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





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:

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Introduction

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

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

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

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

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

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

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

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

- 25 • Problem definition and identification;
- 26 • Research and analysis; and
- 27 • Development and reporting of the value.

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

- 29 • Sustainability
- 30 • Green Building
- 31 • Integration
- 32 • Rating Systems, Scores and Certifications
- 33 • Energy Modeling, Benchmarking and Auditing

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- 34 • Policy Initiatives and Regulations
- 35 • Financing Incentives
- 36 • Green Leases

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

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

47 The Advisory contains suggested minimum thresholds of competence for residential and
48 commercial appraisers. It illustrates the specific types of knowledge and skills required of those
49 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

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

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

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

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

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

77 NEW CHALLENGES

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

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

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- 84 2. ***Green building codes, benchmarking and mandates for green space:*** An increasing
85 number of jurisdictions are instituting or expanding green building codes and ordinances,
86 and/or requiring periodic benchmarking of certain classes of commercial buildings. The
87 U.S. General Services Administration is requiring that federal buildings conform to green
88 standards. It is important for appraisers to have an understanding of new building
89 technologies and the value implications of new building code standards. These new
90 standards affect not only new buildings and retrofits but also conventional buildings that
91 do not comply with current building codes.
- 92 3. ***Prevalence of conventional buildings upgraded with green features such as energy-***
93 ***efficient Heating, Ventilating, and Air Conditioning (HVAC) systems, solar***
94 ***photovoltaic (PV) systems, or water-efficient fixtures:*** These types of upgrades, even in
95 conventional buildings, could yield value impacts. Appraisers performing this type of
96 work must identify and value such features with market-supported adjustments.
- 97 4. ***Potential for obsolescence, also known as the brown discount, for existing buildings***
98 ***that don't "green up":*** Just as green buildings that outperform the market may show a
99 value premium, conventional buildings that underperform relative to their market may
100 show a discount.
- 101 5. ***New sources of revenue and new encumbrances to the property:*** On-site generation
102 assets may actually produce revenue streams, not just energy savings associated with
103 lower energy consumption. Certain types of financing for energy efficiency and
104 renewable energy (Property Assessed Clean Energy (PACE) or On-Bill Repayment) also
105 stay with the property in the event of a transfer of ownership.

Section II: Core Competency

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

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

113 Key Terms and Concepts

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

- 116 • Sustainability
- 117 • Green Building
- 118 • Integration
- 119 • Rating Systems, Scores and Certifications
- 120 • Energy Modeling, Benchmarking and Auditing
- 121 • Policy Initiatives and Regulations
- 122 • Financing Incentives
- 123 • Green Leases

124 SUSTAINABILITY

125 Sustainability is a very broad concept that lacks a single definition. It is most often defined with
126 reference to the 1987 United Nations Brundtland Commission Report¹ which defines sustainable
127 development as that which “meets the needs of the present without compromising the ability of
128 future generations to meet their own needs.” When considering the application of this concept to
129 a business setting, Elkington’s “triple bottom line” (TBL) is commonly cited, which states that
130 one must balance the economic, social and environmental objectives across current and future
131 generations.² The TBL concept is also sometimes framed as “People, Planet, Profit” in the same
132 work.

133 While neither of these definitions speak specifically to the built environment, the Royal
134 Institution of Chartered Surveyors (RICS) Global Property Sustainability Survey strongly echoes
135 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.

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

138 *Relevance to Appraisers*

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

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

- 147 • Resource Use: Operational and Construction/Renovation
- 148 • Obsolescence
- 149 • Transparency & Stakeholder Influence
- 150 • Externalities

