builders & Southface	Site, energy, appliances/lighting, materials, indoor air quality, water	6 states across the Southeast
Green Built Texas	Dallas Builders Association	High performance, healthy	Texas
Passive House (in Europe Passivhaus)	Passive House Institute US	Energy, building envelope, interior air quality	Mostly in European Union, starting in US
Living Building Challenge	International Living Future Institute	Place, water, energy, health & happiness, materials, equity and beauty	US, International
WELL Building Standard	International WELL Building Institute	Aspects of building performance that impact occupant health and well being	US, International
Zero Energy Ready Home Program	U.S. Department of Energy	This program considers whether systems for high performance homes are energy efficient through energy consumption and renewable energy.	Nationwide

Each program varies in its minimum category requirements, rigor, requirements for performance testing, pre-drywall inspection, third-party or self-certification, and whether the program applies to new or existing houses.

Other rating standards are more focused on commercial and investment property or multifamily properties. Additional detail will be provided in the voluntary guidance related to both the valuation of residential, as well as commercial, multifamily and institutional green and high performance buildings.

Relevance to Appraisers

Green building rating systems/certifications are designed to offer market participants an easy-to-read label that purports to convey a building's sustainability attributes. In simple terms, these rating systems seek to answer the question: How green is this building, if it is "green" at all?

It is important for the appraiser to determine if the local market recognizes a particular certification label, score, or rating, and if it has an impact on the appraisal process.

In many cases, the green-label sensitivity of market participants may be uncertain and/or difficult to substantiate. In such cases, the various rating systems are best used as a framework to assist the appraiser in understanding how the green or energy-efficient building is different from the comparables.

In some cases, appraisers may not be able to make direct comparisons between buildings that are rated or not, nor between similar buildings rated at different levels (LEED Silver versus LEED Gold, for example). Due to the cumulative nature of the point system, two buildings at the same rating level may have different value-impacting characteristics from an appraisal standpoint.

Each potential improvement should be assessed to determine if it could create a differential to the operational, overall performance and/or risk characteristics of the property and whether this differential constitutes a market advantage/disadvantage. This should include analysis of the design intent of the various strategies, and the degree to which these goals meet the needs of relevant market participants. Properties rated by market-recognized, third-party certified standards have generally been subject to a more rigorous level of scrutiny and, as a result, many believe that they reflect a higher overall asset quality than unrated buildings. For example, properties certified under LEED require at least a basic third-party commissioning (quality assurance process). Likewise, residential rating systems that mandate a pre-drywall inspection for thermal bridging and quality insulation installation reflect an added level of third-party review of the construction -- over and above basic code-compliance building inspections.

It is worth noting that a number of building owners/developers can, and sometimes do, elect to follow LEED and best practices of green and performance building guidelines without incurring the effort and costs of formal certification. These buildings are sometimes referred to as "LEED-compliant" versus "LEED-certified." While these buildings do not bear an actual label, the in-house documentation referencing equivalency may be of value to an appraiser.

Given the wide variety of residential standards, the appraiser's responsibility is to familiarize him/herself with the specifics of the relevant standards in their respective markets and to objectively analyze whether or not these factors create potential differentials in market value for higher performing properties.

This analysis would consider market factors and trends regarding these standards and whether or not a particular market recognizes the standards as creating a benefit for properties adopting them. Key differences among the programs that might impact value include the sponsor (such as the home building industry vs. an independent organization), whether third-party certification is mandatory, and whether third-party and/or performance testing is mandatory.

The dissemination of necessary information may be impacted by the filtering process of the appraisal engagement. The need for an appraisal -- albeit from the lender directly or through an Appraisal Management Company (AMC) or from a private individual or governmental agency -- requires communication to the appraiser of the property's relevant facts and characteristics. The Scope of Work depends upon a well-defined appraisal problem. The valuation of green buildings has unique factors and components that impact an appraiser's competency requirements. Competency to perform any appraisal involves both knowledge and experience in the property type and in the applicable analytical methods (see USPAP COMPETENCY RULE). It is imperative that both the users of the appraisal service and the appraiser recognize the need to have meaningful, relevant communication when seeking to engage in valuation services for green properties. In the strictly regulated world of residential appraisals, a particular challenge is for lenders to correctly flag orders to the AMC, who must post a special request for proposal scope (perhaps requiring an Income Approach) to a panel of competent appraisers.

There are useful tools available to properly inform all stakeholders of any special considerations involving a property, such as the *Residential Green and Energy Efficient Addendum* and the *Commercial Green and Energy Efficient Addendum.*[6]

These considerations demonstrate the potential impact that various green strategies and practices might have on the market value analysis. If the valuation professional completing an assignment on a green building does not have the skills and experience to understand and analyze the various green strategies employed, then he/she may not have the competency to perform an accurate analysis of the property.

ENERGY MODELING, BENCHMARKING AND AUDITING

Energy Modeling and Benchmarking

Energy modeling is similar to cash flow modeling used in appraisal practice. Instead of modeling cash flows, engineers, designers, and energy raters use a computer program to model energy flows within and throughout a structure. Energy models consist of a computer program that requires a variety of inputs pertaining to the building envelope, mechanical systems, construction materials, equipment, climate, occupancy and use. The output of an energy model is a prediction of the building's energy use. The reliability of the output is highly dependent on the quality of

[6] Appraisal Institute, Chicago, Illinois
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the inputs, the sophistication of the software, and the skill of the operator. Therefore, to be properly used, energy models typically require specialized training. The more advanced models -- such as those used in the commercial sector -- may require more advanced training and/or degrees in engineering or similar disciplines.

Energy models are widely used in new construction for code compliance with energy codes and to comply with energy ratings like ENERGY STAR and voluntary green building rating systems such as LEED. Energy models are also used in existing homes and commercial buildings to identify opportunities for energy-efficiency upgrades and to estimate potential energy savings from a proposed retrofit or energy-efficiency upgrades. This is sometimes called an asset rating, as it predicts the building's performance with limited input on occupant behavior. Examples of asset rating in buildings include the HERS Index Rating and the U.S. Department of Energy's Building Energy Asset Score for commercial buildings. Energy modeling can be performed on any type of building, including both green and conventional buildings.