151 The following exhibit illustrates examples of each of the above risks and the potential for impact
152 on value. Note that the exhibit includes up and down arrows, which are abbreviations. The
153 arrows pointing up should be read as “increasing,” and the arrows pointing down should be read
154 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	<ul style="list-style-type: none"> ▪ ↑ global demand for materials vs. fixed supply ▪ ↑ energy cost, volatility; ↑ water cost, rationing 	<ul style="list-style-type: none"> ▪ ↑ replacement cost; ↑ TI & future renovation costs ▪ ↑ operating expenses, ↓ NOI; Energy efficiency becomes paramount 	<ul style="list-style-type: none"> ▪ ↑ replacement cost may ↑ market barriers to entry; Renovate preferred over new construction; Life cycle costing
OBSOLESCENCE	<ul style="list-style-type: none"> ▪ Consumption rate ↓, or patterns shift ▪ ↑ need for properties to adapt to future uses and users (not yet identified) ▪ Increased rate of change expected in future 	<ul style="list-style-type: none"> ▪ ↓ demand for retail; change in type/location ▪ ↑ rate of depreciation; ↑ TI, cap ex cost for less adaptable properties 	<ul style="list-style-type: none"> ▪ ↓ economic growth due to ripple effect of consumer (70% GDP) ▪ ↑ risk for special-purpose improvements
TRANSPARENCY & STAKEHOLDER INFLUENCE	<ul style="list-style-type: none"> ▪ ↑ disclosure of energy efficiency ▪ Non-financial stakeholders influence investor decisions 	<ul style="list-style-type: none"> ▪ GRI reporting that triggers green-up of REIT portfolio; carbon reporting 	<ul style="list-style-type: none"> ▪ Stigma for poor performers ▪ Supply chain reporting requirements
EXTERNALITIES	<ul style="list-style-type: none"> ▪ Greenhouse gas (GHG) and climate change legislation ▪ Community charges back project externalities ▪ Poor indoor air quality 	<ul style="list-style-type: none"> ▪ Carbon taxes, cap & trade; Project GHG emissions used as reason not to allow development ▪ Impact fees; assessments ▪ Health risk liability 	<ul style="list-style-type: none"> ▪ Stigma: ↓ marketability

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

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

158 GREEN BUILDING

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

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

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

173 ***Relevance to Appraisers***

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

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

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

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

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205 **INTEGRATION**

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

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

214 The table below summarizes some of the key differences between IDP and the conventional
215 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.

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

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

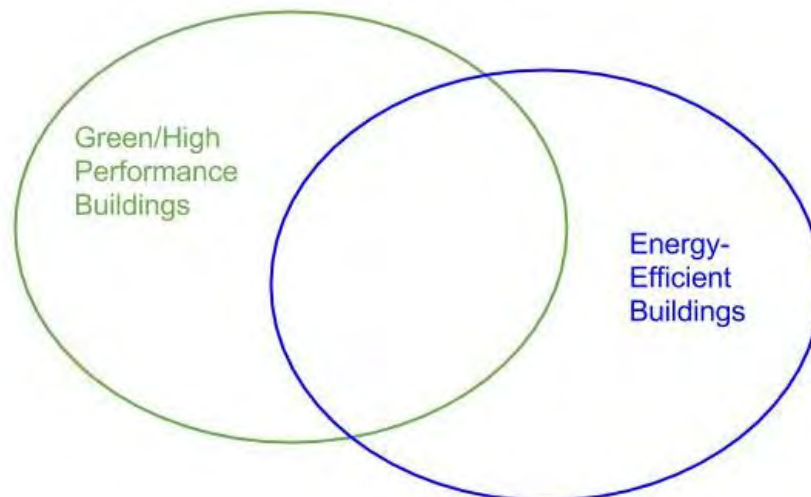
228 ***Relevance to Appraisers***

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

240 **RATING SYSTEMS, SCORES AND CERTIFICATIONS**

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

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



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

- 254 • Energy Efficiency
- 255 • Materials and Resources
- 256 • Water Efficiency
- 257 • Indoor Environmental Quality (IEQ) and Indoor Air Quality (IAQ)
- 258 • Site Efficiency/Community
- 259 • Operations and Maintenance

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

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

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

ENERGY-EFFICIENT RATINGS <i>Measures energy efficiency only</i>
ENERGY STAR
HERS
Building Energy Asset Score
Home Energy Score

269 The various rating systems, scores and certifications can also differ from each other based upon
270 the types of property that are eligible for the respective programs. Certain programs apply only
271 to residential property, some only to commercial property, and some apply to both. ENERGY
272 STAR includes programs for both residential and commercial buildings. The HERS rating
273 system applies only to single-family residential property. These differences are illustrated with a
274 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

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

277 **LEED**

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

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

- 290 • Sustainable Sites
- 291 • Water Efficiency
- 292 • Energy and Atmosphere
- 293 • Materials and Resources
- 294 • Indoor Environmental Quality

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

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

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

307 For more information, visit: www.usgbc.org

308 **Green Globes**

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

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

- 318 • Energy
- 319 • Water
- 320 • Resources
- 321 • Indoor Environment
- 322 • Emissions
- 323 • Project/Environmental Management
- 324 • Site

325 Green Globes offers multiple tracks and standards, including New Construction and Existing
326 Buildings. For more information, visit: www.thegbi.org

327 **ENERGY STAR**

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

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

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

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

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

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

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

346 For more information, visit: www.energystar.gov

347 **The Building Energy Asset Score**

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

359 **Home Energy Rating System**

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

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

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

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

383 For additional information, visit: www.hersindex.com

384 **The Home Energy Score**

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

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

398 **National Green Building Standard**

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

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

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

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

409 For more information, visit: <http://www.nahb.org/page.aspx/generic/sectionID=2510> or
410 www.homeinnovation.com/Green.”

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

419 ***Additional Rating Systems and Concepts***

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

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

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

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

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

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

444 ***Comparison of Residential Green Building Rating Systems***

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

Program	Sponsor	Brief Program Description	Where Prevalent
<i>Home Energy Score</i> (existing homes)	U.S. Department of Energy	Energy efficiency score compared to national averages	Nationwide
<i>WaterSense</i>	U.S. EPA	Water efficiency compared to peer national averages	Nationwide
Home Energy Rating System <i>HERS</i> and <i>HERS II</i>	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

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

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

456 ***Relevance to Appraisers***

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

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

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

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

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

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

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

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

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

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

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

517 **ENERGY MODELING, BENCHMARKING AND AUDITING**

518 ***Energy Modeling and Benchmarking***

519 Energy modeling is similar to cash flow modeling used in appraisal practice. Instead of modeling
520 cash flows, engineers, designers, and energy raters use a computer program to model energy
521 flows within and throughout a structure. Energy models consist of a computer program that
522 requires a variety of inputs pertaining to the building envelope, mechanical systems, construction
523 materials, equipment, climate, occupancy and use. The output of an energy model is a prediction
524 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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525 the inputs, the sophistication of the software, and the skill of the operator. Therefore, to be
526 properly used, energy models typically require specialized training. The more advanced models
527 -- such as those used in the commercial sector -- may require more advanced training and/or
528 degrees in engineering or similar disciplines.

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

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

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

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

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

553 ***Relevance to Appraisers***

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

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

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

572 ***Energy Audits***

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

587 ***Relevance to Appraisers***

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

596 As with energy modeling, most appraisers lack the specialized training required to perform an
597 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.

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

610 **POLICY INITIATIVES & REGULATIONS**

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

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

624 ***Relevance to Appraisers***

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

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

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

648 **FINANCING INCENTIVES**

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

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

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

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

677 ***Relevance to Appraisers***

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

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

689 **GREEN LEASES**

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

700 ***Relevance to Appraisers***

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

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

709 There is a growing body of standardized green lease clauses. For information on the GSA's
710 Green Lease Policies and Procedures, visit <http://www.gsa.gov/portal/content/103656>. For
711 information on New York City's Energy Aligned Lease Clause, visit
712 <http://www.nyc.gov/html/gbee/html/initiatives/clause.shtml>. The green lease library provides a
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713 centralized site for commercial green leasing resources, including guidance, sample lease forms
714 and case studies. For more information, visit: <http://www.greenleaselibrary.com> and
715 <http://www.greenleaselibrary.com/green-lease-leaders.html>.

Section III: USPAP Considerations

716 USPAP RULES AND STANDARDS

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

720 Under the COMPETENCY RULE, appraisers must:

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

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

- 736 ○ The appraiser lacks competency to define an appropriate scope of work; and/or
737 ○ The appraiser does not have adequate knowledge and experience to reach a credible value
738 conclusion.

739 ***Insufficient Knowledge and Experience***

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

- 741 • *Assigning value, or no value, to green components without market support.*
742 • *Assuming impacts on value that may not be market-supported.* Appraisers unfamiliar with
743 green building concepts, features and practices may incorrectly assume that value impacts
744 will be obvious in the comparable data, when, in fact, many data service providers do not
745 specifically identify green features or labels.

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

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

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

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

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

- 785 • Assuming the market reaction, if any, to green or energy-efficiency features is the same for
786 different geographic areas (such as Northeast vs. West Coast, Central California vs. Coastal
787 California, urban vs. suburban). This also applies to different market segments (such as
788 commercial vs. residential, high-end residential vs. entry level, Class A office vs. Class B
789 office);
- 790 • Using methods and/or analytical approaches that are inconsistent with established appraisal
791 theory and practice, and therefore raise competency concerns, just as they would if applied to
792 conventional features;
- 793 • Using an inappropriate assumption of superadequacy when the appraiser encounters a new
794 technology or improvement that he/she is not familiar with; and
- 795 • Assuming that the market will react the same way it did the last time the appraiser worked in
796 that market. Market reactions to green building can evolve more rapidly than some
797 appraisers may be accustomed to, and competent valuation requires the appraiser to stay
798 informed and aware of all relevant market trends.