The Department of Energy's Building Performance Database (BPD) is a repository of information about the physical and operational characteristics of existing buildings. The BPD enables users to perform statistical analysis on an anonymous dataset to:

- examine specific building types and geographic areas,
- compare performance trends among similar buildings,
- identify and prioritize cost-saving, energy-efficiency improvements, and
- assess the range of likely savings from these improvements.

For more information, visit http://energy.gov/eere/buildings/building-performance-database

In contrast to modeling, benchmarking analyzes actual energy use data, providing a method to quantify the performance of a subject non-residential property in relation to typical energy-performance levels. While modeling analyzes a single building in isolation, benchmarking compares its performance to that of a comparable peer group. Benchmarking requires much less subject-matter expertise than energy modeling. The most widely used commercial buildings energy benchmarking tools are EPA's Portfolio Manager and Energy IQ (http://EnergyIQ.lbl.gov), developed by Lawrence Berkeley National Laboratory.

Relevance to Appraisers

Use of energy modeling data in the valuation process requires the appraiser to be aware of the predictive limitations of energy modeling, as well as how an energy model differs from an energy audit. Just as with car mileage, actual results rarely match modeled predictions, and in the built environment, occupant behavior can significantly impact actual energy use. Further, as the sophistication of the energy model increases, so do the required inputs that may or may not be reliably known or supportable. The skill level and experience of the energy modeler also must be consistent with the sophistication of the software and the complexity of the building.

While most appraisers lack the specialized training necessary to perform energy modeling, appraisers may be expected to review and understand reports that result from energy modeling. These reports typically require an understanding of basic energy modeling concepts and terminology such as EUI as well as what kWh and kBTU measure, and how to convert between the two measures.

The appraiser's basic knowledge of energy modeling and benchmarking concepts, practices and terminology is required to effectively interact with the professionals responsible for creating the energy model and/or the report, and to incorporate the results, as appropriate, into the appraisal. Appraisers should further be aware of the USPAP requirements relating to relying on the work of others when contemplating the use of energy modeling analysis in valuation settings. (See the Comment to Standards Rule 2-3.)[7]

Energy Audits

An energy audit – sometimes referred to as a Building Performance Assessment (BPA) -- differs from energy modeling because it measures how a building is actually performing, not how it is intended to perform. Energy audits are routinely performed on all types of properties, including both green and conventional buildings. Typically, an energy audit involves, at a minimum, a walk-through inspection of the building by a trained inspector or rater, a basic equipment assessment, and an analysis of utility usage and energy-efficiency upgrade recommendations. More advanced audits may include building envelope testing (blower door test) and/or mechanical systems and combustion safety energy modeling. Energy audits in the residential sector may include a BPA, and for more comprehensive results, can be combined with a HERS rating. In the commercial sector, the typical standard is an American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE) Level 1, 2 or 3 energy audit -- progressing from a Level 1 walk-through inspection with upgrade recommendations to an "investment grade" Level 3 report that may include advanced energy modeling and analysis of systems interactions.

Relevance to Appraisers

Potential uses of energy audits by appraisers and underwriters include comparing similar properties based on their predicted energy use as well as for ranking or assessing proposed energy-efficiency upgrades or retrofits. HERS ratings may be used to adjust residential comparables for predicted energy use. Energy audits in the commercial sector may point the user to areas of potential cost-effective upgrades as well as to identify areas where the subject property differs, positively or negatively, from the comparables. In both residential and commercial settings, the basic equipment assessment can provide meaningful insight to the appraiser as to the anticipated performance and remaining useful life of the components.

As with energy modeling, most appraisers lack the specialized training required to perform an energy audit. However, appraisers should review and have a basic understanding of energy audit

[7] Uniform Standards of Professional Appraisal Practice (USPAP) – 2014-15 edition, (Washington, D.C.: The Appraisal Foundation, 2014), U-27.

reports, such as a HERS report or a BPA. A basic understanding of energy audit concepts, practices and terminology is also required in order to effectively interact with the professionals responsible for creating the energy audit report. The details of a HERS rating are just as important as the rating itself. It is very important for the appraiser to understand the features of the home that contributed to the HERS rating and to note whether the rating is based on projections (plans and specifications, anticipated remodeling, etc.) or on actual testing. Appraisers should understand whether an ENERGY STAR rating is positively or negatively correlated with actual energy use. Clients may also require the appraiser to review and understand a basic ASHRAE audit (www.ashrae.org\greenstandard). As with energy modeling, appraisers should be aware of the USPAP requirements relating to relying on the work of others when contemplating the use of energy audits/building performance assessments in valuation settings.

POLICY INITIATIVES & REGULATIONS

Government policy and regulations concerning green building have proliferated in recent years. Policy is generally broad in nature while regulations target specific market segments and behaviors. Both can serve to shape market behaviors in ways the market would not otherwise address.

Policy and regulations concerning green building can come from the federal, state and/or local governments. The federal government has a variety of policies relating to sustainability, including a 2009 Executive Order (EO13423 "Strengthening Federal Environmental, Energy, and Transportation Management"), requiring that agencies must buy products that contain low or no toxic or hazardous constituents, contain the highest percentage of recovered materials practicable, use energy-efficient products, and reduce indoor and outdoor water use, among other requirements. At the state level, state-mandated renewable portfolio standards may specify how much of a state's electricity must be derived from renewable sources. At the local level, green building codes may have been enacted.

Relevance to Appraisers

Appraisers should be aware of and familiar with green building policies and regulations so that they can differentiate between market-driven demand and policy-driven demand. For example, for an appraiser unfamiliar with local green building codes, the widespread use of energy-efficiency technologies might be interpreted as market-driven demand, due to the market participants' embrace of sustainability principles. While this market-driven demand may be a factor, the appraiser should also consider the possible role of increasingly stringent energy portions of local or state building codes in generating demand for energy-efficient technologies.

Changing policies and regulations concerning the energy use and performance of buildings can also have implications in the adjustment process of older comparables constructed to less rigorous code standards. Energy codes might also affect the level at which energy costs are stabilized for purposes of direct capitalization.

Disclosure of building energy use can vary depending upon the jurisdiction in which the property is located. Some jurisdictions require disclosure at all times, while others may require disclosure at the time of sale, lease or financing. Numerous exclusions by building type and/or size exist, but this growing trend is helping buyers, sellers and lenders better understand building performance risk. Disclosure requirements may include due diligence documents generated by tools like ENERGY STAR Portfolio Manager for commercial property or a HERS report for a residential property. The Institute for Market Transformation, in association with CBRE, provides a website tracking the latest energy use disclosure rules (see Addendum: Selected Resources.) Like vehicle mileage ratings and restaurant inspection letter grades, energy disclosure information has the potential to affect market participant behavior. As a result, appraisers should be aware of and consider any potential value influence of energy use disclosure requirements that may affect their market.

FINANCING INCENTIVES

While mandates like building codes and regulations are the "stick" used to implement policy, incentives are the "carrot" meant to motivate behaviors consistent with policy. Incentives are available at the federal, state and local level, primarily from government entities, but also from regional and local utilities. The incentives include preferential tax treatment such as credits and deductions, financing products, and direct rebates. Each of these incentives is targeted to encourage a particular policy, and/or incorporation of specific building practices, protocols and/or characteristics. The program funding availability and qualifications may change over time, and the state and local incentives vary widely in their availability and nature, based on the particular location.

The following are examples of federal, state, and local incentive plans:

- Mortgage financing products tailored to energy efficiency and/or renewable energy, such as the Federal Housing Administration's (FHA) Energy Efficiency Mortgages (EEM) and PowerSaver loans.
- The DSIRE/Database of State Incentives for Renewables and Efficiency (www.dsireusa.org.) website provides a listing of current state, utility and local incentives for renewable energy and efficiency programs.
- At the state level, direct rebates for energy-efficiency renovations and/or solar and renewable energy generating installations are available.
- Local and regional utility companies, charged with increasing the proportion of energy from renewable sources, may offer direct rebates to customers who install solar PV or solar thermal systems. In many cases, these incentives decline over time, in an effort to offset the higher initial cost to early adopters and mirror the typical price declines in new technology as it increases in scale.
- Some counties (Los Angeles, San Francisco and Sonoma Counties in California, to name a few) are experimenting with financing solar PV and other distributed renewable energy sources with PACE programs. These programs function much like a bond assessment where

the property owner pays the cost of the renewable energy improvements over time, as a special assessment added to the property tax bill.

Relevance to Appraisers

Appraisers who work with specialized financing products like EEM or PowerSaver loans will need to be familiar with these programs and the scope of work should detail how the assignment differs from an appraisal for conventional financing. PACE program characteristics vary by the local jurisdiction and should be analyzed in order to determine the appropriate scope of work.

Tax benefits typically are outside the consideration of a typical market value appraisal since they accrue to the property owner, not the real estate, and their value is dependent on the owner's tax situation. However, for appraisers providing consulting services including feasibility analysis for renewable energy, payback or return on investment analysis for upgrades and retrofits, tax benefits and rebates may be relevant depending on the particular assignment. Appraisers engaging in this area of work should seek the advice of outside professionals when needed, particularly with respect to tax implications that might be outside the appraiser's expertise.

GREEN LEASES

The term "Green Lease" refers to a broad range of real property leases that include language addressing sustainability and green building criteria, including the operation of a green building. They differ from conventional leases in the manner in which certain lease rights and responsibilities are aligned, particularly relating to energy and resource use. A primary feature of a green lease addresses expense allocations between tenant and landlord. It may include language, in the body of the lease or as attachments, that governs the tenant's use of energy and/or water, the timing of janitorial service, the type of products and equipment used, a requirement to use ENERGY STAR-labeled office equipment, desk fans, or LED task lighting, among others. Green lease clauses often address the "split incentive" issue where costs and benefits are shared by the landlord and the tenant.

Relevance to Appraisers

It is important for the appraiser to consider identifying and discussing these clauses and report how the lease cost-saving measures will be calculated, as well as their value impact if any.

Operational cost savings may be extracted from operating statements, but this is a complex process. Such savings may be supported by historic operating statements, but ongoing performance monitoring may be the best strategy to ensure that they will continue. In addition to energy cost savings, lease terms might address on-site power systems (solar PV, fuel cell, co-generation, etc.) impacting the tenant's utility costs such as a Power Purchase Agreement or a PACE obligation on the tax bill.

There is a growing body of standardized green lease clauses. For information on the GSA's Green Lease Policies and Procedures, visit http://www.gsa.gov/portal/content/103656. For information on New York City's Energy Aligned Lease Clause, visit http://www.nyc.gov/html/gbee/html/initiatives/clause.shtml. The green lease library provides a

centralized site for commercial green leasing resources, including guidance, sample lease forms and case studies. For more information, visit: http://www.greenleaselibrary.com and http://www.greenleaselibrary.com/green-lease-leaders.html.

Section III: USPAP Considerations

USPAP RULES AND STANDARDS

All USPAP sections relevant to the valuation of green and/or energy-efficient buildings must be considered in assignments where the scope of work dictates that such analysis is necessary for credible results.

Under the COMPETENCY RULE, appraisers must:

- ***Properly identify the problem to be addressed in markets where green features could influence market value***: Appraisers should be able to recognize green buildings and green features in conventional buildings in order to determine and perform the appropriate scope of work, conduct relevant market research, and use appropriate valuation methodologies. Green buildings and features are sometimes difficult to distinguish from conventional buildings and features. Appraisers must have enough basic competency to know whether or not the property being appraised requires specialized knowledge of green buildings.