799 **INFLUENCE OF BIAS**

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

804 “An appraiser must not perform an assignment with bias.” USPAP defines bias as: “a
805 preference or inclination that precludes an appraiser’s impartiality, independence, or
806 objectivity in an assignment.”⁹

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

- 812 • *Assuming the market doesn’t care, so why should the appraiser?* Appraisers may misjudge or
813 intentionally refuse to conduct the necessary market research to render an appropriate
814 judgment on the degree to which the market has incorporated sustainability into its market
815 value decision matrix. As a result, they miss the value the market may assign to green
816 labels, energy-efficiency ratings, green features and sustainable building practices. Given
817 that appraisers need to properly identify all relevant physical characteristics of a property,
818 they may not simply “ignore” a green certification or green features just because the
819 borrower or property owner does not volunteer such information. Appraisers are required to
820 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.

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

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

834 **EXPECTATIONS FOR APPRAISERS/THRESHOLDS FOR COMPETENCE**

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

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

845 • ***identify the subject property’s characteristics that would cause it to be***
846 ***classified as green or energy efficient (applies to both green buildings and***
847 ***conventional buildings with green features);***

848 • ***verify these characteristics through documentation and information available***
849 ***for the type of characteristic with an emphasis on third-party verification;***

850 • ***analyze the market to determine if these characteristics contribute to market***
851 ***value; and***

852 • ***develop and report a credible opinion of value for the subject property.***

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

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

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- 897 • Be aware of, and monitor, market behaviors and attitudes relating to sustainability, green
898 building and energy efficiency, which may include primary research (observation,
899 interviews, surveys) as well as secondary research (publications, studies, published research.)
- 900 • Conduct an appropriate level of market research and analysis to support the market’s
901 willingness to pay for energy efficiency and other green building features.
- 902 • Appropriately analyze, discuss and report the degree of value impact and capitalization, if
903 any, of on-site generating assets and attributable revenue (for instance, renewable energy
904 credits).
- 905 • Explain, describe and cite the relevance, if any, to market value of any transferable obligation
906 which encumbers the property (i.e., leased solar panel system).
- 907 • In addition, residential appraisers may be expected to:
- 908 ○ Understand the HERS Index Rating or similar energy-efficiency scoring metric that is
909 predominant in the market and know where to obtain this data for the subject and
910 comparable properties.
- 911 ○ Report energy efficient or green features and the methods used to analyze value in that
912 particular market within the appraisal report.
- 913 ○ Appropriately consider potential operating cost savings which may result from energy-
914 efficiency upgrades in the valuation process. Conduct adequate market research to
915 support applicable market-derived adjustments to a gross rent multiplier, discounted cash
916 flow analysis, or similar income-based valuation techniques.
- 917 In order to meet the above criteria, appraisers who work in markets where green and/or high
918 performance building features are prevalent may need to more fully understand the meaning and
919 implications of selected key terms and concepts. Many of these terms are included in the
920 following section titled “Glossary of Key Terms and Acronyms.”

Section IV: Glossary of Key Terms and Acronyms

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

923 GLOSSARY OF KEY TERMS

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

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

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

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

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

941
942 **Building Energy Asset Score** - A national standardized tool for assessing the physical and
943 structural energy efficiency of commercial and multifamily residential buildings on a 10-
944 point scale. The Asset Score generates a simple energy-efficiency rating that enables
945 comparison among buildings and identifies opportunities to invest in energy-efficiency
946 upgrades. (Derived from: <http://energy.gov/eere/buildings/building-energy-asset-score>)

947
948 **Building Envelope or Building Enclosure** - The building’s thermal barrier isolating the
949 interior conditioned space from the exterior environment, consisting of roof, walls, exterior
950 doors, windows, foundation and other sealing barriers. (Derived from
951 <http://www.greenresourcecouncil.org/green-resources/green-building-glossary>)

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

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

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

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

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

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

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

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

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

979 **Green Globes** - An online green building rating and certification tool that is used primarily
980 in the United States and Canada. (Derived from <http://www.thegbi.org>)