- ***Have or be able to acquire the knowledge and experience to complete the assignment competently:*** When appraising green buildings, appraisers must possess or take steps to gain the necessary knowledge and experience required to competently value green buildings and conventional buildings with green and/or energy-efficient features. Like any other property type or property characteristic, competence mandates that the appraiser be adequately familiar with the asset type/features, as well as the appropriate and most widely-used valuation techniques for the particular property/features. Potential scenarios where appraisers may encounter difficulty can occur in the following cases:

    - The appraiser lacks competency to define an appropriate scope of work; and/or

    - The appraiser does not have adequate knowledge and experience to reach a credible value conclusion.

Insufficient Knowledge and Experience

The following are examples of potential issues that can occur in the valuation of green buildings:

- *Assigning value, or no value, to green components without market support.*

- *Assuming impacts on value that may not be market-supported.* Appraisers unfamiliar with green building concepts, features and practices may incorrectly assume that value impacts will be obvious in the comparable data, when, in fact, many data service providers do not specifically identify green features or labels.

- *Overlooking green features*. Appraisers may fail to observe green features in the appraisal because they either do not know how to address them, or simply fail to note their existence. Such oversight could result in an error of omission. Many green characteristics are virtually invisible on a typical inspection, such as high-performance glazing, above-standard insulation, energy-efficient lighting, motion- and daylight-responsive lighting controls, or BAS/BMS. Competent appraisers can be expected to know what to look for and what questions to ask to avoid missing relevant features.

  If the market places a greater emphasis on green characteristics such as energy efficiency, or the air quality of the interior environment, the potential impact on the existing, conventional buildings is obsolescence – the brown discount. Green features such as solar panels, low-flow water fixtures, and energy-efficient lighting are also found in older buildings which have been renovated or retrofitted. Unless appraisers have a fundamental understanding of green building concepts and practices, and study market behavior relating to these features, appraisers risk missing or misapplying important adjustments to the comparables. As is the case in any appraisal, applying random or unsupported percentage or dollar adjustments to the comparable properties may not yield credible results.

- *Utilizing unsupported or inappropriate adjustments.* As with any other building feature, adjustments for green building features, labels and certifications require market support. These adjustments may be derived from conventional paired-sales/rent analysis, or from other sources including market interviews and/or applicable secondary data sources such as studies and third-party research. However, appraisers applying an across-the-board adjustment to the comparable properties based on a dollar amount that is not market-derived, or random/unsupported percentage adjustments for green features and characteristics, face the same competency risk as do appraisers who apply unsupported or inappropriate adjustments for other, more conventional features.

When considering adjustments to the comparables in the valuation process, appraisers must subject green feature adjustments to the same rigor of analysis as any other adjustment. Adjustments must remain consistent with appraisal theory, and must be supportable by observations of market behavior including, but not limited to, sale and lease comparable data. In cases where there is a lack of appropriate transaction data, sufficient interviews with knowledgeable local market participants are needed to reach reasonable adjustments. The following are examples of unsupported or inappropriate adjustments:

- Using a multiplier for energy-efficiency savings without adequate market research and support;
- Applying a fixed percentage premium for green certification, based solely on the industry-reported cost premium over a code-built structure. This should not be done without independently investigating if the cost premium is accurate and relevant to the specific market, and whether or not market participants are using this as a basis of comparison/adjustment;

- Assuming the market reaction, if any, to green or energy-efficiency features is the same for different geographic areas (such as Northeast vs. West Coast, Central California vs. Coastal California, urban vs. suburban). This also applies to different market segments (such as commercial vs. residential, high-end residential vs. entry level, Class A office vs. Class B office);

- Using methods and/or analytical approaches that are inconsistent with established appraisal theory and practice, and therefore raise competency concerns, just as they would if applied to conventional features;

- Using an inappropriate assumption of superadequacy when the appraiser encounters a new technology or improvement that he/she is not familiar with; and

- Assuming that the market will react the same way it did the last time the appraiser worked in that market. Market reactions to green building can evolve more rapidly than some appraisers may be accustomed to, and competent valuation requires the appraiser to stay informed and aware of all relevant market trends.

INFLUENCE OF BIAS

Good ethical business practice and an appraiser's professional reputation are centered on the assumption of objectivity – that the appraiser will render an objective value opinion free of bias. Further, performing an assignment with bias is a clear violation of the USPAP ETHICS RULE,[8] which states, in part:

> "An appraiser must not perform an assignment with bias." USPAP defines bias as: "a preference or inclination that precludes an appraiser's impartiality, independence, or objectivity in an assignment."[9]

Some level of skepticism and resistance to new concepts and market influences is normal and a healthy part of the valuation process when dealing with new property types and market influences. However, when resistance to new ideas or approaches persists in spite of changing market norms, the appraiser's objectivity may become compromised. Bias may result when objectivity is compromised. Examples of bias include:

- *Assuming the market doesn't care, so why should the appraiser?* Appraisers may misjudge or intentionally refuse to conduct the necessary market research to render an appropriate judgment on the degree to which the market has incorporated sustainability into its market value decision matrix. As a result, they miss the value the market may assign to green labels, energy-efficiency ratings, green features and sustainable building practices. Given that appraisers need to properly identify all relevant physical characteristics of a property, they may not simply "ignore" a green certification or green features just because the borrower or property owner does not volunteer such information. Appraisers are required to perform a level of due diligence that is necessary to produce credible assignment results.

[8] Uniform Standards of Professional Appraisal Practice (USPAP) – 2014-15 edition, (Washington, D.C.: The Appraisal Foundation, 2014), U-7.
[9] Ibid, U-2.

- *Assuming that all green building benefits accrue only to the public or environment.* Green buildings and green features often cause non-economic impacts. Such impacts may create positive or negative influence on market value. Energy savings, water savings, and the potential for higher rents are examples of direct impacts that may positively impact the economic bottom line. Indirect impacts might include improvement to the interior environment (air quality and daylight) that can improve productivity and tenant satisfaction – leading to improved tenant retention and lower turnover costs. Green-certified buildings are often subjected to added inspections and performance testing, with greater attention to durability.

- *Assuming that green characteristics and/or certifications always add value.* Appraisers should not assume that all green building certifications and green building features add value, without adequately analyzing the full spectrum of value impacts or conducting adequate market research to support that contention.

EXPECTATIONS FOR APPRAISERS/THRESHOLDS FOR COMPETENCE

Determining the minimum threshold for core competency will depend to some degree on property type, geography, time, and the intended use of the appraisal opinions and conclusions. However, while the level of rigor expected of an appraiser may vary, the basic criteria to judge competency for a green property follows the same steps that apply to any appraisal assignment: problem definition and identification, research and analysis, and development and reporting of the value.

For example, in an assignment to appraise a residential or commercial green building, an energy-efficient property, or a conventional property with green/energy-efficient features, the appraiser's competency for the particular assignment may be determined based on the appraiser's ability to accurately:

- ***identify the subject property's characteristics that would cause it to be classified as green or energy efficient (applies to both green buildings and conventional buildings with green features);***
- ***verify these characteristics through documentation and information available for the type of characteristic with an emphasis on third-party verification;***
- ***analyze the market to determine if these characteristics contribute to market value; and***
- ***develop and report a credible opinion of value for the subject property.***

The following bullet points provide specific examples of possible factors to consider for both residential and commercial appraisers when valuing green buildings, energy-efficient buildings, conventional buildings with green or energy-efficient features and conventional buildings in predominantly green markets:

- Determine an appropriate scope of work to address the green, energy efficient, or sustainable features in the subject property, in the context of the market attitudes, client requirements, intended use of the assignment results, and the intended user(s) of the report.
- Collect, verify, and analyze relevant green and energy-efficient characteristics from data services (such as MLS, CoStar, Loopnet) related to the subject property and comparable sales while recognizing that such data services may not specifically note green features, certifications, labels, and energy scores. Appraisers may be required to move beyond traditional data sources like MLS for information on certifications, labels, third-party verifications, and specific green/energy-efficient features.
- Understand the difference between an energy-efficiency score (ENERGY STAR for commercial buildings or HERS for homes) and a sustainability-based green building certification/label (such as LEED or NGBS), and the implications for valuation.
- Understand the dominant green building rating system for the market and property type being appraised. Be aware of the differences between the various green building rating systems in terms of metrics (what it measures), rigor (how it measures), whether it is self- or third-party certified, and whether it is performance/operations-based (such as LEED EBOM) or design/asset based (LEED Core & Shell, LEED New Construction, etc.).
- Recognize that green building certifications and energy scores are time sensitive, and the relevance/reliability of a rating or certification may diminish as time passes. Properties may need to be re-certified or re-rated due to changes in: 1) the rating system, 2) the structure, and/or 3) the occupancy or manner in which it is used or operated.
- Summarize or state (based on the reporting option utilized) the relevance, if any, to market value of any green labels/certifications and/or energy-efficiency scores/labels as well as energy efficient or green building features in the appraisal report.
- Appropriately analyze in the development process, and disclose in the report, the degree of value impact, if any, of the label, certification or green and energy-efficient characteristics of the property (includes green or energy-efficient features in conventional buildings).
- Read, analyze and appropriately consider in the valuation the impact, if any, of any building performance assessments, audits, or energy-efficiency reports available for the property.
- Gain access to and appropriately employ the "green section" of popular building costs estimator services. Understand that in areas with green building codes, the marginal costs of green and energy-efficient buildings may or may not be included in costs from manuals or other sources. The appraiser should verify if these costs are included before use.
- Be aware of the cost/value implications of integrated design and integrated systems. Integrated design and systems integration (synergies) can result in cost savings that may offset added costs of green features. These cost interactions may not be reflected in the recognized cost manuals.
- Possess baseline knowledge of energy efficiency, green building and sustainability concepts, technologies, and building features sufficient to differentiate between properties that are considered green, and/or energy efficient and those that are not.

- Be aware of, and monitor, market behaviors and attitudes relating to sustainability, green building and energy efficiency, which may include primary research (observation, interviews, surveys) as well as secondary research (publications, studies, published research.)
- Conduct an appropriate level of market research and analysis to support the market's willingness to pay for energy efficiency and other green building features.
- Appropriately analyze, discuss and report the degree of value impact and capitalization, if any, of on-site generating assets and attributable revenue (for instance, renewable energy credits).
- Explain, describe and cite the relevance, if any, to market value of any transferable obligation which encumbers the property (i.e., leased solar panel system).
- In addition, residential appraisers may be expected to:
    - Understand the HERS Index Rating or similar energy-efficiency scoring metric that is predominant in the market and know where to obtain this data for the subject and comparable properties.
    - Report energy efficient or green features and the methods used to analyze value in that particular market within the appraisal report.
    - Appropriately consider potential operating cost savings which may result from energy-efficiency upgrades in the valuation process. Conduct adequate market research to support applicable market-derived adjustments to a gross rent multiplier, discounted cash flow analysis, or similar income-based valuation techniques.

In order to meet the above criteria, appraisers who work in markets where green and/or high performance building features are prevalent may need to more fully understand the meaning and implications of selected key terms and concepts. Many of these terms are included in the following section titled "Glossary of Key Terms and Acronyms."

Section IV: Glossary of Key Terms and Acronyms

NOTE: If a link provided in the "Glossary of Key Terms" or in the "Addendum: Selected Resources" doesn't work, please paste the web address into your browser or Google link.