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

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

- 989 **High Performance Building** - A building that integrates and optimizes on a life cycle basis
990 all major high performance attributes, including energy [and water] conservation,
991 environment, safety, security, durability, accessibility, cost-benefit, productivity,
992 sustainability, functionality, and operational considerations. (Derived from
993 <http://www.gpo.gov>; Energy Independence and Security Act 2007 401 PL 110-140)
- 994 **Home Energy Rating System (HERS)** - A nationally-recognized scoring system that
995 measures a home's energy performance. Based on the results, an energy-rated home will
996 receive a HERS Index Score. (Derived from <http://www.resnet.us>)
- 997 **Home Energy Scoring Tool** – A national standardized rating system that places a home on a
998 10-point scale. It reflects the level of energy efficiency of a home's fixed assets (e.g.,
999 envelope and major equipment), while controlling in occupant-varying influences. (Derived
1000 from <http://homeenergyscore.gov>)
- 1001 **HUD PowerSaver** - A special loan program that allows homeowners to make energy-saving
1002 changes, including the installation of insulation, water heaters, new windows, and solar
1003 panels. (Derived from <http://www.energy.gov>; <http://www.fha.com>)
- 1004 **Indoor Environmental Quality/Indoor Air Quality (IEQ/IAQ)** - The conditions inside a
1005 building – air quality, lighting, thermal conditions, ergonomics – and their effects on its
1006 occupants or residents. (Derived from <http://www.usgbc.org>)
- 1007 **Integrated Design Process (IDP)** - Involves multiple areas of a project working together
1008 from the start towards one major goal. In regards to green building, this approach is
1009 commonly taken to allow a building to achieve maximum efficiency, lower costs, and
1010 increase overall performance. (Derived from <https://www.go-gba.org>)
- 1011 **Leadership in Energy and Environmental Design (LEED)** - Rating systems for the design,
1012 construction, operation, and maintenance of green buildings, homes and neighborhoods.
1013 (Derived from <http://www.usgbc.org>)
- 1014 **LEED Certification** - A certification for a building that satisfies the prerequisites of the
1015 LEED rating system for the design, construction, operation and maintenance, and energy
1016 efficiency. (Derived from <http://www.usgbc.org>)
- 1017 **LEED Existing Buildings Operation and Maintenance (EBOM)** - A third-party (LEED)
1018 rating and certification system for existing buildings. Buildings are evaluated for
1019 sustainability, energy efficiency, indoor air quality, etc. (Derived from
1020 <http://www.usgbc.org>)
- 1021 **Light-Emitting Diode (LED)** - A semiconductor diode that emits light when a voltage is
1022 applied to it and that is used especially in electronic devices. It is significantly more efficient
1023 than incandescent lighting. (Derived from <http://www.businessdictionary.com>)

- 1024 **Living Building Challenge** - A performance-based green building certification program
1025 sponsored by the International Living Future Institute. (Derived from [http://living-
future.org](http://living-
1026 future.org))
- 1027 **National Green Building Standard (NGBS)** – ANSI-approved residential green rating
1028 system developed by the National Association of Home Builders and the International Code
1029 Council. NGBS Green certification is issued by Home Innovation Research Labs. (Derived
1030 from www.homeinnovation.com/Green)
- 1031 **National Renewable Energy Laboratory (NREL)** - The U.S. Department of Energy's
1032 primary national laboratory for renewable energy and energy-efficiency research and
1033 development. (Derived from <http://www.nrel.gov>)
- 1034 **Net Zero Energy (NZE)** - A building where the total amount of energy used by the building
1035 on an annual basis is roughly equal to the amount of energy created on the site. (Derived
1036 from <http://www.nrel.gov>)
- 1037 **Passive House Institute US** - A program that certifies buildings based on specific
1038 performance criteria including ultra-low energy use and airtight building envelope integrity.
1039 (Derived from <http://www.nrel.gov>)
- 1040 **Passive Housing** - A comprehensive system working with natural resources (instead of
1041 relying predominantly on ‘active’ systems) to reduce energy consumption. (Derived from
1042 <http://www.phius.org>; <http://www.passipedia.org>)
- 1043 **Portfolio Manager Tool** - An online tool from the EPA used to measure and track energy
1044 and water consumption, as well as greenhouse gas emissions. (Derived from
1045 <http://www.energystar.gov>)
- 1046 **Property Assessed Clean Energy (PACE)** - A program to finance energy efficiency and
1047 renewable energy upgrades to buildings. It is typically repaid as a property tax assessment
1048 for up to 20 years. (Derived from <http://pacenow.org>)
- 1049 **Residential Energy Services Network (RESNET)** - An independent, non-profit
1050 organization to help homeowners reduce the cost of their utility bills by making their homes
1051 more energy efficient. (Derived from <http://www.resnet.us>)
- 1052 **Sandia Lab PV Value** - Online calculators to determine present value of solar PV. (Derived
1053 from <http://www.pvvalue.com>)
- 1054 **Solar Photovoltaic Systems (Solar PV)** - A system designed to supply power utilizing solar
1055 panels to absorb and directly convert sunlight into electricity. (Derived from
1056 <http://www.nrel.gov>)