GLOSSARY OF KEY TERMS

American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE) - A building technology society focused on building systems, energy efficiency, indoor air quality, refrigeration and sustainability within the industry. (Derived from https://www.ashrae.org)

Appraisal Management Company (AMC) - An entity that serves as an intermediary between appraisers and lenders and provides appraisal management services. (Derived from http://www.federalreserve.gov)

Brown Discount - The concept that properties which do not meet market expectations for energy efficiency and sustainability may sell, rent or lease at a lower price. (Derived from http://gislab.wharton.upenn.edu; http://www.architectsjournal.co.uk)

Building Automation System (BAS) - A computer-based control system installed in buildings that controls and monitors its mechanical and electrical equipment such as ventilation, lighting, power systems, fire systems, and security systems. (Derived from http://www.gsa.gov)

Building Commissioning – An intensive quality assurance process that begins during building design and continues through construction, occupancy, and operations. (Derived from http://www.cacx.org)

Building Energy Asset Score - A national standardized tool for assessing the physical and structural energy efficiency of commercial and multifamily residential buildings on a 10-point scale. The Asset Score generates a simple energy-efficiency rating that enables comparison among buildings and identifies opportunities to invest in energy-efficiency upgrades. (Derived from: http://energy.gov/eere/buildings/building-energy-asset-score)

Building Envelope or Building Enclosure - The building's thermal barrier isolating the interior conditioned space from the exterior environment, consisting of roof, walls, exterior doors, windows, foundation and other sealing barriers. (Derived from http://www.greenresourcecouncil.org/green-resources/green-building-glossary)

Building Management System (BMS) - See Building Automation System.

Building Performance Assessment (BPA) - An energy audit that provides objective and quantified measurements of a building's performance including energy, lighting, thermal comfort and maintenance. (Derived from http://www.gsa.gov)

Energy Audit - An assessment of how much energy a building consumes and what steps can be taken to improve its energy efficiency. (Derived from http://energy.gov)

Energy Efficiency Mortgages (EEM) - A mortgage that credits a home's energy efficiency in the mortgage itself. EEMs give borrowers the opportunity to finance cost-effective, energy-saving measures as part of a single mortgage. (Derived from http://hud.gov)

Energy Modeling - A computer program to model energy flows within and throughout a structure. It uses computer-based tools to simulate a building's energy use throughout an entire year of operation. (Derived from http://www.buildinggreen.com)

ENERGY STAR - A standard for energy-efficient consumer products originated in the United States. It is also a benchmarking process that reveals how a building's energy consumption compares to that of similar buildings of the same space type – based on a national average. (Derived from http://www.energystar.gov)

Energy Use Intensity (EUI) - A benchmark expressing a building's energy use. Energy per square foot per year; calculated by dividing the total energy consumed by the building in one year by the total gross floor area of the building. (Derived from http://www.energystar.gov)

Energy-Efficiency Rating Systems - A rating system designed to evaluate buildings solely on energy efficiency. These are different than green building rating systems which rate a building across multiple aspects of sustainability-related criteria. (Derived from http://www.epa.gov)

Green Building – (verb) - The practice of creating structures and using processes that are environmentally responsible and resource-efficient throughout a building's life cycle from siting to design, construction, operation, maintenance, renovation and deconstruction. (noun) - A structure with sustainability related features. (Derived from http://www.epa.gov)

Green Globes - An online green building rating and certification tool that is used primarily in the United States and Canada. (Derived from http://www.greenglobes.com)

Green Lease - Real property leases that include language addressing sustainability and green building criteria, primarily relating to the operation of a green building. A green lease aligns the financial and energy incentives of building owners and tenants to save money, conserve resources, and ensure the efficient operation of buildings. (Derived from http://www.greenleaselibrary.com)

Greenhouse Gas Emissions (GHGs) - Emitted gases that trap heat from the sun and warm the planet's surface. The majority are related to energy consumption, and most of those are comprised primarily of carbon dioxide. (Derived from http://www.epa.gov)

High Performance Building - A building that integrates and optimizes on a life cycle basis all major high performance attributes, including energy [and water] conservation, environment, safety, security, durability, accessibility, cost-benefit, productivity, sustainability, functionality, and operational considerations. (Derived from http://www.gpo.gov; Energy Independence and Security Act 2007 401 PL 110-140)

Home Energy Rating System (HERS) - A nationally-recognized scoring system that measures a home's energy performance. Based on the results, an energy-rated home will receive a HERS Index Score. (Derived from http://www.resnet.us)

Home Energy Scoring Tool – A national standardized rating system that places a home on a 10-point scale. It reflects the level of energy efficiency of a home's fixed assets (e.g., envelope and major equipment), while controlling in occupant-varying influences. (Derived from http://homeenergyscore.gov)

HUD PowerSaver - A special loan program that allows homeowners to make energy-saving changes, including the installation of insulation, water heaters, new windows, and solar panels. (Derived from http://www.energy.gov; http://www.fha.com)

Indoor Environmental Quality/Indoor Air Quality (IEQ/IAQ) - The conditions inside a building – air quality, lighting, thermal conditions, ergonomics – and their effects on its occupants or residents. (Derived from http://www.usgbc.org)

Integrated Design Process (IDP) - Involves multiple areas of a project working together from the start towards one major goal. In regards to green building, this approach is commonly taken to allow a building to achieve maximum efficiency, lower costs, and increase overall performance. (Derived from https://www.go-gba.org)

Leadership in Energy and Environmental Design (LEED) - Rating systems for the design, construction, operation, and maintenance of green buildings, homes and neighborhoods. (Derived from http://www.usgbc.org)

LEED Certification - A certification for a building that satisfies the prerequisites of the LEED rating system for the design, construction, operation and maintenance, and energy efficiency. (Derived from http://www.usgbc.org)

LEED Existing Buildings Operation and Maintenance (EBOM) - A third-party (LEED) rating and certification system for existing buildings. Buildings are evaluated for sustainability, energy efficiency, indoor air quality, etc. (Derived from http://www.usgbc.org)

Light-Emitting Diode (LED) - A semiconductor diode that emits light when a voltage is applied to it and that is used especially in electronic devices. It is significantly more efficient than incandescent lighting. (Derived from http://www.businessdictionary.com)

Living Building Challenge - A performance-based green building certification program sponsored by the International Living Future Institute. (Derived from http://living-future.org)

National Green Building Standard (NGBS) – ANSI-approved residential green rating system developed by the National Association of Home Builders and the International Code Council. NGBS Green certification is issued by Home Innovation Research Labs. (Derived from www.homeinnovation.com/Green)