- 1057 **Solar Thermal Systems (STE)** - A technology for harnessing solar energy for thermal
1058 energy (heat). (Derived from <http://energy.gov>)
- 1059 **Sustainability** - Sustainability is based on a simple principle: Everything needed for survival
1060 and well-being depends, either directly or indirectly, on the natural environment.
1061 Sustainability creates and maintains the conditions under which humans and nature can exist
1062 in productive harmony, that permit fulfilling the social, economic and other requirements of
1063 present and future generations. (Derived from <http://www.epa.gov>)
- 1064 **Sustainable Building** - A structure that is environmentally responsible and resource efficient
1065 throughout a building's life cycle: from siting to design, construction, operation,
1066 maintenance, renovation, and demolition. Also known as "high performance" or "green
1067 building." (Derived from <http://www.gsa.gov>; <http://www.epa.gov>; <http://www.wbdg.org>)
- 1068 **Triple Bottom Line** - An accounting framework with three parts: social, environmental (or
1069 ecological), and financial. These three divisions are also called the three Ps: People, Planet
1070 and Profit, or the "three pillars of sustainability". (Derived from
1071 <http://www.ibrc.indiana.edu>; <http://www.investopedia.com>)
- 1072 **U.S. General Services Administration (GSA)** - A U.S. Agency that provides workplaces by
1073 constructing, managing, and preserving government buildings and by leasing and managing
1074 commercial real estate. (Derived from <http://www.gsa.gov>)
- 1075 **WaterSense program** - An EPA program that seeks to protect the future of the nation's
1076 water supply by offering people a simple way to measure the water efficiency of products
1077 and homes. (Derived from <http://www.epa.gov>)

ACRONYMS

1078	ASHRAE - American Society of Heating, Refrigeration and Air Conditioning Engineers
1079	AMC - Appraisal Management Company
1080	BAS - Building Automation System
1081	BMS - Building Management System
1082	BPA - Building Performance Assessment
1083	EEM - Energy Efficiency Mortgages
1084	EUI - Energy Use Intensity
1085	EBOM - Existing Buildings Operation and Maintenance
1086	GHGs - Greenhouse Gas Emissions
1087	GSA - U.S. General Services Administration
1088	HERS - Home Energy Rating System
1089	IEQ/IAQ - Indoor Environmental Quality/Indoor Air Quality
1090	IDP - Integrated Design Process
1091	kBTU - Kilo British Thermal Unit
1092	kWh - Kilowatt Hour
1093	LEED - Leadership in Energy and Environmental Design
1094	LED - Light-Emitting Diode
1095	NGBS – National Green Building Standard
1096	NREL - National Renewable Energy Laboratory
1097	PACE - Property Assessed Clean Energy
1098	RESNET - Residential Energy Services Network
1099	Solar PV - Solar Photovoltaic Systems

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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.

1100

INTERNET RESOURCES

1101

Energy Efficiency Rating Systems, Scores and Certifications

1102

- Appraisal Institute Residential Green and Energy Efficient Addendum (form 820.04): <http://www.appraisalinstitute.org/assets/1/7/Interactive820.04ResidentialGreenandEnergyEfficientAddendum.pdf>

1103

1104

1105

- Appraisal Institute Commercial Green and Energy Efficient Addendum: http://www.appraisalinstitute.org/assets/1/29/AI_821_Green_Commercial_Interactive.pdf

1106

1107

- EPA ENERGY STAR (ENERGY STAR for Homes and EPA Portfolio Manager for Commercial): <http://www.energystar.gov/>

1108

1109

- Energy Information Administration (EIA): <http://www.eia.gov/consumption/commercial/>

1110

- The U.S. Department of Energy's Office of Energy Efficiency and Renewable Energy: <http://www.eere.energy.gov/>

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- 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>

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1115

- The U.S. Department of Energy's Building Performance Database: <http://energy.gov/eere/buildings/building-performance-database>

1116

1117

- Lawrence Berkeley National Laboratory's Energy IQ web-based tool: <http://EnergyIQ.lbl.gov>

1118

1119

- The U.S. Department of Energy's Building Energy Asset Score for commercial buildings: <http://energy.gov/eere/buildings/building-energy-asset-score>

1120

1121

- Standardization Roadmap, Energy Efficiency in the Built Environment, June 2014: <http://www.ansi.org>

1122

1123

- Energy Efficiency Standardization Coordination Collective, American National Standards Institute: http://www.ansi.org/standards_activities/standards_boards_panels/eesc/overview.aspx?menuid=3

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- Sustainable SITES Initiative: <http://www.sustainablesites.org/>

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- 1127 • The Database of State Incentives for Renewables & Efficiency: <http://www.dsireusa.org>
- 1128 • Sandia National Laboratories PV Value Tool: <http://www.pvvalue.com> or
- 1129 www.energy.sandia.gov

1130 **Residential Rating Systems, Scores and Certifications**

- 1131 • NGBS Certification Activity: <http://www.homeinnovation.com/ngbsgreenstats>
- 1132 • National Green Building Standard (NGBS): <http://www.homeinnovation.com/green>
- 1133 • RESNET/Home Energy Rating System (HERS): <http://resnet.us/> and
- 1134 <http://www.energy.ca.gov/HERS/>
- 1135 • Home Energy Score: <http://www1.eere.energy.gov/buildings/residential/hesindex.html>
- 1136 • Build it Green (GreenPoint Rated): <http://www.greenpointrated.com>
- 1137 • Fannie Mae Green Initiative (especially Green Initiatives Resources):
- 1138 <https://www.fanniemae.com/multifamily/green-initiative>
- 1139 • American Society of Heating, Refrigeration & Air Conditioning Engineers (ASHRAE):
- 1140 www.ashrae.org/greenstandard
- 1141 • Living Building Challenge and International Living Future Institute (ILFI): [http://living-](http://living-future.org/lbc)
- 1142 [future.org/lbc](http://living-future.org/lbc)
- 1143 • National Association of Realtors Green Multiple Listing Service Implementation Guide, v
- 1144 1.0, May 2014: <http://www.greenthemls.org>
- 1145 • ENERGY STAR: <http://www.energystar.gov>

1146 **Commercial Rating Systems, Scores and Certifications**

- 1147 • The U.S. Department of Energy’s Building Energy Asset Score for commercial buildings:
- 1148 <http://energy.gov/eere/buildings/building-energy-asset-score>
- 1149 • U.S. Green Building Council (LEED): <http://usgbc.org> (especially Resources), also
- 1150 <http://gbig.org>
- 1151 • Green Building Initiative (Green Globes): <http://www.thegbi.org> (In the United States)
- 1152 • New Buildings Institute: <http://newbuildings.org/>
- 1153 • Passive House Institute US:
- 1154 <http://www.passivehouse.us/passiveHouse/PassiveHouseInfo.html>
- 1155 • Passivhaus Institut: <http://passiv.de/en/>
- 1156 • LEED: <http://www.usgbc.org>
- 1157 • Green Globes: <http://www.greenglobes.com> (Green Globes in Canada)
- 1158 APB Valuation Advisory #6 - *Valuation of Green and High Performance Property: Background and Core Competency*

1159 **Building Codes**

- 1160 • International Green Construction Code (IgCC):
1161 <http://www.iccsafe.org/cs/igcc/pages/default.aspx>
- 1162 • ASHRAE Green Standard 189.1 (Standard for the Design of High-Performance, Green
1163 Buildings): <https://www.ashrae.org/resources--publications/bookstore/standard-189-1>