National Renewable Energy Laboratory (NREL) - The U.S. Department of Energy's primary national laboratory for renewable energy and energy-efficiency research and development. (Derived from http://www.nrel.gov)

Net Zero Energy (NZE) - A building where the total amount of energy used by the building on an annual basis is roughly equal to the amount of energy created on the site. (Derived from http://www.nrel.gov)

Passive House Institute US - A program that certifies buildings based on specific performance criteria including ultra-low energy use and airtight building envelope integrity. (Derived from http://www.nrel.gov)

Passive Housing - A comprehensive system working with natural resources (instead of relying predominantly on 'active' systems) to reduce energy consumption. (Derived from http://www.phius.org; http://www.passipedia.org)

Portfolio Manager Tool - An online tool from the EPA used to measure and track energy and water consumption, as well as greenhouse gas emissions. (Derived from http://www.energystar.gov)

Property Assessed Clean Energy (PACE) - A program to finance energy efficiency and renewable energy upgrades to buildings. It is typically repaid as a property tax assessment for up to 20 years. (Derived from http://pacenow.org)

Residential Energy Services Network (RESNET) - An independent, non-profit organization to help homeowners reduce the cost of their utility bills by making their homes more energy efficient. (Derived from http://www.resnet.us)

Sandia Lab PV Value - Online calculators to determine present value of solar PV. (Derived from http://www.pvvalue.com)

Solar Photovoltaic Systems (Solar PV) - A system designed to supply power utilizing solar panels to absorb and directly convert sunlight into electricity. (Derived from http://www.nrel.gov)

Solar Thermal Systems (STE) - A technology for harnessing solar energy for thermal energy (heat). (Derived from http://energy.gov)

Sustainability - Sustainability is based on a simple principle: Everything needed for survival and well-being depends, either directly or indirectly, on the natural environment. Sustainability creates and maintains the conditions under which humans and nature can exist in productive harmony, that permit fulfilling the social, economic and other requirements of present and future generations. (Derived from http://www.epa.gov)

Sustainable Building - A structure that is environmentally responsible and resource efficient throughout a building's life cycle: from siting to design, construction, operation, maintenance, renovation, and demolition. Also known as "high performance" or "green building." (Derived from http://www.gsa.gov; http://www.epa.gov; http://www.wbdg.org)

Triple Bottom Line - An accounting framework with three parts: social, environmental (or ecological), and financial. These three divisions are also called the three Ps: People, Planet and Profit, or the "three pillars of sustainability". (Derived from http://www.ibrc.indiana.edu; http://www.investopedia.com)

U.S. General Services Administration (GSA) - A U.S. Agency that provides workplaces by constructing, managing, and preserving government buildings and by leasing and managing commercial real estate. (Derived from http://www.gsa.gov)

WaterSense program - An EPA program that seeks to protect the future of the nation's water supply by offering people a simple way to measure the water efficiency of products and homes. (Derived from http://www.epa.gov)

ACRONYMS

ASHRAE - American Society of Heating, Refrigeration and Air Conditioning Engineers

AMC - Appraisal Management Company

BAS - Building Automation System

BMS - Building Management System

BPA - Building Performance Assessment

EEM - Energy Efficiency Mortgages

EUI - Energy Use Intensity

EBOM - Existing Buildings Operation and Maintenance

GHGs - Greenhouse Gas Emissions

GSA - U.S. General Services Administration

HERS - Home Energy Rating System

IEQ/IAQ - Indoor Environmental Quality/Indoor Air Quality

IDP - Integrated Design Process

kBTU - Kilo British Thermal Unit

kWh - Kilowatt Hour

LEED - Leadership in Energy and Environmental Design

LED - Light-Emitting Diode

NGBS – National Green Building Standard

NREL - National Renewable Energy Laboratory

PACE - Property Assessed Clean Energy

RESNET - Residential Energy Services Network

Solar PV - Solar Photovoltaic Systems

Section V: Addendum: Selected Resources

NOTE: It is acknowledged that the lists below are incomplete, but are provided as a starting point to discover the expanding universe of information related to green/high performance property. Additional links are also provided in the Glossary section. These links were operational at the time of publication, but they may have been changed or removed over time. If this has occurred, please search for current operational links.

INTERNET RESOURCES

Energy Efficiency Rating Systems, Scores and Certifications

- Appraisal Institute Residential Green and Energy Efficient Addendum (form 820.04): http://www.appraisalinstitute.org/assets/1/7/Interactive820.04ResidentialGreenandEnergyEfficientAddendum.pdf
- Appraisal Institute Commercial Green and Energy Efficient Addendum: http://www.appraisalinstitute.org/assets/1/29/AI 821 Green Commercial Interactive.pdf
- EPA ENERGY STAR (ENERGY STAR for Homes and EPA Portfolio Manager for Commercial): http://www.energystar.gov/
- Energy Information Administration (EIA): http://www.eia.gov/consumption/commercial/
- The U.S. Department of Energy's Office of Energy Efficiency and Renewable Energy: http://www.eere.energy.gov/
- Institute for Market Transformation energy use disclosure law summary website: http://www.imt.org/resources/detail/guide-to-state-and-local-energy-performance-regulations-version-3.0
- The U.S. Department of Energy's Building Performance Database: http://energy.gov/eere/buildings/building-performance-database
- Lawrence Berkeley National Laboratory's Energy IQ web-based tool: http://EnergyIQ.lbl.gov
- The U.S. Department of Energy's Building Energy Asset Score for commercial buildings: http://energy.gov/eere/buildings/building-energy-asset-score
- Standardization Roadmap, Energy Efficiency in the Built Environment, June 2014: http://www.ansi.org
- Energy Efficiency Standardization Coordination Collective, American National Standards Institute: http://www.ansi.org/standards activities/standards boards panels/eescc/overview.aspx?menuid=3
- Sustainable SITES Initiative: http://www.sustainablesites.org/

- The Database of State Incentives for Renewables & Efficiency: http://www.dsireusa.org
- Sandia National Laboratories PV Value Tool: http://www.pvvalue.com or www.energy.sandia.gov

Residential Rating Systems, Scores and Certifications

- NGBS Certification Activity: http://www.homeinnovation.com/ngbsgreenstats
- National Green Building Standard (NGBS): http://www.homeinnovation.com/green
- RESNET/Home Energy Rating System (HERS): http://resnet.us/ and http://www.energy.ca.gov/HERS/
- Home Energy Score: http://www1.eere.energy.gov/buildings/residential/hesindex.html
- Build it Green (GreenPoint Rated): http://www.greenpointrated.com
- Fannie Mae Green Initiative (especially Green Initiatives Resources): https://www.fanniemae.com/multifamily/green-initiative
- American Society of Heating, Refrigeration & Air Conditioning Engineers (ASHRAE): www.ashrae.org\greenstandard
- Living Building Challenge and International Living Future Institute (ILFI): http://living-future.org/lbc
- National Association of Realtors Green Multiple Listing Service Implementation Guide, v 1.0, May 2014: http://www.greenthemls.org
- ENERGY STAR: http://www.energystar.gov

Commercial Rating Systems, Scores and Certifications

- The U.S. Department of Energy's Building Energy Asset Score for commercial buildings: http://energy.gov/eere/buildings/building-energy-asset-score
- U.S. Green Building Council (LEED): http://usgbc.org (especially Resources), also http://gbig.org
- Green Building Institute (Green Globes): http://www.thegbi.org
- New Buildings Institute: http://newbuildings.org/
- Passive House Institute US: http://www.passivehouse.us/passiveHouse/PassiveHouseInfo.html
- Passivhaus Institut: http://passiv.de/en/
- LEED: http://www.usgbc.org
- Green Globes: http://www.greenglobes.com

Building Codes

- International Green Construction Code (IgCC): http://www.iccsafe.org/cs/igcc/pages/default.aspx
- ASHRAE Green Standard 189.1 (Standard for the Design of High-Performance, Green Buildings): https://www.ashrae.org/resources--publications/bookstore/standard-189-1

PUBLICATIONS

Below are suggested sources; individual articles may be found on the subject from these various publications:

- Colorado Energy Office, An Early Look at Energy Efficiency and Contributory Value, February 2015 www.colorado.gov
- An Introduction to Green Homes, Appraisal Institute, 2010
- Residential Green Valuation Tools, Appraisal Institute, 2014
- Colorado Energy Office, The Impact of Photovoltaic Systems on Market Value and Marketability, May 2013 www.colorado.gov
- Green Builder magazine (residential) http://www.greenbuildermedia.com/magazine
- Journal of Sustainable Real Estate (JOSRE) www.josre.org
- Journal of Green Building http://www.collegepublishing.us/journal.htm
- Hoen, B., R. Wiser, P. Cappers and Mark Thayer, An Analysis of the Effects of Residential Photovoltaic Energy Systems on Home Sales Prices in California, Lawrence Berkeley National Laboratory Environmental Energy Technologies Division, April 2011 http://emp.lbl.gov/sites/all/files/lbnl-4476e.pdf
- Muldavin, Scott, Value Beyond Cost Savings, Green Building Finance Consortium: http://www.greenbuildingfc.com/
- Pivo, G. and J. Fisher. Investment Returns from Responsible Property Investments: Energy Efficient, Transit-oriented and Urban Regeneration Office Properties in the U.S. from 1998–2008. Working Paper, Responsible Property Investing Center, Boston College, University of Arizona Benecki Center for Real Estate Studies, Indiana University, October 11, 2008, revised March 3, 2009 http://kelley.iu.edu/bcres/files/research/PivoFisher10-10-08.pdf
- Runde, Timothy and Thoyre, Stacey, Integrating Sustainability and Green Building into the Appraisal Process, Journal of Sustainable Real Estate (JOSRE) Vol 2, No. 1, 2010. http://www.josre.org/wp-content/uploads/2012/09/Sustainability and Green Building Into Appraisal Process-JOSRE v2-11.pdf
- Chappell, Theddi Wright and Corps, Chris. High Performance Green Building: What's it Worth? Cascadia Region Green Building Council, May 2009. http://living-future.org/sites/default/files/HighPerfGB ValuationStudy.pdf

EDUCATIONAL RESOURCES

- Appraisal Institute Courses: http://www.appraisalinstitute.org/education/green/
  - Introduction to Green Buildings: Principles & Concepts
  - Case Studies in Appraising Green Residential Buildings
  - Case Studies in Appraising Green Commercial Buildings
  - Residential and Commercial Valuation of Solar
- Appraisal Institute's Valuation of Sustainable Buildings Professional Development Program: http://www.appraisalinstitute.org/education/green/downloads/green-faqs.pdf
- Earth Advantage Courses: http://www.earthadvantage.org/education/
  - Appraising Green Homes: Construction Methods & Trends
  - Appraising Green Homes: Valuation Techniques
  - Appraising Green Homes: Advanced Application
- Earth Advantage's Accredited Green Appraiser (AGA) program:
  - http://www.earthadvantage.org/education/accredited-green-appraiser-aga
- SEEC, LLC Courses: http://www.seecsolutions.com
  - Appraising Energy Efficiency in New Homes and Retrofits (Webinar)
  - Green Home Trends and Appraisal Methodologies (Live Class)
  - Green Building – The Marketing Advantage (Live Class)
  - Energy Performance Scores – Valuing Energy Improvements (Live Class)
  - Navigating Green Fields Within the MLS Form (Live Class)
  - Getting the Most Out of a Green Appraisal (Live Class)
  - Indoor Air Quality for Real Estate Professionals (Live Class)
  - Green Building – An Emerging Sector in Residential Appraisal (Live Class)
  - Comparing High Performance Heating Choices for Home Upgrades (Live Class)
  - Water Conservation for Real Estate Professionals (1 and 2) (Live Class)
  - Introduction to Residential Green Building – Background and Competency (Live Class)