1164 **PUBLICATIONS**

1165 Below are suggested sources; individual articles may be found on the subject from these various
1166 publications:

- 1167 • Colorado Energy Office, An Early Look at Energy Efficiency and Contributory Value,
1168 February 2015 www.colorado.gov
- 1169 • An Introduction to Green Homes, Appraisal Institute, 2010
- 1170 • Residential Green Valuation Tools, Appraisal Institute, 2014
- 1171 • Colorado Energy Office, The Impact of Photovoltaic Systems on Market Value and
1172 Marketability, May 2013 www.colorado.gov
- 1173 • Green Builder magazine (residential) <http://www.greenbuildermedia.com/magazine>
- 1174 • Journal of Sustainable Real Estate (JOSRE) www.josre.org
- 1175 • Journal of Green Building <http://www.collegepublishing.us/journal.htm>
- 1176 • Hoen, B., R. Wiser, P. Cappers and Mark Thayer, An Analysis of the Effects of Residential
1177 Photovoltaic Energy Systems on Home Sales Prices in California, Lawrence Berkeley
1178 National Laboratory Environmental Energy Technologies Division, April 2011
1179 <http://emp.lbl.gov/sites/all/files/lbnl-4476e.pdf>
- 1180 • Muldavin, Scott, Value Beyond Cost Savings, Green Building Finance Consortium:
1181 <http://www.greenbuildingfc.com/>
- 1182 • Pivo, G. and J. Fisher. Investment Returns from Responsible Property Investments: Energy
1183 Efficient, Transit-oriented and Urban Regeneration Office Properties in the U.S. from 1998–
1184 2008. Working Paper, Responsible Property Investing Center, Boston College, University of
1185 Arizona Benecki Center for Real Estate Studies, Indiana University, October 11, 2008,
1186 revised March 3, 2009 <http://kelley.iu.edu/bcres/files/research/PivoFisher10-10-08.pdf>
- 1187 • Runde, Timothy and Thoyre, Stacey, Integrating Sustainability and Green Building into the
1188 Appraisal Process, Journal of Sustainable Real Estate (JOSRE) Vol 2, No. 1, 2010.
1189 [http://www.josre.org/wp-content/uploads/2012/09/Sustainability_and_Green_Building_Into](http://www.josre.org/wp-content/uploads/2012/09/Sustainability_and_Green_Building_Into_Appraisal_Process-JOSRE_v2-11.pdf)
1190 [Appraisal Process-JOSRE v2-11.pdf](http://www.josre.org/wp-content/uploads/2012/09/Sustainability_and_Green_Building_Into_Appraisal_Process-JOSRE_v2-11.pdf)
- 1191 • Chappell, Theddi Wright and Corps, Chris. High Performance Green Building: What's it
1192 Worth? Cascadia Region Green Building Council, May 2009.
1193 http://living-future.org/sites/default/files/HighPerfGB_ValuationStudy.pdf

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1194

EDUCATIONAL RESOURCES

- 1195 • Appraisal Institute Courses: <http://www.appraisalinstitute.org/education/green/>
- 1196 ○ Introduction to Green Buildings: Principles & Concepts
- 1197 ○ Case Studies in Appraising Green Residential Buildings
- 1198 ○ Case Studies in Appraising Green Commercial Buildings
- 1199 ○ Residential and Commercial Valuation of Solar
- 1200 • Appraisal Institute's Valuation of Sustainable Buildings Professional Development Program:
1201 <http://www.appraisalinstitute.org/education/green/downloads/green-faqs.pdf>
- 1202 • Earth Advantage Courses: <http://www.earthadvantage.org/education/>
- 1203 ○ Appraising Green Homes: Construction Methods & Trends
- 1204 ○ Appraising Green Homes: Valuation Techniques
- 1205 ○ Appraising Green Homes: Advanced Application
- 1206 • Earth Advantage's Accredited Green Appraiser (AGA) program:
- 1207 ○ <http://www.earthadvantage.org/education/accredited-green-appraiser-aga>
- 1208 • SEEC, LLC Courses: <http://www.seecsolutions.com>
- 1209 ○ Appraising Energy Efficiency in New Homes and Retrofits (Webinar)
- 1210 ○ Green Home Trends and Appraisal Methodologies (Live Class)
- 1211 ○ Green Building – The Marketing Advantage (Live Class)
- 1212 ○ Energy Performance Scores – Valuing Energy Improvements (Live Class)
- 1213 ○ Navigating Green Fields Within the MLS Form (Live Class)
- 1214 ○ Getting the Most Out of a Green Appraisal (Live Class)
- 1215 ○ Indoor Air Quality for Real Estate Professionals (Live Class)
- 1216 ○ Green Building – An Emerging Sector in Residential Appraisal (Live Class)
- 1217 ○ Comparing High Performance Heating Choices for Home Upgrades (Live Class)
- 1218 ○ Water Conservation for Real Estate Professionals (1 and 2) (Live Class)
- 1219 ○ Introduction to Residential Green Building – Background and Competency (Live Class)

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